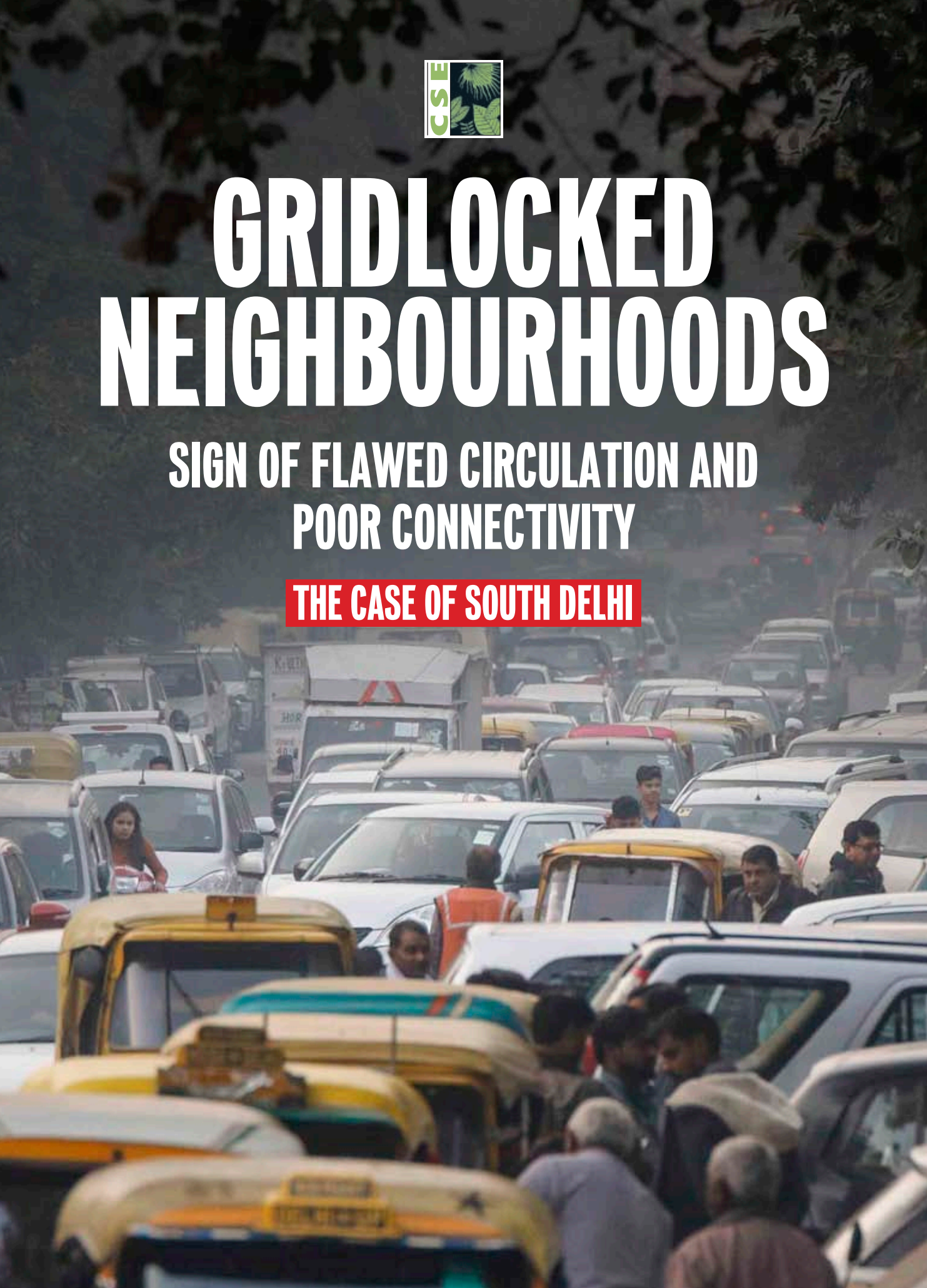


GRIDLOCKED NEIGHBOURHOODS

SIGN OF FLAWED CIRCULATION AND POOR CONNECTIVITY

THE CASE OF SOUTH DELHI

GRIDLOCKED NEIGHBOURHOODS

SIGN OF FLAWED CIRCULATION AND POOR CONNECTIVITY

THE CASE OF SOUTH DELHI

Writers: Anumita Roychowdhury and Usman Nasim

Research inputs: Gaurav Dubey and Anu K Soman

Cover photo: Vikas Chaudhary

Cover design: Ritika Bohra

Photographs: Usman Nasim

Editor: Arif Ayaz Parrey

Design: Ajit Bajaj

Production: Rakesh Shrivastava and Gundhar Das

Traffic survey: Ark Foundation, New Delhi

We are grateful to the Citizens' Alliance (Delhi), local residents and volunteers for their valuable inputs.

Citation: Anumita Roychowdhury and Usman Nasim 2017, *Gridlocked neighbourhoods: Sign of flawed circulation and poor connectivity—The case of South Delhi*, Centre for Science and Environment, New Delhi

Maps in this report are indicative and not to scale.

Published by
Centre for Science and Environment
41, Tughlakabad Institutional Area
New Delhi 110 062
Phones: 91-11-40616000
Fax: 91-11-29955879
E-mail: cse@cseindia.org
Website: www.cseindia.org

Contents

List of graphs

List of maps

List of tables

Abbreviations

CNCRI	Chittaranjan National Cancer Research Institute
CPCB	Central Pollution Control Board
CR Park	Chittaranjan Park
DDA	Delhi Development Authority
GK-II	Greater Kailash-II
IIT	Indian Institute of Technology
IRC	Indian Road Congress
LOS	Level of Service
PCUs	Passenger Car Units
RITES	Rail India Technical and Economic Service
V/C ratio	Volume to capacity ratio

Why neighbourhoods?

Choked roads, polluted air and road injuries are but a few symptoms of the severe and crippling mobility crisis in Delhi. The city is in a health emergency with the lungs of every third child impaired, as established by a joint study of Central Pollution Control Board and Chittaranjan National Cancer Research Institute. Vehicular pollution is worsening this toxic exposure as more than 55 per cent of Delhi's population lives within 500 meters from any road where exposure to highly toxic vehicular fumes is maximum. The city also records the highest fatal road accidents among all Indian cities—an average of four road accident deaths per day as per the 2016 Delhi traffic police records. Clearly, Delhi is paying a very high price for explosive motorization.

While several steps are now underway to solve the problem on a city-wide scale and a comprehensive action plan has also taken shape under the direction of the Supreme Court for time-bound action on all sources of pollution, the full range of transportation and traffic-related interventions remain least understood and too complex to address. Even though plans are evolving slowly for integrated strategies for public transport including bus, metro and para-transit, and last-mile connectivity, local solutions at a neighbourhood scale are poorly understood and grossly neglected. This study hopes to unravel some of these aspects.

The crisis is visible in local congestion that is crippling neighbourhoods and compromising the quality of life. This is only expected to get worse in Delhi that has crossed the mark of one crore registered vehicles. Due to inadequate public transport strategies, poor last-mile connectivity and lack of vehicle restraint policies, all neighbourhoods have become major generator of traffic and are also vulnerable to huge volume of through and transit traffic. This has increased local exposure to toxic pollution in gridlocked neighbourhoods.

Among all these factors that are responsible for the mobility crisis in the city, the most neglected is the role of circulation and dispersion of traffic at the neighbourhood scale and quality of street density and network to improve access for all road users. Transportation planners ignore local area networks and circulation and remain obsessed with improving speed and seamless movement of long-distance traffic on arterial roads. Neighbourhoods are becoming conduits of large volume of through traffic from large catchments. Local areas are already severely crippled by inefficient network grids that impede dispersal of traffic and compromise last-mile connectivity. This discourages walking and proper deployment of para-transit and non-motorized trips in neighbourhoods that are needed for integration with public transport strategies. There are very limited openings from neighbourhoods to arterial roads, most inner streets remain gated, further impeding traffic dispersal, and the very small number of junctions that are inlets and outlets to a zone become completely choked. This results in severe traffic choke points rendering neighbourhoods immobile. This is further aggravated by uncontrolled parking pressure on carriageways and public land.

