

# Sustainability guide to Contemporary Housing of an Indian Hill City: Need Based Urban Development Approach Model

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**Abstract—** As most of the India is Rural. Hence, opportunities in urban areas including hill cities means these are in a quest to make more Housings to cater mostly the migrated population. This paper focus on the latest housing developments being done in the winter capital of tourism gracious state of Jammu & Kashmir. Thus, two case studies of such housing developments shall be done in this paper. A detailed analysis of the same shall also be done in relation to the population, Road & traffic density, support infrastructure (energy optimization) as well as ecological impacts on the climate of the town and surrounding. Subsequently, a need based model for the legible Sustainable housings for this important Hill town of the country shall be the main target of the paper. The inherent Architecture style for the targeted housings shall also be attempted in the paper.

**Keywords—** City, Development, Energy, Hill, Housing, Jammu, Kashmir, sustainability, Urban.

## I. INTRODUCTION

Shelter is the basic need of Man, particularly in the context of a great country like India, second most populated country of the world after China. In India, a substantial proportion of the households either do not own houses or have inadequate housing. As the population of country is increasing rapidly, the number of houseless families is increasing at an alarming rate.

Graph from the last 20-25 years show that India has majorly borne a paradigm shift in development icons as such its cities have surpassed even double to its initial infrastructure in this period. Reasons for these as the prime urban fabric element is the increased affordability of the Globalized Indian Urban

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citizen, so quest of having accommodation as close as possible to the place of luxury e.g. city center, Transit Corridors. It also means to own properties for different purposes. This factors have revolutionized the 21<sup>st</sup> century Indian Housing sector.

Yes, **India is short of housing that too amounting to millions in Numbers.** Reasons other than the increase in population are obvious due to problem in Design and Vision. Majorly, it was also due to the poor implementation of urbanism principles where **Place, work & Folk** were not thought of together in addition to the congestion at a place. All these factors prompted few development authorities to go for mandatory EWS (economically weaker section) developments up to 33% component in addition to main-stream housings (Delhi Master Plan) in modern developments including T.O.D's (Transit oriented developments). Further, Concept of neighborhoods were tried up in few selected cities with great success. Here, implementation of concepts under the holistic approach of urbanism concepts e.g. city within a city. Still, the idea is weak to the stretch of India & the housing shortage challenges it.

## II. SUSTAINABLE GUIDE TO JAMMU HOUSING

When I talk of sustainability guide of contemporary housing for a strategic hill town like Jammu, then I must understand various key factors which leads to the talk of sustainability for this town's housing. Yes, there are various general parameters of sustainability of particular project domain but with respect to such hill towns like Jammu, there are some special factors which needs to be carefully examined before suggesting the guidelines model. Some of these factors & impediments worth studying & examined are as under:

- (i) Jammu..Why..?--Concerns
- (ii) Context of Jammu
  - Location & Climate
  - Growth pattern & Demography
  - Occupational structure
  - Socio-economic pattern
  - Affordability
  - Circulation-Roads, Vehicle scenario etc.
- (iii) Housing Condition-Jammu
- (iv) Case -Studies

### III. JAMMU- A CONCERN...WHY?

Jammu is one of the town which could not get much attention for different formal & political reasons earlier, but now is in a blind contest in terms of Real Estate, without caring much about the factors for failure in other parts. Jammu is blessed with very rich heritage and cultural history attached to it ranging from rulers, dynasties, folks & religious culture. *Hindu shrines, such as Vaishno Devi finds its home right here as such Jammu is a major pilgrimage center for Hindus. Due to relatively better connectivity, location, political unrest, natural calamities and infrastructure, Jammu has emerged as the main economic center of the state and experiences handful migration of different working age groups from within the state majorily.* Jammu represents the 'gateway' for the tourists to enter this tourism gracious state. Moreover, Jammu is the nearest link of the state to the immediate neighboring state including capital of the country.. Thus, it has many things to offer for non-working rural people. All these factors serve as ideal impetus for the Real estate to initiate and flourish. Other cities have learnt a lesson in Housing but Jammu is unidirectional for the time being.

