

Proposal for the Development of Pedestrian Facilities in Gujranwala City



TRANSPORT PLANNING UNIT

TRANSPORT DEPARTMENT
THE GOVERNMENT OF PUNJAB

DISCLAIMER

This report is meant to serve as a guidance note for the CDG/TMA offices, Gujranwala to prepare reference designs and drawings and cost estimates. However, while preparing PC-1, approval and tendering etc, all legally prevalent procedures should be followed and all approvals/sanctions sought as per law.

Table of Contents

ABBREVIATIONS	vii
1. Introduction	1
2. Aim and Objective of the Study	2
3. Methodology.....	2
4. Gujranwala –Phelwana da shehar	4
5. Assessment of Prevailing Pedestrian Infrastructure	12
5.1 Road Network	12
6. Focus Group Discussion.....	22
6.1 Constraints, Opportunities and Experiences	22
6.2 Availability and Preference for Walking as mode of Transport	23
6.3 Pedestrian Infrastructure and Black Spots	24
7. Pedestrian Count Survey	25
7.1 Denga Phatak Intersection.....	30
7.2 Sheranwala Bagh.....	32
7.3 Sialkoti Darwaza	35
7.4 Alam Chowk	37
7.5 Gondalawala Chowk	40
7.6 Maafiwala Chowk	43
7.7 Munir Chowk	45
7.8 Pindi Bypass.....	47
7.9 Shiekhupura Moor.....	49
8. Vehicular Traffic Count Survey	51
9. Pedestrian Infrastructure Type and Provision Requirements	53
9.1 Infrastructure Parallel to Carriage way	53
9.2 Types of Pavement Markings used for Pedestrians	61
9.3 Pedestrian Signal Heads	62
10. Recommendations	65
Appendix.....	73
Annex A: Pedestrian Counts Performa.....	74
Annex B: Traffic Counts Performa.....	75
Annex C: Pavement Markings and Signage	76

List of Figures

Figure 1: Methodology Adopted for the Study.....	3
Figure 2 : Location Map of Gujranwala	4
Figure 3: Transit Locations within/ around the city (Google Amended).....	6
Figure 4: Location of High Pedestrian Movement (Google Amended)	8
Figure 5: Identified High Pedestrian Movement Area (Google Amended).....	9
Figure 6: Daily Traffic Volume at Identified Pedestrian Movement Location (Google Amended).....	10
Figure 7: Peak Hour Traffic Volume at Identified Pedestrian Movement Locations (Google Amended).....	11
Figure 8: Road Classification Map of Gujranwala	15
Figure 9: High Vehicular Volume with non-availability of Pedestrian Crossing.....	17
Figure 10: No Walkways Available to Pedestrian	17
Figure 11: Pedestrian crossing at Gujranwala Phattak	18
Figure 12: Figure: Non-Availability of Pedestrian Infrastructure	18
Figure 13: Illegal Parking on Pedestrian Right of Way	19
Figure 14: Daily Pedestrian Volume Percentage	26
Figure 15: Daily Pedestrian Volume at Nine Locations	27
Figure 16: Peak Hour Pedestrian Volume Percentage at Nine Locations	28
Figure 17: Peak Hour Pedestrian Volume at Nine Locations	29
Figure 18: Location of Danga Phattak Intersection (Google Amended).....	30
Figure 19: Daily Pedestrian Volume at Denga Phattak	31
Figure 20: Location of Sherawala Bagh (Google Amended)	32
Figure 21: Daily Pedestrian Volume at Sheranwla Bagh	33
Figure 22: Pedestrian Facilities at Sheranwla Bagh	34
Figure 23: Pedestrian Facilities at Sheranwala Bagh.....	34
Figure 24: Pedestrian Facilities at Sheranwala Bagh.....	35
Figure 25: Location of Sialkoti Darwaza.....	36
Figure 26: Dily Pedestrian Volume at Sialkoti Darwaza.....	37
Figure 27: Location of Alam Chowk	38
Figure 28: Peak Hour Pedestrian Volume at Alam Chowk	38
Figure 29: Pedestrian Facilities at Alam Chowk	39
Figure 30: Pedestrian Facilities at Alam Chowk	40
Figure 31: Location of Gondalawala Chowk.....	41
Figure 32: Daily Pedestrian Volume at Gondalawala Chowk.....	41
Figure 33: Pedestrian Facilities at Gondalawala Chowk	42
Figure 34: Pedestrian Facilities at Gondalawala Chowk	42
Figure 35: Location of Maafiwala Chowk.....	43
Figure 36: Peak Hour Pedestrian Volume at Maafiwala Chowk.....	44
Figure 37: Pedestrian Facilities at Maafiwlala Chowk	44
Figure 38: Pedestrian Facilities at Maafiwala Chowk	45

Figure 39: Location of Munir Chowk.....	46
Figure 40: Daily Pedestrian Volume at Munir Chowk	46
Figure 41: Location of Pindi Bypass Chowk.....	47
Figure 42: Peak Hour Pedestrian Volume at Pindi Bypass.....	48
Figure 43: Peak Hour Pedestrian Volume at Pindi Bypass.....	49
Figure 44: Location of Sheikhpura Morr	50
Figure 45: Daily Volume at Sheikhpura Morr	50
Figure 46: Peak Hour Traffic vs Pedestrian Volume at Nine Locations	52
Figure 47: Walkways, Sidewalks and Shoulder Design	54
Figure 48: Recommended Sidewalk Design.....	54
Figure 49: Planting Buffer between Sidewalk and Street.....	57
Figure 50: Typical Zebra Crossing	58
Figure 51: Marking on Roads for Pedestrian.....	59
Figure 52: Typical Pelican Crossing.....	60
Figure 53: Typical Puffin Crossing.....	60
Figure 54: Typical Toucan Crossing.....	61
Figure 55: Pedestrian Signal Head Indications.....	64

List of Tables

Table 1: Total Traffic Volume and Passenger at the intersections around the city	5
Table 2: Intersections Inventory Survey Results	19
Table 3: Road Inventory Survey Results	20
Table 4: Road Inventory Survey Results	21
Table 5: Daily Volume of Pedestrian.....	26
Table 6: Peak Hour Volume of Pedestrian	28
Table 7: Summary of Pedestrian Count Survey at Denga Phattak	31
Table 8: Summary of Pedestrian Count Survey at Sheranwala Bagh.....	33
Table 9: Summary of Pedestrian Count Survey at Sialkoti Darwaza	36
Table 10: Summary of Pedestrian Count Survey at Alam Chowk	37
Table 11: Summary of Pedestrian Count Survey at Gondalawala Chowk	40
Table 12: Summary of Pedestrian Count Survey at Maafiwala Chowk	43
Table 13: Summary of Pedestrian Count Survey at Munir Chowk	45
Table 14: Summary of Pedestrian Count Survey at Pindi Bypass Chowk	48
Table 15: Summary of Pedestrian Count Survey at Sheikhupura Morr	49
Table 16: Daily Traffic Volume at Nine Locations	51
Table 17: Peak Hour Traffic Volume	51
Table 18: Recommended Sidewalk Widths for Different Street Types	55
Table 19: Pedestrian Infrastructure at Nine Locations	65
Table 20: Pedestrian Infrastructure as per Road Classification	66

ABBREVIATIONS

CBD	Central Business Districts
CDG	City District Government
ROW	Right of Way
GoPb	Government of the Punjab
Km	Kilometer
LG	Local Government
USP & MU	Urban Sector Policy and Management Unit
UU	Urban Unit
P & D	Planning and Development
TMA	Tehsil Municipal Administration

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1. Introduction

Walking being the prime form of movement and considered as most sustainable and environment friendly mode serves as first mean of transport in any journey whether made by car or by private/ public transport. It is because access to means of transport itself requires movement and unless disabled people walk to their modes of movement. In reality, cities are constituted by Pedestrians and their movement patterns affect its development. However, several parameters pertaining to pedestrian movement and circulation needs to be addressed before hand while developing/ planning a sustainable green city. Importantly; these parameters to be considered at planning stage are relative to various social group needs and the area in which they dwell. Inadequate planning not conforming with the needs of social groups prevailing in the cities results in car dependent societies thus resulting in externalities such as congestion, parking issues etc. In developing countries, impromptu growth, lack of planning institutions and enforcements had further worsened the situation and problems specifically related to pedestrians have become chronic. It is because due consideration is not given to pedestrian movement during planning and construction phase of civic infrastructure. For instance, Central Business Districts (CBD) areas having higher concentration of activities require extensive movement by foot because; firstly, land in these areas is costly and is usually used for revenue generation instead of service provision. Secondly, CBD areas are usually composed of old quarters closely knitted. Walking can serve as an excellent mean of transport in these closely knitted areas, where parking of private modes often become a serious issue but it is not so especially in the cities of developing countries such as Pakistan.

Evidently, the major cities of Punjab are either developed along a primary transport link i.e. canal, railway line or highway. Over the time, these cities have swollen and lack of planning strategies/ guidelines or non-conformity to byelaws have resulted mostly in mono-centric pattern of development where old quarters along the primary link have been transformed into CBD area. In addition, these CBD areas are dominated by financial and commercial activities resulting in lesser space for other civic amenities. The story is same for major cities of Punjab province where pedestrians are given least priority in terms of planning and all efforts are made to provide more space for vehicular traffic.

Promisingly, the situation is changing and due importance is now given to pedestrians. It is because geometric designs of roadways prepared by local government entities include design

of pathways. Nonetheless, it is imperative to review pedestrian mobility in old built up areas which already serves as CBDs of the cities and where infrastructure is already developed.

This study was conducted on the request of City District Government (CDG), Gujranwala. The CDG Gujranwala aims to provide, sustainable integrated and safe transport services to all in their areas and to achieve its desired aim, a request was made to the Urban Unit, Planning and Development Department, GoPb. The Urban Unit requested Transport Planning Unit (TPU), a unit developed solely for the purpose of strategic planning within Transport Department to conduct the underlying study through assistance and supervision of its Transport Research Assistants.

2. Aim and Objective of the Study

The underlying study aims to review the existing facilities in the city and propose new pedestrian infrastructure ensuring safe mobility and accessibility to activity locations for the inhabitants.

Following constitute the objectives of the study:

- To review and analyze the available pedestrian facilities within the city
- To identify Pedestrian mobility and accessibility hazardous locations in the city where modal conflicts results in accidents
- To identify hot spots in the city where pedestrian facilities are of utmost important and necessity
- To propose and develop efficient pedestrian infrastructure for the people in the city

3. Methodology

Methodology for this study involves composite approach encompassing descriptive, quantitative and quantitative analysis approach. The combination of both subjective and objective techniques helped to examine the prevailing conditions and to propose necessary infrastructure required to meet pedestrian needs. Assessment of existing situation was done by field visits, consultation meetings, and descriptive examination of available literature if any. Assessment helped to define the physical description of the prevailing infrastructure. In the second phase methods or tool of analysis was applied i.e. both quantitative and qualitative techniques to collect primary information regarding pedestrian needs and requirements.

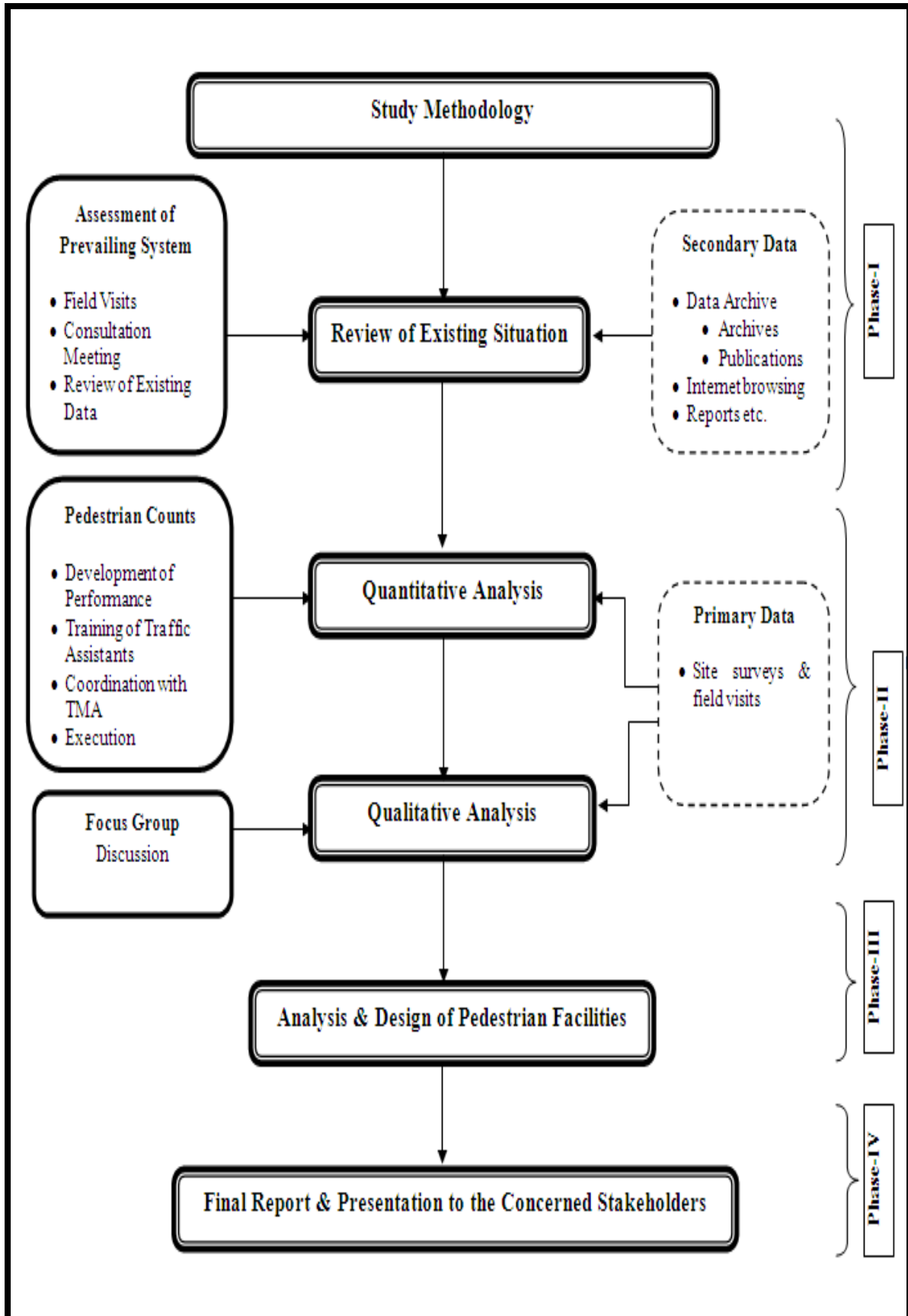


Figure 1: Methodology Adopted for the Study

Pedestrian count surveys formulated the quantitative part; whereas focus group constituted the qualitative part of the methodology. In the subsequent phase, both secondary and primary data collected was analyzed and proposal was made for the development of infrastructure facilities. In the last phase, the whole process was documented. Figure 1 below highlights the adopted methodology for the underlying study.

4. Gujranwala –Phelwana da shehar

Gujranwala commonly known as the city of wrestlers or Phelwana da shehar is in fact the industrial hub of the Punjab province and is the seventh largest city of the province. The other major commercial expertise of the city is export of Rice. The total population of approximately 2,661,360 of the city is dispersed within the residential quarters located along/ adjacent to the Grand Trunk (G.T) Road formally known as National Highway (N5). As stated earlier, the city due to its development on the primary corridor (N5 and National Railway Line) has flourished within the manufacturing and agricultural sector. Within agriculture sector, the city is known for production grains primarily rice which is exported globally. In addition, the city has a well developed structure of commercial and industrial entities which produces ceramics, steel, cutlery, crockery, iron safes, metal tool, utensils, textiles, sanitary and tannery goods. Figure 2 depicts the strategic importance of city due to its location.



Figure 2 : Location Map of Gujranwala

Evidently, the city serves as the industrial heart of the province and provides jobs to people in both industrial/ manufacturing and agriculture sector. In addition to people residing within the city, it also provides employment opportunities for the people living in neighboring towns and villages who commute to various manufacturing units on daily basis. Likewise, the city serves as commercial centre for the people of neighboring towns / villages who commute to the CBD area for retail shopping purposes through transit intersections highlighted in Figure 3 below. In addition, due to development of the city along the National Highway N5, most of city CBD area is located along the road. Evidently, pedestrian movement along N5 road is comparatively higher than that in other parts of the city. In addition, facilities and services such as schools, offices, hospitals, bus stands etc. are also located along this road. Presence of these services results in generation of significant passengers trips mostly along / on GT Road as indicated in Table 1.

Table 1: Total Traffic Volume and Passenger at the intersections around the city

Sr. No.	Name of Intersection	Total Traffic Volume (PCUs)	Total Passengers
1.	Chan Da Qila Chowk	81544	407720
2.	Judicial Colony Chowk	29700	148500
3.	Wapda Town Chowk	88690	443450
4.	Khiali Bypass Chowk	27222	136110
5.	Jinnah Rodhian Chowk	35707	178535
6.	Malhi / Nowshera Sansi Chowk	92624	463120
7.	Nowshera Road / Awan Chowk	751	3755
8.	Alam Chowk	58932	294660
9.	Nawab Chowk	90565	452825
10.	Alipur Chowk	49851	249255
11.	Pindi Bypass Chowk	179081	895405
12.	Sui Gas Chowk	68609	343045
13.	Maifiwala Chowk	51270	256350
14.	Sialkot Bypass Chowk	51067	255335
15.	Chicharwali Pull Chowk	47626	238130
16.	Ferozwala Chowk	60478	302390
17.	Kanganiwala Bypass Chowk	65972	329860

(Source: Traffic Management Study for Gujranwala City, TPU)



Figure 3: Transit Locations within/ around the city (Google Amended)

Contrary, there is scarcity of pedestrian infrastructure in the city and along N5. Though pathways have been constructed along few stretches of the roads in the city but they are not inter-connected. Also, there does not exist adequate signs and pavement markings to direct/guide pedestrians at intersections.

Road Inventory survey and Focus Group Discussion was conducted to identify the potential pedestrian areas and to assess the available pedestrian facilities/ infrastructure in the city. It was found that a high number of pedestrian movements were observed near and at Denga Phatak, Sheranwala Bagh, Sialkoti Darwaza, Alam Chowk, Gondla Wala Phatak, Maafiwala Chowk, Munir Chowk, Pindi Bypass and Shaikhupura Moor. These locations shown in Figure 4 and 5 below constitute high pedestrian movement areas in the city. Likewise Daily and Peak Hour Traffic Counts highlighted in Figure 6 and 7 were made to examine the vehicular movement and patterns at these identified locations. Importantly, almost all identified locations through road inventory survey and Focus group discussion where pedestrian movement was observed had high volume of vehicular traffic.

It was found that these locations have major commercial and retail centers thus resulting in high pedestrian and vehicular traffic making these locations a hot spot / hazardous site within the city transport network. People living in different quarters of the city, and from the surrounding villages/ towns commute to these centers to access their desired activities.

