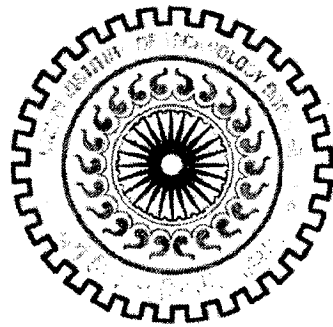


AFFORDABLE HOUSING

FOR URBAN POOR



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GUIDED BY

PROFESSOR P.K PATEL

DISSERTATION BY

UDAYAN

M.ARCH II

(2009-2011)

DEPARTMENT OF ARCHITECTURE AND PLANNING

INDIAN INSTITUTE OF TECHNOLOGY

Roorkee

CANDIDATE'S DECLARATION

I hereby declare that the work, which is being presented in the dissertation, entitled '**AFFORDABLE HOUSING FOR URBAN POOR**', in partial fulfilment for the award of the **MASTER OF ARCHITECTURE** submitted in the Department of Architecture & Planning of the Indian Institute of Technology, Roorkee is an authentic record of my own work carried out during the period from August 2010 to June 2011 under the supervision of **Prof. P.K.Patel**.

The matter embodied in this dissertation has not been submitted by me for the award of any other degree.

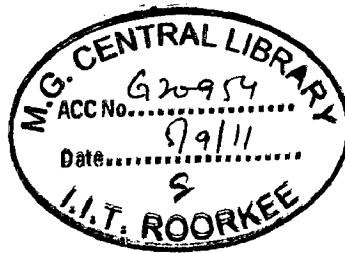
Place: Roorkee
Dated: June 30th, 2011



(UDAYAN)

CERTIFICATE

This is to certify that the above statement made by the candidate **UDAYAN** is correct to the best of my knowledge.



Dated: June 30th, 2011



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UDAYAN

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1.1.1 AFFORDABLE HOUSING AND LOW-COST HOUSING

Affordable and low-cost housing are often interchangeably used, but are quite different from each other. Low-cost housing is generally meant for EWS category and comprises bare minimum housing facilities while affordable housing is mostly meant for LIG and MIG and includes basic amenities like schools, hospitals and other community facilities and services while affordable housing is mostly meant for LIG and MIG and includes basic amenities like schools, hospitals and other community facilities and services.

Parameters	Low-Cost Housing	Affordable Housing
Amenities	Bare minimum to none	Basic
Target Income Class	EWS & LIG	LIG & MIG
Size of Dwelling Unit	<=300 Sq. Ft.	300 – 1200 Sq. Ft.
Location	Generally within city but can also be located on city peripheries due to high cost of land	Within city
Project Developer	Mostly Government agencies	Private Developers and Government
Mostly available source of finance	Micro finance institutions	Traditional banking system
EMI to Monthly Income	Not exceeding 30 percent of gross monthly income	Not exceeding 40 percent of gross monthly income

Source: Credit Suisse, Knight Frank, KPMG Analysis

1.1.2 CAUSES OF THE SUDDEN SPURT IN AFFORDABLE HOUSING

While the real estate industry across developed countries went through one of its worst stages, the Indian real estate industry, which was considered “shockproof”, was also badly hit. The tremors of the global liquidity crisis led to price corrections in the domestic real estate industry leaving developers with land parcels acquired at peak prices and with considerable stress on their balance sheets. This led to some serious funding problems for real estate developers as traditional banking channels became more cautious in providing credit and consumer demand witnessed a slump due to the uncertain economic environment. The real estate business in India underwent considerable changes after the global slowdown. To improve the cash flows many developers across India reduced property prices on an average by 20-30 percent. The correction in prices was a boon for people who wanted to purchase houses for a long time but could not earlier due to steep property prices and high costs of finance. The other reason could be the changing policy of Govt. of India in housing sector. Affordable housing is the current Indian government's new mantra. President Pratibha Devi Patil mentioned it in her speech on Bharat Nirman, a project that plans to double the number

of low-cost houses that are to be constructed to 12 million. The government is banking on public private partnerships. This implies that government will set up the enabling framework and private sector players like developers and microfinance institutions will partner to deliver the affordable housing units. Traditionally, developers have been slow to target this market. But now it seemed easier and more profitable, with so many Govt. schemes in EWS, LIG & MIG housing sectors, like Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Rajeev Awas Yojna (RAY) National Habitat and Housing Policy-1998 (NH&HP) etc.

1.1.3 POTENTIAL OF AFFORDABLE HOUSING IN INDIA

- Nearly 12 million households (owned / rented) in the INR 0.2 - 1.0 million per annum category
- 4 - 5 million of these are in urban areas assuming 34 - 40 percent urbanization ratio
- 2.1 million houses required in seven major cities alone for LIG and MIG population
- This translates into a potential opportunity of close to INR 3 trillion
- Including the EWS category, this number more than doubles to INR 7.5 trillion

Source: Credit Suisse, Knight Frank, KPMG Analysis

We will consider three stakeholders viz. Government, Real Estate Developers and Financial institutions.

1.4 GOVERNMENT:

- Interest Rate Subsidy
 - One percent subsidy on loans up to INR one million for purchase of houses costing less than INR two million
- FSI (Floor Space Index)
 - Haryana & Tamil Nadu Government have announced increase in FSI for housing projects targeting lower and middle income groups
 - Tamil Nadu has announced 50 percent extra FSI for projects targeting EWS in Chennai Metropolitan Area (CMA)
 - Tamil Nadu has further announced 30 percent extra FSI for projects targeting MIG
- Resumption of 80 IB
 - Profits from housing projects approved between April 01, 2007 and March 31, 2008 will be made tax free if they are completed by March 31, 2012
- PPP Measures
 - EWS rental project at Virar, Mumbai by MMRDA (Mumbai Metropolitan Regional Development Authority) and HDIL (Housing Development and Infrastructure Limited); Bengal Ambuja Housing Project

- Modification in JNNURM (Jawaharlal Nehru National Urban Renewal Mission) to encourage affordable housing on PPP (Public Private Partnership) basis
- Policies
 - Launch of Rajiv AwasYojana to promote slum free India

1.1.5 REAL ESTATE DEVELOPERS

- Private developers have been aggressively pursuing affordable housing post the economic slump of 2008
- Developers have realized the opportunity and need of affordable housing and have taken several steps to tap the same
- Developers have on an average reduced the prices by 30 percent in last one year and are willing to operate at a lower margins
- Players like Tata Housing, DLF, Unitech, etc. have multi-city, pan-India plans of developing 10,000 -15,000 units over next four years
- Tata Housing has taken the lead by launching an affordable housing project in Boisar
 - Phase I will be allotted to LIG families – one room kitchen and one bed room hall kitchen (BHK) flats upto INR 0.7 million
 - Phase II to MIG families – 2/3 BHK apartments at INR 1.2 million and above

source Company Websites; Express India, 'Falling property prices fail to lift sales', 27 March 2009

1.1.6 FINANCIAL INSTITUTIONS

- Banks are willing to fund suitable projects, provided that adequate checks are in place to monitor credit risk
- MFIs have expressed interest in funding EWS dwelling units up to INR 0.5 million
- Micro Housing Finance Corporation is an MFI that is exclusively focused on housing finance

Source: Micro Finance Housing Corporation (MFHC)

1.2 AIM & OBJECTIVES

1.2.1 AIM & OBJECTIVES:

- Study of the issues around affordable housing in India.
- What is the role of the land use planning systems in retaining and providing affordable housing?
- How do planning mechanisms intersect with the policy, legislative and financial frameworks supporting affordable housing supply, and which specific tools are most effective?

- To what extent do the different States currently use their planning systems (at State, regional, and local levels) to promote affordable housing objectives, and what policy or legislative support do they give?
- What potential is there to better integrate property for affordable housing within the land use planning process?
- Establishing the relation between Land prices, Cost of construction, Interest rates on loans & cost or selling price of housing.
- Suggesting suitable technologies that can be adopted in Indian context.
- Tabulation of existing low cost techniques which can be used in affordable housing projects.

1.3 SCOPE & LIMITATIONS:

- **Study area is Ahmedabad, Gujarat.**
- **Community and Housing Design**
how community and residential design decisions can reduce housing costs.
- **Construction and Technology**
how construction techniques and the use of innovative technology can reduce housing costs.
- **Operations and Management**
housing affordability can be improved by reducing ongoing operating costs including building and portfolio management.
- **Redevelopment and Renovation**
how redesign and reuse of buildings and communities can be used to provide affordable housing.
- **Policy and Regulation**
how central, state and municipal governments can affect housing affordability through public policies and the legal and planning framework.

CHAPTER 2: LITERATURE STUDIES

2.1 DESIGNING FOR THE HOMELESS: ARCHITECTURE THAT WORKS.

Architect **Sam Davis**, long time professor of Architecture at UC Berkeley and author of several books on affordable housing, was awarded in 2002 a Guggenheim Fellowship to write his latest book, *Designing for the Homeless: Architecture that Works*. Ar. Sam Davis lays out a solid foundation of research for the causes of the crisis in this country, and then builds on a role of activism that must encourage the design community to take a lead in creating dynamic and dignified structures for our increasingly diverse homeless population. As an architect himself of affordable housing for three decades, he begins namely by pointing out how our solutions up to this point have ironically fostered the problem more than they have managed to tackle it.

The book surveys a history of unique projects from the last decade, like the St. Vincent de Paul Village in San Diego, to more innovative prototypes like Common Ground's First Step Housing Project; being experimented with in dense cities like New York, and even self-assembled community projects like 'Dome Village' in L.A., as examples of what is and what may be possible, and points out with illustrations why each of these has managed to work on some level. However, while these projects have achieved notable degrees of success, Davis ultimately explores why we keep ending up with a fragmented agenda stymied by subsidy shortages and stigmatized by those lacking the political will to effect change in our policy. He argues that a much greater degree of creativity and collaboration between different economic entities, between the design community and policy advocates, is required in both our funding strategies as well as our housing design itself in order to progress past these dissected forms of homeless relief.

There can be no debate, the first step to recovery and helping homeless people become independent is to provide models of decent housing, and no longer these band-aid constructs of temporary shelters poorly placed over the basics of the community. Though Ar. Sam Davis reminds us, every shelter type is still needed to accommodate the multi-tiered folds of homeless people with varying degrees of needed assistance, at least until we can create stable and quality housing where elements of design directly addresses the specific needs of each individual group. This is something architects have a unique advantage for providing. From everything to supportive housing units, to a special storage closet that fits neatly into a cramped shelter space, architects have a crucial role to play in the effective and efficient recovery of our homeless.

Another area where their expertise has been underutilized is in the integration of this type of housing into neighborhoods so the occupants can feel accepted and encouraged by their surrounding environment. This is a critical planning component future housing needs to adopt and an obstacle to be overcome; establishing a functional and delightful

space for homeless recoveries within the complexion of our existing neighbourhoods. As professionals who design structures to blend in with the contexts and local vernacular of a neighbourhood, theoretically enhancing these areas, architects have failed to assert themselves in this approach through out the evolution of public housing projects. While Davis is praising of many successful and interesting architectures documented in this book, he's also not afraid to be critical of his colleagues, and admits that he especially views housing as the most socially relevant area of architectural practice. He stresses that as problem solvers for any given framework, architects have a greater degree of responsibility to serve the homeless because of their skills and the desperate social status homeless people face existing without respectful housing in society.

Ar. Sam Davis designed the Larkin Street Youth Centre back in '95 which unquestionably influenced his reasons for writing this book. He discusses the challenges and rewards of that project, and the special dialogues with homeless children affected by HIV that allowed him to respond to the extent of their dilemma. In this book Ar. Davis asks, "What is possible and desirable when designing a new facility for the homeless? Should it be elegant or unassuming? What types of spaces should be included? How should it look and what should it feel like? Should it be more like a house or more like a dormitory? What is the proper balance between function, quality of construction, and architectural delight?" Many practitioners today might simply overlook smaller important features like a communal kitchen, an outdoor smoking area, a bicycle facility, on site pet kennels, on site banks and courtrooms, laundry facilities, locked storage units, dining rooms, gyms, a beauty parlor, garden space, and all of the social/vocational services supportive housing provides. How can surveillance be integrated appropriately while being sensitive to the fact many homeless people have been confined where security was a menacing authoritarian device? And so it goes without saying that in order to properly design for any community, an intimate relationship must be established with the client who can have considerable input into the development process. Indeed this is how architects treat all other clients, so why should the poor deserve any less? Even though points like these may seem overstating of the obvious, Davis makes very clear that the reality of our treatment of the poor has failed to meet these basic standards, and it's time architects take a risk, practice what they preach, and prove their worth in an area they have mostly ignored.

This is also a very timely book, both in regards to our national focus on homelessness as cities all over are experimenting with new programs and competing for federal funds, as well as for our own local agenda where we have a mayor who has at the very least committed himself to the issue more so than mayors of San Francisco's past. It also represents a spirited direction in the international design community which is undergoing a major philosophical shift. Designers are paying considerable attention today to the importance of social responsibility and political activism that is informing their work, from disaster relief to other marginal communities like farm worker housing and infrastructure for third world refugee camps. This is also one area of

architectural practice that has been largely omitted from the academic realm and the training of architects, save innovative programs like the Rural Studio in Auburn began by the revolutionary architect Sam Mockbee, whose recent death has spawned new programs around the nation. For Ar. Sam Davis to make these assertions from his vantage as a professor is a very positive sign that design does and can matter, and those academic curriculums are transforming into a more proactive community-based process. But perhaps urban homelessness is where architects in cities today could and should have their most significant impact. No crisis in our country is needier, except perhaps the shortage of job creation, and certainly no person is capable of holding a job if they don't have access to decent housing. If the profession of architecture today is feeling increasingly marginalized by a construction industry monopoly, here is one area where the clever resourcefulness of their training can put them back on the map. At least by providing dignified models of housing and helping to solve the perplexing difficulties of situating and constructing these projects in times of space shortage and exorbitant land values, architects can offer cities ingenious solutions to assist urban planning, developers, and service providers struggling to create a cohesive plan.

What if these solutions actually improved lives and the quality of our neighborhoods beyond just helping the homeless people themselves? What if in their goals to create innovative homeless housing architects stumbled upon solutions to in-fill development, new models of home ownership, experimental approaches to community based planning? If anything, architects could be providing a new basis of hope and dignity for our most destitute, instead of pointing them back to these antiquated substandard and dehumanizing shelter spaces again.

2.2 GOOD NEIGHBOURS: AFFORDABLE FAMILY HOUSING

It is ordinary America the one that Tom Jones, William Pettus and Mike Pyatok describe in their book on U.S. housing and community planning. *Good Neighbors: Affordable family housing* - this is the title of this challenging book - speaks about another America, the one that hardly ever finds a place in newspapers and magazines because usually it is overwhelmed by the most common archetypical images. Sparkling are such images when they express financial and technological power; carefree when they convey the idea of open space and free time seaside or mountain escape; dramatically violent and deteriorated when they express social and legal problems.

Through the description of their vision of life styles, Jones, Pettus and Pyatok offer us a sample of North American social living styles, of the variety of regional architectural expressions, of the difference among urban centers, suburbs, countryside and their relationship with public space and historical identity. Written in a simple linear style, the book tells us about a new interpretation of the designer's profession that derives from the authors' clear social and civic convictions in their job considered as a community service. Through the illustration of the housing problems a great number of Americans

has to face, of the welfare system and of the applied experiences, the authors portray American social life. They also describe the neighborhood life and the citizens efforts to overcome economical, ethnic, and cultural barriers.

In the wide review of study cases collected in this book, exceptional architectures are rarely found, if we take the word "exceptional" as contemporary architectural style. The majority of the projects is inspired to tradition in the constant search for a urban model that encourages identification and socialization. On the contrary, "exceptional" is the design process care, the constant search for a better human living dimension considered as everybody's right even though the customers are low income people and budgets are limited.

A thorough quest of the aspects that improve everyday life is evident in the book together with the search for social aggregation and a sense of belonging to a community. Moreover, the community planning method and the theoretical aspects are verified during the design process with the neighbors and the new inhabitants. The book is rich in descriptions of the social, economic and legislative context in which affordable housing designers work. All the aspects regarding the community design are confronted: the subjects living in community housing, the needs expressed by them, the factors influencing the community housing design. The second half of the text concentrates on a rich variety of study cases accompanied by photos and essential information.

The authors gained a long experience in the community housing field: **Tom Jones** was Director of Architecture of the Asian Neighborhood Design of San Francisco, a company that works for the development of the non-profit settlements. He worked in the community planning field and he has a 25-year experience in public housing. Working for the AND Company he won several prizes for community planning and for his dedication in design. **William Pettus** worked as an architect in affordable housing and community planning design. He taught design at the University of California at Berkeley and edited several books on San Francisco Bay Area community planning. **Michael Pyatok** designed lots of family housing throughout the US. Winner of several design prizes and competitions, he collaborated with communities in the design process. At the moment he teaches at the University Of Washington School Of Architecture in Seattle.

2.3 CASE STUDIES

2.3.1 *BENGAL AMBUJA HOUSING DEVELOPMENT LIMITED*

Kolkata, West Bengal, India.

A joint enterprise of The West Bengal Housing Board and Gujarat Ambuja Cements Limited. We believe a strong, stable and secure home is the answer to many problems we face today. Our dream is to build homes, not just for a selected few but for everyone. Affordable homes built on strong foundations, to bring you closer to Nature, to happiness, and to yourself. To make a difference to the way people live.

Our journey started with Udayan - The CondoVille. A neighbourhood in the truest sense of the word, south-east of Kolkata, on the Eastern Metropolitan Bypass. Then came Urvashi-A Residential Neighbourhood, in Durgapur which also offers not just homes, but home plus ! This was followed by Ulhas-The Minitownship in Bardhaman, Utsa-The CondoVille, in New town, Kolkata and the recently launched Ujjwala-The CondoVille, also in New Town, Kolkata.

2.3.1.1 Areas explored by Bengal Ambuja Housing Development Ltd

Bengal Ambuja Housing Development Ltd is an infrastructure and housing development company that operates in the eastern part of India. It is engaged in different types of projects. And some of the areas Bengal Ambuja Housing Development Ltd has explored include the following -

- Retail projects
- Housing projects
- Food court
- Cineplex
- Shopping Malls
- Entertainment areas
- Residences/villas/apartments
- Spas
- Clubs
- Offices
- Cinemas etc

Bengal Ambuja Housing Development Ltd has worked in the commercial as well as the residential areas.

2.3.1.2 Projects by Bengal Ambuja Housing Development Ltd at a glance

There are different projects that you will find under the banner of this well known realty group. They operate mainly in the following areas -

- Realty
- Education
- Hospitality
- Healthcare

2.3.1.3 Upcoming projects of Bengal Ambuja Housing Development Ltd

In addition to the projects mentioned above, Bengal Ambuja Housing Development Ltd has several different upcoming projects in different parts of the country. You are likely to see the upcoming projects in areas like Siliguri, Patna, Salt Lake, Kolkata etc.

2.3.1.4 Affordability factor has appealed immensely

The residential projects of Bengal Ambuja Housing Development Ltd cater to the needs of all income groups and help an individual belonging to the LIG (Lower income group) to fulfill his dream of buying a house.

The affordability factor has made this private-public partnership very appealing. Similarly, people belonging to the MIG (Middle Income Group) and HIG (High Income Group) can avail houses too.

The upcoming projects are expected to take off fast as the real estate market is turning around. Moreover, the infrastructural facilities those are required to take these projects successfully to completion are present in the real estate market.

If you are planning to buy a home in one of the residential complexes that is being constructed by the Bengal Ambuja Housing Development Ltd, don't delay and go ahead and book your apartment/house now. Since the purchasing power of individuals is improving, the apartments, houses, villas and commercial complexes may get sold off faster than you can fathom.

Bengal Ambuja Housing Development

Completed Projects

Si.NO	Name of the Project	Location	Year of completion	Number of Units of different categories				
				LIG	MIG	HIG	EWS	Developed Plot
1	Udayan	Kolkata	2003	264	626	718		
2	Urvashi	Durgapur	2005	42	84			749
3	Utsa	Rajarhat	2005	48	144	208		
4	EWS I	Rajarhat	2003				192	
TOTAL				354	854	926	192	749

Ongoing Projects

Si. NO	Name of the Project	Location	Year of commencement	Number of Units of different categories					
				LIG	MIG	HIG	EWS	Developed Plot	Plot with houses
1	Ujjwala	Raharhat	April '05	77	154	235			
2	Ulhas	Burdwan	Dec '01					982	
3	Upaban	Santiniketan	Dec '04			221			33 Duplex
4	EWS I	Rajarhat					224		
TOTAL				77	154	456	224	982	33

2.3.2 UDAYAN HOUSING, KOLKATA

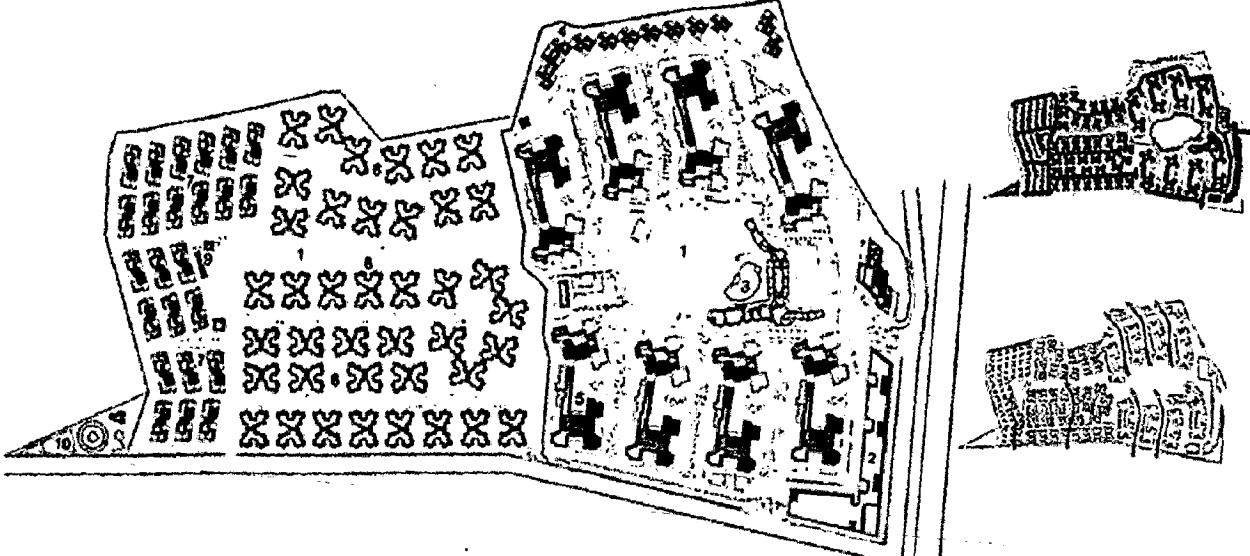
Udayan, a neighbourhood of dream condominiums spread over 25 acres in south-east Kolkata, along the Eastern Metropolitan Bypass, was designed by the internationally acclaimed architect-visionary ShriBalkrishnaDoshi&Mandla Design Services, Ahmedabad. With nearly 1600 homes nestling within sprawling greens.Udayan exemplifies what was to become a hallmark of any Bengal Ambuja project - large and manicured open green spaces, finely etched design and aesthetics and holistic facilities.

The path-breaking concept behind Udayan was recognised by many awards. HUDCO, India's premier urban development authority declared Udayan - The CondoVille as a 'Model Housing Project' for all states and conferred the citation of appreciation for 'the lead given in forging Public-Private partnership in Housing' to Mr.HarshavardhanNeotia, our Managing Director. On March 23, 1999, Mr.Neotia was conferred Padmashree by the then President of India, His Excellency Shri K R Narayanan.



Central open at Udayan housing, kolkata

The Udayan Housing has three type of housing LIG, MIG, HIG. Udayan also has town houses & commercial complex.



PROJECT INFORMATION:

Address: University
 Project of Urban Quality
 to provide affordable housing
 and social infrastructure

Subsidiary facilities:
 200-bay sewage treatment plant,
 auditorium and communications infrastructure
 and social facilities.