### IV. CONTEXT

Understanding of various factors of Jammu could play an important part to define sustainability in Jammu's Context in general and its Housing solutions for the future in particular. The study of its worthy ingredients is as under:

#### A. Location Data



Fig. 1. Jammu –Location

It is located at 32.73°N 74.87°E. , average elevation of 327 m (1,073 ft). Shivalik ranges surround it from east, north and southeast while to the north-west, Trikuta ranges lie. National capital, New Delhi is approx.. 550 Kms away. The Tawi river presents the central focus of the city i.e. *the old city overlooks it from the right bank while new developments spread across the left bank of it.* Ridges dominate the city with as many as four bridges on River Tawi connects various sections of it.

Jammu bears **composite climate** as such November to march are the winter months where as May to Mid July brings a lot of heat to the region. Monsoon rains generally hit the region from mid-july till mid- September. Summer temperature goes as high as 44<sup>o</sup>c & low of 4<sup>o</sup>c in peak winters.

Jammu is amongst the three administrative divisions within J&K, the northernmost state in India. Hilly or mountainous, terrain including the Pir Panjal range which separates it from



Fig. 2. Jammu today-Expansion across River Tawi the Kashmir Valley, signifies most of the land of this region, located in seismic Zone-V. Its main rivers are Tawi & Chenab.

#### B. Demographics and Growth Pattern

|                                    | 1981      | 1991 (Projected) |
|------------------------------------|-----------|------------------|
| 1. Total population                | 59,87,389 | 77,18,700        |
| 2. Density of population per sq km | 59        | 76               |
| 3. Decadal percentage growth rate  | 29.69     | 28.92            |
| 4. Urban population                | 21.05     | 23.83            |
| 5. Sex-ratio                       | 925       | 923              |
| 6. Literacy rate                   | 26.67     | 46.25            |

Fig. 3. Jammu and Kashmir's :Demographic Attributes1981-1991

Jammu and Kashmir is one of those states in the country where both the demographic situation and level of socio-economic development remains far from satisfactory. The 2001 census reveals that the population of Jammu and Kashmir is 10,069,917 sharing 0.98 % of India's population. The population growth rate in the state has been consistently high and during 1981-2001 it was more than 2 %.

| Year  | Population in Million | Growth Rate |
|-------|-----------------------|-------------|
| 1901  | 31.39                 | ---         |
| 1951  | 32.5*                 | 0.84        |
| 1961  | 35.6                  | 9.34        |
| 1971  | 46.1                  | 29.49       |
| 1981  | 59.5                  | 29.66       |
| 1991* | 77.19*                | 28.95*      |
| 2001* | 101.23*               | 25.00       |
| 2011* | 117.88*               | 23.95       |

Fig. 4. Jammu and Kashmir : Population Growth Pattern

An analysis of Fig. 4 shows that the estimated population in 1951 was about 32.5 million. Between 1961-81 the growth of population was over 29 %, one of the highest in the country. If the present trend of population growth continues till 2021, the total population of the state would be over 125 million. *The density of population is a useful concept to arrive at better understanding of the population resource relationship.* An examination of the density chart shows that the average density of the state in 1981 was 59 person per sq. km which rose to about 76 persons per sq. km in 1991. Within the state, however, there are significant variations in the average density of population (Table 1). It may be observed from that there are four districts including Jammu, in which the average density of population is much higher to that of national average of 276. As per An official Census 2011, Jammu had population of 1,529,958. In 2001 census, Jammu had a population of 1,357,077 Jammu District population constituted 12.20 percent of total Maharashtra population. There was change of 12.74 percent in the population compared to population as per 2001. The initial provisional data released by census India 2011, shows that density of Jammu district for 2011 is 653 people per sq. km. In 2001, Jammu district density was at 528 people per sq. km. Jammu district administers 2,342 sq. km area.