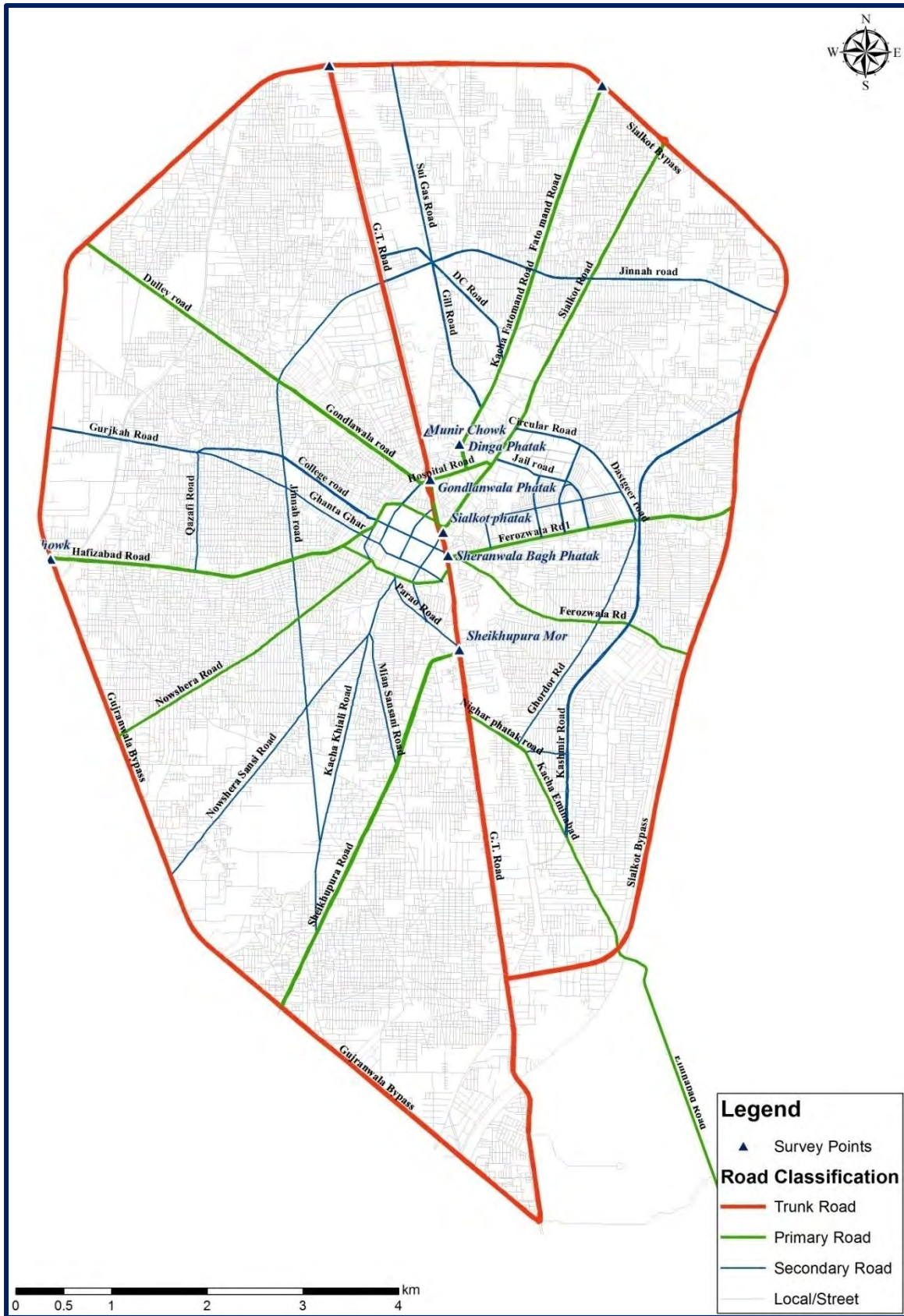


Figure 4: Location of High Pedestrian Movement (Google Amended)



Figure 5: Identified High Pedestrian Movement Area (Google Amended)



Figure 6: Daily Traffic Volume at Identified Pedestrian Movement Location (Google Amended)



Figure 7: Peak Hour Traffic Volume at Identified Pedestrian Movement Locations (Google Amended)

5. Assessment of Prevailing Pedestrian Infrastructure

Pedestrian pathways and are integral part of the road geometry. Review of urban transport infrastructure aided in examination of geometric design of roads; thus facilitating classification of prevailing transport infrastructure into links and nodes. It was important because field visits highlighted that presently very scarce pedestrian infrastructure exists in the city.

5.1 Road Network

The city of Gujranwala being the third largest industrial center of Punjab is well linked to other cities of the province through primary roads like Grand Trunk Road, Sheikhpura Road, Sialkot Road, Hafizabad Road and Pasroor Road. Amongst provincial inter-city roads, G.T Road has the heaviest traffic flows. The traffic flow on primary roads is made up of 87% of motorized modes and 13% of non-motorized modes.

The road network prevailing in the city follows Hub and Spoke pattern. The existing road network of Gujranwala city comprises of inner radial road in addition to outer ring road around the city for inter / intra city traffic. The inner ring road i.e., circular road provides mobility for Central Business District area in circular pattern. Central ring road i.e. Jinnah Road, serves the intra city traffic requirement. This central ring road is incomplete due to a missing link from Nowshera Road to N5 Road on Western side of the city. The outer ring road i.e., Bye Pass Road, at the periphery of the city accommodates both intra-city and intercity traffic.

During the last 30 years, the population of the city has increased from 0.30 million to 1.5 Million but there has been marginal increase in the length of urban roads. In order to assess the existing transport infrastructure available to the people, a robust road inventory survey was carried out. It helped to examine the available Right of Way (ROW), Encroachments if any, and pedestrian infrastructure available if any. Based upon the survey results, Road network in Gujranwala city can be divided into following four categories as highlighted in Figure 8;

- Trunk Roads
- Primary Roads
- Secondary Roads
- Local/ Street Roads

Trunks Roads

Gujranwala city is looped by Trunk Roads, providing a strategic network of major routes linking centers of national/ provincial importance. Name of existing trunk roads are:

- Grand Trunk Road
- Gujranwala Road
- Sialkot Bypass

Primary Roads

Primary roads are directly connected with trunk roads and also provide linkages to commercial and institutional areas. Following are the intercity roads: -

- | | |
|-----------------------|-----------------------|
| • Alama Iqbal Road | • Dulley Road |
| • Eminabad Road | • Paka Fatomand Road |
| • Ferozwala Road | • Gondlawala road |
| • Hafizabad Road | • Hospital Road |
| • Kacha Eminabad Road | • Kacha Fatomand Road |
| • Nighar phatak road | • Nowshera Road |
| • Sheikhupura Road | • Sialkot Road |

Secondary Roads

These are the roads which fall under the jurisdiction of City District Government Gujranwala for development works. Secondary roads are also connected with primary roads and deal with main streamline of residential areas. The main secondary roads are;

- | | |
|----------------------|-----------------------|
| • Aroop Road | • Jamia Masjid Rd |
| • Bazar Khardan | • Jinnah road |
| • Circula Road | • Kacha Khiali Road1 |
| • Civil Hospital DHQ | • Kashmir Rd |
| • College Road | • Main Market road |
| • Dastgeer Road | • Mian Sansi Road |
| • DC Road | • Nowshera Sansi Road |
| • Ghanta Ghar | • Parao Road |

- Ghordor Road
- Gill Road
- Gurjkah Road
- Jail road
- Qazafi Road
- Rex Cinema Road
- Sui Gas Road
- Tipu Road

Locals/ Street Roads

Spread over the entire city, these roads provide accessibility from neighborhoods to the secondary roads and access for people to their residences / work places etc. These roads fall under the jurisdiction of Town Municipal Administrations.

- Academy Road
- Ahmad Nagar Road
- Airbase Road
- Alipur Chatha Road
- Approach Road
- Atta Muhammad Road
- Awami Road
- Bajwa Road
- Bazar Road
- Canal Bank Road
- Cantt Road
- Cemetery Road
- Chenab Gate Road
- CMH Road
- Denga Phatak Road
- Exchange Road
- Dc Colony To Cantt
- Garden Town Road
- Garjakh Road
- General Bus Stand Road
- Ghakka Mitter Road
- Ghalib Chowk Road
- Ghosia Flyover
- Gondlanwala Road
- GT Rd-Skp Road link
- Gujranwala Cantt Road
- Haidri Rd
- Kachehri Road
- Khajoor Wali Road
- Lamba Wali Road
- Lohian Wala Bypass
- Madni Road
- Mandiala Road
- Markaz-e-Sanat Road
- Model Town Road
- Model Town Square Road
- Munir Road
- Muslim Road
- N5 G.T Rd to Isb
- Nomania Road
- Octroi Post Road
- Pasrur Road
- Prince Road
- Rahwali Gate Road N
- Rahwali Gate Road S
- Railway Road
- Rustam Road
- Sadiq Road
- Session Court Road
- Shelton Road
- Stadium Road
- Station Road
- Sugar Mill Road
- Suvay Wala Road
- Tower Road
- Wadala Road
- Zia ul Haq Road

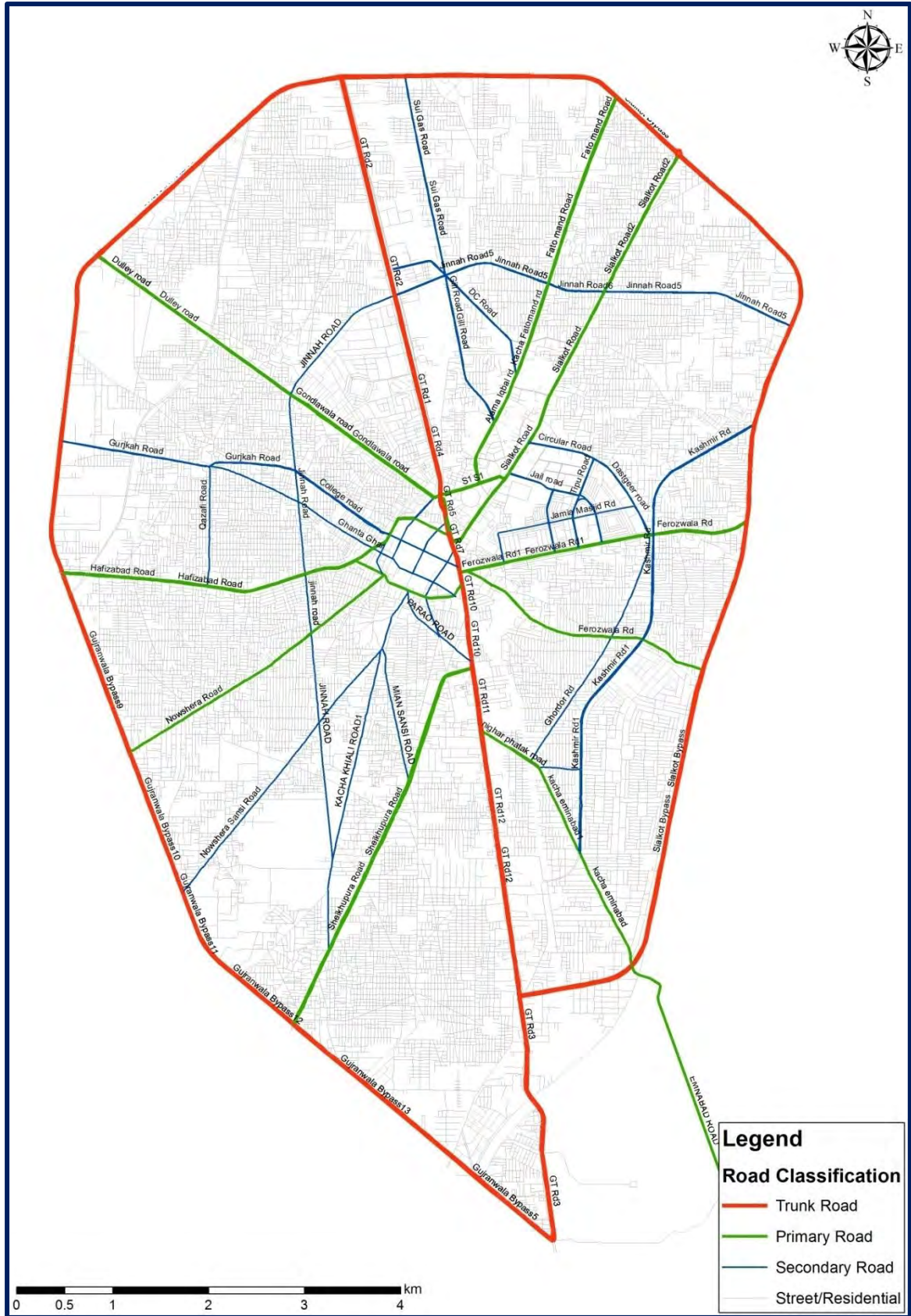


Figure 8: Road Classification Map of Gujranwala

All intersections where pedestrian movement was observed high during preliminary survey are un-signalized except one i.e. Pindi By-pass Intersection. There exist no pavements markings for Zebra crossing, also. Major intersections in the city do not have pedestrian signals; making mobility by foot hard for the commuters. Furthermore, islands provided within intersection for facilitation of pedestrian are also not available.

Likewise, most of the roads are encroached. Illegal parking and hawkers were the two most dominant factors observed that cause barriers in pedestrian mobility. It is because the pedestrian pathway areas are encroached by them. Occupation of ROW by these illegal parked vehicles and hawkers force commuters to walk on main carriageway; thus, making them vulnerable to accidents.

The mobility barriers experienced by the pedestrians are further aggregated due to lack of signage pertaining to pedestrian movement guidance and facilitation. Key findings below highlighted in Figure 9, 10, 11, 12 and 13 clearly depicts the deficiencies in the existing pedestrian network in the city and need of sustainable pedestrian network in the city.

- The available right of way where walkway should be available to commuters are either encroached or used for parking purposes.
- At various places, shop keepers have illegally extended their retail areas by occupying pedestrian pathway space.
- Frequent pedestrians and vehicle conflicts / collisions occur due to pedestrian usage of road width. Especially, during lunch time when school children leave for their home.
- Lack of proper signage results in inconvenience for the pedestrian; thus creating more chaos and making pedestrian more vulnerable.
- There exist no pedestrian signals at intersections resulting in problems and confusion for pedestrians when to cross road.
- There exist no underpasses or overhead bridges for pedestrian to cross primary corridor N5 from onside of the CBD to other side.

The Road and Intersection Inventory survey results highlighted below in Table 2, 3 and 4 clearly depicts that that exist no pedestrian facilities in the city.



Figure 9: High Vehicular Volume with non-availability of Pedestrian Crossing



Figure 10: No Walkways Available to Pedestrian



Figure 11: Pedestrian crossing at Gujranwala Phattak



Figure 12: Figure: Non-Availability of Pedestrian Infrastructure



Figure 13: Illegal Parking on Pedestrian Right of Way

Table 2: Intersections Inventory Survey Results

No.	Intersection Name	Type	Zebra Crossing	Pedestrian Signal	Island for Pedestrian Movement	Pedestrian Signage
1	Denga Phatak	Uncontrolled	No	No	No	No
2	Sheranwala Bagh	Uncontrolled	No	No	No	No
3	Sialkoti Darwaza	Uncontrolled	No	No	No	No
4	Alam Chowk	Uncontrolled	No	No	No	No
5	Gondalawala Phatak	Uncontrolled	No	No	No	No
6	Mafiwala Chowk	Uncontrolled	No	No	No	No
7	Munir Chowk	Uncontrolled	No	No	No	No
8	Pindi Bypass	Signalized	Yes	No	Yes	No
9	Shaikhupura Morr	Uncontrolled	No	No	No	No

Table 3: Road Inventory Survey Results

Sr. No.	Road Name	Width (ft)	Encroachment			Sidewalk	Zebra Crossing	Pedestrian Signage
			Yes/No	TYPE	%age of Length			
1	Alama Iqbal Road	34	Yes	Illegal Parking	10%	Yes	No	No
2	Eminabad Road	50	No	Nil	Nil	Yes	No	No
3	Ferozwala Road	38	Yes	Illegal Parking/Shops	100%	No	No	No
4	Hafizabad Road	34	Yes	Shops	100%	Yes	No	No
5	Kacha Eminabad	60	Yes	Illegal Parking/Shops	100%	Yes	No	No
6	Nighar phatak Road	30	No	Nil	Nil	No	No	No
7	Sheikhupura Road	44	Yes	Shops	20%	No	No	No
8	Dulley Road	40	Yes	Hawkers/Shops	70%	Yes	No	No
9	Fato mand Road	18	Yes	Hawkers/Shops/Illegal Parking	50%	No	No	No
10	Gondlawala road	62	Yes	Parking/Shops	50%	Yes	No	No
11	Hospital Road	64	Yes	Shops/Illegal Parking	60%	Yes	No	No
12	Kacha Fatomand Road	18	No	Nil	Nil	No	No	No
13	Nowshera Road	42	Yes	Shops	80%	Yes	No	No
14	Sialkot Road	68	Yes	Shops/Hawkers	60%	Yes	No	No
15	Aroop Road	24	No	Nil	Nil	No	No	No
16	Bazar KhaRoadan	38	Yes	WorkShops/Shops/Hawkers	100%	Yes	No	No
17	Circular Road	28	Yes	Shops	100%	No	No	No
18	Civil Hospital DHQ	42	Yes	Illegal Parking	20%	No	No	No
19	College Road	52	Yes	Shops	100%	Yes	No	No
20	Dastgeer Road	24	Yes	Illegal Parking	50%	No	No	No
21	DC Road	32	Yes	Illegal Parking/Shops	20%	No	No	No
22	Ghanta Ghar	24	Yes	Illegal Parking/Shops	100%	Yes	No	No
23	GhoRador Road	32	Yes	Illegal Parking/Hawkers	50%/100%	Yes	No	No
24	Gill Road	22	Yes	Illegal Parking/Shops	30%	No	No	No
25	Gurjka Road	32	Yes	Shops	30%	Yes	No	No
26	Jail road	32	Yes	Jail	50%	No	No	No
27	Jamia Masjid Road	16	No	Nil	Nil	No	No	No
28	Jinnah Road	40	Yes	Illegal Parking	50%	No	No	No
29	Kacha Khiali Road I	16	No	Nil	Nil	No	No	No
30	Kashmir Road	44	Yes	Illegal Parking	5%	No	No	No
31	Main market road	68	Yes	Illegal Parking/Shops	50%	Yes	No	No
32	Mian Sansi Road	32	No	Nil	Nil	Yes	No	No
33	Nowshera Sansi Road	16	Yes	Shops	60%	No	No	No
34	Parao Road	48	Yes	Illegal Parking/Shops	50%	Yes	No	No
35	Qazafi Road	16	Yes	Shops	50%	No	No	No
36	Rex Cinema Road	14	Yes	Illegal Parking	50%	No	No	No
37	Sui Gas Road	12	No	Nil	Nil	No	No	No
38	Tipu Road	18	No	Nil	Nil	No	No	No
39	Academy Road	20	No	Nil	Nil	No	No	No
40	Ahmad Nagar Road	20	No	Nil	Nil	No	No	No
41	Airbase Road	16	No	Nil	Nil	No	No	No
42	Alipur Chatha Road	22	No	Nil	Nil	No	No	No
43	Approach Road	18	Yes	Illegal Parking/Shops	100%	No	No	No
44	Atta Muhammad Road	16	Yes	Shops	50%	No	No	No
45	Awami Road	16	No	Nil	Nil	No	No	No
46	Bajwa Road	16	No	Nil	Nil	No	No	No
47	Bazar Road	24	Yes	Illegal Parking	100%	Yes	No	No
48	Canal Bank Road	16	No	Nil	Nil	No	No	No
49	Cantt Road	24	No	Nil	Nil	No	No	No
50	Cemetery Road	16	No	Nil	Nil	No	No	No
51	Chenab Gate Road	50	No	Nil	Nil	No	No	No
52	CMH Road	16	No	Nil	Nil	No	No	No
53	Dinga Phatak Road	22	Yes	Illegal Parking	100%	Yes	No	No
54	Exchange Road	50	Yes	Shops	40%	No	No	No
55	DC Colony To Cantt Road	55	No	Nil	Nil	Yes	No	No

