CENTRAL DELHI DISTRICT ROAD SAFETY REPORT

SUBMITTED TO:

TRANSPORT DEPARTMENT

Government of NCT of Delhi

सत्यमेव जयते

TRANSPORT DEPARTMENT

Government of NCT of Delhi

Report by:

TRANSPORT DEPARTMENT
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Figure 35 : (Right) - Pilot School Zone Central - Students walking on safe and accessible pedestrian paths, cycle track ..... **Error! Bookmark not defined.**

Figure 36 : (Left) - Pilot School Zone Central - Student using Dedicated drop off zone. Learning aid, vendor spaces, green areas and waiting spaces integrated as part of pedestrian environments**Error! Bookmark not defin**

Figure 37 : (Right) - Waiting area and street art in front of Government school**Error! Bookmark not defined.**

Figure 38 : (Left) - School students using the newly built segregated cycle track during school commute**Error! Bookmark**

Figure 39 : (Right) - Segregated Cycle Track with cycle parking separated by Multi Utility Zone with signages (as per IRC 67: 2022) and street lighting .....**Error! Bookmark not defined.**

Figure 40 : Safe NMT Infrastructure segregated on both sides (Left); Learning Aid integrated with NMT Infrastructure for students (centre); Students walking to school from intersection (Right) **Error! Bookmark not defined**

Figure 41 : Area between schools used as a shared space with SDG floor corner street art - safety promise and play and gym areas (Left): Students using the corner for waiting and learning about road safety principles (Right) .....**Error! Bookmark not defined.**

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LIST OF ABBREVIATIONS

- **GNCTD** Government of National Capital Territory of Delhi
- **DM** District Magistrate
- **DMRC** Delhi Metro Rail Corporation
- **DRSC** District Road Safety Committee
- **DTC** Delhi Transport Corporation
- **DTP** Delhi Traffic Police
- **FIR** First Information Report
- **FOB** Foot Over Bridge
- **GIS** Geographic Information System
- **GT** Grand Trunk
- **HV** Heavy Vehicle
- **IACP** International Association of Chiefs of Police
- **IIT** Indian Institute of Technology
- **IPC** Indian Penal Code
- **IRC** Indian Road Congress
- **iRAD** Integrated Road Accident Database
- **ISBT** Inter State Bus Terminal
- **KM** Kilometre
- **LMV** Light Motor Vehicle
- **MACT** Motor Accident Claims Tribunal
- **MCD** Municipal Corporation of Delhi
- **MoRTH** Ministry of Road Transport and Highways
- **MPD** Master Plan for Delhi
- **MTW** Motorised Two-Wheeler
- **NCR** National Capital Region
- **NCT** National Capital Territory

- **NGO** Non-Governmental Organisation
- **NH** National Highway
- **NHAI** National Highways Authority of India
- **NIC** National Informatics Centre
- **NSP** Netaji Subhash Place
- **PCR** Police Control Room
- **QGIS** Quantum Geographic Information System
- **RSLA** Road Safety Lead Agency
- **SKV** Sarvodaya Kanya Vidyalaya
- **SOP** Standard Operating Procedure
- **TRIPC** Transportation Research and Injury Prevention Centre
- **UT** Union Territory
- **WHO** World Health Organisation

KEY HIGHLIGHTS

- Fatal road crashes increased from 148 to 199 from 2021 to 2022.
- Pedestrians comprised 53% of the fatalities and motorcyclists comprised 32% of the fatalities in 2022.
- A large number of fatal crashes occurred between 2200 to 0600 hours.
- More than half of the fatal crashes(57%) are hit-and-run cases.
- A large number of fatal crashes involving pedestrians and motorcyclists were hit and run cases.
- The high-risk locations of the Central District are ITO Intersection, Timarpur Intersection and SKV Zeenat Mahal, Kamla Market.

INTRODUCTION

There has been an increase of road crash fatalities in Delhi since the easing of pandemic mobility restrictions. Vulnerable road users such as pedestrians, two-wheeler occupants and three-wheeler occupants are most at risk of severe injuries and - in worst case scenarios - death in a road crash. This risk which hinders the basic right of mobility for the road users warrants that effective and evidence-based road safety interventions and programs must be implemented regularly and systematically to mitigate the effects of road crashes.

In the year 2023, the Transport Department released the 'Data to Action' report which analysed 2019 to 2021 data and identified high-risk locations for each of the eleven districts in Delhi. The report provided detailed maps, overall analysis for the National Capital Territory (NCT) of Delhi, and general recommendations for each district. The report was presented to the District Road Safety Committees (DRSCs) to guide them in implementing road safety interventions and address the most urgent road safety risk factors in their jurisdictions. The DRSCs take the lead in drafting the district road safety plan. They are instrumental in planning road safety interventions for high-risk locations in the district, implement interventions on the ground, and disburse road safety funds.

As a next logical step, to take evidence-based action in order to reduce crashes, the Transport Department are producing highly customised district specific road safety reports (DRSR) for the DRSCs. These reports include detailed findings on road crashes in the given district including a list of high-risk locations and provide specific recommendations to reduce crashes. The purpose of these DRSR is to guide DRSCs in implementing evidence-based interventions to reduce crash fatalities in high-risk locations and provide detailed infrastructure designs for specific locations which can be readily implemented on ground. The ultimate goal of this process is to inform and train the DRSC members in replicating the evidence-based action in the future.

METHODOLOGY

DATA SOURCE

The District Road Safety Report (DRSRs) focused on road crash fatalities' data in the National Capital Territory (NCT) of Delhi from the years 2019, 2021 and 2022. The data source for this report is police crash data records from the Motor Accident Claims Tribunal (MACT) cells of the Districts. In addition, this data is supplemented by the FIR lists from the Delhi Traffic Police. The dataset was compiled, digitised, and cleaned at the Transport Department.

DATA ANALYSIS

The digitised datasets were compiled and analysed using MS Access to produce descriptive statistics and were mapped using Quantum Geographic Information Systems (QGIS) platform, to identify high-risk locations including high-risk corridors in each district. Similar process will be followed for producing district road safety reports for the remaining districts.

ON-SITE INVESTIGATION OF HIGH-RISK LOCATIONS AND CORRIDORS

An in-depth and on-site investigation was conducted for the identified high-risk locations. At the site, both qualitative and quantitative data were collected which informed the design of the interventions. The data collection was based on the following parameters:

- Inspection of the road infrastructure and land use at the site.
- Identification of hazards and conflict points, especially pedestrians' movement, bus stop locations.
- Assessment of the type and quality of enforcement
- Observations on road user behaviour, parked vehicles, street vendors and accessibility of vulnerable road users
- Identification of types of road users and traffic mix and speed.

These data points were collated and presented for the selected high-risk sites, and were used to inform the design of the proposed interventions.

REPORT STRUCTURE

Each district has a dedicated report. There will be a total of 11 reports - one for each district in NCT Delhi. The report is divided into three parts. The first part includes the introduction of road safety in the context of the district, and methodology that was followed to produce the report. The second part covers the discussion on the road safety situation in the given district. Finally, the last part of the report provides detailed investigation and recommendations for the selected high-risk sites in the district.

ABOUT THE DISTRICT

The District of Central Delhi is bounded by River Yamuna to the east, districts of North Delhi to the north, West Delhi and North West Delhi to the west, New Delhi and South East Delhi to the south, and East Delhi, Shahdara, and North East Delhi to the east across the Yamuna.

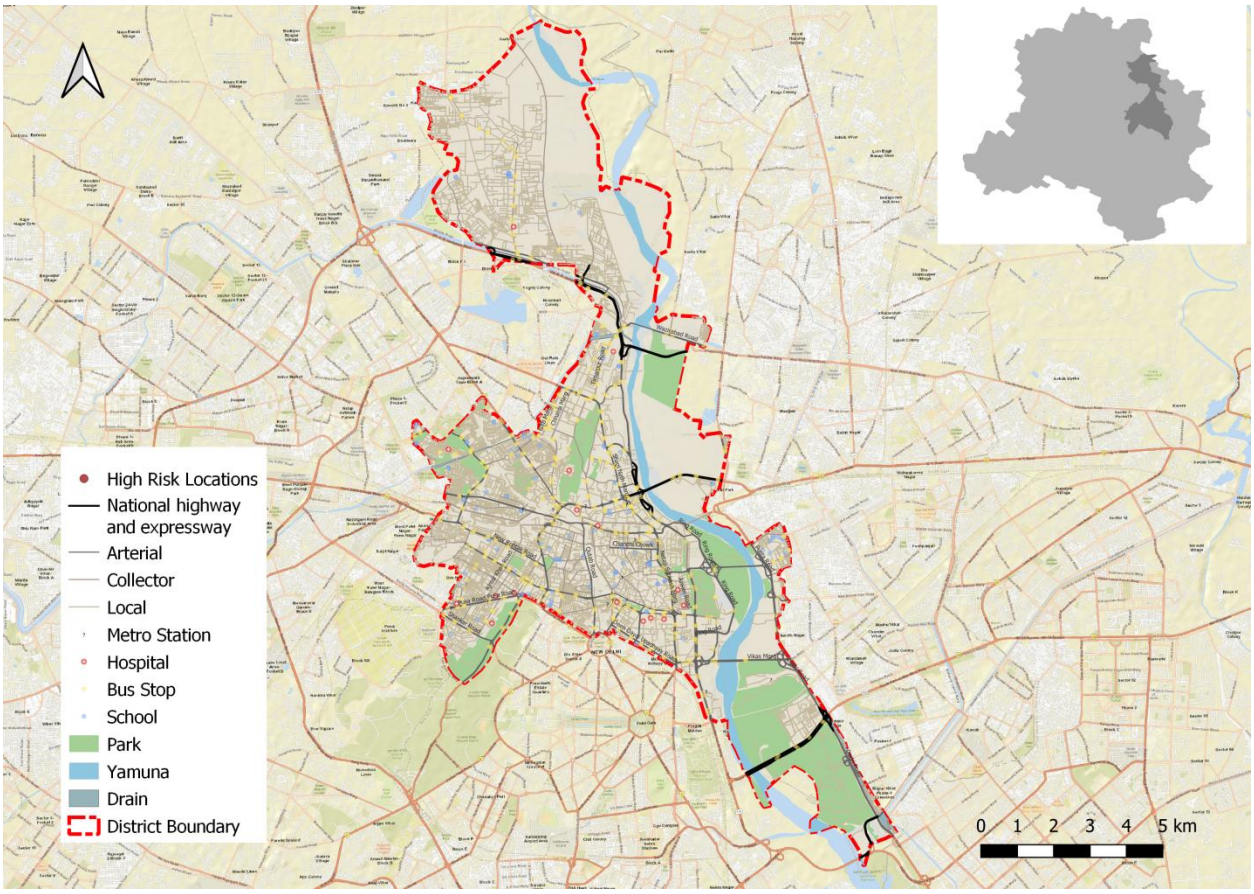


Figure 1: Central district map

A: ROAD SAFETY SITUATION AND TRENDS IN CENTRAL DISTRICT

A.1: ROAD CRASH DEATH TRENDS

A.1.1 : FATAL ROAD CRASHES AND FATALITIES TREND.

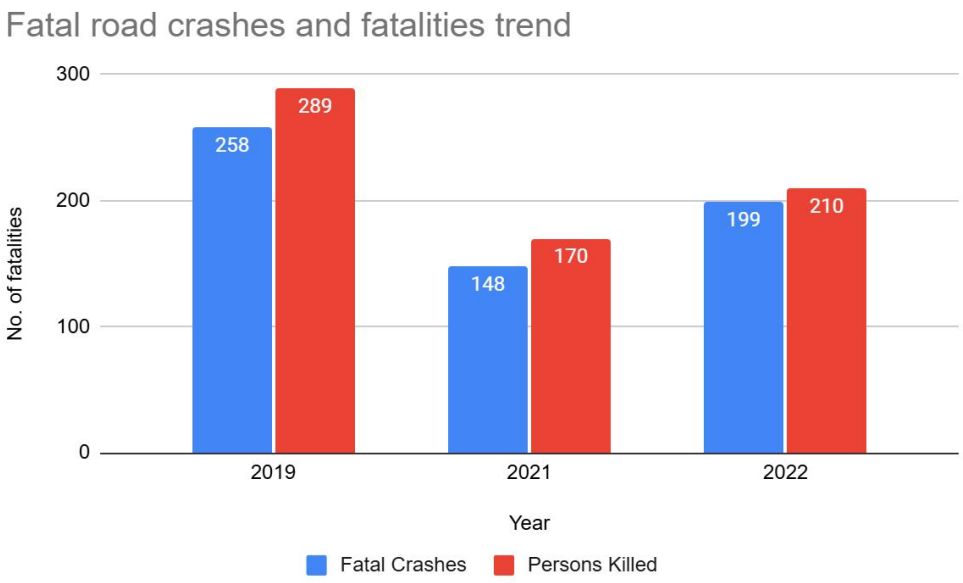


Figure 2: Fatal Road crashes and fatalities trend

There were 199 fatal road crashes in the Central District of Delhi in 2022 with 210 persons killed in these crashes. There is a 34% increase compared to the previous year 2021 which is 148. One person is killed in road crashes in the Central District every two to three days.

