



CITY LEVEL PROJECTS

## SUDHAR CAMP, KALKAJI

Slum Redevelopment Scheme, Ward Number 196





## Delhi Urban Art Commission

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## Acknowledgements

It is said that for an artist to join establishment is a kiss of death. I was fully aware of this aphorism when the Minister of Urban Development, Mr. Kamal Nath, asked me to be the Chairman of the Delhi Urban Art Commission. I had three conditions before accepting the assignment and one of these was that DUAC should be allowed to carry out site specific studies for improving slums and unauthorized colonies. Subsequently, the Minister along with the then Lieutenant Governor of Delhi, Mr. Tejendra Khanna, and Secretary, Ministry of Urban Development, Dr. Sudhir Krishna, approved the proposal to carry out three dimensional studies for improving slums and unauthorized colonies. I am grateful for their support.

I would like to thank other members of the Commission, Eric P.Mall, Satish Khanna, Sonali Bhagwati and D. Diptivilasa for helping to make success of problematic urban design exercises and charting new paths.

I take this opportunity to thank senior consultants, architects, urbanists and planners as well as younger colleagues who have been working full time. DUAC Secretary, Vinod Kumar, and other permanent staff have enthusiastically supported us and guided us through government procedures. Many thanks to all of them.

**Raj Rewal**  
Chairman

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## Preface

Half of Delhi lives in ramshackle slums and shabby unauthorized colonies. This state of affairs is a serious blot on the face of the city which has great historical monuments and aspires to be a world class city. The centre of New Delhi is lined with leafy trees and can boast of superb example of contemporary architecture but its growth under exploding population has disintegrated into shanty towns.

My first memory of Delhi is that of a child going in a tonga from the railway station to our government quarter in New Delhi around a square which became our home for several years. The squares were built near Birla temple and when my father was promoted in the government hierarchy, he was offered an independent house with a larger area but my mother refused to move as she had developed kinship with families around the square. This was my first lesson in neighbourhood "mohalla" as an urban phenomenon.

In fact the word 'urb' in Latin stands for neighbourhood space. It was a period when Connaught Place was the leisurely centre for social, shopping and cultural activities and the Old Delhi was lively and still gracious, dominated by Jama Masjid and Red Fort. Delhi's monuments like Humayun's Tomb, Qutab Minar and Lodhi Garden were favourite places for picnics.

Seventy years have passed since the tonga ride, Delhi has dramatically changed as the population of Delhi has exploded from under a million before partition in 1947 to about twenty million today.

As a Professor in the School of Planning and Architecture in Delhi, I had ample scope of studying typology of Indian cities which helped me to design Asian Games Village in my mid-career around 1980 as a series of clusters (mohalla neighbourhood) woven around pedestrian pathways, segregated from road networks. This was a low rise high density housing built within the framework of 150 FAR (FSI 1.5).

Delhi has changed even more drastically during the last thirty years since the Asian Games Village was built, but the idea of a city as a series of sympathetic, humane interconnected neighbourhood building blocks interspersed with social, cultural and educational facilities has remained embedded in my mind.

Delhi Urban Art Commission was established to preserve, develop and maintain the aesthetic quality of urban and environmental design within Delhi. During the last 40 years of its existence, DUAC has not received any three dimensional exercises which visualizes neighbourhoods, wards etc. The emphasis has often been only appraising individual

buildings and complexes submitted through local municipal agencies. After taking over the direction of DUAC in 2011, members of the Commission arranged meetings with wide spectrum of advisors and formulated principles on which a building can be automatically and speedily approved and decided to take over the job of visualization and three dimensional planning for various aspects of the site specific designs which need to be urgently developed if Delhi has to maintain standard as a world capital city.

A large part of Delhi lives in unauthorized colonies and slums and even the Master Plan of Delhi had suggested a detailed design proposal to augment the Master Plan based on ground realities.

In order to fulfil the requirements of neighbourhoods, wards, the DUAC has undertaken a few pilot projects which can be eventually developed in a manner that the local municipal agencies can implement them. In order to carry out these studies, DUAC developed in its own office a core group of architects and urban planners. This was done on the basis of DUAC mandate that "the Commission may suo motu promote and secure the development, re-development of which no proposals in that behalf have been received from any local body".

The studies involve the visual tools for ground studies combined with extra assistance of Google images. It is hoped that the proposals and their conclusions would be evolved to such an extent that a process can be worked out with the resident welfare associations to make meaningful designs for the neighbourhood upgradation for the different kind of wards.

The DUAC's site specific designs are the seeds which can grow and it is hoped that economic principles would be evolved to implement the meaningful neighbourhood upgradation for the different kind of slums and wards. India cannot remain shabby and ramshackle forever and solutions have to be found for shanty towns.



**Raj Rewal**  
Chairman, DUAC

January 2014

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## Summary

As per Shelter Policy of MPD 2021, 50-55% of the 24 lakh additional dwelling units to be provided in the plan period would be for the Urban Poor and economically weaker sections in the form of houses of two rooms or less. In the existing slum settlements, the threefold strategy of relocation from areas required for public purpose, in-situ upgradation and the interim measure of upgradation to minimum standards is to be followed.

**Objective** In keeping with the above framework the Delhi Urban Art Commission has undertaken alternative site specific housing design options for one site, i.e. Sudhar Camp which falls under the Municipal Ward No. 196.

**Design Intent** The intent was to explore low-rise housing options within the limits of the site geometry and size.

**Outcome** Explorations have resulted in two alternative design options for in-situ rehabilitation of the slum population of Sudhar Camp.

