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# Infrastructure Evaluation of Affordable Housing Projects Built Under BSUP Scheme: A Case of Lucknow City

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***Abstract*** **- Planning of affordable housing is one of the major requirements for any country to deal with the growing issues of housing shortage and growth of slums and squatter settlements in urban areas. In India, the government shifted its prime focus on development and planning of urban areas by introducing a scheme in the year 2005 called Jawaharlal Nehru National Urban Renewal Mission (JNNURM). The component of affordable housing under JNNURM was addressed through two verticals Basic Services to Urban Poor (BSUP) & Integrated Housing and Slum Development Programme (IHSDP). The BSUP scheme was introduced to provide formal housing to urban poor equipped with mandatory physical and social infrastructure. The scheme had seven broad deliverables, namely affordable housing, secured tenure, water supply and sanitation, education, health, and social security to the economically weaker section. The scheme was proposed in 63 mission cities in India. Lucknow city being one of those mission cities was benefitted under the scheme with 7 projects having 5570 housing units along with basic services, executed in 23 different areas. The goal of the paper is to study the deliverables under the scheme guidelines and investigate the present situation of these projects after 10 years of their completion. The study investigates the condition of various infrastructural services through 13 infrastructural, and neighbourhood-level attributes selected through various post occupancy studies and evaluate their status as per the scheme commitments. The findings are then interpreted to recommendations for design and planning of upcoming affordable housing schemes in a sustainable manner.**

*Index Terms* - Affordable housing, Basic Services, Infrastructure, Neighbourhood, Urban Poor, Lucknow.

## INTRODUCTION

Affordable housing schemes was launched with the basic objective to provide a permanent house with elementary facilities for the urban poor who are otherwise forced to live in slums, squatter settlements, dilapidated structures, and temporary housing. Indra Awas Yojana launched in 1990 to provide housing in rural areas, was the stepping stone towards the aim of housing for all. Later the focus shifted to urban areas by introduction of Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in the year 2005.

These housing schemes have been catering to the Economically Weaker Sections (EWS) and Lower Income Groups (LIG) and with the introduction of Pradhan Mantri Awas Yojana (PMAY) in 2015, Middle Income Group (MIG) has also been included in the beneficiaries. There is a change in the supply mechanism of housing units under the schemes, but even with these changes, there are certain issues identified related to governance, guidelines, and end-users, which apply to all existing schemes.

Ministry of Urban Development introduced two verticals of affordable housing schemes namely Basic Services to Urban Poor (BSUP) and Integrated Houses and Slum Development Program (IHSDP) launched in 2005 under JNNURM had an objective to encourage and expedite urban reforms and include 1.5 million houses for the Urban Poor in 65 mission cities between 2005-2012.

### *I. Basic Services to Urban Poor (BSUP 2005-14 extended till March 2017)*

It is one of the two verticals of JNNURM introduced in December of 2005 which aims at provision of pakka houses with basic services for the urban poor. The scheme focused on provision of formal housing with all essential civic amenities to the slum dwellers. The scheme ensures overall development of urban poor by the provision of essential elements listed as follows:

1. Secured tenure
2. Pakka (permanent) housing at affordable price
3. Infrastructure facilities: water supply, sanitation, electricity, etc.
4. Social infrastructure: health, education, and security. (MoHUPA 2009)

## METHODOLOGY OF THE STUDY

The study is based on the physical survey carried out in 23 BSUP projects in Lucknow City. Non-Participant observation technique is used to gather the required data. The qualitative aspect of the research included mapping the condition of physical

infrastructure provided, condition of open space and green areas, construction, maintenance, cleanliness, and proximity to essential social infrastructure like education and health care facilities. The data was collected physically from the site in the form of pictures and videos. The quantitative aspect of research included accessibility to the project, availability, and type of physical infrastructure provided, availability and distance of social infrastructure in the area, safety and security, communication, and connectivity. An observatory tool consisting of 13 infrastructure and neighbourhood-level attributes and 39 sub-attributes was prepared to record the availability of various infrastructures and get insights into these services after 10 years of project completion. The data collected in three different project typologies is indexed in the table showing respective percentage distribution of infrastructure availability. Further, the findings in each project typology are compared with each other for making relevant inferences.