A.1.2 : ROAD CRASH FATALITIES BY ROAD USER TYPES

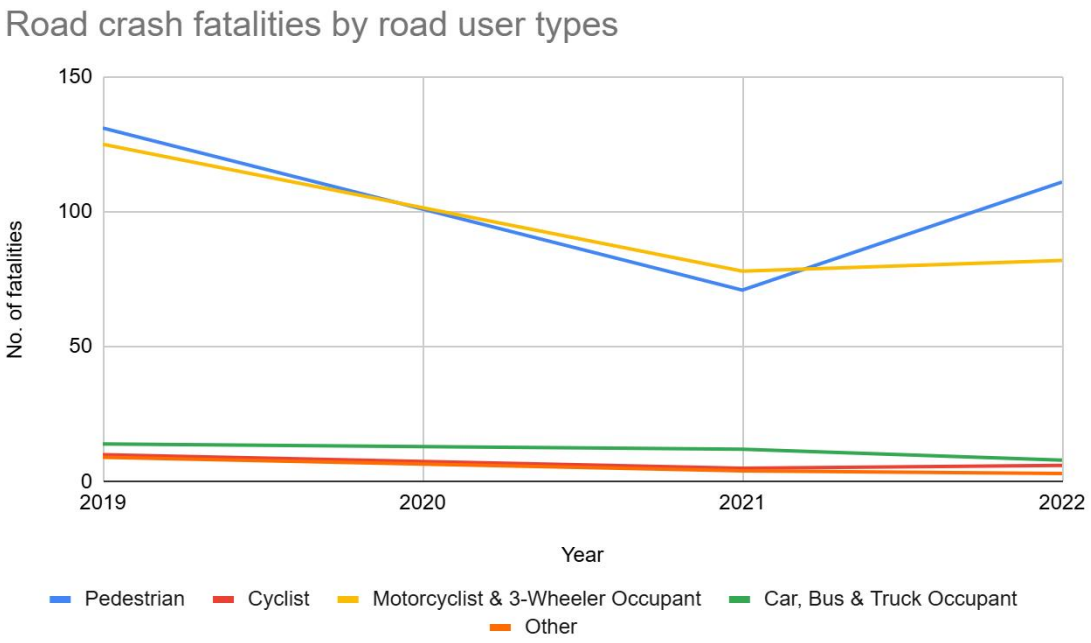


Figure 3: Road crash fatalities by road user types

Pedestrians formed a majority of persons killed in road crashes in the Central District across all three years, followed by motorcyclists and auto rickshaw occupants. Between the highlighted categories, the pedestrians' fatalities surpassed the motorcyclist and autorickshaw occupants' fatalities in 2019 and 2022.

A.1.3 : ROAD CRASH DEATHS BY MONTH

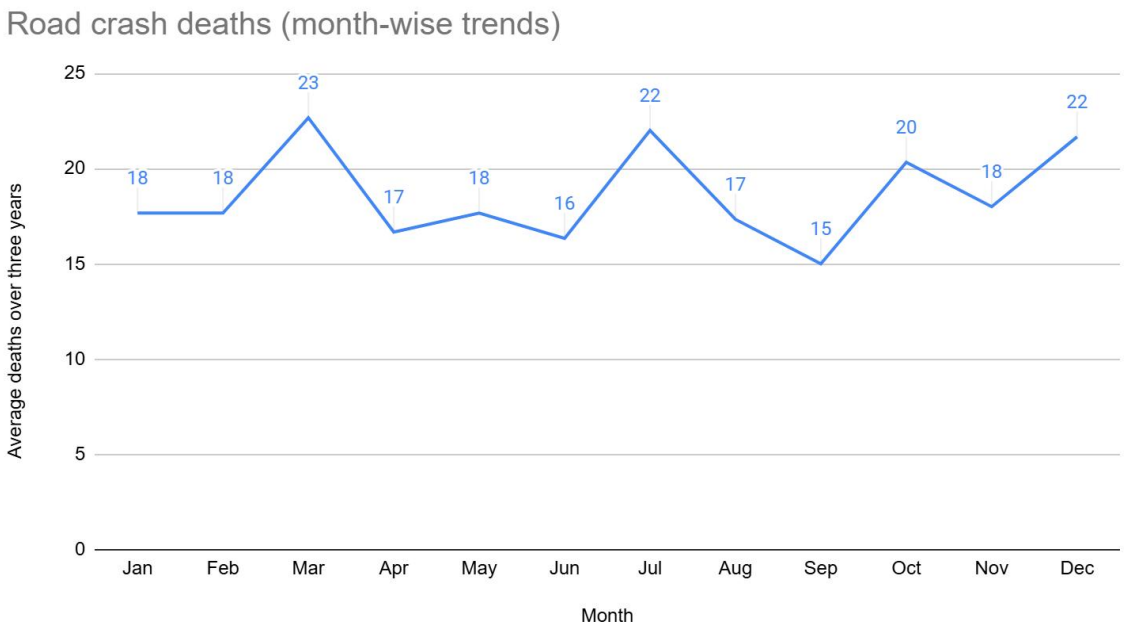


Figure 4: Average Road crash deaths by months

March witnessed the highest number of persons killed followed by July and December, there is no discernible pattern of fatalities by month.

A.1.4 : ROAD CRASH DEATHS BY TIME AND DAY OF WEEK

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
02:00-06:00	10	8	10	12	16	15	16	**87**
06:00-10:00	10	7	11	10	8	15	9	**70**
10:00-14:00	7	11	9	11	11	10	4	**63**
14:00-18:00	14	5	14	8	13	10	14	**78**
18:00-22:00	21	16	18	14	12	27	14	**122**
22:00-02:00	24	31	19	29	25	26	34	**188**
Total	**86**	**78**	**81**	**84**	**85**	**103**	**91**	**608**

Table 1: Road crash deaths by time and day of week

Thirty-one percent of the total road crash deaths occurred at night 10:00 pm to 2:00 pm. Forty-six percent of the total deaths occurred either on Fridays, Saturdays and Sundays.

A.2: ROAD CRASH DEATHS BY AGE AND GENDER

A.2.1 : ROAD CRASH DEATHS BY GENDER

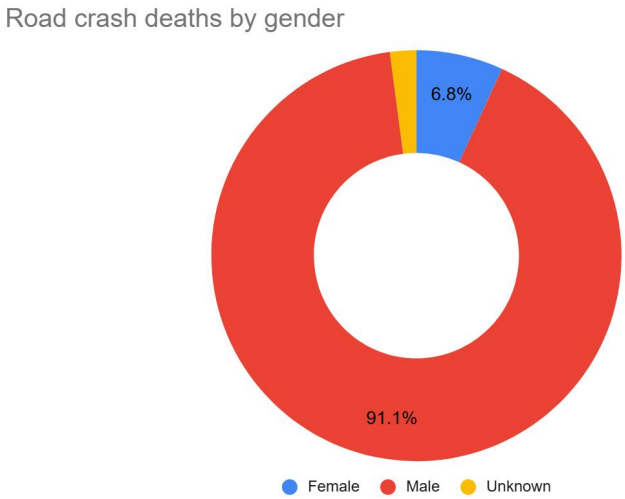


Figure 5: Road cash deaths by gender

A.2.2 : ROAD CRASH DEATHS BY AGE-GROUPS AND GENDER

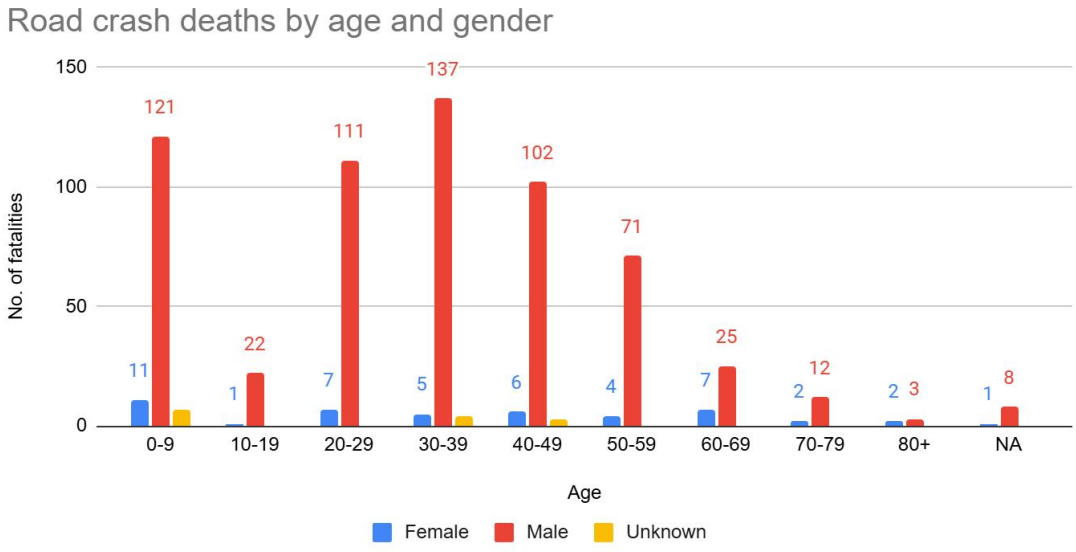


Figure 6: Road crash deaths by age groups and gender

Looking at the absolute numbers, the males had a higher number of fatalities 91% compared to females. Among the males, the fatalities were observed to be highest in the age group of 30-39 years, followed by 0-9 years.

A.3: ROAD CRASH DEATHS BY ROAD USER TYPE

A.3.1 : TOTAL ROAD CRASH DEATHS BY ROAD USER TYPE (2019, 2021, 2022)

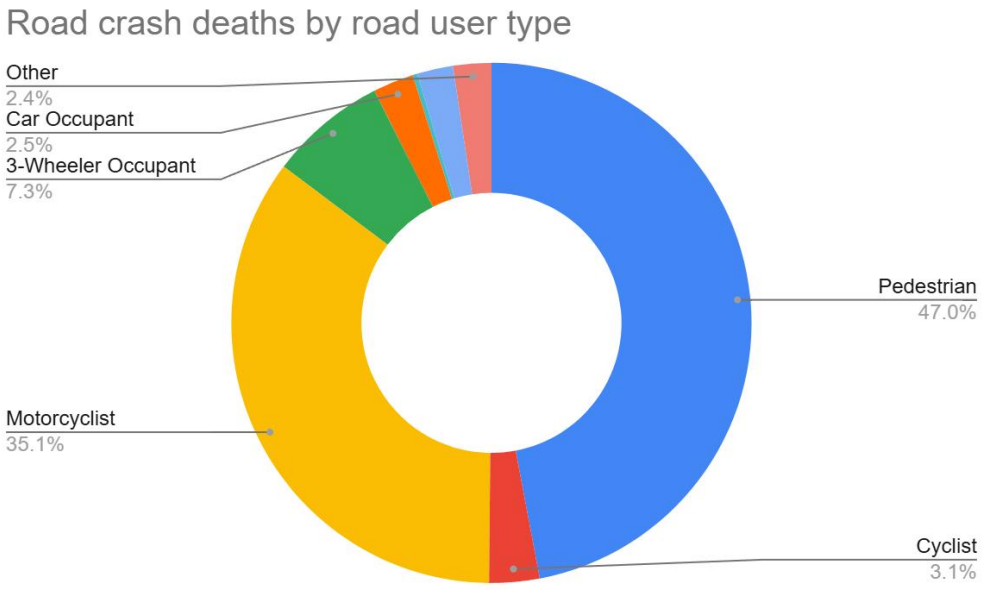


Figure 7: Road crash deaths by road user type (2019, 2021, 2022)

*Other includes cycle rickshaws, converted rickshaws and hand carts

Ninety-three percent of fatalities were among vulnerable road users (i.e., pedestrians, motorcyclists, cyclists, and auto rickshaw occupants). Among this, forty-seven percent of road crash deaths in the Central district were among pedestrians, followed by motorcyclists (35%).