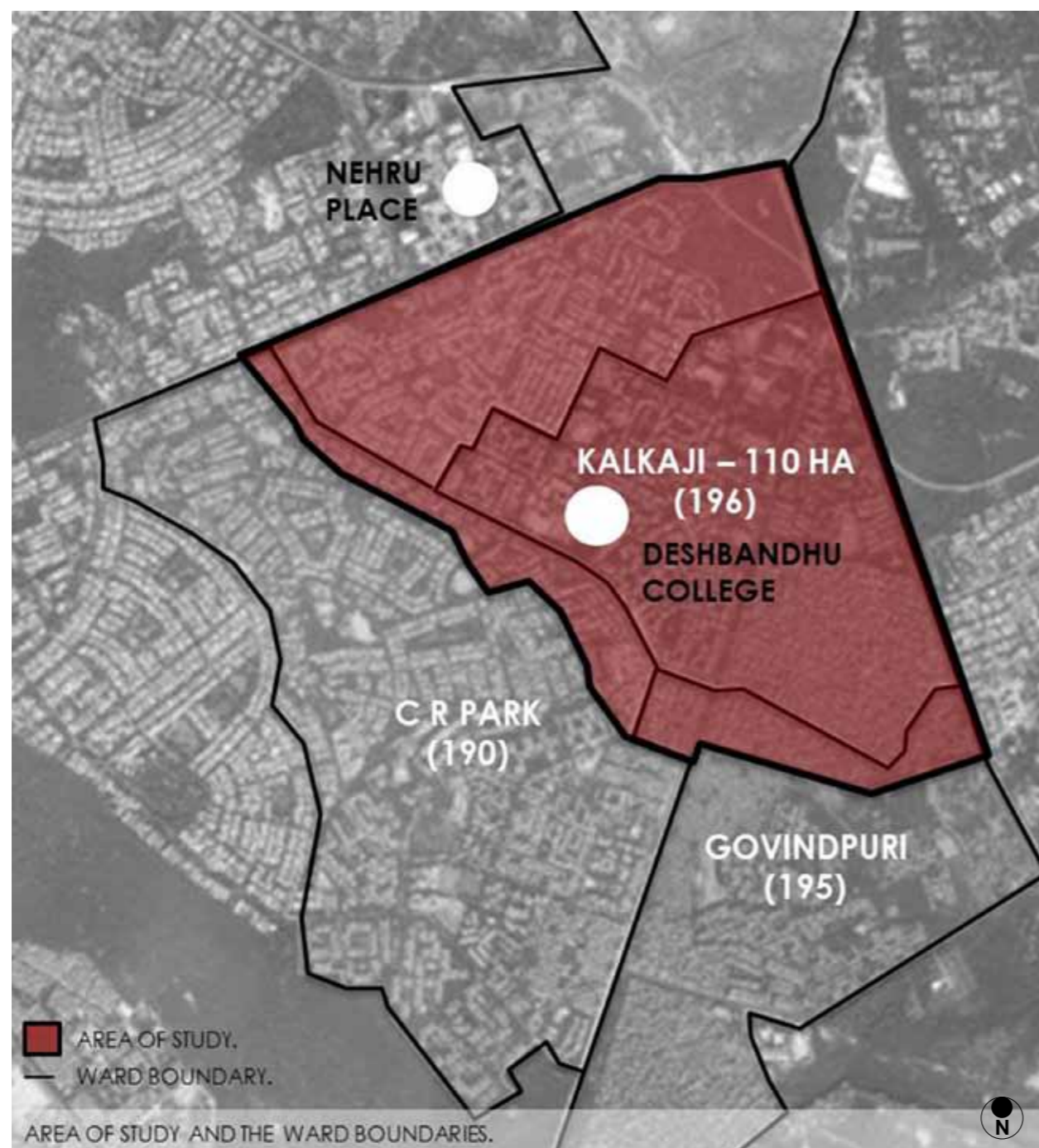
Results have also resulted in establishing some insight into the inter-relationships of governing norms of FAR, density, ground coverage, setback norms and appointment for commercial use.

For Economically Weaker Section Housing, the Master Plan of Delhi 2021 and the National Building Code of India 2005 recommend a small unit size. This size is in keeping with affordability of the beneficiary in the first instance and their financial capacity to retain it subsequently.

With this income group it is the failure of the latter which pushes the head of the family to sell the house as a commodity in the market at every potential financial crunch. It is this lack of financial security that forces a family of 5 to 6 to live in a small shelter unit with a carpet area of 25 square metres.

This miniscule unit with four or five independent, internal spaces i.e., 1-2 rooms, kitchen, bathroom/water closet and balcony requiring direct light and ventilation, implies a rather intricate spatial organization which has many interstitial open to sky spaces. It calls for a careful crafting of the built and the open.

When a family of 5-6, sometimes across 3 generations, is forced to live in 25 square metres of indoor area, the space immediately outside the unit becomes very valuable. Outdoor living and sleeping thereafter become a sheer necessity, reinforced by the requirements of social and family structure. This calls for careful apportioning of common spaces around the unit.



### 1.1 Location and Connectivity

Sudhar Camp is located in between the ward boundaries of East of Kailash (Ward No. 194) and Kalkaji (Ward No. 196).

It is surrounded by a high-end residential area comprising plotted developments of minimum 500 sq m of area under each plot

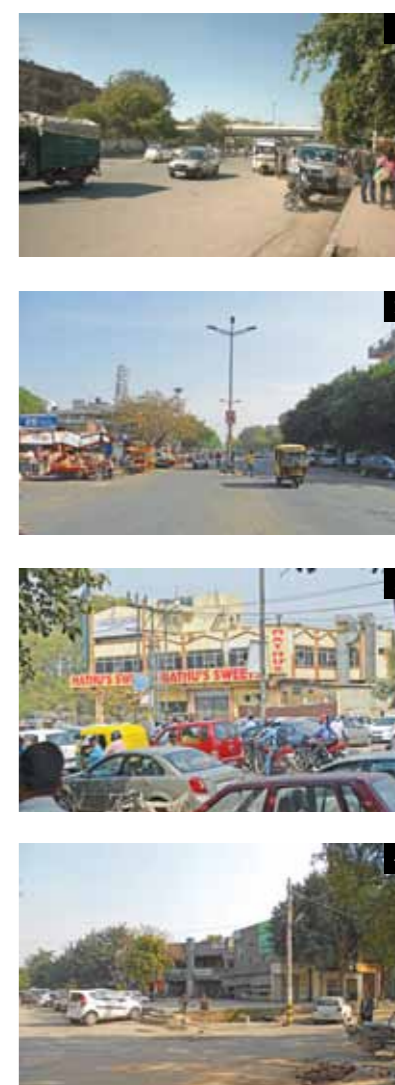
It is connected with the Outer Ring Road on the west side, Ma Anandmai Marg on the east side and with a Metro link of the Violet Line which is at a distance of half-a-kilometre.