TABLE. 1. JAMMU TABLE DATA (SOURCE : CENSUS OF INDIA, 2011)

| Description                      | 2011      | 2001      |
|----------------------------------|-----------|-----------|
| Actual Population                | 1,529,958 | 1,357,077 |
| Male                             | 813,821   | 727,738   |
| Female                           | 716,137   | 629,339   |
| Population Growth                | 12.74%    | 29.01%    |
| Area Sq. Km                      | 2,342     | 2,342     |
| Density/km <sup>2</sup>          | 653       | 528       |
| Proportion to J&K Population     | 12.20%    | 13.38%    |
| Sex Ratio (Per 1000)             | 880       | 865       |
| Child Sex Ratio (0-6 Age)        | 795       | 795       |
| Average Literacy                 | 83.45     | 77.56     |
| Male Literacy                    | 89.08     | 84.80     |
| Female Literacy                  | 77.13     | 69.26     |
| Total Child Population (0-6 Age) | 167,363   | 167,363   |
| Male Population (0-6 Age)        | 93,242    | 93,242    |
| Female Population (0-6 Age)      | 74,121    | 74,121    |
| Literates                        | 1,137,135 | 0         |
| Male Literates                   | 641,916   | 0         |
| Female Literates                 | 495,219   | 0         |
| Child Proportion (0-6 Age)       | 10.94%    | 12.33%    |
| Boys Proportion (0-6 Age)        | 11.46%    | 12.81%    |
| Girls Proportion (0-6 Age)       | 10.35%    | 11.78%    |

### C. Jammu- Socio Economic Pattern & Affordability Status

J&K, like rest of India is predominantly an agrarian state with 70% population depends on agriculture. As/ Census-2001, cultivators & agriculture workers comprised 49% of the total working force of state. The contribution of the agricultural sector to the state domestic product declined from 38% in 1980-81 to 32 % in 2000-2001 & 27 % in 2004-2005. The contribution of the manufacturing sector has increased from 5% in 1980-81 to 6 % in 2004-2005 & the share of the other tertiary sector has increased from 58 % to 67 % in 2004-2005. **Agriculture contributed 32 % to the state domestic product in 1999-2000 & provided job to 60% of the working population (Directorate of Economics and Statistics, 1991).** In recent years, the horticulture sector has lead to greater production & export of the produce. The forests besides useful to the environment are a great source of revenue to the state. The forests contribute less than 2% towards the net state domestic product, despite the fact that 23% of the total geographical area is under forests. J&K grows cereals, fruits & cash crops.

Industrially, Jammu and Kashmir is one of the backward states in the country due to lack of infrastructural facilities such as easy transportation, electricity, topography & other factors. **As such, Jammu is one of the few regions in the country having the least per capita income as compared to average Indian per capita income of Rs. 80,000/- per year. Jammu has a per capita income of Rs. 58,593/- per year (2013-14, Source: Directorate of Economics & Statistics of respective State Governments, & for All-India - Central Statistics Office).** It's on a constant rise owing to obvious urbanization but still economic affordability is quite low comparatively. **In 2011, total 366 families live without any roof cover in Jammu**

**district of J&K. Total population of all who lived without roof at the time of Census 2011 numbers to 1,741. This is approx 0.11% of total population of Jammu District.**

### D. Jammu- Roads and Vehicle scenario



Fig. 5. Jammu- Routine Traffic Scenes

Jammu has seen a phenomenal growth in the number of vehicles without a proportionate increase in the road length & infrastructure. (Source: Home Ministry document). Thus, traffic congestion on roads in Jammu & Srinagar has become a routine. About 50,000 vehicles are being added to the vehicle population annually in the twin cities. **Jammu has 574 vehicles/km traffic density, while vehicular population in Jammu city stood at 4,04,400 excluding security & tourist vehicles.** The road length in Jammu is 702.22 kms. Density in Jammu is 574 vehicles/Km. (Source: PTI & Jammu-Early Times News).

### E. Jammu Housing Condition-Factors & Existing Scenario



Fig. 6. Jammu-A view from the right bank of Tawi (Source: Google Images)

Two capital cities of Jammu & Srinagar are faced with acute housing shortage. Owing to urbanization, rural population has moved in large numbers to the two cities. Jammu city has seen the influx of large number of refugees, thus created acute pressure on land, labour & building material. The State Govt. has not had a long term housing policy, signifying land around the two cities would be earmarked for utilization in raising housing colonies. *So, people in need of housing grabbed wherever they get & raised structures on them without the permission in consonance with the plan which never is there. All this has created a mess of housing.*

