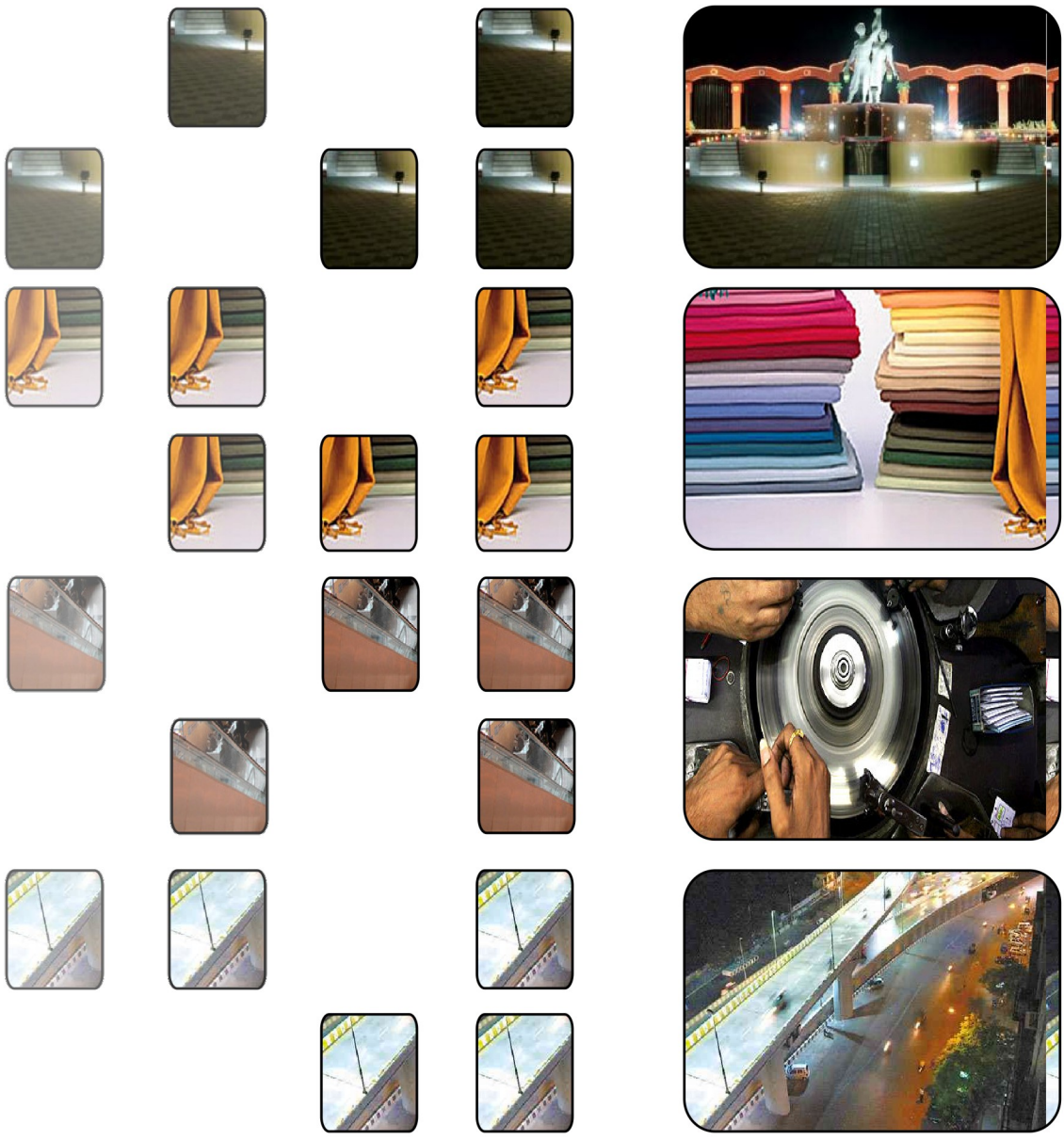


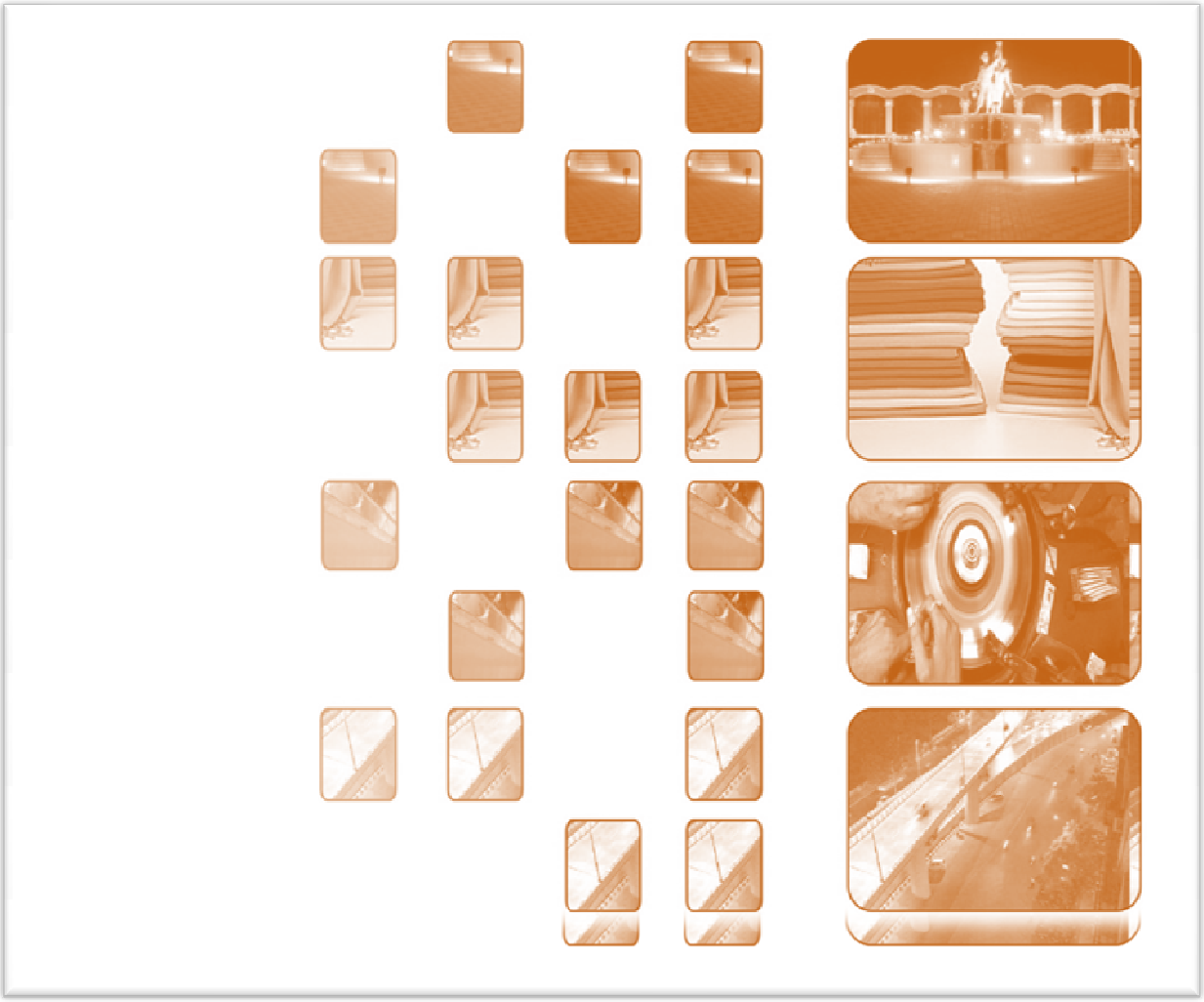
S U R A T

City Development Plan (Revised)
2008 - 2013

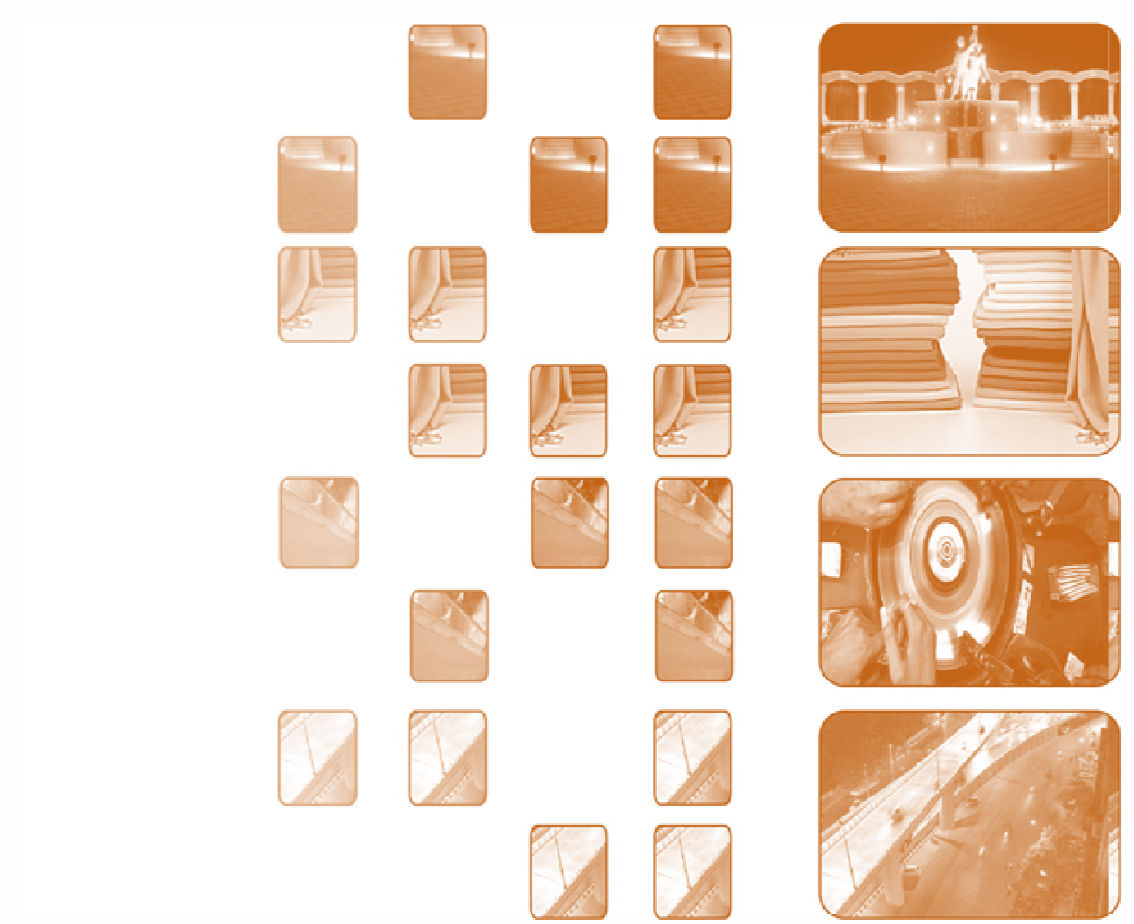
Surat Municipal Corporation (SMC)

Surat Urban Development Authority (SUDA)

With technical assistance from:
CEPT University, Ahmedabad



Surat City Development Plan (Revised)



Executive Summary

Executive Summary

Surat, is gearing up for becoming a city with global presence in a well-planned and systematic way. Known for its textile trade and diamond cutting and polishing industries, Surat has assured the world of its incredible revitalization capabilities. Rejuvenated civic sense amongst the citizens of Surat, efficient administration, focused planning and governing reforms were continued to convert the threat to the city into an opportunity. Surat expects to continue to aspirate in being a 'Global City – Global Standards'. In continuation of its effort in achieving its Goals, this document is an update of the City Development Plan, a process the city has been focused on since 1999.

The textile hub of the country, Surat produces 62% of the total power loom products, it has 6 lakh power looms and the sector provides over 12 lakhs jobs. 65% of nation's total diamond export is from Surat. The city displays high work participation rates average 32%. Surat is the India's tenth and Gujarat's second most populous city. With a population of 28.5 Lakhs, Surat presents a high rate of growth of population (Section 2.3.1). A feature of Surat is its vast pool of migrant population (about 55% of the total population).

Surat is a compact city and has been expanding along the transport corridors. The growth trends indicate sprawl tendency towards south and north east with growth extending towards northern side across the river. The residential development in the city covers about 57% of the total land use developments in the city. The major growth issues are over densification in the core central city area, concentrated residential development in the central and south western part of city, and highly unregulated Land and Real Estate Market lined developments. This creates intricate accessibility to land for affordable housing. The major challenge is to channelize the growth such that mobility is efficient. A feature of the city is also peri-urban growth, especially along the Surat- Hazira corridor as well as the resultant growth in the periphery. There are proposals to develop Surat Navsari Hub which will add to the sprawl in that direction (Section3.6). A recent feature in the city's growth is the merging of 35 peripheral villages (2006-7) as part of the Municipal Area.

Environmental Services

Considering the expansion of the city limits, Surat Municipal Corporation (SMC) has prepared a master plan for water and waste water disposal with a strong environmental safety and energy efficiency agenda built as part of the plan.

Water supply: Present system covers 85% of population with 145 lpcd water supply and the area covered is 56%. The current average yield to supply ratio for SMC's four major water works, Katargam, Sarthana, Varachha and Rander, is 57%. With the implementation of the Master Plan and management measures in terms reduction of unaccounted for water and energy conservation, Surat aims at achieving a 100% coverage target as well as address issues of contamination in areas where the pipes need to be replaced. (Section 4.1)

Sewerage: Waste water management is organized in six drainage zones including the walled city. This network covers 85% of the population, not being an undulating terrain, sewage is pumped through 28 pumping stations and this adds upto 50% of the cost of &M. More than coverage, the issue in Surat is of replacement of old pipelines in walled the city- Athwa and Umra areas. This is an action as part of the Sewer Master Plan 2041. A related issue in terms of environmental quality linked to sewage is the mixing of domestic sewage and industrial waste water from textile, printing and dying industries. The downstream of River Tapi has high quantities of industrial wastes and at the estuary of river Tapi, BOD, COD & FC is very high due to large number of sewerage outfalls. The commissioning of STPs would help in reduction of pollution levels at estuary of river Tapi. Though an issue of coordination than investment, there is a need to coordinate with the GPCB on river water quality monitoring (Section 10.2).

Solid waste Management Post plague in 1994, SMC has continuously upgraded the quality of waste management service delivery and the recent efforts include involvement of private sector. The private sector involvement is evident in the door-to-door waste collection, transportation and the final disposal of waste. A centralized bio-medical waste treatment facility has also been installed on BOOT basis. From a management perspective, the city is divided into 7 zones. The waste generated is collected throughout the city and treated at the Khajod disposal site (200 ha area). SMC's implementation of bio-medical waste treatment facility on BOOT basis has been recognized as best practice by an ULB. (Section 4.3.1)

Storm water: Being a relatively flat terrain has its unique problem of flooding and this is an important element of city's Disaster Management System (Section 4.4). The SWD system is not complete in the city and is a priority program of the city. Presently, the moats outside the peripheral wall of the old city carried the storm water discharge into Tapi River. The closed drains of the city amount to only 20.3 percent of the total length of surfaced roads.

Mobility

Surat has a network of 1599.0 kms. The public transport system was withdrawn since May 2007 and privately operated bus systems is operational since August 2007. The buses handle 1 % and Auto rickshaws handle about 21% of the total trips. Being a commercial city, the peak traffic volumes are observed throughout the days although two major peaks are also identifiable

(Section 6.6). The peak volumes are high especially in the industrial areas. Mobility in the City is by personal modes (51%). The impact of such a high rate of individual modes is the very high suspended particulate matter in the city which is attributed to the un-surfaced margins on most roads and inadequate traffic management measures resulting in reduced speed of vehicles. Chaotic movements at junctions have increased the dimension of the problem (Section 6.10). Besides upgrading public transport including a BRT, Surat has prepared a mobility plan for the city and plans to implement the projects defined thereof.

Social Infrastructure

It is observed that the city has to go long way as far as providing adequate social infrastructure for its citizens. Adequate social infrastructure reflects a good quality of life managed through provision of required health centers, educational institutes, recreational spaces, etc. SMC envisages a "Completely Literate and Green Surat" with adequate lung spaces in all the localities and a "Healthy Surat", free of health risks with adequate health facilities to tackle any situation of emergency by 2021.

Urban Poor and Inclusivity: Being a city dominated by migrant population and a higher concentration of lower Income households, SMC thrust is to provide better quality living environment. The main approaches followed by SMC are Slum rehabilitation, Slum Up-gradation and redevelopment under SMC Housing Policy and JnNURM sub-mission for Basic Services for Urban Poor (BSUP). SMC also need to focus on livelihoods and informal sector.

City Finances

SMC has been maintaining surplus funds over the years on account of strong revenue income stream, and efficient revenue and capital expenditure management. SMC's capital budget for the year 2008-9 was of the order of Rs 700 crore and substantial resources were from the JNNURM, the State and more importantly internal contribution. Internal sources have been in the form property tax, though the city receives 60% of revenue income by way of a grant in lieu of Octroi. Current collection efficiency of property tax stands at about 75%. Revenue expense has been 60% to the revenue income and establishment expenditure is around 50% of the total expenditure. (Section 15.2)

Table 1 Summarized SMC accounts from 2004-05 to 2008-09

Particular	2004-05	2005-06	2006-07	2007-08	2008-09	CAGR
Rs. Lakh						
Opening balance	**3662**	**5085**	**3223**	**5011**	**4399**	
Revenue Account						
Revenue Income	62042	67347	80245	89658	98766	**12%**
Revenue Expenses	34515	37826	45367	51300	58655	**14%**
Revenue surplus / deficit	**27526**	**29521**	**34878**	**38358**	**40110**	
Capital Account						
Capital Income	4669	4663	5253	20033	42756	**74%**
Capital Expenditure	17387	32563	34237	55375	73188	**43%**
Capital surplus / deficit	**-12718**	**-27900**	**-28984**	**-35342**	**-30432**	
Increase/decrease in cash due to increase/decrease in current assets/current liabilities	13386	3483	4106	3627	10784	
Closing balance	**5085**	**3223**	**5011**	**4399**	**3294**	

Source: SMC/ Author's analysis

SUDA Finances: Being a regulator and developer, SUDA's income is erratic in nature. Capital income remains SUDA's key source of revenue. Major areas of SUDA's capital income since 2004-05 is recovery from various EWS housing scheme constructed by the authority, development charges levied by SUDA, contribution from SMC, amenities fee and income from sale of land. Government grant and long term borrowings also contribute significantly but sporadically. SUDA has made capital expenditure around Rs. 3000 Lakh to Rs. 7500 Lakh per annum since in 2004-05. This represents about 25% of the capital expenditure when compared to SMC. Key sources of revenue income are zoning, licence, scrutiny etc. fees and interest income from fixed deposits. While on expense side salary - wages and general office expenses are the major heads.

Surat's Response

Surat has been innovating and has been using the CDP as tool to define and implement cities priorities. This revision of the CDP is a major step in this regard. One of the major inputs to the revision is the fact that population of Surat is likely to double from the present 2.8 million to 5.0 to 6.0 million by the year 2022 with low to medium growth scenario. Given the revitalization of economic growth, the demands for services to the growth drivers and the floating population would be on the rise. For the city's economic base to remain attractive and continuously upgrade quality of life of its residents, the strategic focus of the city has been structured around three elements:

- Promoting Growth
- Good Governance
- Improved Service Delivery

For growth the city should offer quality services and the Master Plans for environmental services and mobility should enable the city to be attractive and competitive. The Master Plans for environmental services focus on services as well as the larger objective of the CDP of environmental quality and energy savings. One of the concerns has been peri urban growth. To address the same the jurisdictional limits of the Municipal Corporation have been extended to 326.5 sq km in 2006.

Also, it is important to keep the city mobile and the need is to focus on public transportation systems along with development of road and other transportation services is necessary. Based on the city mobility plan, SMC has undertaken the implementation of Bus Rapid Transit System (BRTS) for a stretch of about 120 km. First phase of 30 km is expected to be completed by 2010. The project worth Rs. 469 Cr (with 82 Cr of outlay for year 2009-10). Apart from development of public transportation system focus is on improving parking and traffic management. (Section 6.11)

In terms of achieving the CDP Goals, support from **Jawaharlal Nehru National Urban Renewal Mission** (JNNURM) has been significant and SMC expects continuous support not just for investments but also for reforms in the city's planning and management systems.

Investment Needs

The invest needs in relation to the city's goals is placed at Rs. 3166 Crores (2009-14), about Rs 600 crores a year. An investment that can be managed given the city's history of investments. A management decision of importance will be in terms of delegation of powers to various levels of SMC in terms of investment decisions. (Section 16.3)

Table 2 Summary of Investment Requirements for SMC (*Figures in Rs. Lakhs)*

Name of the sector	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Water supply	14473	12607	11125	10150	0	**48355**
Sewerage	9706	23545	23545	23545	0	**80342**
Storm water drainage	5574	6813	6869	6869	4579	**30704**
Solid waste management	1285	1285	1285	0	0	**3856**
Transportation System - Roads and bridges	13025	52223	2100	0	0	**67349**
Transportation System - Urban Transport (BRTS)	8200	27500	11202	0	0	**46902**
Housing/E.W.S (VAMBAY)	5390	23238	2622	0	0	**31250**
Social Development -Central Science Centre & -High-tech entertainment	737	1475	1475	0	0	**3687**
Flood protection and Disaster management & Tapi River Front Development	3560	570	0	0	0	**4130**
Total	**61950**	**149257**	**60223**	**40564**	**4579**	**3,16,573**

Source: SMC/ Author's analysis

It is apparent from the above table that about 35 % of the investment is proposed towards environmental services – (Water sewerage, and drainage) followed by mobility related investments (21%), and Housing under EWS/ VAMBE (10% each). Around 70% of the above investment is planned under JnNURM. Of this, the share of Central and State Government is estimated to be 49% of the total proposed investment and contribution from SMC would be 51%.

SUDA had handed over most of its TPSs to SMC. Since then, no major capital projects are being carried out by SUDA. New TPSs have been proposed. They are likely to be approved in the next two to three years. New projects would come up only after the approval of TPSs. However some projects are under execution. Those projects are worth of Rs. 6260 Lakh. Key projects are two ROBs at Sachin railway station. One ROB is under JnNURM while other is being constructed in collaboration with Indian Railway. SUDA is planning to beautify lakes and gardens under its purview.

Investment Sustainability:

With the level of investment, analysis of SMC's sustainability presents a deficit of Rs. 419.18 crore and Rs. 127.81 crore occurs in the opening balance of 2011-12 and 2012-13 respectively. While this is an area of concern, mitigation strategies for meeting the deficits are as follows;

Strategy 1

A) Short Term debt can be raised from banks / financial institutions as the repayment is possible in the next three years immediately following the deficit years.
B) Decrease in employee burden through innovative rationalization.

Strategy 2

A) Short Term debt can be raised from banks / financial institutions as the repayment is possible in the next three years immediately following the deficit years.
B) Decrease in employee burden through innovative rationalization.
C) Explore the possibility of increase in taxes and charges.

The strategy 2 is the most appropriate. According to this strategy, the taxes and charges levied by SMC are to be increased by 20% and amount to be invested in pension fund in 2009-10 and 2010-11, which is around Rs. 60 crore, is not to be spent.