Local Transport



Road Network



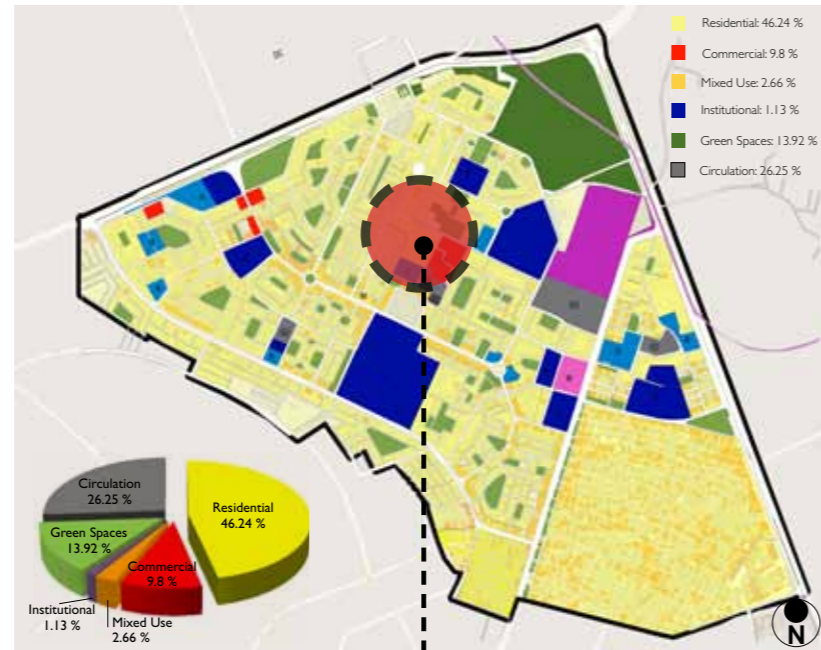
## 1.2 MPD 2021 Requirements

For Economically Weaker Section Housing the Master Plan of Delhi 2021 and the National Building Code of India 2005 recommend a small unit size. This size is in keeping with affordability of the beneficiaries in the first instance and their financial capacity to retain it subsequently.

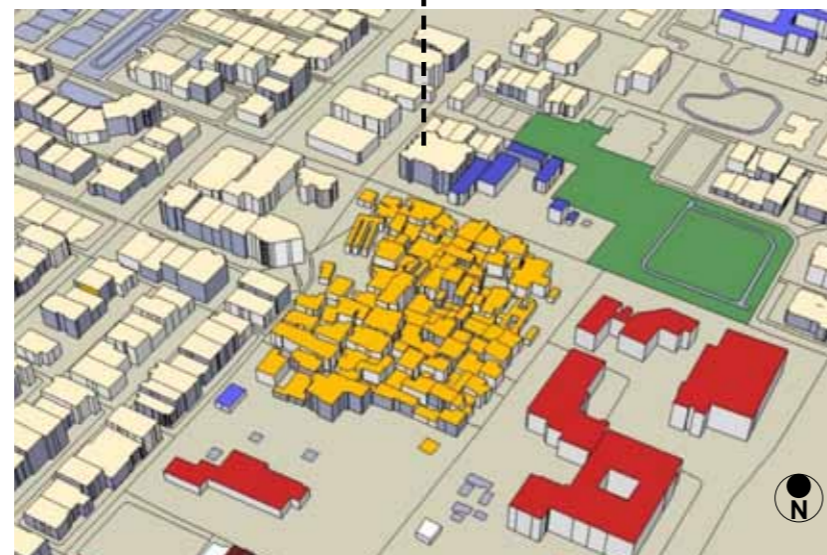
With the Master Plan of Delhi 2021 specifying a density of 600 dwelling units per hectare for this income group in keeping with the high costs of urban land in the city, the human footprint is enhanced manifold in an EWS housing area.

### Existing Demographics

Ownership	= DDA
Status	= Unauthorized
JJC	
Total Site Area	= 11015 M <sup>2</sup> = 1.10 ha
Existing Dus.	= 600 no.
Ground Coverage	= 55.8%
Existing Far	= 1.16
Ppl/Du	= 5
Total Residents	= 3000 (5 X 600)
Rented Population	= 1500
Gross Population	= 4500
Popu. Density/Ha	= 4085
Avg. Unit Size	= 9-12 sq m



Land Use Map for Kalkaji Ward No. 196



Existing Development In the Vicinity of Sudhar Camp



The conditions on edge on the east and west sides of the plot

## 1.3 Slum Livelihood Catchment



Livelihood profile of slum

### Built Form



Facilities present near the Slum

Catchment Area

### Amenities in Vicinity

1. Deshbandhu College
2. Kalkaji Main Market
3. Krishna Market
4. Local Shopping Centre
5. Community Centre
6. Malaria Department
7. MCD School
8. Post Office
9. ESIC O.P.D
10. CGHS Hospital
11. Multilevel Car Parking
12. Nehru Place
13. Existing Violet Metro Line