A.3.2 : TIMEWISE ROAD CRASH DEATHS BY ROAD USER TYPE

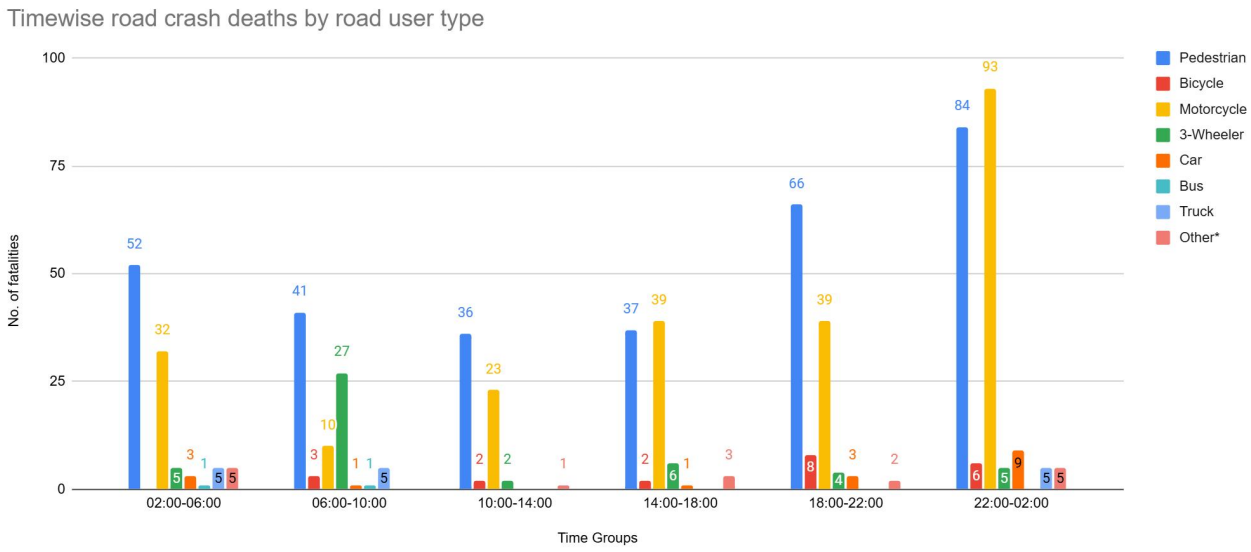


Figure 8: Timewise Road crash deaths by road user types

*Other includes cycle rickshaws, converted rickshaws and hand carts

A.3.3 : WHO-HIT-WHOM MATRIX

Victim Road User	Impacting Vehicle								
	Motorcycle	3-Wheeler	Car	Bus	Truck/ Tractor	Single Vehicle Crash	Other	Unknown	Total
Pedestrian	22	8	33	24	35	0	1	193	**316**
Cyclist	3	1	8	2	2	0	0	5	**21**
Motorcyclist	8	0	22	21	44	33	2	106	**236**
3-Wheeler Occupant	2	1	4	10	21	2	2	7	**49**
Car Occupant	1	1	3	1	1	7	0	3	**17**
Truck Occupant	4	0	0	0	3	6	1	1	**15**
Other	1	1	2	2	1	3	0	8	**18**
Total	**41**	**12**	**72**	**60**	**107**	**51**	**6**	**323**	**672**

Table 2: Who-hit-whom matrix

Note: Other includes cycle rickshaws, converted rickshaws and hand carts

Among all fatal road crashes where the impacting vehicle was known, pedestrians and motorcyclists were found to be the most vulnerable category of road users. They were often hit by trucks and tractors. Hit-and-run crashes dominate both the categories of cases where the impacting vehicle was not known for 193 cases in case of pedestrians and 106 in case of motorcyclists.

A.4: HIT-AND-RUNS IN FATAL ROAD CRASHES

A.4.1 : PERCENTAGE OF HIT-AND-RUN AND NON-HIT-AND-RUN CASES

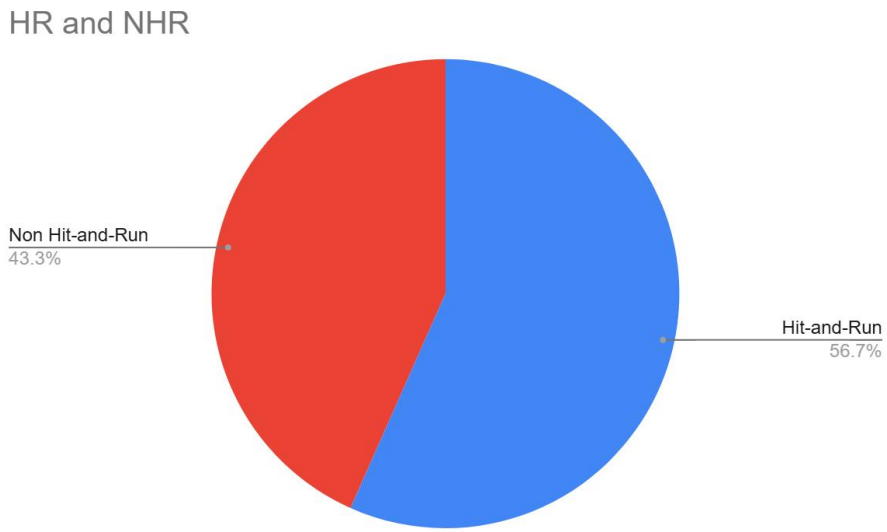


Figure 9: Percentage of hit-and-run and non-hit-and-run cases

Overall, more than half of the fatal crashes are hit-and-run cases. The high rate of hit-and-run cases is indicative of non-reporting of accused vehicles as well as non-reporting of crashes by the public.

A.4.2 : HIT-AND-RUN ROAD USER TYPES

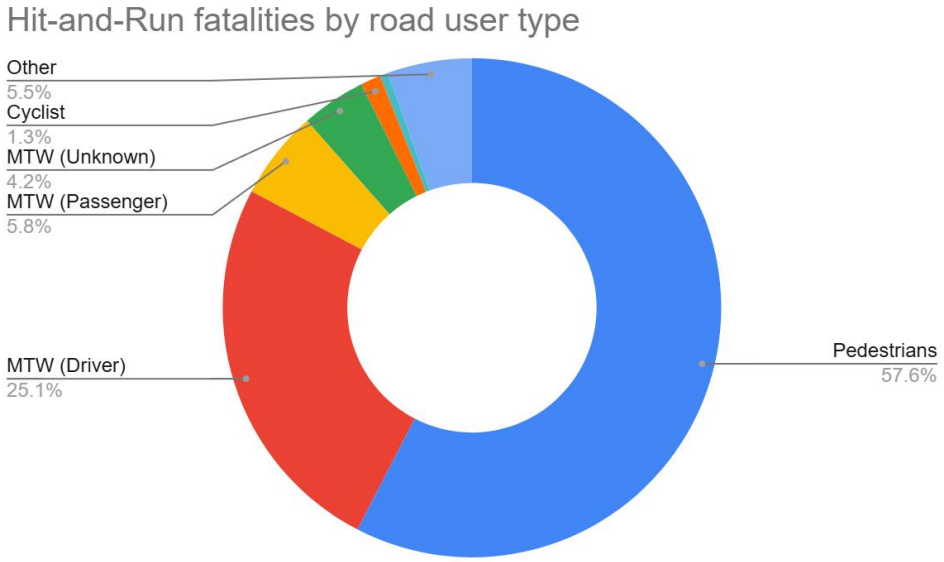


Figure 10: Hit-and-run Road user types

A.5: ROAD CRASH HEATMAPS

A.5.1 : HEATMAP OF ALL ROAD CRASH DEATHS

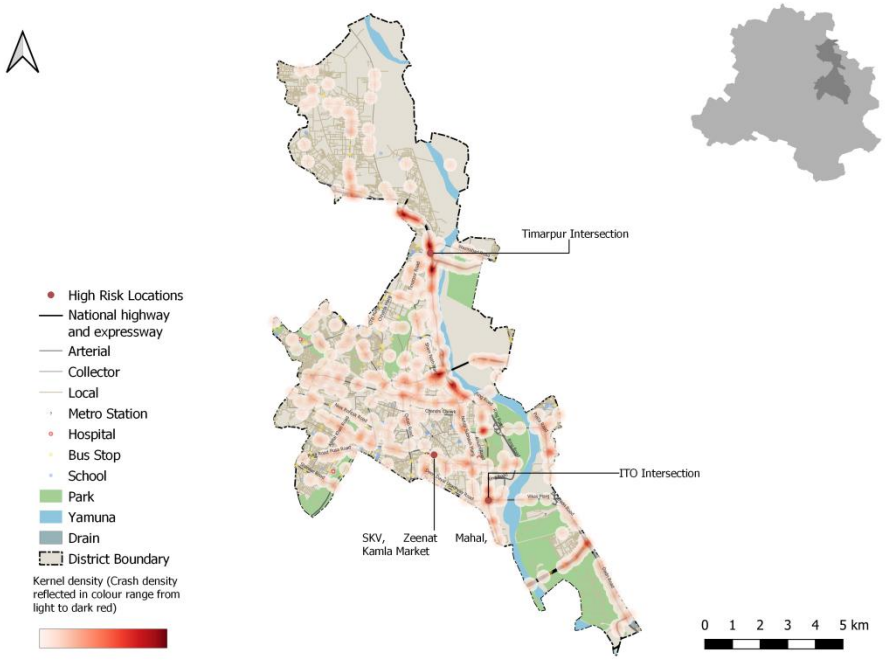


Figure 11: Heatmap of all road crash deaths in Central district

A.5.2 : HEATMAP OF ALL PEDESTRIAN DEATHS

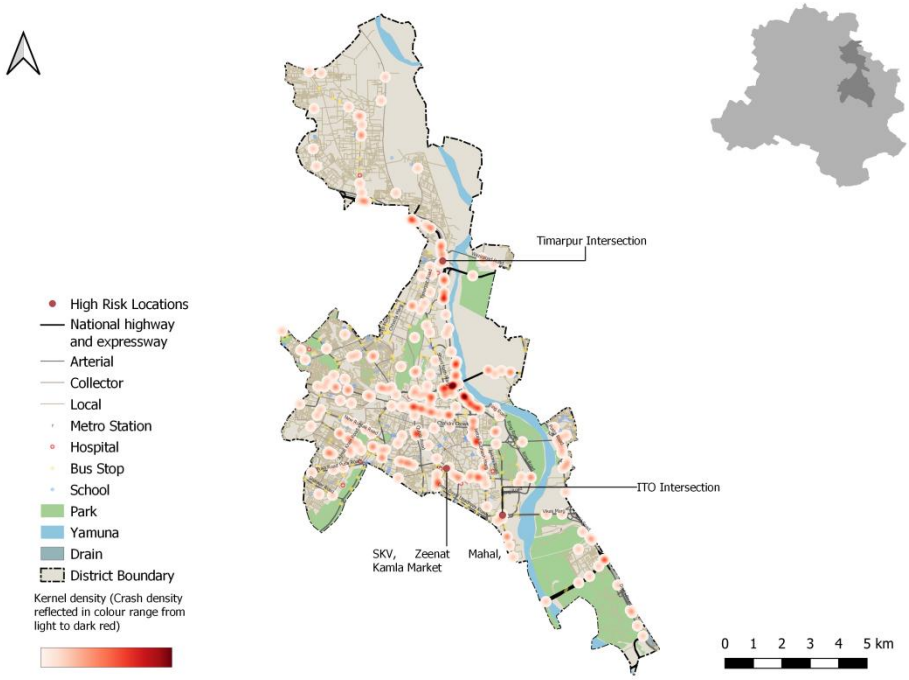


Figure 12: Heatmap of all pedestrian deaths due to road crashes in Central District

A.5.3 : HEATMAP OF ALL MOTORCYCLE (RIDER + PILLION) RELATED DEATHS

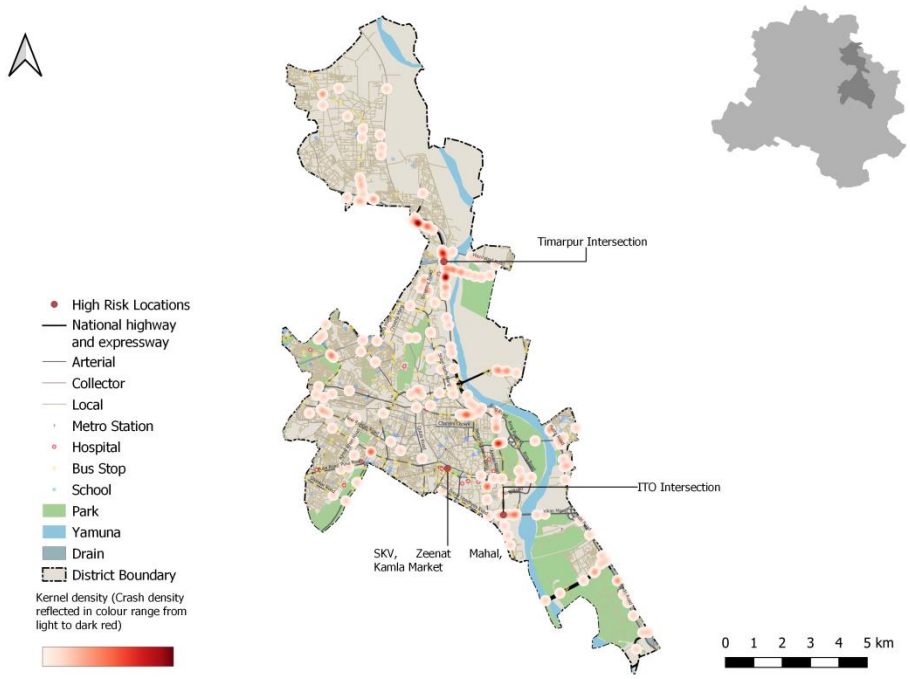


Figure 13: Heatmap of all motorcycle related deaths due to road crashes in Central District

A.6: HIGH RISK LOCATIONS

A.6.1 : LIST OF HIGH-RISK LOCATIONS

The following is a list of high-risk locations in the Central district which includes the number of fatal crashes, hit-and-run crashes, and deaths occurred during these crashes in years 2019, 2021 and 2022.