With this the estimated deficit at the end of 2010-11 would go down up to Rs. 291 crore. Amount to be borrowed is estimated, considering the remaining deficit and working capital fund requirement of SMC. Thus it is proposed that SMC would have to borrow Rs. 370 crore from the banks/institutions. Closing balance of at the end of 2010-11 would remain Rs. 34 crore surpluses. It would also suffice the working capital need of SMC. The deficit occurring in 2011-12 also disappears owing to the strategy. The Result from the strategy is as follows:

Table 3: Status of municipal finance according Strategy 2 ***Figures in Rs. Lakhs***

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Opening balance	**3293.84**	**9014.90**	**3451.88**	**24799.73**	**37260.83**
Revenue Income	110932.47	131873.19	148621.52	167654.87	189276.47
Revenue expenditure	76579.20	95123.95	92399.63	99382.80	106031.72
Revenue surplus / deficit	**34353.27**	**36749.24**	**56221.89**	**68272.07**	**83244.75**
Capital income	34358.08	108035.36	39043.37	28158.16	5071.41
Capital expenditure	62990.29	150347.63	73917.41	83969.12	48085.91
Capital surplus / deficit	**-28632.21**	**-42312.27**	**-34874.04**	**-55810.96**	**-43014.49**
Closing balance	**9014.90**	**3451.88**	**24799.73**	**37260.83**	**77491.09**

Source: Author's analysis

The amount to be borrowed with the strategy 2 is Rs. 80 crore less than the other one. Thus it would reduce the interest burden by Rs. 19 crore (assuming debt is available at 12% interest rate)

Analysis of SUDA's finances assumes that TPS would come up in 2012-13 and the associated revenue and expenditures. SUDA does not have any major capital expenditure it would generate large fund surplus. It is assumed that apart from the proposed investment and select

capital works would continue upto year 2012-13 when new TPS are assumed to come up and thus a higher capital expenditure is expected. The scenario is as follows;

Table 4: SUDA – Key Scenario for FOP *(Figures in Rs. Lakhs)*

Particular		2009-10	2010-11	2011-12	2012-13	2013-14
Scenario 2	Unidentified Capital Investment	500	500	500	5000	5000
	State Government Grant	0	0	0	2500	2500
	Amount for FD with GSFS	4000	1500	1000	0	0
	Cumulative FD	4,000	5,500	6,500	6,500	6,500
	Interest on cumulative FD	360	495	585	585	585
	Total Interest gained	**2610**				

Source: Author's analysis

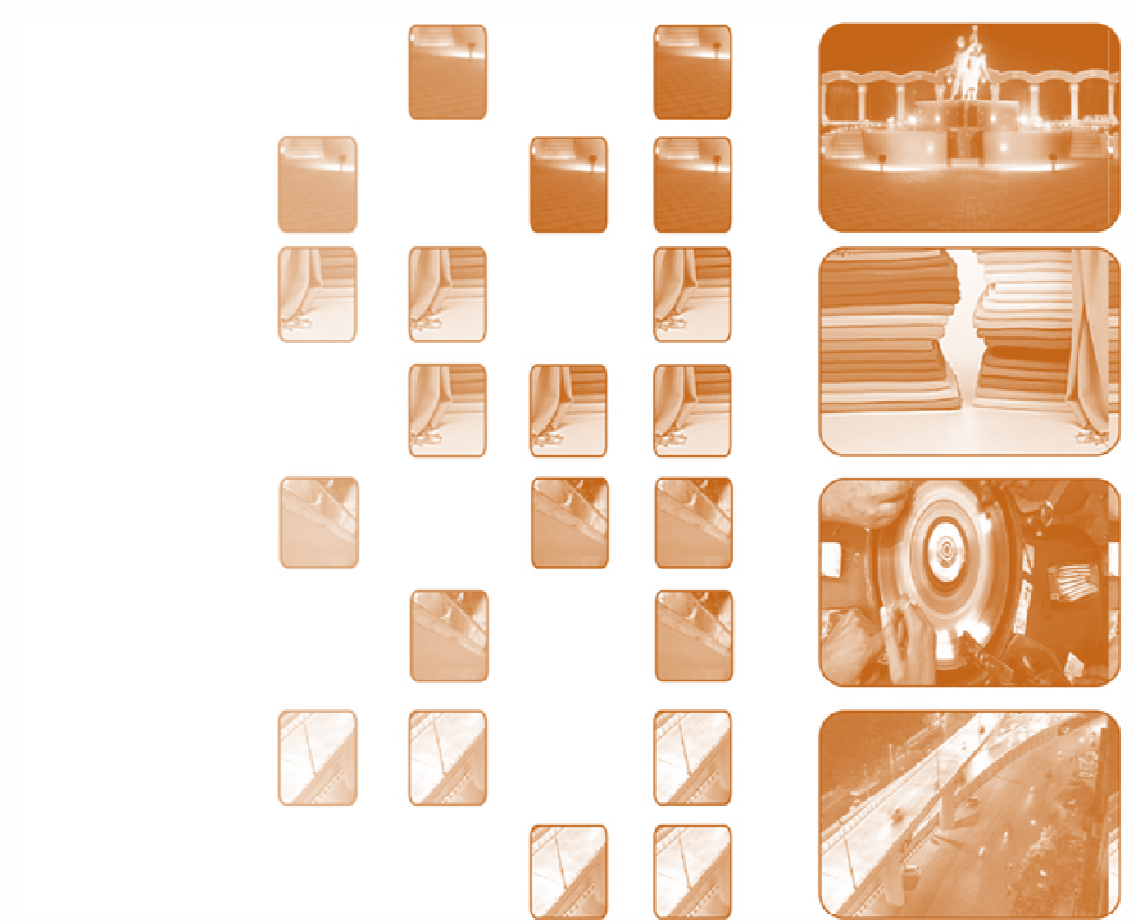
The above scenario provides most likely situation if TPSs are introduced in 2012-13. The status of projected SUDA finance with the scenario is as follows;

Table 5: SUDA – Status of SUDA finance with Scenario 2 *(Figures in Rs. Lakhs)*

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Opening balance (A)	**5,135.88**	**4,623.50**	**5,135.36**	**6,060.43**	**5,088.73**
Revenue income (1)	1,763.99	1,423.18	1,511.79	1,518.29	1,524.99
Revenue expenses (2)	527.04	563.64	604.22	583.19	548.77
Revenue surplus / deficit B = (1-2)	**1,236.95**	**859.55**	**907.57**	**935.10**	**976.23**
Capital income (3)	3,356.67	4,182.31	3,841.50	3,893.20	3,879.23
Capital expenditure (4)	5,106.00	4,530.00	3,824.00	5,800.00	5,000.00
Capital surplus / deficit C= 3-4	**(1,749.33)**	**(347.69)**	**17.50**	**(1,906.80)**	**(1,120.77)**
Closing balance (A+B+C)	**4,623.50**	**5,135.36**	**6,060.43**	**5,088.73**	**4,944.19**

Source: Author's analysis

It can be said that SUDA is financially sustainable to carry out projects on hand and unidentified projects by 2013-14.



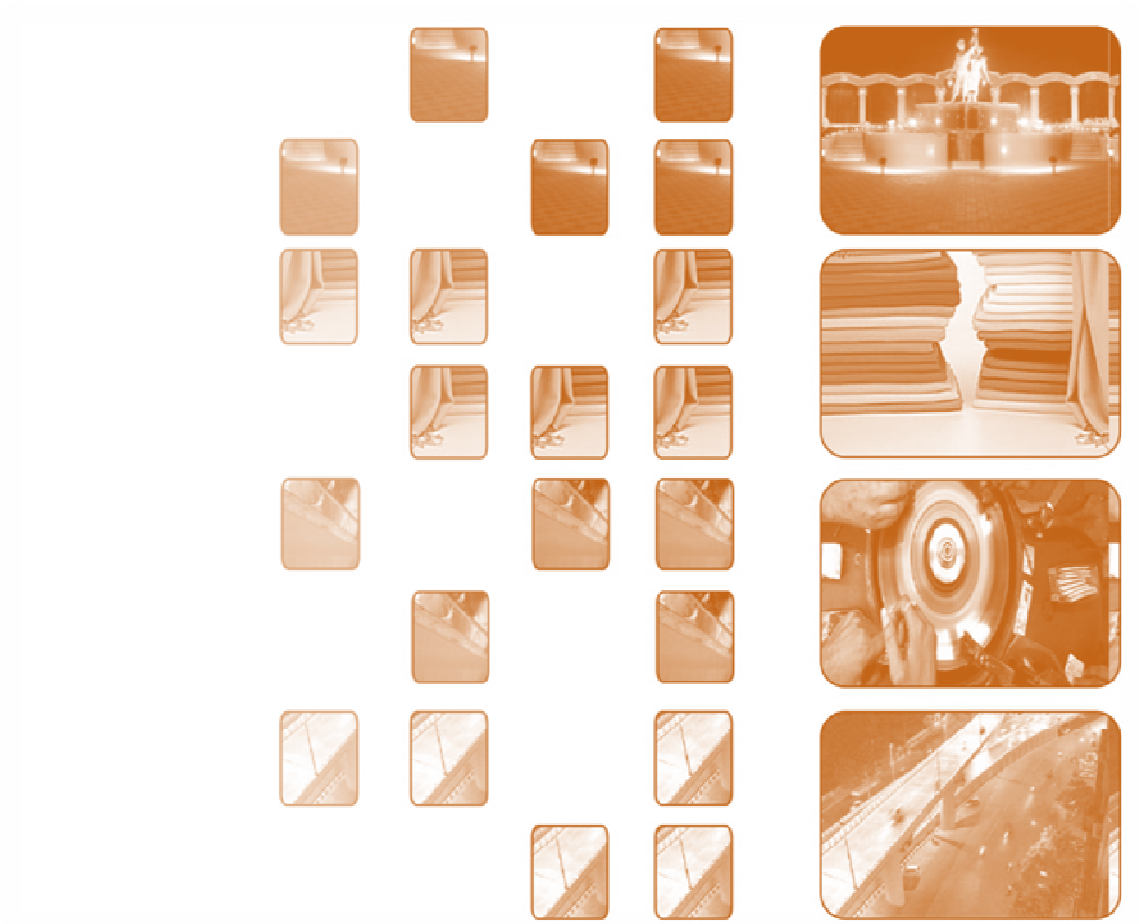
Abbreviations

Abbreviations

ACCCRN	-	Asian Cities Climate Change Resilience Network
ACP	-	Assistant Commissioner of Police
ASI		Archaeological Survey of India
BMW		Bio Medical Waste
BNHS	-	Bombay Natural History Society
BOD	-	Bio-Chemical Oxygen Demand
BOOT	-	Built Own Operate and Transfer
BOT	-	Built Operate Transfer
BPL	-	Below Poverty Line
BPMC Act		Bombay Provincial Municipal Corporation Act
BRTS	-	Bus Rapid Transit System
BSUP		Basic Services for urban Poor
CAA	-	Constitutional Amendment Act
CBD	-	Central Business District
CBO		Community Based Organizations
CDP	-	City Development Plan
CEPT	-	Center For Environmental Planning and Technology
CES	-	Consulting Engineering Services
CMIE	-	Center for Monitoring Indian Economy
CMP		City Mobility Plan
CMP	-	Comprehensive Mobility Plan
CNG	-	Compressed Natural Gases
COD	-	Chemical Oxygen Demand
CPCB	-	Central Pollution Control Board
CPM		Construction Project Management
CRPF		Central Reserve Police Force
CRRI	-	Central Road Research Institute
DCR	-	Development Control Regulations
DPR	-	Detailed Project Report
DWCUA	-	Development of Women & children in Urban Area
EDP		Electronic Data processing
EMI	-	Equated Monthly Installment
EOI	-	Expression of Interest
ESR	-	Elevated Storage Reservoir
EWS	-	Economically Weaker Section
FC	-	Fecal Coli forms
FDI		Foreign Direct Investment
GDP		Gross Domestic Product
GIDB	-	Gujarat Infrastructure Development Board
GIDC	-	Gujarat Industrial Development Corporation
GIS	-	Geographic Information System
GPCB	-	Gujarat Pollution Control Board
GSPCL		Gujarat State Petroleum Chemical Limited
GSRTC	-	Gujarat State Road Transport Corporation

GTPUD	-	Gujarat Town Planning and Urban Development Act
GWSSB		Gujarat State water supply and sewerage board
Ha	-	Hectare
HIG	-	High Income Group
IAS		Indian Administrative services
IPTS	-	Integrated Para-transit Service
IRDP	-	Integrated Road Development Program
IRMA	-	Independent Review and Monitoring Agency
ISHUP	-	Interest Subsidy Scheme for Housing for Urban Poor
ISO	-	International Standard Organization
JGP	-	Juvenile Guidance Programs
JnNURM	-	Jawaharlal Nehru National Urban Renewal Mission
LED	-	Light emitting Diodes
LIG	-	Low Income Group
LRT	-	Light Rail Transit
MIG	-	Middle Income Group
MIS		Management Information Systems
MLD	-	Million Liters Per Day
MSW	-	Municipal Solid Waste
MSW	-	Municipal Solid Waste
MT	-	Metric Tunes
MW	-	Mega Watt
NAAQS	-	National Ambient Air Quality Standards
NGO		Non Governmental Organizations
NIUA	-	National Institute of Urban Affairs
NMV	-	Non-motorized Vehicles
NOx	-	Oxides of Nitrate
PCU	-	Passenger Car Unit
PEARL		Peer Experience and Reflective Learning
PERT		Program Evaluation and Review Technique
PHPD	-	Per Hour Per Direction
PIU	-	Project Implementation Unit
PPH	-	Persons Per Hectare
PPP	-	Public Private Partnership
PTS		Para Transit services
PWD		Public Works Department
REACH		Relevance and Excellence in Achieving New Heights in Educational Institutions
RoW	-	Right of Way
RSPM	-	Respirable Suspended Particulate Matter
RTO		Regional Transport Office
RWA	-	Resident Welfare Association
SCADA	-	Supervisory Control And Data Acquisition
SEZ	-	Special Economic Zone
SJSRY	-	Swarna Jayanti Shehari Rojgar Yojana
SMC	-	Surat Municipal Corporation
SMIMER		Surat Municipal Institute for Medical Education and Research

SO2	-	Sulfur Di-oxide
SPM	-	Suspended Particulate Matter
SPS	-	Sewage Pumping Stations
STM	-	Surat Textile Market
STP	-	Sewage Treatment Plants
SUDA	-	Surat Urban Development Authority
SWOT	-	Strength, Weakness, Opportunities and Threats
TDS		Total Dissolve Solids
TIFAC		Technology Information Forecasting and Assessment Council
TMAI		Traffic Management Awareness Institute
TPS		Town Planning Schemes
UCD	-	Urban Community Development
UDPFI	-	Urban Development Plan Formulation and Implementation
UFW	-	Unaccounted for Water
UGSR	-	Under Ground Storage Reservoir
UHC	-	Urban Health Center
UIG	-	Urban Infrastructure and Governance
ULB	-	Urban Local Body
URIF	-	Urban Reform Incentive Fund
USD	-	US Dollars
VAMBAY	-	Valmiki Ambedker Awas Yojana
VGGIS	-	Vibrant Gujarat Global Investors Summit



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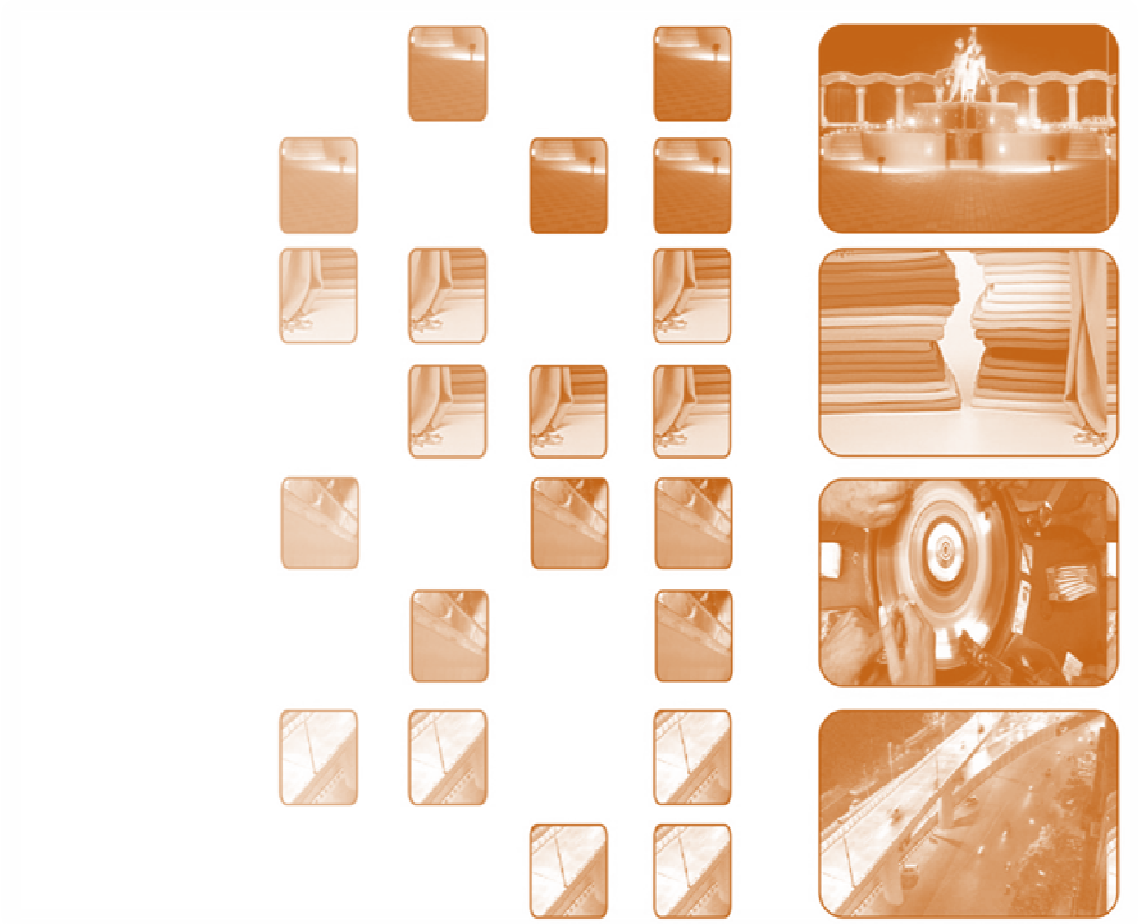


Chapter 1

Introduction to the City and Its Planning Process

City Development Plan

CDP as Living Document

City Planning Process in Surat

City Development Plan (2008-2013)

Structure of the Report

CHAPTER 1. INTRODUCTION TO THE CITY AND ITS PLANNING PROCESS

1.1 BACKGROUND

Cities play a critical role in the economic development process of the nation. The cities continue to have a positive influence on the surrounding region if the urban planning is improved and the city services are properly maintained. Cities are the engines of economic growth and places of high productivity. They contribute more than the proportionate share towards the region's income. For instance, Surat district alone contributed about Rs. 407.19 Crores to the State through Service Tax, Rs. 5378.73 Crores as Excise duty and over Rs. 241 Crores as Customs Revenue in 2008-09. This clearly demonstrates that to sustain high rates of economic growth, cities have to be made productive and competitive. In a globalizing scenario, the role of the cities is even more pronounced. With no barriers, attractiveness of a city as an investment destination depends on the quality of infrastructure, social safety and connectivity. Ultimately, improved quality of life in our city would depend on our ability to compete successfully with other city-regions and to provide the necessary foundations for growth. Competitive businesses and industries are going to result in employment and increased revenues to the local government. To achieve this objective of being the most appropriate choice of investment/ residence, there is a need to strategically position our city strengths.

While cities generate more than proportionate share of States' income, they also pose certain challenges. The challenges relate to providing access to serviced land for housing the urban poor, provision of basic amenities and facilities and a system to plan and manage these. To address the critical concerns, the Government of Gujarat has articulated and is implementing several state specific programs apart from implementing centrally sponsored schemes the urban local bodies in the state have been implementing many urban development programs to improve governance, encourage stakeholder participation, and improve service delivery in the areas of water supply, sanitation, and other services.

The Government of Gujarat also initiated a number of reforms in the urban sector for strengthening governance and to strengthen service delivery in the areas of resource mobilization, property tax reforms, encouraging private sector participation, e-governance, transparent and people oriented urban governance. Hence urban investments in economic, physical and social infrastructure at adequate levels are a prerequisite. In recognition of these the state has initiated a series of reforms in urban governance. A greater emphasis was laid when the state declared the year 2005 as Urban Development Year. At the State level several initiatives have been made in line with URIF (Urban Reform Incentive Fund) framework.

As part of this, cities have prepared City Development Strategies/Plan which outlined vision, strategies to achieve the vision and time bound action plans. The City Development Strategy/Plans were prepared through consultative process for all major cities.

1.2 CITY DEVELOPMENT PLAN (CDP)

A City Development Plan is a comprehensive plan for the sustainable development of the city, with a strong focus on addressing prioritized problems, in line with a medium to long term vision for the future and supported by available financial resources.

The **Jawaharlal Nehru National Urban Renewal Mission** (JnNURM) gives the city an opportunity to carry forward and place the reform process on a higher plane. This would also be an opportunity for the city to undertake a mid-course assessment and reposition its priorities with changing needs within the JNNURM framework.

It is an iterative process and focuses on the key services as identified in the Visioning exercise. As envisaged, the plan is anchored on the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) goal of creating economically productive, efficient, equitable and responsive cities. Among the agencies the Surat Urban Local Body (Surat Municipal Corporation), the apex-planning agency is important as it takes care of major developmental activities in the peripheral areas of SMC. The consideration is that in the near future these outgrowth areas either will be merged with SMC jurisdiction or a separate Municipal Corporation will be formed so that service delivery improves.

A City Development Plan is a perspective of and a vision for the future development of a city. Essentially it addresses following questions:

- **Where are we now?**
- **Where do we want to go?**
- **What do we need to address on priority basis?**
- **What interventions do we make in order to attain the vision?**

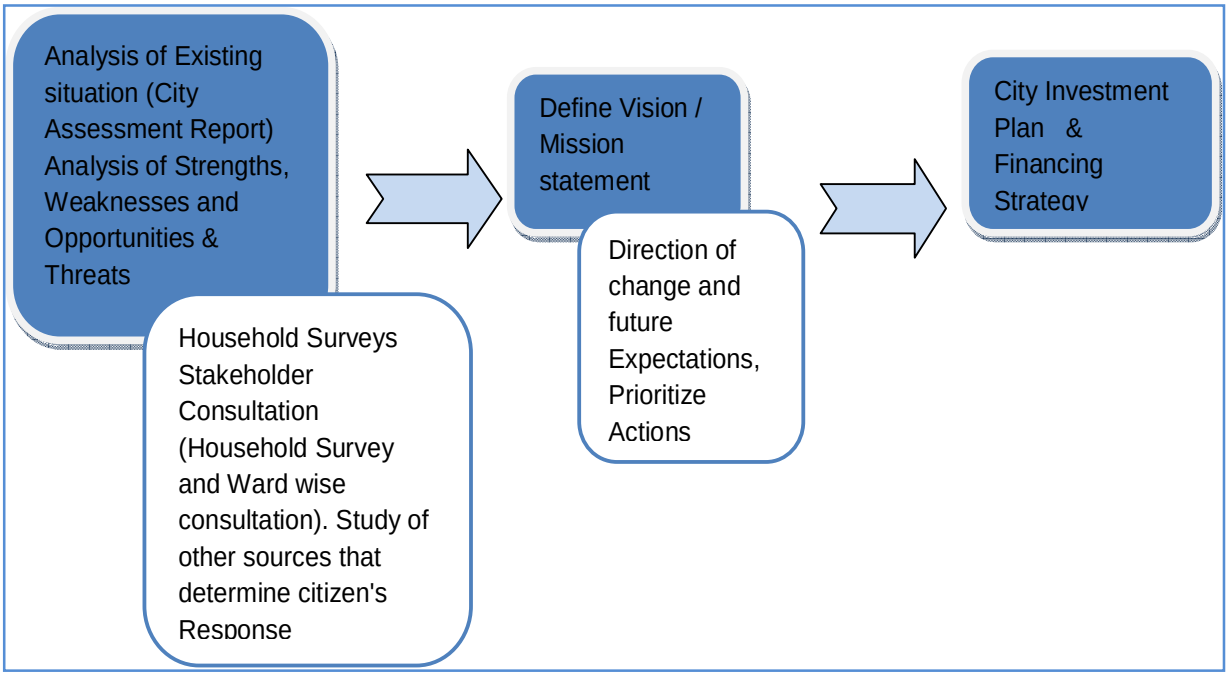


Figure 1-1 CDP Process

As discussed above, strategic planning has to be action oriented and linked to tactical and operation planning in order to be effective. Thus the medium term City Development Plan is prepared for the initial 5 years. The plan will set out in detail the priority projects, outline the tasks to be undertaken and give investment options ahead. The plan also proposes a Financial Operating Plan for the period based on the long-term financial vision and high priority investment requirements.

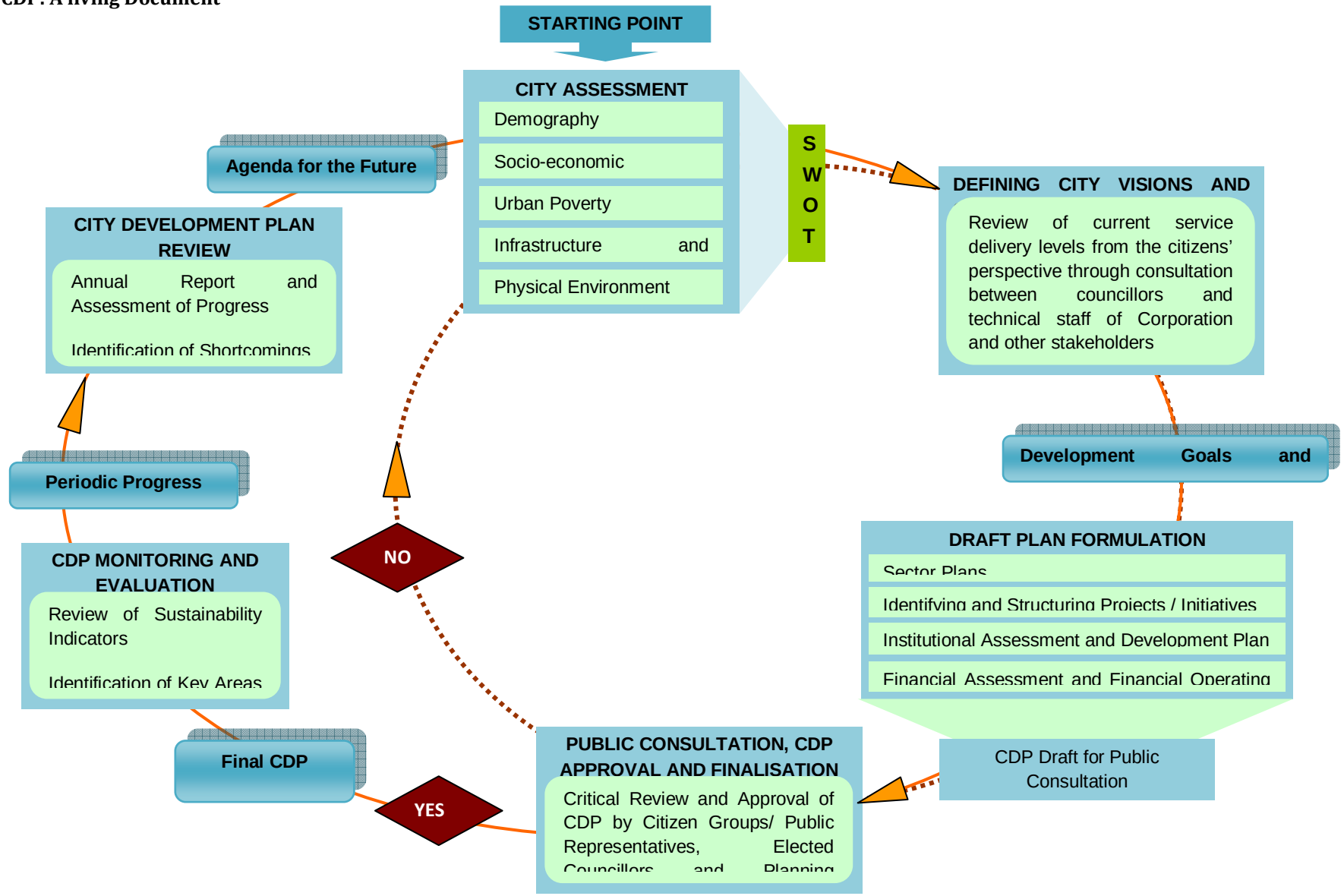
1.3 CDP AS A LIVING DOCUMENT

'City Planning' is a process of continuous development. The changes in the physical and qualitative status of the city's infrastructure should reflect in the planning process. Hence, the CDP has to be looked at in a context of the dynamic nature of the issues involved. The timeline and processes for changes and mid-term course correction related to varying aspects of the CDP have to be dynamic, to reflect the changing physical as well as policy environment. The CDP should integrate developments in the ULBs with its immediate spatial continuum extending to the peri-urban and rural areas.

CDP is both a perspective and a vision for the future development of a city, it should not limit itself only to provide for existing and projected shortfalls but to provide for better quality of services, infrastructure and built environment for the future.

The process of CDP revision is explained in the diagram below.

