

Land-Use Planning Proposal along a Stretch of BRT Corridor in Context to Transit-oriented Development, Surat

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Abstract - Surat is a fast-growing city with 55.29 percent growth in 2011 and population growth from 24.33 lakhs in 2001 to 44.66 lakhs in 2011. As a result, the population has risen, land scarcity, noise, urban sprawl, congestion, and other related problems have escalated. To address this issue, TOD-land uses planning are taken as study area along a stretch of the outer ring road. TOD mainly covers mixed land use, such as residential, industrial, public facilities. It allows for pedestrian-friendly travel around transit stations. Three TP schemes cluster are considered as a study area. TOD based effective land use planning that promotes the usage of the network of mass traffic is proposed. Land use is classified into zones like residential, commercial, institutional and public purpose. In addition, residential areas are divided into a various household income group and household sizes. National and state policy institutional support document are followed for planning.

- To prepare TOD based planning proposal for the study area.

3. METHODOLOGY

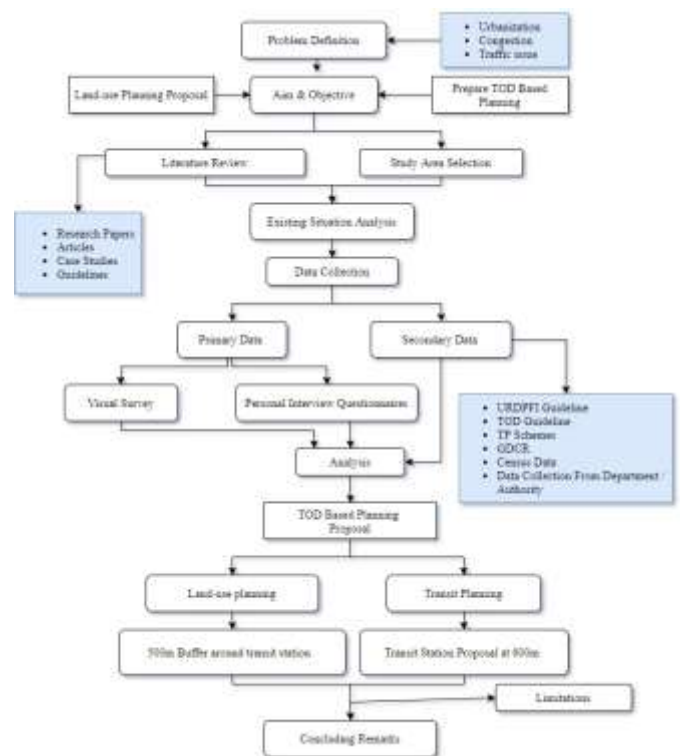


Chart -1 Methodology

Key Words: Transit-oriented development, Outer ring road, TP schemes, Mixed Land use planning, BRTS, Floor space index, High density

1. INTRODUCTION

Public transport has existed since the days of horse and buggy streetcars. For better or for worse, cities have been shaped by their mode of transportation, and development always has focused on public transit. As development spread out of the cities and into the suburbs, development was increasingly focused on transit stops. The term "development-oriented transportation" better describes these primitive suburbs than transportation-oriented development, since public transit was built to serve development. As part of these public transit systems, small commercial and retail districts, which served commuters and residents, have developed around public transit stops. These districts, an early shape of contemporary TOD.[1]

2. AIM & OBJECTIVE

- To prepare TOD based land-use planning proposal for the study area.
- To study existing scenario of the selected stretch of Outer ring-road.
- To Review FSI criteria and prepare mixed land-use over selected land parcel.