1992-1998, around 6% of the households in J&K live in houses that are katcha (mud, thatch or low quality material), 58% live in semi-pucca houses (partly low quality & high quality materials), & 36% live in pucca houses (quality materials throughout). Across regions, households living in pucca houses is 38% in Jammu region. Marginal improvement in the housing situation is observed in the state between 1998 and 2006. As/records, 50% of the households in J&K live in pucca houses, 34% live in semi-pacca houses and only 11%

have katcha houses. **The mean number of persons living/house in J&K in 2005-2006 was 2.9 as compared to 3.3 for the country.** As/per Union Ministry of Housing and Urban Poverty Alleviation, there is an acute shortage of houses in entire India. As/their figures, the estimated housing shortage in J&K in 2007 was 1,800,00. As/present growth, the current housing shortage is well above 200,000 houses. **By 2022, J&K need 800,000 new houses. In rural areas, kms. of fertile farmland is converted into real estate, thus plunging the state into a critical food deficit zone.** There is talk of building new towns & localities but there is no clear cut policy of how & when. Jammu Development authority, e.g., has been grappling with land issues for disputed lands allotted to it. So, it's not able to draw any plan for raising colonies. Though, by real estate boom in the contemporary India, Jammu also experienced bit of it though quite late as compared to rest of country.

### V. CASE STUDIES

To know Housing scenario of Jammu; Case studies pertaining to their location & positives, circulation pattern in the Jammu city & problems associated with it are important to understand. Provided below is a detailed labelled map to aid it.

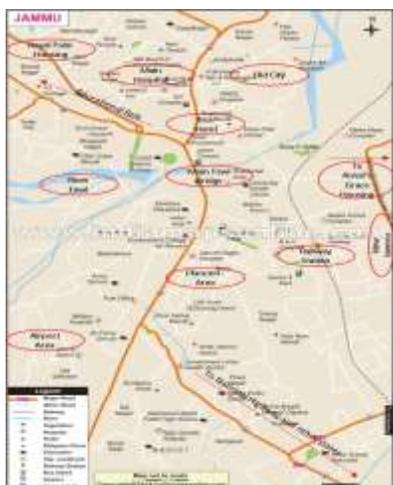


Fig. 7. Jammu-Detailed City map with urban extensions

#### A. Royal Palms, Top Sherkhanian-Jammu

Located at 05 min. driving distance from left bank of Tawi, Royal palm represents the inception of iconic housing development in Jammu city. It is in the area where migrated population from other parts of the state reside. Zone also has strong impetus for future urban growth due to location, open spaces & institutional vicinity. Salient Features are as follows:

- (1) 700 Premium Luxury flats i.e. 1-BHK, 2-BHK & 3-BHK's.
- (2) 2-BHK, 3-BHK & 5-BHK Luxury pent-houses.
- (3) A Modern Club House with Ultra Modern Landscape.
- (4) Parking –open and covered only surface parking.
- (5) Exclusive Interiors.
- (6) Accessibility not proper i.e. entrance through a narrow road leading to main entrance gate. Not any pre-dominant orientation i.e. siting of the buildings involve priority of the form to orientation.
- (7) Essentials of neighbourhood totally missing even shopping and Health care area is absent from the proposal.

- (8) International style Architecture- no emphasis on Hill Architecture, local materials, local labour (employment) or local resemblance in terms of development pattern.
- (9) Jammu's urban context in terms of problems being faced seems not the basis of this project.
- (10) General sustainability features like response to climate, energy efficiency, rain water harvesting smart materials etc. missing.



Fig.8 : Royal Plam Housing-Jammu

#### B. Ansal's Grace- Sainik Colony-Jammu:

Located at around 12 min. driving distance from right bank of Tawi, these represent yet another new housing developments in the new Jammu region. This is located along the National Highway, area which emerged as the outcome of congestion in Jammu old-city. It's the area which is dictating new sky-line of 21<sup>st</sup> century Jammu. Through Residential towers first and now, commercial establishments are dotting the area in bits and pieces too. The salient features are as follows: (Fig. 9).



Fig.9 : Ansal's Grace Housing-Jammu

- (1) 6.5 Acres Site, 348 Units comprising of Luxury 2 & 3-BHK's.
- (2) A Club House with small outdoor Landscaped gardens.
- (3) Open parking lots along the periphery of the housing available.