Congestion has led to serious tension and protests across neighbourhoods today. Local congestion has become so severe that any proposal of new commercial or mixed-use development in neighbourhoods draws angry protest for fear of those becoming traffic magnets in over-saturated areas. This is symptomatic of public policy failure in addressing integrated street design and management as well as vehicle restraint measures to cater to the needs of all road users and special requirements of local areas.

Autonomous growth of the city is expected to lead to densification and commercial development and this is an inevitable corollary of urban growth. This is also a way of plugging the huge deficit in housing, retail and office spaces in the city. According to the Delhi Master Plan 2021 (MPD 2020–21) Delhi needs 24 lakh more dwelling units; and the Economic Survey of Delhi expects substantial increase in enterprises in whole sale trade and in retail by 2020. The new urban principles for sustainable development goals or the newly adopted transit-oriented development policies or smart city development require dense and mixed land use development to reduce distances and improve access to all needs. But new development or redevelopments will require proper planning based on new principles of sustainability and traffic impact assessment to pre-define mitigation strategy. Otherwise, this can over burden the already saturated infrastructure in local areas and lead to unintended consequences. In fact, globally, new development now requires special traffic mitigation strategies.

Clearly, the link between development and traffic is disjointed in our planning process and if this is not addressed immediately, each and every neighbourhood of Delhi will erupt and lock in enormous energy and pollution intensity that cannot be easily undone in future. This presents the challenge of adopting mitigation strategies for traffic impacts, and appropriate planning within well identified local constraints while scaling up of sustainable mobility solutions for all.

It is also important to note that there is danger in focusing only on traffic volume and road capacity as a problem as that distracts conventional urban and transport planners from sustainable mobility solutions to continuous expansion of road capacity to facilitate more traffic. This never-ending spiral induces more traffic and worsens the gridlock. Global review shows that for every 10 per cent increase in road capacity there is a 9 per cent increase in traffic. The newly induced traffic immediately consumes from 10–50 per cent of the new road capacity immediately and 50–100 per cent in four years and demand for more road space remains insatiable.

Therefore, it is time to understand the constraints imposed by the local area network in terms of flawed circulation, poor accessibility and public transport connectivity, impaired walkability and unsustainable parking pressure to find the integrated solution. These conditions will worsen if new developments or redevelopment happen in isolation and disconnected from the larger planning to find complete set of solutions.

To draw attention to this poorly understood and deeply neglected issue Centre for Science and Environment (CSE) has initiated a series on micro-mapping of some of the critical zones and neighbourhoods of Delhi to understand the local challenges and to inform the city-wide policy making.

The is an assessment of the vast expanse of the contiguous neighbourhoods of South Delhi, including plotted colonies in Greater Kailash-II (GK-II) and Chittaranjan Park (CR Park); DDA colonies in the Alaknanda area; and the Tughlakabad Institutional Area. This zone is cut off from the rest of the city on four sides by four big arterial roads including the Outer Ring Road towards Nehru Place, Ravidas Marg towards Govindpuri, Mehrauli Badarpur Road towards Tughlakabad Institutional Area, and the BRT corridor towards Greater Kailash-II. Jahapanah district forest is a natural boundary between Khanpur and this zone.

To understand what is wrong, CSE has carried out in-depth micro-mapping of circulation and alignment patterns, and assess traffic flow and peak congestion build-up within the zone.

To get deeper insight into the local constraints, CSE has closely engaged with Citizen's Alliance, a network of prominent resident welfare associations and local residents in this. It has further analyzed data from the traffic survey that was carried out by the Ark Foundation in seven stretches on selected roads for this zone in 2017 and made available for this study. CSE has further used daily real-time information on traffic speed data from Google Maps for these seven stretches from 31 August–4 September 2017 to get a sense of the impact of congestion.

It is hoped that the lessons from this assessment of this neighbourhood, while helping to inform local policy interventions, can also help to inform more local area planning across all neighbourhoods to unclog Delhi.

Spotlight on the local area

This vast zone virtually has two major openings as inlet and exit points for traffic—one near Savitri Cinema on outer Ring Road and the second near Tara Apartments on Ravidas Marg. Within this zone there are basically two to three key roads that are available for circulation of the entire local area as well as through traffic from a very large catchment going upto Faridabad. These roads are the crescent road through GK-II connecting Tara Apartments and Savitri Cinema; and Bipin Chandra Pal Road through CR Park and the road that divides Kalkaji and CR Park.

Besides the two major openings, there are only minor openings which prove inadequate to enter and exit the area. This limits and constrains the circulation so much that traffic chokes colonies as well as the surrounding arterial roads. The neighbourhood-level connector roads that have 18–24 m wide right-of-way are smaller than arterial roads. But they are increasingly being forced to function as arterial or sub-arterial roads carrying large volume of through traffic. There is also no local system to organize parking encroachment on these roads that further reduces efficiency of the carriageway and crossings. Moreover, due to impossibly large block sizes of residential colonies without deeper penetration of para-transit, average distances to the nearest public transport nodes and services have increased, discouraging people from walking and making them captive users of cars.

This neighbourhood has become flashpoint from time to time whenever large developments have been planned in total disregard of local constraints and without mitigation strategies. Tensions had started with the protest against the multiplex in Savitri for fears of induced traffic in the already choked solitary entry into the neighbourhood. Currently, there are huge concerns around the proposed shopping mall planned as part of the Alaknanda community centre near Kalka public school. Residents are up in arms fearing induced traffic pressure on roads that are already saturated, and additional pressure on basic services when there is no possibility of mitigation.

This is symptomatic of the larger malaise that plagues this city. What is worrying is that the RITES (Rail India Technical and Economic Service) study of 2010 had already projected massive increase in traffic volume in the catchment of this study area by 2021. In fact, some of the local roads close to this neighbourhood are expected

to witness significant increase in traffic volume hitting more than 5,000 PCUs by 2021—arterial roads are supposed to carry as much. This will have severe cascading effect on this neigbourhood. Due to poor circulation and planning, outflow and inflow of traffic from the adjacent residential complexes along the main road further aggravates congestion.

In fact, the traffic assessment that was done by the Delhi Development Authority for the Alaknanda Community Centre in 2006 was very inadequate. The traffic count and projection was done for very small and limited four stretches on roads in the immediate vicinity of the development. No clear mitigation strategies were proposed. About 12 years have lapsed since the original assessment done in 2006. Development and densification have expanded quite significantly since then and the new traffic assessment carried out as part of this study shows phenomenal increase (at least four–nine times) in traffic volume in the area.

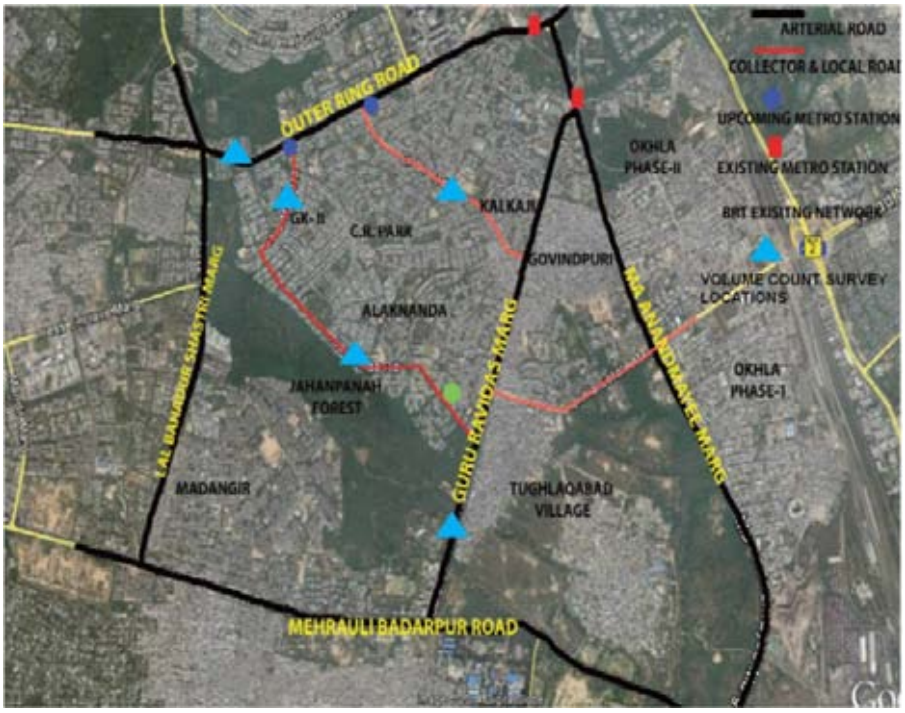
Despite the provision in the revised Delhi Master Plan 2020–21 (MPD 2020–21) for detailed traffic impact assessment of new developments and redevelopments and to identify appropriate mitigation strategies, they are not properly implemented. According to global best practice, traffic impact assessments needs to be done for an effective influence area of at least 500 meter to 1 kilometer.