## PROJECTS UNDER BSUP SCHEME IN LUCKNOW CITY

The rising demand of housing for the urban poor in Lucknow city has been addressed through projects built under various Affordable housing schemes. Under JNNURM, Lucknow has been part of both BSUP and IHSDP. Lucknow city was selected as one of the 63 mission cities for intervention under BSUP in 2005, whereas the other towns of the district like Kakori, Mahona, and Malihabad were benefitted under IHSDP. Later in 2013 Lucknow city was selected under RAY for slum redevelopment and is currently part of the ongoing affordable housing scheme PMAY. Table 1 enlists the projects taken under BSUP in Lucknow city. Under the BSUP scheme in Lucknow City housing development was done in two formats - Relocation and In-Situ. The construction started in 2007 and continued till 2015 for few projects (Prasad, 2021). There are 14 in-situ and 9 relocation sites in Lucknow. In-situ development involved onsite upgrading and improvements of existing housing and infrastructure for beneficiaries having house ownership, whereas In-Situ Redevelopment - In Nishatganj, the existing slum area is redeveloped in G+3 housing, and slum dwellers have been benefitted. Relocation projects involved construction of group housing projects having building in G+3 and G+2 formats.

TABLE 1

PROJECTS UNDER BSUP IN LUCKNOW CITY

| Sr. No | Area | Houses | Total | Development Type | Developer Organization |
|---|---|---|---|---|---|
| 1 | Para | 504 | 1488 | Relocation | Uttar Pradesh Avas Vikas Parishad (UPAVP) |
| | Kharika,Telibagh | 312 | | | |
| | Semra Gauri | 288 | | | |
| | Hewat Mau Maveya, Ibrahim Pur | 384 | | | |
| 2. | Amausi | 506 | 593 | In-situ | Uttar Pradesh Project Corporation Ltd. (UPPCL) |
| | Gadarian Purwa, | 26 | | | |
| | Chandan | 30 | | | |
| | Chaudhry Purwa , Dewa | 31 | | | |
| 3 | Kila Mohammadi, | 44 | 364 | In-situ | UPPCL |
| | Aorangabad,,Raja Bijli Pasi | 75 | | | |
| | Sugamau, | 72 | | | |
| | Jarhara, | 97 | | | |
| | Rahimabad, Raja Bijli Pasi | 76 | | | |
| 4 | Bhakti Khera Kanpur Road | 60 | 181 | In-situ | UPPCL |
| | Rahim Nagar, Dudauli | 75 | | | |
| | Munshi Khera | 29 | | | |
| | Behsa, Amausi | 17 | | | |
| 5 | Chak Malhauri, Chinhat, | 336 | 336 | Relocation | UPPCL |
| 6 | Umrao Hata, Nishatganj | 176 | 176 | In- Situ (Redevelopment | UPPCL |
| 7 | Rashmi Khand, Sharda Nagar, | 80 | 2432 | Relocation | Lucknow Development Authority (LDA) |
| | Sector -H, Vasant Kunj | 896 | | | |
| | Sector -T, Vasant Kunj | 1184 | | | |
| | Bhadruk | 272 | | | |

## OBSERVATION SURVEY PARAMETERS

An observation survey is conducted to perceive the availability and condition of various infrastructural services in the projects. The survey helped us to understand the type of facilities provided and observe their qualities after almost 10 years of construction of these projects.

Further, the findings were studied to understand the gap in the implementation of these schemes as per their guidelines. The parameters of the observation survey are selected after studying various post-occupancy evaluations for the neighbourhood as mentioned in table 2-