Figure 1-2 CDP: A living Document



1.4 CITY PLANNING PROCESS IN SURAT

Surat City went through substantial transformation after the Plague of 1994. Rejuvenated civic sense amongst the citizens of Surat, efficient administration, focused planning and governing reforms were continued to convert the threat to the city into an opportunity. City development strategies were one such planning exercise that was initiated involving the people of Surat.

1.4.1 CITY DEVELOPMENT STRATEGIES

The process of preparation of City Development Strategy as part Gujarat Urban Reforms Project of the World Bank began in the year 1998 with initiation of series of consultations. The outcome of these consultations was synthesized to form a City Development Strategy in February 2003. The strategic plan involves articulating a clear vision for the city over the next 20 years with the active participation of the stakeholders and subsequently implementing the vision articulated by them. For effective implementation of the strategies and vision, the City Development Plan (CDP) works as Medium-term plan focusing on priority projects.

The Surat Municipal Corporation (SMC) took up the project of devising “City Development Strategies” for the long term and short term planning of the city in the year 2000. The purpose: a more focused and better use of resources through clarity in mission and long-term goals of SMC. The main objective of the project was to develop Surat into a “Model City” through a definite Strategic Plan, covering all sectors of services with short term (next 5 years) and long term (up to 2022 A.D.) plans.

IDENTIFICATION OF SECTORS AND SERVICES

In January 2000, the Surat Municipal Corporation (SMC) successfully conducted the workshop on "City Development Strategies" with Surat State Government Officials, Municipal Councilors and leading NGOs. The workshop was aimed to exchange the views on "the exquisite formulation of the City Development Strategies (CDS)". Sectors and Services were to be identified for short term and long term planning of the City Development Strategies. Accordingly, SMC defined the sectors/ services to be covered for the City Development Strategies to nurture every citizen's dream to make Surat as the "Model City of India".

EVALUATION OF EXISTING SERVICES

In order to elicit the people’s responses in developing the future vision of the city and to measure the satisfaction level regarding the existing services, SMC had distributed approximately 30000 copies of a questionnaire to the identified stakeholders. Questionnaires were also sent to all the senior officials of the SMC for their suggestions. Nearly 13 percent of the questionnaires were duly filled in by the stakeholders and suggestions made were analyzed.

SWOT ANALYSIS

The analysis of the filled in questionnaires made the SMC have a close look at what it believed were the strengths and weaknesses together with the threats and opportunities it faced.

FUTURE PLANNING

Workshop on "City Development Strategies" conducted on 12th January 2000 at Indoor Stadium, Athwalines, Surat.

In order to realize the stature of a "Model City" and while taking into account the expectations of external and internal lending agencies, which would finance the long-term development goals; the city corporation felt the need for a short-term strategic framework that will guide the long-term strategic plan. This short-term framework is otherwise called the CITY CORPORATE PLAN. All implementation plans will be based on the Corporate Plan only. The budgetary provisions, development of financial and physical resources, augmentation of existing services and development of new projects are planned to be based on the Corporate Plan. The SWOT analysis carried out by SMC also produced a set of core values which will act as fundamental guidelines for the preparation of the Corporate Plan and the ultimate measure of the plan's success or failure. Based on the SMC's infrastructure analysis SUDA has also identified the sectors and services to be improved for model city.

1.4.2 SURAT VISION 2020

Based on the first phase of City development strategies and its sectoral analysis done by SMC and SUDA, an exercise to formalize Vision 2020 was launched in March – May 2004 with the objective of positioning Surat as "**Global City with Global Standards**". This is the vision articulated by the citizens of Surat, supported by the Government of Gujarat. Surat Vision 2020 took the shape of a public document and was inaugurated by Shri Narendra Modi, Hon. Chief Minister of Gujarat on May 1, 2004. Upon completion of one year, a progress review was done with a stakeholder meeting organized on September 15, 2005 along with the Chamber of Commerce.

Surat city is gearing up for becoming a city with global presence in a well-planned and systematic way. There is an awareness that the City needs to strategically decide its future growth direction. The people of Surat articulate their aspirations in terms of their vision 'Global City – Global Standards' and the 'FUTURE CITY' with Global Standards and Values'.

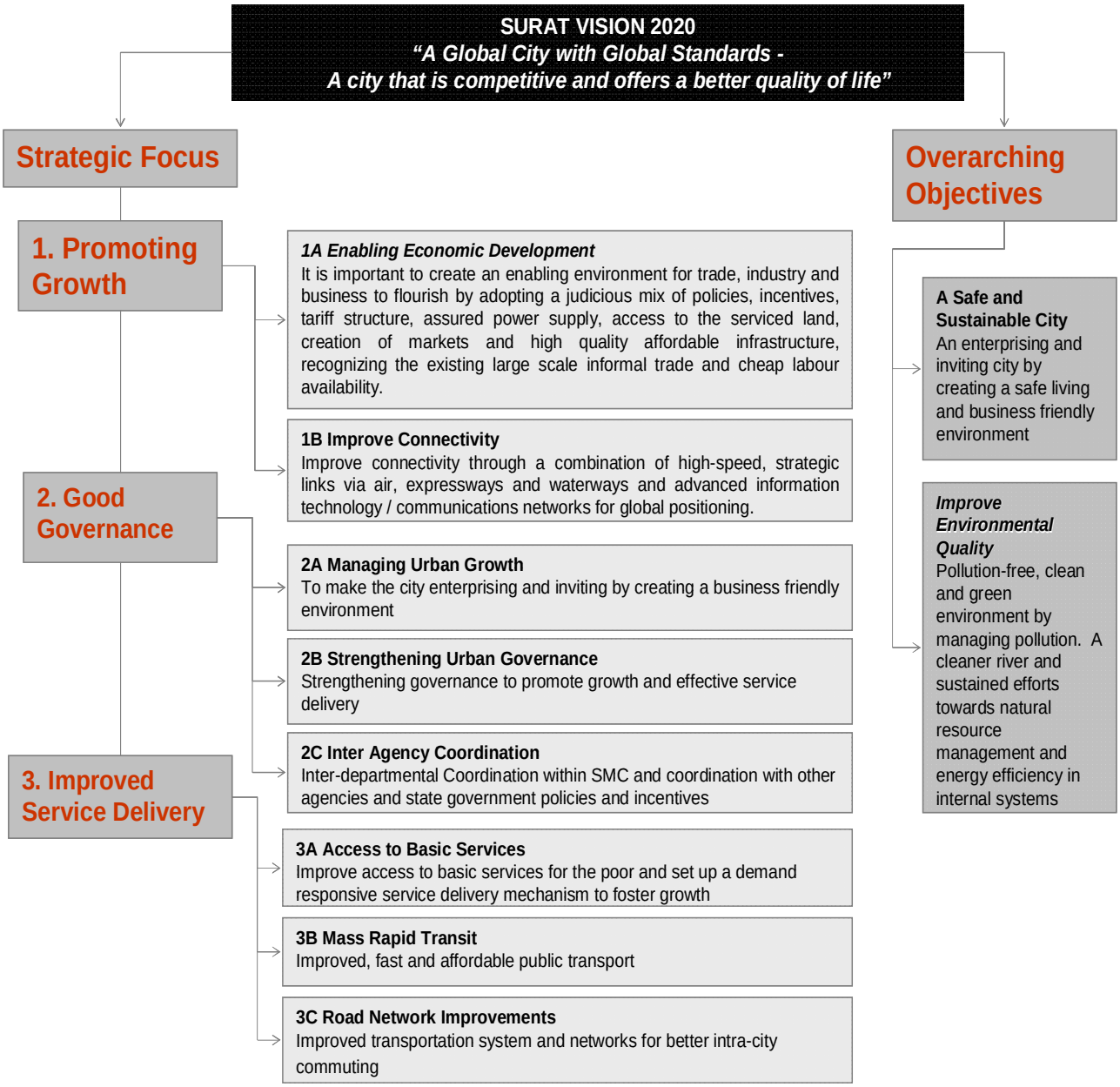
» **Strategic Focus**

The city's population with its continuing high rate of growth is likely to double from the present 2.8 million to 5.5 to 6.0 million by the year 2020. The forecasts are in the order of 3.9 and 4.5 Million by 2012 and 2017 in medium growth scenario. The city's economic base has to remain attractive and continuously upgrade quality of life of its residents. In this light the

strategic focus of the city has been structured around three elements:

- Promoting Growth
- Good Governance
- Improved Service Delivery

Figure 1-3 Surat Vision 2020



The overarching objective of this strategy is to promote safety, security, and environmental quality. Promote a range of actions to achieve the wider environmental sustainability of the growing city, including radical improvements in the use of land, use of water, the treatment of waste, the reduction of noise, air pollution and the promotion of a green city.

1.4.3 SURAT CITY DEVELOPMENT PLAN (2006-12)

With initiation of **Jawaharlal Nehru National Urban Renewal Mission** (JNNURM) in December 2005, Surat Municipal Corporation Prepared the City Development Plan (2006-2012). The aim of the JNNURAM is to encourage reforms and fast track planned development of city. CDP is a perspective and vision for the future development of a city. For Surat city CDP is a continuous process and focuses on the key issues which were identified in the above two visioning exercise. The CDP contained detail assessment of all sector of the city and gave detail outline of the priority projects and ongoing projects also detailed out financial operating plan for the short term and long term bases.

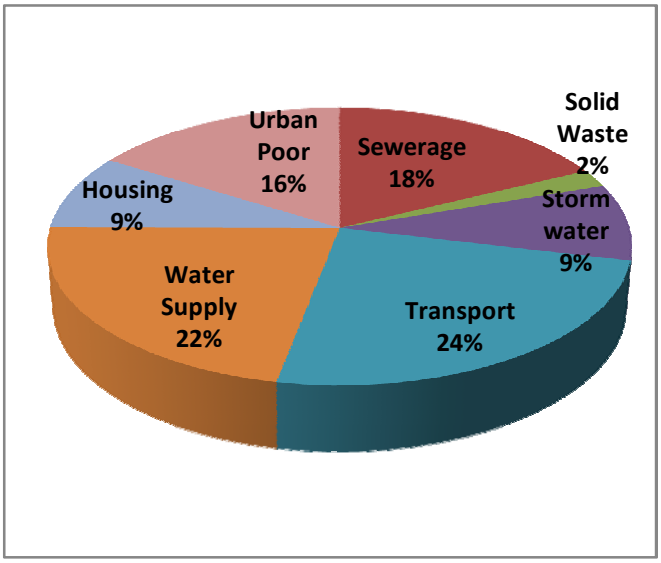


Chart 1-1 Sector wise Percentage of total cost sanctioned

According to Appraisal report of National Institute of Urban Affairs (NIUA), SMC has prepared and presented CDP (2006-12) very Well. Towards achieving vision, urban growth management strategies have been formulated in CDP, which shall take into account integrated water & waste water management, storm water management and offer a safe and sustainable environment to promote growth. Based on CDP Surat stands in the list of leading cities to implement the sanctioned JnNURM projects. At the same time Surat has intimated to implement the urban reforms within the time frame of MoA with Central and State Government. The number of projects sanctioned in various sectors along with the sanctioned project cost is given in the table ahead

Table 1-1: Detail of Sanctioned Projects under JnNURM after CDP (2006-12) in Surat (Rs. In Crores)

Sector	No of Projects Sanctioned	Project Cost Sanctioned by Govt of India	Awarded Cost	Share of (GoI)	Share of (ULB)	Share of (GoG)	Total Release	Expenditure till May 09 end
Sewerage	9	432.19	392.43	82.85	33.14	96.63	212.62	191.52
% of Sanctioned cost			***90.8***				***49.2***	***44.3***
Solid Waste	1	52.5	52.41	6.56	2.62	4.26	13.44	14.87
% of Sanctioned cost			***99.8***				***25.6***	***28.3***
Storm water	3	218.04	189.21	54.49	21.81	36.56	112.86	109.57
% of Sanctioned cost			***86.8***				***51.8***	***50.3***
Transport	7	594.37	97.44	96.67	38.65	67.39	202.71	77.38
% of Sanctioned cost			***16.4***				***34.1***	***13.0***
Water Supply	5	538.34	252.76	113.41	45.34	69.9	228.65	184.7
% of Sanctioned cost			***47.0***				***42.5***	***34.3***
Housing	4	216.76	171.61	61.82	24.71	69.71	156.24	148.19
% of Sanctioned cost			***79.2***				***72.1***	***68.4***

Sector	No of Projects Sanctioned	Project Cost Sanctioned by Govt of India	Awarded Cost	Share of (GoI)	Share of (ULB)	Share of (GoG)	Total Release	Expenditure till May 09 end
Urban Poor	5	393.97	246.04	96.96	38.79	62.25	198	146.97
% of Sanctioned cost			***62.5***				***50.3***	***37.3***
Total	34	3907.53	2252.59	808.59	323.37	676.99	1808.95	873.2
% of Sanctioned cost			***57.6***				***46.3***	***22.3***

Table 1-2 Current Status - Surat Reform Projects

	Sr. No.	Reform committed	Target date	Present status
ULB Level Reform	1	E-Governance set up	2007-08	Achieved
	2	Shift to Accrual based Double Entry Accounting	2007-08	Achieved
	3	Property Tax (85% coverage)	2009-10	
		Property Tax (90% collection efficiency)	2010-11	
	4	100% Cost Recovery (Water Supply)	2011-12	
		100% Cost recovery (Solid Waste)	2011-12	
	5	Internal Earmarking of Funds for Services to Urban Poor		Achieved
	6	Provision of Basic Services to Urban Poor	2011-12	
STATE LEVEL REFORMS	7	74th CAA (Transfer 12 sch. Functions)		Achieved
		74th CAA (Constitution of DPC)	2007-08	Achieved
		74th CAA (Constitution of MPC)	2006-07	
	8	Transfer-City Planning Function		Achieved
		Transfer-Water Supply & Sanitation		Achieved
		Transfer-Public Transport		
	9	Reform in Rent Control	2009-10	
	10	Stamp Duty rationalization to 5%	2011-12	Achieved
	11	Repeal of ULCRA	NA	Achieved
	12	Enactment of Community Participation Law	2007-08	Achieved
	13	Enactment of Public Disclosure Law	2006-07	Achieved
OPTIONAL REFORMS	14	Introduction of Property Title Certification System in ULBs	To be indicated	
	15	Revision of Building Bye laws – streamlining the Approval Process	2005-06	Achieved
	16	Revision of Building Bye laws – To make rain water harvesting mandatory	2005-06	Achieved
	17	Earmarking 25% developed land in all housing projects for EWS/LIG	2005-06	Achieved
	18	Simplification of Legal and Procedural framework for conversion of agricultural land for non-agricultural purposes	To be indicated	Achieved
	19	Introduction of computerized process of Registration of land and Property	To be indicated	Achieved
	20	Byelaws on Reuse of Recycled Water	2005-06	
	21	Administrative Reforms	2008-09	Achieved

	22	Structural Reforms	2006-07	
	23	Encouraging Public Private Participation	2005-06	Achieved

1.5 CITY DEVELOPMENT PLAN (2008-2013)

Surat Municipal Corporation has correctly identified City Development Plan as a living document and decided to revise the previous City Development Plan. It is also a critical need with the increase in the jurisdictional limits of the Municipal Corporation to 326.5 sq km in 2006. In Addition to other components covered in the previous CDP, the revised City Development Plan will include components of Heritage conservation, Services to the urban poor, Disaster management, Training Need Assessment, E-governance reform and Review of the public-private-partnership (PPP) activities & opportunities. Considering the importance of stakeholder workshop and visioning exercise in the previous CDP, SMC decided to do various stakeholder consultations rigorously for Revised City Development Plan. The process of making Revised City Development Plan is explained in two phases as below:

1.5.1 PHASE 1 – DEFINE VISION/ MISSION STATEMENTS, PRIORITY ACTIONS

This phase contained a detailed analysis of the existing situation, covering the demographic, economic, basic amenities, environmental, and heritage, cultural and institutional aspects. This phase is to help identify the strengths and weaknesses of the city and to bring out the unique features of the city. Following activities were done in this phase.

Activity 1 – City Assessment Report.

Based on the recommendations of CDP (2006) and Vision - 2020 Document, Surat Municipal Corporation had undertaken different projects to improve the quality of life in the city through up gradation of level of basic services such as Water Supply, Sewerage, and Solid Waste Management. Expansion of SMC jurisdictional limits from 112 sq. km to 326.5 sq km demands the reassessment of the existing service levels in the newly merged areas. To serve the purpose a study for the assessment of the existing conditions in the newly merged areas was conducted covering the ward wise conditions of all sectors like demography, basic services, housing and urban poor, Road and transportation, Education, Health. The report of the study was submitted separately.

Activity 2 – Stakeholders Consultation.

The process of consultations aims to bring the opinions of a range of stakeholders to a common platform that can be converted into tangible developments in the city. The process also helps in formulation of a common vision for the city. The efforts to improve the quality of life of the people in the city yields satisfactory results only when the citizens realize that there are various stakeholders involved in the delivery of basic services to the city.

The primary objective of the stakeholder consultation is to identify the city needs through consultations with a range of stakeholders. The inputs gained through the consultations with respect to the perceptions, attitudes, behavior and likes-dislikes and identify the

interventions desired by the community for urban development would be used to customize the proposed projects to meet the city needs.

Stakeholder Consultation report was submitted separately with the City Assessment report. To identify the issues on the basis of administrative hierarchy of the city the stakeholder consultation was divided into three major parts mentioned below. The details of the household survey and ward level consultations are given in Annexure I

1) Household Level	- Household Survey (1100 Sample size)
2) Ward level	- Ward Level Consultation
3) City Level	- Focused Group Discussions

Activity 3 – Study of other source that determines citizens' response

To assess the citizen's response to the service delivery and governing system, some alternative secondary sources are identified. These sources are:

Grievance Registration:

Based on grievance registration, a ward level data is made available that would identify the various sectors of service delivery, where intervention is required. This would in turn help in identifying priority areas and the needs.

News Paper Clippings:

The newspaper covers issues related to urban development at the city level and they have dedicated reporters for the same. A review of newspaper clippings would help identifies issues that mattered to the city in the immediate past. A focus group discussion with the local reporters can also help developing insights into the city needs.

Activity 4 – Key Stakeholders' Workshop (City level)

The key stakeholders involved in the overall city development include government utilities, trade and commerce organizations, industrial associations/ organizations, NGOs, community based organizations, voluntary organizations and the citizens of the city. The draft City Development Plan would be presented to the Key stakeholders for their final feedbacks. The Draft City Development Plan will be uploaded on the SMC website to take views of the citizens a way before the city level workshop. Based on the city level consultation, final programs and project will be formulated and the final revised city development plan will be submitted.

1.5.2 PHASE 2 - PROJECTS AND INVESTMENT SCHEDULING

An investment plan and a financing strategy are an integral part of the CDP. It is an aggregate investment plan accompanied by identification of strategies and programmes for financing the projects. All of the above activities form an input for deciding the projects and investment scheduling. The list of identified projects along with the investment scheduling is presented in the last section.

1.6 STRUCTURE OF THE REPORT

This report - the Revised City Development Plan (2008-2013) is divided in three sections.

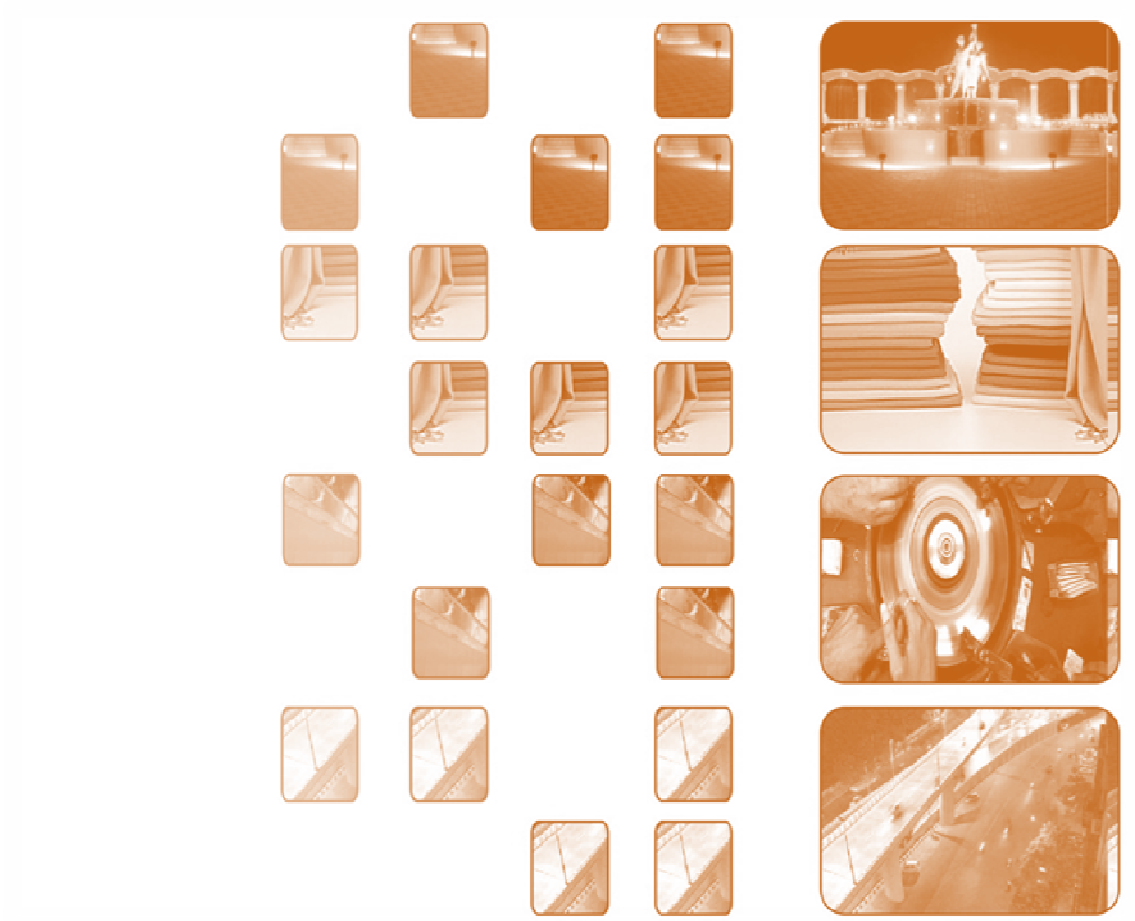
Section I Gives an Introduction to the City development plan and planning efforts in Surat city and explains the need for revision of the CDP. Then it describes in brief the socio-economic profile of Surat City.

Section II focuses on Situation analysis for various sectors such as urban basic services, physical planning, Roads and transportation, Education and Health, Slums and Housing, Environment, heritage conservation, disaster management, urban governance and Finance.

Section III of the report outlines the framework of Vision 2020 and integrating it with sector wise issues, goals, strategies and action plans focusing on identification of projects, their resources allocation and implementation mechanism.

Scope

This report is prepared placing the needs of Surat City in a holistic perspective and help to improve living condition and basic amenities in the newly merged areas. However, in the peripheral outgrowth areas under SUDA, the availability of urban services is limited to a minimum, while the needs are included in total to cover the entire area.



Chapter 2

City and Its Growth Dynamics

Profile of the city

Demography

Urban Economy and Growth Dynamics

Population growth and Forecast

Summary

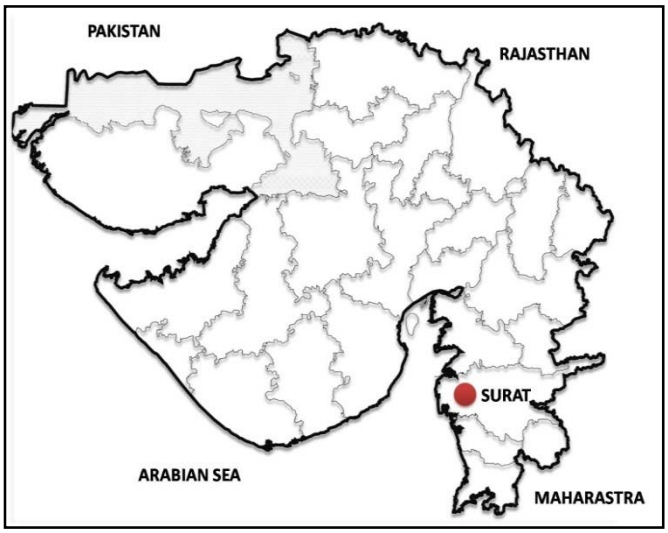
CHAPTER 2. CITY AND ITS GROWTH DYNAMICS

2.1 BACKGROUND

The dynamic nature of the CDP is very well adopted by SMC. The extension of boundaries of the SMC in 2006 made it necessary to once again look into the status of the various services in the city which is described in the coming chapters. This chapter throws light on the general profile of the city and the various factors contributing to its rapid economic development.

2.2 PROFILE OF THE CITY

The city of Surat has a glorious history dating back to 300 B.C and owes its name to the old Hindu Town 'Suryapur'. During the 15th century, the city of Surat emerged as an important port town and a trade centre. The city was at the height of prosperity till the rise of Bombay port in the 19th century. While there was a downslide in Surat's economy since 1901, the foundations for the growth in the city was laid in the 60's with the expansion of diamond trade, the gradual shift in the economic base into zari and textiles (power looms), and the intensification of oil and gas exploration activities. Today, apart from the traditional industries of textile manufacturing, trade, diamond cutting and polishing industries, intricate Zari works, the base has expanded to gas based industries at Hazira.



Map 2-1 Location Map of Surat

Surat continues to present a 6% plus annual population growth since 60's, placing Surat 10th in terms of size countrywide (2001). Parallel to the industrial expansion, Surat emerged as a major center for trade and commerce in the region and a silent evolution has been that of the informal sector. While the city had a vibrant economy, the focus was on growth with limited response to housing and services and the local administration did not translate benefits of growth in terms of a financially robust local administration. The turnaround of the city of Surat happened after the plague in 1994. This event reflected the ability of local governance to turnaround and the support of the citizens in transforming their city. This transformation is an outcome of ingenious entrepreneurship skills of people of Surat and commitments of the Central and the State Governments. In the center of all this transformation process is the Surat Municipal Corporation (SMC).