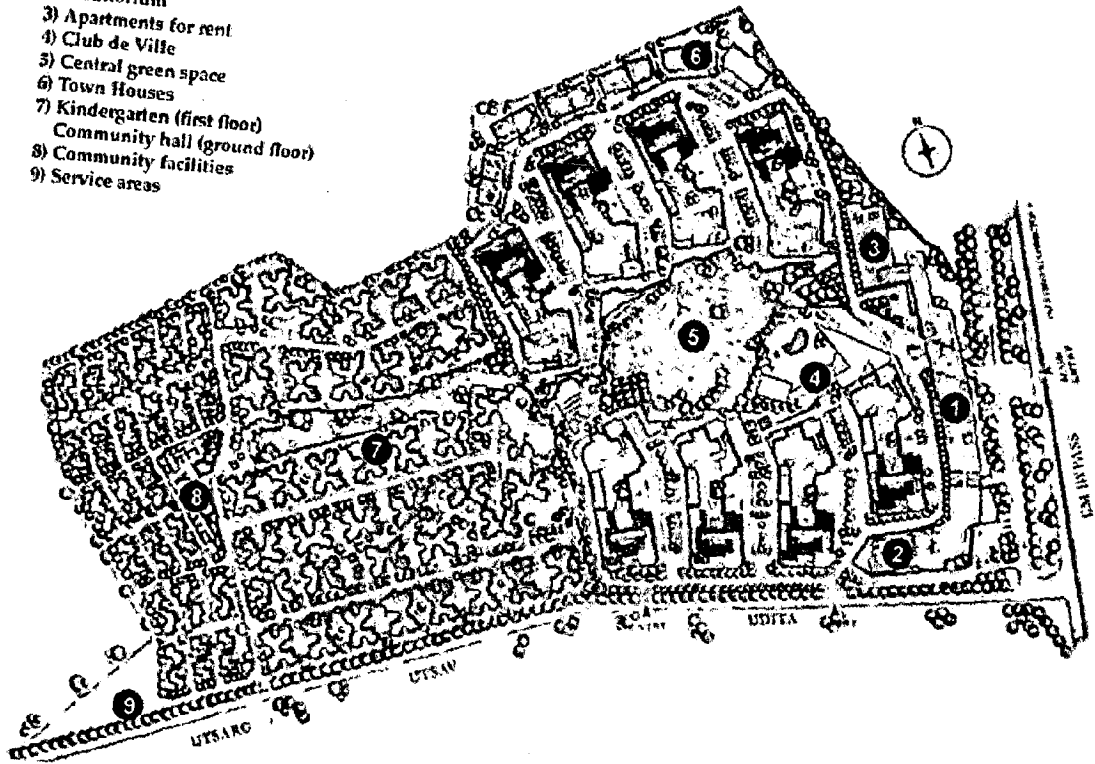
Site Area: 25 Acres (Dhaka)
Total Built-up Area: 20,00,000 (sq. ft.)
Total Units: 1204
 250 - L.I.G.
 820 - M.I.G.
 700 - H.I.G.

SITE PLAN

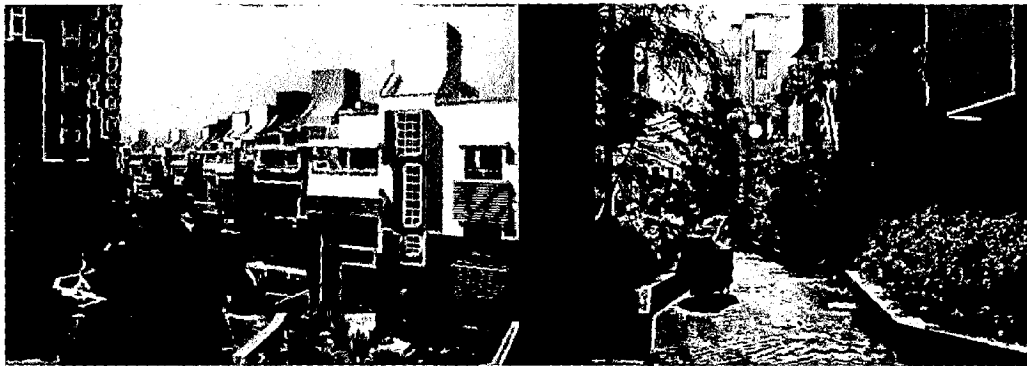
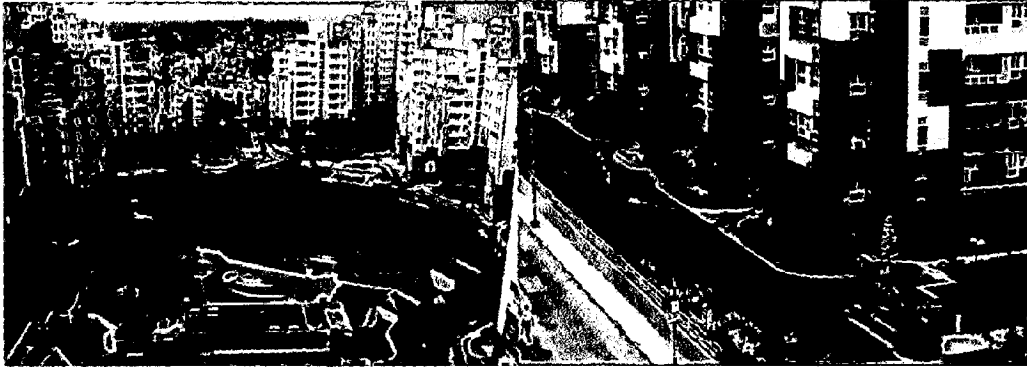
LEGEND

- 1. CENTRAL GREEN SPACE
- 2. COMMERCIAL COMPLEX
- 3. CLUB
- 4. TOWN HOUSES
- 5. L.I.G. UNIT
- 6. M.I.G. UNIT
- 7. H.I.G. UNIT
- 8. COMMUNITY HALL
- 9. MARKET PLACE
- 10. SEWAGE TREATMENT PLANT

- 1) Commercial centre
- 2) Auditorium
- 3) Apartments for rent
- 4) Club de Ville
- 5) Central green space
- 6) Town Houses
- 7) Kindergarten (first floor)
Community hall (ground floor)
- 8) Community facilities
- 9) Service areas



Affordable Housing for Urban Poor





Udayan - The Condoville

NSA, Survey Park, E M Dhyani	
Chennai, India	
Architects	Mumbai Design Services : Anandkumar, Indu : Anandkumar V. Chand : Anandkumar, Indu
Client	Special Affordable Housing Development Ltd., India
Completion	1995
Design	1995 - 2001
Construction	1995 - 2002
Occupancy	1997
Site	897500 sq ft
Ground floor	27000 sq ft
Field floor	116000 sq ft
Cost	
- Land	200000 USD
- Base	95000000 USD
- Global	37500000 USD
- Total	247000000 USD
	USD = 66.15 INR (2000)
	VVD = Indian Rupee
Programme	This public-private partnership project provides a total of 1,524 housing units spread across the social spectrum. 264 low-income, 624 middle-income, and 636 high-income. It is based on the principle of cross-subsidy, which allows a lower buying price for lower income because units are distributed over the whole spread rather than being allocated in a segmented way. In addition to housing, the complex provides a marketplace and community centre, shops and offices. The construction uses locally available bricks and reinforced concrete.
Building Type	722
2001 Award Cycle	250, 1, 2

TRANSFORMING THE ORDINARY

Explosive urban growth-huge number to be housed
 Scarcity of resources, land and infrastructure
 Breakdown of traditional communities
 Degradation of urban environments
CAN THE PROBLEM OF URBAN HOUSING BE SEEN AS ONE OF THE TOOLS TO AMELIORATE THE ABOVE PROBLEMS?
 The project attempts to find out.

The answer
PARTNERSHIP
 Pooling and complementing resources, knowledge and managerial capacities
 Government - Planner institutions - Corporate body
 Individuals - People

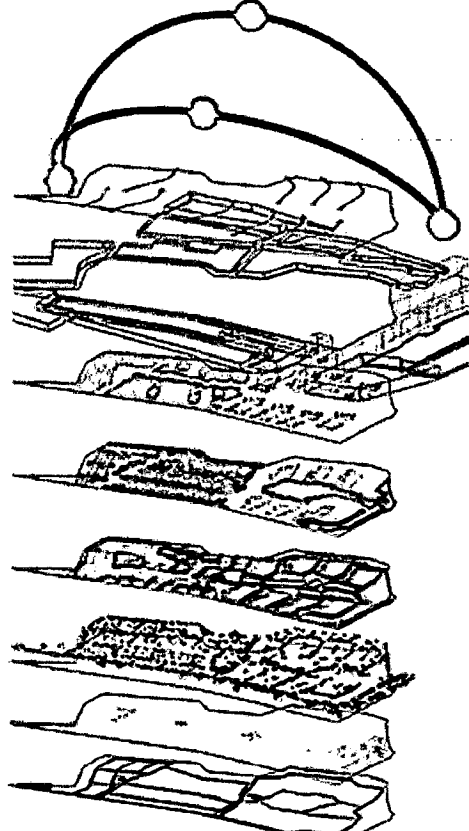
DIVERSITY
 Of functions, income levels, typologies
 In order to create complex and rich urban networks and to generate sufficient financial resources to allow

CROSS SUBSIDY
 For economically disadvantaged families

DESIGN
 Accepting the constraints of large scale mass construction and economies of scale, adoption of conventional typologies, giving great attention to quality of detail at all scales
 seizing opportunities generated by unexpected juxtapositions and situational constraints
TRANSFORMING THE BANAL INTO THE MEMORABLE WITHOUT RECOURSE TO STYLISH, DECORATIVE OR TECHNOLOGICAL EXERCISES

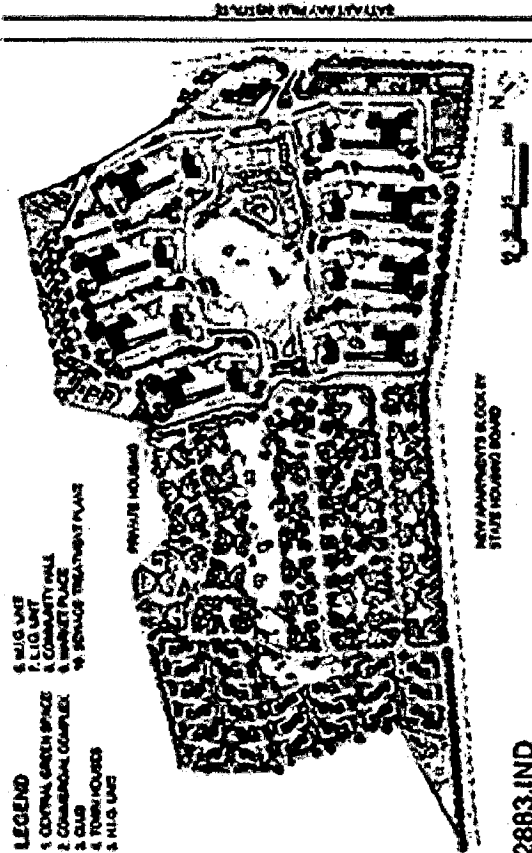
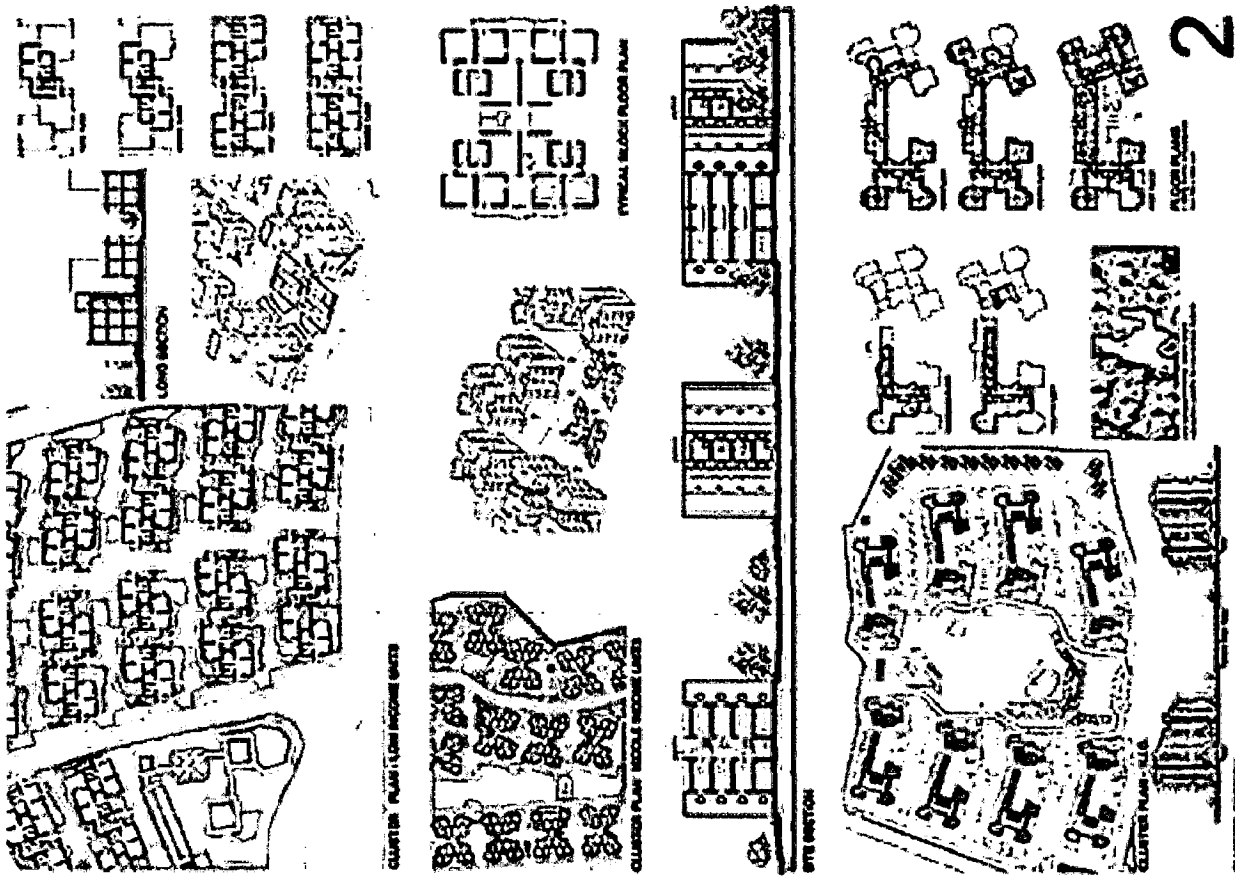
THE PROJECT IS AN INTERESTING AND A SIGNIFICANT EXAMPLE OF A NEW APPROACH TO URBAN HOUSING IN INDIA. THE FREQUENT AND CONSIDERED THAT THE PROVISION OF HOUSING IS NOT AN ACT OF CHARITY, BUT IS A SOCIAL AND CIVIL RESPONSIBILITY IN ITS OWN RIGHT THAT IS POSSIBLE TO ACCOMPLISH THROUGH THE COOPERATION OF APPROPRIATE ECONOMIC ACTIVITIES, AND THROUGH COSTS ARE DISTRIBUTED OVER THE WHOLE SPREAD, NOT PROPORTIONALLY ALLOCATED OVER THE WHOLE SPREAD, NOT PROPORTIONALLY ALLOCATED OVER THE WHOLE SPREAD, NOT PROPORTIONALLY ALLOCATED OVER THE WHOLE SPREAD, NOT PROPORTIONALLY ALLOCATED OVER THE WHOLE SPREAD.

- LAND
SUN AND BREEZE
- CITY STRUCTURE
- BUILDING BLOCKS
- SOCIAL AND GREEN OPEN SPACES
- VEHICULAR AND PEDESTRIAN PATHS
- VEGETATION
- COMMUNITY AND COMMERCIAL FACILITIES
- WATER AND SANITATION



DESIGN-SEIZING OPPORTUNITIES
 THE OPTIMUM DESIGN CONDITIONS OF EACH LAYER CREATE
 DISTINCT PATTERNS OF ORDER.
 Juxtaposed, they give rise to insurmountable unexpected conditions.

1



- LEGEND**
- 1. M.I.G. UNIT
 - 2. CENTRAL GREEN SPACE
 - 3. COMMERCIAL COMPLEX
 - 4. CLUB
 - 5. TOWN HOUSES
 - 6. H.I.G. UNIT
 - 7. L.I.G. UNIT
 - 8. COMMUNITY HALL
 - 9. MARKET PLACE
 - 10. SCHOOL TREATMENT PLANT



- PIONEERING PARTNERSHIP: CORPORATE BODY • COMMUNIST GOVERNMENT
- HOUSING FOR LOW/MIDDLE AND HIGH INCOME GROUPS: SOCIAL • ECONOMIC • CULTURAL INTEGRATION
- PROJECT DESIGN NOT AS AN END SOLUTION: A CONCEPTUAL MODEL DESIGNED FOR FUTURE REPLICATION
- CLIENT • ADVISER • ARCHITECTS' CONCERN FOR SOCIALLY COHESIVE ENVIRONMENT: LOOKING BEYOND UTILITARIAN SOLUTIONS
- EFFECTIVE RESOURCE MANAGEMENT: SUSTAINABLE SOLUTIONS

CHAPTER 3: POLICIES

3.1 JNNURM

3.1.1 INTRODUCTION

The Scheme of Affordable Housing in Partnership aims at operationalising the strategy envisaged in the National Urban Housing & Habitat Policy (NUHHP) 2007, of promoting various types of public-private partnerships – of the government sector with the private sector, the cooperative sector, the financial services sector, the state prostates, urban local bodies, etc. – for realizing the goal of affordable housing for all. It intends to provide a major stimulus to economic activities through affordable housing for the creation of employment, especially for the construction workers and other urban poor who are likely to be amongst the most vulnerable groups in recession. It also targets the creation of demand for a large variety of industrial goods through the multiplier effect of housing on other economic activities.

This Scheme is a part of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and takes into account the experience of implementing Basic Services to the Urban Poor (BSUP) and Integrated Housing & Slum Development Program (IHSDP) for three years, and the assessment that shortfall in response from BSUP towns is a factor of the lack of urban land availability for expansion of cities, and after consultation with States/UTs who have agreed that the responsibility of making urban land available at affordable rates must rest with them in order to reduce the acute shortages of housing in urban areas. The scheme is also an acknowledgement of the strain of BSUP and IHSDP on state budgetary resources, and the need to draw in institutional finance for construction of affordable housing on a mass scale.

The scheme is primarily applicable to the 65 cities covered under the BSUP program. Other cities of population above 5 lakhs could be considered during implementation with approval of the National Steering Group for JNNURM, if adequate number of projects is not forthcoming from the 65 cities. However, project proposals from non-BSUP towns could be considered for sanction based on a review of the implementation of the Scheme by the Ministry of Housing & Urban Poverty Alleviation after two years.

The scheme seeks to encourage State Governments to make provision for land to meet the acute shortage of affordable housing and to work in the partnership model envisaged in the NUHHP 2007.

These Guidelines will come into effect from 1st April, 2009 and the scheme will be a part of JNNURM.

3.1.2. OBJECTIVE

The basic aim of the Scheme is to provide stimulus to economic activities through affordable housing programs in partnership. Its immediate objective is employment generation to the urban poor, especially construction workers, where adverse impact of current economic downturn is being experienced. The Scheme will also strive to ensure equitable supply of land, shelter and services at affordable prices to all sections of society, and thereby to prevent the growth of slums in urban areas.

3.1.3. COVERAGE

- a) The scheme will apply mainly to the 65 BSUP cities, where shortages of land for housing are driving unplanned growth and raising home prices and rentals to unsustainable levels.
- b) The projects which should be eligible under this scheme for assistance would need to meet the following two criteria:
 - i. Dwelling units should be a mix of EWS/LIG/MIG categories with the maximum size of a dwelling unit being at 1200 square feet super area, with at least 25% of them for EWS of about 300 square feet. In terms of carpet area, the minimum carpet area for EWS category shall be 25 square meters and maximum carpet area for MIG category shall be 80 square meters.
 - ii. The sale price of dwelling units should have an upper ceiling in terms of Rupees per square meter of carpet area. The price ceiling would be settled in consultation with the States/UTs for different classes of cities.
- c) An indication of allocation of ACA funds for implementation of the scheme, to be released by way of Central Grant, among State/UTs would be made as follows:

Categories of Cities	No of Cities	ACA per City (Rs. Crore)	Total ACA Allocation (Rs. Crore)
A. Mega Cities/Urban Agglomerations	7	100.00	700.00
B. Other Million-plus Cities/Urban Agglomerations	28	70.00	1960.00
C. Other Cities identified under BSUP	30	50.00	1500.00
Addition Allocation for High Performing Cities*/Other Cities**			840.00
TOTAL			5000.00

Additional projects in the 65 BSUP cities having scope for wider replication could be considered subject to no city getting more than 50% additional allocation as compared to the indicative level. The States/UTs will be encouraged to develop a legal/regulatory framework of provision of land for affordable housing that promotes innovative partnerships/models for affordable housing.

** Other Cities, under Category C, with more than 500,000 population could be considered with the approval by the National Steering Group if adequate number of projects are not forthcoming from the 65 identified cities. This will be based on a review by the Ministry of Housing & Urban Poverty Alleviation after the implementation of the Scheme for two years.

As the scheme is a part of Jawaharlal Nehru National Urban Renewal Mission (JNNURM), in consonance with the need to sanction projects so as to achieve the Mission outcomes and target for housing by the end of the Mission period, the Ministry of Housing & Urban Poverty Alleviation would consider sanction of additional projects to States/UTs which give priority to the provision of land for affordable housing on a demand-driven basis so that the overall objective of the program is achieved. This will be after allowing a period of one year to all States/UTs to come up with adequate number of projects conforming to the scheme guidelines.

3.1.4. DEFINITION OF AFFORDABLE HOUSES

Keeping in mind that the housing shortages affect mostly the EWS and LIG, and the younger group of urban-urban migrants changing cities in search of better prospects, affordable houses, for the purpose of this scheme, may be taken as houses ranging from about 300 square feet (super built up area) for EWS, 500 square feet for LIG and 600 square feet to 1200 square feet for MIG, at costs that permit repayment of home loans in monthly installments not exceeding 30% to 40% of the monthly income of the buyer. In terms of carpet area, an EWS category house would be taken as having a minimum 25 square meters of carpet area and the carpet area of an LIG category house would be limited to a maximum of 48 square meters. The carpet area of an MIG house would be limited to a maximum of 80 square meters.

3.1.5. STRATEGY OF THE SCHEME

The scheme for construction of affordable houses in partnership visualizes that the cost of land and construction would be held down to affordable levels:

- Land costs would be intermediated by States/UTs and Development Authorities/Urban Local Bodies, by providing land at nominal, predetermined or institutional rates (not including more than cost of acquisition and development

costs of land) for specified housing or integrated housing projects. This would be the prerequisite for the scheme.

- Costs of land can also be intermediated by attracting private developers to build on their land, by granting zoning-related incentives such as land use conversion, extra FAR for the construction of affordable houses to be allotted by the State/UT government (where ever infrastructure permits densification), etc..
- Cost of construction can be held down by construction through no profit no loss organizations or at reasonable profit; and by beneficiaries directly accessing institutional funds for construction, namely the loans offered by public sector banks, available at reduced interest rates to individual buyers (as announced under the economic stimulus package).
- Cost of construction can also be driven down by planning layouts which mix EWS/LIG/MIG with HIG houses and commercial layouts, and cross subsidizing through the premium earned on the sale of HIG and commercial spaces.
- States/UTs could reduce costs of housing further by charging a reduced stamp duty to a maximum of 2% for affordable houses (LIG) and nil (0%) for EWS under this scheme and/or charging reduced tax rates on inputs for affordable housing.
- Cost of construction can also be driven down by adopting appropriate construction technologies.

3.1.6. MAIN FEATURES OF THE SCHEME

The scheme modifies the guidelines of JNNURM (BSUP) for providing Central Assistance to States to incentivise land assembly for affordable housing to promote development of projects for a total of 10 lakh affordable housing units by provision of central assistance of 25% for the cost of provision of civic services for projects for affordable housing at an approximate cost of Rs.5,000crores to Central budget.

The main features of affordable housing in partnership scheme are:

- a) A project approach would be followed. Projects prepared by urban local bodies/urban development agencies/housing boards/improvement trusts/other agencies which may be designated as 'implementing agencies', accompanied by duly approved layout plans and maps to scale would be posed for sanction to the State Level Steering Committee and then the Central Sanctioning and Monitoring Committee set up for BSUP.
- b) Land for an affordable housing project could be identified within municipal limits, or on the periphery or outskirts of towns and cities within jurisdictions of development or planning authorities.
- c) Projects with a minimum of 200 affordable houses would be entertained.
- d) Dwelling units built under this scheme would be a mix of EWS/LIG/MIG.