- (4) Accessibility to the site is better as compared to the individual access to the buildings/apartments.
- (5) Inward planning keeping the uniform orientation overlooking the city towards the accessing road is mostly targeted.
- (6) Shopping and health care facilities despite of distant location from the city are missing.
- (7) Uniform style prevailing through-out the country is followed only. Hill architecture or Locational Context totally missing.
- (8) Jammu's urban problems seem far temporarily from the proposal site mainly due to location but development is not conceived as a permanent solution. (Non-sustainable).
- (9) In crux, its another load on the urban infrastructure of the city.
- (10) Despite of reputed name, sustainability features mostly missing.

## VI. ANALYSIS

Careful study of the impediments present in Jammu as mentioned earlier in the paper lead to following observations:

- (1) Jammu- winter capital of J&K state is a strategic **hill town** owing to location & connectivity with other cities.
- (2) Jammu of today possesses all the major determinants of **urban infrastructure** like Administration, business hub, educational belt & industrial belt, recreational facilities, transportation, health facilities, ISBT, Railway terminus & an Airport. Though, Location of these infrastructural icons is debatable majorly because it's not a planned city.
- (3) It experienced major population explosion post 1990 & Bare-minimum infrastructure of the city was burdened.
- (4) Jammu is the biggest population hub in the state as people from high hills particularly less educated ones targets it for jobs plus floating population it holds due to necessary transfer of capital headquarters & tourism potentials present.
- (5) Agriculture is no. 1 occupation in the state however, with more of population & urbanization; it is decreasing.
- (6) Beyond 2004, Srinagar experienced natural hazards more frequently due to disrespect of Nature & sustainability.
- (7) Due to special status, J&K is far behind in development i.e. facilitating potential investors in the city.
- (8) It has already attained an alarming population density pertaining to its nature of hill city, but very little was added in its urban infrastructure to counter double of it post 1980's.
- (9) **Core of the city is already saturated as such old city represents the wholesale market hub whereas, Bahu plaza (near railway station) represents IT & business hub.** So, unplanned Jammu show an all-round distribution with more density along right bank begin with Hari Niwas Palace. Whereas, developments on left bank represents the migrated population, right bank holds permanent Jammuites, majorly.
- (10) City's attaining threshold limit in new housings towards NE end (New-Jammu) developed by private agencies.
- (11) **With limited road length, its vehicle density is one of the largest in the country (traffic jams), quite alarming to sustainability issue. (People, folk & work relation)**
- (12) Though many permanent Jammuites have left the cores of Jammu (right bank, Jammu east & west) & moved towards New-Jammu (Channi, Sainik colony etc) but yet daily

business requirements demands to access the core of old city on daily basis (major issue due to road widths & vehicle density).

- (13) **Location** dictates careful planning norms and **Architectural style** pertaining to the composite climate of Himalayan bound northern India & Seismic Zone V. Being the Land of rivers & small water channels, **stone is the chief local material.** There is no major architectural style present. Hilly surroundings & weather data aid **sloping roofs.** However, history supports **Rajput Architecture mix with Mughal Architecture.** City's terrain is chiefly ridges joined by bridges. Sky-line is undulating with majorly temples dominating it.
- (14) City has various **heritage icons (Old City-right bank) which are also the tourist attractions Like Hari Niwas Palace, Ranbir School, Bahu Fort, Mubharak Mandi Palace** etc. mostly set up on the highest points of the city. These buildings are over 150 year's old Major highlight of these buildings is the **stone masonry in lime mortar with Jack Arches, Brick Jalties, Jarokhas, bay-windows (overlooking Tawi), Reinforced brick roofs, thick walls in stone with high Plinths & exhaustive carvings in interiors.**
- (15) **Less development opportunities in the past means Jammu is far behind in terms of per capita income as compare to rest of the country. Thus, affordability is a major challenge in meeting the housing for all initiative.**
- (16) It seems Housing /other developments in Jammu are conceived in isolation. Indeed, Jammu is not a planned city & Zoning suitability of its urban infrastructure is totally missing. New housings are focused only on latest infrastructure due to impact of the neighboring states. There is least initiative to address affordability, New housing is catering only to the economically well-off people, mostly migrated ones. Density is increasing but not the housing shortage, (housing for all).
- (17) In addition, this housing is serving to the affordable core people to move out of congested city or for investments.
- (18) As very less infrastructures addition were done with time, as such, housing were planned with no consideration for its sustainability in essentials of neighborhood e.g. commercial zone, recreational zone & parking lots. City's infrastructure isn't relieved in terms of people & vehicles for different needs.
- (19) Site for the housings are inclined towards new Jammu for good connectivity to essential urban needs .
- (20) Regular Sustainable guidelines haven't yet embarked the city infrastructure in general & housings in particular.