This indicates that all neighbourhoods are undergoing massive transformation in terms of landuse change, densification and traffic. But the planning process is not equally dynamic to address the changing scenario. This dense residential neighbourhood has several markets and schools. While having schools and markets within walking distance of residential colonies is a good urban principle, its benefit gets eroded when appropriate design and plans for safe access, public transport connectivity and parking mitigation are also not put in place. These utilities end up becoming magnets for chaotic traffic and unorganized parking. An earlier assessment of this area by CSE in 2015 has shown enormous public transport deficit in the area due to curtailment of bus routes, lack of last mile connectivity to metro stations and poorly designed streets without safe access for people.

Yet this neighbourhood is expected to be an attractive transit-oriented development zone when the upcoming metro station Near Savitri Cinema becomes fully functional and is part of the grid that includes metro stations in Nehru Place, Kalkaji Mandir and Govindpuri. But despite this opportunity, there is no official plan to leverage the new transit advantage of this area to plan last mile connectivity and walking access to reduce traffic and unclog the area. On the contrary, the current reporting shows that instead of focusing on well-designed pedestrian and feeder access to the metro for last mile connectivity, more flyover loops are being proposed to flush in traffic from Outer Ring Road into the neighbourhood.

This policy failure to link land use with transit opportunities to promote more sustainable solutions plagues not only this neighbourhood but the entire city. What are the symptoms of mobility crisis in this areas?

Map 1: Stretches selected for the traffic count survey



Note: Blue dots indicate traffic survey points
Source: Google Maps

Table 1: Road stretches assessed for traffic survey

Name of road	From	To
Lal Bahadur Shastri Marg	Chirag Delhi intersection	Ambedkar Nagar Terminal
Mehrauli Badarpur Road	Ambedkar Nagar terminal	Guru Ravidas Marg
Guru Ravidas Marg	Guru Ravidas Marg (Near Hakim Abdul Hameed hospital)	Hanuman Mandir, Govind Puri
CR Park Road–Outer Ring Road	Hanuman Mandir, Govind Puri	Chirag Delhi Intersection
Alaknanda Road	Tara Apartments	Block E, GK-II
Bipin Chandra Pal Marg	Outer Ring Road	DDA Flats, Kalkaji
Bipin Chandra Pal Marg–Alaknanda Road	Kalka school	Tara Apartments

Source: CSE

Overstretched local roads: A reality check

Roads are normally designed keeping in view a certain traffic volume capacity, which is defined in India by the guidelines of the Indian Road Congress (IRC). According to IRC 106-1990 guidelines for capacity of urban roads in plain areas, every category of roads have a designed service volume (see *Table 2: Designed service volume of different road categories*), which is considered as the maximum carrying capacity of those roads.

In addition the level of service (LOS) of the road, which is defined as the qualitative measure for describing operational conditions within a traffic stream and their perception by drivers or passengers, is a clear indicator of the level of utilization of roads and the consequent pressure. LOS is dependent on various parameters including speed, travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience etc. This is expressed as volume by capacity of the road (V/C ratio). If V/C exceeds one, it is considered to have exceeded the design capacity and is the threshold for congestion build up.

LOS is graded from A to F, with 'A' representing the best operational condition and service level or is considered free flow (see *Table 3: Grading of level of service of roads based on volume to capacity ratio*). However, for urban roads, given the heterogeneity of traffic, pedestrian flow, roadside fringe conditions, parking, frontage access of buildings etc. are all taken into account to define the level of service and normally, LOS C is adopted for the design of urban roads in Indian conditions.

The traffic survey of Ark Foundation has generated data on traffic flow in terms of vehicles per hour and vehicles per day. For the traffic survey, critical entry exit and mid-blocks were selected on the main conduit roads (see Map: Stretches selected for the traffic count survey). As the traffic is composed of different types of vehicles, it was practical to convert the flow into equivalent passenger car units (PCUs), by using certain equivalency factors. This helps to assess the current situation on the road—whether the usage of the road is above or below its vehicle carrying capacity. Based on this traffic count survey, CSE has calculated the 'peak hour factor' to indicate congestion pressure. This indicates trip generation patterns that are typically calculated from traffic counts and considers the peak hour volume. The traffic volume count survey was carried out at seven locations from 8 a.m. to 10 p.m. and covered all modes of transport, motorized and mon-motorized (see *Table 1: Road stretches assessed for traffic survey*).

Table 2: Designed service volume of different road categories

Type of carriageway	Total design service volumes for different categories of urban roads (PCU per hour)		
	Arterial	Sub-arterial	Collector
Two-lane (one-way)	2,400	1,900	1,400
Two-lane (two-way)	1,500	1,200	900
Three-lane (one-way)	3,600	2,900	2,200
Four-lane undivided (two-way)	3,000	2,400	1,800
Four-lane divided (two-way)	3,600	2,900	-
Six-lane undivided (two-way)	4,800	3,800	-
Six-lane divided (two-way)	5,400	4,300	-
Eight-lane divided (two-way)	7,200	-	-

Source: IRC 106-1990 guidelines for capacity of urban roads in plain areas

Table 3: Grading of level of service of roads based on volume to capacity ratio

LOS	V/C	Performance
A	0–0.2	Excellent
B	0.2–0.4	Above average
C	0.4–0.6	Average
D	0.6–0.8	Below Average
E	0.8–1	Poor
F	> 1	Very poor

Source: IRC 106-1990 guidelines for capacity of urban roads in plain areas

The traffic volume count in this zone shows that the current traffic volume far exceeds the designed capacity and the desired level of service. The level of service is considered ideal when V/C ratio is 0.2. But the actual traffic volume inside the zone can be more than six times and on the surrounding arterial roads—especially close to the junctions—more than ten times. The level of service is three–four times worse than the C level of 0.4–0.6. These streets and roads cannot hold any more traffic if other mitigation strategies are not adopted in terms of improving circulation, public transport access and car restraint measures.