Table 4: Road Inventory Survey Results

Sr. No.	Road Name	Width (ft)	Enchroachment			Sidewalk	Zebra Crossing	Pedestrian Signage
			Yes/No	TYPE	%age of Length			
56	GaRoaden Town Road	45	No	Nil	Nil	No	No	No
57	Garjakh Road	16	Yes	WorkShops/Others	50%	Yes	No	No
58	General Bus Stand Road	22	Yes	Hawkers	50%	No	No	No
59	Ghakka Mitter Road	16	No	Nil	Nil	No	No	No
60	Ghalib Chowk Road	24	Yes	Hawkers/Illegal Parking/WorkShops	70%	Yes	No	No
61	Ghosia Flyover	24	No	Nil	Nil	No	No	No
62	Gondlanwala Road	60	Yes	WorkShops/Illegal Parking	50%	Yes	No	No
63	GT Road-Skp Road link	40	Yes	WorkShops/Illegal Parking	40%	Yes	No	No
64	Gujranwala Cantt Road	24	Yes	Shops	30%	No	No	No
65	Haidri Road	14	Yes	Hawkers/Illegal Parking	100%	Yes	No	No
66	Kachehri Road	52	Yes	Illegal Parking	50%	No	No	No
67	Khajoor Wali Road	16	No	Nil	Nil	No	No	No
68	Lamba Wali Road	16	No	Nil	Nil	No	No	No
69	Lohian Wala Bypass	60	Yes	WorkShops/Illegal Parking	60%	Yes	No	No
70	Madni Road	20	No	Nil	Nil	No	No	No
71	Mandiala Road	30	No	Nil	Nil	No	No	No
72	Markaz-e-Sanat Road	16	No	Nil	Nil	No	No	No
73	Model Town Road	65	Yes	Illegal Parking	50%	Yes	No	No
74	Model Town Square Road	65	No	Nil	Nil	Yes	No	No
75	Munir Road	26	Yes	Illegal Parking	50%	No	No	No
76	Muslim Road	20	No	Nil	Nil	No	No	No
77	N5 G.T Road to Isb	60	Yes	Illegal Parking	100%	No	No	No
78	Nomania Road	16	No	Nil	Nil	No	No	No
79	Octroi Post Road	22	No	Nil	Nil	No	No	No
80	Pasrur Road	34	No	Nil	Nil	Yes	No	No
81	Prince Road	16	No	Nil	Nil	No	No	No
82	Rahwali Gate Road N	52	No	Nil	Nil	No	No	No
83	Rahwali Gate Road S	52	No	Nil	Nil	No	No	No
84	Railway Road	30	No	Nil	Nil	No	No	No
85	Rustam Road	16	No	Nil	Nil	No	No	No
86	Sadiq Road	16	No	Nil	Nil	Yes	No	No
87	Session Court Road	30	Yes	Hawkers	20%	No	No	No
88	Shelton Road	26	No	Nil	Nil	No	No	No
89	Stadium Road	20	Yes	Shops	50%	No	No	No
90	Station Road	24	Yes	Shops	20%	No	No	No
91	Sugar Mill Road	30	Yes	Illegal Parking	40%	No	No	No
92	Suvay Wala Road	18	No	Nil	Nil	No	No	No
93	Tower Road	16	No	Nil	Nil	No	No	No
94	Wadala Road	16	No	Nil	Nil	No	No	No
95	Zia ul haq Road	22	Yes	Illegal Parking	10%	No	No	No

6. Focus Group Discussion

The first stage in phase II of the methodology involved focus group discussion. Focus group discussion was selected as part of the methodology because in comparison to other qualitative research methods such as interviews, participants, observation, it is more advantageous and provides multiple views and different perspectives in a short time; thus, a large amount of diverse data can be collected in a small period. It offers a more natural environment than interviews where the opinion of the participant can be influenced by the interviewer. The interaction among the participants enhances the quality of data producing check and balances which the participants apply upon each other; consequently, eliminating abstract views. Focus groups provide more specific, meaningful, vigorous feedback than one that can be obtained from individually asked questions because they act as a part of the needs-assessment process of the potential respondents. This makes focus group discussion more prominent than other qualitative tools (Krugger and Casey, 2000; Patton, 2002; Litosseliti, 2003).

A number of focus group discussions were carried to collect information from various groups belonging to different age bands and gender. The idea of probing multiple groups belonging to diverse age bands (18 to 65 years or above) and gender (male and female) helped to collect valid information pertaining to social groups' experiences, which can be relative to them. Topic guide containing questions and possible probes were developed and were passed to all participants before the start of the session. Topic guide helped in keeping social group focused on the research topic during the session.

6.1 Constraints, Opportunities and Experiences

The starting discussion in the focus group session probed walking experience of the participants as mode of transport. A clear consensus was noticed among the focus group members regarding quality of service offered by the pedestrian network. From the response of the participants, it was evident that all the groups had almost identical experiences, whereas limitations and constraints varied from one social group to another. Almost all the participants belonging to various age groups had a firm belief that *the city lack necessary pedestrian infrastructure and they face barriers in their mobility and accessibility towards their desired destinations*. There was a general acceptance, that *“the pedestrian network is present along the main road i.e. Lahore Sargodha Road at few places in patches only but within residential areas, there exists no network or even Right of Way for pedestrian movement as any space if available along the road is either encroached by house owners or by street hawkers.”*

Furthermore, the pedestrian walkway patches along the Lahore-Sargodha Road are also encroached by the Street hawkers; thus *“forcing them to walk on the main carriage way.”* In fact participants were of the opinion that pedestrian infrastructure is *“unfair to their needs.”*

Safety is the other factor that constrains participants' utilization of walkways. According to the participants, walkways are not safe to use during off-peak hours, especially in the evening and at night, because walking to and from the bus stop or activity location located within neighbourhood or local commercial area is often extremely dangerous. Therefore, they tend to utilize other modes of transport. An elderly participant *“it is best to use other modes of transport than walking after daylight as you never know what will happen to you.”* Likewise, women, particularly those who have small children were of the opinion that *“if they have to go out in the evening; they use a car or qingqi, which drops them near to their home.”*

Correspondingly, participants were of the opinion that walking on main carriageway often results in accidents with motorized modes of transport for them

It was evident from the participant's responses that they face severe constraints from the existing network; thus limiting the number of opportunities they can access resulting in social exclusion for them.

6.2 Availability and Preference for Walking as mode of Transport

In the context of availability and preference for walking as mode of transport, participants were of the opinion that the presence of Qingqi in their area is *“more beneficial”* to them in comparison to walking. It is because these Qingqi pick up and drop off passengers from and to the homes, thus *“allowing them more flexibility in their travel pattern and serving them as a replacement to conventional public transport and walking.”* Participants preferred Qingqi over walking, if they do not own a car or have access to conventional modes of public transport such as buses, wagons etc. The reasons stated for this preference were the *“lower fares and easy availability and non-availability of walkways.”*

“Lack of pedestrian infrastructure” is in fact the main cause for their preference for alternate modes of transport instead of walking. The majority of participants in the focus groups stated that they rarely prefer walking as a main mode of transport, except for trips within the local neighbourhood. Trips made in the local area are often less than a mile and include journeys to nearby shops or to neighbours houses. The reasons provided for not considering walking as an option for an alternative mode of transport includes *“availability of*

infrastructure, safety concerns, and weight carried in the form of shopping bags and babies in laps.”

6.3 Pedestrian Infrastructure and Black Spots

On the subject of transport pedestrian infrastructure, it was broadly agreed among the groups that its supply and provision are “*inadequate*” in the city. One of the serious problems cited in the discussion was “*lack of Right of Way for pedestrian infrastructure and encroachments on the space if available.*” According to participants either pedestrian paths are not available or in case there exists any space for their construction, it is encroached by street hawkers and cart sellers. Often it becomes impossible for participants to walk in case of traffic congestion on the road. It is because motorists tend to violate road width and occupy pedestrian space left along the metalled paved surface. This often results in causalities and fatalities.

Similarly, a majority of the participants pointed out that “*road marking, pedestrian signalling at intersection, and lighting*” is a critical issue that creates black spots i.e. potential points for accidents within the transport. Based on the analysis carried out to determine the physical description of the transport links, consultation meetings and focus group discussion, following locations were identified as Black Spots in the city where improvements in the prevailing pedestrian network is of need of the hour.

- 1) Denga Phatak
- 2) Sheranwala Bagh
- 3) Sialkoti Darwaza
- 4) Alam Chowk
- 5) Gondalawala Phatak
- 6) Mafiwala Chowk
- 7) Munir Chowk
- 8) Pindi Bypass
- 9) Shaikhupura Moor

For this purpose pedestrian counts survey was conducted from 07:00 AM to 10:00 PM at these nine locations. Correspondingly, the vehicular traffic data was also collected at these nine locations.

7. Pedestrian Count Survey

Pedestrian counts are usually employed to measure pedestrian volume and their directional movements. A wide range of counting methods exists. The selection of method for counting depends upon available resources, level of details required and duration for which it is required.

The underlying study employed manual counting technique because it is easy to use and have wider applications. The Performa used for counting purposes is attached as Annex A. Surveyors conducted manual counts at all critical positions. These experts' were trained to conduct and collect the information adequately. Likewise, Traffic counts were carried out during peak and off-peak hours in a day i.e., from 07:00 AM to 10:00 PM. Table 5 and 6 highlights Peak Hour Volume and Daily Volume of pedestrians at 9 locations respectively.

Figure 14 and 16 represent the Daily and Peak Hour pedestrian volume percentage share for the nine locations respectively. Likewise, Figure 15 and 17 shows the location of these Black Spots with daily and hourly pedestrian volume respectively. From the Figures, it is evident that the volume is high at Pindi Bypass, Sheranwala Bagh, Sialkoti Darwaza and Alam Chowk. Interesting from Pindi Bypass, traffic approaching from Rawalpindi, Wazirabad, Lala Mousa, Kharain and surrounding villages either enters the city or access Bypass Road. Higher Volume at this location is due to practice of public transport vehicles boarding and alighting passengers from here.

Gondal wala Phattak, Sheranwala Bagh and Sialkoti Darwaza are the hub of CBD because high passenger volume is observed at these locations; whereas Alam Chowk serves as Transit Point between Sargodha and Gujranwala. It is because same practice of vehicles boarding and alighting passengers was observed here too. Interesting Pindi Bypass, Sheranwala Bagh, Sialkoti Darwaza and Alam Chowk are all located on Gujranwala by pass where vehicles operate at high speed i.e. 70 to 100 kilometre per hour; thus making these locations hazardous for pedestrian movement. Correspondingly, Sheikhupura Morr and Mafiwala Chowk serve a transit point and same phenomena of passenger boarding and alighting as mentioned above is observed during field visits and survey counts. Peak Hour volume was observed higher in CBD area i.e at Sheranwala Bagh and Sialkoti Darwaza; evidently, this was due to shopping trips made by commuters.

Table 5: Daily Volume of Pedestrian

Location	Daily Pedestrian Volume
Denga Phatak	1441
Sheranwala Bagh	15426
Sialkoti Darwaza	12110
Alam Chowk	13963
Gondalawala Phatak	9153
Mafiwala Chowk	452
Munir Chowk	3410
Pindi Bypass	14789
Sheikhupura Morr	7559

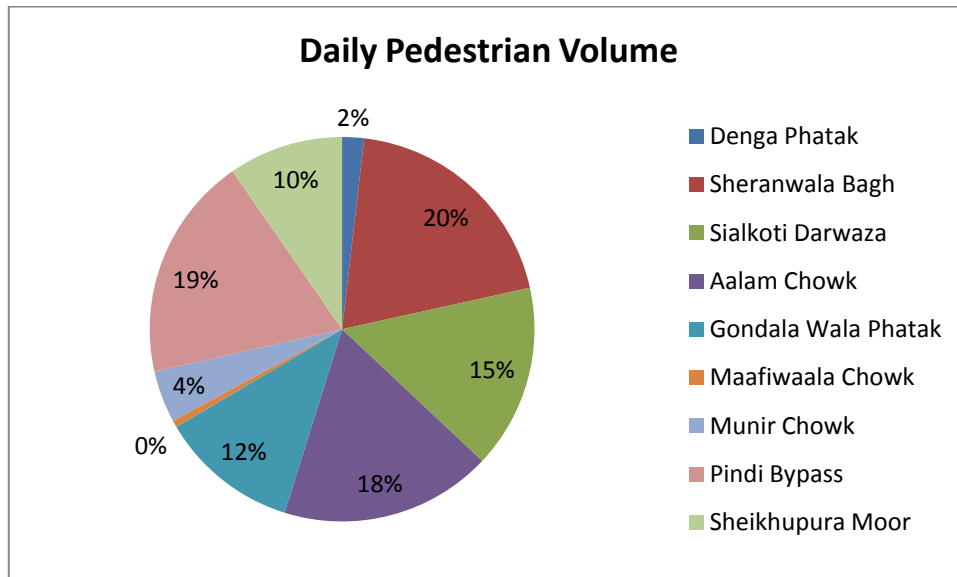
**Figure 14: Daily Pedestrian Volume Percentage**



Figure 15: Daily Pedestrian Volume at Nine Locations

Table 6: Peak Hour Volume of Pedestrian

Location	Peak Hour Volume Of Pedestrian	Time
Denga Phatak	141	17:30-18:30
Sheranwala Bagh	1279	18:30-19:30
Sialkoti Darwaza	1043	10:45-11:45
Alam Chowk	1184	07:45-08:45
Gondalawala Phatak	921	13:15 -14:15
Mafiwala Chowk	46	13:15 -14:15
Munir Chowk	295	13:00 -14:00
Pindi Bypass	1583	14:30 -15:30
Shaikhupura Moor	775	13:00 -14:00

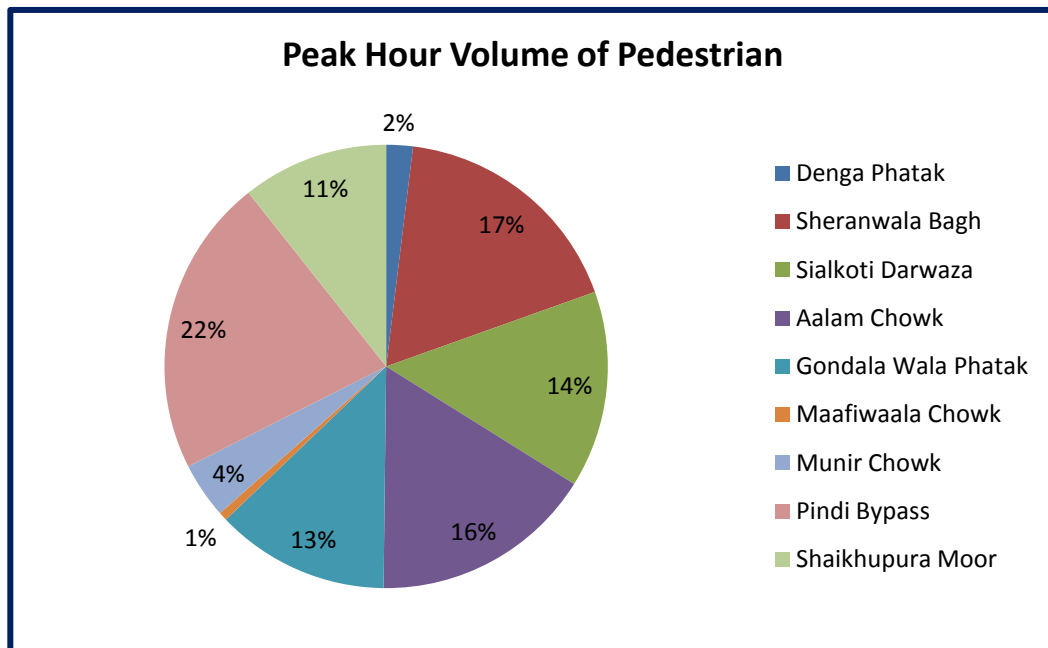


Figure 16: Peak Hour Pedestrian Volume Percentage at Nine Locations

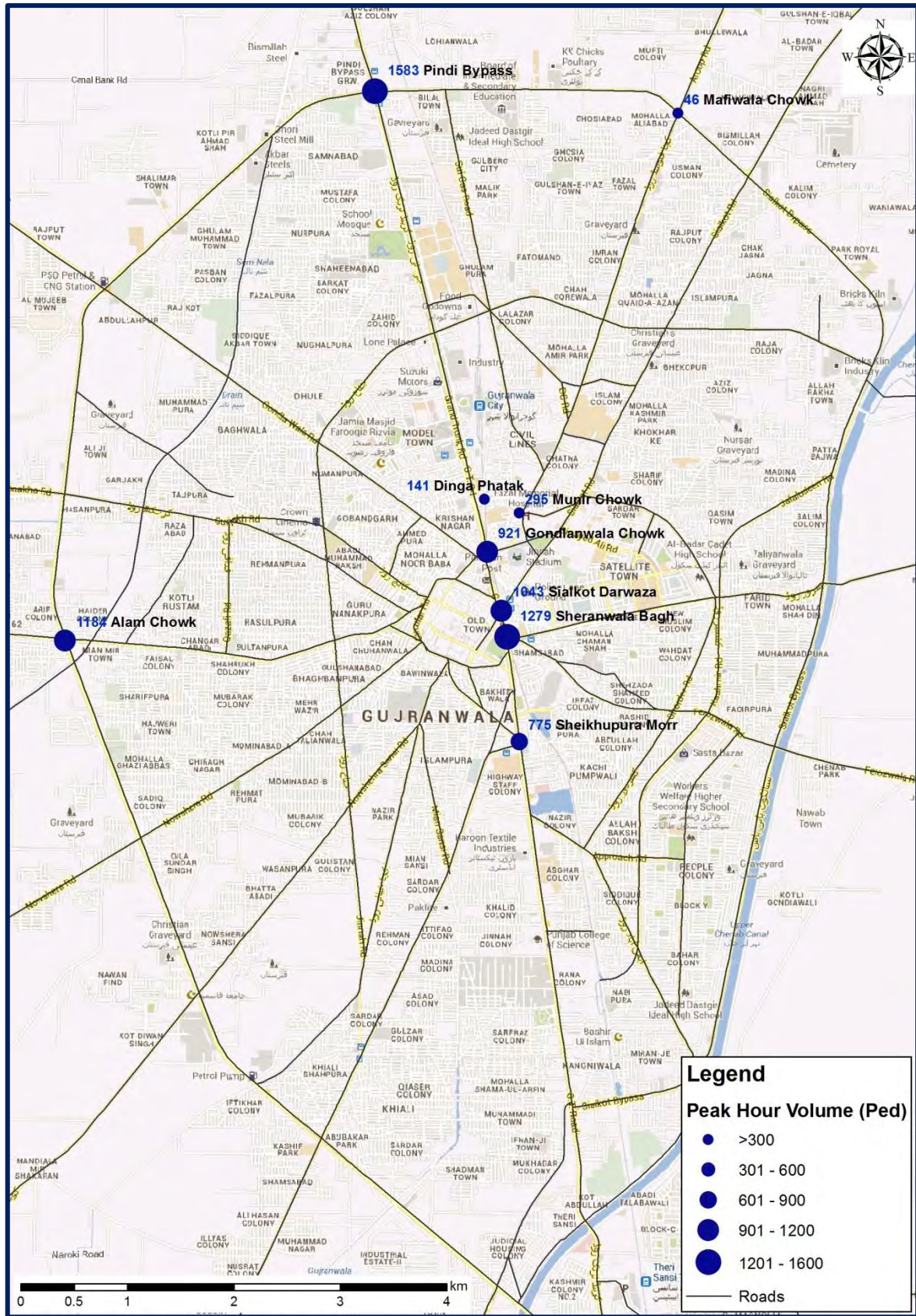


Figure 17: Peak Hour Pedestrian Volume at Nine Locations

7.1 Denga Phatak Intersection

Location of Denga Phattak is depicted in Figure 18 below where hourly pedestrian volume survey was performed. Table 7 below highlights the total and peak hour pedestrian volume at the intersection. Likewise Figure 19 highlights the Daily Pedestrian volume at the intersection; clearly, pedestrian volume is high during evening hours. Participants were of the opinion that the railway line serves as cordon line for the city dividing into two halves and people residing in part of the city commute towards other part for the accessing various facilities.