**Table 2.**

OBSERVATION PARAMETERS

| Sr.No | Parameter | Indices | References |
|---|---|---|---|
| 1 | Water | Supply system | (Ilesanmi 2010) (Behloul 1991) (BIJOUX, SMITH and LIETZ 2008) (Bonaiuto, Fornara and Bonnes 2003) (Ziama and Li 2018) |
| | | Supply Duration | |
| | | Quantity | |
| | | Quality | |
| | | Storage | |
| | | Recycle | |
| | | Bills | |
| 2 | Solid Waste | Collection system | (Behloul 1991) (Bonaiuto, Fornara and Bonnes 2003) (Ilesanmi 2010) |
| | | Access to communal waste point | |
| | | Cleanliness of communal waste point | |
| | | Recycle | |
| 3 | Sewage and Drainage | Sewerage system | (Bonaiuto, Fornara, & Bonnes, 2003) |
| | | Drainage system | |
| | | Rain water collection point | Bonnes 2003) (Ilesanmi 2010) |
| | | Recycling rain water | |
| 4 | Electricity | Supply duration | (Ilesanmi 2010) (Ziama & Li, 2018) |
| | | Bills | |
| **Social Infrastructure** | | | |
| 1 | Education facilities | Primary and Secondary school | (Bonaiuto, Fornara, & Bonnes, 2003) |
| | | Government college | |
| 2 | Health centers | Clinics and dispensaries | (Ziama & Li, 2018) |
| | | Government hospitals | |
| 3 | Public areas and green space | Size | (Youth for Unity and Voluntary Action and Indian Housing Federation, 2018) |
| | | Quality | |
| | | Accessibility | |
| | | Cleanliness | |
| | | Outdoor play areas | |
| | | Streetscape | |
| **Transport and Roads** | | | |
| 1 | Accessibility | Road width | (Behloul, 1991) (Bhattacharya, 1998) |
| | | Road condition | |
| | | Pedestrian lane | |
| 2 | Public transport and traffic | Bus frequency | |
| | | Walking distance to the nearest station | |
| | | Traffic density | |
| | | Parking facilities | |
| **Employment opportunities** | | | |
| 1 | Employment opportunities | Distance to workplace | (Ziama & Li, 2018) |
| | | Local market opportunities | |
| | | Demand for laborers in the local area | |
| **Safety and security** | | | |
| 1 | Level of safety in the building | Fire escape | (Ilesanmi 2010) (Behloul 1991) (BIJOUX, SMITH and LIETZ 2008) (Bonaiuto, Fornara and Bonnes 2003) |
| | | Lighting in building | |
| 2 | Safety in neighbourhood | Gated community | |
| | | Street lighting | |
| | | Firefighting measures | |
| | | Community guard | |
| | | Institutional support | |

| Communication | | | |
|---|---|---|---|
| 1 | Communication | Network coverage | (Ilesanmi 2010) |
| | | Internet/ broadband | |
| | | Postal services | |
| | | Door to door service | |

**OBSERVATION TOOL**

The observation tool is prepared using parameters selected mentioned in table 2. The tool is based on 6 broad parameters - physical infrastructure, social infrastructure, transport and roads, Safety and security, communication, and employment opportunity. Future divided into 13 attributes and 39 sub-attributes. The findings of the observation survey of BSUP projects in Lucknow City are discussed below –

*I. Physical Parameters*

The key aspect of the affordable housing schemes in India is to provide basic amenities to the poor. land utilization, water supply, electricity supply, and sanitation the most critical parameters for any housing development as the success or failure of the projects depends largely on these aspects.

| Attributes | Sub- Attributes | Observations | In-situ (%) | Relocation (%) | Redevelopment (%) |
|---|---|---|---|---|---|
| **Land Utilisation** | All residential | | 100 | 100 | 100 |
| | Both residential and | | 0 | 0 | 0 |
| **Water Sup- ply** | Piped Connection | Household | 100 | 100 | 100 |
| | Boring | Project (Jal Nigam) | `0 | 100 | 100 |
| | | Individual | 58 | 0 | 0 |
| | Community supply (Jal Nigam) | Tap | 0 | 0 | 0 |
| | | Overhead | 50 | 100 | 100 |
| | | Hand pump | 75 | 22 | 0 |
| **Sanitation** | Piped Outlet | Community | 8 | 100 | 100 |
| | | Municipal/ | 92 | 0 | 0 |
| | Soak Pit | | 100 | 100 | 100 |
| | Surface Drains | Open | 100 | 100 | 100 |
| | | Covered | 0 | 0 | 0 |
| | Rainwater Collection | | 0 | 0 | 0 |
| **Solid Waste** | Municipal Bins | | 0 | 11 | 100 |
| **Electricity** | Metered Connection | | 100 | 100 | 100 |
| | Community Distribution Lines | Overhead | 100 | 100 | 100 |
| | | Underground | 0 | 0 | 0 |

*II. **Land Utilization***

The parameter was studied to understand onsite land use activity distribution in the projects. The development of all three project types i.e. in-situ, redevelopment and relocation is done on residential land and major land-use activity is residential. Although there are few encroachments of small shops, animal shelters, and other informal workspaces within the facility.