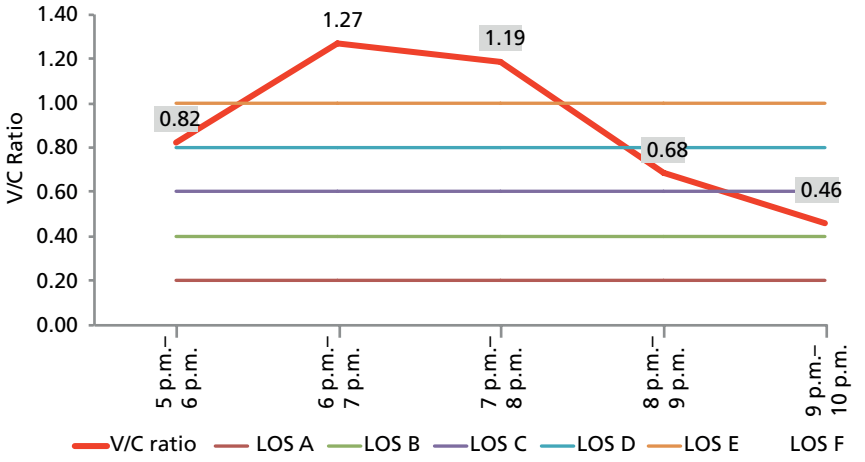
Alaknanda (Tara Apartment F-Block)

This area includes a group of housing blocks developed by Delhi Development Authority. The survey point on the road along Tara Apartments (F Block) is a 20 metres wide with 4-lane undivided carriageway which is also the main entry point of traffic from outside the area. Being inside a residential area, the road segment has extensive on-street parking and heavy cross-traffic. Buildings along both sides

have free frontage access that effectively reduces overall capacity of the road. The Alaknanda stretch, which comes under the category of collector roads, has a design capacity of 1,800 PCUs per hour. Traffic survey conducted at this spot shows evening peak hours between 6–7 p.m., when the PCU reaches 2,282, 27 per cent higher than the design capacity. The LOS of the stretch has a V/C ratio of 1.27, about two-three higher than the average. The peak subsides after 9 p.m. (see *Graph 1: Hourly traffic along the Alaknanda road*).

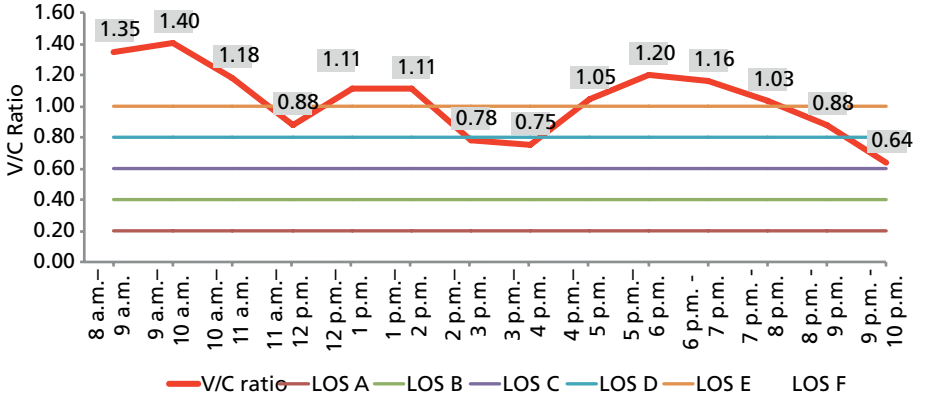
During the morning peak, traffic builds up between 9 and 10 a.m., when V/C ratio reaches up to 1.4. The road stretch remains congested all day with an average V/C ratio of 1.04 (see *Graph 2: Hourly traffic along Pocket F, Alaknanda).*

Graph 1: Hourly traffic along the Alaknanda road



Source: CSE computation based on survey data of Ark Foundation

Graph 2: Hourly traffic along Pocket F, Alaknanda

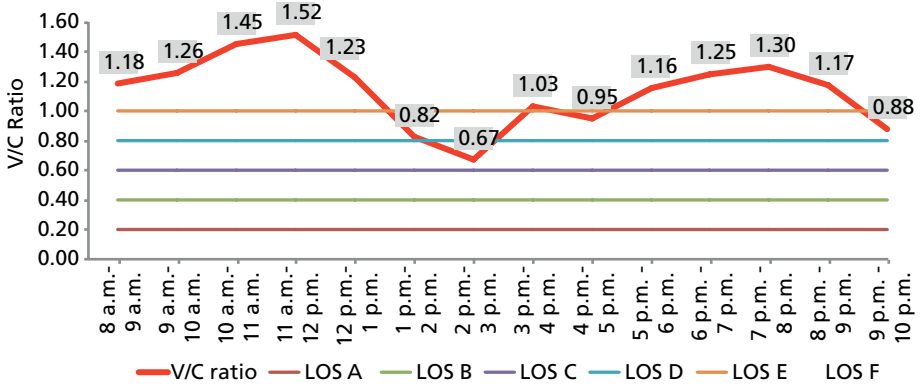


Source: CSE computation based on survey data of Ark Foundation

Chittaranjan Park

CR Park, the residential community area, has experienced high density housing development with equally busy commercial streets. The 18 metre wide two-lane undivided road of the area functions like a collector road with free frontage access to buildings on both sides as well as heavy cross-traffic. According to IRC, such roads should have maximum design service volume of 900 PCUs per hour. From the day long traffic survey conducted, it is evident that the road experiences peak traffic between 11 a.m. and 12 p.m., when the PCU reaches 1,365, 52 per cent higher than the design capacity, and with a maximum V/C ratio of 1.52; except between 1 and 3 p.m., the area experiences congested traffic with LOS-F almost all day long (see *Graph 3: Hourly traffic along Bipin Chandra Marg, CR Park*).

Graph 3: Hourly traffic along Bipin Chandra Marg, CR Park

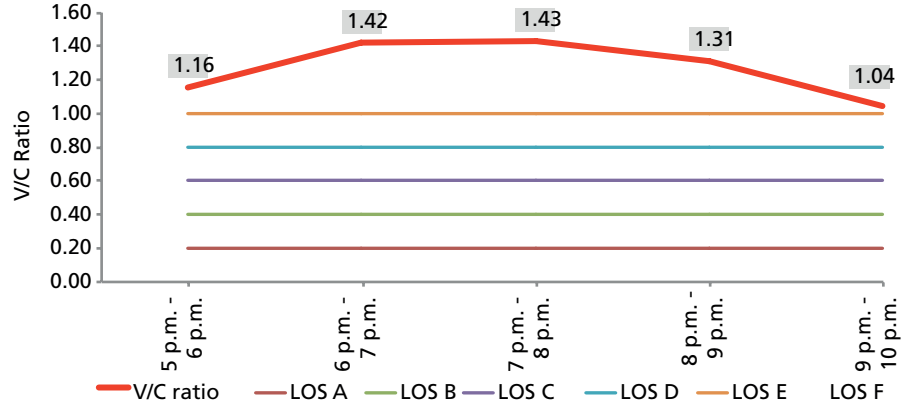


Source: CSE computation based on survey data of Ark Foundation

Greater Kailash-II (GK-II)

GK-II is a posh neighbourhood with multiple market places. Though the area has a 24 metre wide four-lane undivided road, the frequent crossings and frontage access to buildings and market places along both sides of road pushes it to the category of sub-arterial roads with a capacity of 2,900. From 5–10 p.m. (the period for which the survey was conducted), when the PCU reaches 4,144, 42 per cent higher than the design capacity, and the road is congested with a V/C greater than 1. Peak hour builds up from 7–8 p.m. (see *Graph 4: Hourly traffic along GK-II main road*).

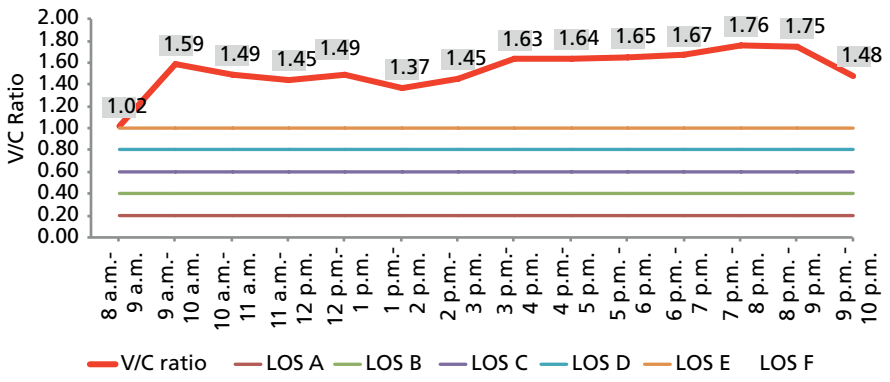
Graph 4: Hourly traffic along GK-II main road



Source: CSE computation based on survey data of Ark Foundation

The full day-long survey also shows the road stretch passing through the busy GK–II neighbourhood is congested all day with an LOS F. Even the period of minimum traffic (between 8 and 9 a.m.) has volumes crossing the maximum capacity of the road. V/C ratio of the road during peak hours (between 7 and 8 p.m.) is found to be 1.76, and PCU reached 5,093, 76 per cent higher than the design capacity, while the minimum V/C ration during a 24-hour cycle is still a high 1.02 (see *Graph 5: Hourly traffic along GK-II main road*).