MCD Multilevel Parking

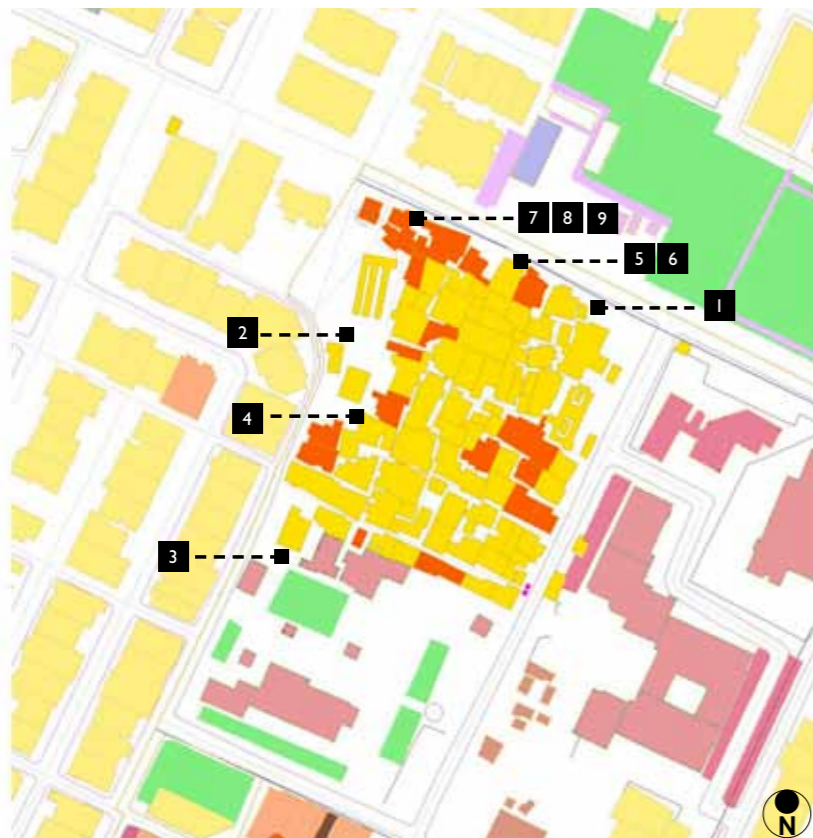


MCD School



Local Shopping Centre

## 1.4 Existing Condition/Situations



### Dwelling Unit (DUs) Typology

DU typologies were found, with number of floors reflecting the changing family needs of increasing number. In some cases additional floors were added to exploit the rentals it would bring in to enhance family income.

### Parking & Accessibility

On-road parking for scooters and cycle rickshaw encroach upon the pedestrian walking areas and ROWs. Connectivity by public transport also is an issue with people walking to the main road for travelling.

### Services

The camp has inadequate basic amenities like toilets, proper sewerage and other facilities. Moreover lack of proper maintenance is a major concern.



### Open Spaces

In the absence of any public open spaces in the form of green areas or parks, residents block the peripheral roads and makeshift arrangements for community gatherings.



### Edge

The edge is characterized by unorganized informal markets overflowing on to the ROWs and drains.



### Structure

Mixed varieties of built conditions have been observed as per site conditions depending upon the needs. Though the construction is restricted within a boundary wall by local bodies, yet a temporary extension can be seen on all the sides of the site. Ladders are used to climb to the upper floors due to lack of space for constructing a common staircase, which could have been shared by a group of dwelling units.



### Built Conditions

A maximum of G+2 structures with several issues which needs to be taken care of. The average street widths vary from 0.75 m to 1.0 m



### Roofing

Aluminium/asbestos sheets for single storey and G.I. sections with local red sandstone slabs for G+1 structures respectively, were the types of roofing conditions which have been spotted in the residential dwelling units. Use of RCC slabs were also seen for some newly constructed buildings (temple shelters).



## 1.5 Social Infrastructure

The MCD school space is available only during school hours and not beyond.

The green pockets are not open to the Sudhar Camp children to play.

The community centre is bounded and remains locked most of time and is underutilized.

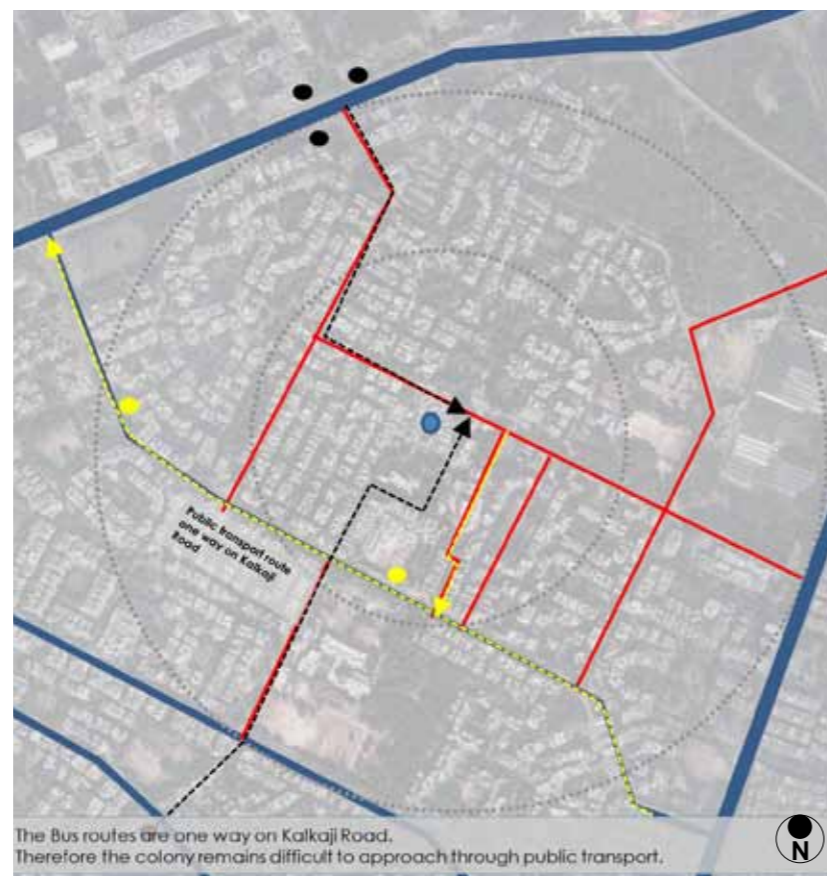
The Malaria Department within the vicinity takes care of any such threat.

The courtyard of the shopping centre remains cut off from the colony.

The working population has work places within 2–3 kms from the Camp.

Men earn their livelihoods working as rickshaw pullers, drivers, vegetable vendors and sellers at kirana shops.

Women, on the other hand, work as maids at residences within walking distance from the colony.



## 1.6 Development Details

### Shelter Unit

The Shelter Policy of Master Plan of Delhi 2021 stipulates the need to carefully calibrate the equation between Floor Area Ratio and density for optimum land utilization. It has been observed that in the first two Master Plan periods, housing areas have not fully delivered the envisaged FAR, leading to underutilization of infrastructure. In general the stipulated FAR for housing is 200, but MPD 2021 also recommends enhancement of FAR by 50% in sites located in the vicinity of Metro corridors and significant road corridors. Due to the small unit size in the case of EWS housing, meeting the target FAR is usually a challenge albeit the higher permissible ground coverage. This is in keeping with the felt need that EWS housing must be low rise, i.e. 2 to 3 floors as the connection with the ground is crucial due to the small-unit size. This leads to the question of how to have higher FAR which ensures optimization of the value of urban land and creates livable high-rise living for the EWS community.