## VII. PROPOSED MODEL

The Analysis clearly dictates that for any sort of sustainability in the overburdened Jammu, the said points are the major criterion. Hence, proposed model suggesting sustainability guide for the contemporary housing of Jammu must respond to all the said impediments and is as follows:

- (1) Housing is a private affair and must be located in a serene, safe and friendly environment. Hence, must be located separated to the **business hubs of Jammu city**. Additionally, Location of the housing must respond to the transport connections. i.e. accessibility to the Highway in particular. **For the same, Jammu-Katra highway (NH) is the ideal location.**
- (2) New housing must not demand additions in congested city's infrastructure. So, new **housing must be a sustainable neighborhood comprising of all the essential facilities.**
- (3) Redevelopment of unplanned Jammu is out of scope of this paper for the better sustainability of housing. Instead, Urban infrastructural icons may be allocated in mega housings independently or common basis in multiple Housings.
- (4) Location of housing, transport modes, transit stations minimum transport distances, pedestrian friendly access in & from the housing to the work place matters. Additionally, **alternate transport mediums like pod taxis, rope ways may be considered in this hilly & congested terrain.**
- (5) Sustainability is a far off target unless it meets **Affordability check**. Scrutiny to promote high end housing for the well-off people is the need of the hour. Indeed, Sustainable Housing must target **destitute of Jammu** at Grass root level.
- (6) Density of housing : New housing must adhere to hill town density norms particularly due to seismic location risks.
- (7) Jammu's potentials need to be carefully examined. NH corridor along right bank leading to new Jammu is the best possible potential by Good Views, Natural easements (light, water, Air, drainage, safety, eco-friendly), accessibility & surrounding urban infrastructure coming up. This along with other areas (e.g. Jammu-Akhnoor Road) may be surveyed for mega sustainable neighbourhoods behaving as satellite towns of Jammu. As, this would enhance the sustainability content amid population growth, which shall be a constant affair.
- (8) Sustainability must speak of ground reality. e.g. it's a Hill city, known as city of temples. Hence, Housing must not dominate the sky-line. Architecture style comprising of low-rise buildings with sloping roofs rhyming the surrounding hills would be best possible sustainable approach depicting world-famous diversity of Indian towns instead of uniform globalization everywhere, current world is suffering from.
- (9) Check on existing globalized patterns i.e. Modern technology with local Architecture based on local materials like stone, local icons like temples & **heritage structures** may be emphasized in new housing for **regionalism** sustainability.
- (10) It must invite minimum maintenance i.e. Heritage structures based on local resources are best inspiration for it.
- (11) For sustainability theory of 3-R's i.e. nature to be utilized for next generation in equally good quality. The modern record breaking temperatures variations & rainfall data demand minimum degradation of nature by virtue of future housing.
- (12) Due to Terrain, Jammu's central Road (B.C. Road) through the bikram Chowk Bridge serves as the central plateau on both sides of which natural drainage follows. Future sustainable housing must respect the natural drainage & surface run off must be check for sustainable measures.
- (13) Jammu's environment & over all climate is greatly influenced by Himalayan Ranges & River Tawi. Recent developments clearly show no respect for nature as such many small cliffs & rocks were cut to give way for new projects & roads. In the absence of proper sewerage and drainage plan, most of the effluents of the city is carried to River Tawi & Chenab River subsequently. Hence, resources respect by virtue of proper drainage plans, treatment plants & disposal system shall be a great determining factor in the future housing.
- (14) Primary economic resource of the country, agriculture, is reduced to uplift the secondary & tertiary resource at the cost of degrading environment. Hence, reality check of same & concepts like zero carbon foot-print must be taken on priority.
- (15) Inspirational areas of the city e.g. .Gandhi Nagar has most of urban needs with in the walking distances with proper road widths for safety. However, present encroachments, violation of land use regulations are constantly degrading these areas for commercial benefits, to cope with increasing population. Indeed, proper drainage, sewage disposal & treatment, storm water drainage & rain water harvesting are missing.
- (16) Jammu experiences harsh summers & winters with ample sun-shine hours. Hence, south & south-east orientation holds the key. Sustainable housing must exploit south orientation to the extent of 75-80% to achieve adequate energy sustainability.
- (17) Jammu experiences major rains during Monsoons (July-Sept.).But, unreliability of weather demand ground water recharges pit & water recycling tanks for efficient water use.
- (18) Within weather context, medium sized windows with 25% openable panels are recommended with cross ventilation. Cavity wall construction in concrete blocks, brick or composite material is recommended to have adequate insulation with reflective material/earthen material in roofing for minimum impact of heat in the interiors. Old city of Jammu indicating courtyard planning,