In terms of pedestrian infrastructure availability, there exists no such facility. There is lack of coordinated, continual pathways, pedestrian signage, and pedestrian signals. Furthermore, the location is encroach by street vendors making mobility on foot cumbersome. Lack of adequate pedestrian facilities results in longer journey times especially for people commuting in evening hours; furthermore, results in accidents due to conflicts. The situation is further worsened due to existence of railway line. The railway line is in operation and lack of pedestrian signage and controlling mechanism results in casualties. It because people tend to cross the Phattak even it is closed for Railway rolling stock movement.



Figure 18: Location of Denga Phattak Intersection (Google Amended)

Table 7: Summary of Pedestrian Count Survey at Denga Phattak

Sr.No	Directions	Total No. of Pedestrians	Peak Hours		
			Morning (10:30 - 11:30)	After Noon (15:00 - 16:00)	Evening (17:30- 18:30)
1	Denga Phatak to Ghala Mandi	750	47	58	78
2	Denga Phatak to City top Hotel	392	41	25	44
3	City top Hotel to Denga Phatak	298	21	24	19
Total		1441	109	107	141

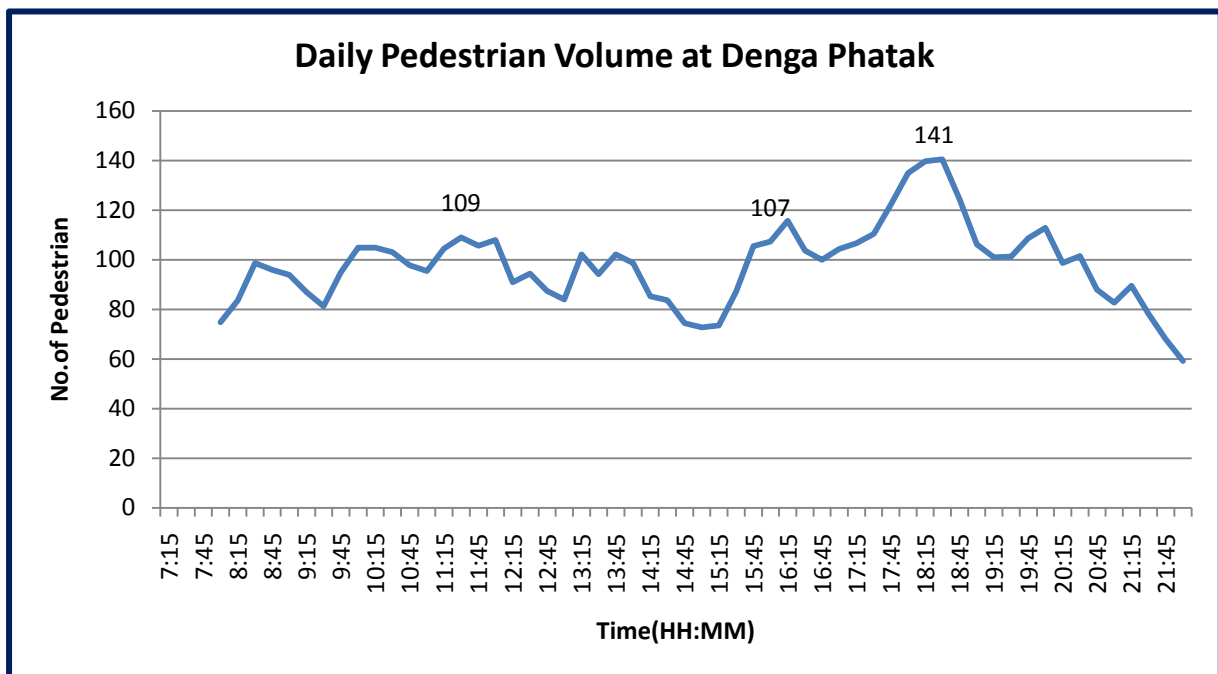


Figure 19: Daily Pedestrian Volume at Denga Phattak

7.2 Sheranwala Bagh

The location of Sheranwala Bagh is shown in Figure 20 below; whereas Table 8 below highlights pedestrian Peak Hour Volume for the location. The survey was carried out here on all four directions. It is because the said location serves as primary transit point within the CBD. The first two directions are from Sheranwala Bagh to Phatak and vice versa. The other two directions are from Phatak to Sialkoti Darwaza and vice versa. Figure 21 highlights the daily pedestrian mobility pattern at the intersection. It is evident that pedestrian volume is high during afternoon and evening hours which is justified as the location serve as an important transit node in the city. People commute from here to their homes after completing their desired activities in the city.

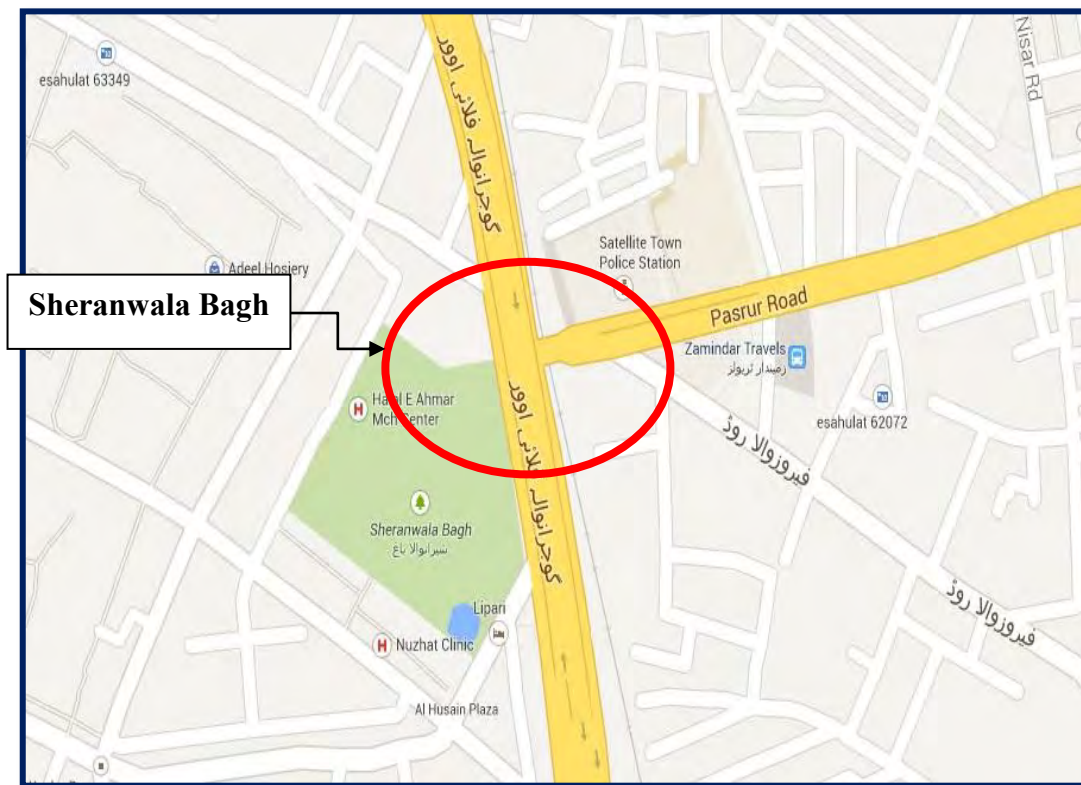


Figure 20: Location of Sherawala Bagh (Google Amended)

Table 8: Summary of Pedestrian Count Survey at Sheranwala Bagh

Sr.No.	Directions	Total No. of Pedestrians	Peak Hours		
			Morning (11:00 - 12:00)	After Noon (12:30 - 13:30)	Evening (18:30- 19:30)
1	Sheranwala Bagh to Phatak	1618	116	135	149
2	Phatak to Sheranwala Bagh	1761	130	136	89
3	Phatak to Sialkot Darwaza	5400	455	469	481
4	Sialkot Darwaza to Phatak	6647	456	465	560
Total no. of Pedestrians		15426	1157	1205	1279

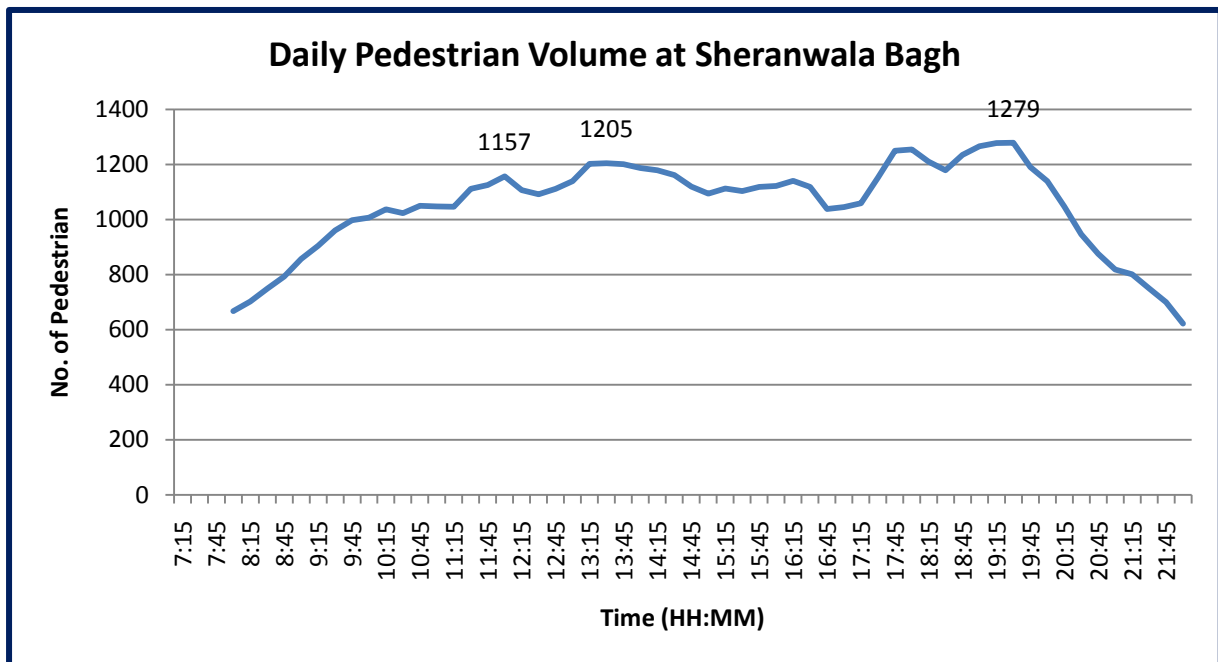


Figure 21: Daily Pedestrian Volume at Sheranwla Bagh

There exists no pedestrian facility at the Sherawala Bagh. Figure 22, 23 and 24 below clearly indicates that people tend to walk parallel to vehicular traffic resulting casualties and accidents. Furthermore, presence of Railway crossing at Pasrur Road further worsened the situation for the commuters who opt walking as their mode of travel. Mix traffic including pedestrian, animal carts, non-motorized and motorized means creates delay at intersection in journey time. The situation is more chronic for women, elderly people whose mobility is barricaded by this mix traffic in case the railway crossing is closed due to rail operations.



Figure 22: Pedestrian Facilities at Sheranwla Bagh



Figure 23: Pedestrian Facilities at Sheranwala Bagh



Figure 24: Pedestrian Facilities at Sheranwala Bagh

7.3 Sialkoti Darwaza

The location of Sialkot Darwaza is shown below in Figure 25; whereas Table 9 highlights total numbers and Peak Hour pedestrian volume for the location. There are total four directions at which survey was performed. The first two directions are from Sialkoti Gate to Phatak and vice versa. The next two directions are from Bazar to Phattak and vice versa. Figure 26 highlights the daily pedestrian volume of the pedestrians at the location. It is pertinent to mention that pedestrian volume from 10:30 am to 09:00 pm is almost constant i.e. more than 800 pedestrians. The pedestrian mobility pattern at the said intersection varies from pattern prevailing at other locations; it is because Sialkoti Bazar serves as an important transit and commercial node. Sialkot Road connecting Sialkot city with Gujranwala terminate at this location.

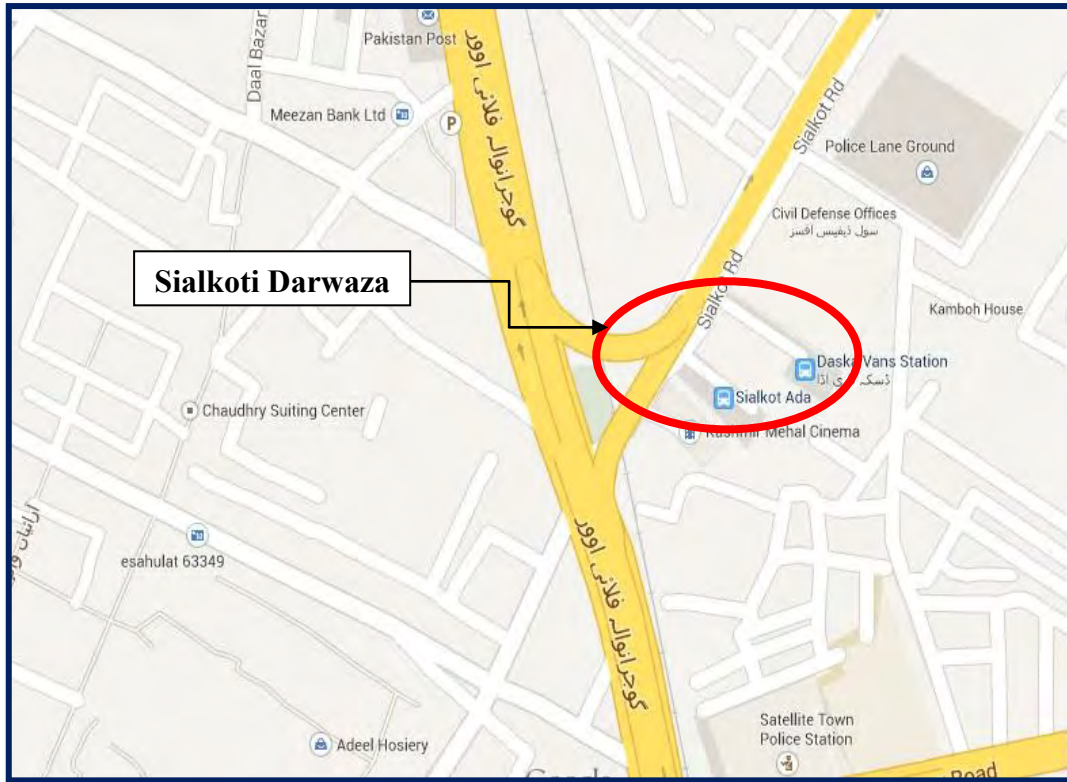


Figure 25: Location of Sialkoti Darwaza

Table 9: Summary of Pedestrian Count Survey at Sialkoti Darwaza

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (10:45 - 11:45)	After Noon (13:00 - 14:00)	Evening (18:00- 19:00)
1	Sialkot Gate to Phatak	1798	188	113	124
2	Phatak to Sialkot Gate	2382	165	254	265
3	Bazar to Phatak	5331	495	397	378
4	Phatak to Bazar	2598	195	186	248
Total		12110	1043	950	1015

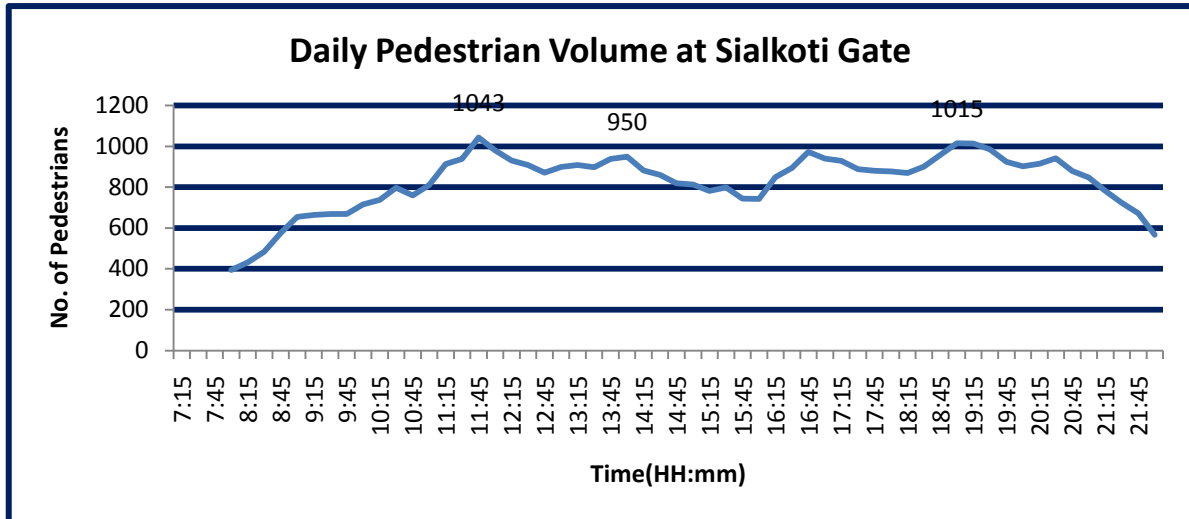


Figure 26: Dily Pedestrian Volume at Sialkoti Darwaza

7.4 Alam Chowk

Alam Chowk connecting Hafizabad Road with Gujranwala Bypass serves as important feeding artery in the road network of the city. Furthermore, the intersection is located next to major residential areas from where trips are generated to employment, commercial and service centers. Surveys were carried out in all four directions. Table 10 below highlights the total number of pedestrian and the Peak Hour volume for the said location. Average daily passenger volume is around 1150 pedestrians.