***III. Water Supply***

Across 23 sites all 9 projects under relocation and one underredevelopment have an overhead tank and piped water connection through *Jal Nigam*, 2 of the projects also have hand pumps installed for communal usage. The capacity of the rooftop water storage tank is 200 liters as

For the in-situ projects, in 7 projects the dwellers have installed individual borings and 9 projects have community-level tanks and handpumps installed as seen in FIGURE 2

HANDPUMP AT INSITU PROJECT OF AMAUSI

Further all the relocation projects and insitu redelopment project are provided with overhead water tank wintin the project premise

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FIGURE 1

ROOF TOP WATER STORAGE TANKS AT BSUP PROJECT IN CHAKMALHAURI

FIGURE 2

HANDPUMP AT INSITU PROJECT OF AMAUSI

FIGURE 3

OVERHEAD WATER TANK AT INSITU REDEVELOPMENT PROJECT AT NISHATGANJ

### *IV. Sanitation*

In the relocation projects, the wastewater from the houses is drained through piped outlets to the manholes on the street, which finally connects to the community septic tank. Projects at Haibat Mau and Para are provided with fixed dome biogas digester for production of biogas, but currently are non-functional as seen in FIGURE 4. The sewage is overflowing in most of the projects as obdserved in FIGURE 5.

In the in-situ projects, the wastewater is drained through piped outlets to the manholes leading to the village/ municipal line. Although the service and stormwater drains are present, they are all open and are overflowing in all the projects as seen in FIGURE 6.

FIGURE 4

BIOGAS DIGESTER AT HAIBAT MAU

FIGURE 5

SEWER & DRAINS OVERFLOWING AT SEMRA GAURI

FIGURE 6

OPEN-DRAIN AT INSITU PROJECT AT AORANGABAD PASI

### *V. **Solid waste management***

There is no formal arrangement of solid waste management in any project. The projects lack communal waste collection and segregation points except in one relocation project at Para, where a municipal bin was provided FIGURE 8. In few projects, the residents have made the collective arrangement of the door-to-door waste collection. Piles of waste are a common sight across all the projects, as seen in FIGURE 7. Condition of Insitu redelopment project at Nishatganj is even more critical, as the project premise is used for dumping the construction materials and debries of near by areas, FIGURE 9.

FIGURE 7

HEAPS OF GARBAGE AT VASANT KUNJ SECTOR P PROJECT

FIGURE 8

MUNICIPAL BIN AT PARA PROJECT

FIGURE 9

CONSTRUCTION MATERIALS DUMPED AT NISHATGANJ PROJECT

### *VI. Electricity*

All the projects under the BSUP scheme have metered electricity connections in each house. The overhead distribution lines are placed at the roadside mounted on a concrete pole. In few projects, even the streetlights are placed on these poles as seen in

. A series of tangled wires can be seen on electric poles placed close to the buildings in all the projects, violating the mandatory clearance norms as per model building bye-laws. This can be seen in FIGURE 11.

FIGURE 10

OVERHEAD DISTRIBUTION LINES AT HAIBAT MAU

FIGURE 11

OVERHEAD DISTRIBUTION LINES AT BHADRUK

### *VII. Social Infrastructure*

Social infrastructure is a necessity for all housing communities, education and health facilities need to be present in walkable proximity. Public areas and green spaces are mandatory to develop any housing scheme, there can be the park, garden or children play area in different sizes and locations.