- e) The layout and specifications including design of the affordable houses to be built would be approved by the State/UT Government or its designated implementing agency.
- f) The sale price of dwelling units would have an upper ceiling in terms of Rupees per square metre of carpet area. This ceiling would be proposed by the States/UTs for different classes of cities for approval by the Central Sanctioning & Monitoring Committee.
- g) Beneficiaries would be selected and allotments made on a transparent procedure by the State / implementing agency, e.g. draw of lottery, based of detailed guidelines approved by the State/UT Government.
- h) As far as possible, beneficiaries would be selected in advance to beginning construction, so that the loan for construction can be availed directly by beneficiaries. A tripartite agreement between loanee, bank and development agency should enable facilitation of loan procedures for the individual, and release to the development agency as per the progress in construction.
- i) EWS/LIG beneficiaries can be enabled to access loans under the Interest Subsidy Scheme for Housing the Urban Poor (ISHUP), which provides 5% interest subsidy on loans up to Rs 1 lakh.
- j) Title to the EWS/LIG houses would be given as far as possible in the name of the woman. Where the land is at predetermined rates, title may be leasehold, subject to State/UT Government decision, with sufficient safeguards to ensure that the beneficiary is not dispossessed and the sale of the house to another name is not recognized or registered for a certain minimum period; within which transfer of the house should be permissible back to the designated (project) agency only, at cost of construction adjusted for inflation.
- k) States/UTs/implementing agencies would make effort to ensure that at least 25% of the total built up/constructed area of the projects proposed is EWS/LIG units.
- l) In order to promote EWS/LIG dwelling units / cross-subsidize the cost of land, the project, with approval of the State/UT Governments may also offer zoning incentives such as land use conversion, additional FAR/FSI for the patch, with or without TDR, based on the prevailing market price of land and the cost of construction, provided the civic infrastructure at the site or the TDR sites is not put under strain.
- m) The State/UT Government may also permit a portion of the identified plot of land being used for construction of HIG dwellings or commercial purpose, on which the development partner can raise funds to cross subsidize the construction of EWS/LIG dwellings.
- n) In the case of partnership with a private developer on Government land, it would be required of the State/UT Government / implementing agency to select the private party by a transparent bidding process.
- o) If considered appropriate, the States/UTs may consider private lands under this scheme. Concessions and FAR, etc. would need to be judiciously designed by

them to make it attractive on private lands. However, the project prerequisites will not be relaxed, and the project would not be entertained for sanction except through the State/UT Government

- p) Supervision of quality and timeliness of construction would need to be done by quality control mechanisms put in place by States/UTs. A three tier Quality Management System will be mandatory. The first level will be developing agency, second by the State level quality monitor and third level by a nationally empanelled third party inspection and monitoring (TPIM) agency. Involvement of beneficiaries in the project should be encouraged.

3.1.7 CENTRAL GOVERNMENT ASSISTANCE

Based on the experience that housing colonies do not get occupied for want of civic service connectivity, Central Government assistance under this scheme will flow for the provision of civic services such as water supply including ground level/overhead service reservoirs, storm water drainage, solid waste management, sewerage including common sewerage treatment facilities, rain water harvesting, approach roads, electricity lines including electricity transformers, parks and playgrounds and other amenities.

Central Assistance under the scheme will be limited to least of following:

- Rs. 50,000 per Dwelling Unit for all dwelling units taking EWS, LIG and MIG units together which are proposed in the project; and
- 25% of the cost of all civic services (external and internal) proposed in the project.

Subject to the above, Central Assistance would be computed in the following manner:

S.No	Built up area for EWS/LIG as a percentage of total constructed area	Subsidy Amount*
1	25%	Rs. 60,000 per EWS/LIG unit
2	>25% and upto 30%	Rs. 60,000 - 70,000 per EWS/LIG unit
3	>30% and upto 35%	Rs. 70,000 - 80,000 per EWS/LIG unit
4	>35% and upto 40%	Rs. 80,000 - 90,000 per EWS/LIG unit
5	>40%	Rs. 90,000-Rs. 1,00,000 per EWS/LIG unit

*An Additionality of 12.5% may be provided for North Eastern States including Sikkim & Special Category States (Jammu & Kashmir, Himachal Pradesh & Uttarakhand).

Release of Central Government share would be in three installments to the State/UT Government or its designated agency on reimbursement basis (@ 25%, 50%, 25% respectively). The last installment would be released after ascertaining the completion of construction and selection of beneficiaries.

3.1.8. AGENDA OF REFORM & MEMORANDUM OF AGREEMENT

Agenda of reform and the Memorandum of Agreement will be same as applicable to BSUP/IHSDP.

3.1.9. NATIONAL STEERING GROUP

The National Steering Group of JNNURM, will steer the scheme to its objectives.

3.1.10. APPRAISAL AND SANCTION OF PROJECTS

The procedures of BSUP would be applicable.

3.1.11. SANCTION OF PROJECTS

The Central Sanctioning and Monitoring Committee in the Ministry of Housing & Urban Poverty Alleviation for sanctioning the projects submitted by States/UTs under BSUP, would also sanction projects of affordable housing in partnership.

3.1.12. STATE LEVEL STEERING COMMITTEE

The State level Steering Committee for BSUP would decide projects and their priorities for inclusion in the scheme, and for submission to the Central Sanctioning & Monitoring Committee.

3.1.13. NODAL AGENCY

Nodal Agency for BSUP would be the Nodal Agency for this scheme, and perform the same functions, inter alia:

Appraisal of projects;

- Obtaining sanction of State Level Steering Committee for seeking assistance from Central Government under the scheme;
- Management of grants received from Central Government;
- Release of funds;
- Monitoring physical and financial progress of sanctioned projects; and
- Monitor implementation of reforms as committed in the MoA.

3.1.14. MISSION DIRECTORATE

The Mission Directorate for BSUP and IHSDP in the Ministry of Housing & Urban Poverty Alleviation, under the charge of Joint Secretary (JNNURM) & Mission Director, would ensure effective coordination with State Governments and other agencies for expeditious processing of the project proposals and implementation of the scheme.

3.1.15. MONITORING PROGRESS OF PROJECTS

The monitoring process occurs as follows:

- a) A provision of 5% of the grant will be earmarked under the Ministry's Budget for meeting Administration and IEC expenses, including support for project preparation, appraisal, monitoring, evaluation, and capacity building activities at various levels.
- b) The Ministry of Housing & Urban Poverty Alleviation will periodically monitor the scheme.
- c) State Level Nodal Agency would send quarterly progress report to the Ministry of Housing & Urban Poverty Alleviation.
- d) Upon completion of the project, nodal agency through the State Government, would submit completion report in this regard.
- e) Central Sanctioning & Monitoring Committee may meet as often as required to sanction and review/monitor the progress of projects sanctioned under the Mission.
- f) Monitoring of progress of implementation of reforms may be outsourced to specialized/technical agencies.

3.2 RAJIV AWAS YOJANA (RAY) GUIDELINES FOR SLUM-FREE CITY PLANNING

3.2.1 OBJECTIVES

Rajiv AwasYojana (RAY) for the slum dwellers and the urban poor envisages a 'Slum-freeIndia' through encouraging States/Union Territories to tackle the problem of slums in a definitive manner. It calls for a multi-pronged approach focusing on:

- a) Bringing existing slums within the formal system and enabling them to avail of the same level of basic amenities as the rest of the town;
- b) Redressing the failures of the formal system that lie behind the creation of slums; and
- c) Tackling the shortages of urban land and housing that keep shelter out of reach of the urban poor and force them to resort to extra-legal solutions in a bid to retain their sources of livelihood and employment.
- d) An outline of the broad policy issues that need to be addressed by States/UTs under RAY

3.2.2. CENTRAL SUPPORT: PRE-CONDITIONS

As in JNNURM, the goals of RAY will be driven and incentives by the provision of central support for slum redevelopment and construction of affordable housing conditional to a

set of reforms necessary for urban development to become inclusive. Annexure II describes the admissible and inadmissible components currently envisaged under RAY.

As regards reforms under RAY, security of tenure through entitlement will be critical for the overarching aim of promoting inclusive cities. Accordingly, Central Assistance under RAY will be predicated on the condition that States/UTs assign legal title to slum-dwellers over their dwelling space. The other reforms include the continuation of the three pro-poor reforms of JNNURM till they are legislated and internalized as part of the system; legislation for property rights to all slum dwellers; reform to the rental and rent control laws regarding urban housing; and review and amendment to the legislations, rules and regulations governing urban planning and development structures and systems towards an adequate response to the demands, process and pace of urbanisation. The three propoor reforms under JNNURM are reiterated as follows:

Internal earmarking within local body budgets for basic services to the urban poor;

- i. Provision of basic services to urban poor including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery of other already existing universal services of the government for education, health and social security; and
- ii. Earmarking at least 20-25% of developed land in all housing projects (both public and private agencies) for EWS/LIG category with a system of cross-subsidization.

3.2.3. STATE SLUM-FREE PLAN OF ACTION (POA)

Rajiv AwasYojana envisages that each State would prepare a State Slum-free Plan of Action (POA). The preparation of legislation for assignment of property rights to slum dwellers would be the first step for State POA. The POA would need to be in two parts, Part-1 regarding the up gradation of existing slums and Part-2 regarding the action to prevent new slums. In Part-1 the State would need to survey and map all existing slums in selected cities proposed by the State for coverage under RAY. In Part-2 the Plan would need to assess the rate of growth of the city with a 20 year perspective, and based on the numbers specify the actions proposed to be taken to obtain commensurate lands or virtual lands and promote the construction of affordable EWS houses so as to stay abreast of the demand. This part would need also to make necessary legislative and administrative changes to enable urban land expansion, and in town planning regulations to legislate reservations for EWS/LIG housing in all new developments. Annexure III indicates the broad outline of a State Slum-free Plan of Action (POA)..

The State POA would include the cities identified by the State and intended to be covered under RAY in five years, and their phasing. It will commit to a 'whole city' approach, so that an integrated and holistic plan is prepared for the up gradation of all existing slums, notified or non-notified, in each identified city. Within a city, in each

slum taken up for redevelopment, a holistic coverage would be required, with provision of all basic civic infrastructure and services as well as decent housing, with emphasis on planned layouts (after reconfiguration of plots based on existing / modified building bye-laws wherever necessary) and on total sanitation (by provision of individual toilets and water supply to each household). With regard to housing, the State may adopt a flexible approach as to the manner of construction and arrangement of funds for construction, to follow a beneficiary- built housing model with design and technical support from the Municipality/State, or to construct housing through state, parastatal or private partners or by delineating a mix of methods. The POA would be expected to give primacy to a Public-Private-Partnership model that would enable it to cross-subsidize through FSI and land use concessions as much of the slum redevelopment as possible. The POA would be required to describe the model proposed to be followed in each slum, the efforts for obtaining the community's participation and the financial strategy for holistic development along with timelines.

The State POA will include Slum-free City Plans of Action for the cities identified for inclusion under RAY. While the City POA has to be developed for each city included under RAY as a whole, the pace of slum up gradation within the city can be phased out. For the purpose of phasing, each city may be divided into zones and each zone be taken up as a whole to ensure the universal provision of basic infrastructure and services and decent housing in all slums in the zone, and to attain slum-freeness. A city-wide/zone based approach would enable shifting untenable slums to the nearest possible available vacant land or notified slum which has the space to receive them.

States would be required to forward the Slum-free City Plans of Action (POA) to the Centre for clearance along with the bill for assignment of property rights cleared by the State Cabinet and the commitment of the Government as to the session of the State Assembly before which it will be placed. In considering the POA, the Centre would particularly assess that the cities have been chosen to maximize cross-subsidizations, that the extent of commitment for cross-subsidizations through PPP has been fully explored; and that the mechanisms for community participation have been clearly delineated and activated.

3.2.4. SLUM-FREE CITY PLANNING: METHODOLOGY

3.2.4.1 Conceptual Framework

Slum-free City Cell in Urban Local Body headed by the Municipal Commissioner/Executive Officer will be primarily responsible for the preparation of Slum-free City Plans based on guidelines provided by the concerned State Government and support extended by the Nodal Agency for Rajiv AwasYojana at the State level. The diagram in the next page provides a conceptual framework for the preparation of Slum-free City Plan.

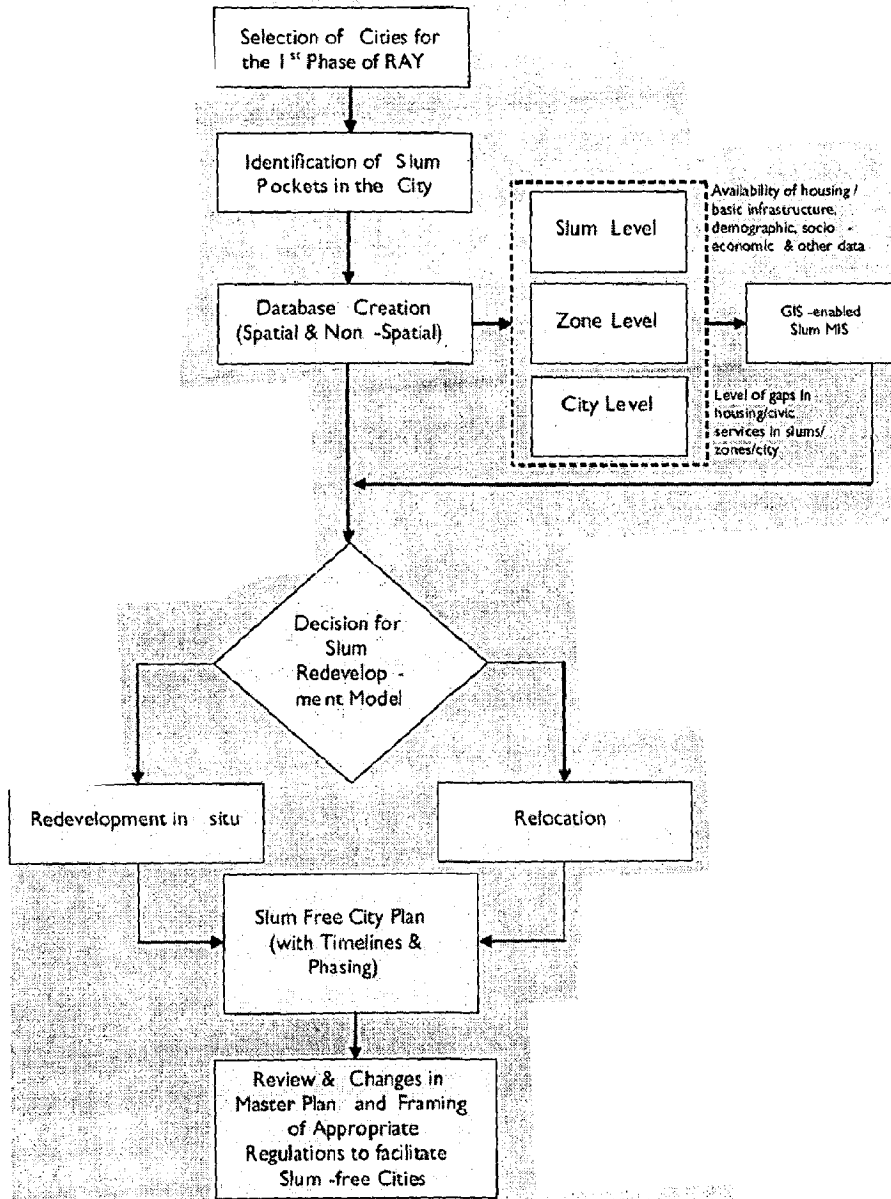
3.2.4.2 Planning Methodology

The preparation of Slum-free City Plan will broadly involve Slum redevelopment/ Rehabilitation Plans based on:

- a) survey of all slums – notified and non-notified;
- b) mapping of slums using the state-of-art technology;
- c) integration of geo-spatial and socio-economic data; and
- d) identification of development model proposed for each slum. Base maps to an appropriate scale would be a pre-requisite for the preparation of Slum Redevelopment Plan/Slum-free City Plan. States/UTs may need to proceed in the following steps for the preparation of Slum-free City Plans.
 - a. Securing CARTOSAT II/latest satellite images from NRSC/ISRO and preparation of base maps for the whole city and its fringes using the images;
 - b. Identification and inventory of all slum clusters of all descriptions in the urban agglomeration with the help of satellite image and other available data;
 - c. Inventory of all possible vacant lands in each zone of the urban agglomeration that could be used for slum redevelopment/ rehabilitation development purposes;
 - d. Development of Slum Map of every slum within the city and its fringes using GIS with CARTOSAT II images, ground level spatial data collected through total station survey, collating spatial information with respect to plot boundaries, network of basic infrastructure like roads, sewerage, storm drainage and water lines, etc and superimposing this on the satellite image and importing them into GIS platform as the first step towards the preparation of Slum Development Plans and Slum Free City Plan. This may be undertaken with the help of technical partners of NRSC/ ISRO/other technical institutions/agencies;
 - e. Identification and engagement of Lead NGO/CBO to guide and anchor community mobilization for the purpose of slum survey, (May be more than one NGO/CBO in different slum zones) of the city. These Lead NGOs/CBOs should also be associated in slum survey operations and dialogues for preparation of slum level redevelopment plans;
 - f. Conduct of Slum Survey based on the detailed formats (with or without changes) prepared by the Ministry of Housing & Urban Poverty Alleviation with the help of National Buildings Organization (NBO) - after due training of trainers, training of survey personnel /canvassers and canvassing. It would be helpful for community mobilization to pick as many canvassers from the sourced slum or nearby slum pockets;
 - g. Collection of bio-metric identification data of slum dwellers based on the above survey (subject to guidelines issued by Unique Identity Authority of India (UIDAI));

- h. Entry of data from Slum Surveys in the web-enabled MIS application (to be provided by Ministry of HUPA), compilation and collation of data, preparation of Slum-wise, City and State Slum Survey Database and Baseline Reports. The MIS will assist in developing a robust Slum and Slum Households Information System. (Guidelines and software for development of the MIS will be issued by the Ministry of HUPA);
- i. Integration of Slum MIS with GIS Maps to enable the preparation of GIS-enabled Slum Information System that is to be used for the preparation of meaningful Slum Development Plans and Slum-free City Plan using a city-wide/zone-based approach. (Guidelines and software for development of GIS platform and its integration with the MIS will be issued by the Ministry of HUPA);
- j. For each slum identified, Slum Redevelopment Plan to be decided based on models like PPP development, infrastructure provision only, community-based development through Rajiv Awas Housing Societies, etc. This decision-making should necessarily be done with the involvement of the community after community mobilization and dialogue for deciding the model to be adopted. Each slum redevelopment plan should have the timeline against each of the activities; and
- k. Preparation of Slum-free City Plan should be based on the development plans for all slums and strategies for the prevention of future slums, including reservation of land and housing for the urban poor. The Plan should contain timeline of activities for achieving slum-free city, phasing information and financial estimates against each of the activities.
- l. The steps that will need to be adopted for guiding the State and City Governments in the above exercise have been described in greater detail in Annexure IV.

Diagram
Methodology for Preparation of Slum-free City Plan:
Conceptual Framework



3.2.4.3 Slum-free City Planning Team (State Government/ULB)

It is suggested that the State needs to first establish a Slum-free City/Technical Cell at the State Nodal Agency level and in each city identified for the preparation of Slum-free City Plan. At the State level, the Secretary dealing with JNNURM/RAY will head the Slum-free City/Technical Cell, coordinated by the State Nodal Officer for RAY. The composition of the Cell will be decided by the State Government. At the city level, the Municipal Commissioner or Executive Officer of the Urban Local Body, assisted by the Additional/ Deputy Commissioner/Officer in charge of Slums/Urban Community Development/Planning, will head the Slum-free City Cell, which will include the chiefs of all municipal departments.

Each city included under RAY must be enabled to have a competent Slum-free City Planning/ Technical Team which can undertake procurement and coordinate with various agencies such as: National Remote Sensing Centre (NRSC)/Indian Space Research Organisation (ISRO) and other Technical Agencies

The Technical Cell at the State Nodal Agency for RAY/Urban Local Body (identified for the preparation of Slum-free City Plan) may have the following experts on contract basis selected on a transparent process (monthly remuneration will be commensurate with qualification and experience - not exceeding Rs.75,000 per month):

- MIS Specialist - 1
- GIS Specialist - 1
- Town Planning Specialist - 1
- Social Development Specialist - 1
- Project/Engineering Specialist - 1 and
- Capacity Building/Training Coordinator -1.

3.2.5. GOVERNMENT OF INDIA'S SUPPORT

The activities for which the Centre intends to lend support towards the preparation of Slum-free City Plans to States/UTs would include:

3.2.5.1 Financial Support

- a) Conducting Slum Surveys in cities based on the detailed formats worked out by the Ministry of Housing & Urban Poverty Alleviation with the help of National Buildings Organisation (NBO), including training of trainers, undertaking training, canvassing and surveying for City/State MIS;

- b) Entry of data from Slum Surveys into MIS database, compilation and collation of data in MIS to aid preparation of City Slum-free Plans of Action;
- c) Development of City and Slum Base Maps using GIS - including cost of CARTOSAT II/latest images, spatial total station slum surveys, integration of Slum MIS with GIS Maps (to enable preparation of GIS-enabled Slum Information System that is to be used to prepare meaningful Slum Development Plans and Slum-free City Plans), procurement of hardware and software at State and ULB levels based on recommendation by the Technical Committee;
- d) Engagement of consultants/technical agencies/institutions for the preparation of detailed Slum-free City Plans for each selected City/Urban Agglomeration;
- e) Engagement of Lead NGOs/CBOs to guide and anchor community mobilization for Slum-free City in the selected Cities/Urban Agglomerations;
- f) Carrying out biometric identification survey of slum-dwellers and hardware for the storage of bio-metric information (excluding issue of biometric identity cards to the slum dwellers) - duly taking into account the imperatives of the Unique Identity Card initiative; and
- g) Training programmes in Slum MIS/GIS, Slum Mapping, Slum Development/Slumfree City and Slum-free State Planning, Project Management, Pro-poor Reforms etc. with the involvement of National Technical Institutions and National Network of Resource Centres.

3.2.5.2 Handholding/capacity development support

The Ministry of HUPA will be involved in developing Slum-free City/State Plan e-Tools and Manuals covering the following to aid the State/City Governments:

- a. Slum Survey MIS – e-Tool (including storage of bio-metric information) and Manual for the use of the same;
- b. Tool for Slum Mapping using GIS - drawing up guidelines for Slum Mapping exercises and providing technical inputs to States/Urban Local Bodies;
- c. GIS-MIS integration and development of a dynamic tool “GIS-enabled Slum MIS” for being operated as a tool for Slum-free City planning and monitoring the implementation of Slum-free City Plans and projects. Software and Guidelines are to be developed for integration of MIS-based on Slum Surveys covering spatial and socioeconomic data with GIS-based Slum Maps based geo-spatial data from sources of remote sensing/aerial surveys and ground level corrections;
- d. Manual for use of latest gadgets, tools and techniques required for GIS mapping of slums within the framework of Spatial Planning for cities. The Slum Mapping exercises have to keep in view the Master Plan framework;
- e. Step-by-Step Guidelines for drawing up Slum Development Plans, Slum-free City and Slum-free State Plans; and

- f. Guidelines for Reforms required to usher in Slum-free Cities and States. In connection with the above activities and providing assistance to States/UTs and when required, the Ministry of Housing & Urban Poverty Alleviation will establish a Technical Cell with composition and remuneration as indicated in para 4.3 and engage appropriate personnel on outsourcing basis. For the purpose of capacity building and training to State/City level officials and non-officials in various guidelines, manuals, tools and techniques for Slum-free City Planning, the Ministry will support select nodal institutions with specialised Capacity Building & Training Cells. These institutions would undertake capacity building/training programmes and provide handholding support to States/UTs in the following areas:

- (a) GIS Mapping,
- (b) Slum Survey & MIS,
- (c) Slum-free City Planning and
- (d) Legislative Framework for Inclusive City Planning.

3.2.6. OTHER MODALITIES OF SCHEME

The Slum-free City Planning scheme will be implemented under the guidance of a National Steering Committee under the chairpersonship of Secretary (HUPA) – composition at Annexure V. This Committee will steer and monitor the entire process of preparation of Slum-free City Plans by States/UTs in a time-bound manner. A Technical Committee (composition at Annexure VI) will guide the States/UTs through the formulation of operational guidelines in technical, costing, procurement of hardware/software, planning and other aspects and will assist the National Steering Committee.

States/UTs will be required to send Detailed Proposals seeking support under the Slumfree City Planning – Rajiv AwasYojana scheme which will be considered by the Central Sanctioning & Monitoring Committee for JNNURM/RAY. Following the sanctions, funds will be released by the Ministry of Finance/Housing & Urban Poverty Alleviation.