Fig..10 : Heritage of Jammu-Bahu Fort

narrow bazaar and high stepped facades facilitating mutual shading and shading on the streets could be a vernacular & sustainable approach in Jammu's context.



Fig..11 : Heritage Markets(Bazaars) of Old City-Jammu.

- (19) Jammu experiences wind direction from SW to NE from march-Nov. & in winters it is from NE-SW. Local micro-climate is also dictated by river Tawi & Surrounding Mountains. Hence, exploitation of these resources for siting and spatial planning shall be a boon in sustainability. Post-independence developments show disrespect of locally available resources. However, Iconic heritage structures show response to local in the globalized era.
- (20) Global Elements like Curtain Glass, dry Cladding etc. can't be a good option here. Also, composite wall construction, use of alternate building materials for insulation & energy efficiency, use of wind-energy & solar energy to reduce energy loads, Landscaping importance in urban environments could hold the key for sustainability in Contemporary Housing.
- (21) Successful ventures of some countries recently like Singapore and Hong-Kong may be consulted. There, Public initiatives with government aid have revamped the housing policies & met the overall shortage addressing the affordable issue in particular. There is no shortage of Housing as of today.
- (22) Implementation of strict bye-Laws in such congestion is the need for sustainability & for diversification. Its revision could result in better sustainable housing in Hill towns.
- (23) As declared, Jammu is destined to be one of the smart city of India in next few years. As such, for any smart city development; housing deserves to be the earnestly at the center stage for any economic development. Smart cities are based on fostering economic developments & best ways of achieving high growth rates include a strong impetus to the housing sector. Evidently, Jammu is always delayed in terms of development initiatives. Thus, it should incorporate all the best of the sustainable measures with in its context by taking examples from history for the time-being in its new housings. Yes, IT based controls in smart city initiatives are due to come shortly but ground work is must as explained in points 1-23.

### VIII. CONCLUSION

Housing is a complicated affair and all ingredients have to be taken into account. What is needed, may be, to develop at least two mega colonies in close proximity of the work place with capacity of housing around 10,000 homesteads each in the first phase. The raising of colonies has to be a regular phenomenon. It could be a joint public & private venture. The example of

such ventures in other parts of the country could be taken into account. **The focus is on providing affordable housing to the needy people & more especially the weaker people.**

Contemporary housing solutions in India started in mid-1980's with Hiranandani apartments & Kanchenjunga apartments of Mumbai led the way. Having said it, most of such developments could not site the urban problems which led to the failure of cities, or miscommunication between work, place & folk and in turn the outset success of such apartments. And, that was why the notion of sustainability came into picture. We need to understand that it was narrow understanding about the expansion of Indian contemporary city first that led to its failure, initially. Subsequently, Narrow understanding of expansion of earlier housings led to their failure too. As there seems *a blessing in disguise* for Jammu for the delay in development comparatively i.e. in the light of such lessons, less developed cities like Jammu should not proceed with the unsuccessful attempts of developing conventional housings (initial housings in developed cities) first & then come up with the sustainable solutions as a remedy later on, like other cities are doing it presently. So, for sustainability to happen, it must be targeted right now without tasting the rub of soil by failure of conventional housings of Jammu. However, present housings of Jammu seems far from it & sooner the better it is for sustainability to catch hold of, in its future housings. Otherwise, congesting Jammu would again be visible in small miniatures i.e. the conventional housings/ neighborhoods.

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