4. 90-METER-WIDE OUTER RING ROAD

SUDA proposes a 90-meter-wide 66-kilometer outer ring road on the outskirts of the city in anticipation of the potential growth of the fast-growing city of Gujarat. The road will provide convenient access to all areas of the mega town and also to the twin cities of Surat and Navsari in the future. Land use along this outer ring road is designed to make the city look like a megacity with a skyline giving competition to both the developed cities of India and the world. The 66 km in total, 29 km in the SMC area will be proposed, while the remaining 37 kilometers will go through 27 villages of SUDA area. The 90 m long outer ring broad is proposed in such a way that the National Highway (20 km) and State Highway

(17 km), which are respectively part of the 60-meter-wide road proposed in the re-Development Plan.[2]



Figure 2 Surat city outer ring road

- Proposed width 90 meter.
- Proposed length 66 km. (29 km.- new road development)
- 500-meter-wide residential zone on both the sides of the ring road
- TP schemes proposed for implementation
- FSI upto 4 (1.8 in other area)
- FSI from 0.6 to 4 shall be permitted by levying additional infrastructure charge @ 40% of jantri rate.
- Ground coverage for residential zone is avg. 45% & assuming 50% of total built-up area used as max. paid FSI.

5. STUDY AREA SELECTION

The study area selected for the TOD proposal is limited to three TP Schemes 54,55,56 which total length is 7.8 km. The road is 90-meter-wide which covers 7 villages. The study area is located on the outskirts of Surat City, called peri urban area that can be developed for future expansion due to high urbanization and migration rates. The site is Greenfield, which has vacant land and agricultural land.

- Due to increase in the usage of a private car, which results in pollution and congestion. The outskirts of the city have to the best option for development.
- As per TOD guideline, TOD site either infill or greenfield. Infill sites are challenging to implement as compared to the greenfield site.

Table 1 Study area village population

Villages	Population	Area (Ha)
Niyol	1,626	552.26
Sedhav	596	129.49

Deladva	1374	647.23
Mohni	1424	440.22
Kharvasa	1231	661.73
Khambhasala	452	261
Sania kanade	1555	157.34

(Source: Census of India, 2011)[3]

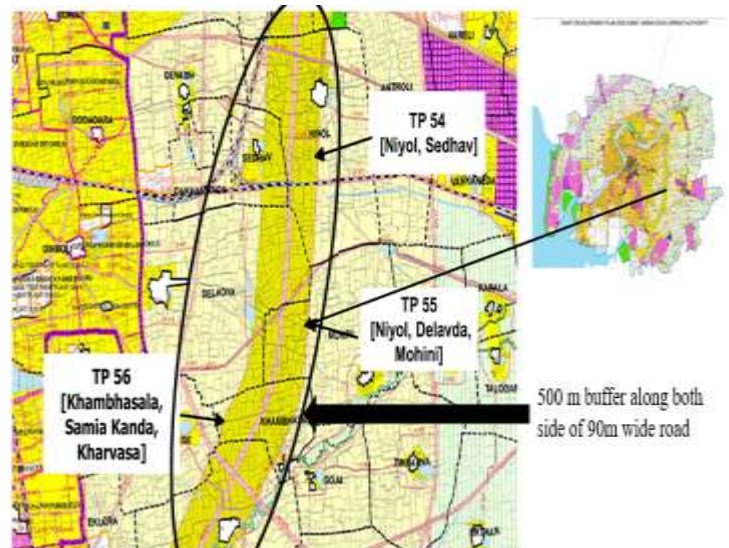


Figure 3 Study area profile

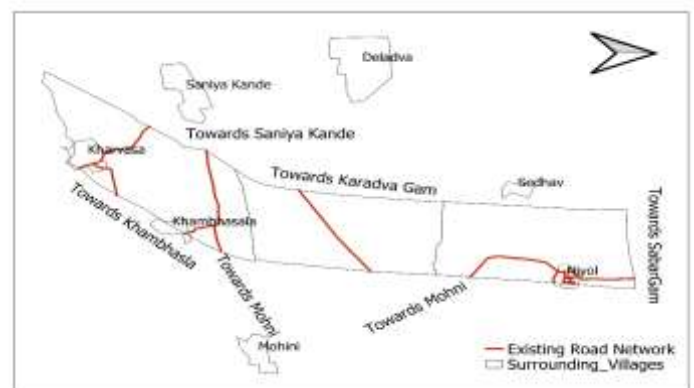


Figure 4 Existing road network of study area

6. TP SCHEME 54.55.56

- We gathered original study area TP schemes, identified as 54, 55 and 56.
- Such TP schemes were combined, and attention was given to the 7.8 km patch from Niyol to Kharvasa. Study proposing land-use plan along this 7.8 km on both sides for 500 metres.
- In any case, the 90-meter road, canal, khadi and village rest portion proposed in the TP scheme given by SUDA has not been updated. They were taken into account, as it is.