High Risk Location	Total fatal crashes	Total hit and run fatal crashes	Total persons killed
ITO Intersection	16	4	28
Timarpur Intersection	17	14	17
SKV, Zeenat Mahal, Kamla Market	3	2	3

Table 3: List of high-risk locations

A.6.2 : MAP OF ALL HIGH-RISK LOCATIONS

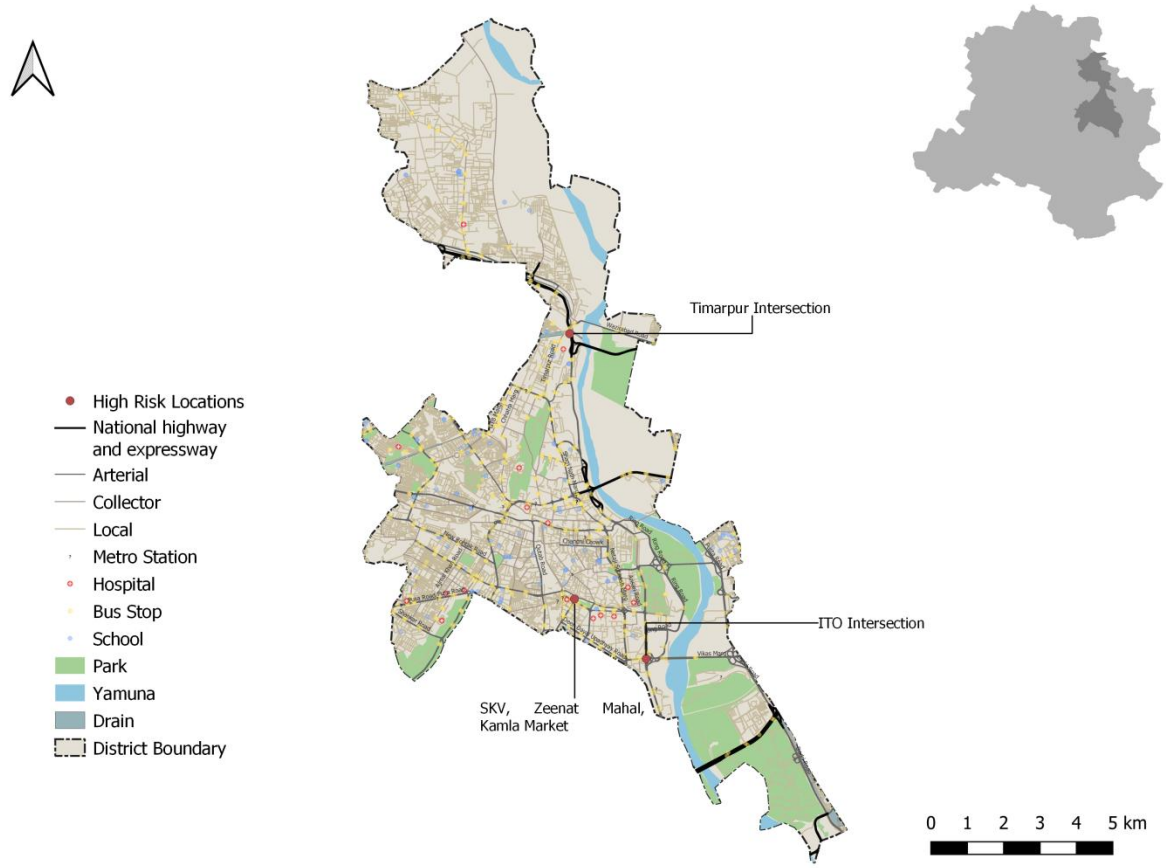


Figure 14: Map of all high-risk locations intervened in Central District

A.6.3 : HIGH RISK CORRIDORS

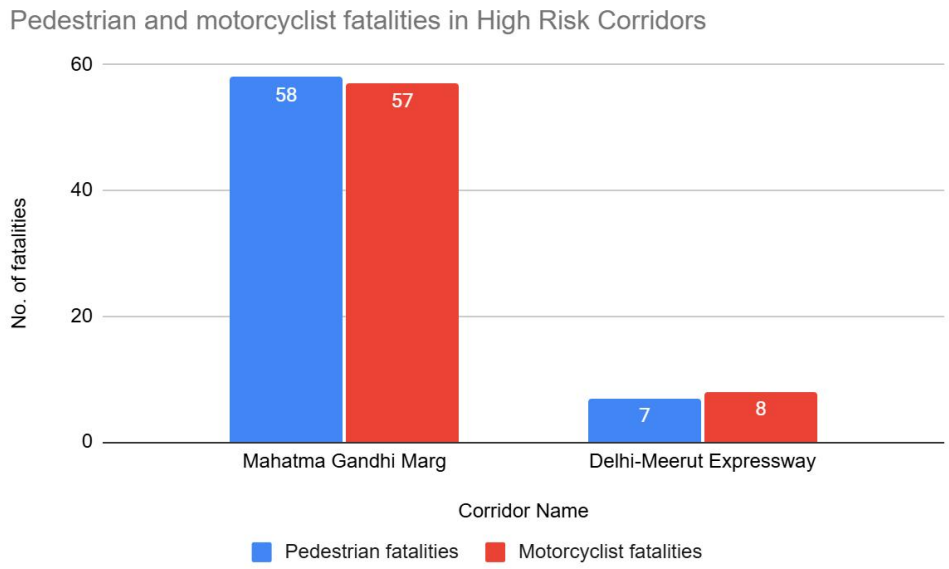


Figure 15: Vulnerable Road users on corridors

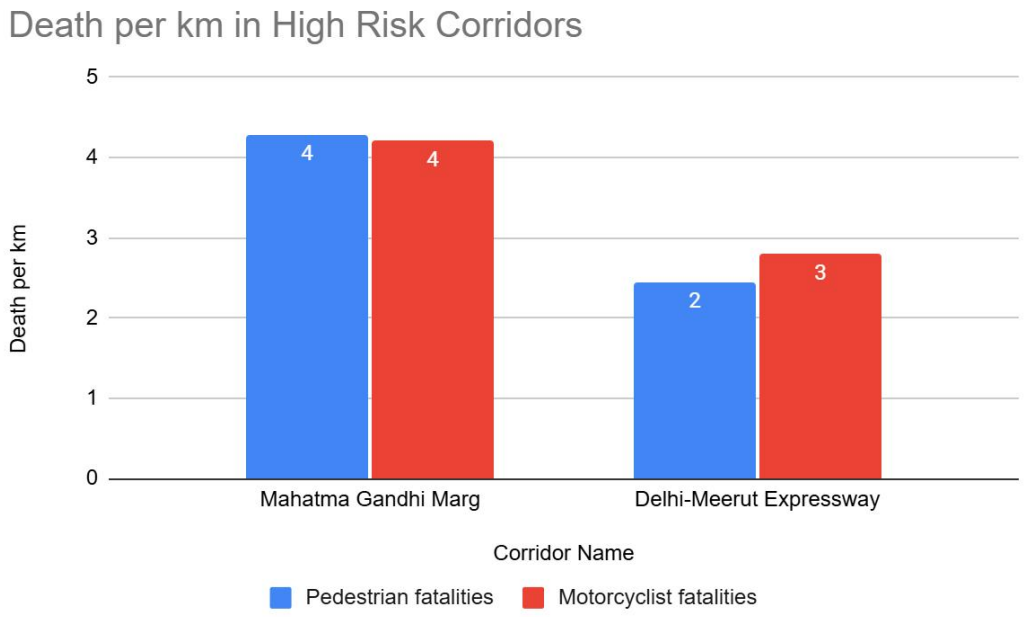


Figure 16: Vulnerable Road users' death per km

B : DATA TO ACTION

B.1 : ITO INTERSECTION

B.1.1 : GENERAL DESCRIPTION OF THE SITE

ITO Intersection (Latitude:28°37’41.06"N, Longitude: 77° 14’48.90"E). It is a four arm intersection which is signalised. The intersecting road names are Indraprastha Marg (Arterial) and Mahatma Gandhi Road(Arterial Road).

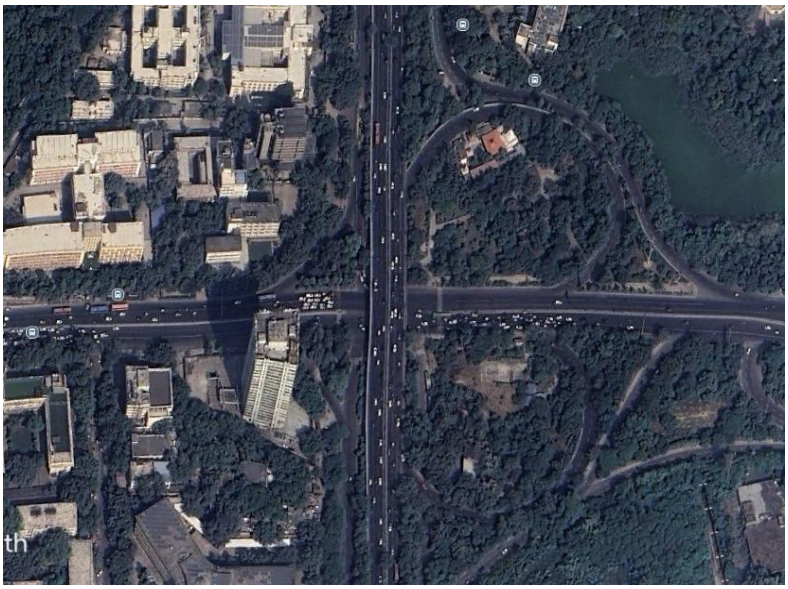


Figure 17: ITO Intersection satellite image

B.1.2 : EXISTING LAND USE

Figure 18: Existing land use around ITO Intersection

B.1.3 : EXISTING SCENARIO

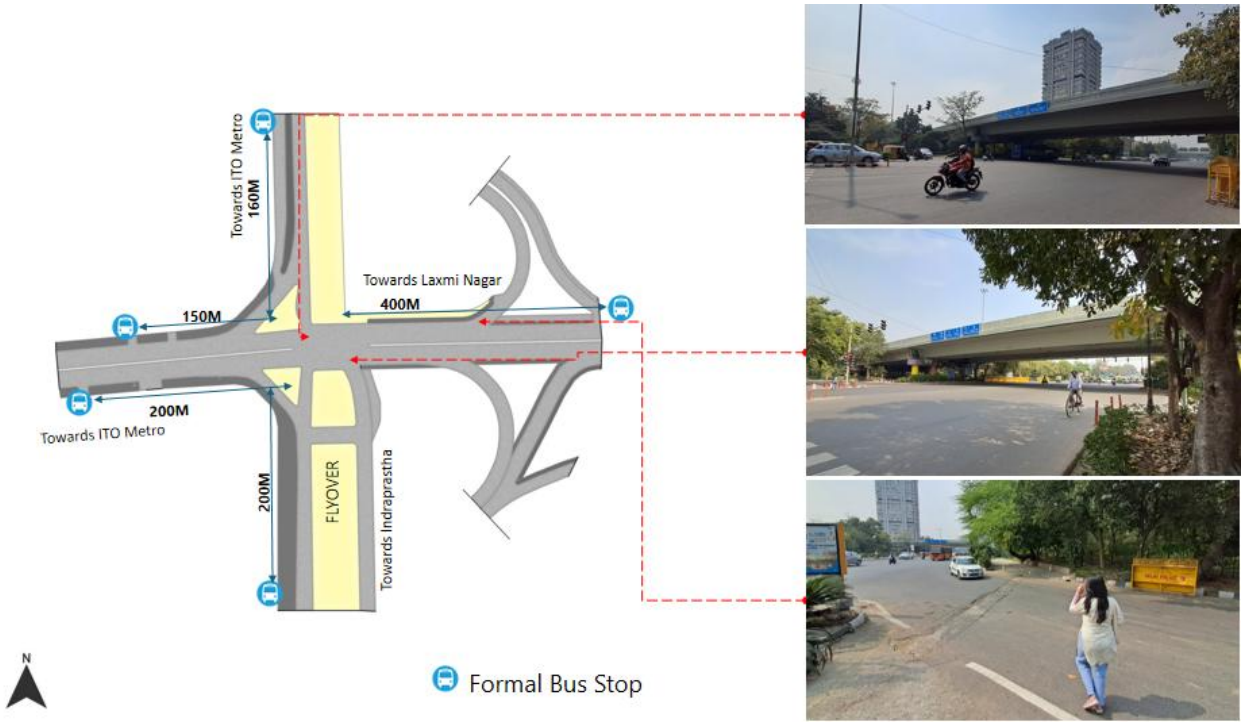
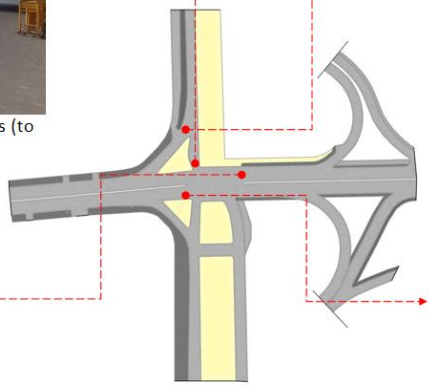


Figure 19: Existing scenario of ITO Intersection

B.1.4 : ISSUES IDENTIFIED

Absence of traffic calming near junctions (to control the speed of vehicles).