**Table 4.** Observation of Social Infrastructure in BSUP projects

| Attributes | Sub- Attributes | Observations | In-situ (%) | Relocation (%) | Redevelopment (%) |
|---|---|---|---|---|---|
| **Education Facilities** | Primary School | 0-1 km | 92 | 56 | 0 |
| | | 1-3 km | 8 | 33 | 100 |
| | | more than 3 km | 0 | 11 | 0 |
| | Secondary School | 0-1 km | 83 | 56 | 0 |
| | | 1-3 km | 17 | 44 | 100 |
| | | more than 3 km | 0 | 0 | 0 |
| | College/ Technical School / University (Government) | 0-1 km | 17 | 22 | 0 |
| | | 1-3 km | 75 | 33 | 100 |
| | | more than 3 km | 8 | 44 | 0 |
| **Health Care Facilities** | Clinics/ Dispensaries/ Hospitals | 0-1 km | 67 | 56 | 100 |
| | | 1-3 km | 33 | 44 | 0 |
| | | more than 3 km | 0 | 0 | 0 |
| **Commercial Facilities** | Small grocery or Convenience store | 0-1 km | 100 | 100 | 100 |
| | | 1-3 km | 0 | 0 | 0 |
| | | more than 3 km | 0 | 0 | 0 |
| | Pharmacy | 0-1 km | 75 | 33 | 100 |
| | | 1-3 km | 25 | 56 | 0 |
| | | more than 3 km | 0 | 11 | 0 |
| | Food establishment (Restaurants/ Dhaba etc.) | 0-1 km | 100 | 67 | 100 |
| | | 1-3 km | 0 | 33 | 0 |
| | | more than 3 km | 0 | 0 | 0 |
| | Entertainment (e.g., movie theatre) | 0-1 km | 0 | 0 | 100 |
| | | 1-3 km | 17 | 44 | 0 |
| | | more than 3 km | 83 | 56 | 0 |
| | Post office | 0-1 km | 0 | 22 | 100 |
| | | 1-3 km | 50 | 56 | 0 |
| | | more than 3 km | 50 | 22 | 0 |
| | Bank | 0-1 km | 42 | 11 | 100 |
| | | 1-3 km | 58 | 67 | 0 |
| | | more than 3 km | 0 | 22 | 0 |
| | Petrol Pump | 0-1 km | 17 | 22 | 100 |
| | | 1-3 km | 67 | 67 | 0 |
| | | more than 3 km | 17 | 11 | 0 |
| **Recreational Facilities** | Parks and play ground | | 33 | 100 | 0 |
| | Community centre | | 17 | 44 | 0 |

### *VIII. Education facilities*

All three typologies of educational institutions are located within a distance of 3km except in the project at Vasant Kunj sector P where the nearest primary school is located beyond 3km. These include both government and private institutions.

▪

### *IX. Health centers*

Physical Health centre's(PHC's) in form of clinics, dispensaries, and hospitals are located within a range of 3km in all the projects. Under relocation projects, Semra Gauri is equipped with PHC within the project FIGURE 12 and a temporary health kiosk is setup in the community hall of Para project FIGURE 13. An urban PHC was observed in Insitu project of Sugamau, shown in FIGURE 14. The PHC's include both government and private facilities.

FIGURE 12

PHC AT SEMRA GAURI

FIGURE 13

COMMUNITY HALL CONVERTED TO HEALTH KIOSK AT PARA

- FIGURE 14
- PHC AT INSITU PROJECT OF SUGAMAU

### *X. Commercial facilities*

Almost all the projects have commercial facilities within the range of 3 km except for banks and post offices. The shops in Insitu projects are provided in dedicated space in an organized manner as seen in FIGURE 15 and FIGURE 16. Fifty percent of the In-situ projects have post offices beyond a distance of 3km due to their distant locations from the city centre. The same scenario was observed in two relocation projects of Vasant Kunj Sector H and sector P due to their far-off location from the main city. The shops within the project campus have developed encroaching access lanes and parks as seen in FIGURE 17 and FIGURE 18.

FIGURE 15

SHOPS AT INSITU PROJECT OF JARHARA

FIGURE 16

SHOPS AT INSITU PROJECT OF SUGAMAU

FIGURE 17

STREETS ENCROACHED FOR SHOPS AT SEMRA GAURI

▪

FIGURE 18

STREETS ENCROACHED FOR SHOPS AT VASANT KUNJ SECTOR H

### *XI. Recreational facilities*

All the relocation projects have been allotted either an open space or a park, whereas only 4 in-situ projects have any kind of open/ green spaces. But presently most of these parks are encroached upon for parking FIGURE 19, informal workspace, animal shelters, temporary shops, etc. In the project at Vasant Kunj sector P, development of slums and squatter settlements is observed in parks as seen in FIGURE 20.

FIGURE 19

- PARKING IN OPEN SPACE AT CHAK MALHAURI

FIGURE 20

SLUMS DEVELOPMENT IN PARK AT VASANT KUNJ SECTOR P

The provision of the Community centre is limited to 4 relocation projects and 2 in-situ projects. But it is observed that even in these projects the facility is used as storage space, PHC's FIGURE 21, or is forcefully captured by locals for residential use and is inaccessible for the project occupants for their usage. This is observed at the relocation project at Chak Malhauri shown in FIGURE 22 and in the In-situ project of Sugamau shown in FIGURE 23.