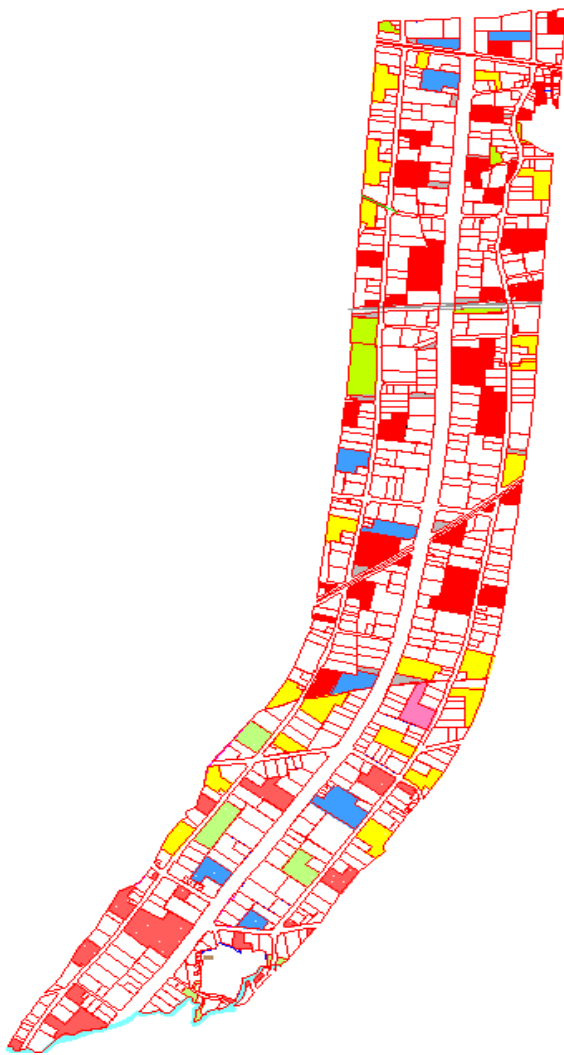


Figure 5 Merged TP 54,55,56

Table 2 Land use structure of TP 54,55,56

Land-use	T.P 54 (%)	T.P 55 (%)	T.P 56 (%)
Residential	64.97	63.74	66.24
Commercial	2.44	3.16	2.62
Transport & Communication	16.94	16.56	17.49
Social Infrastructure	13.44	13.13	10.06
Parking	1.15	1.28	0.97
Recreational	2.21	2.13	2.62

7. LAND USE MIX

As per Delhi TOD policy guideline, a minimum of 30% of FAR for residential uses, a minimum of 5% FAR for commercial uses and a minimum of 10% FAR for community facilities shall be required in any integrated scheme. At least 50% of the total FAR shall be as per ZDP use.[4]



Figure 6 Land use mix

(Source: Delhi Transit-oriented development manual)

8. PLANNING CRITERIA

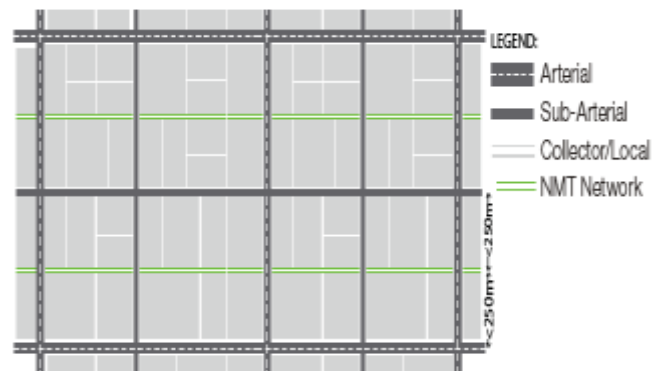
8.1 FSI for TOD Area

Table 3 FSI for TOD area

ZONES	Base FSI	Chargeable FSI	TOTAL FSI
Non-Transit oriented zone	1.8	0.9	2.7
Transit oriented zone	1.8	2.2	4.0