2.2.1 LOCATION AND CONNECTIVITY

Government of India is developing a Dedicated Freight Corridors (DFC) linking Delhi-Mumbai

(western DFC) and Kolkata-Chennai (Eastern DFC). The proposed Western DFC passes through six states, out of which, Gujarat accounts for 38% (564 Km) of total DFC length (1483 Km). The influenced area of 150 Km on either sides of DFC is being developed as "Delhi Mumbai Industrial Corridor" (DMIC). Almost 62% of the total area of Gujarat (18 out of 26 districts) would be benefited by DMIC development. The State government has identified 82 links in the DMIC Influenced area to upgrade them into two/four lane carriageway offering connectivity between ports, industrial estates, hinterlands, markets and points of agricultural produce. Surat- Navsari industrial area lies within 50 Km of the Dedicated Freight Corridor in southern Gujarat. This region is well connected by NH-8 and NH-6.
The city is a pivotal centre on the Ahmadabad-Mumbai regional corridor as well as on the 225 km long industrial belt, having direct linkages with the industrial urban centers of Vadodara, Ankleshwar and Vapi.

Air: Surat has a domestic airport which is well connected to different metros. It has daily flights to Delhi, Jaipur, and Ahmadabad. Government of Gujarat has also undertaken aviation master plan for the state which prioritizes development as well as up gradation of the Surat airport. The nearest airports are at Vadodara and Mumbai.

Rail: Surat is located midway on the 500 km long Ahmadabad-Mumbai western railway corridor and as many as forty pairs of express, mail and passenger trains pass through it.

Road: Surat is well connected through road as the National Highway 8. The high way passes within 16 km of the SMC boundary and is one of the busiest inter-state trunk routes in the country.

Port: Magdalla & Hazira Ports in Surat have good rail and road connectivity. Magdalla port is 2 Km away from the state highway and 15 Km away from NH-8. Hazira Port in Surat has close proximity to the high speed dual carriageway which is under construction. The port is well connected with main Mumbai – Ahmadabad - Delhi broad gauge railway line. The nearest airport is in Surat. The proposed Mumbai – Delhi Freight Corridor is expected to be a major driver for industrial growth of Hazira Port.

2.2.2 TOPOGRAPHY AND CLIMATE

The city lies at a bend of the River Tapi, where its course swerves suddenly from the north-east to south-west. With the walled city at its centre, the city forms an arc of a circle, the bends enclosed by its walls stretching for about a mile and a quarter along the bank. From the right bank of the river, the ground rises slightly towards the north, but the height above mean sea level is only 13 meters. The topography is controlled by the river and the general slope is from north-east to south-west.

The summers are quite hot with temperatures ranging from $37^{\cdot C}$ to $44^{\cdot C}$. The climate is pleasant during the monsoon while autumn is temperate. The average annual rainfall of the city is 1143 mm.

2.3 DEMOGRAPHY

Surat is India's tenth and Gujarat's second most populous city as per Census 2001. It became a metropolis in 1991, along with eleven other major cities across the country. Out of 35 million plus cities in India, four (Ahmadabad, Vadodara, Surat and Rajkot) and in the top 10 million plus cities, two (Ahmadabad and Surat) are in Gujarat.

Table 2-1 Top ten million plus cities in India (2001)

Sr. No.	Name of City	Civic Status	Population in Millions
1	Greater Mumbai	Municipal Corporation	11.91
2	Delhi Municipal Corporation (Urban)	Municipal Corporation	9.82
3	Kolkata	Municipal Corporation	4.59
4	Bangalore	Municipal Corporation	4.30
5	Chennai	Municipal Corporation	4.22
6	Ahmadabad	Municipal Corporation	3.52
7	Hyderabad	Municipal Corporation	3.45
8	Pune	Municipal Corporation	2.54
9	Kanpur	Municipal Corporation	2.53
10	Surat	Municipal Corporation	2.48

The golden quadrilateral corridor also has created huge potential for economic and spatial urban development in Gujarat. A regional authority should be created and a regional plan, development policy and budgetary provision should be made for development of this corridor. Gujarat has the longest coastline and Special Economic Zones (SEZ) notified by the Ministry of Commerce & Industry.

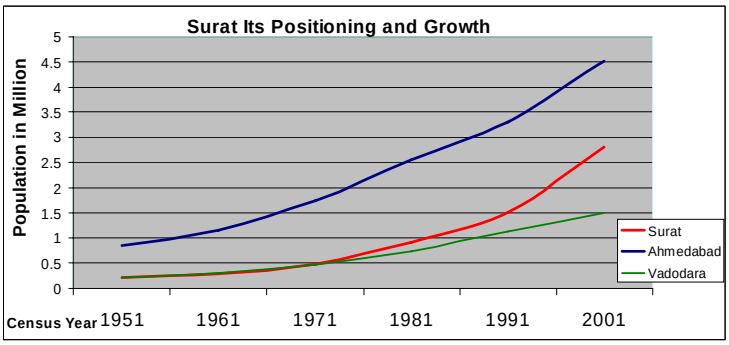


Chart 2-1 Surat–Its Positioning and Growth

Looking a t the demography of Surat it has low sex ratio (773) as compared to the Gujarat state (837). Today, Surat's pole positioning among India's most prosperous cities can be attributed to its booming industries, its demographic make-up, entrepreneurial skills of its populace. Almost 73% of Surat's population is under 35 years of age.

Table 2-2 Demographic Profile Surat

Parameters	SMC	Gujarat State
Population	2876374	50671017
Total Households	491190	9691362
Average Household Size	5	5.2
Sex Ratio	773	880
Sex Ratio (0-6)	824	837
Sex Ratio (SC)	928	911
Sex Ratio (ST)	878	926
Literacy Rate	83%	81.40%
Literacy Rate Male	88%	88.30%
Literacy Rate Female	76%	74.50%
Gender Gap in Literacy Rate	12%	13.80%
Work Participation Rate	32%	33.10%

2.3.1 GROWTH TRENDS

The city has been experiencing rapid growth in population during past four decades. The growth rates have been one of the highest in the country. High rate of growth experienced by the city over four successive decades has been a major feature in the city's growth, necessitating prompt responses in supply of infrastructure. The table below places Surat along with other urban agglomerations in the state of Gujarat. It clearly suggest that Surat urban agglomeration has highest decadal population growth rate and the lowest sex ratio directing towards tremendous increase in the male migration in the city in last decade giving the city of Surat a predominant migrant city status.

Table 2-3 Urban Agglomeration in Surat

Year 2001	Population	Decadal Growth Rate in %	Sex-ratio
Ahmadabad - U.A.	4519278	36.44	885
Surat U.A.	2811464	85.09	773
Vadodara U.A.	1492398	32.44	905
Rajkot U.A.	1002160	53.12	906

During 1991-01, the city experienced an exceptionally high decadal population growth rate of 85.09 percent. Rapid inflow of population is continuing. The sex ratio has dropped down to 774 in 2001 from 839 in 1991. A positive feature is that the literacy rate has gone up from 63 percent in 1991 to 83 percent in 2001 and the figures are well above that of the state. This may also mean that the city received more literate and hence better quality human resource as migrant laborers.

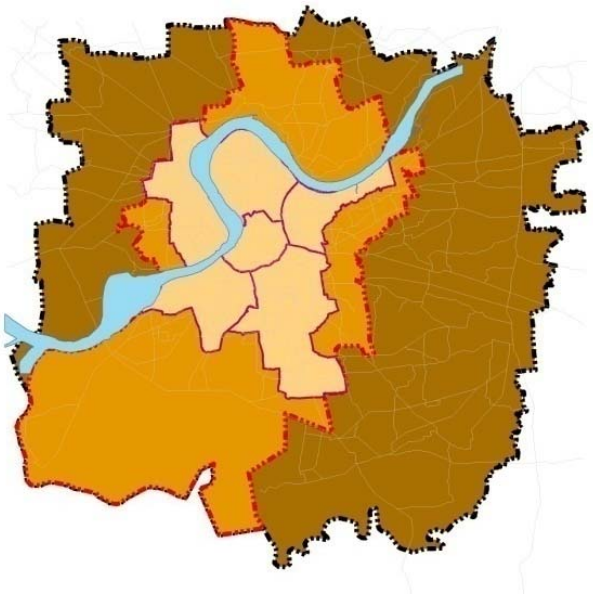
Table 2-4 Surat – Population and Area Growth

Area	1961	1971	1981	1991	2001	2006	2009
Surat Municipal Area							
Area (sq.km)	**8.18**	**33.85**	**55.56**	**111.16**	**112.27**	**326.51**	**326.51**
Population	288026	471656	776583	1498817	2811464	3440838*	3884599*
Decadal Growth Rate (%)	29.05	63.75	64.65	93	85.09	NA	NA
Pop. Density (per sq.Km)	35211	13934	13977	13489	21677	11691	13853
Sex ratio	915	887	857	839	774	NA	NA
Surat Urban Agglomeration							
Population	-	493001	913806	1518950	2811464	4055288	4776016
Decadal Growth Rate (%)	-	-	85.36	66.22	85.09	NA	NA
* Estimated							

2.3.2 SPATIAL LIMITS

Decadal population growth rate during 1991-2001, saw further densification of the core city. Outgrowth areas also experienced rapid rate of growth. With the (old) municipal area in Surat reaching a density of 217 pph, the future development took place outside the municipal limits. Keeping these trends in view, the limits of SMC were increased to 326.5 sq. kms in the year 2006.

Surat Urban Development Authority (SUDA) covers total four talukas Choryasi, Kamrej, Olpad and Palsana spread over an area of 722 sq km. (*Refer Annexure Map 2-1-: Extents of Old SMC, New SMC and SUDA)*



Map 2-2 Extents of Old SMC, New SMC and SUDA

The new municipal area of Surat is being further segregated into seven administrative zones, namely North zone, West zone, East zones, South zone, south west zone, South east zone and Central Zone. (*Refer Annexure Map 2-2- Administrative Zones and 2-3- SMC Zone wise Population and density*). The population and density of these administrative zones as per census of India 2001 is:

Table 2-5 New Surat Municipal Zones – Population and Density

	Population	density (PPH)
Central zone	413,641	506
North zone	334,260	163
West zone	250,480	128
East zone	581,138	419
South zone	320,087	123
Southwest zone	199,668	133
Southeast zone	334,561	367

Source: Census of India, 2001

2.3.3 MIGRATION

Surat has emerged as a national city with majority of the population comprising of migrants. Trends of migration in Surat exhibits rapid increase over the years. It is estimated that 60% of the city's population (Shah, 1997) and 80% of those living in squatter settlements (Das, 1994) were born outside the district of Surat.

Availability of employment and the industrial scenario of the city pull people from neighboring states like Maharashtra, Madhya Pradesh, as well as states like Orissa, which are far from the state of Gujarat. This is reflected by increasing share of inter-state migrants than inter-district migration.

Table 2-6: Migrant Population in Surat as per Census 2001

No.	Last Residence	Total migrants	% to Total
T	Surat Urban Agglomeration Population	29,00,729	
A	Total Migrants in Urban Agglomeration	16,19,967	55.85
B	India and Abroad		
B1	Last residence elsewhere in India - Total	16,14,905	99.69
B2	Last residence outside India	5,062	0.31
	Total (B)	16,19,967	100.00
C	Gujarat and India		
C1	Within the state of Gujarat	862936	53.44
C2	Other States in India	751969	46.56
	Total (C)	1,614,905	100.00
D	Major State contribution to Migrant Population		
D1	Maharashtra	26,55,93	35.32
D3	Uttar Pradesh	16,19,94	21.54
D5	Orissa	90,135	11.99
D2	Rajasthan	84,757	11.27
D4	Bihar	53,549	7.12
D6	Andhra Pradesh	20,114	2.67
D7	Other states	75,827	10.08
	Total (D)	7,51,969	100.00
E1	Within the State of Gujarat		
E2	From Surat District	97,863	6.06
E3	In other districts of Gujarat	7,65,073	47.38
	Total (E)	862936	53.44

Migration to Surat is male dominant. This is also reflected in low sex ratio of the city. Unlike migration from Maharashtra, the flow of migration from specific regions in Ganjam and Puri in Orissa has been more recent. In the city, majority of Oriya migrants are engaged in textile sector, especially in power loom factories and dyeing and printing factories.

Around 70% are employed in informal sector activities, of which 40% are employed in the textile industry, 13% in the diamond polishing and cutting industries, 14% in small scale ancillary workshops and 32% in 'self-employed' street and home workers. The working conditions of these migrants are very poor. Their jobs are temporary and casual. They work for long hours with no break even for lunch. They work in two shifts each of 12 hours and wage rates are very low.

Table 2-7 Purpose of Migration

B	Purpose of Migration	% to Total Migrants
a	% Migrants to Total Population	55.85
1	Work/employment	29.19
2	Business	8.90
3	Education	0.46
4	Marriage	12.84
5	Move after birth	8.03
6	Moved with h/h	29.96
7	Others	10.62

8	Total	100.00

Source: Census of India, 2001

2.4 URBAN ECONOMY AND INDUSTRIAL GROWTH

Surat is known for its textile manufacturing, trade, diamond cutting and polishing industries, intricate zari works, chemical industries and the gas based industries at Hazira established by leading industry houses such as ONGC, Reliance, ESSAR, and Shell. The city economy is characterized by large number of small and medium size unorganized industries. The industrial base is labor intensive.

Out of the total 3,12,782 small scale units registered (up to Sept 2006) in the state, Ahmadabad and Surat districts leads the list with high number of small scale industrial units at 65,763 and 47,404 units respectively constituting 21% and 15.2% of total SSI units in the State. The share of Surat has increased from 12.6% in 1980 to 15.2% in 2006. The revenue generation in terms of service tax and central excise is presented in the table below;

Box 2-1 Surat's Contribution to State and National Economy

GDP

Surat has the highest GDP growth rates in India at 11.5 per cent as of 2008.

FDI

Surat has been very successful in attracting a sizeable amount of Foreign Direct Investment (FDI) in various sectors like energy, oil and petroleum. A significant investment of INR 3,000 crore (USD 726 million) in Hazira LNG terminal project is one of the largest Greenfield FDIs in India

DIAMOND

Surat processes 10 out of 12 varieties of diamonds in the world generating a revenue of INR 60, 000 crore which is 65% of total diamond exports from India. Out of every 10 diamonds made in the world, eight are made in India, of which seven are cut and polished in Surat.

- 44 % of the world's total rough diamond cutting and polishing
- 70 % of the nation's total rough diamond cutting and polishing
- 65 % of the nation's total diamond exports

TEXTILE

Surat hosts over 6 lakh power looms and provides over 12 lakh jobs in textile industry. 2.5 Crore Meter of fabric per day is produced in Surat.

- 62 % of the nation's total power loom cloth production
- 52 % of the nation's total cotton fabric production
- 48 % of the nation's total manmade fabric production (2007-08)

(Source: Indian Real Estate Growth and New Destinations, FICCI - Ernst & Young Report, 2007)

Much of the industrial development is located within the limits of Surat city. In fact Surat is truly an industrial city with over 50% of workforce engaged in manufacturing activity. While the problem of unemployment is almost non-existent, the wages are also lower and the workers are generally deprived of social and other benefits. The detailed account of sub-sectors of the economy is presented below:

Table 2-8 Revenue Generation in Surat District (Rs. In Crores)

Year	Service Tax	Central Excise
	Revenue	CENVAT*
2006-07	289.93	NA
2007-08	333.86	6314.77
2008-09	407.19	5378.73

**CENVAT: Central Value Added Tax Source: http://www.excisesurat1.nic.in accessed on Date Oct 09 2009*

2.4.1 TEXTILE INDUSTRIES

Table 2-9: Estimated jobs in textile industry

Type of Textile Units	Estimated Jobs in the metropolitan region
Power looms Units	7,50,000
Processing Units	1,50,000
Texturising Units	25,000
Embroidery Units	25,000
Cutting, Packing, Dispatching &	2,50,000
Total	12,00,000
Source: On basis of the estimates of the South Gujarat Art Silk Industry, Surat.(2006)	

The textile industry is one of the oldest industries in the country and continues to be a significant contributor to value of industrial production, employment generation and to national income. An estimated 4 percent of GDP is contributed from the sector. It adds to about 30% of country's export earnings while adding about 7 to 8% of the gross import bill.

Surat is a dominant player in the textile sector. The traditional handloom weaving industry has given way to power-looms, printing, and dyeing textiles. Surat is one of the largest centers in the world for production of synthetic fabrics, mainly nylon and polyester.

The Indian Government's policy since 1956 of providing incentives and protection to small-scale industries boosted the power-loom industry in the city. Weavers took advantage of the incentives and converted their handlooms into power-looms.

At present, there are about 6 lacks power-looms, 450 Process houses, 100 and above textile markets, 50000 and more embroidery machines in the city region and the sector provides total employment of over 12 lacks people. The total production value of "Gray Fabrics" in Surat is about Rs. 20,000 Crore.

The textile processing units are the major backbone of the Surat city's economy. However, they depend mainly on ground water for its processing and withdraw about 700 to 1000 cubic meter of water every day. There are about 60 thousand shops and establishments engaged in trading activity in general with textiles as a predominant sector.

As per the latest survey conducted by Federation of Indian Art Silk Weaving Industry, there is decrease in the migrant workers employed in the textile industry due to the various schemes such as National Rural Employment Guarantee (NREGA) run in states such as Bihar, Andhra Pradesh, Orissa and Uttar Pradesh.

Table 2-10 Migrant Workers in Surat

Unit	Before 2006	2007	2008	2009
Power loom	7,50,000	6,75,000	6,45,000	5,40,000
Processing	1,50,000	1,34,000	1,15,000	1,00,000
Texturising	50,000	44,000	35,000	32,000
Embroidery	1,00,000	98,000	89,000	80,000
Workforce	10,50,000	9,51,000	8,84,000	7,52,000

Source: Federation of Indian Art Silk Weaving Industry, 2009

Over the years the industry has faced numerous problems. The strong will of the craftsperson and the enterprising spirit of some of the people have kept the industry alive even in the face of many onslaughts. Today there are above 6750 zari units that employ approximately 47500 workers. An apparel park has also been planned in the city for production and export facilities to be under one roof and to give a face-lift to the textile industry.

2.4.2 DIAMOND CUTTING AND POLISHING

Gujarat accounts for almost 80 % of the diamonds processed in India. Of this, 90 % are processed by the units located in and around Surat alone. The emergence of the industry in the region which did not have raw material, markets or worker base is a significant feat. Even majority of the entrepreneurs are from outside. Initially the industry began largely as an initiative of few individuals belonging to a particular community which has now expanded to large section of the society. Under the Import Replenishment Scheme introduced by the Government of India in 1958, diamond traders were allowed to import rough diamonds from Diamond Trading Corporation, London and other sources abroad and export cut and polished diamonds. Added support came from the encouragement offered to small-scale industries during this time. By the late 1950s, about 100 diamond cutting and polishing units had been set up. With the setting up of the Gems and Jewellery Export Promotion Council in 1966, diamond exports received a further impetus and consequently, the number of cutting and polishing units also increased. Coupled with ease of establishing small-scale industries, various governmental policies aimed at increasing the export of polished diamonds aided the growth of such units in the city.

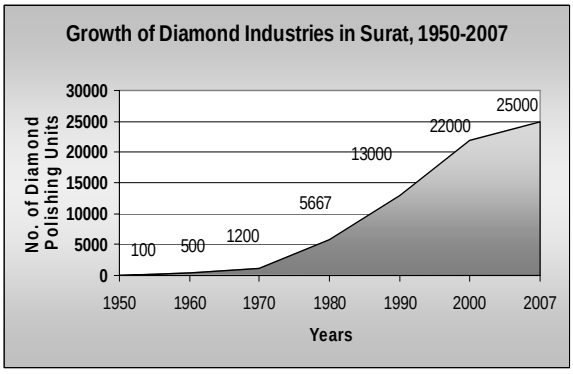


Chart 2-2 Growth of the Diamond industry in Surat, 1950-2007

Like textiles, diamond cutting and polishing is also a labor intensive industry employing about 7, 00,000 workers in about 25,000 units of all sizes operating within the urban region. India's first private Special Economic Zone has been functioning near Sachin in Surat since November 2000. From household industry base, over the years, the structure of the industry has changed to small, medium and large-scale units. Technical advancements have also contributed to improved productivity.

The industry requires a low capital base, is non-polluting, high on employment generation

and is a leading contributor to foreign exchange reserve. Export value increased from a mere Rs. 110 million in 1966-7 to Rs 320,000 millions in 2002-03. However, as a result of technological advancements, during the last 10 years, though output has increased by 5 times, there has not been any significant increase in jobs.

2.4.3 MAJOR INDUSTRIAL ESTATES

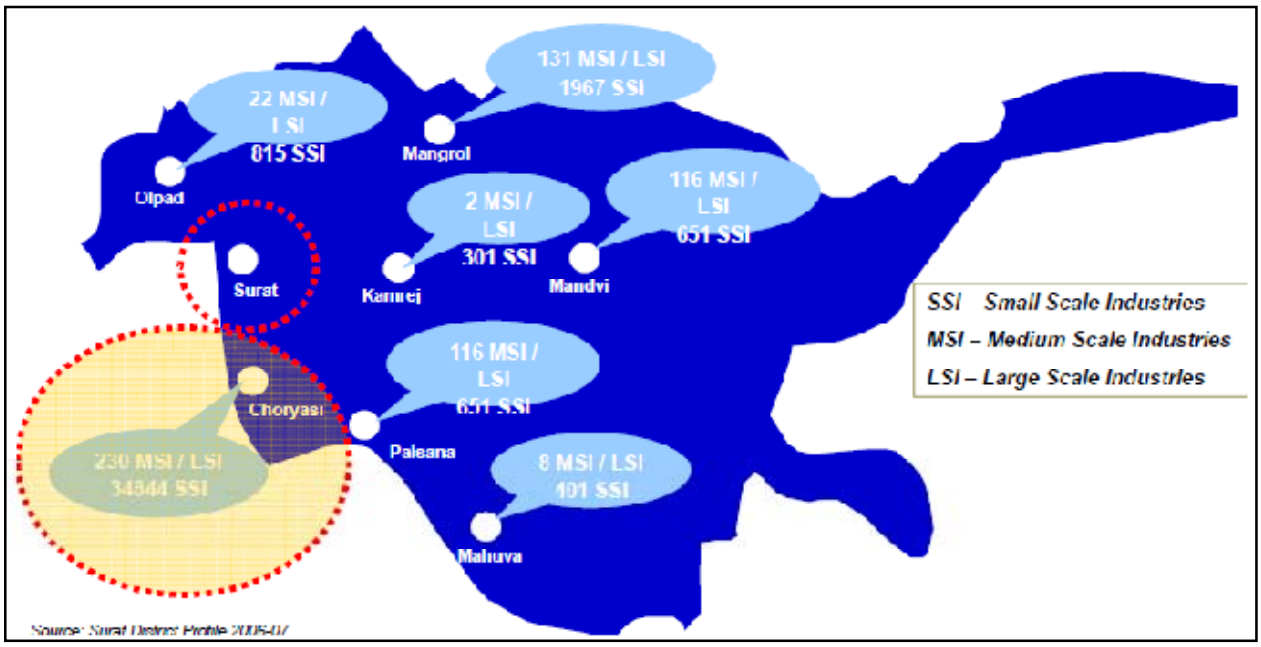
There are 605 medium and large scale industries based in Surat district. Most of the medium and large scale industries are concentrated in Choryasi taluka (West Surat) with 230 units followed by Mangrol (North Surat) and Mandvi taluka (Central Surat) with 131 and 116 units respectively.

» **Small Scale Industries (SSI)**

There are over 41,300 small scale industries (SSI) functioning in Surat district. Some of the main industries under SSIs in Surat are textiles, chemicals dying & printing, diamond processing, jhari (Silver) making, and. engineering and related activities (manufacturing machineries & equipments)

A. Maximum numbers of SSI units (24,000 Units) are related to textile industry in the district followed by repairing & service industry with more than 11,000 units.
B. Most of the small scale industries are located at talukas such as Choryasi (Western Surat), Mangrol (Northern Surat), Olpa (Northern Surat), Mandvi (Central Surat) and Palsana (Southern Surat)
C. Maximum number of SSIs, MSIs & LSI s are located in Choryasi taluka

Figure 2-1 Location of Industrial clusters in Surat District



2.4.4 INDUSTRY INVESTMENT TRENDS

As per the Industrial Entrepreneur Memoranda (IEMs) filed, the total investments during 1988-97 were INR 33,251 Crore (USD 7.92 billion) and INR 35,975 Crore (USD 8.57 billion)

during 1998-2007.

Around 70% of the investments during 1998-07 have been contributed by engineering, electrical equipment, textiles, chemicals & petrochemicals sectors. However, major investments during 1988-97 were contributed by industries such as petrochemicals & refinery, rubber goods, textiles, metallurgical industry and infrastructure projects.

Total 866 units were introduced during 1988-97; however during 1998-07 1215 new units were introduced with textile sector units having taken a lion's share of 51% in terms of new units established in last one decade.

During 1988-97 petrochemical and refinery sector attracted maximum investments to the tune of INR 11,886 crore (USD 2.83 billion) contributing 36% to the total investments

Investments in textile industry were witnessed by 604 units accounting for INR 3,295 crore (USD 0.78 billion). Textile sector generated 88,612 jobs during 1988-97 contributing a share of 62% to the total jobs created

Infrastructure sector received a sizeable investment of INR 3,277 crore (USD 780 million)

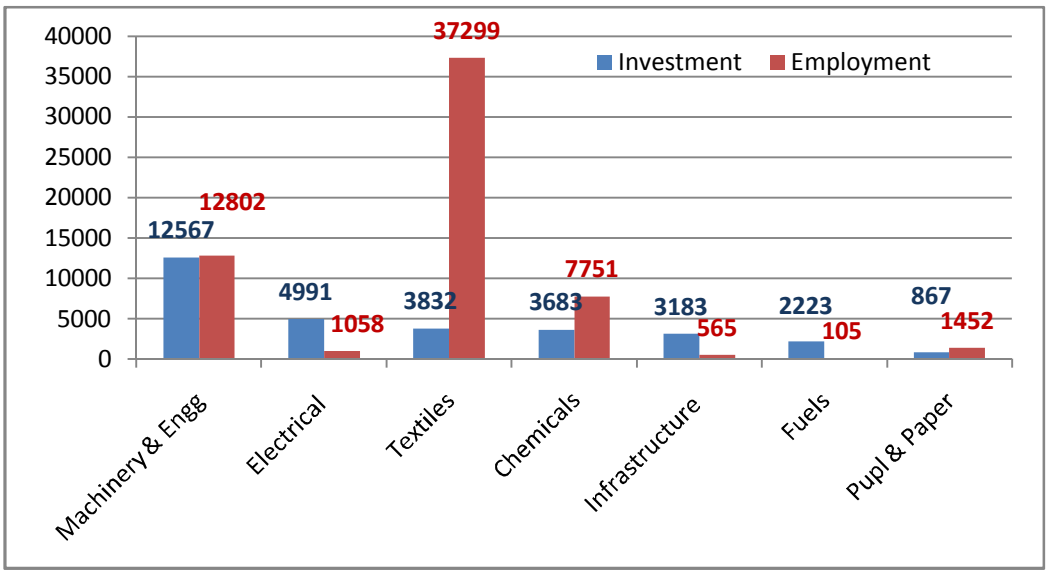


Chart 2-3 Major Investments (Crores) & Employment during 1998-2007

2.4.5 INVESTMENTS IN REGION

A total of 78 MoU's amounting to INR 84,421crore (USD 20 billion) of investments were signed for locations in Surat during Vibrant Gujarat: Global Investors Summit (VGGIS) hosted in the year 2003, 05 and 07

The sectors such as agro, ports, power, textiles, engineering and oil & gas attracted major investments With an investment of INR 3,187 crore (USD 759 million), Gujarat State Electricity Corporation Ltd signed `two MoU's in 2007 Summit for establishing 360 MW gas based power project at Utran and 500 MW coal based power project in Ukai regions In addition, 38 MoU's were signed and 2 announcements were made during VGGIS 2007, involving an investment of INR 31,349 crore (USD 7.46 billion) During last three summits, 23 MoUs were signed in agro sector followed by engineering and power with 8 MoUs in each sector respectively.