Table 10: Summary of Pedestrian Count Survey at Alam Chowk

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (7:45 - 8:45)	After Noon (12:15 - 13:15)	Evening (16:45- 17:45)
1	Hafizabad Road to Gujranwala	4508	280	416	337
2	Gujranwala city to Hafizabad Road	3891	387	420	382
3	Gujranwala city to Ladha wala	2856	201	177	277
4	Ladha wala to Gujranwala city	2707	316	96	179
Total No. of Pedestrian		13963	1184	1109	1175

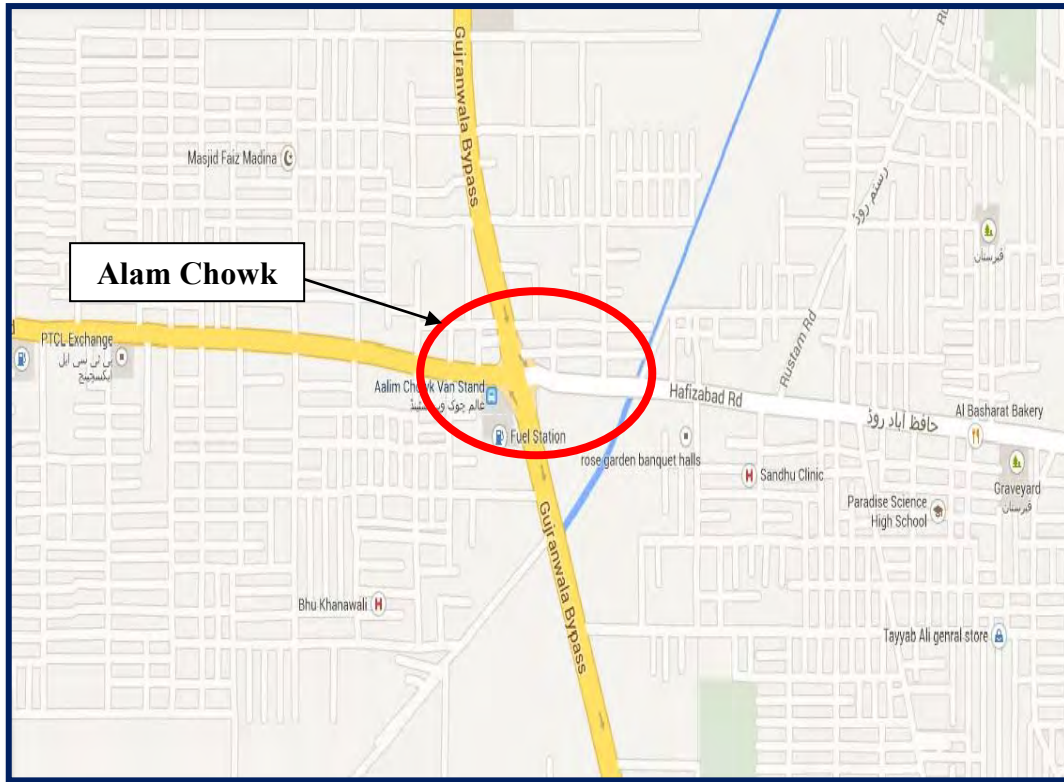


Figure 27: Location of Alam Chowk

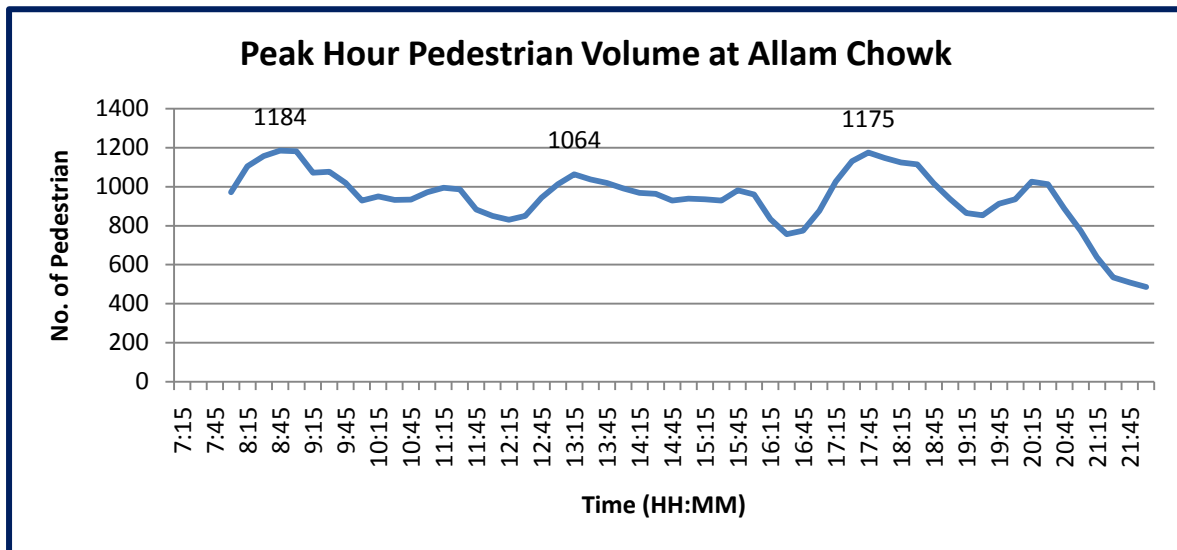


Figure 28: Peak Hour Pedestrian Volume at Alam Chowk

Likewise, there exists no pedestrian facility at the said location as highlighted below in Figure 29 and 30; whereas the intersection is located along the Gujranwala Bypass which serves as provincial highway. The notified speed of light vehicular traffic at Gujranwala Bypass ranges from 70 to 100 Km per Hour whereas the notified speed for heavy vehicular traffic ranges

from 70 to 90 Km per Hour. Lack of pedestrian infrastructure primarily pedestrian signals or zebra crossing often results in casualties and fatalities. The same has been highlighted by the Focus Group participants.



Figure 29: Pedestrian Facilities at Alam Chowk



Figure 30: Pedestrian Facilities at Alam Chowk

7.5 Gondalawala Chowk

Gondalawala Chowk is situated in vicinity of major retail and commercial centers. Furthermore, Jinnah Stadium is located in proximity to it as highlighted by the Figure 31 below. Table 11 below highlights the total number of pedestrian and the Peak Hour volume for the said location. The pedestrian mobility pattern at the said intersection varies from mobility pattern prevailing at other locations. It is observed highest number of pedestrian pass through the intersection between 12:30 pm to 15:00 pm. It is because major retail and commercial activities are performed during these hours. People from surrounding villages commute to commercial and retail centers located in vicinity of the intersection.

Table 11: Summary of Pedestrian Count Survey at Gondalawala Chowk

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (11:00 - 12:00)	After Noon (13:15 - 14:15)	Evening (16:00- 17:00)
1	Phatak to Gondalawala	5483	492	561	420
2	Gondalawala to Phatak	3670	285	360	304
Total		9153	777	921	724

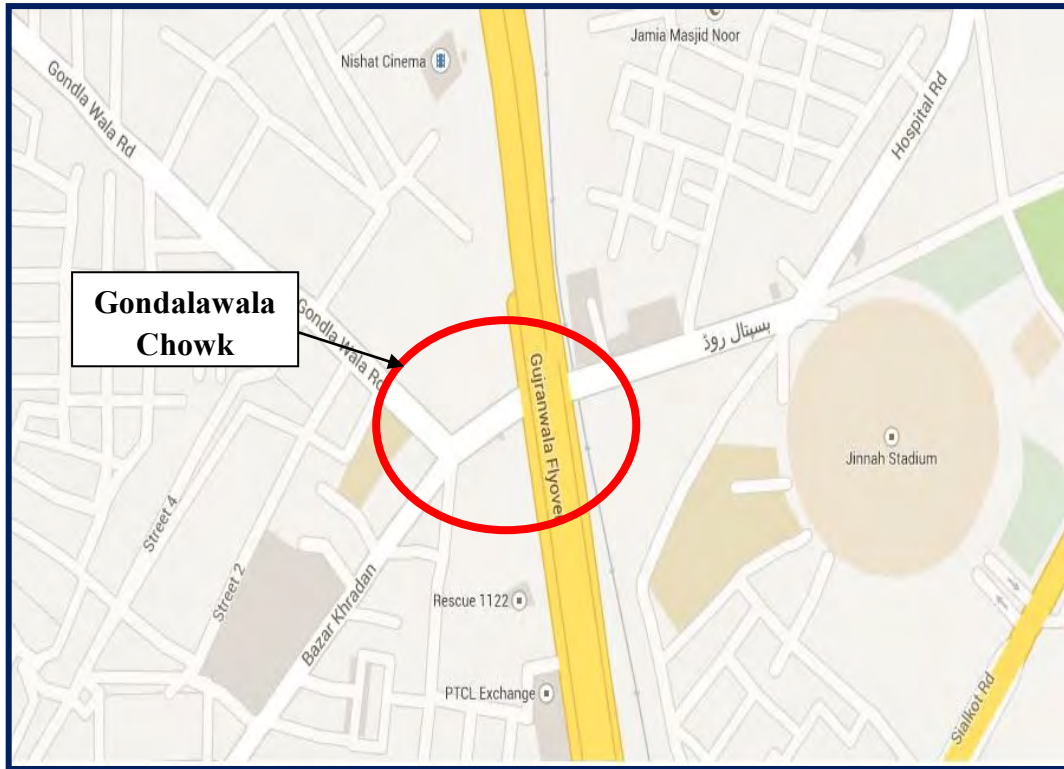


Figure 31: Location of Gondalawala Chowk

It is evident from the Figure 33 and 34 below that there exists no pedestrian facility at the Gondalawala Chowk. People tend to walk parallel/ along/ within mix traffic resulting casualties and accidents. Furthermore, presence of Railway crossing further worsened the travelling conditions. Mix traffic including pedestrian, animal carts, non-motorized and motorized barricaded the mobility of commuters resulting in longer journey time and accidents.

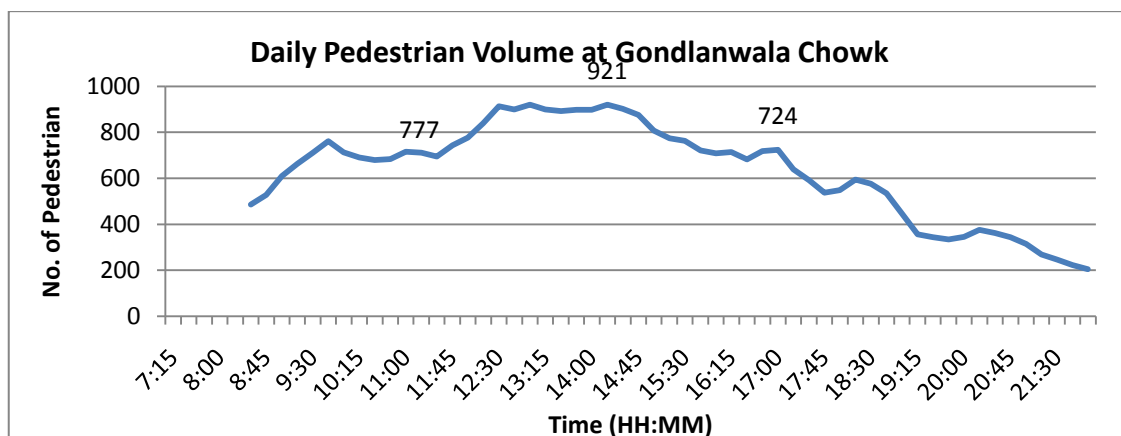


Figure 32: Daily Pedestrian Volume at Gondalawala Chowk



Figure 33: Pedestrian Facilities at Gondalawala Chowk



Figure 34: Pedestrian Facilities at Gondalawala Chowk

7.6 Maafiwala Chowk

Maafiwala Chowk is situated at the Sialkot Bypass and Aroop Road as shown below in Figure 35. Table 12 highlights the total pedestrian volume and Peak Hour pedestrian volume for the location. Importantly, the pedestrian volume at the junction is not too high; however, due to lack of pedestrian infrastructure results in fatal accidents as indicated by the participants of the Focus Group Discussion. Highest pedestrian volume is observed at the intersection during afternoon hours due to return trips made by the commuters especially children to their homes.

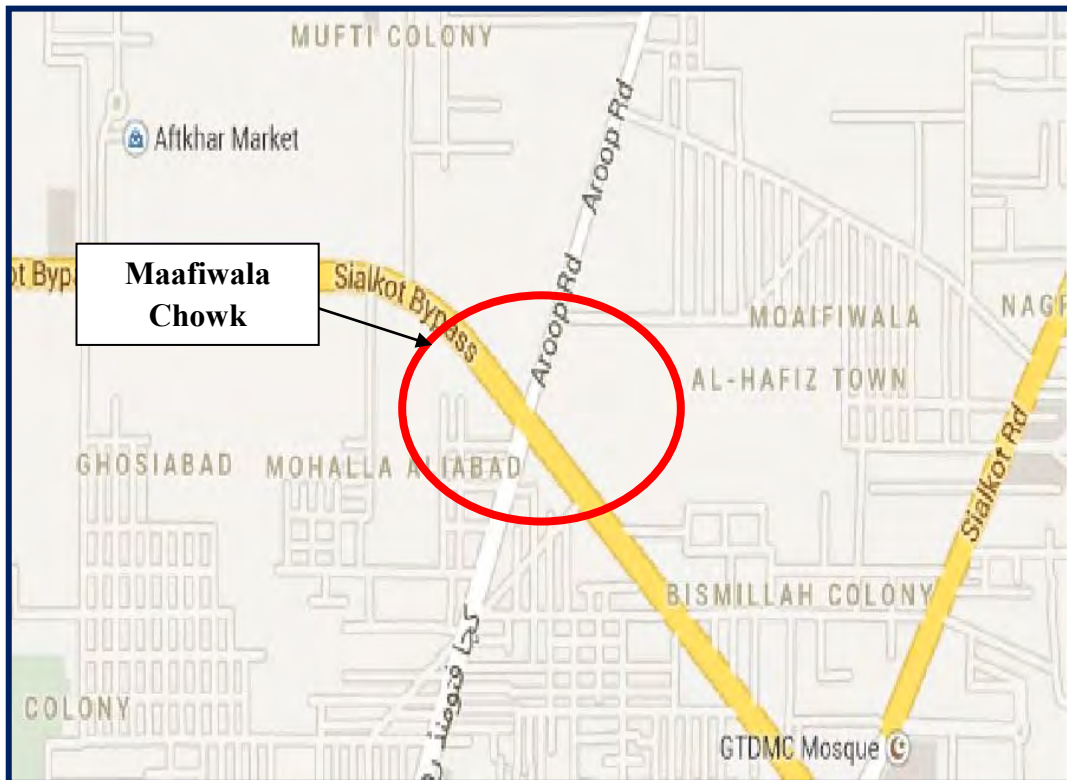


Figure 35: Location of Maafiwala Chowk

Table 12: Summary of Pedestrian Count Survey at Maafiwala Chowk

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (8:00 - 9:00)	After Noon (13:15 - 14:15)	Evening (16:45-17:45)
1	Gujranwal to Maafiwala	452	34	46	37

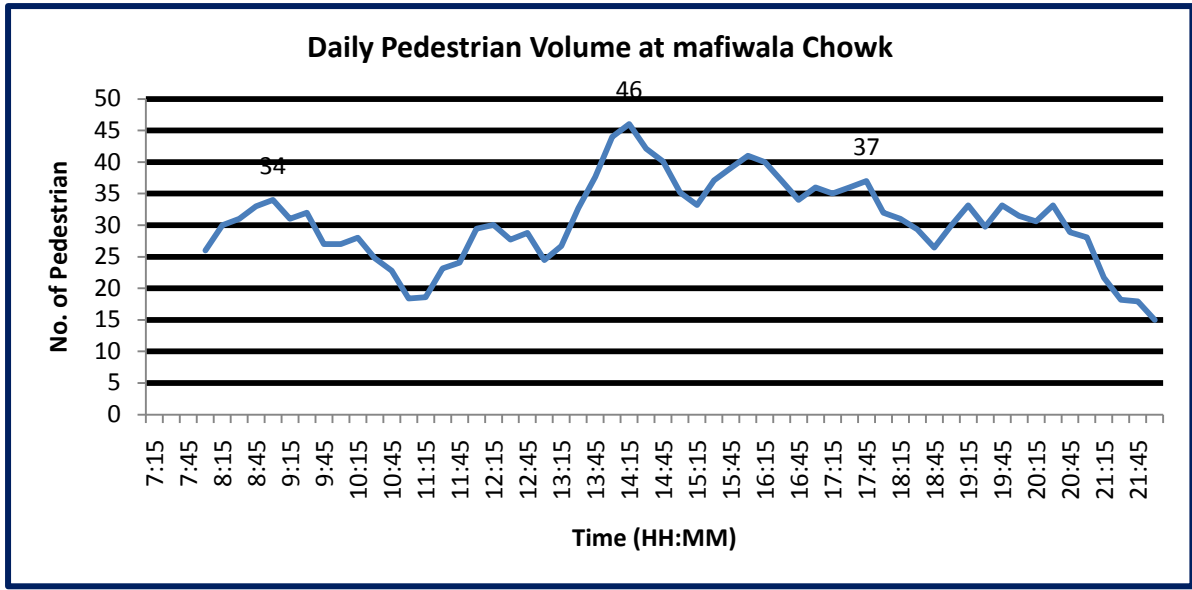


Figure 36: Peak Hour Pedestrian Volume at Maafiwala Chowk



Figure 37: Pedestrian Facilities at Maafiwlala Chowk



Figure 38: Pedestrian Facilities at Maafiwala Chowk

7.7 Munir Chowk

Most of the key education centers located in the Gujranwala city are located around the Munir Chowk as shown in Figure 36 below. Furthermore it provides access to Wasa station, Jinnah Stadium and Civil Hospital; thus making it an important node in the city transport network. Though Daily pedestrian volume observed at this intersection shown below in Figure 39 is less in comparison to its strategic location within the city transport network; however, it provides vital connections to various activity locations.