The National Steering Committee for Slum-free City Planning – Rajiv AwasYojana will monitor the financial and physical progress under the scheme.

3.2.7 RAYANNEXURE I

Slum-free India Vision:

Some Key Policy Issues to be addressed on Priority

Urban Planning:

City master plans follow an exclusionary model that reserves land for housing for high and middle income groups, commercial, institutional, recreational and other uses, with no earmarking for Economically Weaker Sections and Low Income Groups. These plans are not in consonance with the income distribution structure of cities and towns. The norms of planning including density and development controls favour the comparatively better off sections. These factors, coupled with sky-rocketing urban land prices, have squeezed the urban poor out of formal urban land markets. Slums are an inevitable outcome of this deficiency in urban policy and planning. It is necessary that the master plans make provision for EWS/LIG categories by treating them as distinct segments for the purpose of land use and urban planning. There is also a need for 'small lot zoning' in layouts for housing approved by city authorities, creating EWS and LIG plots along with MIG and HIG. The population density norms also require a re-look, not only to rationalise them across cities, but, in understanding of the basic tenet that the poor are deprived of housing where land values are high, to enable better utilisation of valuable land by building vertically on it. It is necessary to catalyse and assist the review of these issues with capacity building and expertise.

Land:

Cost of land is a very significant component of the cost of housing. Not only the master plans but also state, development authority and urban local body policies in the past have made no provision for ensuring adequate supply of serviced land towards housing the EWS and LIG segments. In fact, some states and urban development authorities have resorted to auction of the limited land available with them in cities, setting exorbitant benchmarks for the market price of land. There is need for a well-defined policy for allocation of land to EWS and LIG segments to compensate for the 'historic lack of earmarked space' for them in the formal master plans. There is also need to continue, till completion and internalisation into practice, the reform of JNNURM for reservation of 20%-25% of developed land in all new housing colonies for EWS/LIG housing. In respect of slum areas, and in line with the practice followed globally in upgrading slums, the occupied land or a part thereof should be allocated to the slum-dwellers to enable them to have access to housing and basic amenities. Both reforms need to be pursued.

Housing & Infrastructure:

Affordable housing and provision of basic infrastructure in urban areas, especially slums, would generally require the intermediation of civil society, government and private entities that can engage the community, undertake planning, reconfigure slums to enable cost-effective provision of infrastructure facilities and construct group housing colonies. Given the massive needs for affordable housing and the capacity constraints faced by public agencies like housing boards, urban development authorities and municipalities to take up group housing on a large scale, it is necessary to involve private sector entities in the creation of affordable housing stock on ownership, rental or rental-cum-ownership basis and in scaling up the programme to the desired scale. There is also a need for resource mobilisation and earmarking of resources by public agencies to meet the cost of affordable housing, civic infrastructure and services for the urban poor where the private sector participation is not possible.

Financing:

Banks and other financial institutions are reluctant to lend to the EWS/LIG segments for affordable housing in view of perceived credit risks, these categories having no credit history and due to difficulties of foreclosure of loans. There is need for credit enhancement through appropriate fiscal, legal and institutional mechanisms, including intermediation of public and private housing agencies to ensure the flow of capital for this priority program.

3.2.8 RAYANNEXURE-II

Rajiv Awas Yojana:

Admissible & Inadmissible Components

Admissible Components

The scope of RAY envisaged is as follows

i. Projects involving -

- a) Integrated development of all existing slums, notified or non-notified, i.e., development of infrastructure and housing in the slums/rehabilitation colonies for the slum dwellers/urban poor, including rental housing;
- b) Development/improvement/maintenance of basic services to the urban poor, including water supply, sewerage, drainage, solid waste management, approach and internal road, street lighting, community facilities such as community toilets/baths, informal sector markets, livelihoods centres, etc. and other community facilities like pre-schools, child care centres, schools, health centres to be undertaken in convergence with programs of respective Ministries;
- c) Convergence with health, education and social security schemes for the urban poor and connectivity infrastructure for duly connecting slums with city-wide infrastructure facilities/projects; and
- d) Creation of affordable housing stock, including rental housing with the provision of civic infrastructure and services, on ownership, rental or rental-purchase basis.

ii. Capacity Building, Community Mobilisation, Planning & Other Support.

Note: Land cost will not be financed except for acquisition of private land for schemes/projects in the North Eastern and hilly States, viz., Himachal Pradesh, Uttarakhand and Jammu & Kashmir.

Inadmissible Components

Projects pertaining to the following will not be considered for support under RAY:

- i) Power generation
- ii) Telecom
- iii) Employment generation programs and
- iv) Staffing

3.2.9 RAY ANNEXURE-III

Rajiv AwasYojana: State Plan of Action

The State Slum Free Plan of Action would need the State to prepare legislation for the assignment of property rights to slum dwellers/urban poor as the first step. The State Nodal Agency for RAY will coordinate all legislative and policy formulation/implementation aspects of RAY. The legislative framework would cover all legislative issues necessary for redevelopment / rehabilitation of slums, including spatial planning norms covering density, development controls and other parameters.

The State plan of Action would require to identify the cities intended to be covered in five years, and their phasing, and commit to a 'whole city' approach, so that an integrated and holistic plan is prepared for upgradation of all existing slums, notified or non-notified, in each identified city. Within each city, in each slum taken up for redevelopment, a holistic coverage would be required, with provision of all basic civic infrastructure and services as well as decent housing, with emphasis on planned layouts (after reconfiguration of plots as per existing / modified building byelaws wherever necessary) and on total sanitation (by provision of individual toilets and water supply to each household). With regard to housing, flexibility of approach would be available with the state as to the manner of construction and arrangement of funds for construction, viz. to follow a beneficiary- built housing model with design and technical support from the Municipality/State, or to construct housing through state parastatal or private partners or by delineating a mix of methods. The POA would be required to describe the model proposed to be followed in each slum, the efforts for obtaining the community's participation and the financial strategy for holistic development. Annexure VII provides a list of possible models that States may consider.

The State POA would need to be in two parts, Part-1 regarding the upgradation of existing slums and Part-2 regarding the action to prevent new slums with a 20 year perspective. In Part-2 the Plan would need to assess the rate of growth of the city, and based on the numbers specify the action proposed to be taken to obtain commensurate lands or virtual lands and promote the construction of affordable EWS houses as to stay abreast of the demand. This part would need also to make necessary legislative and administrative changes to enable urban land expansion, and in town planning regulations to legislate reservations for EWS/LIG housing in all new developments. The Slum-free State Plan would include the following suggestive steps/actions:

- a) Preparation of State-wide Legislation –
 - a. For Assignment of Property Rights to slum households: The legislation should provide that the legal title is conferred either on the woman or jointly with the main male householder. Provision may be made for the legal entitlement to property to be on the house or on the land, as suits

the cityscape. The title must be mortgagable and heritable, so as to enable access to formal credit mechanisms. It must be alienable, after a certain number of years as decided by the State, during which period of time transfer back to the State should be permissible.

b) Other Legislations necessary would be for –

- a. Legislative changes for commitment to reservation of 10-15% of land in every new public/private housing projects or 20-25% FAR, whichever is greater, earmarking of 25% of municipal budget for the urban poor and provision of 7-Point basic services and entitlements to the poor as enlisted under the 7-Point Charter of JNNURM in order to make serviced land available for the poor for the future, and to prevent slums. Several states have issued executive orders as part of JNNURM reforms for this purpose – action would be required to give them the force of law;
 - b. Amendment to enactments governing town planning, urban development and municipalities to enable revision of population density norms, FAR, land use, etc. and permit local zoning and other relaxations required, for accommodation of in situ regularization to incentivise private sector participation wherever reasonably feasible and, for future requirements;
 - c. Amendment to legislations under which land is obtained for expansion of urban areas, to enable expansion of urban land at the expected rate of growth of the city. One of the main reasons for the haphazard growth of towns is the housing shortages and the slow pace of planned expansion, resulting in the mushrooming of unauthorized colonies that live outside the ambit of municipal services or taxation; and
 - d. Amendment to Rent Control Legislation, at least to the extent that will enable new rental housing stock to be created, and on terms governed by the market.
- c) Identification and phasing of towns and cities to be covered: The States may decide if they want to cover all the towns and urban areas, or decide to choose on the basis of size or other criterion, taking PPP potential as one clear reason for the particular decision. This would require that Slum-free City Plans are prepared for the Mission cities and cities with the higher population and growth rates in the first instance. In the phasing within a city, priority in redevelopment would be required to be given to slums where the conditions are the most inadequate. The eligibility for central assistance of unauthorised colonies or

regularised unauthorised colonies that are unserved by municipal services will, however, be predicated on the implementation of Part 2 of the State POA.

- d) For each city identified, a whole city approach would be taken, to map all the slums, notified as well as non-notified, and all unauthorised colonies and regularised unauthorised colonies unserved by municipal services. In each city, a total slum survey would be carried out, with biometric identification, to identify each slum dweller (resident, rather than owner of the shanty) for purposes of conferment of rights. Identification would be made of slums that can be upgraded holistically on site, with or without enabling changes in land use and FAR; and those which are untenable and have to be relocated. With a whole city approach, vacant land inventory would be made. A citywide plan would be made to shift untenable slums to the nearest possible available vacant land or notified slum which has the space to receive them. Such slum mapping would also include mapping of the ownership categories of the encroached land viz. municipal, state, central government, public sector undertaking and private in order to find or work out solutions for regularization and reconstruction suitable to each ownership category, ensuring land use modification, additional FAR wherever infrastructure permits etc., to create virtual space and provide incentives. The whole city approach would ensure that no slum is left out of the process of reconstruction and rehabilitation, either in situ or by relocation to another appropriate site.
- e) In each slum, taking a whole slum approach, primacy would be given to the provision of infrastructure within a declared time frame. Every effort would be made to provide infrastructure, civic services on par with the rest of the town, and to create sufficient green spaces and civic amenities of community centre, livelihood centre, school, medical centre, etc wherever these are lacking; reconfiguring the arrangement of houses and plots to enable this. Special emphasis must be placed on the provision of total sanitation with individual water sealed toilets and water connections to each household. External connectivity for sewerage and water mains, wherever available in the vicinity, would be provided for, either under the JNNURM Sub-mission of UIG or UIDSSMT or directly.
- f) In addition to existing slum upgradation, the commitment to a Slum-free Status would need to be spelt out by delineating the steps proposed to be taken, the projects to promote construction of affordable houses and the time lines. Such steps would include:
 - a. assessment of the rate of growth of urban population in different cities and agglomerations;

- b. assessment of the requirement of land and housing over the next two decades to meet this requirement taking into consideration the current population densities and available infrastructure;
 - c. review of the current urban land expansion approaches, models and mechanisms, and the delineation of the proposal for revision to enable expansion at the envisaged rate;
 - d. proposal to tackle the existing housing shortages and to meet the future requirements, especially for the EWS/LIG who are otherwise forced into extralegal spaces, and preferably through private sector and state parastatal involvement;
 - e. review of and proposal for revision of the town planning model (largely of differentiated land use and sprawl with thought to the location of EWS living spaces along
 - f. transport nodes and corridors) and the population density norms; and
 - g. a timetable to introduce legislation to enable orderly town planning and growth.
- g) Capacity building for town planning, and for review and revision of the urban land planning and development approaches must necessarily be a part of the Action Plan.

3.2.10 RAYANNEXURE-IV

Guidelines for Preparation of City Slum-Free Plan of Action

City Slum: free Plans of Action will require Slum Redevelopment/Rehabilitation Plans based on

- (a) survey of all slums - notified and non-notified;
- (b) database creation of slums using the geospatial technologies;
- (c) integration of spatial and socio-economic data; and
- (d) identification of redevelopment model proposed for each slum. It will also require policies and measure for the non-proliferation of growth of slums in the future.

States/UTs may consider the following steps for preparation of Slum-free City /Slum Redevelopment/ Rehabilitation Plans subject to the stipulation that the entire process of slum-free city planning will have to be professionally managed and also be participatory, duly involving the slum communities, NGOs, CBOs, municipal elected representatives, including Mayors and Municipal Chairpersons, experts etc.

Step 1: Preparation of Geo-referenced City Base Map

Inventory of existing Spatial Data

The Slum-free City Cell at the Urban Local Body shall build an inventory of existing spatial data available with various agencies in partnership with the Technical Agency (ies) engaged for GIS Mapping. The Cell shall collect the existing digital/hard copy maps/data from State Governments, Urban Local Bodies, National Remote Sensing Centre (NRSC), Survey of India (SOI), National Informatics Centre (NIC), etc. In case such maps/spatial data (which meet the technical requirements specified by the Technical Committee at the National level) already exist for portions of urban agglomeration with different urban authorities or specialized agencies (e.g. DMRC in the case of Delhi), then these will need to be brought onto a common platform and integrated. The usability and accuracy/reliability of existing maps/spatial data would need to be checked through ground truthing exercises while integrating them. Based on the availability of existing data - including those available from National Urban Information System (NUIS) scheme of Ministry of Urban Development(MoUD) being implemented by Town & Country Planning Organisation (TCPO) - and their usability, fresh data acquisition and the modalities for collection of the same will be determined by the Slum-free City Cell in consultation with the State Level Nodal Agency. The methodology, scale of mapping and standards for the above will be as prescribed by the National Technical Committee.

1.2 Obtaining Satellite Image of the City and its Fringes

1.2.1 CARTOSAT images (CARTOSAT I / CARTOSAT II images of 2.5 meter/1 meter resolution respectively) from NRSC/ISRO may be procured for city and its urbanising fringes, i.e. planning area boundary in order to prepare base maps. The likely urban extensions beyond the existing municipal limits in the next two decades may need to be included while procuring satellite images. This will be necessary in order to address the issues of slums in fringes (peri-urban) areas that are most likely to develop as the city expands. demarcation of planning area (for which images need to be procured for mapping purpose) has to be done with the full involvement of the urban local body and the Metropolitan Planning Committee / Urban Development Authority (or Authorities in the case of larger city agglomerations). In the case of smaller cities/towns not falling under the jurisdiction of any Urban Development Authority, delineation of the planning area for mapping purpose may be done in consultation with the Municipality and District Urban Development Agency/District Office of Town Planning Department/District Planning Committee.

1.2.2 The Slum-free City Cell in the Urban Local Body/State Nodal Agency will procure the required imagery from NRSC/ISRO and engage one or more Technical Agencies – partners of NRSC/ISRO such as State Remote Sensing Centre, other technically competent agencies in the public and private sectors and reputed institutions - for preparing base maps using the images.

1.3 Geo-referencing of Satellite Images and preparing Base Map for entire Urban Agglomeration area

Base Map for the demarcated area of the urban agglomeration (planning area) needs to be prepared at 1:5000 scale or other appropriate scale in GIS format using a standardized reference frame (which defines datum, projection) as decided by the National Technical Committee. This will be done by the Slum-free City Cell with assistance from the Technical Agency/State Town Planning Department/Urban Development Authority/State Remote Sensing Centre and others.

1.4 Identification & Demarcation of Slum areas & Vacant Lands on Base Map

- Criteria for identification of slums as provided by the State Government under the relevant Slum Act or policy/executive instructions will be followed by cities. Slum-free City Cells in the Urban Local Bodies, with support from revenue and other authorities, including Urban Development Authority will prepare the list of slums in their respective areas (Ward/Zone-wise) which meet the above criteria. Cross-examination of the list in each zone needs to be undertaken based on the following exercises:

- i. ULB list will be cross-checked with satellite image to check for any missing slum pockets, which will be added to the list.
- ii. Simultaneously, satellite images will also be updated by identifying those slums which are not identifiable by their physical characteristics in the images - with the help of municipal officers and NGO/CBO representatives who will undertake ground truthing exercise.

Note: Ward and zone boundaries will be added to the map and slums will be categorized zonewise. Where administrative/planning zones do not exist, the same will be prepared taking some contiguous wards into one zone of appropriate size.

- Reputed NGOs/CBOs (with experience of working in urban slums) may be involved in both the above exercise for the identification of slums in each zone in the city and lead the community mobilisation process. Ideally, these Lead NGOs/CBOs should be identified and engaged through a transparent process during this stage, as the community rapportbuilding and mobilization process have to begin before the total station and socio-economic surveys start.
- Vacant lands, which offer possibilities for accommodating slum population in a zone/within the same area, will need to be identified during this stage. Thus, an inventory of all possible lands that could be used for slum redevelopment will be made and marked out on the base map (zone-wise). The areas of vacant lands will have to be cross-checked at a later stage as to their appropriateness and adequacy to house the existing slum population, after exact data on slum densities are available from slum level spatial and socioeconomic surveys. Other emerging city needs which are likely to arise in the future and which are crucial to city planning (example: transport nodes, BRTS, MRTS etc) also need to be kept in mind while making an inventory of vacant lands for the purpose of housing the slum-dwellers.

1.5 Delineation of Slum Areas and Mapping Slum Infrastructure with Total Station Survey

- After slum pockets are identified, detailed footprint of each listed slum settlement and parcel of vacant land available in the city will need to be mapped using total station survey, on a scale of 1:500 or larger scale as decided by the National Technical Committee. This will be geo-referenced with the base map and the exact area dimensions and contours of the slum pockets would have to be delineated on the base map and satellite images.
- To determine the vulnerability of the slums to floods, it is necessary to create a digital elevation model of the slum and also the adjoining areas. The same is also to be done for inventoried vacant lands available in the city to identify their usability for relocation purposes. For this it is essential to carry out a contour survey, of

appropriate intervals as decided by National Technical Committee. This would be particularly relevant to settlements in hilly / uneven terrains or settlements in flood plains. Those slum area lands (or portions thereof) found vulnerable should be declared as untenable. Similarly all the vacant lands which are prone to natural hazards like flooding, land slides etc. shall not be used for slum relocation purposes.

- Note: It is important that Lead NGOs/CBOs start community mobilization exercise in each slum pocket simultaneously with or prior to the total station/socio-economic survey in order to avoid conflicts arising from mis-communication with the slum communities during the survey process.
- During the total station survey various infrastructural facilities like water supply, drainage, roads, street lighting, schools, hospitals, community halls, etc. and other features, including underground utilities will also need to be mapped covering the slum pockets and their vicinities, to plan for the provision of basic services for slum dwellers in later stages. The underground utilities like water supply, sewerage/drainage, gas and cables can be mapped using ground penetrating radar. All the spatial and non-spatial infrastructure data may be captured using a combination of GPS technology, ground penetrating radar (GPR) and field survey. The utilities data thus captured will need to be integrated with the base map database. The same exercise will need to be done for vacant lands identified in case the lands are to be used for development and relocation of slum households.
Note: If the slums are very dense, total station surveying cannot be adopted due to intervisibility problem. In such a case, a combination of plane table survey, total station survey and/or satellite data may be considered.
- Total station survey and other surveys could be a joint effort of the survey team of the GIS technicians of the Technical Agency/bidder/vendor and the Slum-free City Cell/Town Planning Wing of the Urban Local Body (ULB). The ULB personnel and representatives from Lead NGOs/CBOs may accompany the survey team to guide them in identifying various infrastructure networks and render help in the collection of required data
- 1.5.5 The Technical Committee at the national level will provide guidelines for total station survey and mapping of various infrastructure and other features.

Step 2: Slum Socio-economic Survey & Preparation of Slum MIS

2.1 Household Socio-economic & Bio-metric Surveys

- (a) Socio-economic survey will capture the details of slums and slum households in various slum pockets – land status, demographic profile, housing status, economic status, occupational status, access to infrastructure, household level information etc. The National Buildings Organisation (NBO) has circulated model formats for the conduct of slum, slum households and livelihoods surveys in cities and also a manual for the training of functionaries in slum survey operations and compilation of database. The survey formats may be adopted, with or without suitable modification as considered appropriate, by the State/UT concerned.
- (b) The bio-metric survey will capture the unique bio-identification marks for the head of the household and other members. This will be subject to the guidelines issued by Unique Identity Authority of India (UIDAI).
- (c) Data entry, data compilation, collation and analysis processes will take place simultaneously at the ward/zone level for all the information generated in the slum surveys. Data will be entered into a MIS format based on national guidelines/software developed by the Ministry of Housing & Urban Poverty Alleviation.

2.2 Mapping Land-ownership/Tenure Status

Land ownership/legal title may not belong to a single entity for the entire slum pocket or parcel of vacant lands. Therefore, mapping the land ownership titles/land tenure status for parcels of land within the demarcated slum area and vacant lands identified is necessary. This involves collecting information on land ownership details and plot boundaries from land revenue/municipal records for the entire slum pocket and vacant lands (being identified for relocation). While doing the exercise, land parcels with unclear/disputed titles will need to be identified to initiate dispute resolution process for getting clear land titles. All plot boundaries showing ownership/tenure status will be digitized and geo-referenced.

Note: Cities may combine the spatial and socio-economic surveys together or take them up separately depending on availability of competent and trained total station survey/slum survey teams.

Step 3: Integration of Spatial Data and Socio-economic (including Bio-metric)

Information at Slum/City level to create GIS-enabled Slum MIS

Digitized maps from total station survey, slum contour survey, land title information, socio-economic survey etc will all be put into different layers in GIS platform and integrated to enable data analysis using different parameters for the preparation of Slum-free City Plans. This step will involve the integration of slum socio-economic and

biometric survey information into slum, zone and city level base maps on GIS platform. Based on the information generated from GIS-enabled Slum MIS, slums can be categorized based on parameters such as land value, slum density, socio-economic characteristics of slum dwellers, etc. This will enable data analysis to be done at different spatial scales to arrive at different typologies of slums and facilitate informed debate on the choice of development model/ option to be adopted.

Step 4: Formulation of Slum Redevelopment Plans

4.1 Categorisation of Slums - Evaluating Options available to Slum Communities for Redevelopment

- (a) The categorization of slums on a zonal basis using GIS-enabled Slum MIS would help in formulating separate redevelopment models/mechanisms for different categories of slums. In this context, due consideration will have to be given to tenability /un-tenability, existing density of each slum pocket within a zone, additional density that can be accommodated, etc. Slums and vacant lands will first be categorised as tenable, semi-tenable or untenable. Untenable slums/vacant lands will be only those which are a 'safety' or 'health hazard' to the inhabitants or their neighbourhoods, even if redeveloped. Such untenable sites or portions will be earmarked for relocation to other redevelopment/vacant sites, preferably within the same zone.
- (b) The slums and vacant lands will need to be further classified into sub-categories based on the land ownership information and land value (market price) to decide the redevelopment model to be followed for each slum pocket within the zone. Thus, the options available for slum redevelopment would be formulated by the Slum-free City Cell/ULB based on critical considerations taking into account the key aspects - tenability, density, ownership and land price.
- (c) Guidelines will be issued by the National Technical Committee to identify untenable sites and for categorising slums.

4.2 Reconfiguration of Slums - Choice Slum Redevelopment Model

- (a) Based on the spatial analysis and situation assessment done, a participative process will need to be undertaken with slum communities with the assistance from Lead NGOs/ CBOs to decide on the choice of the redevelopment/rehabilitation model - PPP, Viability Gap Funding, by Community, by Governmental Agency, etc. Annexure VII provides an indicative list of alternative slum redevelopment/rehabilitation/affordable housing models. The dialogue for choice of the model will also explore the possibilities of relocating slum households from high density/untenable slums to low-density tenable slums within the same zone with incentives provided for relocation. While undertaking dialogue and deciding the slum redevelopment model due consideration must be given to exploring PPP and Viability Gap Funding options. Slums that can be developed on PPP model will be given preference.

- (b) Once slum communities decide the option best suited to them, the reconfiguration of slums and marking of internal plot boundaries will be done based on land pooling/amalgamation mechanism, taking into account the plan for internal infrastructure: water supply; sewerage; storm drainage; solid waste management; roads; power transmission lines and substations; parks and playgrounds; education and health infrastructure; livelihoods centres/workplaces; informal sector markets etc. External infrastructure connectivities should also be planned simultaneously with internal infrastructure.
- (c) Each slum redevelopment/relocation plan will make arrangements for transit /temporary shelter as a part of the redevelopment/relocation exercise with definite timelines before the redevelopment/relocation process is initiated.