### Plot Details

1	Permissible Density	600 dwelling units per hectare; with plot sizes of 1.1 hectares this converts to 660 dwelling units at Sudhar Camp
2	Permissible FAR	Maximum of 400 wherever necessary although the norm of 200 as per residential group housing shall prevail
3	Shelter size	25 – 30 sq m
4	Ground Coverage	Is subject to local conditions with the stipulation that setback shall be maintained.
5	Parking Norm	

### Shelter Details

1	Heights	
1.1	Building height	Maximum of 15 m for low-rise development with staircase; lifts to be provided for buildings beyond 15 m.
1.2	Habitable room	Minimum of 2.6 m
1.3	Kitchen	Minimum of 2.6 m
1.4	Bath/wc or combined	Minimum of 2.1 m
1.5	Corridor	Minimum of 2.1 m
1.6	Staircase	Minimum of 2.1 m
2	Room Size	
2.1	Habitable room	A minimum of 12.5 sq m in a one-room shelter unit Where there are 2 rooms the first room shall be a minimum of 9.5 sq m (minimum side 2.5 m) and the second a minimum of 6.5 sq m (minimum side 2.1 m);
2.2	Kitchen	Minimum area of 3.3 sq m with minimum side of 1.5 m
2.3	Water closet	Minimum area of 0.9 sq m with minimum side of 0.9 m
2.4	Bath	Minimum area of 1.2 sq m with minimum side of 1.0 m
2.5	Combined bath and wc	Minimum area of 1.8 sq m with minimum side of 1.0 m
2.6	Balcony	Minimum of 0.9 m width to a maximum of 1.2 m width and not to overhang on roads
3.0	Staircase	
3.1	Flight Width	Minimum of 0.9 m for 3 storeys and above
3.2	Riser	Maximum of 200 mm
3.3	Tread	Minimum of 250 mm



## 2.1 Design Option 1

### 2.1.1 Site Plan



#### Design Details

1	Total number of units	608 units
2	Residential density achieved	552 DU per hectare
3	Floor Area Ratio	184
4	Ground coverage achieved	35.75%
5	Unit details	3 types of units with plinth area ranging between 21 to 30 sqm
6	Area under parking	1,780 sq m
7	Amenities on site	Multipurpose hall (area 350 sq m), open community green (area 2505 sq m), 6 shops

### 2.1.2 Design Intent

It is a low-rise built-form of ground and four floors where all units have two rooms with one room opening looking on to cluster level spaces.

The intention is to fulfil both the density and unit area norms to the degree possible.

While this has been achieved this scheme's main area of dissatisfaction is that due to the plot size and geometry, it is neither possible to generate the community open space nor provide for any community facility.

A closer spatial analysis of the scheme indicates that almost 22% of the site area is lost to built-form development due to the peripheral setback of 6 m on all four sides.

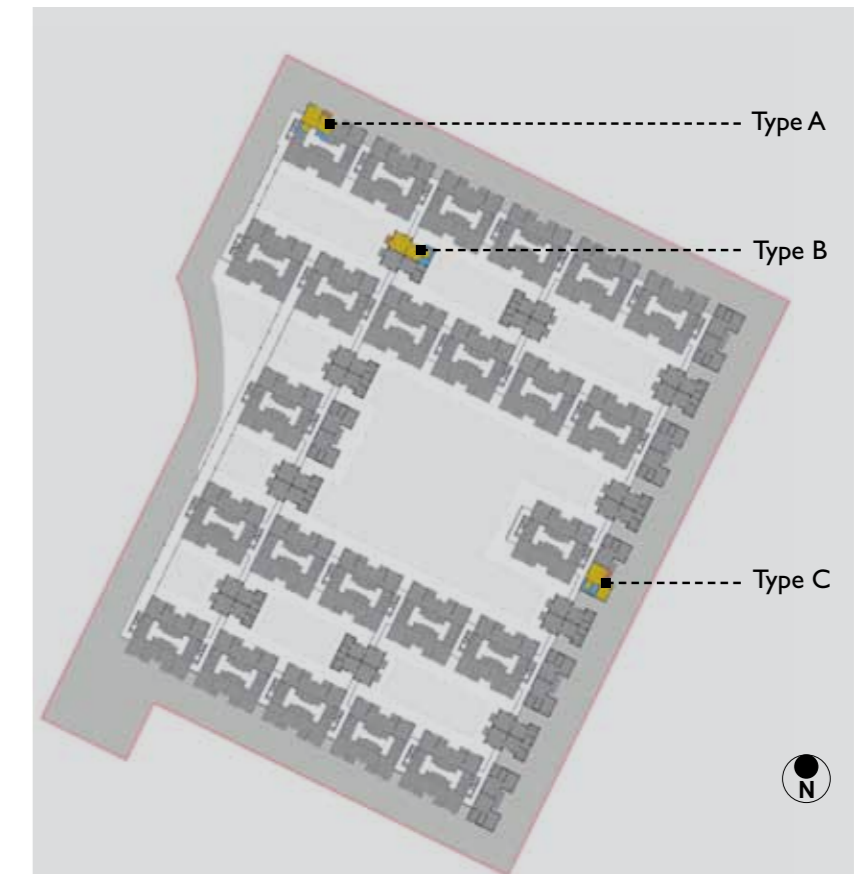
If this area is somehow retrieved and reassembled into one open space all the needs of the community would be met.

In this Design Option, the strategy of providing only larger units in the scheme improves the FAR to a substantial degree.

Cluster level open spaces along with community green spaces are satisfactory.

The larger unit footprint ensures that community open space is reduced to just the peripheral setbacks which are used in this gated community as a peripheral road with access to parking under stilts.