Graph 5: Hourly traffic along GK-II main road

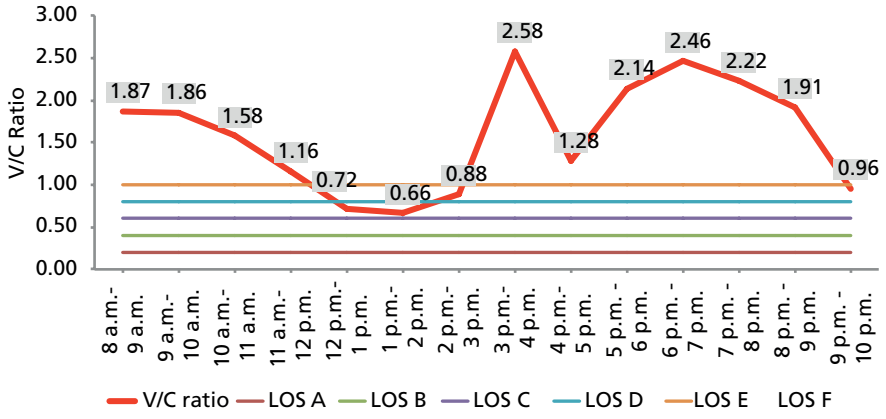


Source: CSE computation based on survey data of Ark Foundation

Tughlakabad Extension

Tughlakabad Extension, which connects Mehrauli–Badarpur road with the Alaknanda area, is among the busy roads of Delhi. The traffic pressure here is enormous as it is the only conduit of traffic for a large catchment upto Faridabad, drawing heavy numbers into the study zone. The 30 metre wide road with a four-lane divided carriageway is an arterial road by function, with limited frontage access, no standing vehicles and least number of crossings. The road has a maximum capacity of 3,600 PCUs per hour. According to the day-long survey conducted, traffic on this road peaks between 3 and 4 p.m, when the PCU reaches 9,298, 1.6 times the design capacity. During the hour, the V/C ratio of the road reaches 2.58, which is thrice the maximum capacity of the road. The road is heavily congested in the evenings, with an hourly V/C ratio consistently above two. The lean period occurs between 1 and 2 p.m. (see *Graph 6: Hourly traffic along Guru Ravidas Marg, Tughlakabad Extension*).

Graph 6: Hourly traffic along Guru Ravidas Marg, Tughlakabad Extension



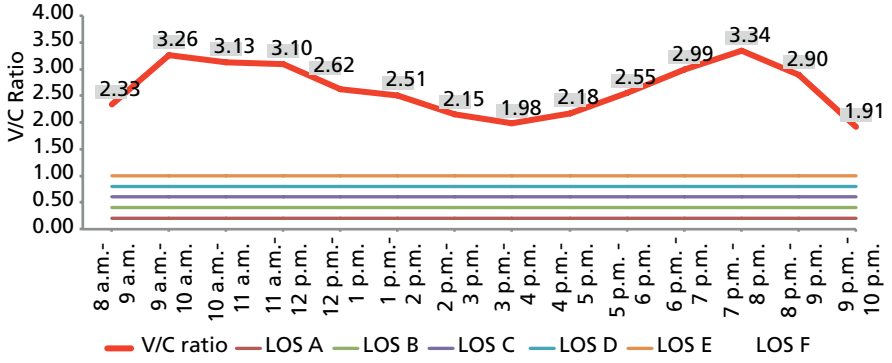
Source: CSE computation based on survey data of Ark Foundation

Outer Ring Road near Savitri Cinema

The Outer Ring road is one of the busiest arterial roads of Delhi, bearing a heavy traffic burden. The 45 metre wide six-lane divided carriageway has a maximum carrying capacity of 5,400 PCUs per hour. Our survey was conducted at the segment near Savitri flyover, where the road intersects with the main Greater Kailash-II road. The day-long survey shows heavy traffic along the road stretch with a traffic volume that is more than twice or thrice the maximum capacity of the road stretch. The V/C ratio of road reaches 3.34 during 7–8 p.m., which is the peak hour, when the PCU reaches 18,047, 2.34 times the design capacity. It is interesting to note that the minimum traffic on the road itself is about twice the maximum capacity of the road. Minimum hourly V/C ratio of the road is 1.91 around the time 9–10 p.m. (see *Graph 7: Hourly traffic along Outer ring road*).

The study area is, therefore, tightly placed between over-saturated arterial roads.

Graph 7: Hourly traffic along Outer Ring Road



Source: CSE computation based on survey data of Ark Foundation

Massive traffic explosion over time

There is not enough data to estimate area-wide changes in traffic flow and pressure and compare the changes over time. It was only in 2006 when the Alaknanda Community Centre project was cleared and assessed by Delhi Development Authority that some limited traffic data was generated in the immediate vicinity of the project area. According to this report—Traffic System Analysis for Kalkaji (Alaknanda) Community Centre 2006—it was estimated that the peak existing traffic on the roads connecting Alaknanda Road to ISU Darshan Munjal Marg was 930 PCU, and on the road connecting Kalka School and to Gurudas Marg was 469 PCUs. It had projected that only 390 peak hour PCU will be added to the existing peak PCU.

The Ark Foundation survey of 2017 shows massive increase in traffic volume in these stretches compared to 2006, by four–nine times. Even on other roads in the area, traffic volume is significantly high. The 2017 traffic survey conducted on the stretch i.e. Kalka Public School to Guru Ravidas Marg showed peak hour traffic to be as high as 4,144 PCUs per hour in contrast to 469 PCUs calculated by DDA in 2006—close to nine times increase. In 2006, on Alaknanda road to ISU Darshan Munjal Marg (near GK-II) the traffic volume was 930 PCU, that has increase by four times now.

No zonal plan for this neighbourhood indicatating mitigation strategies including circulation and public transport strategies for reducing traffic impact from new development and densification is available under the MPD 2020–21.

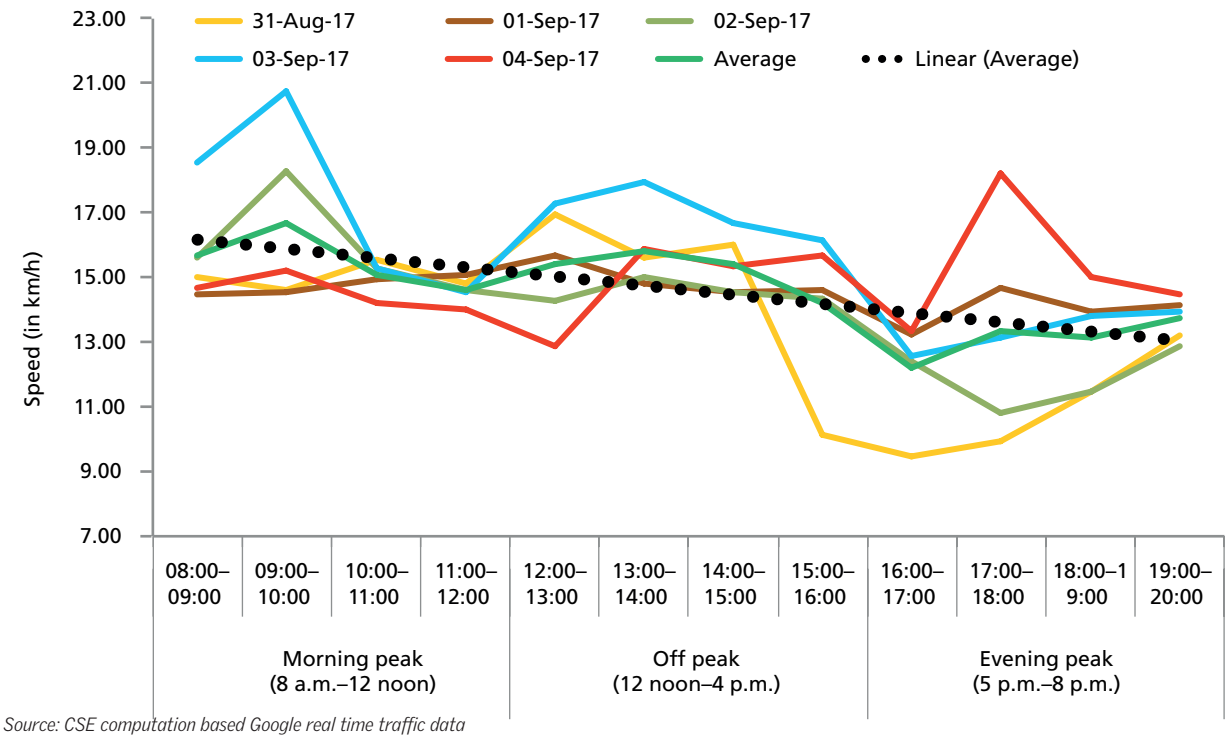
Massive slow down: Assessment of Google traffic data