Step 5: Formulating Slum-free City Plan & Review/Modification of Master/Development Plan

5.1 Formulation of Slum-free City Plan

- (a) Slum-free City Plan (including the phasing of the Plan) would emerge after amalgamating all the different slum redevelopment plans and mechanisms proposed for redevelopment/ rehabilitation of various categories of slums in the city.
- (b) The Slum-free City Plan is a short-term development plan for a period of 5 years and shall indicate the manner in which the city shall be made slum-free by carrying out redevelopment/ rehabilitation of slums and undertaking preventive measures. The Plan shall include the existing status and proposals for Land Use and Infrastructure (external and internal). It will also include the Redevelopment/Rehabilitation models proposed for adoption.
- (c) The contents of Slum-free City Plan may cover the following aspects:
 - i. Delineation of areas under slums and proposed relocation areas including vacant lands identified and their suitability for housing the slum-dwellers;
 - ii. Spatial, demographic and socio-economic profiles of slums;
 - iii. Land ownership (existing and post-redevelopment) of the slum areas and the proposed relocation areas/vacant lands;
 - iv. Land values of slum area (based on land values in the vicinity obtained from Registration/ Revenue Department) and proposed relocation areas;
 - v. Land use, FSI and other details of the slum areas and the proposed relocation areas (including any changes proposed in development control regulations to facilitate slum redevelopment or relocation);

- vi. Physical infrastructure within and in the vicinity of slums and proposed relocation areas including connectivity infrastructure: road network (within and in the vicinity of slums), other transport network (in the vicinity of existing slum pockets and proposed relocation pockets), water supply, sewerage, drainage, electricity and communication networks, and other physical infrastructure facilities;
- vii. Social infrastructure facilities (education, health, banking, community hall, livelihoods centre, informal sector market etc.) in or near the slum pockets and proposed relocation sites;
- viii. Shelter – existing status with respect to age, condition and height of structure and proposed changes including redefined plot boundaries;
- ix. Tenurial Status - analysis of the existing tenurial arrangements between the owners and occupiers or any other parties involved; proposed tenurial arrangements, including assignment of property rights etc.;
- x. Choice of development model for housing and/or infrastructure – PPP, Beneficiary built, Community-based, Public agency-led, etc.;
- xi. Resource mobilization strategy;
- xii. Implementation strategy, including phasing and monitoring and community mobilisation;
- xiii. Measures for preventing future growth of slums – reservation of land for EWS/LIG in all future housing colonies, undertaking affordable housing in partnership, adopting slum-free city policy, addressing regional and urban planning issues to make the same inclusive, etc.
- xiv. Public participation and stakeholders consultation undertaken and mechanisms put in place for resolving conflicts; and
- xv. Institutional framework for the implementation of Slum-free City Plans – development of key institutions and building essential capacity.

5.2 Review/Modification to Master Plan/CDP

Based on the slum-free plan of action the development plan/master plan/CDP of the city will be reviewed /modified wherever necessary to accommodate the slum redevelopment/ rehabilitation plans.

5.3 Capacity Building Plan

Capacity building and training will be critical for the preparation and implementation of slum-free city action plan. This will need to cover both institutional and HR capacity needs. The Slum-free City Plan will specifically include the Plan for Capacity Building which will be supported by the Centre under the scheme following the guidelines and scales approved under the Toolkit for Financial Support for Comprehensive Capacity Building for Improved Urban Governance and Poverty Alleviation.

CHAPTER 4: ANALYSIS & PROPOSALS

4.1. POLICY AND REGULATION

4.1.1 DEVELOPMENT APPROVAL PROCESSING

4.1.1.1 Introduction

The multiplicity of local regulations that govern the development and/or rehabilitation of individual homes and entire neighborhoods is usually administered by a host of government agencies and departments, each of which operates on its own timetable and brings its own particular perspective, statutory responsibilities, and concerns to the residential development process. With today's expanding array and reach of development regulations, the development approval process now plays a significant role in the timely and efficient delivery of affordable housing.

It is obvious that rational and efficient administration of development regulations is an essential complement to any affordable housing effort. The development approval process must be "systematized" so that it operates predictably, reasonably, efficiently, and rapidly while still protecting the health, welfare, and safety of users. An important step that development authorities can take to promote affordable housing is to review the entire regulatory process from zoning through permitting as it is experienced by developers and thereby identify procedures that can be simplified, easy to understand.

4.1.1.2 Evaluation of the Current System

The system as it now exists can offer insights into the effectiveness of its operations. It is recommended that the following kinds of factors should be evaluated:

- Length of the process from application submission to approval or issuance of permit
- Number of separate permits, approvals, hearings, and administrative reviews necessary for construction and occupancy of a dwelling.
- Number of separate agencies, departments, boards, and other groups reviewing the application.
- Types and detail of information, including special plans and designs required for various approvals.

In addition, a couple of inquiries into the operation of the system can yield information on backlogs, snags, and time elapsed for typical project approval. For example, it might be useful to undertake a comparison of time required for processing today versus five or 10 years ago. The length of the process can be determined by documenting dates of application submission and the dates of development approval. A more detailed look into the process would involve an investigation into the time consumed by individual

agencies, departments, boards, etc., in making their respective determination on a proposed project. Patterns of time delays might signal snags that can be untangled through redesign of the process [HUDCO, 2006- 2007].

4.1.1.3 Revamping the Current System

Any attempt at revamping the current system should reflect the following guidelines:

- Provide plain and concise information about requirements and procedures.
- Allow ready access to key personnel who will make initial findings and decisions.
- Establish a cooperative and coordinated review process that is geared to solving problems and issues, not to creating them.
- Make rapid reviews and prompt decisions provide a well-defined appeals process.

The success of redesigning the system is dependent not only on the above considerations but on the process by which change is achieved. The reform effort can be carried out by government staff, consultants, a specially convened task force or commission, or some combination of these actors who have credibility with the overall community. For the following reasons, a working group of public officials, builders and developers, representatives of community groups, and consultants is especially appropriate to review and make recommendations on the development approval process:

- It gives the task the status of a communitywide effort in which diverse interests and views are presented
- It helps consolidate community support for the recommendations and the actions needed to implement them.
- It helps broaden awareness and understanding of affordable housing and of the municipality's support of it

In any event, it is important to recognize that any reform effort must balance the sometimes conflicting goals and needs of elected officials, regulators, developers and builders, residents' interest groups, NGOs, and others. A reworked development approval system must allow for both, predictability and flexibility, all the while ensuring efficiency, fairness, and effectiveness. Further, a redesigned system must lend itself to easy implementation, politically, legally, and practically speaking [J. Semple, 2007].

4.1.1.4 Creating a Reasonable Development Approval Process

The following discussion breaks down the approval process into its component stages:

- Pre application,
- Application,
- Review,
- Final decision.

It looks at how local bodies/ Authorities can expedite and improve each of the basic stages by streamlining procedures. [S. Wilcox, February 2007.]

Pre application:

- a) Lists of permits required for every type of regulation, with summaries of information needed for each
- b) Explanations of procedures, along with official time periods or deadlines and estimates of processing time.
- c) Schedules of fees for all permits
- d) Complete copies of ordinances and regulations
- e) An explanation of appeal procedures
- f) Checklists of guidelines and criteria used by staff in the review process, which may be collected in a guidebook or manual
- g) General information on the local government, including its organization and key personnel, with names and telephone numbers.

Application Stage:

If developers do not secure the printed information made available at the pre-application stage, they should be able to obtain a full package of materials at the application stage. The package should include the following:

- a) An application form
- b) A directory or checklist of all required permits
- c) Permit fee schedules
- d) Information about departments and regulations
- e) Copies of ordinances
- f) Manuals, flow charts, or instruction sheets describing the steps necessary for approvals and their time frames.

Review Stage:

- a) A combined or joint review committee can coordinate reviews by several agencies or departments through regular meetings of department/agency representatives. The committee should be composed of department heads or individuals authorized to make decisions so that the group itself can decide on applications. The effectiveness of a combined or joint review committee depends on earlier analysis completed by individual departments. The committee on its own, however, can reduce total processing time by setting realistic deadlines and, when one individual delays the entire process, by exerting peer pressure. Joint review committees can resolve disagreements more immediately than can departments/ agencies acting individually and can evaluate a project in its entirety rather than in separate pieces.

- b) With a system of concurrent reviews, the department responsible for granting development approvals receives a copy of the application at the same time that all other departments with a role in the approval process receive their copy of the application. Concurrent reviews tend to minimize delay, particularly if a single staff member or department is appointed to coordinate the entire operation.
- c) Establishing realistic review deadlines can provide the staff with guidelines for performance and stimulate productivity, although such deadlines can rarely be enforced.

*In Phoenix, Arizona, the city's chief planner, working with other department heads, developed a stream lined process that cut processing time dramatically without jeopardizing the health, safety, or general welfare of the local citizens. Features of Phoenix's modernized regulatory approach follow:

- **Assistance to developers before application.** A Predevelopment Advisory Team, made up of members of the Planning, Streets and Traffic, and Engineering Departments, provides information and assistance to developers before the submission of formal applications.
- **Expedited reviews and approvals through the Development Coordination Office.** The Development Coordination Office, a division of the Planning Department, is staffed by senior personnel from three city departments and assists developers with zoning matters and site plan reviews.
- **Use of administrative hearings in lieu of city council hearings.** Many matters relating to development now come before a hearing officer, leaving the city council free to deal with issues that involve policy. Administrative hearings are used for site plans, subdivision plats, lot divisions, zoning adjustments, fee waivers, grading and drainage, floodplain problems, fire code variances, off-site improvements, and building code variances.
- **Policy manuals.** Several city departments have published policy manuals that are made available to builders and developers as unified sources of information.
- **"Over-the-counter" processing.** Virtually all small projects can be processed during a single visit by the developer or builder to the Building Safety, Planning, Streets and Traffic, Water and Wastewater, and Engineering Departments. Some more substantial types of approvals such as model home permits and minor site variations can also be processed in this fashion.
- **Private sector consultants for plan review.** The Engineering Department permits developers to contract with private sector consulting engineers for review of development plans. Reviews by such consultants can typically be completed more rapidly than reviews carried out by the Engineering Department. The developer contracts for the consultant's services, paying the consultant's fee in exchange for the time gained.

- **Inter-departmental coordination for complex projects.** A development services administrator in the city manager's office can assist in expediting the approval process through interdepartmental coordination. Among other things, this official can request the release of building permits if time is critical and review processes appear to be, lagging [NAHB National Research Center, 1987].

4.1.2 LAND USE

4.1.2.1 Introduction

Urban sprawl, high land prices, traffic congestion, and growing concerns for environmental protection issues—often the result of low-density zoning—are forcing communities to reevaluate established patterns of residential development. The model of residential development traditionally preferred by society has been the detached single family home, sited near the city-center, facing parks or similar type homes on a wide street. In fact, single-family detached or semi detached units are the predominant type of home in existence today. The growing need for affordable housing has, however, demanded a closer look at what types of homes and communities we provide and at what cost to homebuyers. In this analysis, one key element stands out: the rising cost associated with the purchase and development of land for building sites is the single greatest reason for the increasing prices and reduced affordability of new homes.

If affordable housing is to become a reality, communities, developers and builders, and buyers may have no choice but to accept higher densities.

In many ways, local government policies influence the supply and, therefore, cost of land. Local zoning requirements, land development standards, environmental policies, and infrastructure capacity and standards--most of which are under local control--directly affect the cost of housing. Because land in its natural state is in fixed supply, it is impossible for municipalities to increase the quantity of raw land. But it is possible for most local governments to increase the supply of build ableland through policies.

Many options can provide less expensive and more efficient use of diminishing land resources. These techniques apply equally well to detached and attached units and to single family as well as multifamily dwellings. Reducing land costs is accomplished through higher densities, by allowing either smaller minimum plot sizes or smaller front and side setbacks. In turn, smaller plots and alternative site planning techniques can dramatically influence the costs associated with site improvements [N.T. Dave,2007].

4.1.2.2 Increasing Buildable Land Supply

In *Land for Housing: How Local Governments Can Help Increase Supply*, the following five categories of local government actions that can help increase land supply:

- a) **Increasing allowable densities**, which permit more units on available land and thus an increase in the land supply
- b) Overcoming infrastructure funding problems by emphasizing alternative revenue sources.
- c) Overcoming environmental and topographic constraints, with emphasis on combining residential development with agricultural and wetlands protection.
- d) Developing tax-delinquent and surplus public land.
- e) Using tax and eminent domain powers to influence landowners.

4.1.2.3 Zoning, Density, and Plot Size

In general, zoning ordinances create categories of land use and thereby restrict the use of land and decrease the amount of land available for housing. Once zoning ordinances are enacted, exceptions to the ordinances usually require highly prescribed, formal procedures, including public hearings that are time-consuming and invariably costly for the developer and the homebuyer.

The relationship of zoning to land cost is direct. The Urban Land Institute (USA) found that the average plot prices in the 10 cities rated most restrictive in their zoning requirements were almost twice the average in the 10 cities rated least restrictive.

In addition to the increases in land costs, carpeting the landscape with low-density housing has been a recipe for disaster. The cost of sprawl in terms of traffic congestion, overextended municipal services, pollution, and lost farmland is enormous. Further, growing citizen dissatisfaction with a perceived reduction in quality of life has spawned civic organizations dedicated to slowing or halting growth. As a result, affordable housing issues are often exacerbated.

Pioneering new patterns of development involves a certain amount of risk, especially as building downsized homes on smaller plots appears to be the logical way to meet the demand for affordable single-family homes. But today's public officials and developers and builders often find themselves catching up with earlier trends that are now part of the way of life. For example, sating higher-density development nearer employment centers makes life much easier for working class by reducing commuting time and providing the "critical mass" needed for services. Generally, though, the standards governing such development aspects as density, house and plot sizes, frontages, setback, and other building bye-laws frequently limit the housing industry's ability to deliver affordable housing.

An approach to flexible land use should be included in subdivision ordinances that allow smaller plots for affordable housing without compromising the livability of the community as a whole [K. B. Vaghani, et. al., 2010]

Residential development design:

- d) In conventional developments, the Authorities may vary plot areas and dimensions, and setbacks for the purpose of encouraging and promoting of flexibility, economy and environmental soundness in layout and design, provided that the average plots' area and dimensions, setbacks within the sub division conform to the minimum requirements of the municipal development regulations, and provided that such standards shall be appropriate to the type of development permitted.
- e) Residential plots shall front on residential access, or secondary roads, not on main roads.
- f) Every plot shall have sufficient access to it for emergency vehicles as well as for those needing access to the property in its intended use.
- g) The placement of units in residential developments shall take into consideration topography, privacy, building height, orientation, drainage and aesthetics. Buildings shall be placed so that adequate privacy is provided for units.

4.1.2.4 Small-Plot Sectors

As rising land prices in many markets force both finished plot costs and resulting home prices ever skyward, the most significant savings in development costs can be achieved by reducing the size of the plot. Most zoning ordinances reflect traditional biases against smaller plots by allowing only large minimum plot sizes in most residential areas. However, communities that have attempted to meet the need for more affordable housing by implementing small-plot sectors have found that, as land costs rise and more small-lot units are built, consumer and community acceptance of small-plot units' increases. In fact, a recent study revealed that homebuyers are more willing to sacrifice land than space or quality within the house. In Greater Noida & Noida small plot sectors are developed.

Design considerations for small-unit developments are important to the overall success of any high density project. Developers and their project team need to devise creative design schemes that relieve any sense of overcrowding and ensure privacy. Unit design must be in proportion to the size of the plot with small plots requiring the emphasis on maximizing open spaces and increasing privacy and usable open areas [P.S. Patel]

4.1.2.5 Setback Requirements

Zoning requirements generally include minimum front- side-and rear-setbacks. Reductions in these often arbitrary limits can achieve considerable land savings and reduce associated utility and infrastructure costs. The traditional practice of using large setbacks from all four boundaries of the plot reduces the usability of land on both sides of the house, particularly on smaller plots. Residential units typically are sited in the middle of a plot, with the main building structure oriented parallel to the street. By sitting the building perpendicular or at an angle to the street, developers can reduce plot widths and side-setbacks and achieve a corresponding reduction in plot size and

the amount or "run" of utilities needed to serve the plot. Front and rear setbacks are another area of potential cost savings.

Units can be set back at varying depths from the street and can feature alternating designs and design details that break up the monotonous repetition of gates, ramps & parking. Furthermore, placement of units in clusters can create a sense of community and provide opportunities for consolidated open space.

4.1.2.6 Environmental and Topographic Constraints

According to the earlier mentioned Urban Land Institute report, environmental and topographic constraints often reduce the supply of land available for affordable housing.

Accordingly, answers to the following questions should help determine if these constraints can be modified to help reduce land shortages:

- Is the land to be protected important to the ecological balance or agricultural productivity of the community and region, or is its primary benefit simply the preservation of open space?
- What will be the probable cumulative effect of environmental constraints and related regulatory actions on developable land and housing costs?
- Are there reasonable alternatives to the proposed actions that could allow residential development on part of the site without serious damage to ecological or agricultural functions?
- If the proposed actions will constrain the supply of developable land, what countermeasures can be taken to increase the land supply or facilitate development in other locations?

4.1.2.7 Land/Price Ratio

In addition to higher density, another way to reduce housing costs is to revise some of the traditional land/sales price ratios, even though the land/sales relationship is beyond the direct control of local government and is based on customary business practices. The land/price ratio has gradually moved upward but varies considerably from market to market. In particularly affluent areas, land prices may reach as much as 75-80 percent of the sales price. However, what works with a Rs 80,00,000 structure on a Rs 10 million plot does not work with a Rs 400,000 structure on a Rs 500,000 plot.

To encourage the production of affordable housing, local government can make expensive land more affordable by permitting development at higher densities. A Rs 600,000 dwelling unit on a Rs 600,000 plot would not be easy to finance, but, by dividing a piece of land into four Rs150,000 plots, a Rs 600,000 home would be much more easier to buy. Removing local density restrictions and providing adequate infrastructure is the best solution to affordable housing for most communities [NAHB., 1986].

4.1.2.8 Site Planning

Site planning and land development represent major areas of potential cost reduction for most developers and builders. These costs often increase in direct proportion to the complexity of zoning requirements, subdivision regulations and levels of required standards.

In fact, most of the development cost savings resulting from changes in development standards can be attributed to increased density. In most of Affordable Housing projects, reducing land costs per housing unit was the single biggest factor in achieving affordability. Higher density allows land and improvement costs to be spread over a larger number of units. Reduced frontage and front setbacks allow for less pavement and sidewalk per unit, shorter utility runs and reduced material costs. By contrast, Wide streets and rights-of-way, although sometimes functionally justifiable, add to land development and, ultimately, housing costs.

Site planning for higher density development poses challenges in the design and aesthetics of housing and land use. To maintain and even improve livability in the context of increased density, developers and communities must devote special attention to the following guidelines for site planning:

- Encourage site plans that increase density and maintain open space, preserve natural features, and provide for adequate parking and privacy landscaping.
- Avoid development plans with wide streets in grid patterns, large plots, deep setbacks, and low density.
- Reduce or eliminate setbacks from all four plot boundaries.
- Support "row house" and "Zero plot line" configurations [NAHB., 1986].

4.2 COMMUNITY AND HOUSING DESIGN:

4.2.1 STREETS

4.2.1.1 Introduction

Everyone benefits from street improvements that are functionally adequate, durable, and cost-effective. Builders know that inadequate or deteriorating streets can be a major cause of buyer dissatisfaction. Homebuyers want streets that are safe and functional yet provide an attractive residential environment. The cost of maintaining streets is an important concern to public officials and the community as a whole. But excessively wide streets that are designed to highway standards do not contribute to any of the above and, in fact, compromise housing affordability.

Although extensive studies of higher-order streets and highways have been conducted by universities, highway departments, and the government, little statistical information or research has focused on the refinement of residential street standards. Yet residential streets carry the vast proportion of any community's traffic. Over the years,

rigid zoning ordinances and subdivision regulations have produced repetitious street patterns and monotonous streetscapes and have often contributed to housing affordability problems. Overly stringent residential street standards do not necessarily ensure the best long-term value for either the community or the homebuyer.

In the absence of appropriate research-based guidelines for the design of residential streets, Authorities, designers often have either adopted modified highway design standards, developed standards intuitively without benefit of thorough analysis, or "borrowed" standards from other communities. For example, emergency vehicle access often provides for emergency possibilities that are highly improbable. Because excessive traffic speed causes far more injuries and deaths than residential fires, residential streets designed solely for high speed emergency vehicle access actually decrease the overall safety of the neighborhood.

Too often local decision makers forget that residential streets are part of the neighborhood and, as such, are used for a variety of purposes for which they were not designed. Residential streets not only provide direct automobile access to occupants' homes, they also provide a visual setting, a pedestrian circulation system, a meeting place for residents, and, like it or not, a play area for children. Streets designed and engineered solely for the convenience of easy automobile movement overlook their many overlapping uses. In other words, streets should be designed to serve the neighborhood; the neighborhood should not be designed to serve the streets.

Major street design problems fall into the following three categories:

- a) **Over design:** Wasteful over design serves no useful purpose and adds unnecessarily to environmental damage by frequently requiring more cut and fill and more paving. Over design also causes greater impact on groundwater supply, higher erosion potential, and increased heat build-up in the summer. Unnecessarily wide streets built to highway standards are costly to install and to maintain. Additional first costs are borne by the homeowner and contribute to escalating housing prices while excessive maintenance costs are passed on to the community in the form of taxes.
- b) **Lack of order:** When the needs of the neighborhood are not considered, streets often lack an appropriate sense of order. Without order, there are streets and houses but no neighborhood. The sense of Community is lost.
- c) **Residential character:** When streets are designed to move rather than control traffic, vital neighborhood concerns are ignored. Wide, straight streets encourage speeding, and traffic with no particular need to be in the neighborhood is channeled through the community. Safety, peace, and quiet are sacrificed.

4.2.1.2 Principles of Residential Street Layout

The design of a residential street should be appropriate to its functions, which include not only providing circulation but also enhancing a residential community's living environment. According to the Institute of Transportation Engineers, the design of local streets must recognize the following factors:

- safety for both vehicular and pedestrian traffic
- efficiency of service for all users
- livability of the residential environment
- economy of land use, construction, and maintenance

The Institute of Transportation Engineers developed the following residential street design criteria:

- paved access should be provided to all developed parcels
- street design should discourage through traffic
- layout should not create excessive travel lengths
- street system should be logical, understandable, and easily read by the user
- local systems should not detract from the efficiency of adjacent major streets
- local systems should not rely on extensive traffic regulations or controls
- traffic generators such as schools, mandirs, or neighborhood shops within residential areas should be considered in the circulation pattern
- residential streets should clearly communicate their function and place in the street hierarchy
- local systems should be designed for relatively low volume traffic; collectors, however, should be planned to accommodate peak demands
- to discourage excessive speeds, streets should be designed with curves, changes in alignment, and short lengths and should not be wider than necessary
- conflict points between pedestrians and vehicles should be minimized
- minimum area should be devoted to streets, consistent with safety and livability
- the number of intersections should be minimized
- street layout should allow economic development of land
- streets should be responsive to topography and other natural features
- residential areas should provide for public transit service as appropriate
- streets should be designed for local emergency services
- pedestrians, non-motorized vehicles, and truck deliveries should be accommodated
- streets should enhance the community's visual image

4.2.1.3 Street Hierarchy Classification System

The four-category hierarchy of streets, in descending order, includes arterial, collector, sub-collector, and access streets.

An arterial is a high-volume street with the function of conducting traffic between communities and major activity centers. Residential streets may fit into any category except arterial and are defined below.

- **Collector street:** A street which carries residential neighborhood traffic, but which provides no or limited residential frontage.
- **Sub-collector street:** A street which provides access to abutting properties and which may also conduct traffic from residential access streets that intersect it.
- **Access street:** A street which provides access to abutting properties; it shall be designed to carry no more traffic than that which is generated on the street itself.
- **Special purpose streets:**
 - Alley/ Service: A special type of street which provides a secondary means of access to residential plots, normally located at the rear of the plots.
 - Marginal access street: A street parallel and adjacent to a collector or higher level street which provides access to abutting properties and separation from through traffic. Such streets shall be designed at the level of either residential access streets or subcollector streets as anticipated traffic volumes dictate.