Box 2-2 Economy Drivers

The upgraded Surat airport is envisaged to offer direct air connectivity with important destinations in India and abroad. This is expected to boost commercial activities in the city as well as in the district, leading to an upsurge in the demand in hospitality sector, which is primarily driven by corporate tourism.

Emergence of a petrochemical complex, gems and jewelry Park and the centrally promoted Surat SEZ are expected to further fuel the industrial and economic growth of the city.

Hazira area, spread over 167 sq. kms is a major industrial area located in contiguity with SUDA limits. Magdalla light rage port which also includes captive jetties of M/S ESSAR, RIL, L&T, GACL, and KRIBHCO provides sea connectivity to the region. Hazira Port Pvt. Ltd is being set up by Shell International. Given the nearness to Surat city and the port connectivity, Hazira region accommodates 20 large and medium sized industries. They are producing polymer, heavy engineering products, gas, LPG bottling, steel foils, ammonia etc., The total investment in the Hazira belt exceeds Rs 36,000 crore.

Surat Region has four Industrial Parks,

A. M/s Gujarat Eco Textile Park Ltd. Surat.
B. M/S Fairdeal Textile Park Ltd, Surat
C. M/s Shri Laxminarayan Industrial Cooperative Service Ltd, Surat
D. M/S Surat Super Yarn Ltd. Surat

Five Special Economic Zones SEZ's

A. SURSEZ states
B. Surat Apparel SEZ
C. Gems & Jewelry SEZ
D. Essar Hazira SEZ
E. Essar Power SEZ

And 17 Industrial Estates as mentioned in Table 2-11:

Table 2-11 Industrial Estates in Surat District

Sr NO	Industrial Estate	Area in Hectares	Percentage of total area
1	Valod	1.13	0.04%
2	Khatodara	3.07	0.11%
3	Bardoli	4.71	0.16%
4	Gaviyar-Meghdalla	15.34	0.54%
5	Olpad	31.05	1.09%
6	Hazira(GSPCL)	37.80	1.32%
7	Katargam	38.33	1.34%
8	Ichhapor Bhatpor (IOC)	40.00	1.40%
9	Apparel park	54.96	1.92%
10	Hazira	127.04	4.44%
11	Doshwada	165.14	5.77%
12	Pandesara	218.27	7.63%
13	Hazira (Reliance)	437.50	15.30%
14	Sachin	749.35	26.20%

Sr NO	Industrial Estate	Area in Hectares	Percentage of total area
15	Ichhapor Bhatpor	836.08	29.24%
16	Sachin (DGDCL)	94.41	3.30%
17	Nizer	5.62	0.20%

Source: Gujarat Industrial Development Corporation, Government of Gujarat, 2007

2.4.6 HOUSEHOLD INCOME DISTRIBUTION

The distribution of income in Surat reflects the quality of its work force vis-a-vis comparable cities. Around 60 % earn less than Rs 25000 a year or about Rs. 70 per day. While the incomes are higher than the standard poverty levels, it needs mention that the cost of living in Surat if not equal to Mumbai, is at least close to this level. This is one of the reasons for the growth in informal settlements.

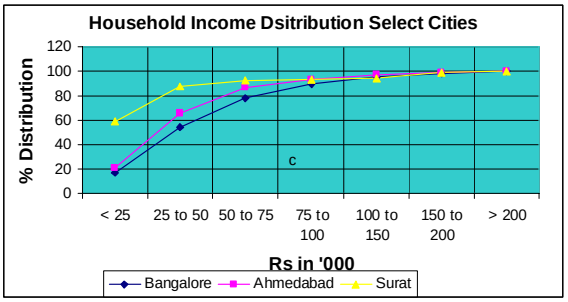


Chart 2-4 Household Income Distribution in Selected Cities-(2000)

2.4.7 GROWTH PROSPECTS

Surat region is one of the leading city-regions in the country that has attracted massive investment proposals. The success rate of converting proposals in to reality has also been very high so far. According to CMIE (Center for Monitoring Indian Economy), as on August 31, 2006, there are 1819 projects under implementation with investment of Rs. 1,34,206 Crores with an estimated employment generation of 2,77,947. Surat district accounts for 26% of units, 21% of investment and 11% of employment being generated through this investment in the state.

In addition, recently, the Government of Gujarat organized an Global Investor's Summit in January 2009. Large number of entrepreneurs signed MOUs (Memorandum of Understanding) to invest in the state in various sectors. In the Surat region, total worth of MOUs signed is about Rs. 31,182.75 Crores and the expected employment generation is over 200,000. The majority of MoUs signed belong to urban infrastructure, industrial and real estate sector. The location of these projects is in the areas like Abhava, Kosad, Rundh, Dumas, Vesu, Pal, Magdalla, Kadodara, Amroli and Sachin, which are in the peripheral areas to the municipal boundary.

2.5 POPULATION GROWTH AND FORECAST

The population growth of the city is dependent on local as well as national factors determining the future economy and in turn the size of the city. Following are considerations for forecasting future population.

Factors likely to contribute to high growth

» On the whole, rapid pace of economic growth is continuing

- The city is on the Delhi-Mumbai Industrial corridor
- Several SEZ's are being proposed
- Textiles and Petrochemical sectors are an expanding sector
- Closeness to Mumbai

Factors likely to contribute towards moderation/ decline in the rate of growth

- While the economy is continuing with high rate of growth, there are factors which are likely to bring some dampening effect on the rate of growth.
- The diamond and textile sector are becoming semi-capital intensive.
- With industries becoming capital intensive, the nature of labour force requirements would also change. The wage levels are likely to improve. The growth of large and medium scale industries in the region, especially in the downstream petrochemical activities would further add to the change. Hence some moderation in the population growth rate is expected.
- The demographic dynamics as anticipated in the forecasts made by Registrar General also indicate towards moderation in the rate of growth at the state level. Similar effect would be observed at the city level.
- The development of other states and Saurashtra region of Gujarat, saturation of existing low quality jobs etc., are possible sources for the decrease in the migration rate.
- Reduced migration as result of various schemes run by the government to abate out-bound migration in different states. (E.g. NREGA scheme, etc.)

The city displays high work participation rates, 32%, as large male migrant population exist. However, trends are likely to change and WPR is likely to stabilize at 35%. With this assumption, overall work force size has been determined. In terms of sectoral distribution, it is estimated that about 54% of the workforce is engaged in manufacturing activities. This share is likely to go down to 50% by 2031 and the share of service sector to go up with construction maintaining its share at 7%. While the rate of growth in population is likely to decline, the travel demand will continue to increase. The city is likely to attract quality jobs both in terms of education and salaries. Better quality workforce, but in reduced numbers would be in demand. Consequently, demand for transport both in quality and quantity would alter. In the absence of quality public transport, high growth in personalized vehicles may be expected.

Table 2-12 Population and Employment Projection

Population in lakh			
Census Year	High Growth	Low Growth (Reduced Migration)	Medium Growth (Stabilisation)
1951	2.23		
1961	2.88		
1971	4.93		
1981	9.14		
1991	15.19		
2001	28.11		
2005 (Estimate)	36.07		
2011 (Projected)	**46.13**	**38.42**	**42.12**

Population in lakh			
Census Year	High Growth	Low Growth (Reduced Migration)	Medium Growth (Stabilisation)
2021 (Projected)	**71.14**	**50.04**	**60.06**
2031 (Projected)	**101.81**	**61.56**	**82.18**

2.6 SUMMARY

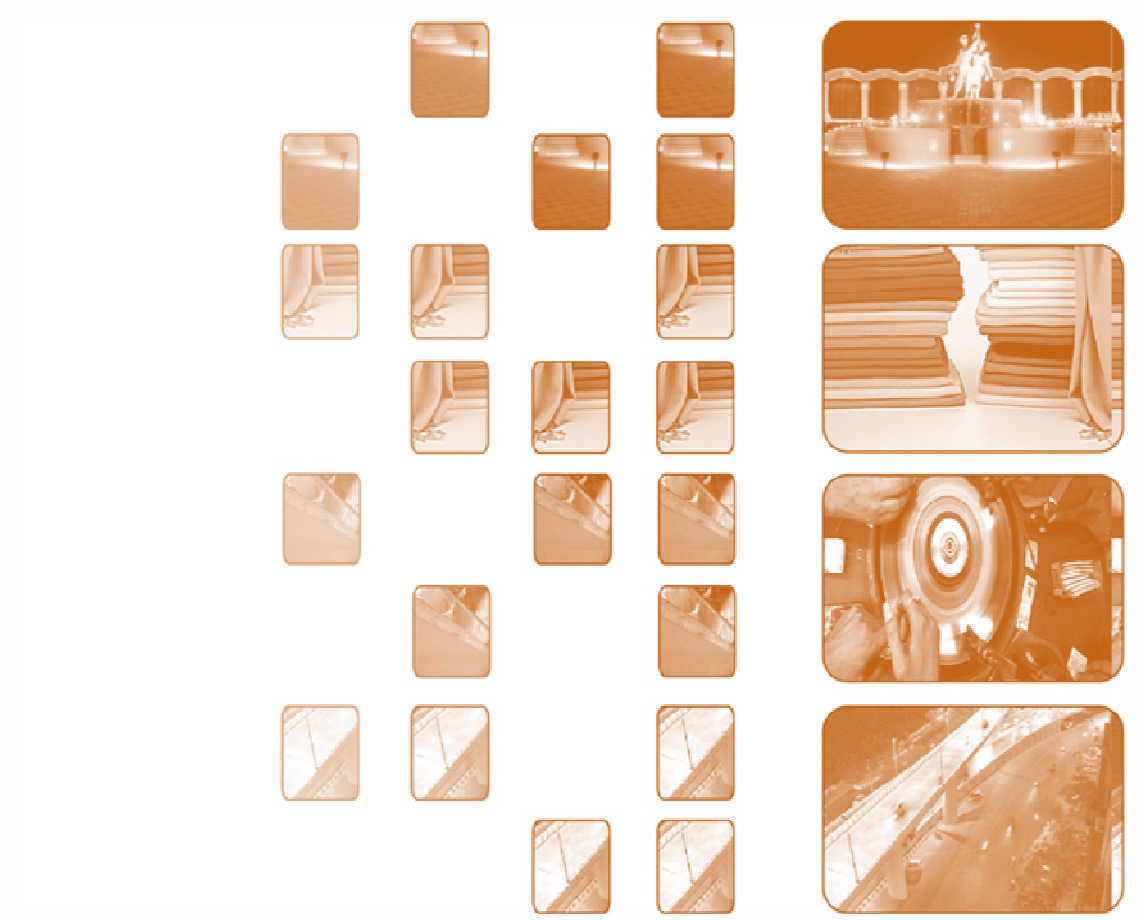
The city of Surat, second largest in the state, has been experiencing exceptionally high rate of growth over the past four decades. The industrial sector, both factory and small scale sectors, is the major contributing factor for the rapid growth. Trade in areas of textile also contributes to the high rate of growth. The establishment of GIDC industrial estates and Hazira has further accelerated the rate of growth. The dynamism seen in the urban economy of Surat has brought large number of people from all over the country to Surat in search of suitable source of livelihood. Based on these trends, by 2031 the city is estimated to accommodate about 75 lakh people.

Rapid Growth:

Surat continues to experience rapid growth. Urbanization has spilled over the city limits. Urban sprawl and other issues of peri-urban growth are matters of concern. In response to this, the areas to the north and south have been added to SMC's limits. With this expansion, factors such as employment and housing will play a role in determining the transport needs. The need therefore arises in exploring transit oriented land-use development strategies.

Socio Economic Changes:

Surat has witnessed a change in the socio economic profile primarily due to the employment opportunities in a variety of upcoming small, medium and large scale industries, and diversification of the trading environment. Increase in wealth results in a change in the trend of lifestyles.



Chapter 3

Urban Land Use Structure

Spatial extension of City

Development Plan Proposals

Strategic Broad Assessment- Land Use

Activity Distribution

Spatial growth of population

Development Potential & Proposals

Recommendations

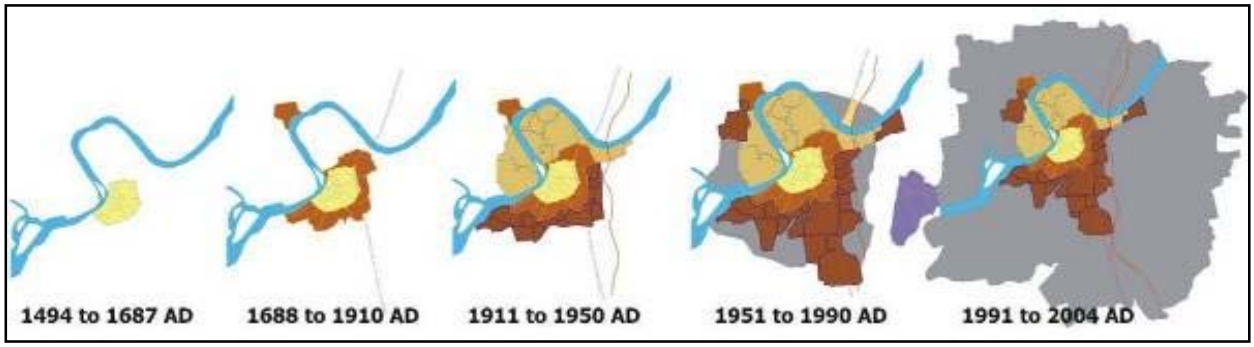
CHAPTER 3. URBAN LAND-USE STRUCTURE

3.1 BACKGROUND

With the growth of the city, the Peri-urban areas also witness the impacts of urbanization and gradually get merged into the existing city limits. The distribution of the land use structures is a major phenomenon which controls the spread of the city as well as mobility within the city. This chapter explains the pattern of the spatial expansion of the city.

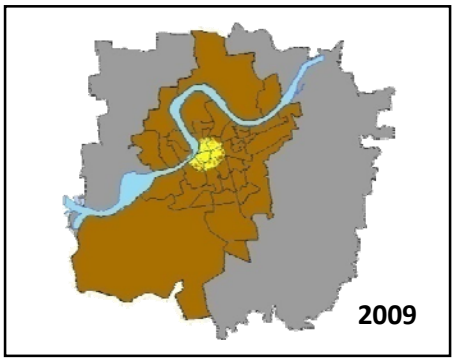
3.2 SPATIAL EXPANSION OF THE CITY

The city was originally established on the southern bank of the River Tapi with a castle on the eastern bank of the river. The activities were concentrated within the inner wall, construction of which was started in the year 1664. The area of the city at this time within the wall was 178 hectares. The entrance to the walled city area was through twelve gates; to the south



were the Navsari and Majura gates and on the west, the Mecca and Badshahi gates and along the riverfront, the Dacca Dwara or Custom House Water gate, Mirbehar and Lati gate.

The construction of the entire wall was completed in the year 1707 enclosing an area of 736 hectares. Surat witnessed the development of its suburbs Udhna, Athwa and Fulpada during the beginning of the 20th century.



Map 3-1 Growth of Surat City

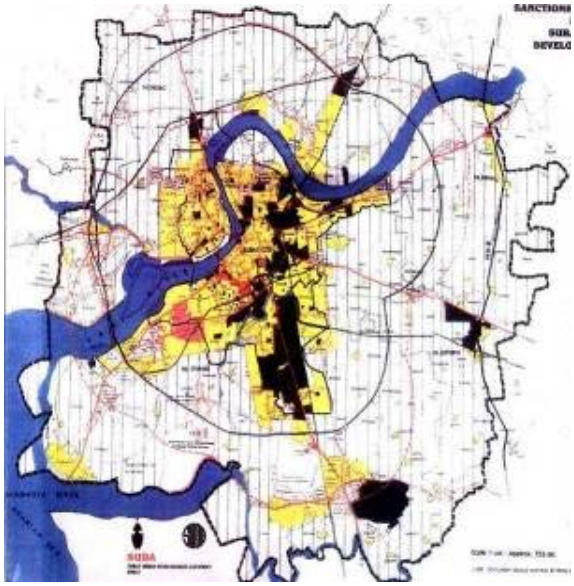
The physical expansion of the town was radial and rapid along five major corridors on the north, south, east, west and south-west till the end of 80's. Since the 90's the city has been growing rapidly on the eastern, southern and south-western sides wherein large chunks of residential localities were developed under the SUDA area.

The land use pattern of the city indicates large parcels of agricultural lands in the Ved area of North zone and in the wards - Jahangirabad and Jahangirpura of West zone. The growth pattern is clearly demarcated with the industrial locations. Industrial location within SMC area along the main railway line from Mumbai to Ahmadabad has attracted major residential development during the past two decades and new industrial developments on the southern

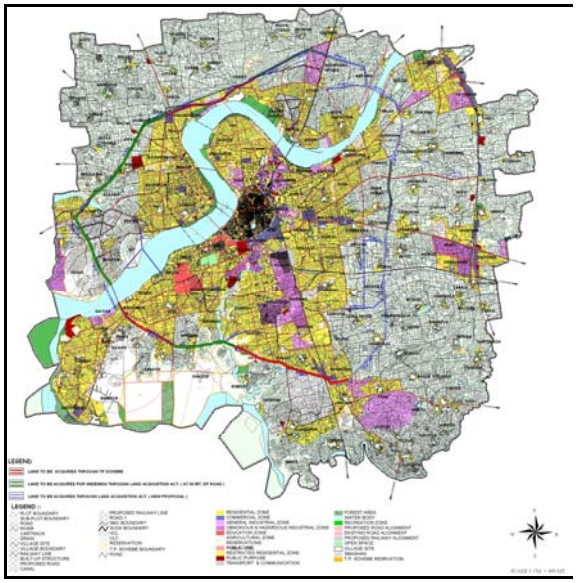
side near Sachin has also been vital in the growth of the city in the southern direction.

3.3 DEVELOPMENT PLAN PROPOSALS 2004

The planning process for the city of Surat is governed by the Gujarat Town Planning and Urban Development Act, 1976 under the provisions of which the Surat Urban Development Authority prepares the Development Plan for the entire SUDA area including the area under the Surat Municipal Corporation. SMC prepares the Town Planning Schemes for the area under its jurisdiction based on the Development Plan proposals.



Map 3-2 Development Plan 1976



Map 3-3 Development Plan 2004

Formal comprehensive urban planning exercise was undertaken for the city in 1960 when the first Development Plan of Surat was prepared. The Development Plan of the city was then revised for the additional area included in the city limits at a later stage. With the establishment of the Surat Urban Development Authority (SUDA) the development plan for its entire area (including SMC's area) was prepared, as provided under the Gujarat Town Planning and Urban Development Act, 1976.

The planning area besides the area within the SMC included 148 villages of Choryasi, Kamrej, Palsana and Olpad taluka. The urban sprawl has already started outside of Surat city limits, along the radial roads and different corridors such as Udhana corridor, Dindoli corridor, Rander – Adajan – Olpad corridor, Nana – Varachha – Kamrej corridor etc. This plan was sanctioned in 1986. The revised development plan for the SUDA area was submitted to the Government in 1998, which was sanctioned on 2/9/2004.

The proposals of the Development Plan are enforced through 'Development Control Regulations (DCR)' which specifies 'Use' and 'Intensity of Use'. This is done through specification of 'Land use zones', and Floor Space Index (FSI), building heights, margins, parking regulations etc.

Though the next revised plan is due in 2014, rapid pace of growth suggests the need for revisions to be undertaken sooner as much of the proposed urbanisable area is already experiencing development pressure.

3.4 STRATEGIC BROAD ASSESSMENT – LAND USE

This section gives a broad assessment of existing land use distribution. The land use details as per the Revised Development Plan (SUDA) are shown in the table below.

Table 3-1 Land use Breakup

No	Type of Zone	SUDA Area in 1978	%	SUDA Area in 1995	%	SUDA Area in 2004	%
1	Residential	2695.60	39.96	6189.00	46.77	9806.18	57.54
2	Commercial	141.30	2.09	256.00	1.93	415.72	2.44
3	Industrial	1006.40	14.92	2784.00	21.04	3023.40	17.74
4	Educational/Public Purpose	540	8.00	735.00	5.55	579.82	3.40
5	Recreational/garden and open space	22.21	0.33	58.00	0.44	106.61	0.63
6	Transport and Communication	790.92	11.72	1661.00	12.55	1661.41	9.16
7	Agriculture	1550.00	22.98	1550.00	11.71	1550.00	9.09
	Urbanized Area	6746.43	100.00	13233.00	100.00	17143.14	100.00
	Non-Urbanized Area	65453.57		58967.00		55056.86	
	TOTAL	**72200.00**		**72200.00**		**72200.00**	

Since 1978, the urbanized area of the city has increased almost 3 times till 2004. The important features in the land use pattern are stated below:

Residential Land use: It includes housing of different types; detached, semi-detached and row houses, group housing and basti's. The nature of city is dominantly residential which is near about 57% of the total urbanized area. The development in the city is taking place in the southern and north-eastern direction with planned and unplanned colonies. Area under residential use has increased drastically, from 2695.6 Hectares in 1978 to 9806.18 Hectares in 2004, indicating the extent of the sprawl of the city. The percentage distribution of residential area is 57.54 % in 2004, which is on a slightly higher side then prescribed standards, which range from 40 % to 45 % as per UDPFI guidelines. High rise development is coming near the University area while low rise development is coming towards Varachha road on SH-66.

A serious challenge in the city is the rapid growth of slums squatter and settlements. Area under slums covers 1.8% of total area of Surat Municipal Corporation in 2007. There are 406 slums covering an area of 579.15 Hectares of the total area of 32651 Hectares of SMC. Mainly these slums are near the medium industry in south and south-east side of the city

Commercial Land use: Surat is one of the major trade centers in the region which is very efficiently connected by rail and road with the state capital Ahmadabad and other parts of

the country. This has made Surat as an important trade and manufacturing centre of Gujarat. The concentration of commercial activity is in the walled city. Therefore being a thickly populated area, it is having a problem of parking and informal activities. Other commercial activities are spread across the city. Commercial land use has increased almost three times in last three decades i.e. 141.3 Hectares to 415.72 Hectares, depicting importance of Surat as a trade centre.

Industrial Land use: The growth of industries shows a steep increase from 1978 to 1995 and then a steady progress over the years till date. Industrial land use is almost seven times the commercial land use in the city. The percentage distribution of land under industries is reduced to 17.74% from 21.04% between 1995 and 2004 but the actual land use under industries has been increased to 3023.4 Hectares in 2004 from 2784 Hectares in 1995. Industries are mostly establishing themselves on the southern side on the road leading to Sachin and to the west on the road leading to Hazira.

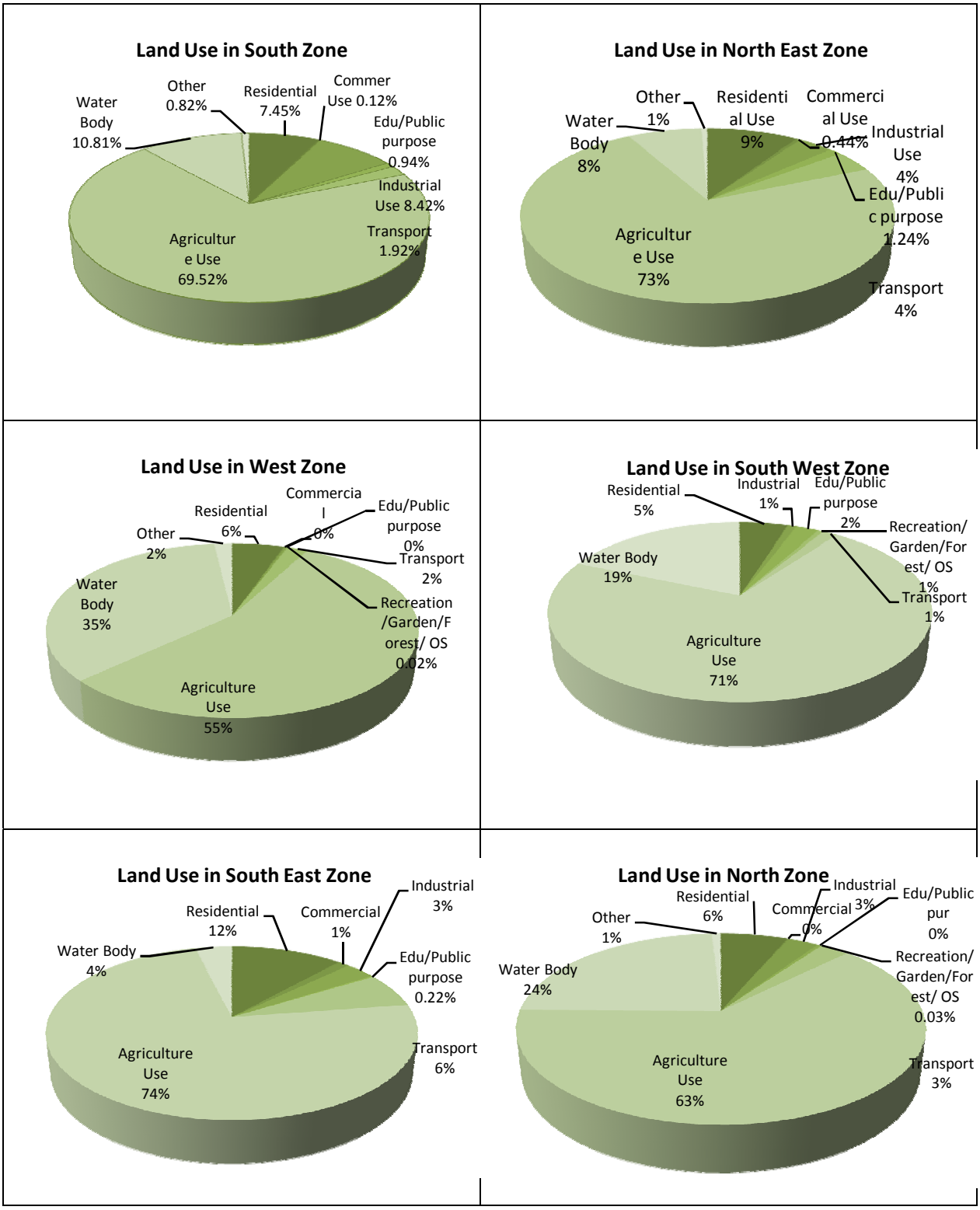
Road Network and Transportation: The road network of Surat is primarily radial with all the regional roads leading out. Land under transportation land use is 9.16 % in 2004 covering an area of 1661.41 Hectares, which is much below adequate standards of 15-20 % as per UDPFI guidelines. This area covered by Road network and Transportation is saturated since 1995 showing no increase in 10 years.