(Source: Surat Development plan 2035)[2]

8.2 Street Hierarchy



(Source: MoUD, TOD Guidance document)

Number of intersections of public pedestrian and cyclist network per square kilometre. Benchmark is at least 50 intersections per square km [5]

Table 4 Road width

Category	Road width (meter)
Arterial	50m to 80m
Sub-arterial	30m to 50m

Distributor	12m to 30m
Access	6m to 15m

(Source: MoUD, TOD Guidance document)[6]

8.3 Road Side Margin

Road side margin shall be as per road width & height, whichever is higher shall be applicable.

Table 5 Road side margin

Road Width meter	Road side margin meter
<Less or equal 7.5	2.5
>7.5 & <9.0	2.5
>9.0 & <12.0	3.0
>12.0 & <15.0	3.0
>15.0 & <18.0	4.5
>18.0 & <30.0	6.0
>30.0 & <45.0	7.5
More than 45.0	9.0

(Source: Comprehensive General Development Control Regulations, 2017)[7]

8.4 Minimum Housing Mix Criteria (By Unit Sizes)

- Minimum 15% of FAR for all TOD projects to be allocated to rental or for-sale housing with unit sizes no larger than 25sq.m.
- In addition to above, a minimum 15% of FAR for all TOD projects should be of unit sizes 40sq.m. or less.[8]

8.5 Road Width & Height

Table 6 Road width and building height

	Less than 9 m	9 m to 12 m	12m to 18m	18m to 36m	More than 36m
Building Height	10	15	25	45	70

(Source: Comprehensive General Development Control Regulations, 2017)[7]

9. LAND USE PLANNING PROPOSAL

Planning proposals are developed on both sides of the corridor with an average distance of 500 meters from the corridor to the Centre of zones. Based on FSI, we have prepared a single model for the area of study and can divide the model into two areas: Zone A & Zone B. Zone A is the high urban transit zone, i.e. 4 FSI and Area B with a value of 3 FSI.



Figure 7 Proposed block details

Area for residential zone is proposed such that gross density up to 300 is 1000 ppha and between 300 – 500 m it is 800 ppha.

- Recommended block size: 150-200m (ITDP TOD Standard)[9]

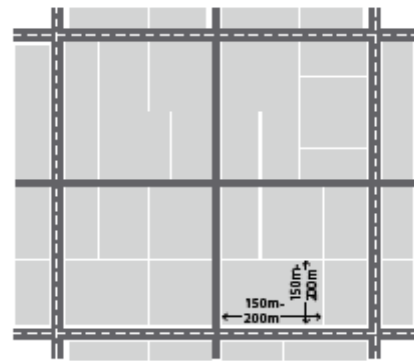


Figure 8 Block size

(Source: MoUD, TOD Guidance document)[6]

Table 7 Proposed population and density of block

	Area (Ha.)	Total Household	HH Density per Hector	Total Population
Block A	381.41	36,192	94.80	1,66,483
Block B	215.23	36,681	170.42	1,68,734
Total	596.64	72,873	265.22	3,35,217

Housing Unit Size (Sq. m)	Income Wise Category	Dwelling Unit	Percentage
25	1 BHK (EWS)	12000	16.55
40	1 BHK (ESW/LIG)	8990	12.40
65	1 BHK (MIG)	5240	7.22
80	2 BHK (MIG)	5555	7.66
160	3 BHK (MIG)	21620	29.81
200	4 BHK (HIG)	14616	20.15
230	5 BHK (HIG)	4508	6.22

(Source: RERA Mukhya mantri Gruh Yojna)[10]

The figure shows the detail land use planning of study area up to 500 m. The land use includes residential, commercial, public purpose, Mix land use and open spaces.