### 2.1.3 Cluster Plan



### 2.1.4 Unit Plans



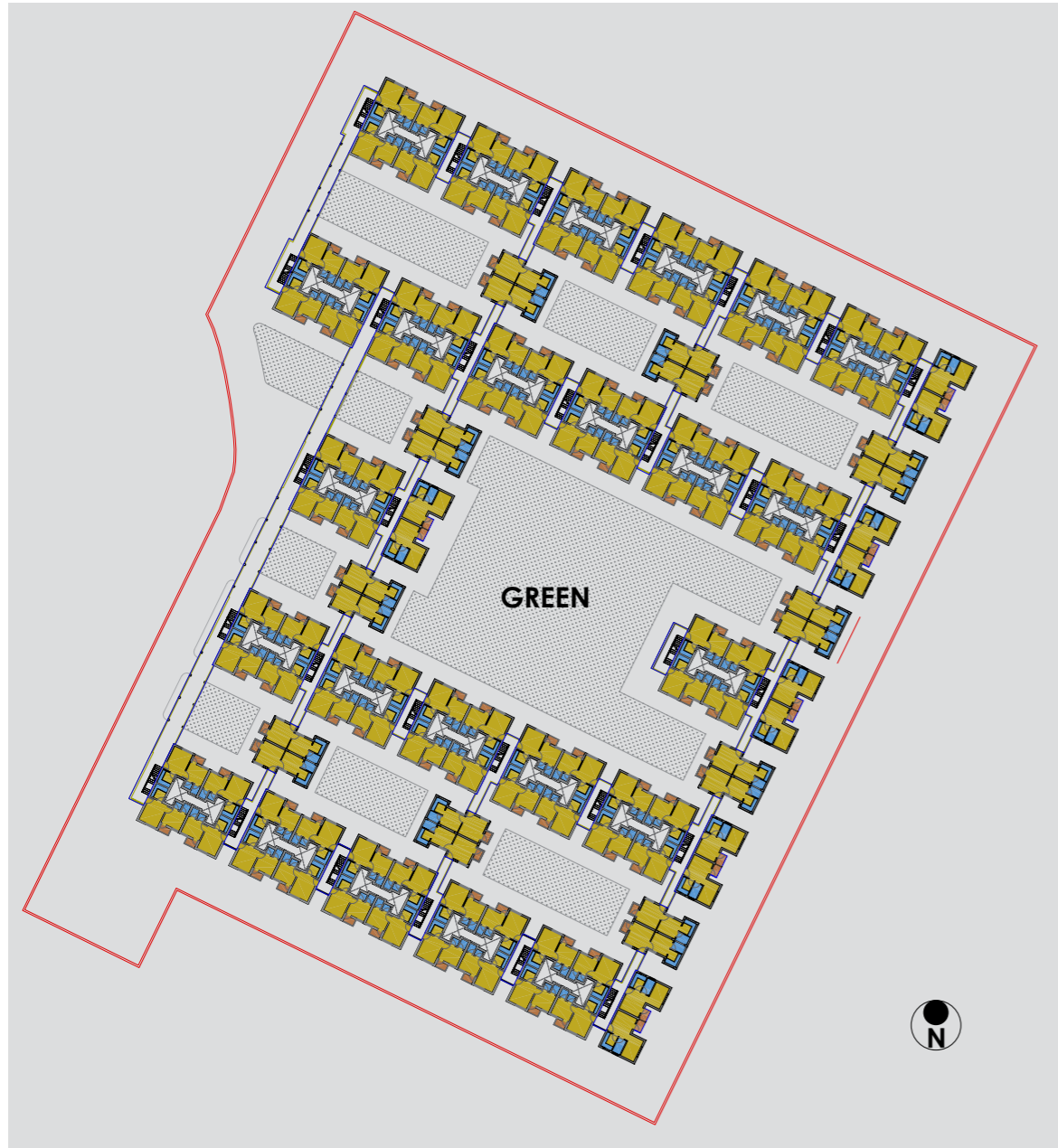
**Type -A**  
Plinth Area : 30.0 sq m.  
Carpet Area : 22.5 sq m.

**Type -C**  
Plinth Area : 28.5 sq m.  
Carpet Area : 21.4 sq m.



**Type -B**  
Plinth Area : 27.0 sq m.  
Carpet Area : 20.5 sq m.

2.1.5 Typical Floor Plan



2.1.6 Design Details

Floors	Block A	Block B	Block C	Corridor	Units
Ground Coverage	2722.95	552.15	273.67	390.00	3938.77
Floors	Area	Area	Area	Area	
Ground Floor	2212.40	552.15	273.67	390.00	104
1st	2722.95	552.15	273.67	653.98	126
2nd	2722.95	552.15	273.67	653.98	126
3rd	2722.95	552.15	273.67	653.98	126
4th	2722.95	552.15	273.67	653.98	126
<b>Total</b>	<b>13104.19</b>	<b>2760.74</b>	<b>1368.36</b>	<b>3005.91</b>	<b>608</b>
Built Up	20239.20				
Site Area	11015.00				
Far	1.84				

2.1.7 Views



Internal Courtyard View



View of the Connecting Bridges





Bird's-Eye View

## 2.2 Design Option 2

### 2.2.1 Site Plan



#### Design Details

1	Total number of units	705 units
2	Residential density achieved	640 DU per hectare
3	Floor Area Ratio	177
4	Ground coverage achieved	40.5%
5	Unit details	Smaller unit of 21 sq m and larger unit of 28.5 sq m
6	Area under parking	2960 sq m
7	Amenities on site	Multilevel community building (area 670 sq m), Open community green (area 1443 sq m), 8 large shops and 3 small shops

### 2.2.2 Design Intent

In the process of creating a low-rise built-form option this design takes cognizance of three aspects of the existing slum settlement in Sudhar Camp:

- The average size of the existing units is in the range of 9 to 12 sq m.
- As much as 33% of the slum population is living on rent.
- The women are currently using the single room space for daily bath and the community toilet for defecation

In this design option of ground and four floors, two types of units have been created to form a block which intertwines to create the cluster. The morphology of the block adjusts to carve out interstitial cluster spaces which allow for external openings, i.e. windows and balcony doors.

The clusters are arranged around a large community open space with a community hall placed on one of the longer faces.

The larger of the two units has two rooms while the smaller has a large multipurpose room.