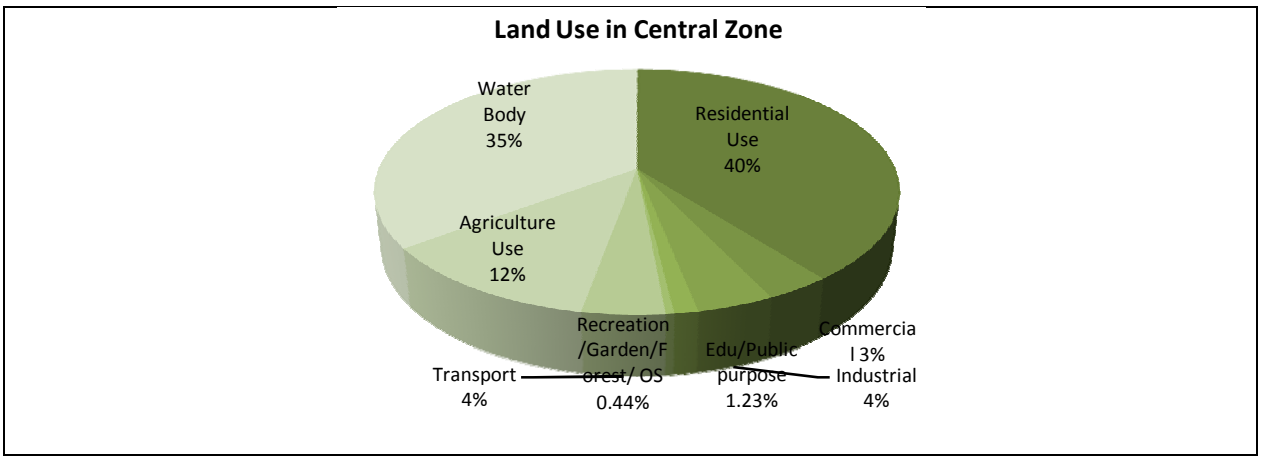
Public and Semi Public: Areas allotted to public semi public use have shown reduction in percentage distribution. It was 735 Hectares (5.55 %) in 1995 and 579.82 Hectares (3.40 %) in 2004. The reason could be attributed to increase in other land uses in comparison to public semi public use.

Recreation and Open space: Recreational areas constitute just 0.33 % (22.21 Hectares) of the total land use till 1978 but have slightly increased to 0.63% in 2004. This is far below the norms set up by the UDPFI Guidelines.

Agriculture: It is notable that land under Agriculture has been kept constant to 1550 Hectares since 1978 to till date but the percentage is decreased from 22.98% in 1978 to 9.09 % in 2004. This shows that whatever area has been taken for development has been acquired fully for other purposes.

Chart 3-1 Category Wise Land use Distribution in the SMC Zones (%)





Source: Derived from actual Land use map of SUDA

The above figures show the percentage of area distribution as per land use category. It can be noted from the above table that the highly dense central zone has almost 40% of the land use as residential use. Commercial use is also dominant in the central zone whereas the industrial use is dominant in the South zone of the city.

3.4.1 TOWN PLANNING SCHEMES

For the implementation of the Development Plan of the city at micro level, SMC has initiated the preparation of Town Planning Schemes. A total of 113 T.P. Schemes have been prepared by the Corporation, which comprise almost 90 percent of the old SMC land area. Whereas, another 18 draft T.P. schemes have been submitted for sanctioning and 12 are under preparation. The entire area within the old SMC limits is thus covered by T.P. Schemes. The remaining portion comprises of river, creek, and areas wholly under industrial houses or Housing Board/govt. land, which cannot be put under Town Planning Scheme.

Table 3-2 T. P. Scheme Details

Sr. No.	T. P. Scheme Details	No. of Schemes	Total Scheme area (in Hectares)
1	Sanctioned Final Schemes	24	3036.79
2	Sanctioned Preliminary Schemes	19	2008.10
3	Sanctioned Draft Schemes	52	5497.20
4	Draft Scheme submitted to Govt. for sanction	18	3215.61
5	Proposed / Under Preparation Town Planning Schemes	12	2917.54
	Total	125	16675.24

Source: SMC, Website Accessed on Sept 29, 2009

SUDA had also taken initiatives of preparing town planning schemes in the outgrowth of the city outside SMC limits. There are total 68 town planning schemes being considered in this area which are at various stages of completion. These schemes are covering about 6,348 hectares of areas.

Reservations under various categories in TP Schemes:

As per Section 40, of the Gujarat Town Planning and Urban Development Act, 1976 (GTPUD

Act), the town planning schemes may make provision for reservation of land for any of the following matters, such as,

Table 3-3 Reservations of Land as per GTPUD Act, 1976

Reservation of land to the extent of	Purpose
10 %	Housing accommodation to the members of S.E.W.S.
15%	Roads
5%	Parks, playgrounds, garden and open space.
5%	Social infrastructure such as schools, dispensary, fire brigade, public utility place
15%	For sale by appropriate Authority for residential, commercial or industrial use depending upon the nature of development.

It can be observed that the actual reservations provided in all the final TP schemes are comparatively on lesser side than the recommended. The total area covered by 22 final schemes is 2797.79 Ha out of which only about 7% is reserved for various purposes. Only five TPS have area reservations above 10% of the total TPS area.

Table 3-4 % Area Reservations in Final sanctioned TP Schemes

Sr. No	Name of the TP Scheme	Total Area Of TPS In Hectare	Total Reservations in Hectare	% area for all reservation to total area
1	T.P.S.NO.1 (Laldarwaja)	40.87	1.273	3.11
2	T.P.S.NO.1 (Udhna-Majura)	141	9.940	7.05
3	T.P.S.NO.2 (Nanpura)	80.94	0.835	1.03
4	T.P.S.NO.3 (Katargam)	177.1	6.573	3.71
5	T.P.S.NO.3 (Karanj)	185.75	8.795	4.74
6	T.P.S.NO.4(Ashwinikumar-Navagam)	211.57	6.656	3.15
7	T.P.S.NO.5 (Athwa-Umra)	170.85	10.380	6.08
8	T.P.S.NO.6 (Majura-Khatodara)	232.08	14.493	6.24
9	T.P.S.NO.7 (Anjana)	191.79	18.103	9.44
10	T.P.S.NO.8 (Umarwada)	166.74	24.936	14.95
11	T.P.S.NO.9 (Majura)	110	8.937	8.12
12	T.P.S.NO.10 (Adajan)	113.2	5.309	4.69
13	T.P.S.NO.11 (Adajan)	88	4.132	4.70
14	T.P.S.NO.12 (Adajan)	109.4	9.421	8.61
15	T.P.S.NO.13 (Adajan)	155.66	16.213	10.42
16	T.P.S.NO.15 (Fulpada)	78.62	10.439	13.28

17	T.P.S.NO.16 (Kapadra)	88	11.372	12.92
18	T.P.S.NO.17 (FULPADA)	76.6	2.023	2.64
19	T.P.S.NO.18 (Katargam)	113.56	4.280	3.77
20	T.P.S.NO.20 (NANAVARACHHA-KAPADRA)	107.06	7.707	7.20
21	T.P.S.NO.32 (ADAJAN)	72	8.313	11.55
22	T.P.S.NO.36 (ALTHAN)	87	7.030	8.08
	Total	**2797.79**	**197.16**	**7.05%**

Out of the total 22 TPS, not all of the TP Schemes have provided reservations for all purposes as mentioned below.

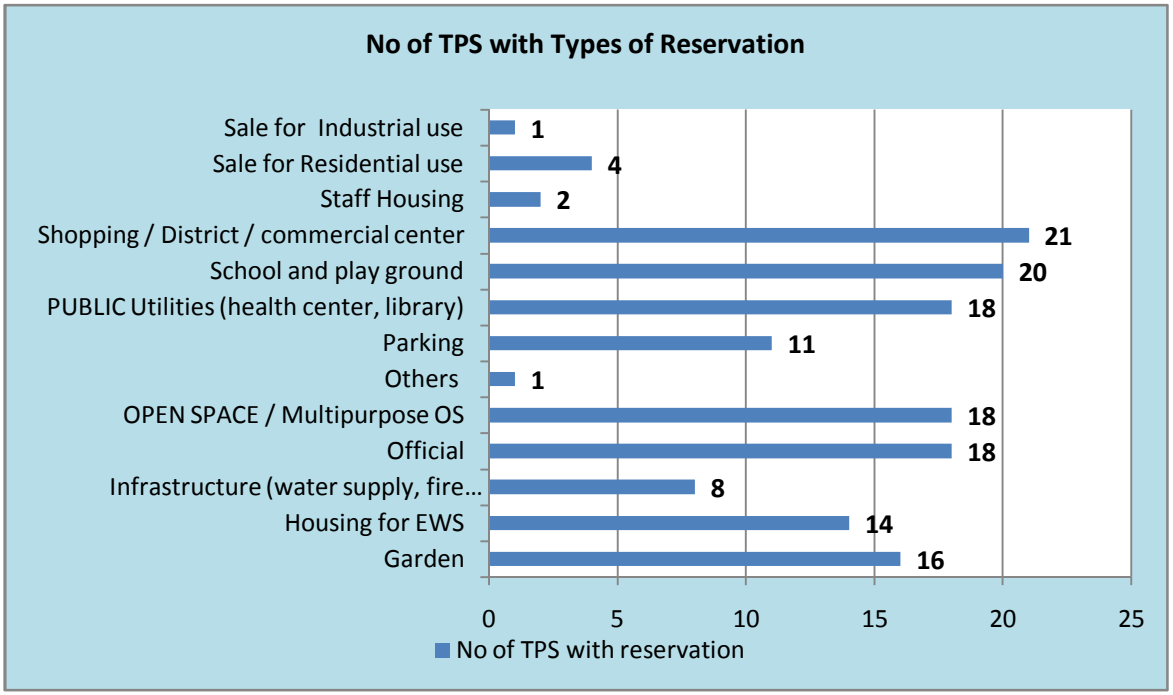


Chart 3-2 Number of Final TP Schemes with Types Reservations Provided

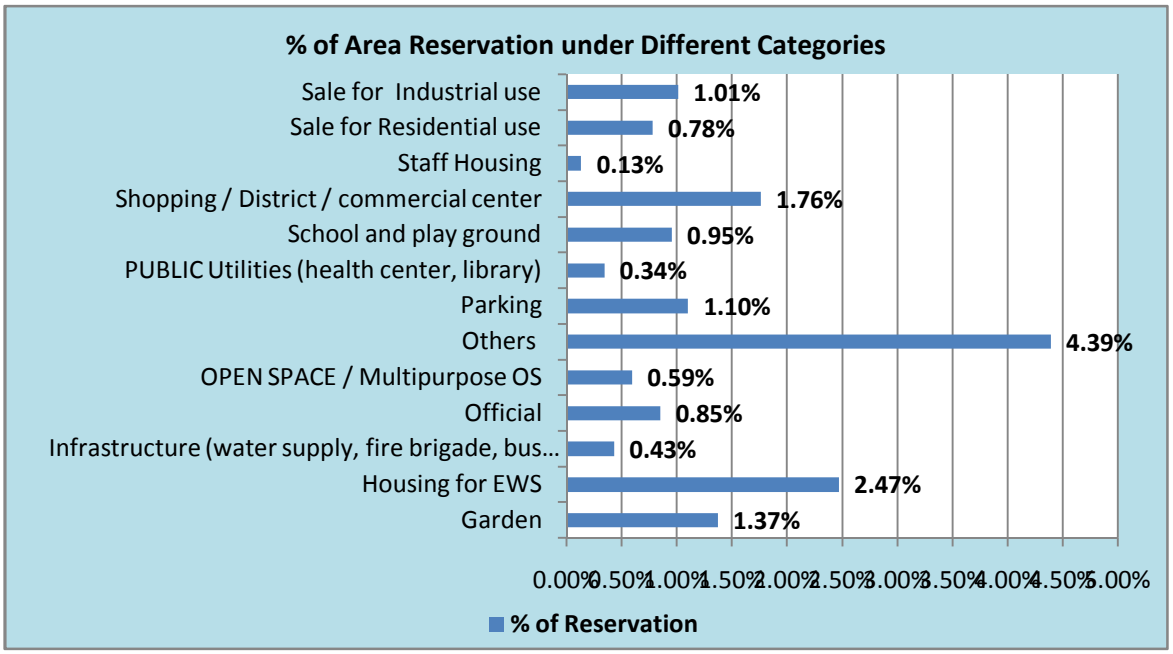


Chart 3-3 Percentage Area Reservations under Different Categories in above Final TP Schemes

It can be observed from above graphs that almost all TPS have reservations provided for Commercial use as well as schools and playgrounds. Reservation for housing for socially and economically weaker sections is provided in 14 TPS whereas 16 TPS have reservations for garden. However, the area reserved for these categories are very less as can be observed from the chart above.

Development Control Regulations

As per the revised Development Plan, the following development control regulations are specified.

FSI and Ground Coverage:

For the purpose of application of the development control regulations, the entire city is divided in two parts such as the Walled City (Gamtal) and rest of the city area.

Walled City (Gamtal) Area:

Maximum permissible FSI (Floor Space Index) in the gamtal (walled city) area is 2. The height of building shall not exceed twice the width of the abutting road.

Table 3-5 FSI & Ground coverage in Walled City area

No.	Building Unit in (Sq.m)	Maximum Permissible Built up area on Ground Floor	Maximum Permissible FSI
1	Up to 90	75%	2
2	90-150	65% (or 67.5 sq.m, whichever is more)	2
3	150-1500	50% (or 90 sq.m, whichever is more)	2
4	1500 and above	45%	2

Rest of the City Area:

Maximum permissible FSI (Floor Space Index) is 1.8 for residential and commercial use, unless specified. The maximum height of any building shall be 40.00 mts. from the plot level to the top of the building, except parapet not exceeding 1.50 mts. in height.

Table 3-6 FSI & Ground coverage in Rest of the City area

No.	Building Use Zone	Max. Permissible Building Area	Max. Permissible FSI
1	Residential	--	1.8
2	Natural Growth of Village	--	1.2
3	Commercial	45% low rise and 30% high rise	1.8
4	Industrial	50%	1
5	Star Hotel on roads > 18 mts	45% low rise and 30% high rise	2.25

3.5 VULNERABLE AREAS

A broad assessment of the existing land use distribution is carried out to identify the

vulnerable areas in the SMC area. The vulnerable areas are identified as below:

- Low Lying Areas (elevation less than 9.5 m)
- Flood affected areas in 1998 floods
- Flood affected areas in 2004 floods

The broad assessment is carried out at the election ward level. About 60% of Surat was flooded in 1998 due to large releases of water from the Ukai Dam. Around 4,00,000 people were affected and 63,115 took refuge with the Relief Camps. The most severely affected area during 1998 floods were Singanpore and Tunki near the Tapi loop and areas along Koyali khadi where the inundation was more than 6 ft. Apart from these areas other affected areas were Rander, Adajan and few parts of the old city area. But today most of these areas have embankments along the river. The total area under submergence was 23.5 sq.km in 1998. The most devastating floods of Surat happened in 2006 in which 128 sq.km area was under submergence. The 1998 floods claimed only 20 lives while the 2006 floods claimed 155 lives (137 in Surat City alone and 18 in rural areas). The floods in 2004 was mainly along the creeks namely, Koyali khadi, Mithi Khadi, Kakra khadi and Bhedvad Khadi. (*Refer Annexure Map 3-1 – Demographic Profile)*

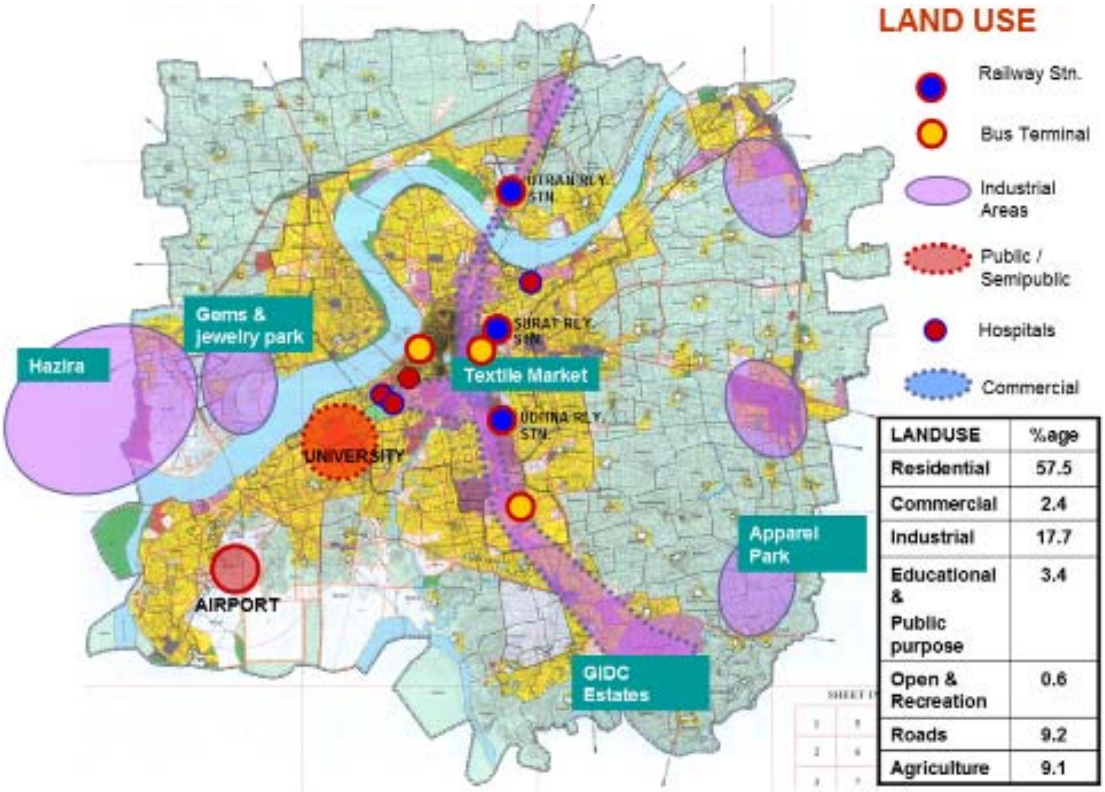
3.6 ACTIVITY DISTRIBUTION

The nature and location of economic activities in relation to residential areas determine the travel demand in a city. Surat is a compact city with very high density (developed area density exceeding 215 per Ha.) Among zones of Surat viz., old city, inner periphery and outer periphery, the spatial distribution of population and traffic generation activity has been summarized below.

The activity centers in Surat include, as stated earlier, areas under industrial use, business and institutional uses. The distribution of the same is represented below.

- The major employment zones in the study area are primarily located in the industrial belts of Pandesara, Udhna, Sachin, Bhestan, Varachha, Kapodara, Fulpada and Katargam. Some industrial activity has spilled over to the periphery.
- In addition, Hazira is another employment zone outside the city.
- Athawalines Road, Ringroad and Ghod-dod road have emerged as important commercial hubs in the city.
- Udhana-Magadalla road, Bardoli road, Varachha road, Navsari Road are major streets thriving with industrial and commercial activities.
- Academic institutes are concentrated in the southern side of the city, though some major institutions are also developing around Varaccha in the northern side.
- Health related facilities are concentrated on the periphery of the ring road.
- Airport is located in the south western part of the city.
- The old city areas are concentrated with mixed type of land use with household based industries, zari industries , etc. Within SMC areas, the Northern, Southern and Eastern portions have industrial areas.
- Type of Development along the major corridors is observed as below:

- Udhana corridor – Navsari Highway: Industrial area
- Uhana-Majura Magdala Corridor: Industrial and residential area
- Dumas road: Residential and Educational institutional area
- Randher-Adajan-Olpad Corridor: Residential and industrial area
- Amroli Corridor: Residential
- Nana Varachha – Kamrej Corridor: Industrial and Residential
- Dindoli corridor: Industrial and Residential



LANDUSE	%age
Residential	57.5
Commercial	2.4
Industrial	17.7
Educational & Public purpose	3.4
Open & Recreation	0.6
Roads	9.2
Agriculture	9.1

Map 3-4 Traffic Generating Activities

Since the inception of SUDA (Surat Urban Development Authority) in late 70s, the City is growing at a rapid pace; though the development in the peripheral areas was not that rapid until 2001. Decadal population growth rate in 1991-2001, did not result in the horizontal urban sprawl; on the contrary. It densified the core city areas, which were part of the municipal corporation. With the municipal area in Surat reaching a density of 21677 persons/Sq kms, it is believed that the future development will take place outside the municipal limits in the urban development authority areas. This demographic fact makes the authority to realize the vast expansion of SUDA area in the immediate surroundings of Surat Municipal Corporation.

Up to 1991 population increase was stagnant in SUDA area; however in 2001 there is stupendous increase in population and having decadal population growth rate of 128% between 91-01. SUDA area is characterized by transformation of non-urbanized area in to urbanized area. In 1978 Non-urbanized area constituted 90% of area, which came down to 80% in 2004, of the total area under SUDA.

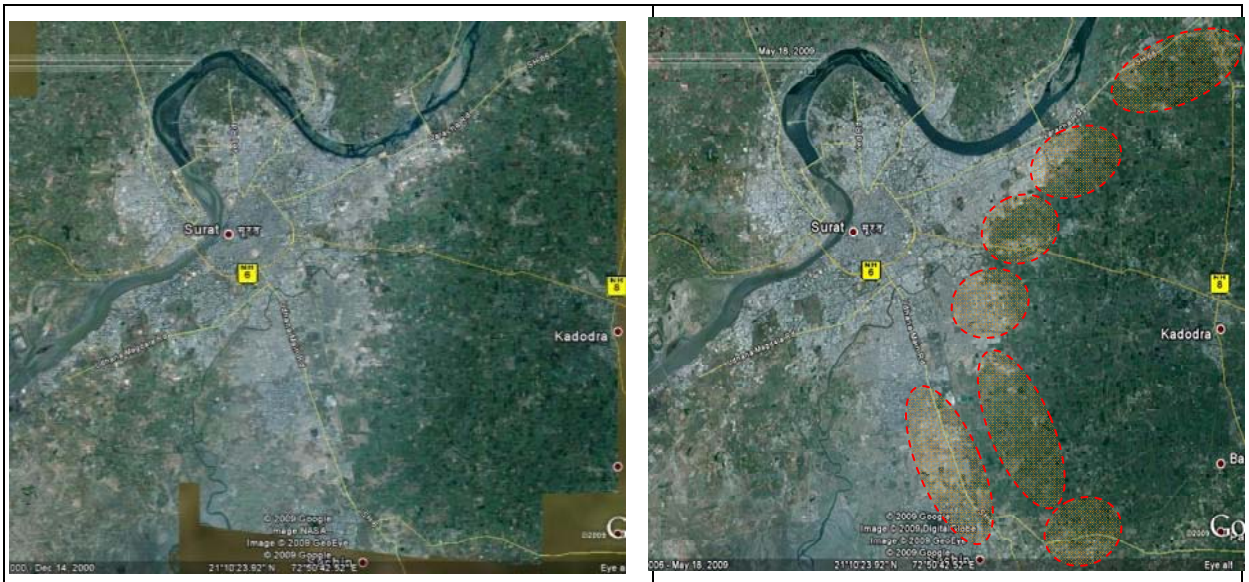
Table 3-7 Population and Growth rate of SUDA area

Year	Population			SUDA
	SMC+SUDA	SMC	SUDA	Population growth rate
1971	620573	471656	148917	
1981	985370	776876	208494	40.01
1991	1716566	1498817	287749	38.01
2001	3090686	2433785	656901	128.29

Surat witnessed the development of its suburbs Udhna, Athwa and Fulpada during the beginning of the 20th century. The physical expansion of the town was radial and rapid along five major corridors on the north, south, east, west and south-west till the end of 80's. Since the 90's the city has been growing rapidly on the eastern, southern and south-western sides. Between 1991-2001, there are only two wards added in Surat Municipal Corporation and hence there is no much increase occurred in its spatial limit

Surat Municipal Corporation has witnessed an unprecedented growth in its jurisdiction. However the expansion of city is pre dominant in southern direction and includes substantial part of Chorasi Taluka. The expansion of city is aligned along the Surat Navsari highway and marked major transformation of villages in to urban landscape.

Looking at the growth pattern and development of Surat and analyzing the satellite imagery for the period 2000 to 2009, it can be seen that most of the developments has been occurred towards Surat-Navsari and Surat-Kamrej Roads. These two areas are developing at a higher pace and providing opportunity for developers. While Surat-Kamrej road has residential development, Surat-Navsari road has industrial development leading to Sachin.