Table 13: Summary of Pedestrian Count Survey at Munir Chowk

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (9:30 - 10:30)	After Noon (13:00 - 14:00)	Evening (16:30- 17:30)
1	Civil Hospital to Kachehri Chowk	1537	113	127	109
2	Kachehri Chowk to Civil Hospital	1185	83	103	97
3	Sialkot Road to Denga Phatak	391	37	40	39
4	Denga Phatak to Sialkot Road	297	18	25	34
Total		3410	251	295	279

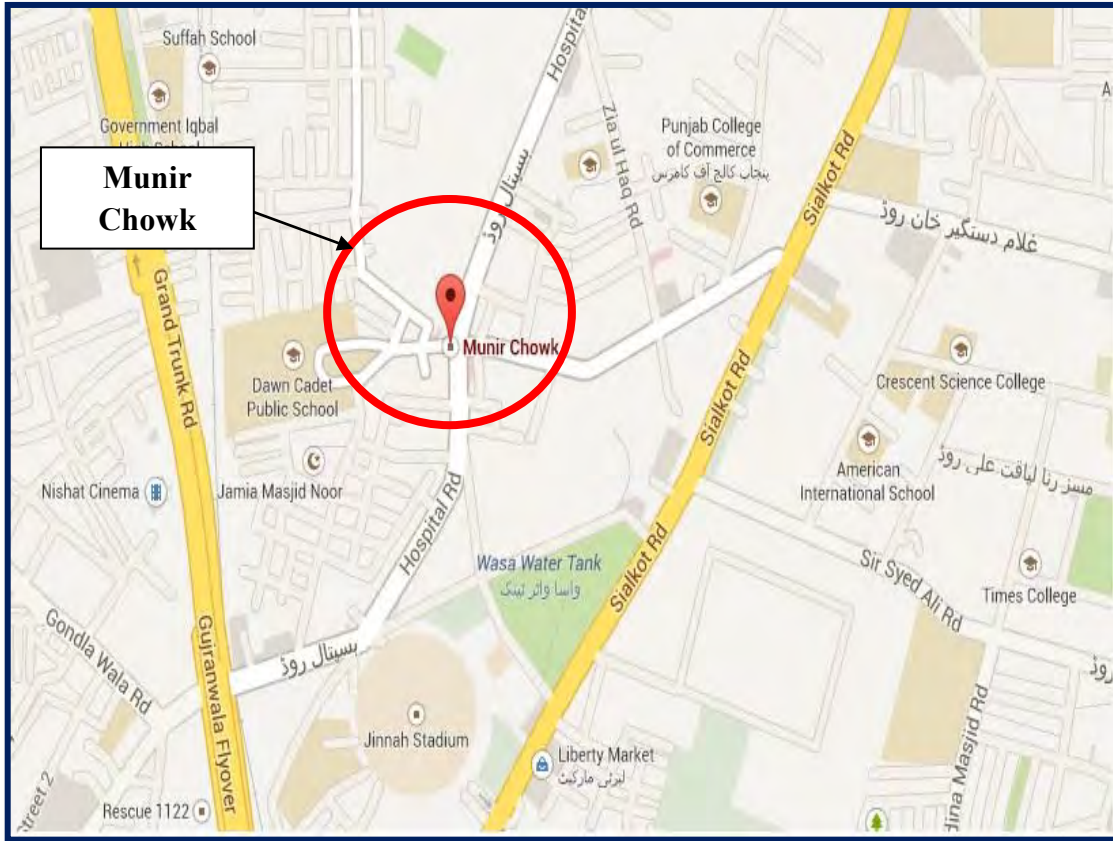


Figure 39: Location of Munir Chowk

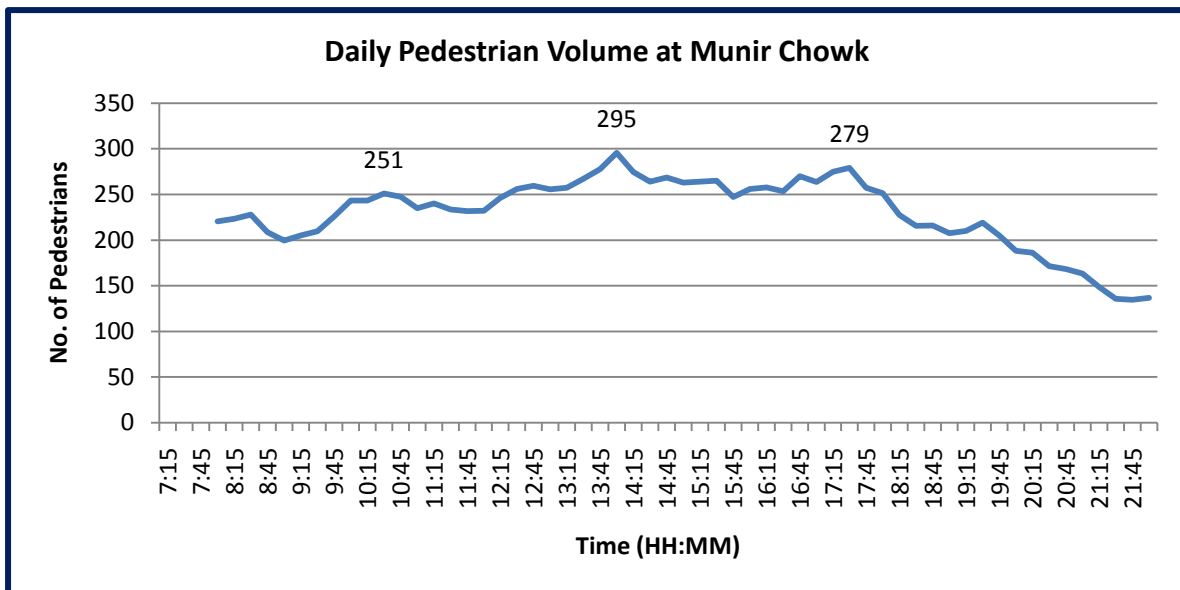


Figure 40: Daily Pedestrian Volume at Munir Chowk

7.8 Pindi Bypass

Travel to Pindi Bypass serves as the entry point of the Gujranwala city as shown below in Figure 41. Inter-city traffic commuting to other parts of the country turn from here to Gujranwala Bypass. In addition, this intersection serves as major transit point for intra-city passengers commuting from surrounding rural areas to the city center. Table 14 depicts the total pedestrian volume and Peak Hour volume of the walking commuters. The daily passenger volume highlighted in Figure 39 clearly indicates that most the pedestrian trips are made in afternoon and evening hours which are due to the fact stated above. People living in suburbs and surrounding villages make return journeys their home in afternoon and evening hours.

Likewise, there exist no pedestrian infrastructure/ facilities at Pindi Bypass as shown in the Figure 43 below. Importantly, Pindi bypass has the highest number of pedestrian volume in comparison to other intersections/ locations identified during the consultation meetings; however. Lack of adequate pedestrian infrastructure results in mobility barriers and fatal accidents.

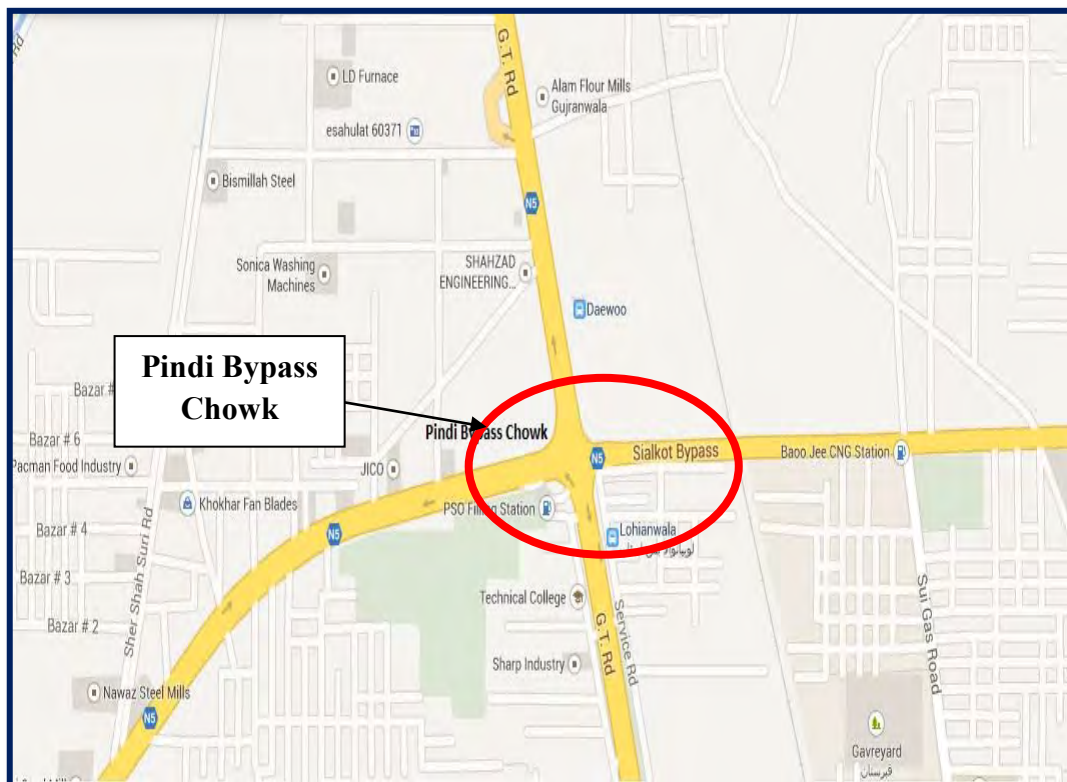


Figure 41: Location of Pindi Bypass Chowk

Table 14: Summary of Pedestrian Count Survey at Pindi Bypass Chowk

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (9:30 - 10:30)	After Noon (14:30 - 15:30)	Evening (18:00- 19:00)
1	Sialkot to Alipur chowk	5625	473	619	640
2	Alipur Chowk to Sialkot	4999	317	695	510
3	Petrol Pump to Sialkot	2386	119	145	226
4	Sialkot to Petrol Pump	1780	94	124	175
Total		14789	1003	1583	1551

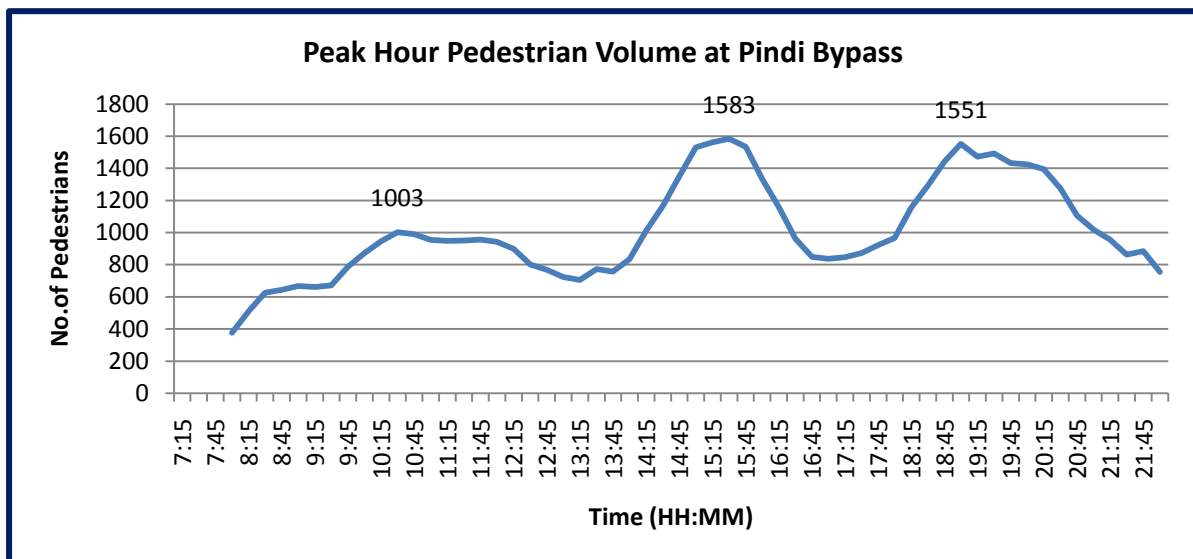


Figure 42: Peak Hour Pedestrian Volume at Pindi Bypass



Figure 43: Peak Hour Pedestrian Volume at Pindi Bypass

7.9 Shiekhupura Moor

Sheikhupura Morr connecting Sheikhupura city with Gujranwala serves as important feeding artery in the road network of the city. Furthermore, the intersection is located next to education institutes from where educational trips are generated to other parts of the city. Surveys were carried out in three directions. Table 15 below highlights the total number of pedestrian and the Peak Hour volume for the said location. Average daily passenger volume is around 600 pedestrians.

Table 15: Summary of Pedestrian Count Survey at Sheikhupura Morr

Sr.No.	Directions	Total No. of Pedestrian	Peak Hours		
			Morning (9:00 - 10:00)	After Noon (13:00 - 14:00)	Evening (16:30- 17:30)
1	TMA to Bus Adda	2220	251	275	230
2	Bus Adda to TMA	3804	235	397	314
3	Sheikhupura Morr to Committee Ghar	1535	123	103	96
Total		7559	609	775	640

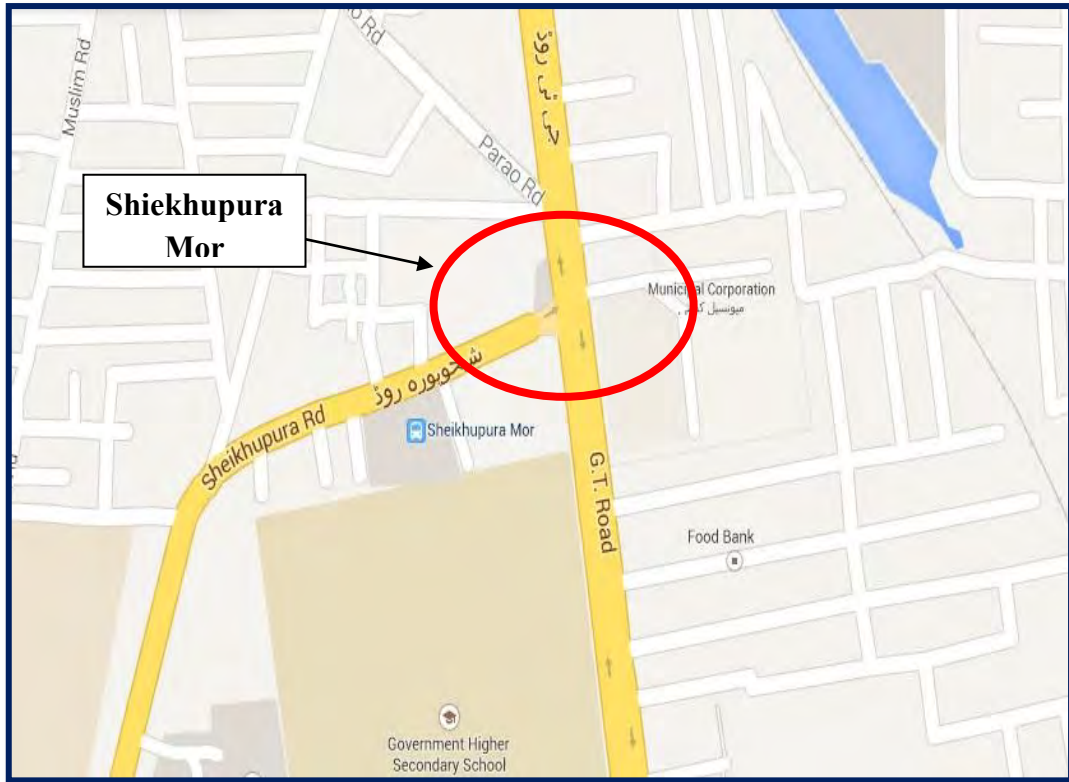


Figure 44: Location of Sheikhupura Morr

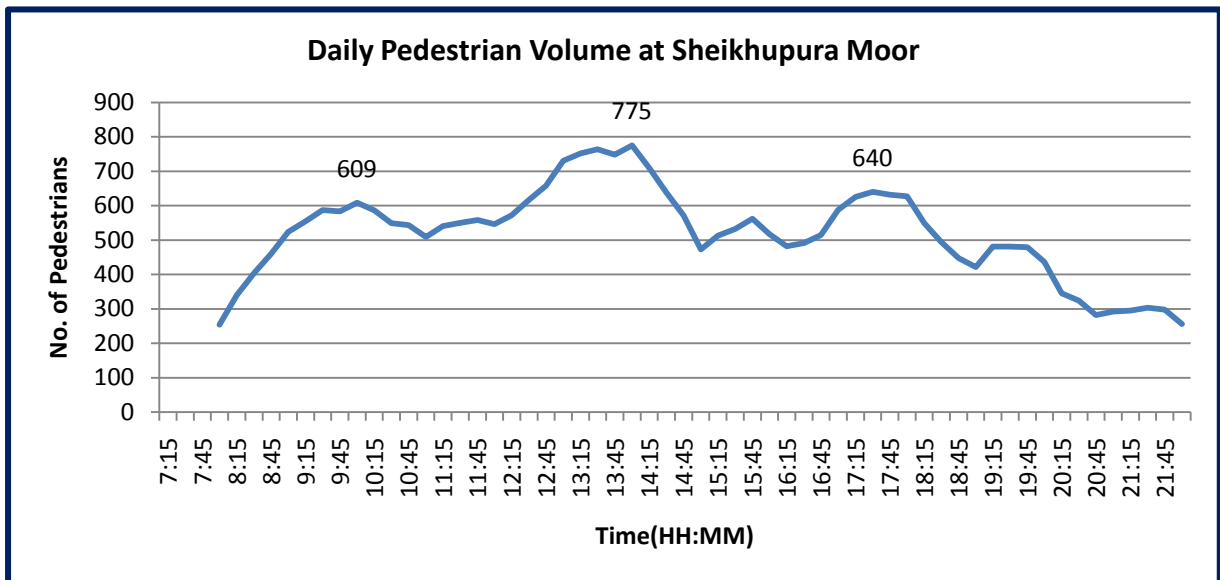


Figure 45: Daily Volume at Sheikhupura Morr

8. Vehicular Traffic Count Survey

Traffic counts at nine locations were also performed. The Daily and Peak Hour vehicular count are mentioned in the Table 16 and 17 below respectively. Pindi Bypass which has the highest pedestrian volume also has the highest vehicular count as already stated above. The Peak Hours during which the highest pedestrian volume is observed is also mentioned in the Table 17 for comparison purposes. Figure 46 below highlights the comparison made between Peak Hour Pedestrian and Traffic volume.

Table 16: Daily Traffic Volume at Nine Locations

Location	Daily Traffic Volume
Denga Phatak	35970
Sheranwala Bagh	56124
Sialkoti Darwaza	51067
Alam Chowk	58932
Gondalawala Phatak	22249
Mafiwala Chowk	51270
Munir Chowk	47588
Pindi Bypass	179081
Sheikhupura Morr	59086

Table 17: Peak Hour Traffic Volume

Location	Peak Hour Traffic	Time
Denga Phatak	2812	17:00-18:00
Sheranwala Bagh	3495	18:30-19:30
Sialkoti Darwaza	3547	8:45- 9:45
Alam Chowk	5526	8:45- 9:45
Gondalawala Phatak	2298	12:00-13:00
Mafiwala Chowk	3980	15:45-16:45
Munir Chowk	3438	11:30-12:30
Pindi Bypass	16699	15:45-15:45
Sheikhupura Morr(chowk)	4831	12:00-13:00



Figure 46: Peak Hour Traffic vs Pedestrian Volume at Nine Locations

It is evident from the data collected that there exists large variation in mode choice. It is because the city has a steady growing vehicular traffic but pedestrian trips are at decline and are not made as preferred mode of transport. It is because of lack of pedestrian infrastructure and safety concerns. There is a dire need of not only pedestrian infrastructure provision but policy formulation for the city. In terms of policy formulation, available rules and regulations pertaining to pedestrian accessibility and mobility should be adhered. Furthermore, pedestrian should be given priority everywhere, and their needs must be considered too while developing new transport infrastructure in the city.