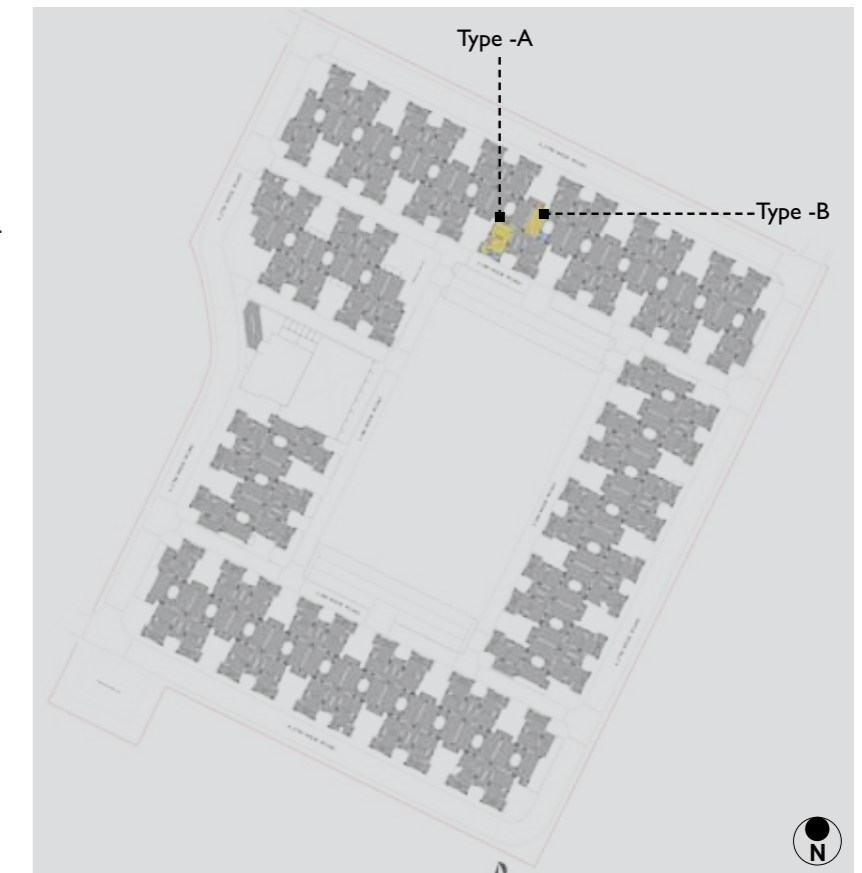
This variation in typology takes cognizance not only of the possible variable affordability but also the need of the rental v/s owner population.

In Design Option 2, the development height is restricted to 15 m and all units have access both to open spaces at the ground as well as the terrace.

Living standards are likely to be far better than before. The introduction of a smaller shelter unit ensures a high residential density of 640 dwelling units per hectare while ensuring satisfactory block and community open spaces.

However, this strategy cuts back the FAR achieved which now stands at 177, well short of the recommended figure of 200, a condition which implies underutilization of urban land from the city point of view.

### 2.2.3 Cluster Plan



### 2.2.4 Unit Plans



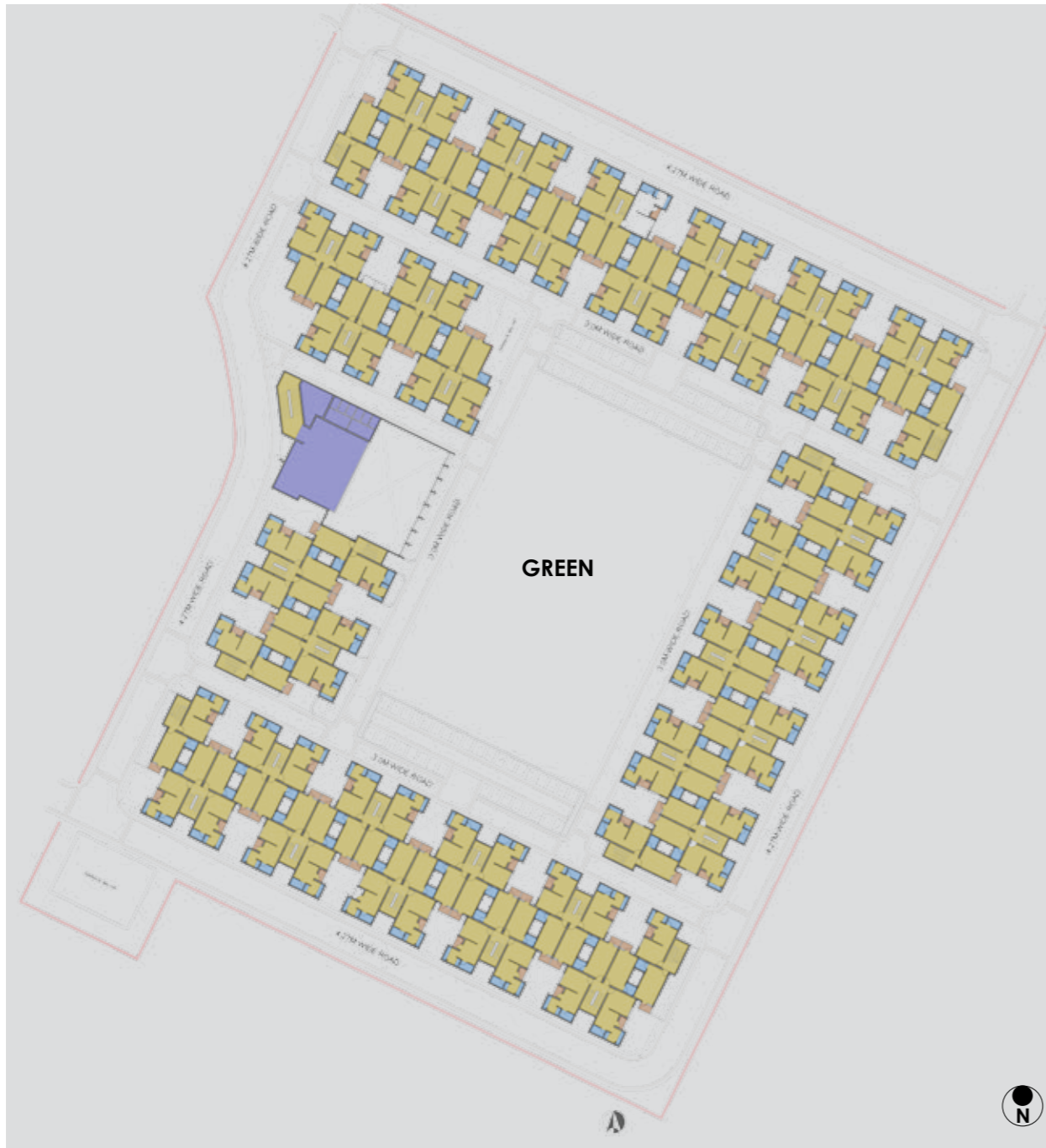
**Type -A**  
Plinth Area : 28.5 sq m  
Carpet Area : 21.5 sq m