Spatial Image of Surat in year 2000 & 2009

3.7 SPATIAL GROWTH OF POPULATION

At present Surat urban agglomeration comprises of Surat Municipal Corporation and the

Development authority area. Up to 2001, the jurisdiction of Surat Municpal Corporation was confined in Surat city Taluka and then in 2006 it spreads to the adjoining part of Chorasi Taluka. However Surat urban development authority is much vast in its spatial extent and comprises of 128 villages. These villages are under Kamrej, Chorasi, Palsana and Olpad Taluka.

Surat City has seen an unprecedented growth in last three decades and along with that the municipal boundaries have been increasing. An exceptional decadal population growth rate of 85.09 percent in 1991-2001 suggest that the Surat City region has to be planned in a broader perceptive and making it possible for the city to capitalize on its thriving economic development. (*Refer Annexure Maps 3-2 – Population 1991 and 3-3 – Population 2001 in SMC zones)*

As discussed, the rate of growth of the population has been rapid. The spatial patterns of population concentration are changing. The population share of the old city has declined as these areas have reached their saturation limit. In fact during the previous decade, these areas have registered a negative rate of growth. SMC areas outside walled city areas, both within the old SMC and new SMC limits have registered very high rates of growth.

These areas are likely to continue to receive additional population. These are essentially industrial areas and largely accommodate migrant population.

Table 3-8 Spatial Patterns of Growth

Spatial Unit	Area (Sq. Km.)	Population 1991	Population 2001	Popn. Growth rate 91-01	Sex Ratio 2001	Density 2001 (pph)	% Popn. 1991	% Popn. 2001
Walled City	8.2	432539	413641	-4.4	921	506	24.2	13.3
Old SMC excluding Walled City	104.1	1067021	2020194	89.3	747	194	59.6	64.9
New Added Area to SMC	214.2	135045	443406	228.3	713	21	7.5	14.2
Total SMC	326.5	1634605	2877241	76.0	764	88	91.3	92.4
Other SUDA Area	388.1	155508	236521	52.1	457	6	8.7	7.6
Total SUDA	**714.7**	**1790113**	**3113762**	**73.9**	**736**	**44**	**100.0**	**100.0**

The densities in the walled city have reached saturation limit. The population density in areas within the old SMC limit outside walled city is also high. The compact nature of Surat is likely to continue. (*Refer Annexure Maps 3-4 – Population Density 1991 and 3-5 – Population Density 2001 in SMC zones)*

With the abrupt increase in population over the last three decades, Surat Municipal corporation limits are pushed to the adjoining part and observed drastic transformation in the fringes part. Prior to 2001 there was 4 lakhs of population residing in the peri-urban areas. Therefore the kind of population growth which city has registered, justify the spatial expansion.

The spurts in growth within particular wards, located especially in its outer suburbs, in response to the growth and concentration of power looms, diamond processing, petty trade, small industrial units as well as easier availability of dwelling areas in and around the zone. A

large proportion of these workers are migrants located mainly in the slum pockets of the city's eastern half.

Most of the old city wards are small in area as compared to the new wards with ward no. 35 having the largest area. Old city ward also have high population then other wards leading to its more density. In 1991 there were ward having population less than 25000 but in 2001 almost all wards have crossed this limit even some wards on the northern side of Surat have crossed the figure of 1 lakh population. This growth is generally on Surat-Kamrej road and on the other side of the river.
However, it should be noted that the ward numbers Adajan West (ward no. 14), Rander road-Gorad (ward no. 13) and Athwa – Umara – Piplod (ward no. 25) which are highly densed areas are also located in the vulnerable areas as discussed earlier. Hence, special attention should be given to the control and regulation of existing as well as upcoming developmental activities in these areas. Growth pattern of Surat city for the period of 1991-2001 indicates that the northern areas of Surat are witnessing a tremendous growth as compared to Western or Southern areas. This also indicates the preference behavior of the people for residential purposes. Density pattern shows a constant behavior over a period of time with most of the areas which were dense in 1991 continue their dense pattern or getting denser in 2001. Density pattern across the river shows the dependency of density on the connectivity of the area to other areas. Old city being the CBD is getting denser over the time. (*Refer Annexure Maps 3-6 – Sex Ratio 1991 and 3-7– Literacy Rate in SMC zones)*

Old city areas show higher sex ratio then the newly areas towards Kamrej and south of walled city. Areas towards north near the river, shows a higher sex ratio while areas in the south shows a steep decrease may be due to influx of migratory population who reside in this area.

Except wards no. 24 almost all of the old city areas have literacy rate less than or equal to 75%. Wards which have a decent growth rate over the time have shown a good literacy rate of 75% or more. There are certain wards on the south which shows a significant literacy rate of more than 85%.

Population Distribution: Population distribution has been arrived at by adopting ratio method. Putting a density constraint, excess population from each zone has been re-distributed in the all remaining zones.

Employment Distribution: Employment has been categorized as Basic and Non-basic employment (65:35 ratios). Basic employment has been distributed on the basis Development Plan Proposals (Land use Zoning) and trends as indicated in MOUs signed. Non-basic employment has been distributed as a proportion to population size.

Table 3-9 Population Forecast

Location	Adjusted Area in Ha	Base Year	Population		
		2006	**2011**	**2021**	**2031**
Walled City	883	403561	371533	335086	317592

Old SMC	10039	2010043	1999288	2098356	2326634
New SMC (Additional)	22459	758269	1150946	1705649	2380650
Rest of SUDA	38086	433222	690031	1866453	3192853
Total SUDA	**71467**	**3605095**	**4211798**	**6005544**	**8217729**
Population Density (Population/Ha)					
		2006	**2011**	**2021**	**2031**
Walled City	883	457	421	379	360
Old SMC	10039	200	199	209	232
New SMC (Additional)	22459	34	51	76	106
Rest of SUDA	38086	11	18	49	84
Total SUDA	**71467**	50	59	84	115

Source: Derived

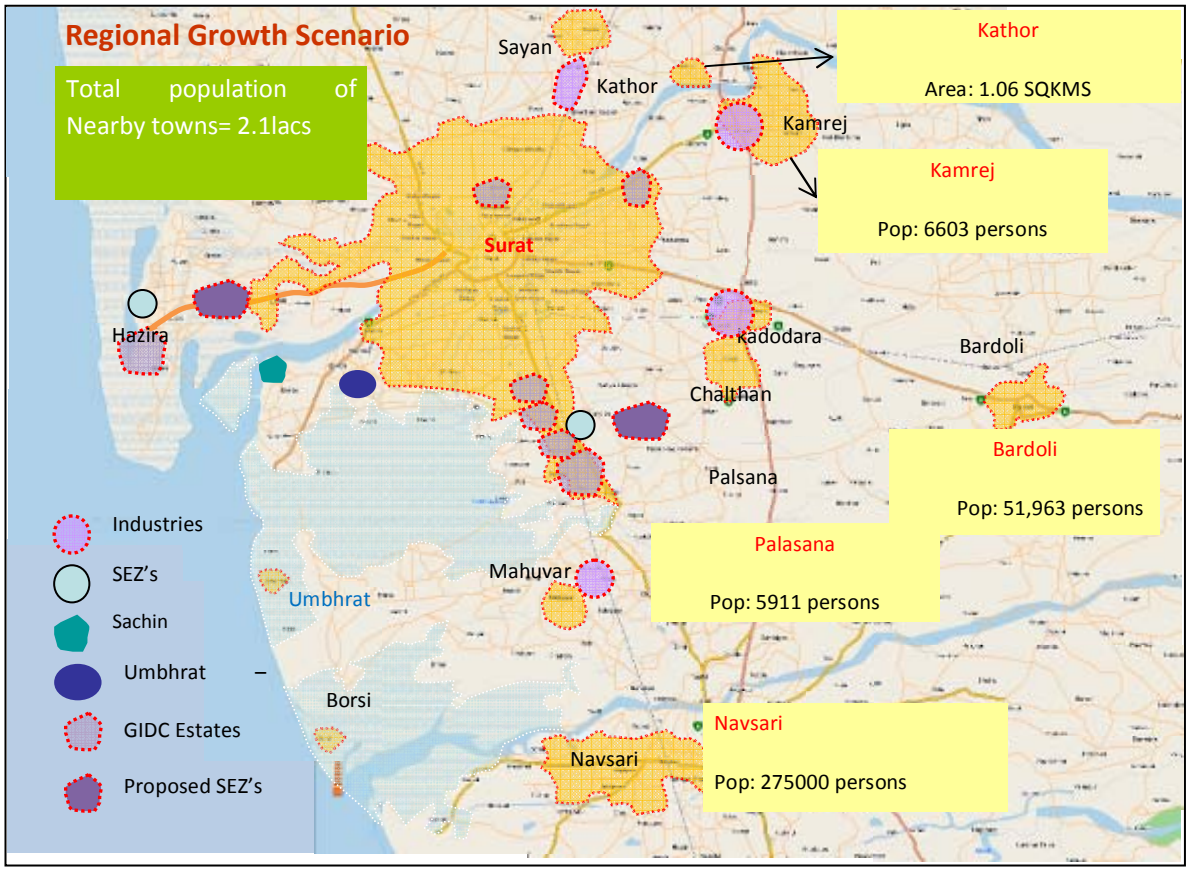
3.8 DEVELOPMENT POTENTIAL

Surat is one of the leading city-regions in the country that has attracted massive investments of which substantial proportion is under implementation. According to CMIE (Center for Monitoring Indian Economy), the Surat City region has proposed investment of about Rs. 11,817 crores, and projects worth another Rs. 2,022 are under implementation. Hazira and SEZ are major focal points for growth. The region falls within the Delhi-Mumbai Industrial Corridor and Hazira is slated to be a major investment zone. The spatial framework for these developments has to be defined at a broader level. This section broadly identifies the growth trends, settlement pattern and proposes a broad regional structure and also a network to connect these. The proposals would have to be placed within a regional framework.

Following are important aspects to be noted as part of development proposals.

- Hazira will continue to be a major investment zone.
- The growth is along Surat-Navsari and Surat-Kamrej Roads.
- The towns, Kadodara, Bardoli, Palsana, Mahuva and Navsari provides some base for development of nodes in the future
- Investments worth 61449.5 crores are committed through signing of MOUs
- Regional connectivity to these nodes needs further improvement
- Hazira is a major industrial township with its workers depending on Surat for residence and amenities.
- The satellite towns such as Navsari and Kamraj surrounding the city of Surat have potential to develop as satellite centers. However, given Surat's primacy and due to lack of infrastructure in these centers, the development is still insignificant in these towns.

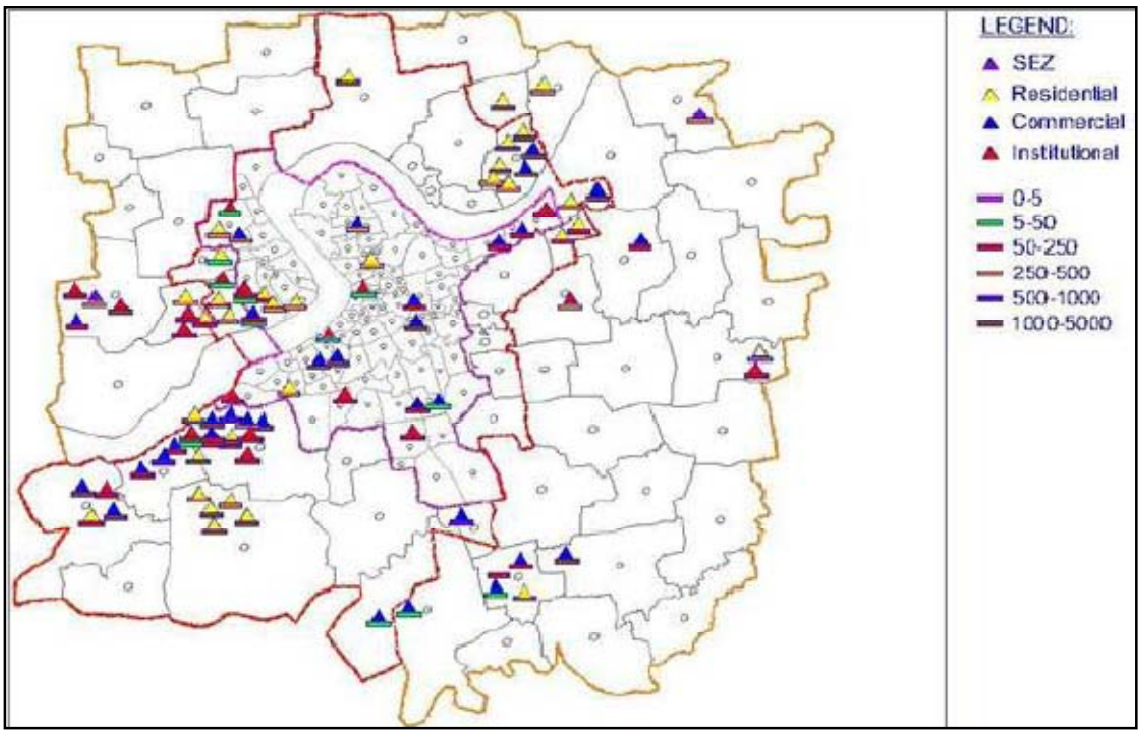
Map 3-5 Existing and Proposed activity centers and urban settlements in Surat Region



3.9 DEVELOPMENT PROPOSALS

As part of Urban-05 Vision, several proposals for location of various economic activities within the vicinity of Surat have been expressed.

- » Industrial nodes are being developed at Sachin and Kamrej corner.
- » A proposal to develop Surat and Navsari as twin cities is underway.
- » A corridor is planned to be developed between Surat and Navsari with an intermediate node near Mahuva.
- » Umbhrat has the potential to be developed as tourist centre.
- » Providing sewerage system for various areas in the walled city.
- » Parking facilities in most congested areas like Hira Bazaar at Khan Saheb's Dela and Dhobi ni Wadi.
- » Cement Concrete roads for all major roads having width between 10 m and 24 m and concrete pavers block roads for minor roads having width less than 4 m.
- » Development of Ring Road, including parking, and traffic amenities below flyover/bridges etc.



Map 3-6 Location of Major Investments in Pipeline

3.10 RECOMMENDATIONS

The city is compact and has been outwardly expanding along the transport corridors. The growth trends indicate sprawl tendency towards south and north east. Some signs of growth extending towards northern side across the river are visible. The major challenge is to channelize the growth such that mobility is efficient. Appropriate modifications to the Development Control Regulations (DCR) to encourage transit oriented development are necessary. They would include higher Floor Space Index (FSI) along transit corridors and developing nodes at appropriate locations.

Following factors contribute in the area development trend:

1. Efficient transportation link
2. Economic activity base
3. Non-vulnerable zones w.r.t. Flood / water logging or properly leveled lands
4. Proper water supply
5. Availability of social infrastructure such as schools, colleges, hospitals

Hence, keeping in this mind, following broad recommendation are given,

Land Use Distribution:

From the above broad land use assessment it is noticeable that the city has become congested due to the less availability of open / recreational spaces as well as increasing residential density. The chaos formed due to traffic congestions in the city area also escalates the air pollution levels. Keeping this into mind following broad measures are suggested:

1. It is important to keep the city mobile, hence proper development of public

transportation systems along with development of road and other transportation services is necessary. The current area under road and transportation use is 9% which should be increased to 15-20% as per UDPFI recommendations.

2. Creation of healthy urban environment by provision of recreational and open spaces. It is recommended that for good quality of life it is indispensable to provide recreational and open spaces at the rate of at least 6-7% of the total land use.
3. Encourage development of industrial nodes as well planned growth centers Industrial areas should be located away from the wind ward direction.
4. Encouragement of use of waste land or khar land with provision of proper infrastructural services for industrial use.
5. Surat is flood prone hence proper SWM is required

Measures Proposed for Flood Prone / Vulnerable Areas

For better management of the developmental activities in the city, it is recommended that the vulnerable areas should be divided into different zones based on the level of vulnerability. A brief description of these zones is as follows:

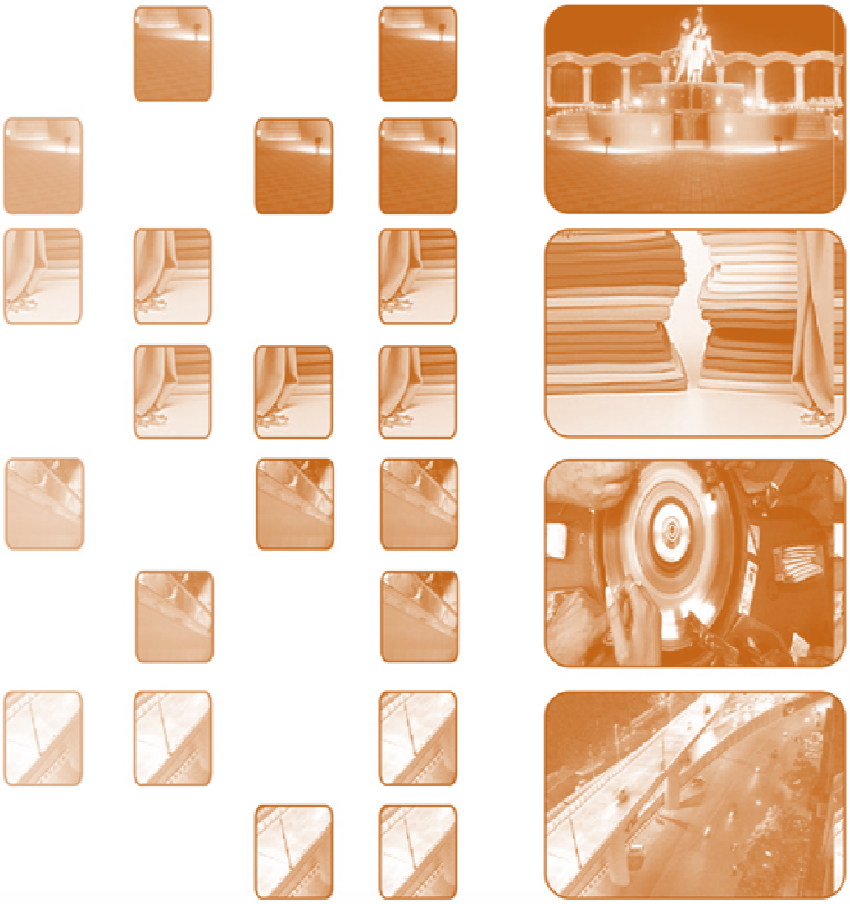
Zone #	Recommendations
Zone 1	Areas in the main river Tapi. This distinction was important because of the potential for new development in the river itself. Now zoned, in this area development is not recommended.
Zone 2	This zone is allocated as an area at a certain distance from both the river bank edges
Zone 2A	River edge to 15m towards landward side.
Zone 2B	15m to 150m away from the river edge
Zone 3	This zone indicates vulnerable low lying areas within the city.

It is recommended that the 'Development Control Regulations' be modified to include the following measures which can save the city from high damage.

1. It is vital to follow and implement the approach for land use zoning as suggested in the SUDA GDCR. As per this approach the building or other utility structures should be grouped into three priorities.
   - » The priority 1 buildings should be located above the levels corresponding to a 100 year flood or the maximum flood levels observed. As of today, the 2006 flood levels were the highest flood levels in last hundred years. Areas submerged in 2006 flood are presented in CHAPTER 13 Disaster Management.
   - » Buildings of priority 2 should be located above the 25 year flood level o a 10 year rainfall contour (the building should have high plinth level above 25 year flood mark or constructed on columns or stilts, with ground area left for the unimportant uses)
   - » Priority 3 activities or services such as playgrounds, gardens and parks, etc. can be located in areas vulnerable to frequent floods.
2. No high occupancy building such as schools, library or hospitals should be constructed in the low lying areas. In the low lying areas, plinth must be raised accordingly, or other measures such providing parking at ground floor to name a few can be adopted.

3. For existing properties, especially businesses, it may be worthwhile to get flood-insurance or move important documents and expensive items on a higher floor.
4. Additional measures using ground recharging, water harvesting, attenuation drainage etc can be attempted.
5. For a larger area, on-site storm water ponds to store and/or attenuate additional runoff from the development will help.
6. For smaller properties if the plinth is low, construct water barriers near openings or use flood gates which would not let water get inside the property.
7. Due care must be taken not to disturb the natural drainage channel by filling or blocking it. A minimum setback of 5m depending on the width of the watercourse must be provided for any structures as well as paving. This set back from the edge of the watercourse will allow access for channel clearing and maintenance.

It is recommended conducting a detailed and comprehensive exercise of survey, mapping, vulnerability analysis and scenario building exercise to support the revision of the Development Plan and Development Control Regulations.



Chapter 4

Basic Infrastructure Services

Water Supply

Sewerage System

Solid Waste Management

Storm Water Drainage & Floods

CHAPTER 4. BASIC INFRASTRUCTURE SERVICES

This chapter takes a detailed overview of four urban basic services namely, water supply, sewerage, storm water drainage and solid waste management. Each of the service is evaluated in terms of its existing service delivery and future augmentation. This is further detailed with on-going JnNURM projects and future actions.

4.1 WATER SUPPLY

Piped water supply system for the Surat City was started first time in year 1894 and first water works was setup at Varachha. Initially water was supplied through surface water from the River Tapti. Gradually, other sources of water came in to existence as the need aroused with respect to population and industrial growth in the city.

Main source of water for Surat is the river Tapi flowing through the city. Surface water is drawn by intake wells from perennial channel of the river throughout the year. Water thus drawn is treated by the water treatment plants and then the same is supplied to the citizens after post-chlorination.

In the year 2006 area of Surat city was increased from 12.**28** sq.km to 326.51 sq.km. The coverage of the water supply system to city areas is presented in the charts below:

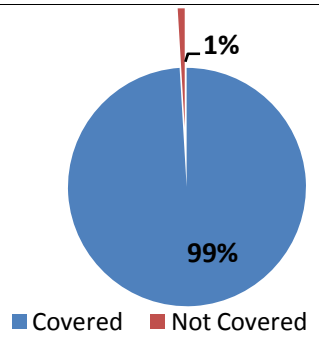
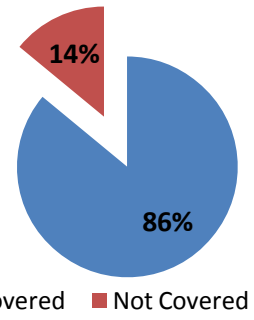
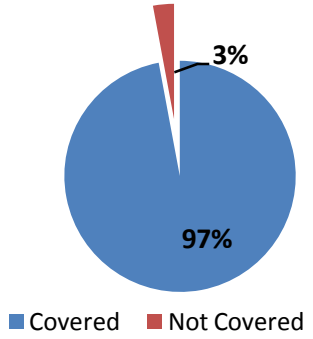
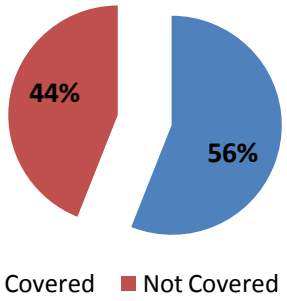
COVERAGE	OLD CITY AREAS	WITH EXTENDED LIMITS
Population		
Area		

Chart 4-1 Area and Population Coverage in SMC

Present gross average daily water supply of the city is 700 MLD. Present average daily per capita water supply is about 145 lpcd. In areas newly added to the city in 2006, water supply

is provided through ground water sources and bulk water by GWSSB at present.

Considering the newly merged area of the city, a long term water supply Master Plan up to the year 2041 is being envisaged by SMC. The implementation of the master plan is to be done in phases. The phasing of the master plan is done so as to cover 100% population & area of city by the year 2012.

4.1.1 SOURCES OF WATER SUPPLY

Surface Water Sources

Main source of water for the city has been the river Tapi since centuries. To cater the portable water need for the city of surat first water works was commissioned at Varachha in the year 1898, to serve 1.08 Lacs population & 8.25 Sq.Km area with water supply from infiltration wells. After that, tube wells were constructed at Varachha & Sarthana to increase the capacity.

Surat city has grown at a very spur growth rate so to harness the river water for flood control, agriculture, power generation, domestic and industrial purposes the Kakarapar weir, the Ukai dam and Singanpore weir were constructed in the year 1954, 1972 and 1995 respectively. Weir-cum-cause way at Rander was built on PPP model with majority of investment from Industries situated in Hazira.

The City witnessed a tremendous growth in textile, diamond and jari industries during sixties and seventies. This was followed by a spurt in major industrial activities in and around the city, like the development of Hazira industrial complex in nineties. Industrial and commercial activities have given Surat a place of prominence in the whole of India.

After a lapse of nearly a century, second water works for the city of Surat was commissioned at Katargam in the year 1997 at a total project cost of about Rs.25 Crores. The concept of Katargam Water Works was developed and materialized after the construction of a weir-cum-causeway in the year 1995, across the river Tapi, connecting Rander and Singanpore area of Surat. The biggest advantage to the development of Katargam Water Works was the large quantity of always-available harnessed water body nearer to city as compared to other water works.