Absence of kerb ramp.



Parked vehicles on the carriageway

Absence of delineators and reflectors on the median and carriageway edges.

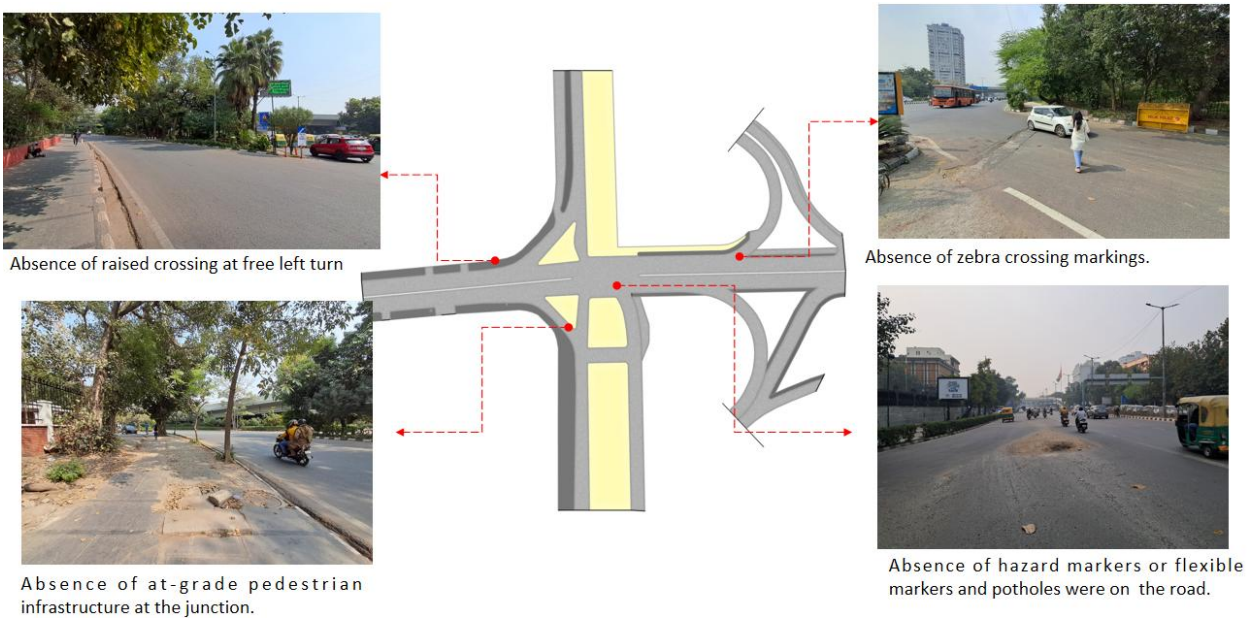


Figure 20: Issues identified at ITO Intersection

Issues Identified:

1. Absence of at-grade pedestrian infrastructure at the junction, making the pedestrians extremely vulnerable among the highspeed traffic movement.
2. Absence of bus stops near junction.
3. Damaged & uneven road surface and pedestrian infrastructure.
4. Absence of traffic calming near junctions (to control the speed of vehicles).
5. Absence of road markings, signages and speed control measures at the intersection.
6. Absence of delineators and reflectors on the median and carriageway edges.
7. Absence of segregated cycle tracks on arterial roads.
8. Parked vehicles on the carriageway.
9. Absence of maintained tactile flooring for differently abled users.
10. Damaged and obstructed pedestrian infrastructure on each arm, most of the pedestrian is damaged and obstructed with construction work.

B.1.5 : PROPOSED DESIGN

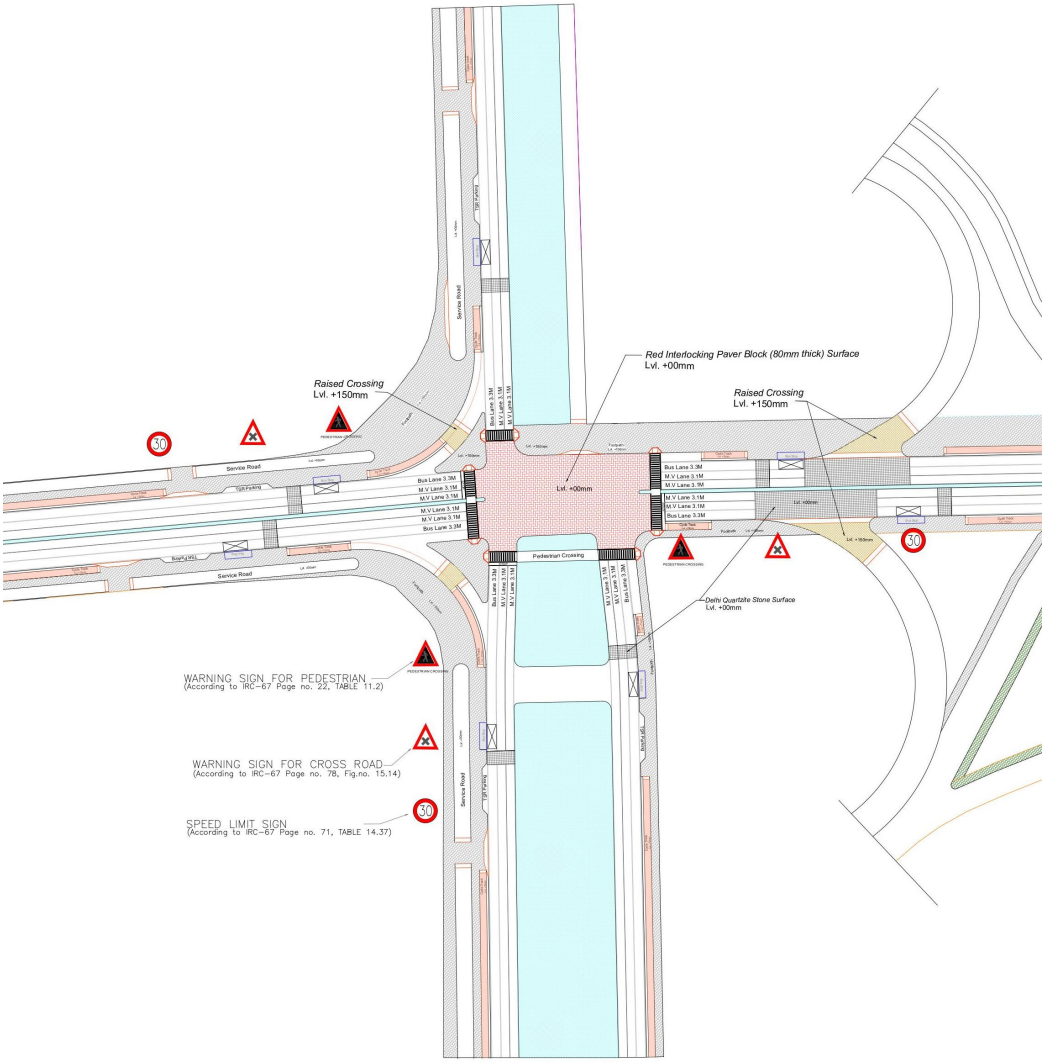


Figure 21: Proposed design for ITO Intersection

1. The junction is redesigned for the speed of 30 km/hr to ensure the safety
2. Proposed at-grade pedestrian infrastructure to increase the accessibility and safety for pedestrians (as per IRC:103-2022)
3. Proposed new bus stop near the junction (30m to 100m) to reduce the pedestrian crossing movement
4. Provision of red interlock paver block surface at intersection to reduce the speed
5. Installation of signages - Speed Limit, stop sign, pedestrian crossing and other necessary Signages on all approaching roads
6. Corrected turning radius, road width and proposed raised crossing on free left turn
7. Provision of Delhi Quartzite stone surface before bus stops and entry/exits of flyover ramps to slow down the approaching traffic
8. Demarcation of Road Markings (properly painted as per IRC 35)
9. Provision of tactile pavers and kerb ramps for the accessibility of differently abled users (as per IRC:103-2022)
10. Provision of kerb ramp, bollards and refuse island for pedestrian crossing.

B.1.6: SUMMARY BUDGET ESTIMATES

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
A	**CIVIL WORK**					
A.1	Footpath (Primary, Secondary including other Flooring area)	2m to 3m wide segregated footpath with tactile pavers	Providing and Laying of footpath 2m to 3m wide, including earthwork and base layer - PCC, GSB and finsihing material.	2909	26,852,979	2.685
A.2	Raised Crossing	Raised crssing with 80mm thick pavers and DQ stone surface	Providing and laying Raised crosseing with 80 mm thk pavers blocks, and DQ stone including Earth work and Base layers- PCC (M15), RCC (M30 Design mix) & GSB etc.	3469	10,911,221	1.091
A.3	Cycle Infrastructure	2.5m wide segregated cycle track	Providing and laying cycle track (2.5mt wide segregated) inculding Earth work and Base layers- PCC (M15), RCC (M40 Design mix) & GSB etc. also thermoplastic paint for marking and cycle symbol and spring post etc	3767	4,991,842	0.499

A.4	CC Items (Kerbs, Pipe, etc)	Kerb stones, Bollards, Kerb Channels etc.	Providing and fixing Kerbs, Bollards , and Kerb Channel etc. in CC.		1,466,050	0.147
A.5	Signages	Mandatory, Cautoniory and Informatory Sign Boards of different sizes	Providing and fixing Signage Mandatory, Cautonory and informatory sign board inculding all the fixing and labours etc.		96,731	0.010
A.6	Marking	Thermoplastic Paint Marking (Edge lines, Centre Line, Lane Marking, Hazard Marking, Chevron, Zebra Crossing, Bar Marking, etc)	Providing and applying road marking strips (retro-reflective) of specified shade/ colour using hot thermoplastic material for road marking .	748	969,149	0.097
A.7	Special Zones	Provision of Sitting Bollards, CC Benches, GRC Jali, Pergola, Dustbin etc.	Miscellaneous items- Provision of Sitting Bollards, CC Benches, GRC Jali, Pargola, Dustbin etc. complete items- including foundation and fixing etc.		286,939	0.029
A.8	Brick Work		Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in:Cement mortar 1:4 (1 cement : 4 coarse sand)	7370.65/CUM	294,826	0.029

A.9	Steel Reinforncement for RCC work		Steel reinforcement (in per kg) for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.Thermo-Mechanically Treated bars of grade Fe-500D or more	107.85/kg	43,140	0.004
A.10	Pavement Surface Dressing	Pavement of Bitumen layer on existing road surface	Surface dressing on old surface with hot bitumen of grade VG - 10	175.10 / sq.m	2,451,400	0.245
A.11	Safety Management Equipment (as per design requirement)	Provision of Delieator Post, Spring Post, Cat eye/studs etc.	Miscellaneous items for Safety Management Equipment (as per design requirement) -Provision of Delieator Post, Spring Post, Cat eye/studs etc.- including foundation and fixing etc.		139,221	0.014
A.12	Bus Shelter	10.5mX2.5m Bus Sheltor (Stainless Steel Strcuture)			10,800,000	1.080
	SUB TOTAL CIVIL WORK (A)				**59,303,498**	5.930
B	Drainage, Irrigation & Plumbing	(Drainage items based on design proposal)	Drainage, Irrigation & Plumbing work @ 20% of the cost of Civil work	20%	**11,860,700**	1.186