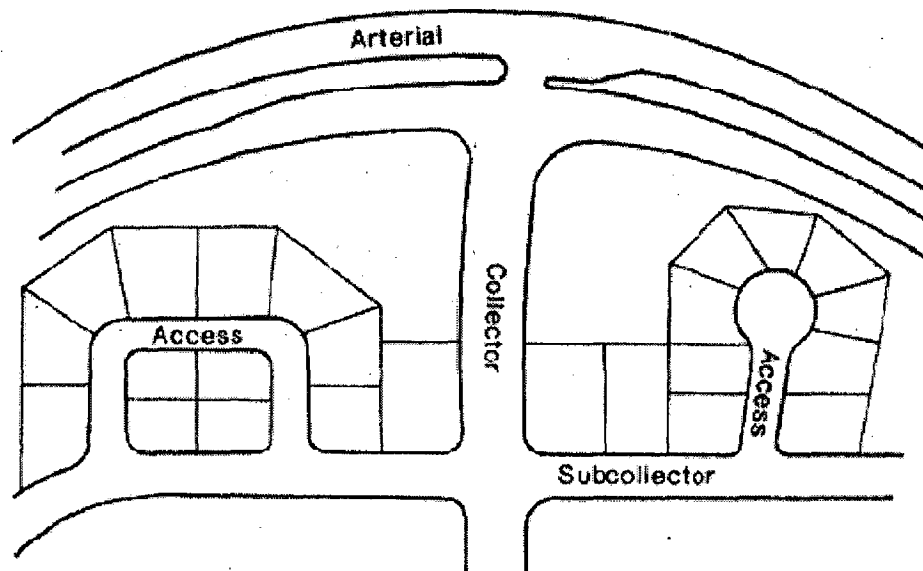


Fig 4.2.1.3a : Street Hierarchy

Factors other than Average Daily Traffic that should be considered in making decisions about street design include the following:

- availability of off-street parking
- lot widths and residential density
- vehicle ownership and use characteristics of present or projected neighborhood residents

- family size and age characteristics expected within the neighborhood as reflected in location, kind, size, and price or rent of dwellings
- proximity to shopping and other support or service facilities
- consideration of the community's public services such as trash collection, snow removal, and public safety
- proximity to public transportation

4.2.1.4 Access and Street Alignment

Collector streets should connect with streets of equal or higher class at two or more intersections. Neighborhood access through subcollector streets can be provided by either single or multiple connections with collector or arterial streets. Advantages of a single neighborhood entrance include elimination of through traffic and short-cutters, increased security, and a greater sense of community. Advantages of multiple accesses include reduced internal congestion and diffusion of traffic impacts on the external road system.

Street alignment should be the result of an evaluation of several factors, including topography, soil and geologic conditions, drainage patterns and runoff quantities, length and type of streets, purpose of individual streets, and desired design character. Alignments should avoid both endless vistas of traffic ways and labyrinths that are irrational and confusing.

An accurate topographic map is necessary for optimum residential neighbourhood planning. The land planner should be aware of development, construction, operation, and maintenance efficiencies that accrue from properly interrelating street layout with natural topography.

In the past, new subdivision streets tended to follow a linear grid pattern with straight streets, especially when the land was relatively flat or could be so graded. More recently, curvilinear street patterns have become predominant in new residential development. In addition to creating a more attractive neighborhood, streets that follow natural contours can achieve substantial economies. Further, storm water management usually becomes less complex when planners use as many natural drainage paths as possible. Whatever their relative advantages, both linear and curvilinear layouts should respect the street hierarchy.

4.2.1.5 Number of Lanes and Pavement Widths

Where the primary functions are to provide access to single family units and to foster a safe and pleasant environment, streets should be designed to ensure at least one unobstructed moving lane if parking is available on both sides. User inconvenience occasioned by the lack of two moving lanes is remarkably low in most single-family subdivisions where the distance between point of trip origin and Collector Street is one-half mile or less. Opposing traffic yields in the parking lanes until there is sufficient width to pass. In high-density multifamily neighborhoods, two travel lanes may be required.

Pavement widths have a significant effect on vehicular speed, visual scale, and cost of construction and maintenance. Widths have evolved largely from considerations of the largest vehicle that might use the street and from the concept that traffic, once in motion, must remain in motion. Such approaches may be appropriate for arterial streets but are difficult to justify for residential streets. Designers should select the minimum width that satisfies realistic, reasonable needs. The tendency to equate wider streets with better streets and to design traffic and parking lanes as though the street were a "micro freeway" is highly questionable, unsafe, unattractive, and expensive.

For cul-de-sacs, pavement widths of between 6.7m and 7.2m are adequate for one moving lane and two parking lanes.

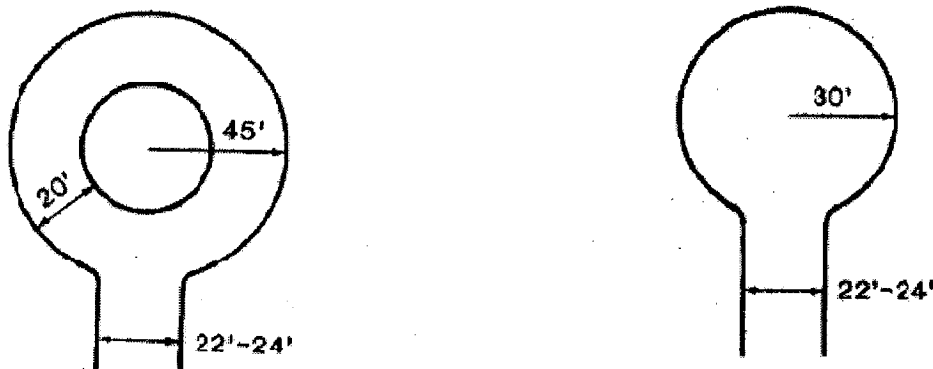


Fig 4.2.1.5a: cul-de-sacs

Widening the street does nothing to increase capacity but does tend to encourage higher-speed driving. On subcollectors, 7.8m -wide pavement provides either two parking lanes and one moving lane or one parking lane and two moving lanes. If no off-street parking is provided on subcollectors, a 8.4m-wide pavement may be preferable when continuous parking is expected along both sides of the street. On collector streets designed for higher speeds, a 10.8m -wide pavement provides two 3.0m-wide moving lanes and two 2.4m-wide parking lanes. However, if no residences front on the collector, a 7.2m- to 7.8m-wide pavement with graded shoulders for emergency parking is sufficient. Pavement widths can be narrowed further by eliminating one or both parking lanes. Rural streets and collector streets that do not provide direct access to homes are not used for parking and do not require a pavement width greater than that which will allow two cars to pass. Pavement widths of 5.4m to 6.0m are adequate for such roads.

Speed

- Traffic speeds on residential streets are affected by the following:
- open width or clearance of the street

- horizontal and vertical street alignment
- number of access points to the street number of parked cars or other obstructions on the street
- signs and signals at controlled intersections

4.2.1.6 Street Construction

Construction of a safe, durable roadway is a function of traffic volume, the weight of vehicles expected to use the roadway, and underlying soil conditions. National/State highway departments generally prescribe minimum standards for pavement thicknesses and for construction materials and methods for roads that ordinarily carry heavier vehicles and more traffic than expected on subdivision streets. However, many municipalities and local governments adopt standards for subdivision streets that reflect those for state roads.

Significant cost savings can be realized by analyzing the functional requirements of subdivision streets and constructing them accordingly [Pak-Poy and Kneebone Pty Ltd, 1989].

4.2.1.7 Parking

Automobile parking poses a significant land use problem in subdivision planning. In the recent past, common practice provided for wide local streets, often capable of accommodating a row of parked cars on each side of the street in addition to one or two lanes of moving traffic. Such parking space has often been provided even though private driveways and other off-street parking can accommodate several cars.

Good planning can reduce the heavy commitment of land to parking without sacrificing adequate accommodation of vehicles. Following are guidelines for parking:

- use common driveways
- provide off-street parking areas whenever possible
- design pavement thickness to meet actual parking load requirements rather than to satisfy general standards
- eliminate curbs and gutters in parking areas
- if curbs must be built, use roll curbs or other alternatives to standard requirements
- if street parking must be used, limit such parking to one side of the street
- use unpaved shoulders for parking to reduce road pavement width

There are only two alternatives for parking: on street and off street.

- *On-Street Parking*

Options for providing on-street parking include parking on both sides of the street, parking on one side only, and parking bays with no parking on the street. Parking lanes require either 2.4m paved width or an equally wide retained gravel shoulder. The latter option may have the advantage of reducing the rate of

stormwater runoff. Gravel shoulders help create a natural or rural appearance but are dependent on sensitive landscaping to fulfill functional and aesthetic objectives. They also require careful design and construction to prevent excessive maintenance. Angle parking requires more moving lane space than does parallel parking and is generally considered more hazardous than parallel parking.

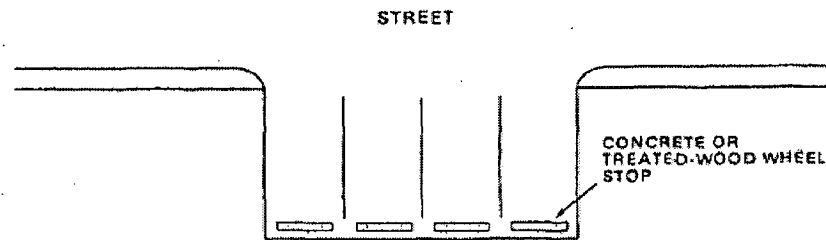


Fig 4.2.1.7a : On street Parking

- **Off-street Parking**

Adequate off-street parking eliminates the need for parking lanes on the street. Off-street parking reduces accidents and keeps the street clear for smooth movement, if necessary. For these reasons, community planners should consider off-street parking that is accommodated by driveways, carports, garages, or, in high-density developments, parking lots. If off-street parking is planned, driveways should be long enough and wide enough to provide adequate space without impeding pedestrian use of sidewalks or streets. Narrower street widths reduce both the direct costs of street construction and maintenance and the indirect costs of unnecessary land use. Elimination of one or both parking lanes along as many streets as possible through the provision of off-street parking makes a major contribution to achieving these savings and keeping housing within the affordable range.

4.2.1.8 Rights-of-Way

Rights-of-way are publicly owned land on which street, sidewalks, curbs, and gutters are built. They often accommodate utilities such as water, sewer, and electrical service. The government body that owns the right-of-way grants a conditional right of use and passage to the public or such designated parties as utilities. Traditional designs often resulted in streets much wider than were necessary. This was done for the following reasons:

- detailed planning to relate road width to reasonable anticipated usage was usually not carried out
- substantial road capacity was routinely built to allow for unevaluated possibilities of "future growth"[NAHB., 1990]

Benefits of justifiable right of way:

- The municipality gains
 - additional land on the tax rolls
 - reduction in land for which it has maintenance responsibility
- The builder gains
 - more land to sell
 - increased design flexibility
- The homeowner gains
 - more usable land
 - lower home costs

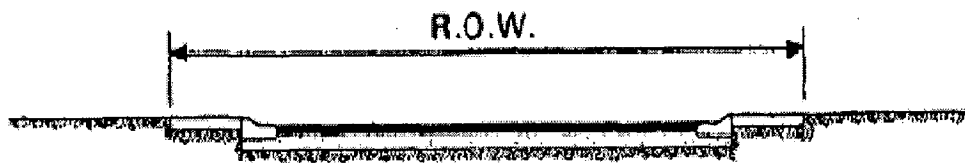


Fig 4.2.1.8a : Right of way

4.3 STORM WATER DRAINAGE SYSTEMS

4.3.1 INTRODUCTION

The storm water drainage system is a single system with two purposes: the control of storm water runoff to prevent or minimize damage to property and physical injury or loss of life that may occur during a major, infrequent storm; and the control of storm water to eliminate or minimize inconvenience or disruption of activity as a result of runoff from frequently occurring rainfall or less significant storms." Gutters, are just one component of the complete storm drainage system.

However, important economies can be achieved in the construction of entire storm drainage systems. Following are guidelines for storm drainage systems:

- use performance requirements in place of prescriptive standards in all components of storm drainage design
- consider detention/retention basins, especially when regional management is preferred
- consider precast structures if available from local suppliers

- reduce the use of manholes and inlets by increasing spacing between structures or by replacing them with curved pipe sections, "tees," and "wyes" where appropriate

Traditional storm water systems were usually "closed"--that is, once water entered the system, it passed through nonporous pipes and channels, sometimes for substantial distances, until it was finally discharged into a moving stream or river. More recently, the advisability of removing a significant portion of runoff from local areas that experience precipitation has increasingly come into question. Consequences can include inadequate recharge of groundwater supplies; increased potential for contamination of groundwater; soil subsidence such as the formation of sinkholes; and downstream flooding.

Modern systems increasingly emphasize retention of rainfall in the local area where it falls. Parts of the conveyance system can be left "open," substituting grassy swales and natural drainage for closed piping. Detention and/or retention basins can also accommodate excess storm water, enabling the gradual recharge of local groundwater supplies.

Open portions of drainage systems cost less than equivalent closed piping. Environmental considerations and cost savings therefore go hand in hand. Additional savings can be achieved through regional storm water management programs that serve the entire drainage basin or several specific sites within a basin. Regional control of storm water generally requires less construction by developers, while the local jurisdiction achieves savings in operation and management costs. Improved efficiency is another benefit over individual site controls as the need for "piecemeal" planning can be reduced.

4.3.2 DESIGN STORM REQUIREMENT

A 10-year design storm is the typical standard for the "minor" storm water system in a residential development. However, major channels or culverts with large contributing areas require special consideration. Design storm frequency is based on convenience and economics. A community decides how much to pay to ensure against the possibility of flooding.

The merits of each proposed site plan must be considered as each site adapts differently to various designs. Performance requirements, which generally encourage innovative and less costly alternatives, should be used over prescriptive standards

Detention/Retention

Two effective methods for carrying excessive storm water are detention/retention basins and "overland relief." Detention/retention facilities can take a variety of forms. Artificial lakes and subsurface absorption are two of the more popular systems. Although each has its own advantages and disadvantages, both achieve the intended

objective of effective storm water management. Lakes contribute to aesthetic value but require more land area. Soil absorption systems can be installed on "tighter" sites but are limited by the capacity of the soil to accept the storm water.

4.3.2.1 Overland Relief

The size of culverts and open concrete channels can be reduced by grading the surrounding land to direct storm water via an overland path to the downstream storm water system when runoff exceeds the design storm. Grassy swales provide overland relief in a residential neighbourhood. Larger "flood banks" are used in major drainage areas.

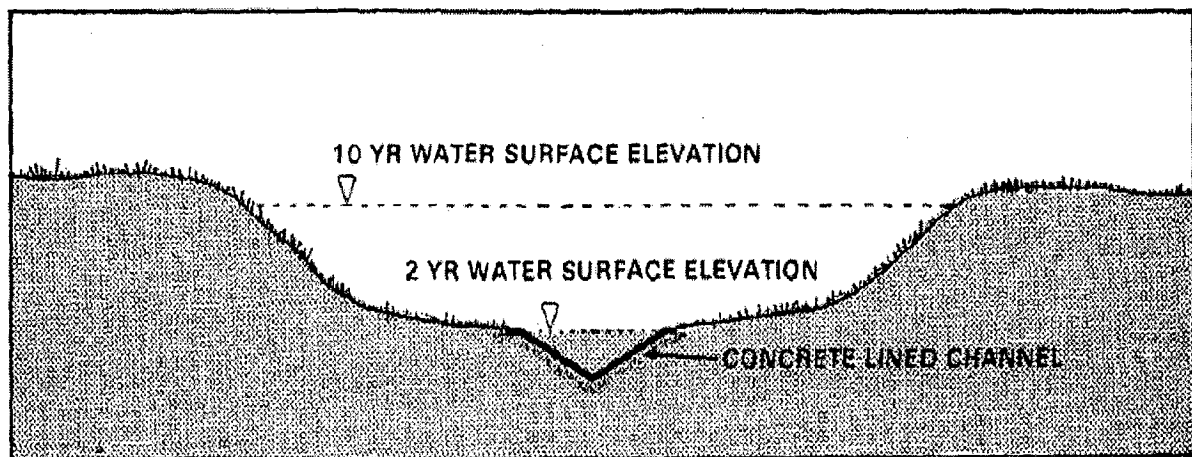


Fig 4.2.3.1a: Overland Relief

4.3.2.2 Materials

In recent years, plastic pipe has been introduced as an alternative to traditional corrugated metal pipe (CMP) and reinforced concrete pipe (RCP). Polyvinyl chloride (PVC) exhibit resistance to corrosion. PVC, a relatively inexpensive plastic, can be installed throughout most of the "minor" storm drainage system. Due to their relatively light weight, PVC pipes do not generally require special equipment for placement in the trench. Choice of materials should be made on the basis of first cost and long-term durability [Rehab Work Group, 1987].

4.4 SANITARY/ SEWER SYSTEM

4.4.1 INTRODUCTION

Various sanitary sewer system alternatives are available to communities. Following are guidelines for sanitary sewers:

- increase maximum manhole spacing
- use television inspection procedures
- use common laterals

- use curvilinear sewers where feasible
- use cleanouts as an alternative to manholes for maintenance
- use the least expensive, appropriate material
- when appropriate, use inside drop connections
- design sewer pipe size and slope to meet the need

4.4.2 MANHOLES, CURVILINEAR SEWERS, CLEANOUTS

Requiring fewer manholes, encouraging curvilinear sewer designs, and allowing use of cleanouts can save money for developers, local governments, and homebuyers. Curvilinear sewers reduce the total length of sewer pipe, but the greater savings accrue from a reduction of manholes. Hydraulic performance within a sewer is not adversely affected by the curved sections. Installation of large-diameter curvilinear sanitary sewers is recognized as an acceptable practice in many communities. Advantages include the following:

- elimination of manholes at each change in direction
- placement of sewers parallel to or on the centerline of curved streets
- easier avoidance of other utilities location of manholes away from street intersections
- conforming with topographic contours for desired sewer alignment

Rigid pipe can be curved by slight deflections of pipe joints from normal straight positions. The radius of curvature is a function of the allowable deflection angle per pipe joint and depends on the pipe material, jointing technique, and pipe size. An alternative to deflection of straight rigid pipe is radius sewer pipe-sometimes called mitred or bevelled pipe-which is manufactured with the proper deflection angle built into the joint. In either case, it is important to follow pipe manufacturers' specifications.

Flexible sewer pipe can be installed on a curve by controlled bending of the pipe and by slight deflection of the pipe joint. As with rigid pipe, pipe manufactures' specifications must be followed.

In addition to curving pipe horizontally, some sanitary sewer pipe can be curved vertically as long as proper bedding is maintained. This technique can result in elimination of drop manholes and/or less trenching.

Although many communities require manholes to be spaced at a maximum of 200 to 400 feet, many now permit spacing in excess of 600 feet due to improved methods of maintenance and construction and innovations in clean-out equipment. For example, flush trucks capable of cleaning sewer lines 600 to 800 feet in length.

4.4.2.1 Cleanouts:

Cleanouts can be provided in lieu of manholes along both curvilinear and straight runs. Cleanouts can also be installed at a much lower cost than a manhole at the terminal end of the sewer line. They offer a cost-effective alternative in flood-prone areas or in areas of high water tables owing to lower costs and better protection against infiltration.

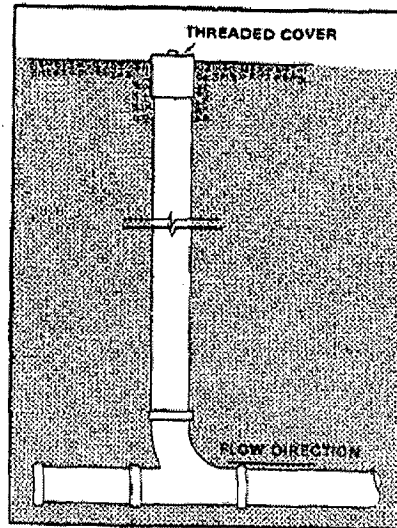


Fig 4.4.2.1a : Cleanouts

4.4.2.2 Drop Manholes:

Drop manholes are often installed at changes in vertical alignment of sewer lines. They can, however, be the source of maintenance and cleanout problems. The abrupt change in direction of flow creates an opportunity for solid material to lodge and cause stoppage. Therefore, drop manholes should be used only when it is not economically practical to steepen the incoming sewer. Some engineers design curved sewer pipe to make vertical alignment adjustments. When significant elevation differences between the influent and effluent pipes cannot be otherwise accommodated, drop manholes must be used.

Many localities require an outside drop connection to convey wastewater across an elevation drop, a costly solution requiring added piping and concrete blocking. An inside drop connection is less costly because it requires less material, is easier to install, reduces stress at the connection, and needs less excavation and backfill.

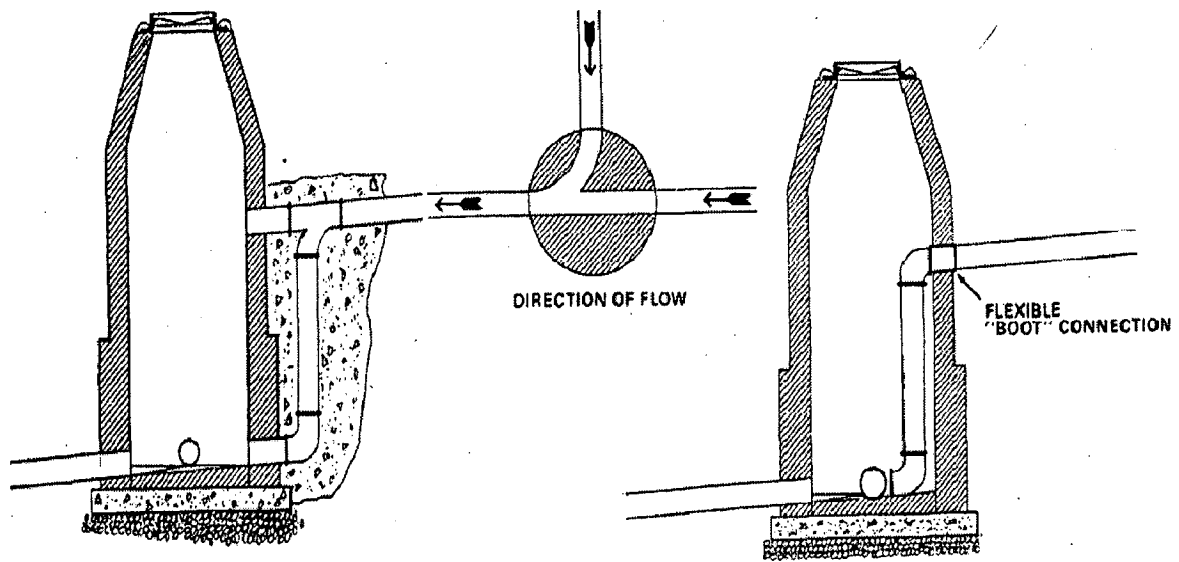


Fig 4.4.2.2a : External Drop Manhole

Internal Drop Manhole

4.4.3 PIPE MATERIALS

Sanitary sewer pipe materials can be roughly classified as rigid or flexible. For affordable housing, the least costly approach that will perform satisfactorily should be considered.

Restricted use of newer materials limits competition and invariably increases cost.

Each of the pipe materials has advantages and disadvantages. Plastic pipe is being used in an increasing number of communities, sometimes offering reductions in materials, installation, and replacement/maintenance costs. If the entire length of the pipe, including joints, is supported by the bedding materials, the pipe is secure. Clean, carefully placed backfill is also recommended.

4.4.4 DESIGN CRITERIA

Communities are encouraged to develop a master plan for sanitary sewer systems. Sewer extensions should be coordinated with that master plan to ensure efficient, integrated systems. Community standards often arbitrarily require a minimum eight-inch-diameter pipe. In many instances, especially on cul-de-sacs, dead-ends, and other areas where the sewer serves only a few houses, smaller pipes of four- or six-inch diameter provide better service because of faster flow. Larger pipe sizes may be detrimental since they could promote deposition of solids at low flows. A three-inch house lateral is generally sufficient for a single dwelling unit. Sizing criteria should be evaluated to reflect actual conditions.

In the past, 135 litres per capita per day was considered the standard design flow from a dwelling. However, researchers have shown that 75 to 85 litres per capita per day,

more accurately reflect typical average flows. An "across the board" minimum slope cannot be applied for all pipes. Sanitary sewers are designed on velocity considerations with a minimum velocity of 0.6m per second (mps) to eliminate deposition and a maximum of 3 mps to prevent scouring. The minimum slope sewer should not be an arbitrary standard but should be determined for a specific site and for particular pipe materials. Flatter sloped sewers reduce trenching depth, a critical factor where bedrock or other obstacles exist.

4.4.5 COMMON LATERALS

Common laterals can be used to connect the public sewer to more than one house, reducing total trench length, quantity of materials, and cost.

Two adjoining plots can be served by one lateral installed along the common property line with an easement dedicated to ensure access for maintenance and/or replacement. A standard "wye" fitting is installed at the junction of the individual building drains. Pipe length is decreased by almost 50 percent since every other lateral is eliminated.

Clusters and townhouses adapt well to common laterals when three or more units are connected to a single line. In any application of common sewer connections, benefits increase as the distance from buildings to public sewer increases.