9. Pedestrian Infrastructure Type and Provision Requirements

This section focuses on the design recommendations of pedestrian infrastructure. Following types of infrastructure can be provided depending upon the local conditions to facilitate pedestrian in urban areas.

9.1 Infrastructure Parallel to Carriage way

Walkways

Walkways are the fundamental element of pedestrian mobility as they allow safe walking paths separated from vehicular or other types of motorized traffic. However, provision of walkways is influenced by the existing carriage way conditions. Therefore, to cater local requirements, various types of walkways can be used as per the requirements of pedestrians to optimize efficiency and achieve sustainability.

Sidewalks

In Gujranwala urban and suburban environments especially in residential quarters, the preferred facility for pedestrians can be sidewalk. Sidewalks are typically constructed of concrete and located adjacent to curbs and separated from the roadway by a buffer zone. They provide positive separation from motor vehicle traffic, a hard smooth surface on which to walk, and the opportunity to clearly indicate crossing points and movements at intersections as shown below in Figure 47 and 48. The recommended standard minimum sidewalk width is 5 feet.

Shoulders

Shoulders on roadways, when designed according to AASHTO recommendations, are usually wide and smooth enough to accommodate pedestrians where the provision of sidewalks or paths may not be practicable or feasible. In urban residential which do not have high

Sidewalks vs. Bikeways

Sidewalks are not to be used as bicycle facilities unless no other option is available. Sidewalks should not be identified as part of a bikeway network. Conflicts arise when pedestrians share sidewalks with bicyclists. Due to the horizontal operation space of both parties, a standard sidewalk does not allow for adequate passing space. Typically it is only recommended that children operate bicycles on sidewalks.

Sidewalk Width

For two people walking side-by-side or passing each other while traveling in opposite directions on a sidewalk, the average space occupied is 4 feet 8 inches. In considering accessibility standards, the ADA (Americans with Disability Act) Design Board calculates that an average wheelchair occupies approximately three feet of horizontal space. It can be reasoned that a wheelchair user and ambulatory pedestrian would occupy at least five feet of horizontal space. Sidewalks in low and high traffic areas should be designed to consider these dimensions. The Institute of Transportation Engineers (ITE) has a design guide for the development of roads that includes design standards for curbs, gutters, and sidewalks. It recommends a minimum sidewalk width of 5 feet to allow two people to pass comfortably or to walk side-by-side if there is a buffer between the sidewalk and the street. A six-foot wide sidewalk is recommended if it abuts the back of a curb. In Pakistan major cities such as Lahore, Sidewalks of width 4 feet are generally provided.

Importantly, the width of a sidewalk or walkway needs to comfortably accommodate the volume of pedestrians normally using it. For example, on a neighborhood collector that provides a high volume of pedestrian access to a school, park, or other popular destinations, it may be desirable to provide wider sidewalks. In high use areas, such as central business districts, sidewalks can be 10 to 15 feet wide, if necessary. Conversely, when excessively wide sidewalks are located in areas with low pedestrian volumes, the expansive pavement and empty-looking sidewalks are uninviting to pedestrians.

Table 18: Recommended Sidewalk Widths for Different Street Types

	Principal Arterial	Minor Arterial	Neighborhood Collector	Local Residential
# Lanes	4-6	2-4	2	2
Sidewalk Width with Buffer Strip	6 feet	6 feet	5 feet	5 feet
Sidewalk Width on Curb (No Buffer)	6-8 feet	6-8 feet	6 feet	5 feet
Central Business District Sidewalk Width	10 - 15 feet	10 - 15 feet	Not Applicable	Not Applicable

Location: Both Sides versus One Side

In almost every instance, it is desirable to provide sidewalks on both sides of streets used by pedestrians. Pedestrians are also encouraged to walk on the side of the roadway facing traffic, unlike bicyclists who ride with the direction of travel. Providing sidewalks on both sides enables pedestrians to travel facing traffic in either direction, and minimizes the need for pedestrian crossing points.

Several factors influence the decision of whether to place sidewalks, walkways, and widened shoulders on both sides and one side. These factors include the available space within the right-of-way, the existing physical limitations on the roadside, and which side of the street origins and destinations (such as bus stops) are located. A sidewalk on one side may be adequate for some local streets, especially when this improves a condition where there were no sidewalks previously.

Sidewalk Buffer Area

Sidewalks alongside roadways are often separated by planting strips consisting of natural vegetation or landscaping that creates a buffer from the noise and splash of moving vehicles often separates sidewalk Buffer Area as shown below in Figure 49. Planting buffers (also referred to as planting strips, landscape strips, landscape buffers, and nature strips) are generally considered to be an effective separation treatment between walkways and streets in all types of settings. The added separation of a planting buffer helps a pedestrian feel more comfortable when walking along the street. The buffer area also provides space for streetlights, fire hydrants, utility boxes, and bike racks. Other advantages of buffer areas include:

- Sidewalk can be at a constant level grade across driveways, avoiding dipping at every driveway cut.
- An area is provided for drainage runoff.
- Aesthetic enhancement, increasing the appeal of the walkway and pedestrian environment.
- If planted with trees, they can provide shade and wind protection.

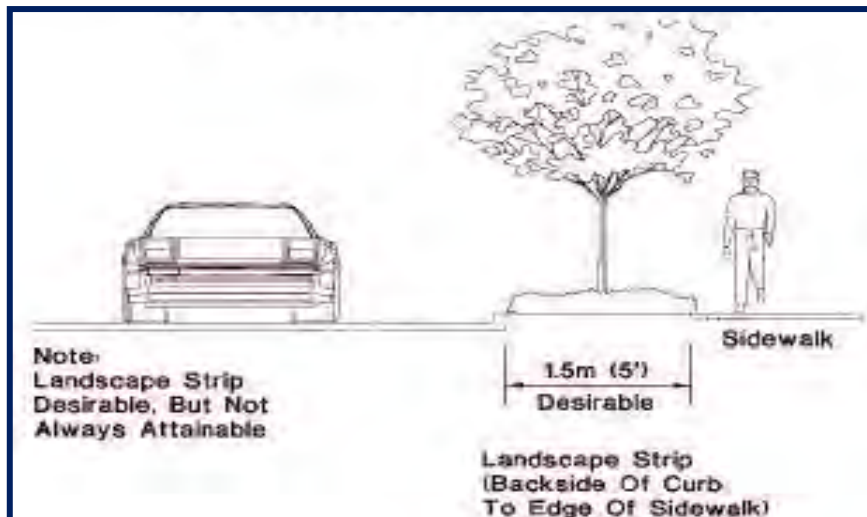


Figure 49: Planting Buffer between Sidewalk and Street

Well-designed arterial and collector streets should include a planting strip as a standard. A planting strip should be at least 5 feet wide. Since any buffer is better than no buffer, if right-of-way is limited, a 3-foot buffer may be sufficient. Buffer landscaping should be relatively low maintenance and should not obstruct vision of pedestrians or motorists at intersections. Disadvantages of planting buffer strips may include:

- Maintenance that varies depending on the type of landscaping selected.
- If not designed and maintained properly, landscaping may hinder visibility and cause security problems.
- Root growth can sometimes lift and buckle sidewalks, creating a tripping hazard.

A swale ditch is sometimes used as a buffer area. It provides an economical alternative to curb and gutter sections. However, attention should be paid to the slopes of the swale to allow for maintenance.

Zebra Crossings

A Zebra crossing is a path across a road marked with black and white stripes where pedestrians may cross as shown in Figure 50.



Figure 50: Typical Zebra Crossing

It is utmost importance the pedestrians using the crossing should have clear sight/ vision of traffic approaching from perpendicular direction; therefore, angle of sight for both pedestrians and vehicle drivers should be clear of obstructions. Furthermore, if the road is slippery, then vehicles require more time to clear the crossing. In terms of zebra crossing operation, the traffic needs not to stop until someone has approached and moved onto the crossing. Under such scenario, pedestrians have to wait until traffic has stopped from both directions, and the road is clear for crossing. There should be road marking at the start of the crossing stating the direction in which the pedestrian has to look before he/she starts crossing the junction/ street.

Zebra Crossing Marking

This type of marking is intended for use at locations where substantial numbers of pedestrians cross without any other traffic control device, at locations where physical conditions are such that added visibility of the crosswalk is desired or at places where a pedestrian crosswalk might not be expected. The area of the crosswalk may be marked with white longitudinal lines at a 90° angle to the line of the crosswalk. These lines should be 30 cm wide and spaced 60 cm apart. When longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. Care should be taken to ensure that crosswalks with longitudinal lines used at some locations do not weaken or detract from other crosswalks (where special emphasis markings are not used). When an exclusive pedestrian phase signal, which permits diagonal crossing, is installed at an intersection, a unique marking may be used for the crosswalk. Design details are provided in the Appendix C. A typical sign highlighting crossing

approaching pedestrians to look right in case of traffic flow from right side is shown below in Figure 51.



Figure 51: Marking on Roads for Pedestrian

The drivers approaching a Zebra crossing should be made aware of the crossing by black and white poles with flashing yellow beacons and appropriate road markings².

Pelican Crossings

Pelican crossings (shown in Figure 52) have red/amber/green signals facing drivers, and red man/green man signal heads on the opposite side of the road to the pedestrians waiting to cross. A pedestrian push button unit is required to operate these types of crossings. When the steady red man is lit pedestrians should not cross. Likewise, when the steady red signal to traffic is lit then drivers must stop. The steady green man will then light for pedestrians and they should, having checked that it is safe to do so, cross the road. When the green man begins to flash pedestrians should not start to cross although there is still enough time for those on the crossing to finish their journey safely. At all Pelican crossings (apart from staggered crossings) have a bleeping sound to indicate to the visibility impaired when the steady green man is lit³.

² http://www.devon.gov.uk/index/transport/traffic/pedestrian_crossings/types_of_pedestrian_crossings.htm

³ <http://www.2pass.co.uk/crossing.htm>

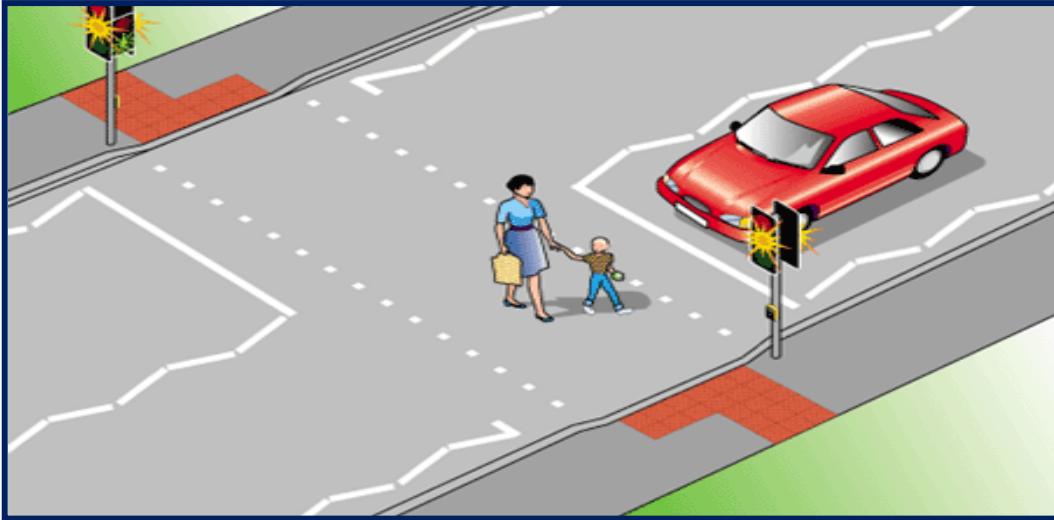


Figure 52: Typical Pelican Crossing

Puffin Crossings

Puffin crossings shown in Figure 53 differ from Pelican crossings as they do not have a flashing green man/flashing amber signal. The overall crossing time is established each time by on-crossing pedestrian detectors. The demand for the crossing is still triggered by the push button unit but kerb-side pedestrian detectors are fitted to cancel demands that are no longer required. At the latest Puffin crossings the red man/green man signals are above the push button unit on the pedestrians' side of the road. This layout encourages pedestrians waiting at the crossing to look at the approaching traffic at the same time as looking at the red man/green man signal⁴.



Figure 53: Typical Puffin Crossing

⁴ <http://www.burystedmundsdrivingschool.net/pedestrian-crossings.html>

Toucan Crossings

Toucan crossings shown in Figure 54 are designed for both pedestrians and cyclists and are typically used adjacent to a cycle-path (Cyclists are not allowed to cross the road using Zebra, Pelican or Puffin crossings). There is a green cycle symbol alongside the green man. At the latest Toucan crossings the crossing time is established each time by on-crossing detectors in the same way as Puffins crossings.

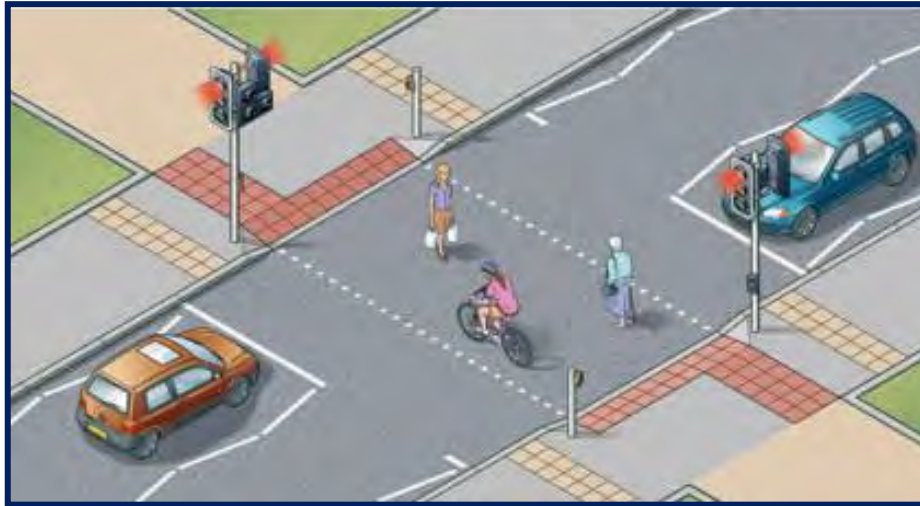


Figure 54: Typical Toucan Crossing

9.2 Types of Pavement Markings used for Pedestrians

Normal Dotted Line Marking

A Normal Dotted Line is used to delineate the extension of a line through an intersection or interchange area. The line shall be of the same color as the line it extends. Design details are provided in the Appendix C.

Dashed Line Marking

Dashed Line is used for the edge continuation at exit or entrance ramp separation. Design details are provided in the Appendix C.

Junction Box Marking

A Box Junction Marking indicates a restriction of the traffic entering a junction unless the crossing is clear from all traffic and a motorist is sure that his entrance in the junction would not cause obstructions in the traffic. Box Junction Lines are yellow solid lines in the form of a square in the centre of the junction and diagonal lines (odd in numbers) crossing each other at 90°. The size of the central yellow square shall be variable according to the size of the junction. Design details are provided in the Appendix C.

9.3 Pedestrian Signal Heads

Pedestrian signal heads provide special types of traffic signal indications exclusively intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a GREEN WALKING PERSON (symbolizing WALK) and an UPRAISED HAND or RED WALKING PERSON (symbolizing DONT WALK) as shown in Figure 55. Engineering judgment should determine the need for separate pedestrian signals.

Application of Pedestrian Signal Heads

Pedestrian signal heads shall be used in conjunction with vehicular traffic control signals under any of the following conditions:

- If a traffic control signal is justified by an engineering study and meets required Traffic Warrant or Pedestrian Volume or in case of specialized Crossing such as School or Hospital etc.
- If an exclusive signal phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped; or
- Where engineering judgment determines that multiphase signal indications (as with split-phase timing) would tend to confuse or cause conflicts with pedestrians using a crosswalk guided only by vehicular signal indications.

Pedestrian signal heads should be used under any of the following conditions:

- If it is necessary to assist pedestrians in making a reasonably safe crossing or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts;
- If pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval; and/or
- If no vehicular signal indications are visible to pedestrians, or if the vehicular signal indications that are visible to pedestrians starting or continuing a crossing provide insufficient guidance for them to decide when it is reasonably safe to cross, such as on one-way streets, at T-intersections, or at multiphase signal operations.

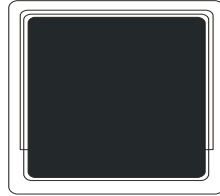
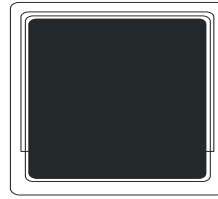
Size, Design, and Illumination of Pedestrian Signal Head Indications

Following should be considered while finalizing the size, design, and illumination of pedestrian signal head indications;

- ❖ All new pedestrian signal head indications shall be displayed within a rectangular background and shall consist of symbolized messages.
- ❖ Each pedestrian signal head indication shall be independently illuminated and emit a single color.
- ❖ The UPRAISED HAND (symbolizing DONT WALK) signal section shall be mounted directly above or integral with the WALKING PERSON (symbolizing WALK) signal section.
- ❖ The WALKING PERSON (symbolizing WALK) signal indication shall be white, with all except the symbol obscured by an opaque material.
- ❖ The UPRAISED HAND (symbolizing DONT WALK) signal indication shall be Portland orange, with all except the symbol obscured by an opaque material.
- ❖ When not illuminated, the WALKING PERSON (symbolizing WALK) and UPRAISED HAND (symbolizing DONT WALK) symbols shall not be readily visible to pedestrians at the far end of the crosswalk that the pedestrian signal head indications control.
- ❖ For pedestrian signal head indications, the symbols shall be at least 150 mm (6 in) high. The light source of a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication shall be flashed continuously at a rate of not less than 50 nor more than 60 times per minute. The illuminated period of each flash shall be not less than half and not more than two-thirds of the total flash cycle.
- ❖ Pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 3 m (10 ft) from the end of the controlled crosswalk during both day and night.
- ❖ For crosswalks where the pedestrian enters the crosswalk more than 30 m (100 ft) from the pedestrian signal head indications, the symbols should be at least 225 mm (9 in) high.



One Section



Two Section

Figure 55: Pedestrian Signal Head Indications

The installation of pedestrian signals should be based on an engineering study, which should consider the following factors:

- a. Potential demand for accessible pedestrian signals
- b. A request for accessible pedestrian signals
- c. Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes
- d. Complexity of traffic signal phasing
- e. Complexity of intersection geometry

10.Recommendations

In case of Gujranwala city, which has no proper-signalized traffic, it is recommended that all Neighborhood Streets, CBD Streets, Secondary and Primary Streets which do have space for pedestrian mobility must be provided with sidewalks. Potential locations from where pedestrians tend to cross road must be provided with Zebra Crossings. The Main Roads and Market Streets must be provided with Pelican crossing or Toucan crossing. Table 19 highlights the recommended pedestrian infrastructure to be provided at nine locations whereas Table 20 highlights the recommended pedestrian infrastructure to be provided as various road types. It is noteworthy here that those roads which are not included in the table can be provided necessary mobility infrastructure as per the above mentioned data and pedestrian requirements.