C	Electrical Work	(Light poles, junction box, other electrical works proposed based on design proposal)	Electrical work @25% of the cost of Civil work	25%	**14,825,874**	1.483
D	Horticulture Work	(Landscape items based on design proposal)	Horticulture work @ 15% of the cost of Civil work	15%	**8,895,525**	0.890
E	Dismantling / Demolition	--	Dismantling work @ 15% of the cost of Civil work	15%	**8,895,525**	0.890
F	Work Zone Safety & Management	--	Work zone Management @ 5% of the cost of Civil work	5%	**2,965,175**	0.297
PART 1	**SUB TOTAL PART 1 (A+B+C+D+E+F)**				**106,746,296**	10.675
G	Design Services & Support	--	Design Consultancy (Preparation of Drawings, BOQ support, Work Zone plan, Site Supervision, Community Engagement & Liason, Change Management @ 2% - 8% of the cost of Civil work.	**2%**	**2,134,926**	0.213

H	Survey Cost	--	Survey Cost (Total Station Survey, underground services, tree demarcation, girths , level differences, steps etc @ (80,000 per junction - 250m on each arm)	80000	**80,000**	0.008
PART 2	**SUB TOTAL PART 2 (PART 1 + G +H)**				**108,961,222**	10.896
J	Contigencies '2.5%	--	Contingencies (@2.5%)		**2,724,031**	0.272
I	GST('@18%)	--	GST @18%		**20,103,345**	2.010
FINAL	**GRAND TOTAL (PART 2 + J + I)**				**131,788,598**	13.179

Notes:

1. This is a preliminary estimate. Final costing to be evaluated & approved by the road owning agency.
2. DSR 2023 has been followed for all rates. Market Rate and Costing from part PWD projects has been included for certain items.
3. Cost of Drainage, Irrigation, Plumbing has been calculated at 20% of the civil work cost.
4. Cost of Electrical Work can be calculated at 20% - 25 % of the civil work cost.
5. Cost of Horticulture has been calculated at 15% of the civil work cost.
6. Cost of Dismantling has been calculated at 15% of the civil work cost.

7. Cost of Work Zone Management has been calculated at 5% of the civil work cost

8. Cost for Design Support can range from 2% - 8%, can vary from site to site. This should include Technical Assistance on drawings, 3D supports, Site Supervision, Change management.

9. Bus Shelter has been calculated at 18 L per shelter; can be changed as per design specific cost.

10. In case of new items specific to design, please add relevant rows in detail budget estimation and include the same in the budget summary under relevant head.

B.2: TIMARPUR INTERSECTION

B.2.1 : GENERAL DESCRIPTION OF THE SITE

Timarpur Intersection(Latitude: 28°42’32.45"N, Longitude: 77° 13’37.45"E). It is a T-junction that is signalised. This intersection is intersecting Chaudhary Fateh Singh Marg (Arterial Road) and Outer Ring Road Road(Sub-Arterial Road).

Figure 22: Timarpur Intersection satellite image

B.2.2 : EXISTING LAND USE

Figure 23: Existing land use near Timarpur Intersection

B.2.3 : EXISTING SCENARIO

Figure 24: Existing scenario at Timarpur Intersection

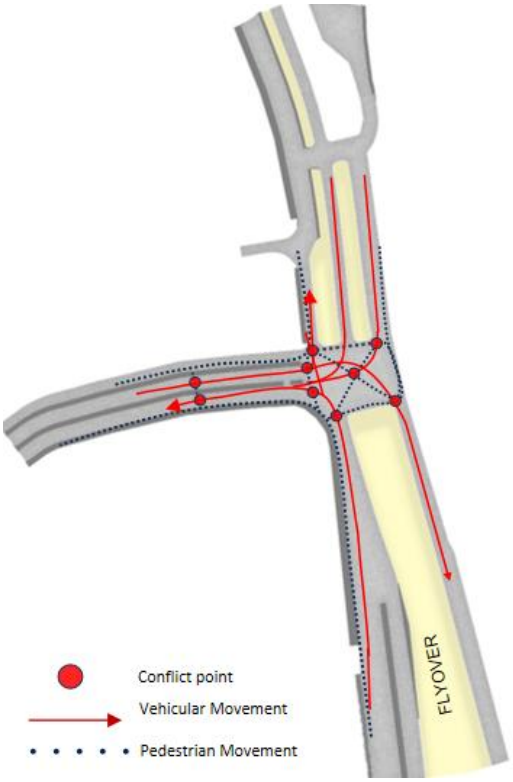


Figure 25: Existing vehicular and pedestrian movement at Timarpur Intersection

B.2.4 : ISSUES IDENTIFIED

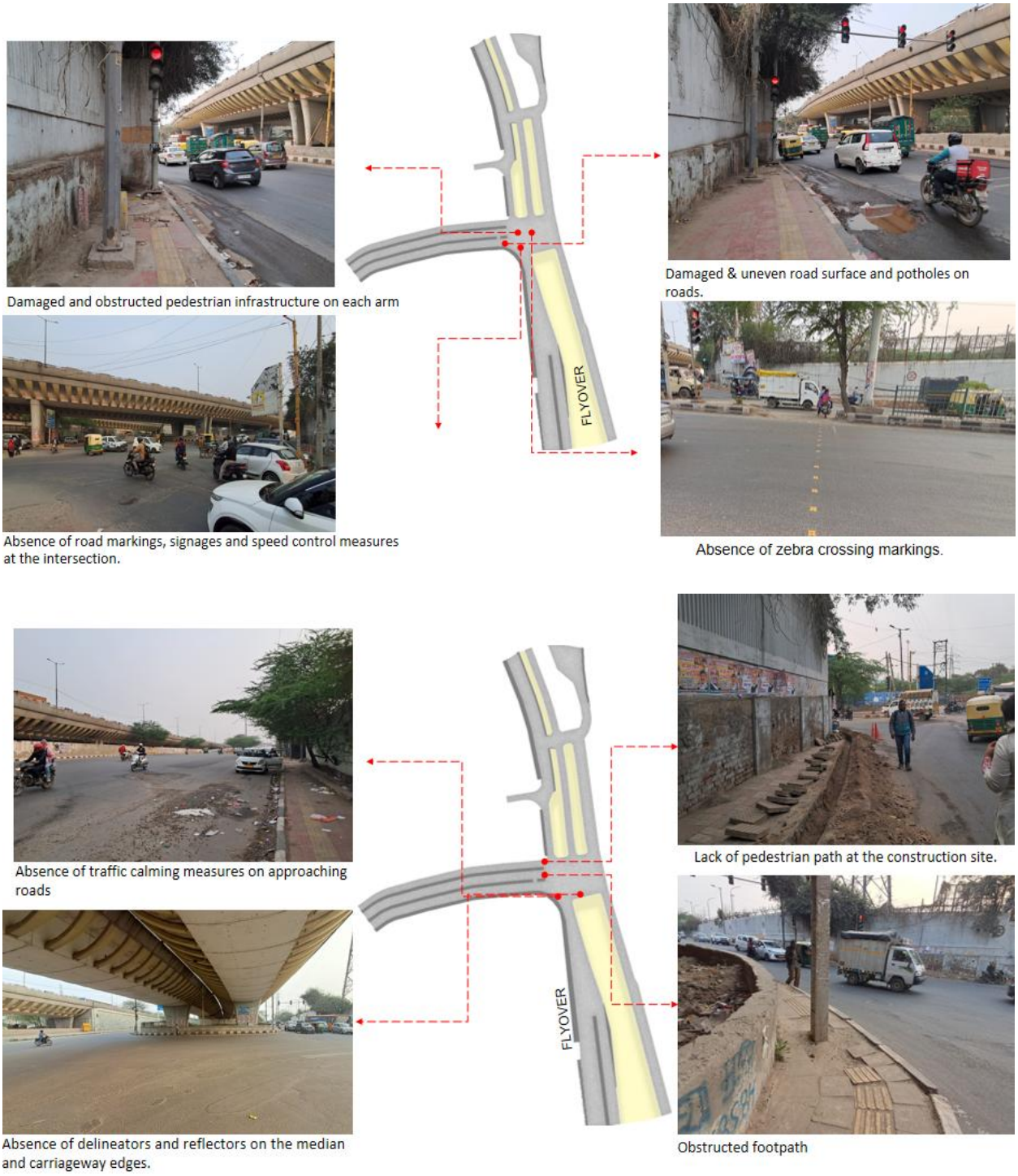


Figure 26: Issues identified at Timarpur Intersection

Issues identified:

1. Absence of at-grade pedestrian infrastructure at the junction, making the pedestrians extremely vulnerable among the highspeed traffic movement.
2. Lack of pedestrian path.
3. Damaged and obstructed pedestrian infrastructure on each arm, most of the pedestrian is damaged and obstructed with construction work.
4. Absence of bus stops at junction.
5. Damaged & uneven road surface and pedestrian infrastructure.
6. Absence of tactile flooring for differently abled users.
7. Absence of road markings, signages and speed control measures at the intersection.
8. Absence of delineators and reflectors on the median and carriageway edges.
9. Absence of chevron marking and hazard markers or flexible markers at bull noses.
10. Absence of segregated cycle tracks on arterial roads.
11. Parked vehicles on the carriageway.
12. Lack of pedestrian path at the construction site, should provide as per IRC 55.

B.2.5 : PROPOSED DESIGN

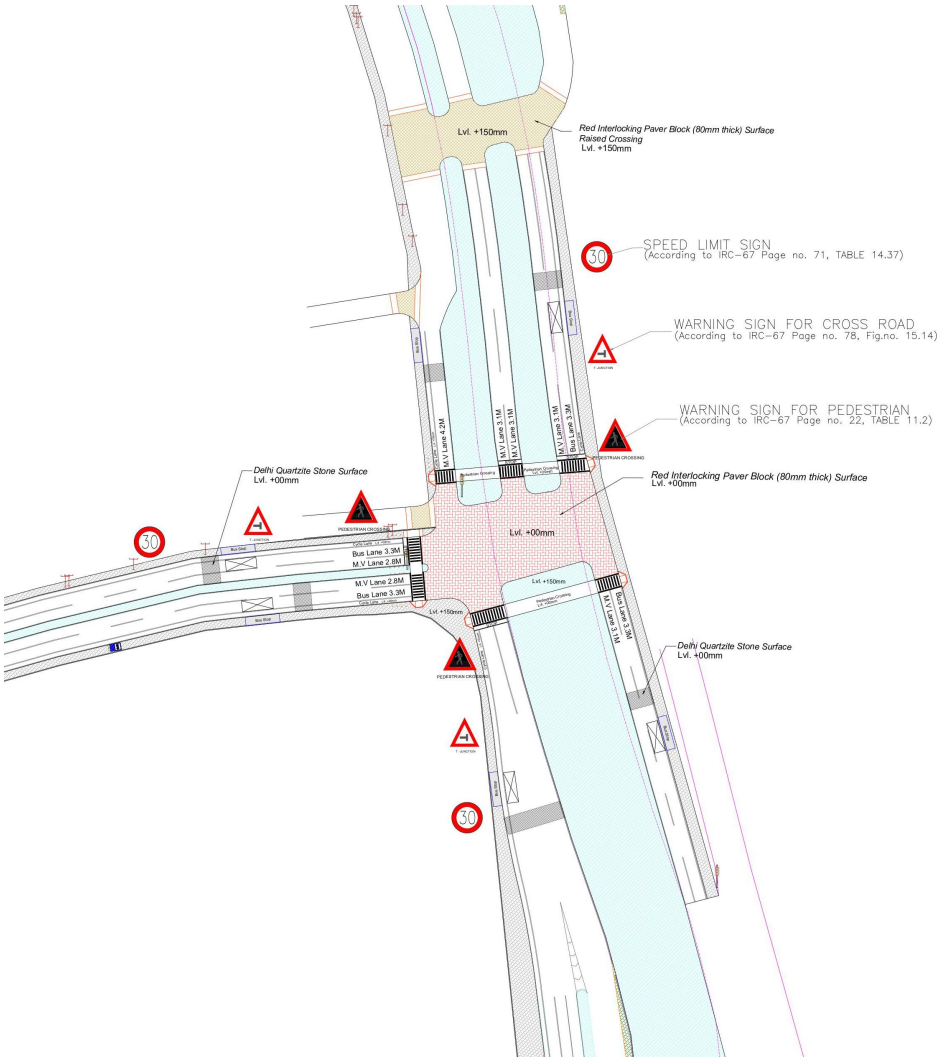


Figure 27: Proposed design for Timarpur Intersection

1. The junction is redesigned for the speed of 30 km/hr to ensure the safety
2. Proposed at-grade pedestrian infrastructure to increase the accessibility and safety for pedestrians (as per IRC:103-2022)
3. Proposed new bus stop near the junction (30m to 100m) to reduce the pedestrian crossing movement
4. Provision of red interlock paver block surface at intersection to reduce the speed
5. Installation of signages - Speed Limit, stop sign, pedestrian crossing and other necessary Signages on all approaching roads
6. Corrected turning radius, road width and proposed raised crossing on free left turn
7. Provision of Delhi Quartzite stone surface before bus stops to slow down the approaching traffic
8. Demarcation of Road Markings (properly painted as per IRC 35)
9. Provision of tactile pavers and kerb ramps for the accessibility of differently abled users (as per IRC:103-2022)
10. Provision of kerb ramp, bollards and refuse island for pedestrian crossing.