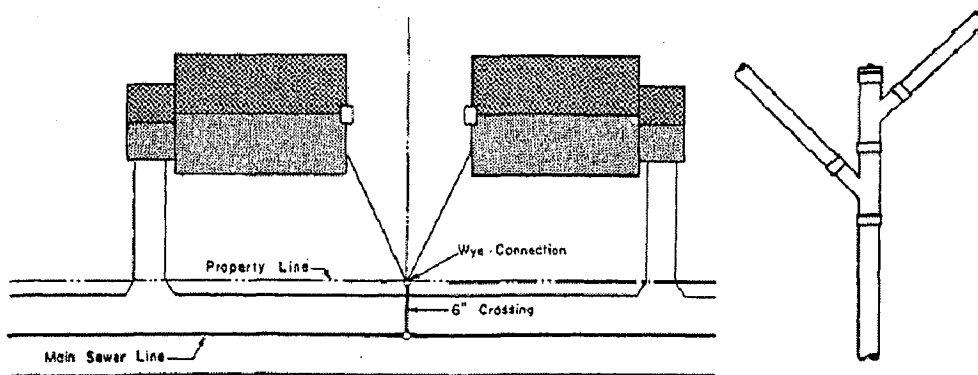


Fig 4.4.5a : 'Wye' connection detail

4.5 WATER SUPPLY

4.5.1 INTRODUCTION

Alternatives to traditional standards, materials, and procedures used in residential water supply systems are often more cost-effective. Following are guidelines for water supply systems:

- consider alternative meter arrangements

- consider alternative materials for water mains and service pipes
- use multiple connections to one common service where feasible
- size water distribution pipes to meet the projected need
- substitute blow-off mechanisms for some fire hydrants

4.5.2 WATER MAINS

For affordable housing, it is important to analyze installed costs and anticipated life cycle costs for maintenance and replacement of water mains. Traditionally, pressure water pipe has been constructed of concrete, vitrified clay, lead, ductile iron, cast iron, and asbestos-cement. The newest material is plastic, most often in the form of polyvinyl chloride (PVC). It has performed as well as many of the more traditional materials in many applications.

Plastic pipe is relatively light weight, easy to install, and resistant to corrosion. Most sizes of plastic pipe can be installed without using the expensive machinery normally required to lower the pipe into a trench. Plastic pipe's relatively long lengths are easily balanced against its lighter per unit weight. PVC does not require complicated mechanical or glued joints. The bell and O-ring joints of standard PVC water pipe are wedged into place, saving material and labor costs.

4.5.3 WATER SERVICE

An alternative to relatively expensive copper tubing for service lines is plastic tubing, usually manufactured from polyethylene (PE) or polybutylene (PB). Although local acceptance of plastic has been a slow process, the major model plumbing codes recognize both plastic materials. Available from most local suppliers, PB and PE have been rated at pressures well above those encountered in public water systems. Plastic tubing is flexible, lightweight, and easily joined with standard fittings. The relatively long lengths of flexible PB tubing ensure that the number of joints will generally be limited to those at the main and the meter [Urban Land Institute, 1985].

4.5.4 CONNECTIONS

4.5.4.1 Saddle-type connections

These can be eliminated where a service line taps into the water main. A corporation stop assembly, used when tapping into ductile iron pipe, provides a complete, tight-fitting connection without the saddle. Crimping of tubing, especially near the tap, can be avoided by bedding the area within a foot or two of the connection with a local aggregate.

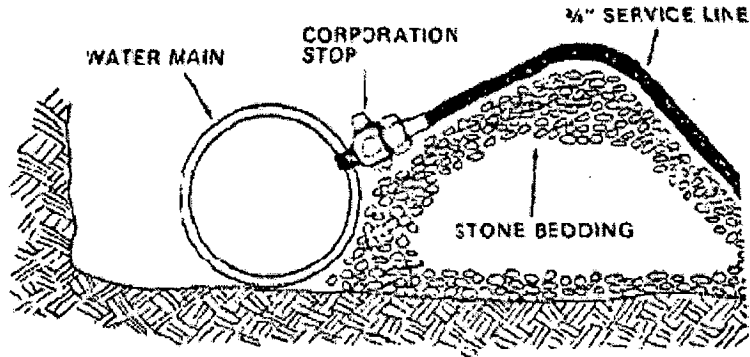


Fig 4.4.4.1a : Service line connection to water main

4.5.4.2 Multiple Connections

Communities should reevaluate standards that require a separate tap for each residence. Tap-in costs can be reduced significantly by branching off a tap to serve more than one building or home. Multiple connections to one common service are frequently used with no adverse impact on performance.

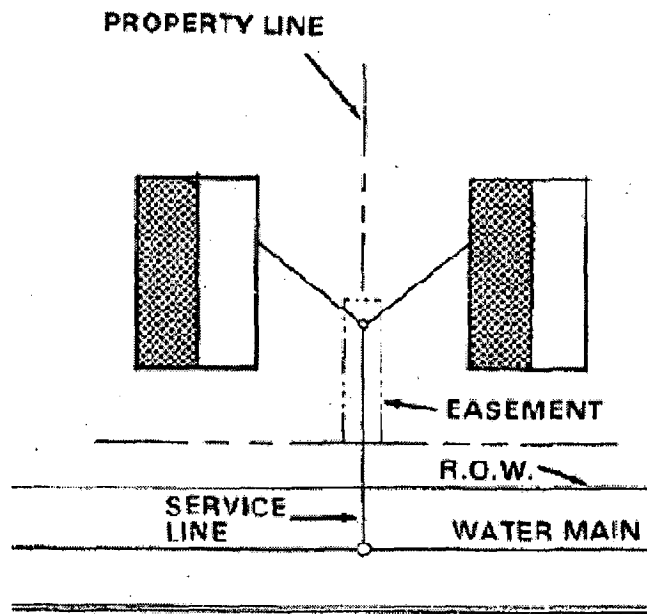


Fig 4.4.4.2a : shows multiple connections

A single water service can be installed along the common property line of adjoining lots. A standard tee is used to branch off the common line near the meter, reducing the number of taps by 50 percent. Trenching costs and maintenance costs are also reduced as only one line is installed for two homes.

Common water service lines can serve a number of homes in cluster or townhouse developments. A branch larger than the typical 3/4-inch service line may be required if more units are to be served. Cost benefits of multiple service lines are directly proportional to the number of units each line serves.

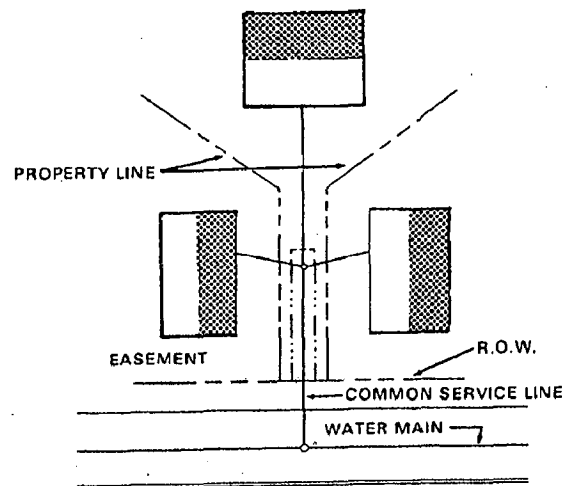


Fig 4.4.4.1b : shows the benefits of multiple connections

4.5.5 SIZING

In many areas standard required 6" to 10" dia water supply main, and often result in to over designed system. Water supply & fire requirement shall determine the size of supply mains. These requirements can be fulfilled by the 2" or 4" line in most of the cases.

Water Supply Capacity

- (a) The water supply system shall be adequate to handle the necessary flow based on complete development.
- (b) Demand rates for all uses shall be considered in computing the total system demand. Where fire protection is provided, the system shall be capable of providing the required fire demand plus the required domestic demand.
- (c) Average daily residential demand can be computed in accordance with the housing unit type and size data.
- (d) Fire protection shall be furnished for any development connected to the municipal water supply system, and minimum fire flows shall be based on recommendations by the NBC [National Building Code of India, 2010]

4.6 DESIGN

4.6.1 INTRODUCTION

Throughout the years, the average single-family home has experienced "design creep"--that is, building lots and homes have become larger; features that were once optional have become standard; and certain "niceties" have become "necessities."

Not too many years ago, homes were smaller with fewer expensive design features. To serve the enormous market of first-time homebuyers in most communities, homes must be smaller, be built on smaller lots, and have fewer amenities.

Good design and affordable housing are not incompatible. They do, however, call for greater sensitivity to the siting of the house on its lot relative to other units, increased attention to exterior appearance and detailing of the units, and a well considered interior layout. Each of these factors can enhance rather than detract from neighborhood aesthetics and property values. In short, good design need not compromise housing affordability if builders are encouraged to follow some simple guidelines.

Certainly, the qualities that distinguish good design from poor design are somewhat subjective and vary from buyer to buyer, builder to builder, architect to architect, and even from one region to another. But design elements that provide a sense of comfort and reflect good taste in the choice of materials, colors, space layouts, and equipment are likely to satisfy new homebuyers, existing residents, and local officials.

4.6.2 UNIT ORIENTATION

A primary concern in the development of small-lot affordable homes is the potential lack of privacy that can result from increased density. But homes on small lots can be sited to ensure privacy while maximizing views to the outside. The zero-lot-line (ZLL) approach, in particular, creates a single, usable yard area rather than two unusable side yards. Walls located along lot lines are windowless to provide a sense of privacy for the abutting neighbors' yards. The "Z" plot variation of the ZLL approach provides yet another option by angling frontages and exposing more of the home to the street. Single-story homes can preserve privacy by eliminating views into neighboring yards. Second-level windows in two-story homes should be oriented away from nearby open area and toward natural or common areas.

Unit orientation is also a factor where passive solar design is a consideration. Any dwelling regardless of cost can take advantage of sun movement by minimizing its south-facing glass exposure and maximizing its north- and west-facing glazing. Major living spaces--living room, dining room, family room- should be oriented to the north so that rooms used during the

day remain cooler . The other spaces, however, will require some type of shading—roof overhangs, second-story balconies, awnings, or deciduous trees to limit heat build-up associated with summer exposures.

4.6.3 EXTERIOR APPEARANCES

Simplicity and restraint in exterior appearances tend to be more acceptable for smaller homes than visually confusing design details that "clutter" a streetscape. Guidelines for style vary with local preferences and markets, although some important principles apply regardless of location. An especially important consideration in higher-density development is unit identity as denoted by the unit entry. The primary entry must be easily distinguished from full height windows and sliding doors on the front of the house.

A transition space to the front entry that uses a pathway, change in level, or landscaping can help provide a sense of arrival as well as permit occupants to individualize their own home. Varied facade treatment is a desirable feature in terms of color, rooflines, and building materials as long as all features are coordinated to present a unified neighbourhood image.

Horizontal and vertical elements must be well proportioned to provide for visual appeal and design continuity. Wall and window projections and entry setbacks can add visual interest (as well as cost). For the roof, a strong fascia can add depth and style. Appropriate massing of units can give a neighbourhood overall character.

In higher-density development, the verandah often dominates the streetscape when placed at the front of the plot. Reorienting the verandah so that its side faces the street can help integrate it visually into the overall unit.

Overall neighbourhood appearance is a marketing consideration in higher-density development where community open space is touted as an important amenity. Landscaping detail at community and neighbourhood entry points helps a new development take on an "established" look. Sidewalks or other walkways should link clusters of homes to common open spaces and minimize street crossings to ensure safe passage for children and cyclists. Lighting provides a sense of security and can highlight community features

4.6.4 UNIT SIZE

Total dwelling unit floor area is not normally a health and safety issue. Instead, unit size should be a function of need and marketability and should not be codified. On the other hand, reasonable minimum habitable room sizes have been included in the codes.

4.6.4.1 ROOM SIZES

Every dwelling unit shall have at least one habitable room which shall have not less than 120 square feet of floor area. Other habitable rooms shall have an area of not less than

70 square feet. Every kitchen shall have not less than 30 square feet of floor area. Habitable rooms, except kitchens, shall be not less than 7 feet in any horizontal dimension

4.6.5 INTERIOR LAYOUT

Simply scaling down an existing unit plan to meet the cost constraints of affordable housing typically yields a house that looks and is perceived as small and confining. Smaller housing demands a design approach that allocates the larger percentage of space to the major living areas. Some designers now rely on the "living room" approach to accommodate entertaining, family relaxation, dining, and cooking. Activity areas in the living room are often defined by food preparation platform or the placement of furniture. Today's smaller homes can be made to look more spacious by relying on multiuse spaces, bigger windows, views to the outdoors, and loft spaces. Outdoor areas such as verandah, porches, and garden seats visually extend the interior spaces while bringing the outdoors inside.

Multiple-use spaces can help eliminate space devoted to circulation except where absolutely necessary. Even modestly sized bedrooms can appear larger by designing in large windows that provide light and ventilation.

4.6.6 DESIGNING FOR ECONOMY

Within the framework of marketable affordable design, modular dimensioning can ensure that costs are lowered without sacrificing market appeal. Since most building materials--including floor tiles, sheathing, and some sidings--are produced in two-foot increments, their most efficient use is realized when overall house dimensions are laid out on a two-foot grid.

House shape and configuration affect total cost for any given amount of floor space. For example, an H-shaped plan has more wall length, more corners, and more roofing area, than a rectangular plan. The most cost-effective plan encloses the desired floor area with the least amount of exterior wall. The ratio of floor to wall should be as high as possible within design constraints.

For example, a 28-foot by 40-foot plan yields 1,120 square feet of floor area and 136 linear feet of wall for a floor/wall ratio of 8.24/1. A 24-foot by 46-foot plan yields 1,104 square feet of floor area and 140 linear feet of wall for a ratio of 7.89/1. The 28-foot by 40-foot plan is more efficient as it takes fewer linear feet of wall to enclose more square feet of living space. The high floor-to-wall ratio approach can also apply to interior partitions.

It is obvious that the first step toward cost-effective construction is efficient design. Many costly details can be addressed in the design process. Therefore, the importance of merging good design for marketability with efficient design for construction cannot be over emphasize [Santucci, et. al, 1990].

CHAPTER 5: CONSTRUCTION AND TECHNOLOGY

5.1 BUILDING CONSTRUCTION AND CODES

5.1.1 INTRODUCTION

The dwelling unit and the numerous construction systems that constitute the final product. It is written for those who are already familiar with construction terminology and typical ways of building homes. Many of the methods discussed are already acceptable under most local construction techniques, although other methods are not presently in practice, it will be worthwhile to work toward cost-saving changes. Success of an affordable housing program depends on builders, government officials, and concerned citizens taking necessary steps to encourage cost-saving construction techniques.

When compared to other affordability issues, excessive building code restrictions may appear relatively unimportant. In the hierarchy of the various costs that contribute to excessive sales prices, building codes are, indeed, usually not the primary contributor. Restrictive zoning, outmoded land development standards, excessive government processing time, inadequate infrastructure, impact fees and exactions, the availability and cost of financing, no-growth attitudes, and other issues often overshadow excessive construction regulations. On the other hand, building codes in many communities contribute their fair share to the housing affordability problem.

Although some code provisions may be considered excessive and unnecessary many builders have not kept pace with construction technology and cost-saving techniques that are already available and developed by government agencies & NGOs. Therefore, to blame building regulations & high cost of material for all excessive construction costs is unfair and misleading. Builders need to understand and apply lower-cost options available today. They need to educate subcontractors on the advantages of new systems or designs based on efficient construction practices and to develop detailed construction drawings that map the outlet placements, frame openings, and plumbing.

All codes have an alternate materials and systems section that is intended to provide a mechanism for appropriate and innovative use of materials other than those described in the code. Most commonly used codes are NBC & different I.S. Codes.

5.1.2 FOOTINGS AND FOUNDATIONS

Because the footing and foundation transfer the weight of the dwelling to the soil, prudent engineering principles and calculations are necessary. But, given that prescriptive code requirements usually codify the worst case situation, costs for all but worst case soil conditions are excessive. A cost effective foundation system design depends on such factors as earth quake zone, soil-bearing capacity, topography, and calculated building loads.

5.1.2.1 Footing Widths

Generally, footing widths are determined by total design load coming on per linear foot/ meter of footing and by soil-bearing capacity measured in tons per square meter. Ideally, the building's total live and dead loads at the bottom of the footing should be balanced against the allowable bearing capacity of the soil. If soil-bearing tests are conducted, footing widths can often be reduced substantially.

The design load of the structure depends on the dead weight of the structure itself as well as on the live weight of the people and furnishings that will occupy the structure.

Soil-bearing characteristics vary but are often locally known with sufficient reliability to serve as a basis for footing design.

Where locally accepted values are suspected to be low for a particular site, it may be advantageous to conduct soil-bearing tests to determine if footing sizes can be reduced. Soils with an allowable bearing capacity of less than 8tons/sqm are rare.

5.1.2.2 Footing: Reinforcement

Reinforcement of concrete footings is recommended in some earth quake zones. Although footing reinforcement is seldom necessary for footings placed on undisturbed or well-compacted soil. However, footings in loose soils should always be designed by a qualified Engineer and will most likely require reinforced concrete.

5.1.2.3 Footing Depth

Typically, footings extend up to 3' below the natural ground level in normal soils. Other local factors such as ground-water tables and certain soil types may also affect footing depth requirements. Footings should normally extend down 3' from original undisturbed soil or, in some cases as determined by a qualified engineer.

5.1.3 WALLS AND PARTITIONS

Generally, Walls carry the load of superstructure and transfer it to the foundations, but many times Column Beam structures are recommended as per the building codes, soil condition, span conditions etc. In case of column beam structure the walls act as a partition or as filler, in this situation the walls does not carry any load, hence it can be of lighter material which can provide partition between outside & inside. Most common material for walls & partitions is Brick in Indian conditions. Some other materials are, stone, concrete blocks, hollow concrete blocks etc. But generally Bricks are considered as the best material for walls.

5.1.3.1 External Load Bearing Walls

For external load bearing walls Rat-Trap Bond (by Ar. Laurie Baker) shall be used as it saves 27 % of the bricks, and gives the same load bearing capacity. The other advantage of using Rat-Trap is Cavity in between, which gives better thermal & sound insulation. The only disadvantage of this bond is difficulty in fixing of conduits & pipe lines.

5.1.3.2 External Non-Load Bearing Walls

For external non-load bearing walls many good options are available, where the bricks are cheaper Rat-Trap Bond can also be used, in other areas Hollow concrete blocks can be used, these hollow blocks are available in different sizes, i.e. 16"x8"x8" & 16"x8"x6" for external walls & 16"x8"x4" for internal walls. The biggest advantage of the concrete blocks is that it gives even surface on both faces, unlike the brick work where one face is smoother & other face is rough & uneven. Due to this the plaster thickness is reduced considerably. Hollow concrete blocks have same disadvantage as in Rat-Trap bond.

5.1.3.3 Internal Partition Walls

For internal partition walls normally Half brick masonry is used as it is easy to construct but now hollow concrete blocks are also used for the internal partitions. Other technology is use of Dry-Wall instead of masonry. This technology is widely used in developed countries like USA & Europe. Dry Wall is same as Zip-board partitions, in which the two skins are attached on both sides of GI frame. Biggest advantage of this type of partition is that it is very easy, fast & ready for painting in no time.

5.1.4 DOOR-WINDOW OPENINGS

Doors and windows are the two most important elements of a house, whether from security considerations, functional considerations or from consideration of aesthetics etc. Finding a quality door can be difficult, but it's an exercise requiring quite a bit of effort. The right door will provide design focus, beauty and appropriate security to the home, but a wrong door can prove to be troublesome or uneconomical in the long run. The type of door to be provided in the house requires attention.

5.1.4.1 Main Elements

The main elements of Doors/Windows are frame, shutter and fittings. The frame is usually made of timber due to its easy availability and that it can be made into any shape. The frames are fixed into the walls by 'holdfasts', which are concrete block with iron clips or steel running through them.

The shutter is the main door/window element which can be made in a number of ways. The shutter is fixed to the frame through hinges to facilitate easy mobility of the door/window. Fittings like sliding bolts, tower bolts, locks, door stoppers, handles are fixed into the shutter for the purpose of opening and closing/locking.

At present, there are a large number of alternatives to wood available for making doors and windows. These include metal doors, PVC doors, and ferrocement doors, doors from agricultural and industrial wastes such as red mud, jute and bamboo etc.

5.1.4.2. Types of Door/Window

Doors can be classified in a number of ways. For example, single leaf door, double leaf door, sliding doors, swing doors, revolving doors etc. Another way of classification can be batten and ledged doors, paneled doors, flush door etc (Fig. 2). Classification can also be done on the basis of the material used for its manufacture, say wooden door, steel door, aluminum door, PVC door, glass door, FRP door, ferrocement door etc.

Windows can be classified in a number of ways say, fixed windows, pivoted windows, sliding windows, double hung windows etc. Normally, windows are glazed in order to allow the entry of sufficient light.