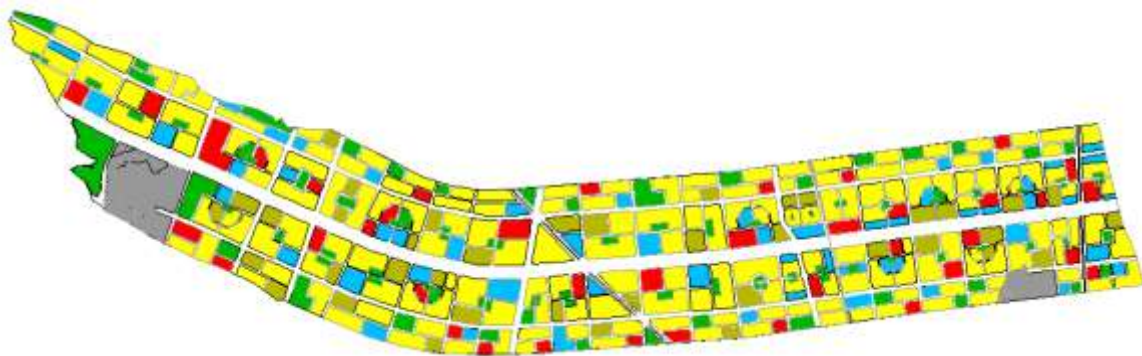


Figure 9 Proposed land use plan

Land Ues	percent %
Residential	40.46
Commercial	7.25
Social Infrastructure	5.95
Rereational	8.02
Transportation Network	32
Mix Use	6.31

Figure 10 proposed land use percentage

10. MASS TRANSIT SYSTEM – BRTS REQUIREMENTS

The overall length of BRT is 7.8 kilometers and 14 BRT station is 600 m apart. In the following figure the position of BRT is shown:



Legends
 • BRTS Station
 — TP Boundary

Figure 11 BRTS location



Figure 12 Integrating land use planning with BRT system
 (Source: Karl Fjellstrom, ITDP-China.org)

11. CONCLUDING REMARKS

- Surat is a fast-growing city of south Gujarat region as a result, the population has risen, land scarcity, noise, urban sprawl, congestion, and other related problems have escalated. To address this issue, TOD-land uses planning are taken as study area along a stretch of the outer ring road.
- The proposed land use planning focused on TOD provides compact, mixed land use planning that eliminates private vehicle usage and encourages mass transit. Planning this mixture of land uses will improve the community life style.
- Proposal of grid road layout plan, the main road would be well connected to each and every arterial as well as subarterial route.
- People with a high as well as a low lifestyle can be accommodated on the plan of mixed residential zoning.
- A plan has effective, fully-accessible walkways where all blocks and all building are linked to the adjacent pedestrian network by continuous walkways in all possible directions. Public bike-sharing also proposed to improving last-mile connectivity.

REFERENCES

- [1] A. D. I. Braswell, "Transit-Oriented Development: An Urban Design Assessment of Transit Stations in Atlanta," 2013.
- [2] S. U. D. Authority, "Surat Development Plan 2035," 2017.
- [3] Government of India, "Census of India, 2011." <http://census.gov.in/>.
- [4] WRI, "Transit Oriented Development Manual: Delhi TOD Policy & Regulations Interpretation," pp. 1-80, 2014.
- [5] "Parameters for the National Mission on Sustainable Habitat (NMSH), 2011," pp. 1-60.
- [6] Ministry of Urban Development Government of India, "Transit Oriented Development Guidance Document," 2016.
- [7] Urban Development and Urban Housing Development Department, "Comprehensive General Development Control Regulations - 2017," vol. 2017, no. October, pp. 1-67, 2019, [Online]. Available: <https://townplanning.gujarat.gov.in/Documents/CGDC R-2017 PART II- PLANNING REGULATIONS.pdf>.

- [8] Unified Traffic And Transportation Infrastructure (UTTIPEC), "Transit Oriented Development: Policy, Norms and Guidelines," New Delhi, 2012.
- [9] Institute for Transportation and Development Policy, "TOD Standard, ITDP , 2017 .," TOD Stand., vol. 3rd, 2013.
- [10] Government of Gujarat, "Urban Development & Urban Housing Development," [Online]. Available: udd.gujarat.gov.in.