FIGURE 21

COMMUNITY CENTRE USED AS HEALTH KIOSK AT PARA

FIGURE 22

COMMUNITY CENTRE AT CHAK MALHAURI

FIGURE 23

COMMUNITY CENTRE AT SUGAMAU

### *II. Transportation, Roads, and Parking*

Public transportation and road connectivity are mandatory physical infrastructure that links the project to various parts of the city. Further provision of dedicated parking space in affordable housing projects hinders various encroachment activities.

**Table 5.** Observation of various parameters in BSUP projects

| Attributes | Sub- Attributes | Observations | In-situ (%) | Relocation (%) | Redevelopment (%) |
|---|---|---|---|---|---|
| **Transit Stop/ Stations** | Bus Stop | 0-1 km | 17 | 33 | 100 |
| | | 1-3 km | 67 | 67 | 0 |
| | | more than 3 km | 17 | 0 | 0 |
| | Auto Stand | 0-1 km | 83 | 78 | 100 |
| | | 1-3 km | 17 | 22 | 0 |
| | | more than 3 km | 0 | 0 | 0 |
| | Railway Station | 0-1 km | 0 | 0 | 100 |
| | | 1-3 km | 8 | 11 | 0 |
| | | more than 3 km | 92 | 89 | 0 |
| **Access Lanes & Parking** | Access Lanes | Paved | 92 | 100 | 0 |
| | | Unpaved | 8 | 0 | 100 |
| | Access Lane Width | Up to 2 m | 8 | 0 | 0 |
| | | 2.1- 4 m | 92 | 0 | 0 |
| | | 4-6 m | 0 | 100 | 100 |
| | Side Walkways | | 0 | 22 | 0 |
| | Cul-de-sac | | 0 | 44 | 0 |
| | Encroachment | Street | 17 | 67 | 100 |
| | | Parks | 0 | 44 | 0 |
| | Parking | Designated | 58 | 0 | 0 |
| | | On- Street | 42 | 100 | 100 |
| **Safety and Security** | Gated Community | | 0 | 56 | 0 |
| | Streetlights | | 100 | 100 | 100 |
| | Fire Fighting | | 0 | 0 | 0 |
| | Police Station/ Chowki | 0-1 km | 17 | 33 | 100 |
| | | 1-3 km | 58 | 56 | 0 |
| | | more than 3 km | 25 | 11 | 0 |
| **Communication Network** | Cellular Network | Strong | 100 | 67 | 100 |
| | | Weak | 0 | 33 | 0 |

### *XII. Transit Stop and Stations*

All the projects have bus stops and auto stands within a vicinity of 3km except for two in-situ projects at Amausi and Bhakti Kheda. Due to the location of all the projects on the city periphery, even the local railway station is located beyond 3km.

### *XIII. Access lanes and Parking*

All the projects have paved access lanes with their width varying from 4 m to 5m in Relocation projects as seen in FIGURE 24 and FIGURE 25 and 1.8m to 3.5m in Insitu projects and Insitu redevelopment projects as seen in FIGURE 26 and FIGURE 27. Insitu redevelopment project at Nishantganj is the single project with unpaved internal access lane, FIGURE 26.Access lanes, open areas, and parks are used to park the vehicles in relocation projects. The provision of side walkways was only observed in 2 relocation projects namely Rashmi Khand and Haibat Mau. . 58 percent of the in-situ projects have dedicated parking space but there is no dedicated parking space in any of the relocation projects.

FIGURE 24

STREET VIEW AT KHARIKA PROJECT

FIGURE 25

STREET VIEW AT VASANT KUNJ SECTOR P PROJECT

FIGURE 26

STEET VIEW OF INSITU REDEVELOPMENT PROJECT AT NISHATGANJ

FIGURE 27

STEET VIEW OF INSITU PROJECT AT RAHIMABAD

### *XIV. Safety and Security*

The provision of access control (project gates) is available in 56 % of relocation projects, but in the current state, the gates are either damaged or uprooted as seen in Figure 28 and Figure 29. This has resulted in an increase in external traffic on internal roads. Lack of any boundary or gate at Nishatganj project has led to encroachment of project premise for market parking, dumping of construction waste and garbage and development of squatter settlements. All the projects are equipped with streetlights, although the quantity is less than required. There is no provision of fire hydrants, fire water tanks, sprinklers, etc. in any of the project typologies. Further, the local police support was present in the range of 4 km in all the projects.