Table 19: Pedestrian Infrastructure at Nine Locations

Location	Infrastructure to be Provided	Signage to be Provided
Denga Phatak	Pedestrian Signal	Zebra Crossing, Stop Line, Dashed Line & Junction Box Marking
Sheranwala Bagh	Pedestrian Signal	Zebra Crossing, Stop Line, Dashed Line & Junction Box Marking
Sialkoti Darwaza	Pedestrian Signal	Zebra Crossing, Stop Line, Dashed Line & Junction Box Marking
Alam Chowk	Overhead Bridge	Stop Line, Dashed Line & Junction Box Marking
Gondalawala Phatak	Pedestrian Signal	Zebra Crossing, Stop Line, Dashed Line & Junction Box Marking
Mafiwala Chowk	Overhead Bridge	Stop Line, Dashed Line & Junction Box Marking
Munir Chowk	Pedestrian Signal	Zebra Crossing, Stop Line, Dashed Line & Junction Box Marking
Pindi Bypass	Underpass	Stop Line, Dashed Line & Junction Box Marking
Sheikhupura Morr	Overhead Bridge	Zebra Crossing, Stop Line, Dashed Line & Junction Box Marking

Table 20: Pedestrian Infrastructure as per Road Classification

Name	Classification of Road	Pedestrian Crossing Type
GT Road	Trunk Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Gujranwala Bypass	Trunk Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Sialkot Bypass	Trunk Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Alama Iqbal Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Dulley Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Eminabad Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Fato mand Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Ferozwala Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Gondlawala Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Hafizabad Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Hospital Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Kacha Eminabad	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Kacha Fatomand Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks

Nighar phatak Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Nowshera Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Sheikhupura Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Sialkot Road	Primary Road	Overhead Bridge for Perpendicular Crossing & Sidewalks
Aroop Road	Secondary Road	Zebra/ Pelican Crossing for Perpendicular Crossing & Sidewalks
Bazar Khardan	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Circula Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Civil Hospital DHQ	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
College Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Dastgeer Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
DC Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Ghanta Ghar	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Ghordor Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Gill Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Gurjkah Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks

Jail Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Jamia Masjid Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
jinnah Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Kacha Khiali Road I	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Kashmir Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Main market road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Mian Sansi Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Nowshera Sansi Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Parao Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Qazafi Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Rex Cinema Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Sui Gas Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Tipu Road	Secondary Road	Zebra/ Pelican Crossing & Sidewalks
Ahmad Nagar Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Airbase Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks

Al - Hamd Street	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Alipur Chatha Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Approach Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Atta Muhammad Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Awami Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Bajwa Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Bazar Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Bypass Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Canal Bank Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Cantt Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Cemetery Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Chenab Gate Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
CMH Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Dhonkal More Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Denga Phatak Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks



Exchange Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Garjakh Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
General Bus Stand Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Ghakka Mitter Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Ghalib Chowk Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Ghosia Flyover	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Gondlanwala Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
GT RD-Seikhpura Rd Link	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Gujranwala Cantt Airbase Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Haidri Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Jandu Sahi Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Kachehri Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Khajoor Wali Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Lamba Wali Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Lohian Wala Bypass	Local/Street	Zebra/ Pelican Crossing & Sidewalks

Madni Road	Local Street	Zebra/ Pelican Crossing & Sidewalks
Mandiala Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Model Town Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Munir Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Muslim Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Nomania Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Pasrur Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Prince Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Railway Rd	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Rustam Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Sadiq Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Session Court Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Shelton Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Stadium Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Station Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks

Sugar Mill Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Suvay Wala Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Tower Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Wadala Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks
Zia ul haq Road	Local/Street	Zebra/ Pelican Crossing & Sidewalks

Appendix

Annex A: Pedestrian Counts Performa

Transport Planning Unit, Transport Department, Government of Punjab

Pedestrian Count Survey



Name of Observer: _____

Day: _____

Location: _____ From: _____ To: _____

Sr. No.	Time		Tally Marks	Total Number
	From	To		
1				
2				
3				
4				

Annex B: Traffic Counts Performa

Transport Planning Unit, Transport Department, Government of Punjab

Traffic Count Survey

Survey Location _____ Surveyor Name _____

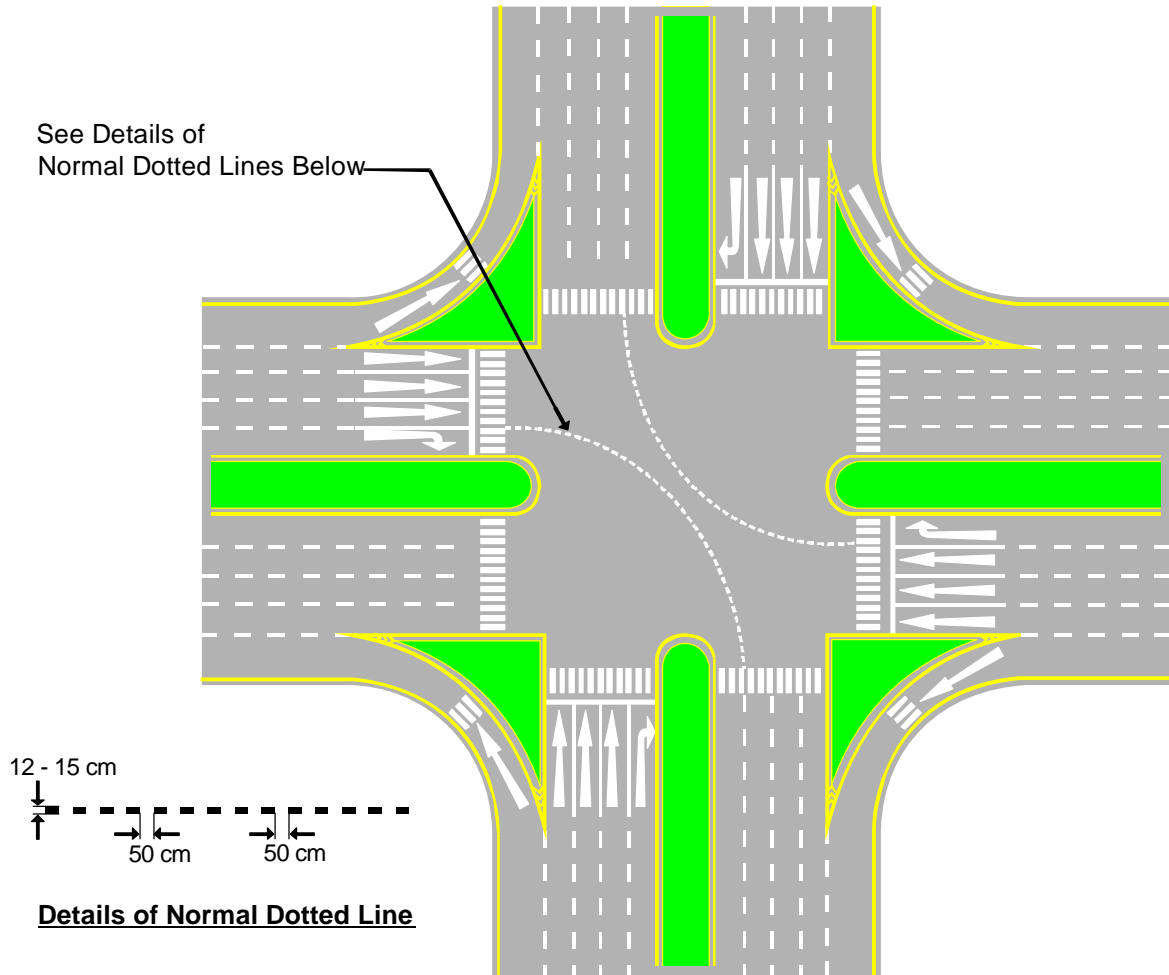
Survey Direction: From _____ to _____

Timing: From _____ To _____ Day _____ Date _____

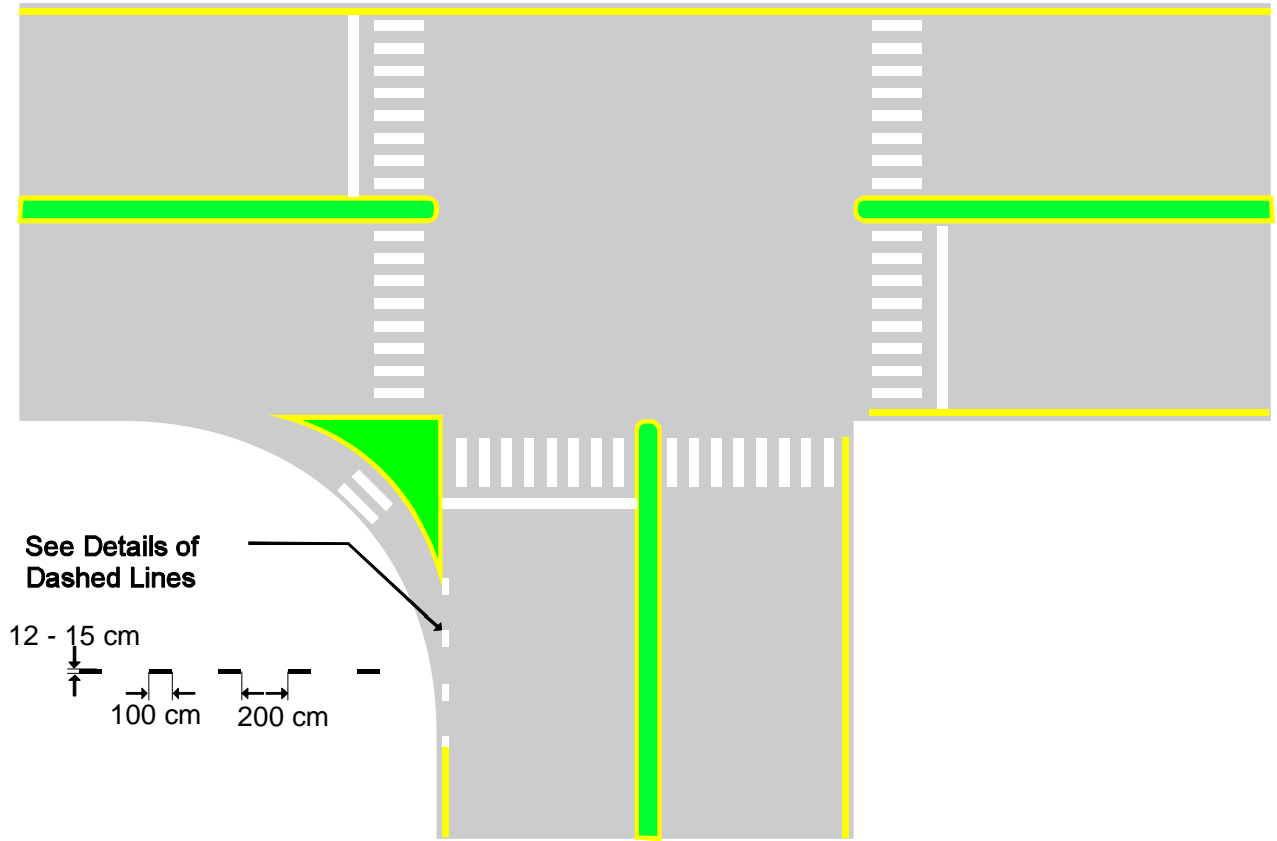
Type of Vehicle	Volume of Traffic (Tally Marks)	Total
Bicycle		
Motor Cycle		
Qingqi		
Car Taxi, Jeep, Suzuki Pick up		
Wagon/ Hiace		
Mazda/Coaster/Minibus		
Large Bus		
2-Axle Truck		
3 or more Axle Truck		
Animal Driven Cart		
Tractor Trolley		

Annex C: Pavement Markings and Signage

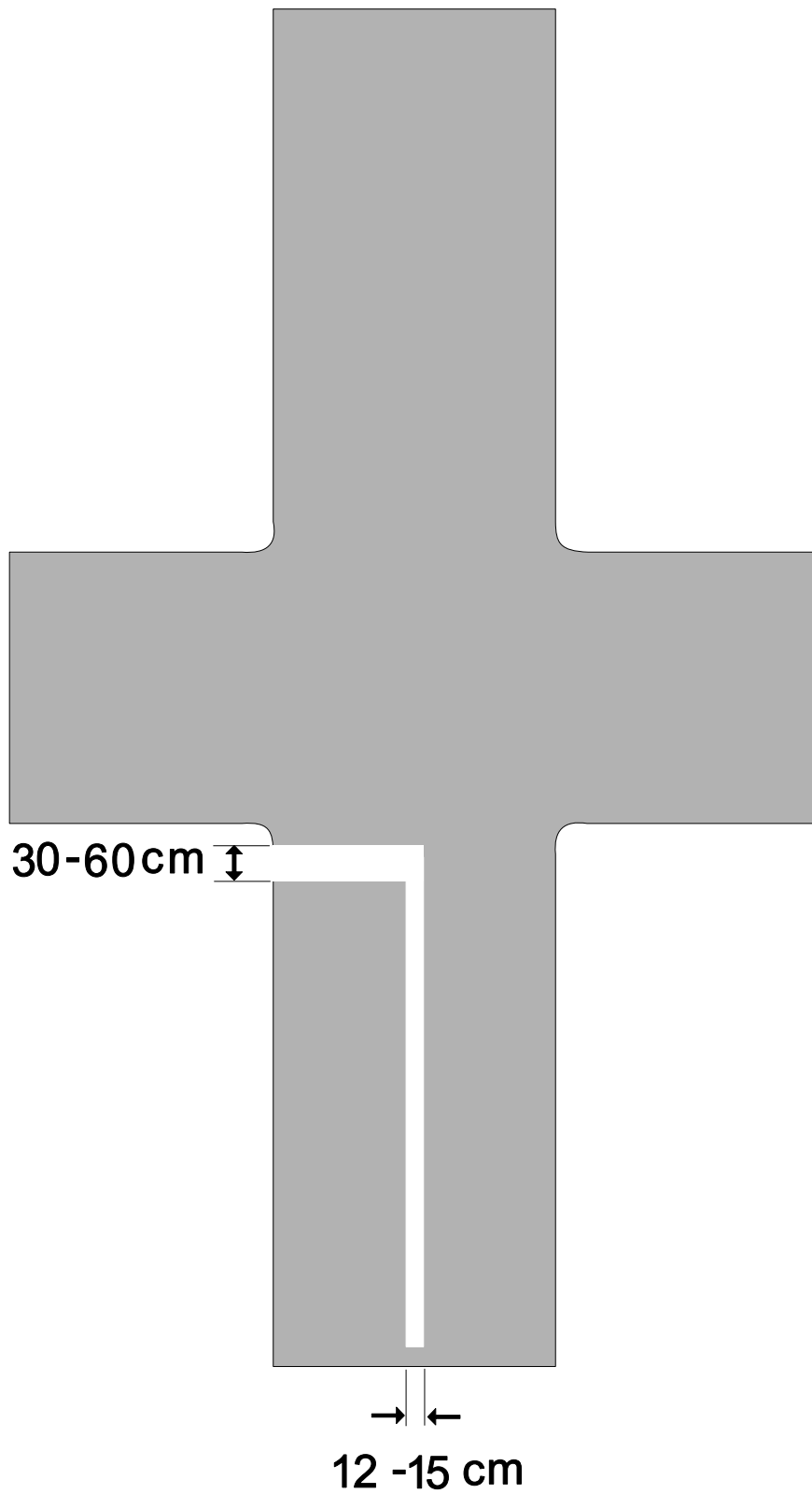
Normal Dotted Line



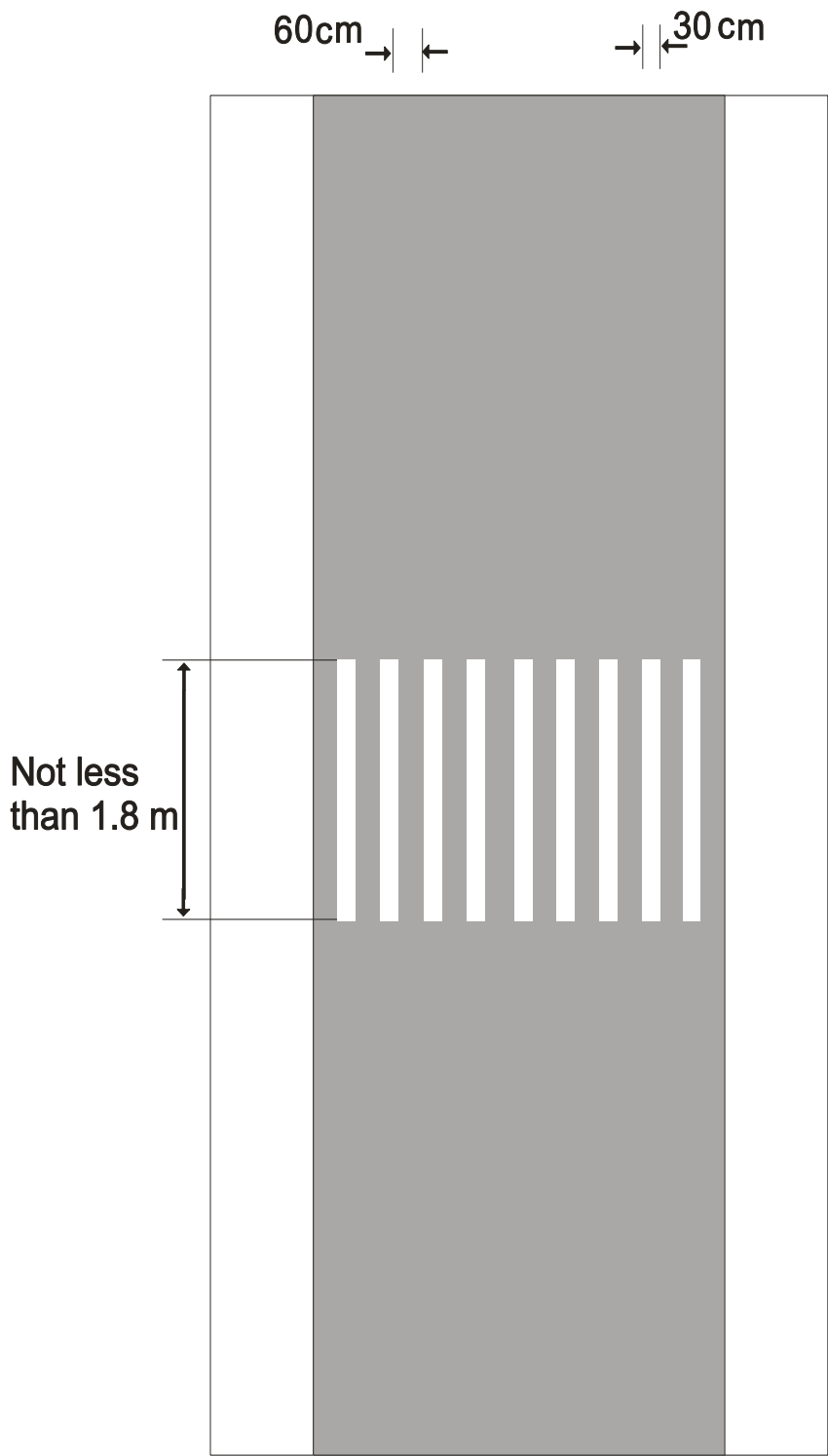
Dashed Line



Stop Line



Zebra Crossing



Box Junction Marking