CSE also assessed real-time traffic information of Google Maps—a popular tool to gauge traffic time by residents of Delhi while travelling in the city—for different stretches to calculate average traffic speed on the roads during different hours of the day. This assessment has used daily real-time information of Google Maps for the selected seven stretches from 31 August–4 September 2017. The data has been noted for every hour from 8 a.m. to 8 p.m. The speeds were then calculated for every hour for all the roads daily. This simple exercise for key stretches of the seven roads shows low traffic speeds, high weekend congestions and low traffic speeds during peak hours.

Average speed in this zone significantly lower than the average speed on Delhi's roads

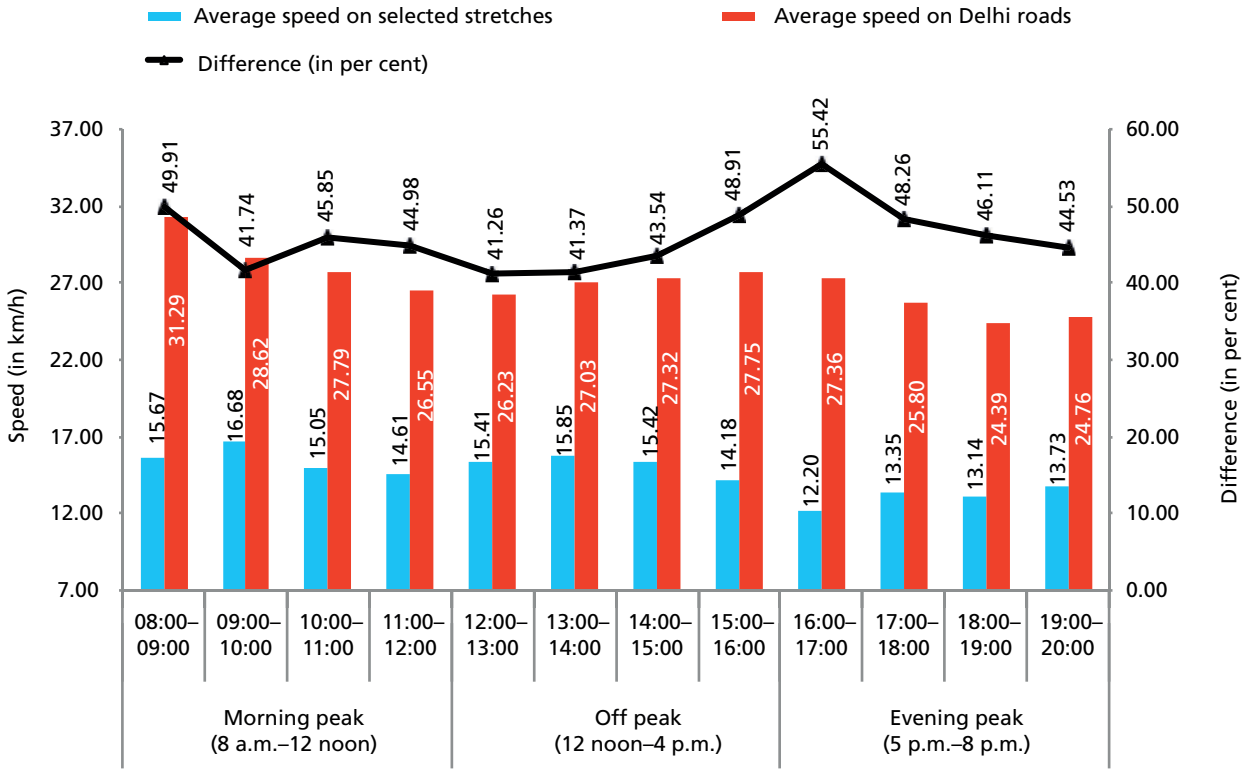
The main takeaway is that the average traffic speed in this area is much lower than the current average traffic speed in Delhi, which in turn is much lower than the legal speed limit. The average traffic speed on the seven selected stretches of roads in the zone is 14.6 km/h, which is 46 per cent lower than average speeds on Delhi's roads. The average speed on Delhi's roads is 27 km/h according to CSE's recent analysis, whereas the average legal speed is 40 km/h.

Graph 8: Hourly average speeds on selected seven stretches in the study area



Source: CSE computation based Google real time traffic data

Graph 9: Hourly comparison of average speeds on selected stretches with Delhi's average speed



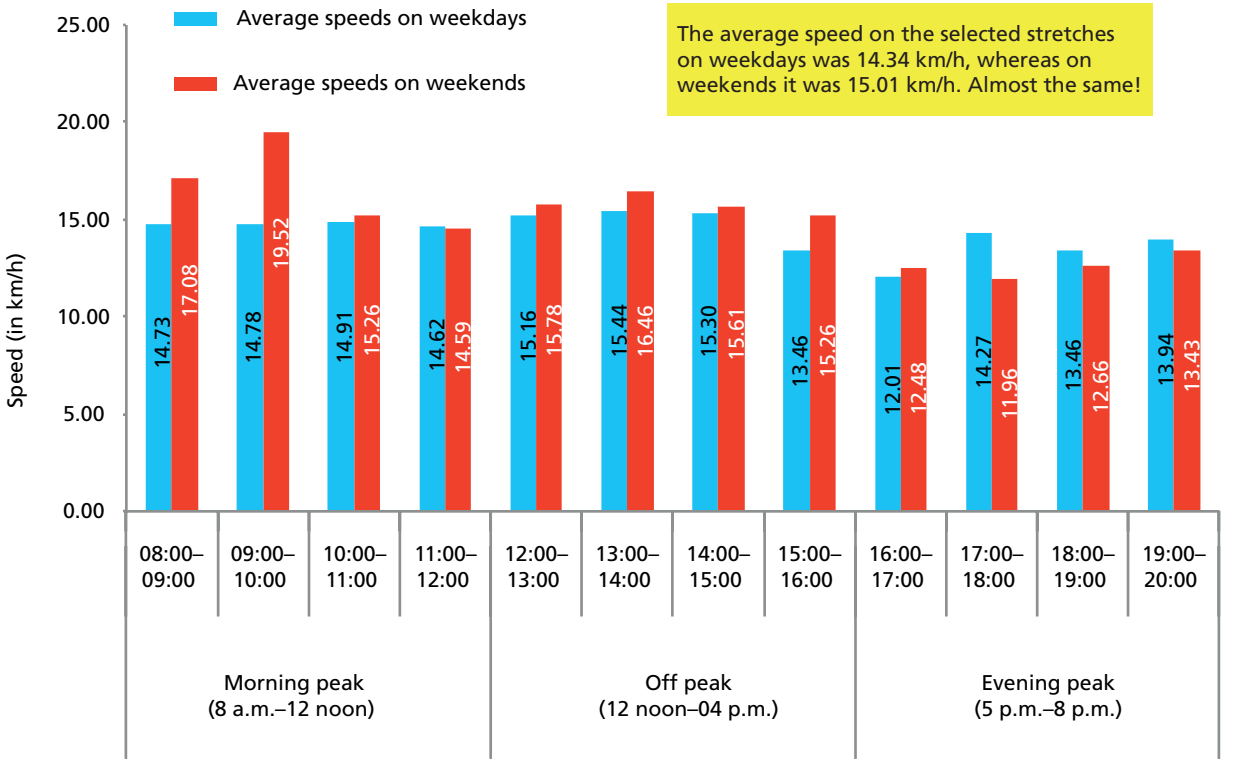
Source: CSE computation based on Google real time traffic data