**Type -B**  
Plinth Area : 25.0 sq m  
Carpet Area : 18.7 sq m



2.2.5 Typical Floor Plan



2.1.6 Design Details

Floors	Block A	Block B	Block C	Block D	Block E	Shops	Multi-Purpose Hall	Shops (Internal)
Ground	815.2839	252.5202	381.712	976.2135	654.3543	97.3479	331.6073	35.1127
1st	1052.5259	324.0519	417.9427	1260.8078	844.2439	0	176.164	0
2nd	1052.5259	324.0519	417.9427	1260.8078	844.2439	0	161.3266	0
3rd	1052.5259	323.539	417.9427	1260.8078	844.2439	0	0	0
4th	1052.5259	323.539	417.9427	1260.8078	844.2439	0	0	0
<b>Total</b>	<b>5025.3875</b>	<b>1547.702</b>	<b>2053.4828</b>	<b>6019.4447</b>	<b>4031.3299</b>	<b>97.3479</b>	<b>669.0979</b>	<b>35.1127</b>
Built Up	19478.9							
Site Area	11015.0							
FAR	1.76							

2.2.7 Views



Internal Courtyard View






View from Terrace





Bird's-Eye View

### 3.1 Comparative Analysis for Sudhar Camp

S.No.	Parameters	Existing Site Plan	Site Plan Option 1	Site Plan Option 2
1	Site Plans			
2	Site Area	11015.8 sq m.	11015.8 sq m.	11015.8 sq m.
3	Ground Coverage	55.80%	35.75 %	40.5%
4	Floor Space Index	110	184	177
5	No. of Floors	G / G+1 / G+2	G+4	G+4
6	Unit Size	9-12 sq m.	3 types of units with plinth area ranging between 21.5 to 30.5 sq m	2 Types of Units with plinth area ranging between 21 to 28.5 sq m
7	Residential Units	550	608	705
8	Density	529/Ha	552/Ha	640/Ha
9	Toilet	2 Public toilet blocks. Houses only have wet points.	Attached Toilet Facility with every DU	Attached Toilet Facility with every DU
10	Facility / Amenity	Temples (2) // Crèche / Health Care Centre	6 shops	Multilevel Community Hall (area 670 sq m), 8 shops
11	Open Greens	Absence of Consolidated Greens	Open community green (area 1050 sq m)	Open community green (area 1443 sq m)
12	Parking Area	On-Street parking of bikes / autos / rickshaws	400 sq m	2960 sq m
13	Educational Bldg.	Computer Instt.	--	--

This selection of a small site has excluded the quest for an intermediate option wherein there is a mix of small, medium and tall blocks which could create community interaction at four different levels in the site.

This is a major potential area of design exploration on a plot size in the range of 4 to 5 hectares. In this scale of operation the possibility of testing apportionment of land for remunerative purposes should also be tested.

### 3.2 On Design Intent

The act of framing the design intent itself was a stormy one due to the scale of the site.

At research initiation a small site was deliberately selected as the MPD 2021 encourages the development of small parcels of land in existing developed areas for housing to meet housing shortages.

Very early in the exploration it was recognized that the recommendation regarding apportionment of land for remunerative purposes could not be tested as the site was too small to hold 2 such independent entities with satisfactory built-form open space characteristics.

The MPD provision of increasing the

FAR on the residential component to 400 to make urban land available for remunerative purpose is a good one.

But in a scheme where the unit size varies between 25 to 30 sq m and there is a cap of 600 dwelling units per hectare, this FAR provision is a pure paradox and cannot be realized.

In the city, slums are characterized by high densities, and in-situ rehabilitation is the most meaningful option for the residents as it allows for a continuum in existing life-work patterns.

In the case of Sudhar Camp the existing density is 550/ha and rehabilitating all of them in situ would at best realize only half the so called

maximum potential FAR given the density cap.

Explorations of the high-rise alternatives once again brought into sharp focus the difficulties of providing suitable setbacks around high-rise blocks both from light-ventilation and fire safety considerations in a small plot.

Although the regulations stipulate that there are no restrictions to ground coverage, the rider that setbacks must be maintained has major implications on development. In plot sizes of 1 to 1.5 hectares, area lost to setbacks is in the range of 23 –19 %.

This leaves about 80 % of the land for any form of development.

### 4.1 On Future Direction

From the foregoing discussion there are rather clear mathematical indicators about how interrelationships between densities – FAR, ground coverage – setbacks – open space structure vary with plot size.

Plot geometry, too, would have major implications as would accessibility to the plot. For development guidelines to be meaningful instruments to deliver a physically satisfactory quality of life they need to be calibrated on the count of plot size. The notion of remunerative apportionment of land needs to be carefully researched to add additional dimensions to the calibration of development guidelines.

### 4.2 Recommendations

- As the relationship between 400 FAR and 600 dwelling units per hectare with a unit size of 25 to 30 sq m is a mathematical paradox there is a need to cut back on the FAR. Alternately this FAR, if sustainable from the point of view of available physical infrastructure in the precinct and neighbourhood could be transferred to the remunerative component.
- The setback provision on small plots needs to be re-examined as it precludes creation of satisfactory community open spaces by scattering precious open land as peripheral ribbons. This is particularly important as the lack of restriction on ground coverage allows for multiple explorations in the realm of low and medium rise development.