FIGURE 28

PROJECT GATES MISSING FROM SEMRA GAURI PROJECT

FIGURE 29

PROJECT GATES MISSING FROM HAIBAT MAU PROJECT

FIGURE 30

STREET LIGHT AT RASHMI KHAND PROJECT

FIGURE 31

STREET LIGHT AT BHADRUK PROJECT

### *XV. Communication network*

The communication network in terms of network connectivity was strong in all the in-situ projects. But weaker connectivity was observed in 33% of relocation projects due to their far-off location from the city.

## FINDINGS

### *I. In-situ Redevelopment project*

In this type of development, the land was acquired to remove slums, and dwellers having land Patta (land entitlement) were given flats in a G+3 building. The project is not complete in terms of infrastructure provision as the access lanes are not completely paved, the boundary of parks and open areas are not developed, surface drains are not completely developed, etc. Access lanes are encroached for parking and shops. The project has a major problem of waterlogging due unavailability of surface drains. The streets are used to park loading vehicles of nearby shops and factories due to the unavailability of gates or the boundary wall. Even after the removals of slums, the place over the period has experienced the development of new jhuggi areas (slums and squatter settlements)around it. The unavailability of informal work-space has forced people to keep their thelas (vendor cart) and cattle on the street.

### *II. In-situ projects*

In-Situ Project development mainly accounts for the construction of *pakka* houses for selected beneficiaries living in urban villages. The module of one room with small kitchen space and toilet is constructed. People, not having *pakka* houses were selected as beneficiaries on the recommendation of the village sarpanch. In In-Situ projects, due to relatively small project size, they are not provided with many community-level facilities such as parks, community centre, access control (Gates), and streetlights. Even the width of access lanes varies from 1.5m to 3m and in some cases are not even paved. These projects are dependent on existing village infrastructure for water supply and sanitation. Dwellers of in-situ projects have upgraded their houses by adding extra rooms and changing the façade as per their satisfaction. Few have also opted for borewells as an additional source of water supply. In the present condition, it is hard to identify such houses as most of them are completely remolded now.

### *III. Relocation Projects*

In relocation projects maintenance of infrastructure was the major problem. Most of the projects have no gates despite having provisions for the same. Manholes and septic tanks are overflowing in most of the project. Few projects are equipped with fixed dome biogas digester, which is either nonfunctional or incomplete in terms of their connectivity. This has resulted in an unhygienic living environment in the project. There is a piling of solid waste in projects. Parks are marked spaces but are either encroached for parking or used as informal workspace. Open drains are choked with solid waste causing waterlogging. Encroachment of roads for parking and shops. Other problems such as crime, theft, forced inhabitation, and renting are prominent in large projects such as Vasant Kunj. The community centers are either inaccessible for use or are used as storage space. In few projects dwellers of the ground floor have illegally constructed on the common area.

## CONCLUSION

The development of Projects under the BSUP scheme, promises to provide housing with basic services, which in the present condition is either incomplete or non-functional in most of the projects. Selection of site for the project should be done keeping in mind the vicinity of necessary services health care & education facilities and occupation structure of end-user as they have limited income to spend on travel. Most of the projects are incomplete in terms of their interior finishing and other construction elements. The regulating authorities need to review the projects carefully before issuing the completion certificate to the developer and allotting the house to beneficiaries to curtail the substandard practices by developers. Lack of social infrastructures such as parks, playgrounds, community centres hinder the overall communal development of the occupants. This enhances the need to have dedicated planning guidelines for the development and maintenance of such infrastructure in the project. Lack of maintenance has

resulted in failure of sanitation services in most of the projects, so there is a need to develop a mechanism where both residents and authorities are responsible for the same. The developers of the project should carry out the maintenance for a stipulated period and in the meantime the authorities and residents should constitute Community Level Organisations (CSO) to carry out the works later. Further NGO,s should be invited to train the occupants for carrying out maintenance and periodic cleanliness activities.

Encroachment of land for informal activities and commercial activities suggests that there should be specific consideration for the needs of the end-user in designing the projects. Demarcating land for commercial activity and informal activity for cattle breeding, pottery, crafts, carpentry, etc.in the project will help reduce the encroachment to large extent. This will also help generating local employment opportunities for the residents.

The policy of these schemes should be brought in coordination with Rojgar (employment) yojana for a stipulated period to provide local livelihood for the occupants ensuring their social security. There is need to conduct post occupancy review by the concerned authority to evaluate the user experience and analyse it to make further improvements in the projects. These housing programmes should be designed to improve the living condition of urban poor and develop a social base for them to progress and prosper

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