No difference between weekdays and weekends traffic

There is virtually no difference between peak hour speed of weekdays and weekends. The average speed on the selected stretches on weekdays is 14.34 km/h, whereas on weekends it is 15.01 km/h, nearly the same. Overall, weekend traffic in Delhi has increased quite substantially in recent times. Combined with local commercial areas, this is drawing heavy traffic into the area.

According to the 2010 RITES report, the average peak speed in Delhi was 27.7 km/h and off-peak was 30.8 km/h, today, it is 26 km/h and 28 km/h, respectively. According to an IIT Madras study on Delhi's congestion cost, traffic congestion in Delhi cost the city close to Rs 54,000 crore a year in 2013. This is expected to get worse, especially as Delhi has now crossed the 10-million mark of total vehicle registrations. Estimates suggest the losses due to traffic congestion will increase to Rs 90,000 crore a year by 2030.

Graph 10: Hourly traffic comparison of weekdays and weekends of the seven selected stretches



Source: CSE computation based Google real-time traffic data

Poorly designed streets and unsafe access

CSE has also carried out a walkability and safety audit in Alaknanda to understand and suggest design solutions to improve safety, convenience, aesthetics and overall attractiveness and well-being. This assessment was based on quantitative and qualitative indicators. The audit was carried out in accordance with a checklist of parameters prepared by CSE based on the street design guidelines of UTTIPEC. These guidelines are expected to be followed by the city authorities, but are not mandatory. The audit identified deficiencies and maintenance concerns, and proposes solutions (see *Graph 11: Ranking of road segments based on the safety audit*).

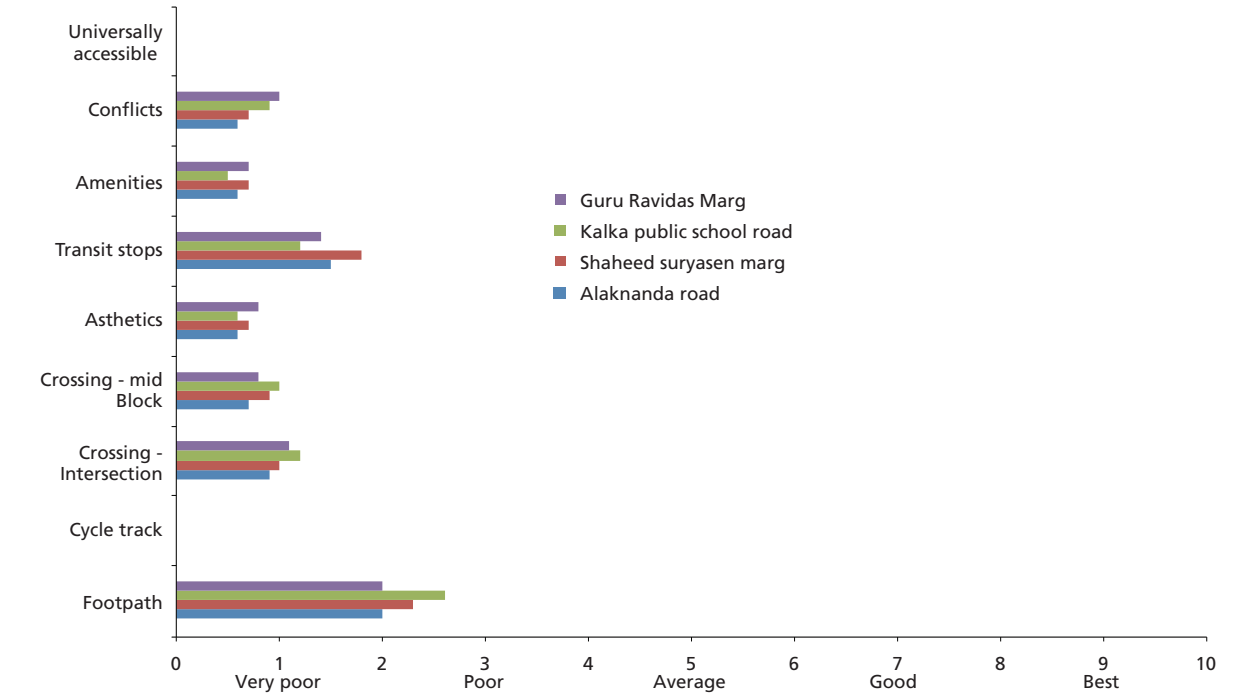
The safety audit has considered engineering and design features of footpaths and cycle tracks; crossing-intersection; encroachments on footpaths; design features for transit bus stop shelter; amenities in terms of toilets, vendor spaces, trees, lighting and seating; conflicts between buses, motor vehicles, non-motorized transport, and pedestrians; safety features (lighting, dead width and public spaces), and aesthetics of design qualities of street furniture or features.

This survey exposed poorly designed footpaths. The width of a footpath (according to the Street Design Guidelines) should be a minimum of 1.8 m, only 20–25 per cent of the total road stretch surveyed meets this norm. The kerb height (for which the norm is 150 mm) is unacceptable along all the roads, only the road near the St. George School has a kerb height meeting the standards. The area along the market does not have a continuous footpath. Footpaths width varies from 1.5–2 m and is very close to the permissible width mentioned in the standards only along the area of the residential colonies; the width of the footpath near the market is 1.5 m, it should be 2 m according to the standard. The footpaths outside the market and along the Alaknanda road have been barricaded by railings, which makes them inaccessible to people. At many places hawkers have not been properly organized.

Similarly, little thought seems to have been given in the road design to safe crossings for pedestrians and cyclists. For crossing, only one element is provided on the road and that is zebra crossing, which is visible only at 10–15 per cent of all the crossings. None of the intersections or junctions are provided with raised table-top crossings or pelican signals for convenient crossing. There is no provision of mid-section crossings at any point even when the land use is mainly residential and mixed. Even at junctions and transit stops there is no provision of safe crossing for pedestrians.

Bus stops are located on footpaths, as there is no clear multi-function zone. The height of the base of the bus stop does not match with the base of the bus. According to the UTTIPEC guidelines, the bus stops should be equipped with amenities such as public toilets, seating areas, kiosks, route maps and have adequate lighting, but all the transit stops score very poor in these aspects. The amenities are negligible; even the size of the bus box is inadequate to accommodate the people using the bus services. The infrastructure in all the corridors is not designed keeping the disabled in mind, in fact, all the corridors score zero in this respect. None of the road stretches in the given corridors have footpaths with adequate height and there is no provision of ramps. There are no auditory signals at any of the intersections. The tactile paving provided on the footpaths have no relevance as they begin in the middle of the footpath and end abruptly anywhere. No provision of ramps has been provided on bus stops for

Graph 11: Ranking of road segments based on the safety audit



Source: CSE

physically challenged and visually impaired. At two or three bus stops, ramps have been provided but they are obstructed by billboards.

Parking pressure is onerous. Double to triple parking on the road near Alaknanda market or near other market areas in GK II not only take away space from pedestrians but also from the carriageways.