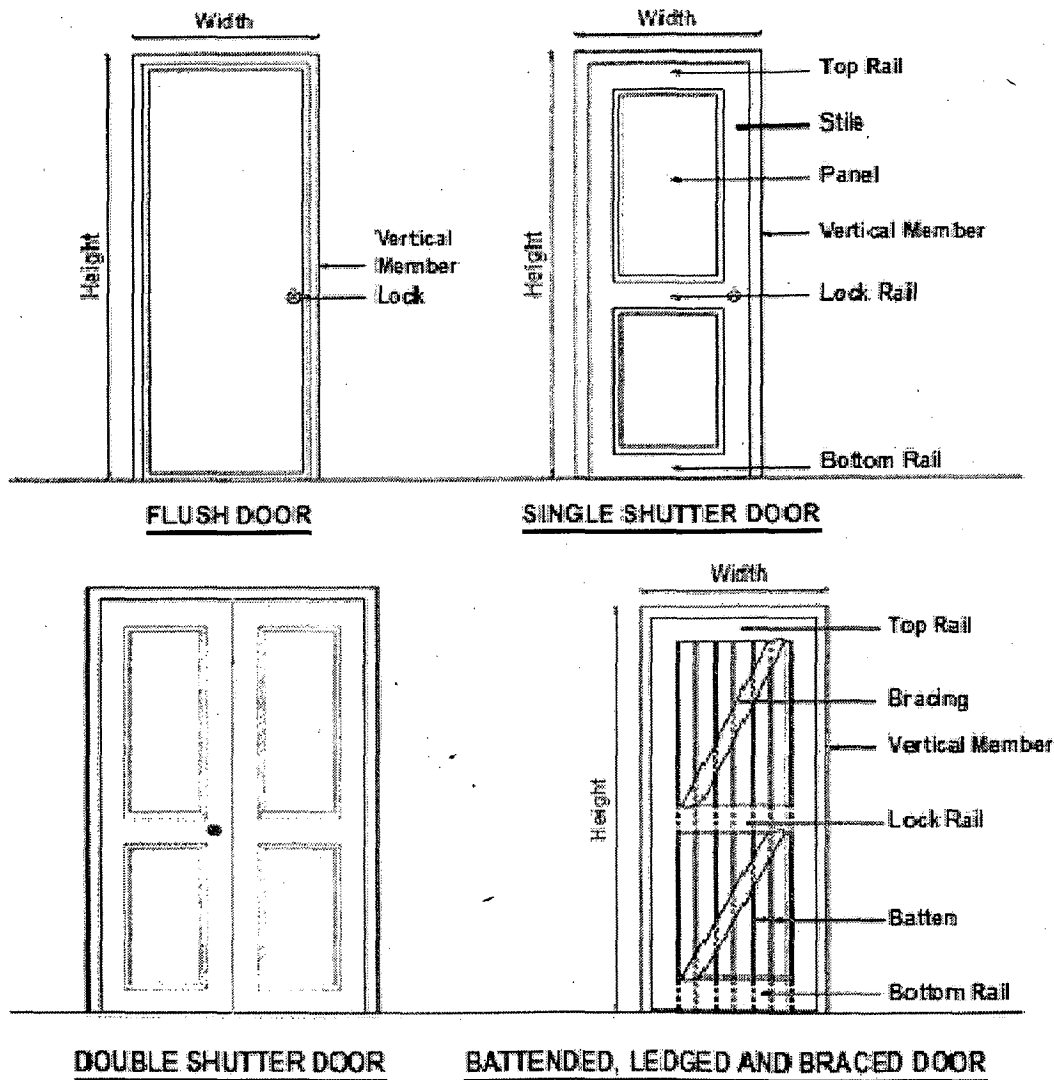


Fig 5.1.4.2a : Different types of Doors

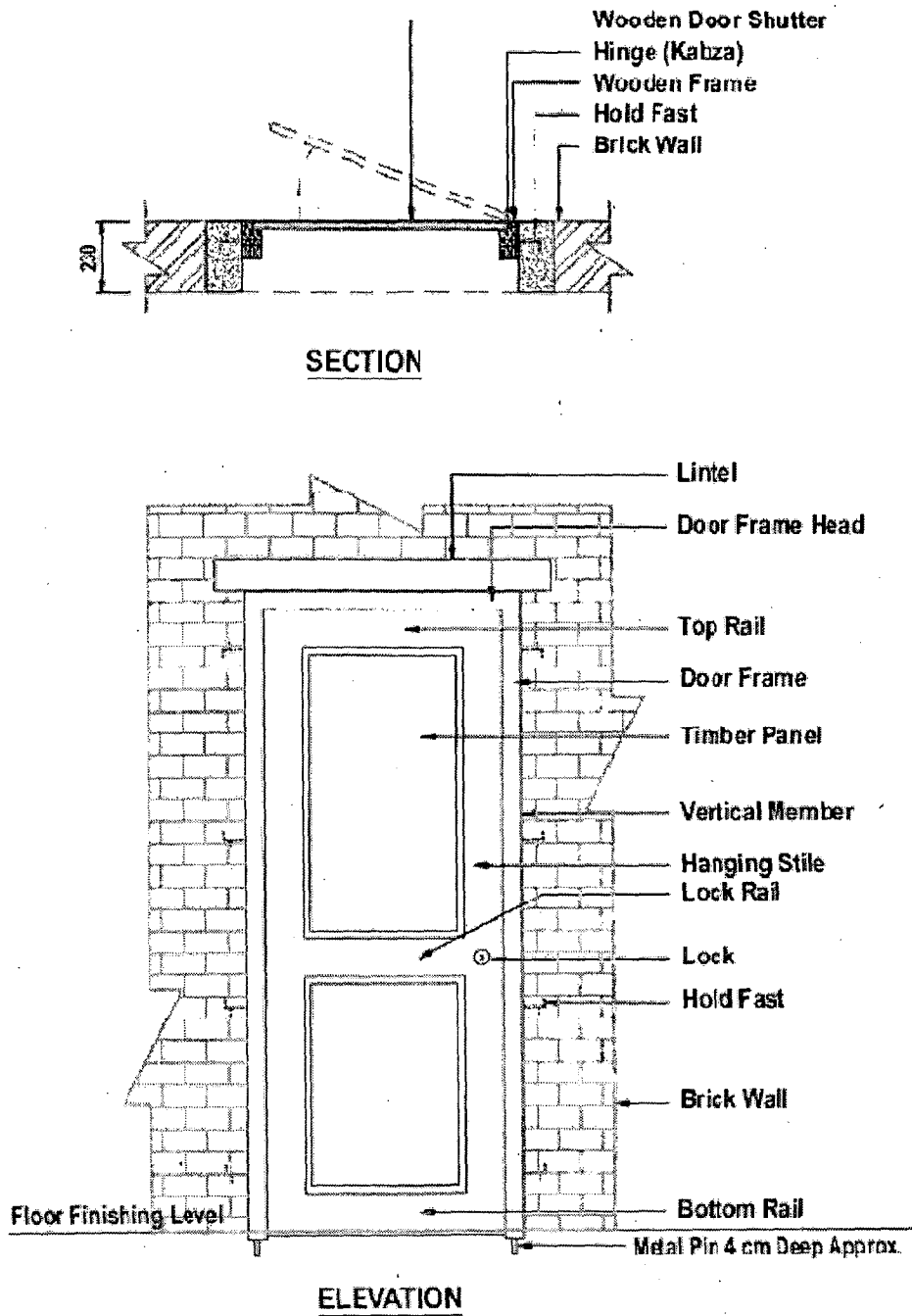


Fig 5.1.4.2b : Typical Single Shutter Door

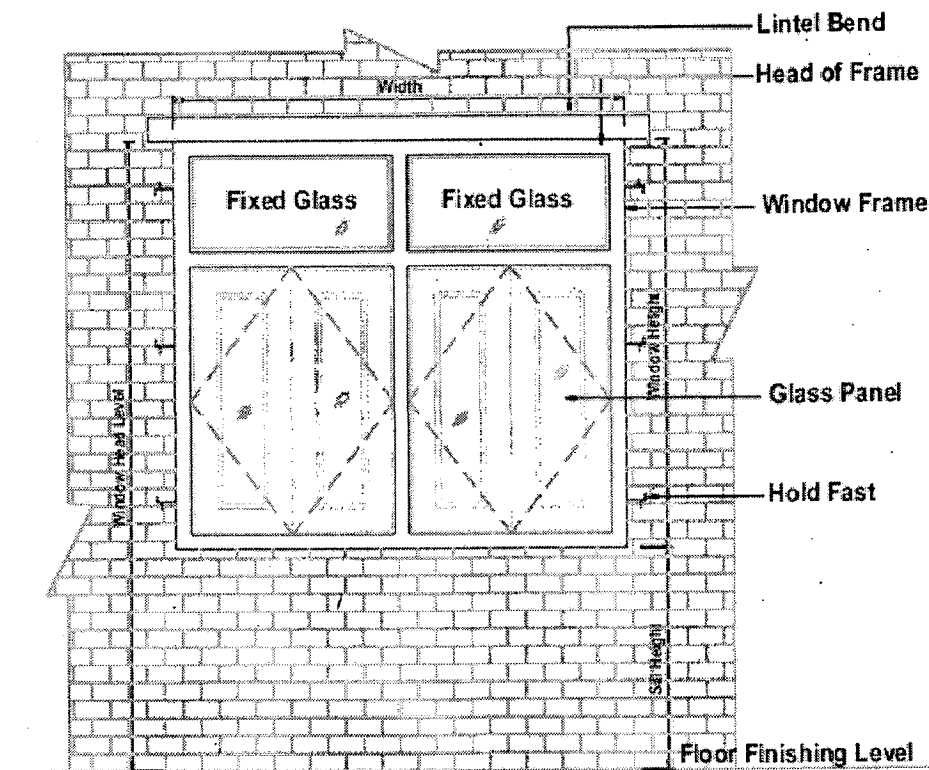
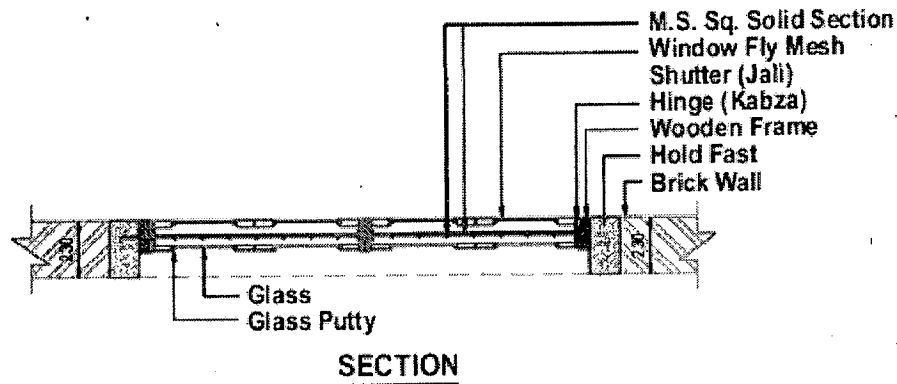


Fig 5.1.4.2c : Typical Glazed Window Detail

5.1.4.2.1 Size

The size of the door in the house is closely related to its location. For example the main entry door has to be of maximum size to enable easy entry of all household goods. The doors within the house can be relatively smaller in size as their primary function is to provide connectivity between the rooms. Similarly, the doors of bath/WC/toilets can be still smaller in size as only one individual is expected to use it at a time.

Typically, the heights of all the door is kept as 2.10 m and the width of the main door is kept as 1.00 m, inner door as 0.9 m and that for bath/WC/toilets as 0.9 m. The sizes of the windows should be such that there is adequate light and ventilation in the rooms. Usually, the window sill is kept between 0.75 m to 1.00 m above the floor level. The window sills should be higher for rooms where privacy is required (for toilets, bath, WC etc). The top of the window should preferably be at the same level as that of the door.

5.1.4.3. Frames

Traditionally frames for doors/windows have been made in wood. Frames have two main elements, two vertical members along the walls, usually called jambs and one horizontal member at the top, usually called the head. The intersection of the members has to be made properly in order to provide rigidity to the frame. For a wooden frame where only one door is to be fixed, its size can be 10 cm x 6 cm. However, where 2 doors are to be fixed in one frame the size can be kept as 12.5 x 6 cm. Typically, a niche is made all along the vertical and horizontal members of the frame to accommodate the door shutter.

Door frames can also be made out of steel (angle or T-sections), aluminum, precast cement concrete, ferrocement etc., which will have different sizes.

Frames for windows can also be made as for the doors except that their sizes are comparatively smaller. For pivoted door/window shutters no frames are required.

5.1.4.4. Shutters

Shutters for doors can be in single leaf (where only one shutter covers the door opening) or double leaf (where two shutter leafs cover the door opening, with each leaf hinged to each of the two vertical members of the frame). Shutters can also be made as folding (where individual shutters are hinged to each other and ultimately hinged to the frame on one side only). Wooden door shutters can be made in a variety of ways and are best known by their mode of manufacture. These include the batten and ledged, panelled, panelled and glazed, flush etc.

5.1.4.4.1 Parts of Shutter

Shutters have a frame having vertical members called stiles horizontal members called rails. Thus for a single shutter door there will be a frame consisting of two stiles and three rails, one each at the top and bottom and one in the middle called the lock rail. Shutter frame can be in-filled with panels or panel and glazing etc as per the requirements and design.

5.1.4.4.2 Size

The size of the wooden door shutter frame can typically be kept as 5 cm x 7 cm and the thickness of the panels can be kept as 1.5 cm. Similarly the size of the wooden window frame can typically be kept as 3.5x7.5 cm with glass or other panels in between. The sizes of the shutters made out of aluminum or other metals etc will vary as per the actual design. Beading has to be provided all along the junction of door/window shutter frame and the infill panels in order to provide rigidity.

5.1.4.4.3 Fixing

Doors and Windows can be fixed in a number of ways depending upon the material used for their manufacture. In any case, the frame is first fixed into the wall and the shutter is subsequently fitted after the finishing works have nearly been completed in the house. However, in case of wooden doors/windows to be fixed to a masonry wall, the following procedure is normally adopted. The sides of the frame are initially given an anti termite treatment and a coat of primer/coaltar is applied on all surfaces which are to come in contact with the walls.

The frame is then placed in proper position of the masonry wall, with the help of hold fasts. The steel hold fasts run into the frame and project outwards into the masonry wall. The projected portion is embedded in concrete, thereby fixing it into the masonry wall.

Normally three holdfasts are provided in each of the vertical members of the door frames. It would be a good practice to secure the jambs at the floor level by means of dowels. In case of normal windows only two holdfasts may be sufficient.

5.1.4.5 Varieties of Doors/Windows

There are a large varieties of doors and windows which can either be manufactured or are available in the market for ready fixing. Based on the material of manufacture, some of their types along with their main feature, advantages and disadvantages are given here to facilitate easy selection for the house owner.

5.1.4.5.1 Timber

Traditionally, timber or wood as it is popularly known has been the mainstay for the manufacture of doors/windows. Its main advantage has been local availability of material and the ease with which it can be made by the local carpenters.

Presently large varieties of wood are available in the market and its selection should be made based on the properties of longevity and the budget of the house owner. Although they can be used for all locations in the house, they are best placed for exterior locations. Timber is most commonly being used for making of doors/windows.

5.1.4.5.2 Framed and Panelled

These types of doors and windows are most commonly provided in the houses. The frame for the door is made out of wood and the shutter panels out of timber, plywood, block board, hard board, etc. A number of designs can be made on the panels, thereby making such door quite decorative.

The panels can also be made out of glass. In cases where part of the door is in wooden panels and the remaining is of glass panels, the door is known as panelled and glazed. Such doors have a flexibility of design which can look aesthetically pleasing

5.1.4.5.3 Flush doors

A flush door is a completely smooth door, having plywood or Medium Density Fiberboard fixed over timber frame which is comparatively light. The hollow core so obtained is often filled with a cardboard core material.

Flush doors are most commonly employed in the interior of a dwelling, although with some variations they are also used as exterior doors in houses.

The frames for such doors can be made out of wood, steel etc, which can hold its weight. The doors are usually hinged along one side to allow the door to open in one direction only.

5.1.4.5.4 Steel Doors

Steel or other such metal construction has been used for years as they are efficient and are a sturdy option for exterior and interior doors alike. These doors can be either solid or hollow. It has been found to be a good substitute for wood and is being used extensively for making frames. The frames can be made out of angles, Tee, channels or pressed steel plates. Holdfasts and hinges are normally welded to the frame in case of steel frames.

Normal shutters made out of wood etc can be fixed on these steel frames.

Shutters can also be made out of Mild Steel (MS) sheets, welded or riveted to a frame of angle iron or channel section, properly braced.

5.1.4.5.5 PVC

PVC is a common term for the product called Poly Vinyl Chloride. It is basically a plastic material commonly used for making various products including water tanks, pipes, fittings etc for houses. The use of PVC for the manufacture of doors has become very popular and a large variety of the same are available in the market in different colours and designs.

The advantages of using PVC doors are that they are termite proof, durable, anti corrosive, light weight, moisture resistant etc. They are also easy to fabricate and install.

However they are not suited for entry doors as they are very light in weight, not weather proof like wooden or metal doors, also they cannot resist the harsh environmental conditions.

5.1.4.5.6 Fiberglass

Fiberglass is a glass which is drawn into fibrous form and woven into cloth. It is strong, light & non-flammable and has a high tensile strength. Glass fibres bonded with resin that can be used to manufacture a range of products including bathtubs, doors and windows etc. Fiberglass is said to be one of the most hardened materials with relatively low maintenance costs as compared with wood and steel.

Fiberglass doors are expected to be stable as they do not warp, bow or twist. They are foam filled and offer good insulation properties. They can also be painted as per design.

5.1.4.5.7 Fiber Reinforced Plastics

Fiber Reinforced Plastics popularly known as FRP is a general term relating to the reinforcement of plastic with fibrous glass. Due to its high strength it can be put to many uses including manufacture of doors. Typically, the tensile strength is about ten times that of PVC. FRP moulded doors are available in many colours and finishes including natural wood finish in the market. The standard door thickness is 30/35 mm and are available with fire retardant properties.

These doors can also have two leaves of 1.5 mm thickness. The leaves are moulded over a core material forming a sandwich panel. Necessary wooden supports are provided for fixing the handles, locks, stoppers and other accessories. FRP doors are in good demand these days for use in modern houses.

5.1.5 ROOFS

Normally 5" (12.5 cms) thick R.C.C. slabs is used for roofing of residential buildings. By adopting rationally designed insitu construction practices like filler slab and precast elements the construction cost of roofing can be reduced by about 20 to 25%.

5.1.5.1 Filler slabs

They are normal RCC slabs where bottom half (tension) concrete portions are replaced by filler materials such as bricks, tiles, cellular concrete blocks, etc. These filler materials are so placed as not to compromise structural strength result in replacing unwanted and non-functional tension concrete, thus resulting in economy. These are safe, sound and provide aesthetically pleasing pattern ceilings and also need no plaster.

5.1.5.2 Jack arch roof/floor

They are easy to construct, save on cement and steel, are more appropriate in hot climates. These can be constructed using compressed earth blocks also as alternative to bricks for further economy.

5.1.5.3 Ferrocement channel/shell unit

Provide an economic solution to RCC slab by providing 30 to 40% cost reduction on floor/roof unit over RCC slabs without compromising the strength. These being precast, construction is speedy, economical due to avoidance of shuttering and facilitates quality control.

5.1.6 INTERNAL PLUMBING DESIGN

Today, many regions of the country are approaching a crisis in water supply capacity. During the design of the dwelling, costs can be reduced by clustering plumbing, or installing "back-to-back" plumbing. The basic principle is to arrange typical plumbing

groupings such as bathrooms, kitchen, and washing areas on a common wall or, in multiple-story buildings, vertically on a common stack. All fixtures discharge into a common drain and vent system and are supplied by a common hot and cold water riser, minimizing DWV and water supply labor and materials. The water heater should also be located close to the grouping.

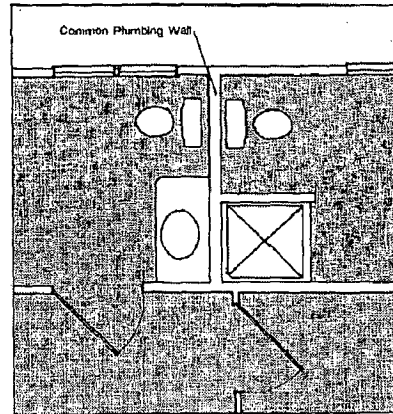


Fig 5.1.6a :Back to back plumbing

According to Section P-2207.7.1 of the CABO one & two family dwelling code, a common vent may be used for two waste fixtures connecting at different levels in stack but within the same branch interval, provided the vertical drain is one pipe diameter larger than the upper fixture drain, but in no case smaller than lower drain. The vertical piping between fixture connections serves as a wet vent for the lower fixture.

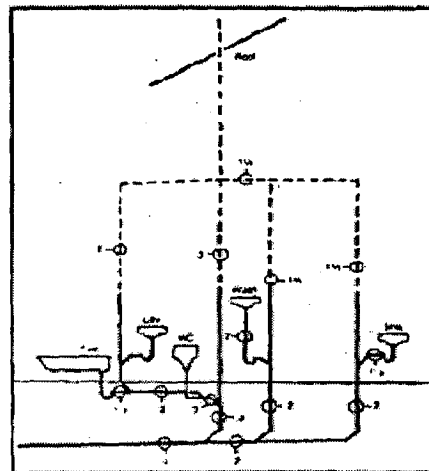


Fig 5.1.6b :Common Plumbing Vent

5.1.6.2 Water heaters

Smaller homes intended for smaller families do not need large water heaters. Hundred ltr. Gas or Solar water heaters are generally adequate. Solar Water heaters have cost subsidies & other incentives such as reduction of Rs 125/- per hundred ltr. per month in electricity bills.

5.1.7 ELECTRICAL

Electrical codes and their application are normally not flexible. Even so, electrical wiring costs can be safely reduced by several methods while still meeting the intent of the Electrical codes.

During the design phase, reduction of length of wiring can be planned. For example, open, multiuse areas are considered desirable in smaller homes. open spaces that

eliminate walls or reduce their length will reduce the number of points required and length of wiring. Check the house during construction to ensure that extra outlets are not arbitrarily installed.

During design, consider clustering heavy appliance circuits near the distribution panel to minimize runs of expensive heavy cable. If this arrangement is possible, the electrical cost should reflect this Cost-Saving design feature. The range, dryer, water heater, electric furnace/air conditioner or pump requires heavy circuits. The lengths of expensive, heavier cable can be reduced by paying attention to the location of this equipment during design. In some locations, entire homes are wired with 1.5 sqmm wire and 20-amp devices for general wiring, although much of the house to be wired with 1.0 & 0.75 sqmm wire and 15-amp devices. For affordable housing, the least expensive yet acceptable wiring approach should be used. Smaller homes do not need heavy service load centers; many can be served by a 100-amp load center.

Extra branch circuits are often routinely installed by electricians to simplify the arrangement of breakers in the panel. By maximizing the number of devices on a circuit, one or two circuits per dwelling unit can often be eliminated. Plastic utility boxes and junction boxes, which are allowed by most codes, will reduce costs at each wiring point.

CHAPTER 6: REHABILITATION

6.1 INTRODUCTION

The alternative to construction of new homes and apartments is to remodel or rehabilitate existing slums. Of the millions dwelling units in India, many are "substandard" and some are vacant because of disrepair. In addition, millions of square feet of commercial and institutional floor space are available for conversion into low- and moderate-income housing. Outmigration from inner cities, especially in mega cities & industrial cities has created an abundance of boarded-up housing that could be rehabilitated into moderately priced rental and for-sale units. The loss of tax revenues from these units has created substantial revenue drains in some communities.

6.2 ACQUIRING PROPERTY FOR REHABILITATION

The keys to successful rehabilitation/remodeling of existing units are

- knowing the local market finding the right properties
- understanding the cost parameters to meet the market
- finding the right properties

The value of a property relates to location, market conditions, and the physical condition of the property. For affordable housing, it is important to locate inexpensive properties that have excellent potential for rehabilitation at low cost within an area where people want to live. Before gaining control of a property, it is essential to find out if it is worth acquiring. Usually, the longer a property has been vacant, the higher the cost of rehabilitation. It is also important to know if the property is zoned for residential use, is free of ownership controversy, and is likely to remain affordable within available financing options. Inspection and evaluation of the potential rehabilitation cost is necessary.

In many cases, the local government has eminent domain "quick-take" authority. In general, this authority allows a government to pay the owner the appraised price for a property and take title to it in a relatively short period of time. Purposes for which a local government may condemn and take or buy private property include

- implementing an urban renewal plan
- alleviating a health hazard
- providing property for low-income housing

This approach to property acquisition is especially useful when current ownership is unclear or when multiple owners cannot agree on the disposition of property.

6.2.1 ECONOMIC ANALYSIS

An analysis of the affordability of a prospective property must be based on at least the following information:

- source(s) of funds
- cost estimate of property purchase, rehabilitation, and development
- projected income
- tenant relocation costs, if any
- estimated operating costs of units

6.2.2 SINGLE ROOM OCCUPANCY

There is a growing need for low-cost housing for employed people who are homeless. One solution is the single room occupancy (**SRO**) or working women/men hostel. Over the past 10 years or so, **SROs** have increasingly served as affordable housing for many low income singles and couples. Although their image remains disreputable in some areas, SROs are generally gaining widespread acceptance as a housing alternative.

CHAPTER 7: CONCLUSION AND RESEARCH EXTENSIONS

- The impact of building byelaws is significant on housing as parcels of land are sold on available FSI on that parcel of land.
- Effect of Development Control Regulations of Bye-laws is tremendous in case of low rise buildings and high rise buildings, which is up to 60 percent in low rise building and 100 percent in high rise building type development due to wide difference in available FSI.
- DCR shall be made such that maximum number of dwelling units can be accommodated in the available parcel of land to optimize the use of land without affecting adversely the quality of urban life.
- A number of methods may be used to increase access to affordable housing and sustainable communities.
- One stream of current research uses civil, environmental and mechanical engineering to design housing units that improve on current practice according to energy-efficiency, cost, structural quality, and construction process efficiency.
- Another stream of current research uses urban and regional planning to help stakeholders define development strategies that reflect best knowledge of social science-based program evaluation, land-use and transportation planning standards and community-level partnerships.
- Housing and community development policies that improve on current practice in construction-engineering and planning according to social outcomes, multi-stakeholder negotiations and housing program client choice.
- Since affordable housing is not at present top priorities for market-rate housing providers, government support for improved engineering of residential housing may also increase environmental sustainability and reduce user costs.
- However, housing policies that optimize various social criteria must also address technology aspects of housing provision and use best practices in urban and regional planning .
- the choice of housing design and construction strategies that balance different housing unit- and community-level sustainability measures;

- development of dynamic models for strategic housing policy design to address place-based housing strategies, i.e. new construction and rehabilitation of existing housing units, and
- design of realistic yet tractable decision models to provide guidance to affordable housing developers who routinely choose among many potential sites a handful to develop with limited funding that maximize the probability of neighborhood revitalization.
- As long as sprawl, environmental degradation and geographical barriers to affordable housing and opportunity remain policy problems, researchers have an opportunity to devise novel and creative solutions at the nexus of engineering, planning and decision sciences.
- There are areas where intervention in the market was desperately needed and it is right that a more radical approach should be taken.
- By almost any measure, affordable housing development offers a very good return on money invested. The pure economic impact of developing housing that is affordable to low-income is substantial.
- There is a huge demand in the affordable housing market and in recognition of this the government has put in place measures to ensure increased participation of the private sector, including major DFIs
- Several initiatives considered by the bank have been reviewed with a view to understanding its appropriate role in the delivery value chain, in particular how to most effectively play on our strengths and leverage partners, skills and expertise
- The bank should focus on providing funding and supporting areas and institutions not currently supported by commercial banks.
- Partnerships with skilled and experienced parties, operating in a commercial manner, means that the bank will be able to share the market risk with other role-players, leverage their skills and networks and catalyze private sector financial resources into this sector
- Further studies on the relation between Land cost, Cost of construction, Interest rates on loans on pricing of the dwelling unit is required.

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