B.2.6 : SUMMARY BUDGET ESTIMATES

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
A	**CIVIL WORK**					
A.1	Footpath (Primary, Secondary including other Flooring area)	2m to 3m wide segregated footpath with tactile pavers	Providing and Laying of footpath 2m to 3m wide, including earthwork and base layer - PCC, GSB and finsihing material.	2765	7,349,600	0.735
A.2	Raised Crossing	Raised crssing with 80mm thick pavers and DQ stone surface	Providing and laying Raised crosseing with 80 mm thk pavers blocks, and DQ stone including Earth work and Base layers- PCC (M15), RCC (M30 Design mix) & GSB etc.	-	8,691,293	0.869
A.3	Cycle Infrastructure	2.5m wide segregated cycle track	Providing and laying cycle track (2.5mt wide segregated) inculding Earth work and Base layers- PCC (M15), RCC (M40 Design mix) & GSB etc. also thermoplastic paint for marking and cycle symbol and spring post etc	814	1,343,870	0.134
A.4	CC Items (Kerbs, Pipe, etc)	Kerb stones, Bollards, Kerb Channels etc.	Providing and fixing Kerbs, Bollards , and Kerb Channel etc. in CC.		736,463	0.074
A.5	Signages	Mandatory, Cautoniory and Informatory Sign Boards of different sizes	Providing and fixing Signage Mandatory, Cautonory and informatory sign board inculding all		72,548	0.007

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
			the fixing and labours etc.			
A.6	Marking	Thermoplastic Paint Marking (Edge lines, Centre Line, Lane Marking, Hazard Marking, Chevron, Zebra Crossing, Bar Marking, etc)	Providing and applying road marking strips (retro- reflective) of specified shade/ colour using hot thermoplastic material for road marking .	748	670,029	0.067
A.7	Special Zones	Provision of Sitting Bollards, CC Benches, GRC Jali, Pergola, Dustbin etc.	Miscellaneous items- Provision of Sitting Bollards, CC Benches, GRC Jali, Pargola, Dustbin etc. complete items- including foundation and fixing etc.		143,470	0.014
A.8	Brick Work		Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in:Cement mortar 1:4 (1 cement : 4 coarse sand)	7370.65/CUM	147,413	0.015
A.9	Steel Reinforncement for RCC work		Steel reinforcement (in per kg) for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.Thermo-Mechanically Treated bars of grade Fe-500D or more	107.85/kg	43,140	0.004

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
A.10	Pavement Surface Dressing	Pavement of Bitumen layer on existing road surface	Surface dressing on old surface with hot bitumen of grade VG - 10	175.10 / sq.m	1,313,250	0.131
A.11	Safety Management Equipment (as per design requirement)	Provision of Delieator Post, Spring Post, Cat eye/studs etc.	Miscellaneous items for Safety Management Equipment (as per design requirement) -Provision of Delieator Post, Spring Post, Cat eye/studs etc.- including foundation and fixing etc.		72,323	0.007
A.12	Bus Shelter	10.5mX2.5m Bus Sheltor (Stainless Steel Strcuture)			10,800,000	1.080
	SUB TOTAL CIVIL WORK (A)				**31,383,399**	3.138
B	Drainage, Irrigation & Plumbing	(Drainage items based on design proposal)	Drainage, Irrigation & Plumbing work @ 20% of the cost of Civil work	20%	**6,276,680**	0.628
C	Electrical Work	(Light poles, junction box, other electrical works proposed based on design proposal)	Electrical work @25% of the cost of Civil work	25%	**7,845,850**	0.785
D	Horticulture Work	(Landscape items based on design proposal)	Horticulture work @ 15% of the cost of Civil work	15%	**4,707,510**	0.471

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
E	Dismantling / Demolition	--	Dismantling work @ 15% of the cost of Civil work	15%	**4,707,510**	0.471
F	Work Zone Safety & Management	--	Work zone Management @ 5% of the cost of Civil work	5%	**1,569,170**	0.157
PART 1	**SUB TOTAL PART 1 (A+B+C+D+E+F)**				**56,490,118**	5.649
G	Design Services & Support	--	Design Consultancy (Preparation of Drawings, BOQ support, Work Zone plan, Site Supervision, Community Engagement & Liason, Change Management @ 2% - 8% of the cost of Civil work.	**2%**	**1,129,802**	0.113
H	Survey Cost	--	Survey Cost (Total Station Survey, underground services, tree demarcation, girths , level differences, steps etc @ (80,000 per junction - 250m on each arm)	80000	**80,000**	0.008
PART 2	**SUB TOTAL PART 2 (PART 1 + G +H)**				**57,699,921**	5.770
J	Contigencies '2.5%	--	Contingencies (@2.5%)		**1,442,498**	0.144

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
I	GST('@18%)	--	GST @18%		**10,645,635**	1.065
FINAL	**GRAND TOTAL (PART 2 + J + I)**				**69,788,054**	6.979

Notes:

1. This is a preliminary estimate. Final costing to be evaluated & approved by the road owning agency.
2. DSR 2023 has been followed for all rates. Market Rate and Costing from part PWD projects has been included for certain items.
3. Cost of Drainage, Irrigation, Plumbing has been calculated at 20% of the civil work cost.
4. Cost of Electrical Work can be calculated at 20% - 25 % of the civil work cost.
5. Cost of Horticulture has been calculated at 15% of the civil work cost.
6. Cost of Dismantling has been calculated at 15% of the civil work cost.
7. Cost of Work Zone Management has been calculated at 5% of the civil work cost
8. Cost for Design Support can range from 2% - 8%, and can vary from site to site . This should include Technical Assistance on drawings, 3D supports, Site Supervision, Change management.
9. Bus Shelter has been calculated at 18 L per shelter; can be changed as per design specific cost.
10. In case of new items specific to design, please add relevant rows in detail budget estimation and include the same in the budget summary under relevant head.

B.3: SAFE SCHOOL ZONE: SKV ZEENAT MAHAL

B.3.1 : GENERAL DESCRIPTION OF THE SITE

Sarvodaya Kanya Vidyalaya (SKV) Zeenat Mahal is located on Sita Road opposite the Ram Leela Maidan in Kamla Market between the two roundabouts near Hamdard Chowk and Minto Road. The Sita road is sub-arterial in nature with 33m ROW. This is also a cluster school and the boys use the same campus. The land use is mixed in nature with institutions like schools, offices and banks, residential, commercial shops and religious places as primary activity generators.The Ramleela Maidan opposite the school also generates activity occasionally like rallies, and other festive events, this affects the traffic flow on the adjacent roads.

Figure 28: Land Use Map of SKV Zeenat Mahal **(AY 22-23)**

SKV Zeenat Mahal is a girls school with a total enrollment of 906 students as per the academic year 2022-2023, from class Nursery to 12 (age 4 to 17). The school has two gates opening onto the Sita road, opposite the Ram Leela Maidan between the two roundabouts. One gate opens on the Jawahar Lal Nehru Marg. Both the gates on Sita Road are used during the entry and exit hour. The major modes of transport observed are walk and public transport. The graph below shows the data collected online via road safety clubs.

B.3.2 : EXISTING SCENARIO

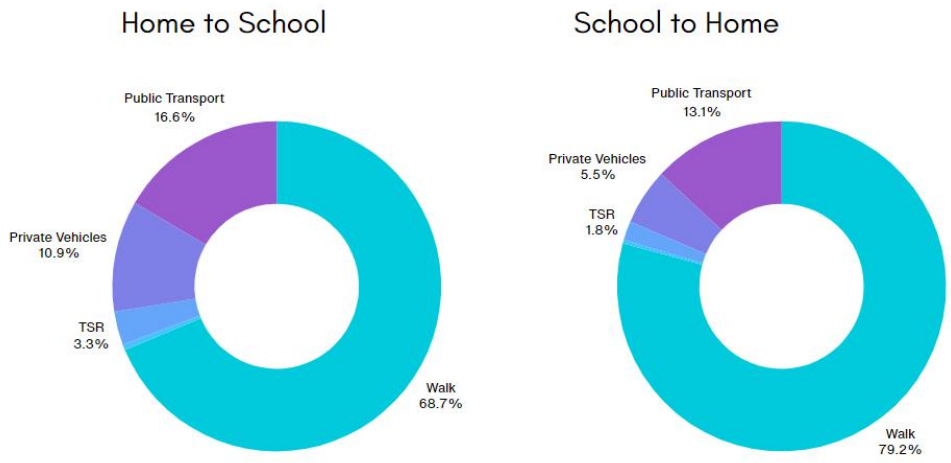


Figure 29: School Travel Data

Source: HumanQind School Travel Survey 22-23

- Walking is the most common travel mode for the students of the school, Around 90% of the students walk..
- Out of the remaining 7% of the students cycle
- More private vehicles drop students in the morning compared to the afternoon.
- There is no significant difference in the mode choices in the morning and afternoon.

B.3.3 : ISSUES IDENTIFIED

Observations on Road Infrastructure: The school is located on a sub-arterial road. Due to the traditional vehicle-centric planning approach, the road infrastructure does not promote pedestrian safety and creates an unsafe environment for the vulnerable road users, putting school children at risk. Conflict between students and moving vehicles have been seen during the entry and exit hours of school as there is a lack of traffic calming devices and safe pedestrian crossing at Sita road and the adjoining roundabouts.
In the Central district, encroachments outside school are observed in the form of spillover from commercial shops, parked vehicles and night shelters take significant pedestrian space on the road edge, leading to insufficient and inaccessible footpaths. The lack of cycle infrastructure increases the risk for cycle commuters as they have to travel with the high speed traffic. Around the pilot safe school zone of SKV Zeenat Mahal, there is also a high influx of freight rickshaws due to the mixed nature of its land surrounding. With a variety of modes of transport, an organized and better parking management is required.
Lack of assigned and dedicated pick up and drop off areas with lack of waiting areas for parents and students leads to crowding and chaos near the school gates during the entry/exit hours.To promote safe environment and enhance the school going experience for school community integration of green areas, vendors zones and defined multi-utility zones are also essential.

Central district schools also witness dark streets in the evening. Better planning for utilities like lighting, drainage and fixation of open toilets is also required for improving safety of all. Public Toilets, Rain Basera, Waste collection point all around school gates & school zones create stench and unpleasant environments, especially for girl students and women staff.

Figure 30: Site Photographs : Students walking and crossing the road in an unsafe maner in front of SKV Zeenat Mahal (Left), Parents waiting outside school without any street furniture (Right)

Type and quality of enforcement: Unorganised parking of autos and e-rickshaw, with lack of any dedicated drop off and pick up areas leads to chaos and congestion during the entry/exit hours. Encroachment with spillover from shops and parked private cars on footpaths further reducing the insufficient pedestrian path this compels students to walk with moving traffic on the carriageway. Students and parents find it difficult to navigate their way, some parents have also reported safety concerns around the school due to reduced direct visibility on the street. To overcome these issues and regulate a smooth flow of traffic and all other road users, school zone management teams and dedicated traffic personnel are required.

Road users behaviour and mobility patterns: To understand the patterns of movements and conflicts in the school zone, activity mapping was conducted in morning hours (home to school traffic) and exit timing during afternoon (school to home).
An activity map documents all users including vendors, vehicular movements & parking in a particular road environment during a certain time.