Impeded access to public transport

Even though this zone is well within the catchment of three metro stations—Nehru Place, Govindpuri, and upcoming one at Savitri Cinema, there is no clear plan for feeders, para-transit deployment, pedestrian access, and local connectivity for convenient and easy transfers from all neighbourhoods. If a proper street grid with adequate openings and pedestrian access are engineered in this zone, it can open up more choices for commuters and reduce local vehicular pressure. Moreover, as the entire traffic flow is confined to two or three roads with inlets and outlets from two main junctions, this seriously impedes bus movement in the area and at least six bus routes have become defunct in the area.

Summary of highlights and local challenges

This local area assessment has helped to identify a range of symptoms of the crippling mobility crisis:

High traffic pressure and significant increase in traffic load over time: The current traffic volume as per 2017 traffic survey far exceeds the designed capacity and the desired level of service of the roads in all the road segments surveyed including

Alaknanda, Greater Kailash II, Chittaranjan Park and outer areas. The actual traffic volume inside the zone can be more than six times the volume on surrounding arterial roads. Close to junctions it can be 10 times. These streets and roads cannot hold any more traffic load if other mitigation strategies are not adopted in terms of improving circulations and enabling more openings, public transport access and car restraint measures.

The limited traffic data set that is available for small four stretches around the Alaknanda Community is available from the assessment of the Delhi Development Authority in 2006. For indicative results it can be compared with the traffic data recently generated from the 2017 traffic survey—and this indicates between four–nine times increase from 2006 levels. Moreover, the 2010 RITES study indicates massive increase in traffic in the entire catchment of this neighbourhhod. In fact, some of the local streets may even have traffic volumes equivalent to that of arterial roads. This will have serious choking effect on the neighbourhood.

Massive slowdown in traffic with no difference between weekdays and weekend traffic speed: Further study based on Google Maps and speed on these road stretches show that the average speed in this zone is lower than the average speed on Delhi's roads—14.6 km/ h in this zone as opposed to 27 km/h hour on city wide roads; 46 per cent lower. Also, the average speed on the selected stretches on weekdays is 14.34 km/h whereas on weekends it is 15.01 km/ h.

Access to infrastructure is deficient and unsafe for all: Walkability and road safety audit in the area has exposed highly deficient and unsafe infrastructure for all road users. Footpaths are inadequate and poorly designed and encroached upon, forcing people to walk dangerously on roads. Crossings are unsafe. This has increased accident risk in the area. Carriageways are under enormous pressure from on-road parking that further reduces available road space. This has seriously compromised pedestrian safety and student safety as they have to negotiate heavy traffic on roads in sheer modal conflict with increasing number of vehicles. This requires immediate overall street improvement.

Worsening of congestion is also adding to high exposure to toxic air pollution: There is no regulatory ambient air quality monitoring close to this neighbourhood. However, an earlier exposure monitoring of particulate pollution carried out by CSE in the Alaknanda area during the winter of 2014–15 has shown high peak averages for PM 2.5. Eight hourly averages during the day show a range of 322–570 microgramme per cum in November of 2014. Night time pollution is even higher due to cold and calm weather that traps pollution very close to the ground level. This has been as high as 787 microgramme per cum. Such toxic exposure can have serious public health consequences. This zone is part of South Delhi airshed and the nearest regulatory monitor of Delhi Pollution Control Committee is 6 km away in Siri Fort. During the winter of 2017–18, the ambient air quality in 72 per cent of the days was in the very poor category, and 10–20 per cent were in the severe and emergency categories. This is a highly polluted zone.

Traffic impact of densification and new development have not been assessed on an area-wide basis for decision making: The demand for residential, commercial and retail spaces in the neighbourhood can only be expected to increase with growing

densification in the area. More and more mixed use buildings are coming up to cater to this demand, which is a good sign and is consistent with the requirements of MPD 2020–21 and Transit Oriented Development Policy. But there is no planning strategy in place to mitigate traffic impact of this growth. New and large developments are not being planned based on potential traffic impact and the requisite mitigation strategies. Thus, all new proposed commercial developments in the area, including the Savirti Cinema Complex, the proposed mall in Alaknanda etc. have kindled fierce agitation and local anger.

There are no plans to leverage the Metro transit line to reduce traffic pressure and improve access for all: This neighbourhood is best suited to be developed as a transit-oriented zone due to its close proximity to several metro stations in Nehru Place, Govind Puri, Kalkaji Mandir and the closest one, that is the upcoming Savitri metro station. High footfall areas approaching the metro stations can be properly designed and integrated with feeder service and para-transit for quick, reliable and safe access that can improve usage of the metro system appreciably and reduce use of personal vehicles for daily commuting appreciably. Internal roads can be unclogged to facilitate access for local residents. Instead, car-oriented road designs are being proposed near Savitri metro station, including fly over loops to flush in traffic from Outer Ring Road into the neighbourhood. There are concerns that this can further burden the seriously deficient circulation network in the neighbourhood.

Step-up action

Proper solutions to the local crisis needs action at the local as well as city and zonal levels. At the local level, there is considerable scope for changing the design of the road and reorganizing street activities for less congestion and for zero accidents and reduced motorized trips for short distances.

Ensure traffic impact assessment of all new developments and redevelopments to identify mitigation strategies: Consistent with the requirements of the MPD 2020–21, any new development or redevelopment should undergo mandatory and rigorous traffic impact assessment based on well-defined criteria within an effective influence zone for decision making as well as to assess the possible mitigation measures within that influence zone. Development agencies should be accountable for implementation. Mitigation strategies to prevent inducement of traffic into the area should be mandated.

Implement a time-bound action plan to improve connectivity of the neighbourhood with all the metro stations in the vicinity through feeder services, para-transit and walkable infrastructure: This area is well-served by the Metro line with several metro stations in close vicinity, including Savitri, Nehru Place, Govindpuri and Kalkaji Mandir. An efficient and integrated feeder service, and safe walkable access to these stations, can be game changers. If this is implemented along with upgradation of the bus strategy, it can substantially control local motorized trips as well as reduce influx of through-traffic.

Need area-wide integrated street improvements to meet the requirements of all road users and improve safety and accessibility for all: Local solutions will have to look at ways to increase people-carrying capacity of existing roads and not the vehicle-carrying capacity. This is simply because more car influx will occupy more

road space but will carry miniscule travel trips. A 2015 CSE survey has shown that the majority of cars accessing an area like Alaknanda market, for instance, are single occupancy cars. But redesigned streets for all road users will improve throughput of people.

Develop and implement area-wide parking area management plan for the entire zone: Integrated street improvement is not possible without simultaneously organizing legal parking and restraining illegal parking. As per the new draft parking rules, area-wide parking plans are needed to earmark legal parking areas, penalize illegal parking, protect green areas and parks and pedestrian paths from parking, among others. This can unclog the roads, streets and public spaces to improve circulation as well as safe access for all.

All civic, transport and urban planning agencies need to coordinate to assess local imperatives and develop local area plans: A comprehensive assessment of the traffic impact of new development, addressing current deficiencies in the existing circulation network for all road users, improvement of traffic dispersal through efficient street network to unclog the area, and ensuring overall street improvement to meet the requirements of all road users needs to be carried out.

Architects, urban planners and designers and members of RWAs should be part of the consultative process related to transport and traffic planning for the local area, local area development and parking area management strategy.

Lessons from this local area are relevant for city-wide interventions. Similar mapping of local area networks and circulation, traffic flow patterns including parking impacts, public transport availability, and status of pedestrian access and of last-mile connectivity is essential to design mitigation strategies, including road engineering interventions. Globally, especially in Chinese cities like Beijing, all new residential and commercial buildings have to mandatorily provide clear strategies to ensure that these developments do not induce more traffic in the area and reduce traffic pressure by providing direct connectivity with the nearest public transport nodes and by freezing and restricting parking requirements in the area.

Longer-term solutions will emerge from the integrated zonal plans reflecting the new principles of sustainable development goals.

Centre for Science and Environment
41, Tughlakabad Institutional Area, New Delhi 110 062
Phones: 91-11-40616000
Fax: 91-11-29955879 E-mail: usman@cseindia.org
Website: www.cseindia.org