Fear experienced during school travel: About 3/4th of the school feel unsafe during their travel to school. Nearly 80% of the students who walk or take public transport feel unsafe during their travels. About 40% of the students who walk also reported feeling unsafe. Students travelling in auto rickshaws feel relatively safer, only around 25% reported feeling unsafe.(Source: HumanQind Safe School Zone Survey 22-23)

Infrastructure Interventions required: About 90% of students responded that they had footpaths for walking, and 87% reported no crowding outside school and 85% asked for a vehicle free street. With that 62%, 81% and 80% students respondents wanted traffic lights and safe crossing, comfortable waiting areas and organised entry and exit hours. (Source: HumanQind Safe School Zone Survey 22-23)

Infrastructure Interventions and Academic Performance: Academic performance is not a result of a child's ability and focus alone; rather it is a combination of various factors, of which travel to school is an important one. Noise, long hours of travel and lack of transport can impact the energy levels and the stress experienced by the student. This can impact the learning experience and performance of the students.
95% of the respondents wanted less noise outside school to improve upon academics. 73% voted for less travel time and less walking time , 69 % opted for availability of public and school transport near school and 43% also responded that no discomfort in travel will help them perform better in academics.(Source: HumanQind Safe School Zone Survey 22-23)

B. 3. 4 : ACTIVITY MAP

Figure 31: Activity mapping at SKV Zeenat Mahal (Home to School - Up, and School to Home - Down)

Key Findings:

Morning : Home to School	**Afternoon : School to Home**
● Conflict between high speed vehicular movement and students as there is a lack of safer crossing and traffic calming. ● Influx of unorganised parked e-rick shaws and autos around the school create chaos and crowd around the school gates. ● Lack of dedicated pick up and drop off areas results in traffic congestion, low visibility for students to navigate their paths. ● Due to lack of sufficient pedestrian pathways and crossing, students and parents have to travel in an unsafe environment.	● With increase in traffic volume during the afternoon hours, exit hours of school results in congestion and chaos on the road in conflict with the walking students. ● Parents have no waiting areas, and lack of shade and benches within the school vicinity leads to discomfort particularly in the hot weather. ● There is also observed a significant number of vendors near the school gates standing in unorganised nature, need for the dedicated vendor zones.

B.3.5 : PROPOSED DESIGN

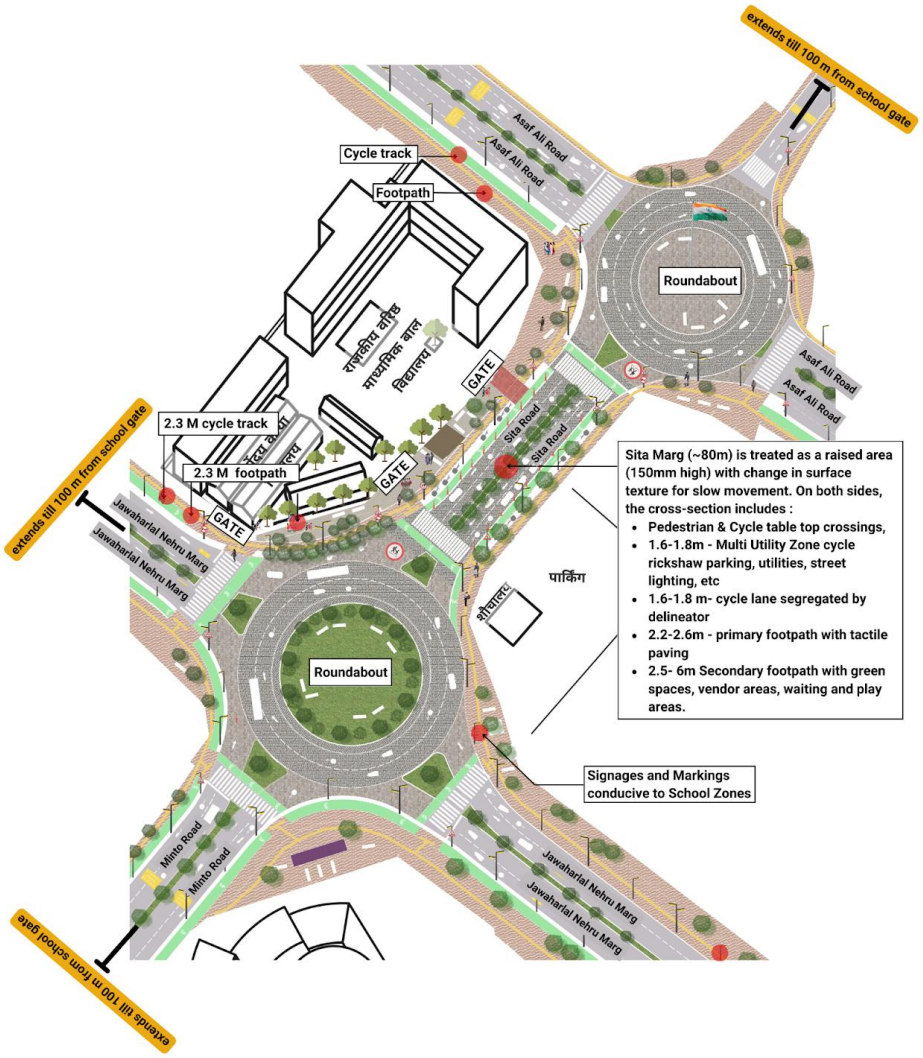


Figure 32: Proposed School Zone Plan for SKV Zeenat Mahal

DESIGN INTERVENTIONS

The proposal prepared by road safety clubs (Refer Safer Delhi through Road Safety Clubs) is called “Humari Duniya” aligning to pedestrian first approach, traffic safety principles, UN Sustainable Development Goals and Ladder of Children Participation. Humari Duniya is an area plan connecting 2 schools and the neighbourhood under 725 m of school zone development (60 m at Sita Road, 380 m at Jawaharlal Nehru Marg from Kamla Nagar Police Station to Income Tax department, 245 m at Asaf Ali from Oriental Insurance Company to Shastri Park and 40 m towards Chandni chowk and 60 m towards Connaught Place). The entire plan is in adherence to Indian Road Congress Guidelines. To reduce speeds and conflicts, the school zone has been designed as per 20km/h or lower speed, promoting walkability and safe mobility. Continuous footpaths with designated

boarding areas and drop off zones have been proposed primarily from Asaf Ali Marg Intersection to Mandir Marg Intersection.

The Right of Way (ROW) and intersection design has been designed as per the street typology.

- 2.2-2.6m accessible and segregated primary footpath
- 2.5- 6m Secondary footpath with green spaces, vendor areas, waiting and play areas.
- 1.6-1.8 m- cycle lane segregated by delineator. (as per IRC 11: 2015)
- 1.8 m of Multi-Utility Zone with planned cycle rickshaw parking pockets at the Sita road.
- Traffic calmings designed in front of entry/exits and school gates at the Sita road.
- 1.8 m of re-defined median at the Sita road.
- Designated boarding areas and drop off zones
- Integrated waiting spaces, vendor spaces and street furniture integrated
- School specific signage and marking
- Planned utilities like lighting and drainage in multi-utility zones.
- Safer planned roundabouts
- 1.6m- 6m segregated footpath on the approaching arms roads
- 2.3m- 6m segregated cycle track on the approaching arms roads
- 1.0m Multi-Utility Zone on the approaching arms roads

Figure 33: Render of the proposed Sita road in front of SKV Zeenat Mahal

Estimated budget - Approx INR 9 Cr. for ~725m length
Source: Estimated budget for 250m length of DAV Vasant Kunj Pedestrianisation (PWD II), Pilot School Zone, District South, Public Works Department, Delhi

B.2.7 : SUMMARY BUDGET ESTIMATES

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
A	**CIVIL WORK**					
A.1	Footpath (Primary, Secondary including other Flooring area)	2.5m segregated footpath with tactile pavers in both directions	Providing and Laying of footpath 2m to 3m wide, including earthwork and base layer - PCC, GSB and finsihing material.	2827	13813216	1.381
A.2	Raised Crossing	Signalised Intersections and traffic calming at entry/exits	Providing and laying Raised crosseing with 80 mm thk pavers blocks, and DQ stone including Earth work and Base layers- PCC (M15), RCC (M30 Design mix) & GSB etc.	1824	11834914	1.183
A.3	Cycle Infrastructure	2.5m segregated cycle tracks on both sides	Providing and laying cycle track (2.5mt wide segregated) inculding Earth work and Base layers- PCC (M15), RCC (M40 Design mix) & GSB etc. also thermoplastic paint for marking and cycle symbol and spring post etc	3902	1463122	0.146
A.4	CC Items (Kerbs, Pipe, etc)	Provision of bollards, kerbs - mountable, kerb channels, etc	Providing and fixing Kerbs, Bollards , and Kerb Channel etc. in CC.		4788994	0.479
A.5	Signages	Provision of signages as per IRC 67 for school zone & 20km/h	Providing and fixing Signage Mandatory, Cautonory and informatory sign board inculding all the fixing and labours etc.		329674	0.033

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
A.6	Marking	Provision of signages as per IRC 35 for school zone & 20km/h	Providing and applying road marking strips (retro- reflective) of specified shade/ colour using hot thermoplastic material for road marking .	1447	1654993	0.165
A.7	Special Zones	Provision of seating areas, vendor spaces and play integrated with design proposal	Miscellaneous items- Provision of Sitting Bollards, CC Benches, GRC Jali, Pargola, Dustbin etc. complete items- including foundation and fixing etc.		499809	0.050
A.8	Brick Work	--	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in:Cement mortar 1:4 (1 cement : 4 coarse sand)	7370.65/CUM	532161	0.053
A.9	Steel Reinforncement for RCC work	--	Steel reinforcement (in per kg) for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.Thermo-Mechanically Treated bars of grade Fe-500D or more	107.85/kg	467206	0.047
A.10	Pavement Surface Dressing	Pavement of Bitumen layer on existing road surface	Surface dressing on old surface with hot bitumen of grade VG - 10	175.10 / sq.m	0	0.000
A.11	Safety Management Equipment (as per design requirement)	Provision of Delieator Post, Spring Post, Cat eye/studs etc.	Miscellaneous items for Safety Management Equipment (as per design requirement) -Provision of Delieator Post, Spring Post, Cat eye/studs etc.- including foundation and fixing etc.		14700	0.001

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
A.12	Bus Shelter	Provision of new bus shelter.			3600000	
	SUB TOTAL CIVIL WORK (A)				**38998790**	3.900
B	Drainage, Irrigation & Plumbing	Details promote catch pit along the footpath linked to existing manholes. Bell mouths are not recommended. Details to be finalised with PWD	Drainage, Irrigation & Plumbing work @ 20% of the cost of Civil work	20%	**7799758**	0.780
C	Electrical Work	5m and 10m light poles have been located alongside footpath / MUZ. Details to be finalised with PWD.	Electrical work @25% of the cost of Civil work	25%	**9749697**	0.975
D	Horticulture Work	To increase green cover and shade, landscape plan to promote ground cover and trees for seasonal variation and color. Irrigation plan to be finalised with PWD.	Horticulture work @ 15% of the cost of Civil work	15%	**5849818**	0.585
E	Dismantling / Demolition	--	Dismantling work @ 15% of the cost of Civil work	15%	**5849818**	0.585
F	Work Zone Safety & Management	--	Work zone Management @ 5% of the cost of Civil work	5%	**1949939**	0.195
PART 1	**SUB TOTAL PART 1 (A+B+C+D+E+F)**				**70197821**	7.020

S.No	Component	Details	Notes	Rate (per sq.m)	Cost (INR)	Cost (INR, crores)
G	Design Services & Support	--	Design Consultancy (Preparation of Drawings, BOQ support, Work Zone plan, Site Supervision, Community Engagement & Liason, Change Management @ 2% - 8% of the cost of Civil work.	5%	3509891	0.351
H	Survey Cost	--	Survey Cost (Total Station Survey, underground services, tree demarcation, girths , level differences, steps etc @ (80,000 per junction - 250m on each arm)	80000	80000	0.008
PART 2	SUB TOTAL PART 2 (PART 1 + G +H)				73787712	7.379
J	Contigencies '2.5%	--	Contingencies (@2.5%)		1844693	0.184
I	GST('@18%)	--	GST @18%		13613833	1.361
FINAL	GRAND TOTAL(INR) (PART 2 + J + I)				89246238	8.925

Notes:

11. This is a preliminary estimate. Final costing to be evaluated & approved by the road owning agency.
12. DSR 2023 has been followed for all rates. Market Rate and Costing from part PWD projects has been included for certain items.
13. Cost of Drainage, Irrigation, Plumbing has been calculated at 20% of the civil work cost.
14. Cost of Electrical Work can be calculated at 20% - 25 % of the civil work cost.
15. Cost of Horticulture has been calculated at 15% of the civil work cost.

16. Cost of Dismantling has been calculated at 15% of the civil work cost.
17. Cost of Work Zone Management has been calculated at 5% of the civil work cost
18. Cost for Design Support can range from 2% - 8%, and can vary from site to site . This should include Technical Assistance on drawings, 3D supports, Site Supervision, Change management.
19. Bus Shelter has been calculated at 18 L per shelter; can be changed as per design specific cost.
20. In case of new items specific to design, please add relevant rows in detail budget estimation and include the same in the budget summary under relevant head.