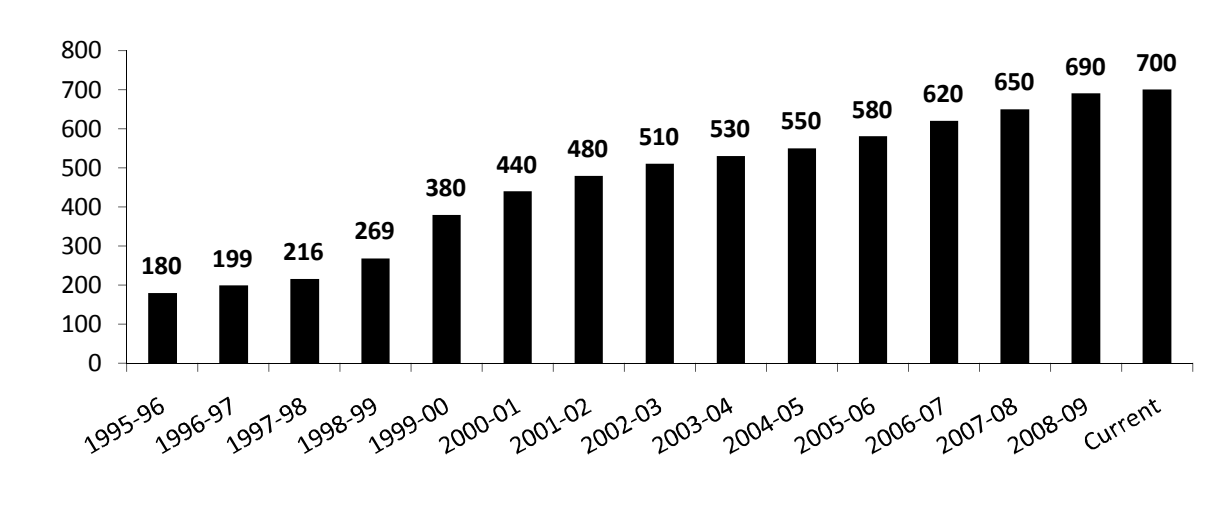


Chart 4-2 Daily average water supply in SMC

Table 4-1 Average yield & Installed capacity (2009)

Source	Installed Capacity (MLD)	Average yield (MLD)	Yield / inst. Cap.
Surface Sources	1128	640	57%
Ground Sources	90	60	67%
Total	**1218**	**700**	**57%**

Table 4-2 Water supply – Quantity (2009)

Purpose	Quantity supply (MLD) 2009
Domestic	600
Commercial	20
Industrial	55
Institutional	3
Public Stand Post	5
Newly merged Area	17
Total	**700**

Table 4-3 Water Supply – Indicators

Head/ Year	2009
Total area of Surat (sq. km)	326.515
Area covered by piped water supply (Sq.Km)	125.74
Total area to be covered under water supply	223.43
% of area served	56
Present estimated population	39.00
Population coverage (lakhs)	31.02
% of total population served	79
Total water supply capacity (ground and surface) (MLD)	1218
Total water supplied (ground and surface) (MLD)	700
Gross daily supply (lpcd)	145
Treatment capacity/ Total Supply	162%
Storage capacity/ Total supply	85%
Supply Frequency	Av. 3 Hrs Daily

Ground Water Sources

The general practice of using ground water in addition to the municipal supply has lead to the existence of bore wells in almost every dwelling unit o f the city. The total number of tube wells for water supply in the city is 34. The detail of the installed capacity and the withdrawal from the ground water as well as the surface water sources is presented in

Table 4-4.

Yield from Surface and Ground Sources

The installed capacity of surface water sources is mostly utilized at present. The contribution from the ground sources is almost less than 10 percent in the daily total water supply to the city. At present surface water sources contribute more than 90 percent of the daily water

supply.

Table 4-4 Water Supply – Sources of water (2009)

Sr No	Source	Year of commissioning	Installed capacity (MLD)	Average withdrawal (MLD)	Withdrawal / Installed Capacity (%)
1	**Surface Water**				
a	Varachha Water Works	1993	68	40	59
b	Katargam Water Works Intake well	1998	240	230	96
	* Under Construction (katargam)	-	263*	0	0
c	Sarthana Water Works- Intake well	2001	240	200	83
	* Under Construction (Sarthana)	-	360*	0	0
d	Rander Water Works- Intake well	2003	360	130	37
2	**Underground Water (newly added areas)**				
a	French Well-1&2 Sarthana	1985	90	60	67
b	Bore wells Nos.	-	34	16.55	49
c	Water supply from GWSSB	-	5.498		

** Water supply in newly merged areas of city is presently catered with their existing systems till new water supply network is laid by SMC.*

4.1.2 WATER TREATMENT AND QUALITY MONITORING

In the first phase of development and as a part of the long-term master plan for the water supply scheme of Surat city, 120 MLD capacity water treatment plant was commissioned in the year 1997. Then in the year 1999, capacity of this water treatment plant was increased to total 240 MLD. Raw water at this water treatment plant was fed by the intake well constructed in the river Tapi. In the year 2000, at Sarthana Water Works, 120 MLD capacity Water Treatment Plant & 240 MLD capacity raw water Intake Well were commissioned at the total project cost of about Rs. 30 Crores.

In January 2003, 200 MLD capacity Water Treatment Plant & 360 MLD capacity raw water Intake Well were commissioned at a total project cost of about Rs.35 Crores. In December 2006, 200 MLD capacity Water Treatment Plant & 225 Lac Liters capacity UGSR Well were commissioned at a total project cost of about Rs.29 Crores. Recently, two water treatment plants of 150 MLD capacity each at Katargam & Sarthana were commissioned under JnNURM at a project cost of Rs.50.20 Crores. Water treatment facilities exist at four major stations at Varachha, Sarthana, Katargam and Rander. Currently total capacity of all water treatment plants is 1128MLD, whereas the working capacities in 623 MLD.

Table 4-5 Water treatment – Design & Working Capacity (2009)

S. No	Water works (Treatment Plants)	Design Capacity (MLD)	Working Capacity in MLD (2008)

1	Varachha	68	40
2	Sarthana	470	213
3	Katargam	390	230
4	Rander	200	140
	Total	**1128**	**623**

Quality Monitoring

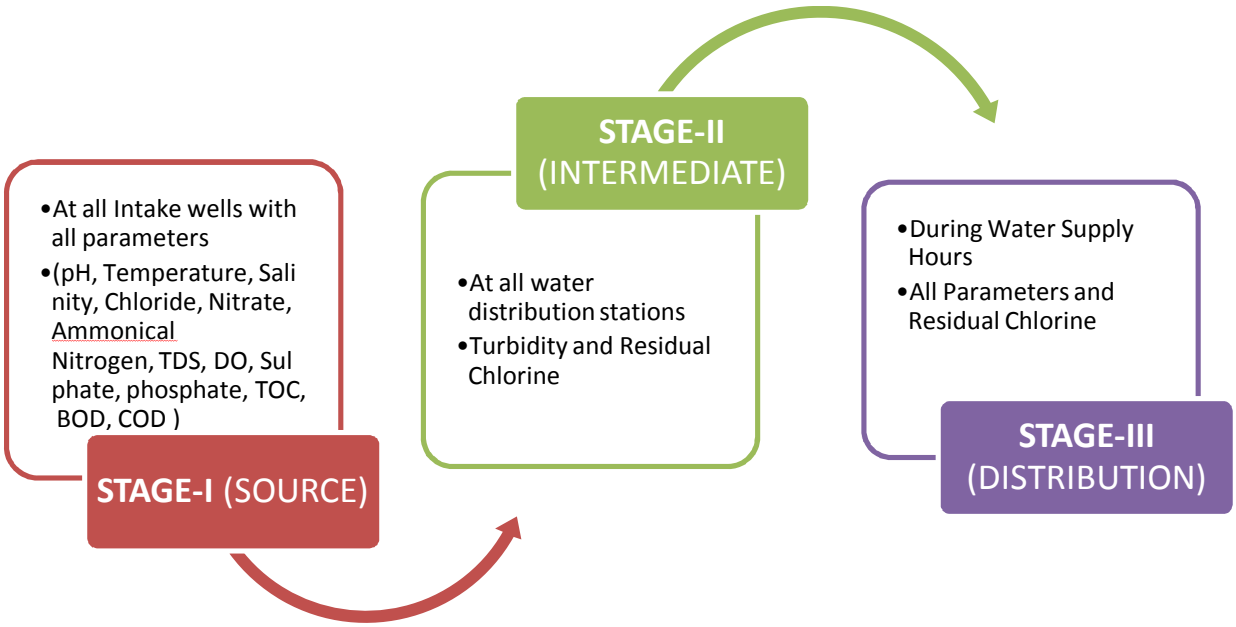


Figure 4-1 Drinking water Quality Monitoring Process in SMC

» **Stage-I (Source)**

At SMC periodically, river water quality at specified locations is monitored with the help of Multi parameter Deployable River Monitoring instrument. This instrument generate instant results at site water quality report for the parameters like pH, Temperature, Salinity, Chloride, Nitrate, Ammonical Nitrogen, Total Dissolved Solids, Dissolved Oxygen etc.etc. Testing results for the above parameters including Sulphate level, phosphate level, Total Organic Carbon (TOC) level, BOD, COD etc. helped apex body to know the status of river water quality as well as the quality of effluent being discharged by point / non-point sources.

» **Stage-II (Intermediate)**

Installation of Portable Digital Turbidity meter and Digital Residual Chlorine analyzer at individual water distribution stations and pumping stations. Monitoring and recording Turbidity and Residual Chlorine for supply water prior to dispatch to consumer. Residual Chlorine was being checked with ordinary Chloroscope at individual water distribution station. Reading value used to depend on the color comparison and reader. Level of residual chlorine was always matter of controversy between health department and water supply department. In order to make in clear, department has decided to go for digital chlorine analyzer.

» **Stage-III (Distribution System)**

Devised surveillance program for collection of water samples during supply hours from the consumers to ensure the fitness of water. Dedicated laboratory is established having advanced analytical facilities (Portable Turbidity meter, Pocket Colorimeter, Portable pH/ISE meter, Portable Spectrophotometer, Digital Balance, Hand Hold Dissolved Oxygen meter, Bacteriological incubator, Hot air oven, autoclave, water still etc.) and laboratory staffs. More than 110 – 120 samples (Average) are being collected and checked daily from the consumers.

Also, portable chlorine analyzers (Chloroscope) are provided to field staff to check the residual chlorine level in the water during supply time.

4.1.3 STORAGE, TRANSMISSION AND DISTRIBUTION

Extracted water from the surface/sub-surface water from sources - like River Intake wells, Jack wells, Infiltration wells and bore wells is sent to the treatment plants for further process. At the treatment plant the raw water is made portable up to the standards of safe drinking water by Pre-Chlorination, Primary treatment and Filtration. Quality control also being carried out by laboratory testing. The total current treatment capacity available with SMC is 1128 MLD

The treated water is then transmitted from Water Works to Water Distribution Stations, located in different parts of the city via Transmission pipelines of 175 km. currently total 2005 lac litres of storage facility is available with SMC at present, collectively at all water works.

At the water distribution stations the water is Post-Chlorinated and the distribution of treated water to the consumers from different Water Distribution Stations via distribution pipelines happens during supply hours. Prior to the distribution of the treated water is stored in the storage facilities available at the distribution stations. The total storage capacity of 3600 lac litres is available with SMC at present. Water is distributed in to the distribution lines through pumping stations through an entensive network of 2350 kms.

The Day to day collection of water samples from different water points of water distribution system happens and laboratory testing (chemical analysis and bacteriological testing) of the collected samples is being done by SMC which finally reaches to Hydraulic Department –for their feedback and monitoring. The water supply system in different zones and their supplying water distribution station and associated water works is presented in Table 4-7

Table 4-6 Water Supply Storage and Distribution system (2009)

Head	2009
Number of water supply zones	7
Water Supply Pipelines – Total length	2525 Km
Transmission mains	175 km.
Distribution Network	2350 km.
Total storage capacity (UGSR + ESR)	5968.50 Lacs litres
Storage capacity / Total supply	85%

Table 4-7 Water Supply Zones-Water works-Pumping Station -Distribution station (2009)

Supply	Water	Water Supplied from

Zones	Supplied (MLD)	Water Distribution Station	Water Works	Sub Pumping Station
West	60	Joganinagar	Rander	
North	130	Katargam	Katargam, Varachha	Gotalawadi
East	120	Katargam, Umarwada	Varachha, Sarthana	
South	125	Udhna, Khatodara, Udhnasangh, Pandesara		Kinnari
Central	135	Khatodara, Umarwada, Katargam	Varachha	Chowk Bazar
South	85	Athwa, Althan,Khatodara		Althan
South East	40	Dumbhal		
TOTAL	700			

Table 4-8 Storage Capacity Available at different locations (UGSR+ESR) (2009)

Sr No	Storage (in Lac Litres)	UGSR Capacity	ESR Capacity	Total Capacity
1	Water Distribution Station	3449.5	150	3599.5
2	Water Works	1967.5	37.5	2005
3	Pumping Station	62	0	62
4	Pal-Vesu Scheme	287	15	302
5	**GRAND TOTAL**			**5968.5**

The storage capacity adequacy at main water works & distribution stations to the total water supply is 87% percent whereas the storage capacity adequacy of all the water distribution stations to the total water supply is 84% percent. The storage capacity at the main water works of Varachha, Sarthana, Katargam, and Rander is about 178 million litres with an adequacy of 28% percent to total water supplied.

Table 4-9 Water Supply - Zone wise Coverage Indicators (2009)

Parameters	East Zone	West Zone	North Zone	South Zone	South West Zone	South East Zone	Central Zone	Total
No of wards Catered								
Total area of the zone (sqkm) old (before ext.)	13.86	19.63	20.54	26.01	14.96	9.1	8.18	112.28
Total area of the zone (sqkm) New (After ext.)	37.53	51.28	36.36	61.76	111.91	19.49	8.18	326.52
Total Resi area of the zone (sqkm) w.r.t. new area (after ext.)	21.26	7.78	25.48	16.26	40.38	0	0	111.15
Total population of the zone $ (2001)	7.12	2.87	4.16	4.08	2.43	3.97	4.14	28.77
Projected Population - in 2009 $	10.57	4.27	6.19	6.06	3.62	5.90	6.15	42.75
Total area covered by piped water supply (%) *	39.47	92.84	40.17	58.46	46.91	100	100	56.28
*Population covered (%)	77.14	78.27	68.24	70.4	77.5	79.54	100	78.29
Total water supply capacity (MLD) - SMC-old	118	60	121	119	67	40	135	660

Parameters	East Zone	West Zone	North Zone	South Zone	South West Zone	South East Zone	Central Zone	Total
-- do -- (for newly merged area) MLD	2.46	1.56	6.9	1.3	2.88	1.45	0	16.55
Gross Per capita per day supply (lpcd)	145 (excluding Industrial supply of 55 MLD)							
Water Supply Pipelines length (km)	2525							
Transmission mains (km)	175							
Feeder mains (km)	--							
Distribution Network (km)	2350							

** Assuming that new infrastructure of water supply will be required for newly merged area (residential only) & population of city.*

4.1.4 WATER CONNECTIONS

Table 4-10 Water Supply - No of Connections (2009)

Connection	2009	% of total
Domestic	330988	97%
Non – domestic	9,346	3%
Total	340334	100%

SMC area has total water connection of 3,40,000 out of which 3,30,988 (97%) connections are domestic and water is supplied at flat rate based on size of the connection. Out of all these connections only 1425 connections are currently metered. Tariffs are laid for all these connections by SMC.

4.1.5 WATER SUPPLY IN SUDA

Water supply in areas under the Surat Urban Development Authority is catered by the Gram Panchayats of the respective villages through bore wells. As such in the past SUDA has also constructed water treatment plants for Vesu and pal areas of Surat city, which were handed over to SMC later they were included in Surat as the city limits got extended.

4.1.6 EMERGING ISSUES

System (transmission and distribution) losses and unaccounted for water

The gross average supply in the city is 145 lpcd (Gross LPCD - Including @ 20% Losses). It is estimated that transmission and distribution losses account for 20 percent of the total supply. Studies are required to check these figures and also amount of water unaccounted for.

Leakage and contamination of water at household connections

Although rehabilitation of old pipelines has been taken up in recent past, the problem of low pressure in water supply persists due to the existence of an aged network especially in central zone. Increasing population has also added to the already existing woes.

Apart from these, the use of GI pipes for household connections leads to leakage and

contamination of water in several areas of the corporation, further increasing the maintenance cost. A separate leak detection cell with latest leak detection equipments and sufficient trained staff will be set up shortly.

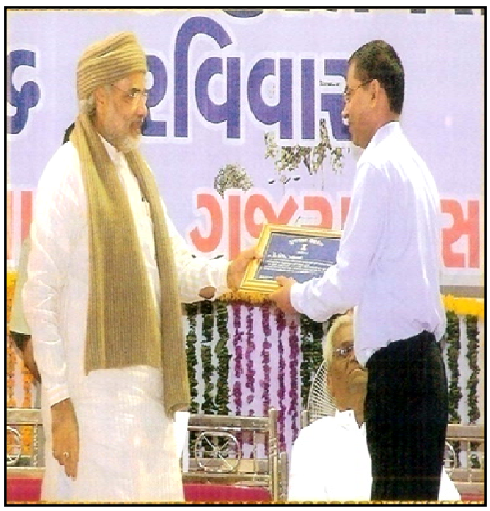
Wastage of water at consumer level is increasing due to intermittent water supply

Inconsistency in water supply timings, though reduced drastically, still persists and wastage of water at the consumer level has been increasing. With only 1425 connections of the 3,40,334 connections being metered, distribution losses are bound to increase, as also the unaccounted for water.

4.1.7 PERFORMANCE OF WATER SUPPLY

The water supply system of SMC has been awarded various award and apperecation from state as well as Central government. These appreciation and awards are given to SMC for their efficient operation and innovations adopted in water supply system. The details of each awards is summarized below:

- Water supply system of Surat Municipal Corporation had been awarded with 1st National Urban Water Award-2008 from Ministry of Urban Development (MOUD) in association with CII and ASCI for initiatives "Water Quality Monitoring system" and "Operation & Maintenance practices" in water supply.
- After floods of August 2006, entire water supply was restored effectively within 36 hours with use of GRID network Efforts made for the immediate restoration of water supply have been appreciated by State Government of Gujarat, Indian Water Works Association and Institution of Engineers India.
- **Water supply system of Surat Municipal Corporation had been awarded with 2nd National Urban Water Award-2009 from Ministry of Urban Development which was honored by The President of India for** "Technical Innovation in Energy Conservation Activities in Waste Water Treatment through Bio Gas and Re- engineering in Water Supply Routes and Other Energy Saving Measures" **and** "Operation & Maintenance practices" **in water supply.**



Award to SMC for best practice in Water Supply

Surat Municipal Corporation is among a very few local bodies in the country to initiate the process of getting an ISO certification for the entire water supply system. Quality, quantity and timing of water supply has been the main criteria under the ISO Certification. The process of training of staff & documentation regarding ISO certification has already been completed.

Implementation of Reforms

Moreover, establishment of water supply infrastructure and maintenance of the same is not enough. It has been realized that reforms are like blood in the body and are necessarily needed to sustain the system of SMC. On same principle, numerous reforms are executed to make water supply reliable, self sustainable and should last for longer period like;

- Metering policy & Water tariff / user charges revision / rationalization,
- Automation & SCADA (Supervisory Control and Data Acquisition),
- Outsourcing of various services like –
- Operation & Maintenance of water treatment plants,
- Operation & Maintenance of Water Distribution stations,
- Housekeeping of water works and water distribution stations,
- Valve operation in transmission & distribution network and
- Collection of water samples at consumer end.
- Online water quality monitoring,
- Distribution water quality monitoring,
- Elimination of conventional coagulant – Alum with advanced coagulant – PAC (Poly Aluminium Chloride),
- GRID Network,
- Safety measures,
- Centralized automatic processing of chlorination for economizing cost (Rs./KL)
- Energy savings / auditing

Private sector Participation

Surat Municipal Corporation has also involved the private sector in providing the water supply to the city. At present, Surat Municipal Corporation has given annual contracts to private agencies for various activities like, Operation & Maintenance of water treatment plants at Sarthana & Rander Works, Valve operation in the different parts of the city, Collection of water samples during the water supply period, Housekeeping & gardening of Water Works & Water Distribution Stations. Surat Municipal Corporation has been exploring possibilities for private sector involvement - Like Annual "Operation & Maintenance" contract for one Water Distribution Station and Intake well.

Leakage mapping

Present gross daily average water supply for Surat City is 700 MLD. As a part of Complaint Redressal System developed by SMC, numbers of water supply leakages through pipeline and contamination of water are registered daily. Repairs of leaking pipelines are generally carried

out within 24 hours. Zone-wise complaints received for leakage & contamination are reviewed daily at departmental level and the same is also discussed at Commissioner level in the weekly meeting. It is learned over the years that a small problem of water leakage if unattended for long can lead to a very serious situation developing as water-borne diseases and also loss of precious potable water along with pumping cost of the same. Due to this, a practice is followed in SMC to repair the leakage at the first instance, when it is found. A record of all such instances is also preserved and shown in the map for further study of leakage pattern and to find frequent leakage points in the water supply system.

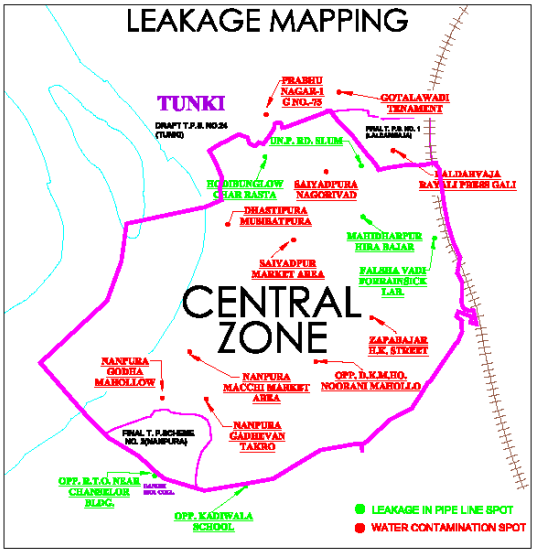


Figure 4-2 Location of complaints for Leakage and contamination of water

A study of leakage complaints received in past several years gave an idea of preparing a map showing frequent leakage prone locations. Zone-wise leakage maps were prepared taking into consideration the available past record of leakages & contamination of water. After locating such locations precisely, suitable measures are taken to solve the problem in a sustainable manner. In the central zone of the city frequent leakages were found at more places as compared to other zones of city, due to age old pipeline network. Hence, it was decided by SMC to change such pipelines and solve the problem of frequent water leakage in these areas. With this concept, total almost 25000 meter of new pipeline of 100 to 200 mm dia. has been laid in last five years at an approximate cost of Rs.336 Lacs.

Due to this action, numbers of complaints regarding water leakage and contamination have been drastically reduced to almost 50% in these areas. Thus, leakage mapping resulted in saving of precious potable water along with less chances of water borne diseases. All these benefits cannot be calculated in monetary terms but they surely outweigh the expenditure as mentioned above.

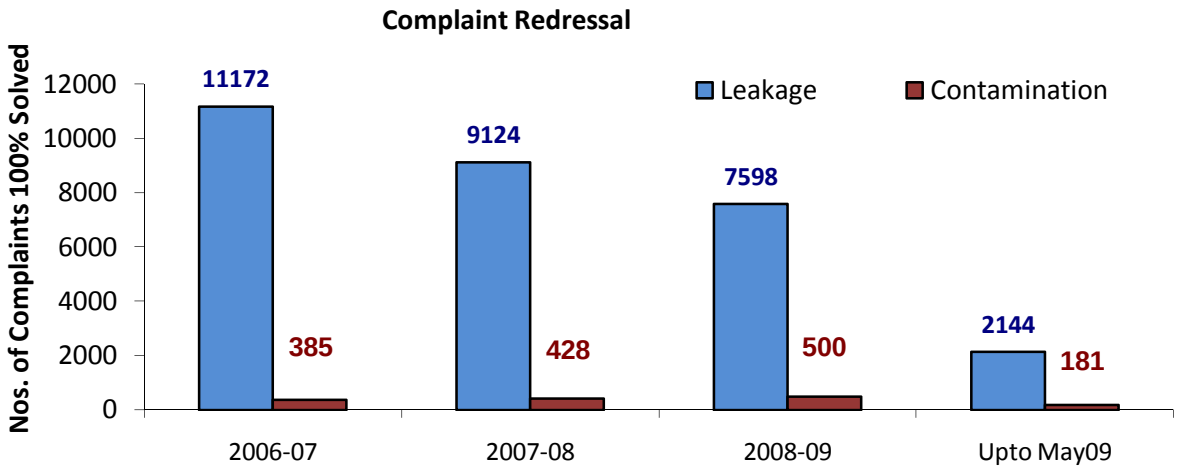


Chart 4-3 Consolidated complaints for leakage and contamination of water

4.1.8 FUTURE PLANNING

Water Demand

» **Source Augmentation**

Surat Municipal has prepared a Master plan for water supply system under the planning horizon of 2036 for source augmentation facility for old city areas and the same as 2031 for the newly merged areas. Considering the capacity augmentation according to the water supply master plan and the demand of water @ 170 lpcd SMC has at least 40% additional capacity available for supply.

Year -->>	2011	2016	2021	2026	2031
Population Considered in Water supply Master plan	59	70	80	91	105
Water Demand as per Master plan	1087	1369	1549	1741	1999
Population Projection in this CDP	42.12	50.29	60.06	70.25	82.18
Water Demand @ 170 lpcd	716	855	1021	1194	1397
Additional Capacity Available in MLD	371	514	528	547	602

» **Treatment Facilities**

According to this master plan SMC has planned the treatment facilities for the planning horizon of 2021 for the old city areas and same as 2026 for the newly merged areas in the city of surat.

» **Distribution Network**

According to this master plan SMC has planned the Distribution network for the planning horizon of 2036 for the old city areas and same as 2041 for the newly merged areas in the city of Surat.

4.2 SEWERAGE SYSTEM

SMC is at present augmenting the existing water supply scheme. Increased water supply is expected to result in a corresponding increase in wastewater generation. For the purpose; SMC had a master plan prepared for the augmentation of the wastewater disposal system in 1997. Out of the total 326.515 sq. km of area, 59.70 % of the habitable area and 85 % of population has a comprehensive sewerage system.

This was 29.45 % and 42.5 % respectively in year 1997. The augmented sewerage system under seven drainage zones has also resulted in the increase of population coverage from 56 percent to 97.10 percent till 2005. The numbers of sewage pumping stations have also been increased from 18 in 1996 to 32 in 2009 with addition of another two under construction and construction of eight pumping station which are likely to start from October 2009.

Before the extention of city limit, the six drainage zones in the city were named based on the location of sewage treatment plant in their respective drainage zones; namely Anjana, Bhesan, Bhatar, Karanj, Singanpore and Bamroli.

After extention of city limit, with the increase of the city limits in each of the above drainage zones and with additional requirement of sewage treatment facilities in some zones; the drainage zones were named on the basis of zone, wherein the sewage treatment plant is located. These are South-East Zone, West zone, South-West East Zone, North Zone and the South Zone drainage schemes respectively.

4.2.1 SEWERAGE NETWORK

The sewerage network in Surat is presently served by six drainage schemes inclusive of the sewerage network in walled city area, namely, South-East Zone, West zone, South-West East Zone, North Zone and the South Zone drainage schemes. The schemes serve a total population of 24.64 lakhs (As per Census 2001) through 26 main sewerage pumping stations and six auxiliary pumping stations.

Table 4-11: Existing sewerage network (2009)

S. No	Sewerage Zone	Location	Year of Comm.	Capacity (MLD)		Process
				Design	Utilizing	
1	**South-East**	Anjana	1995	82.5	85	Conventional Activated Sludge
2	**West**	Bhesan	1995	100	65	Conventional Activated Sludge
		Asarma	2009	15	-	Moving Bed Bio Reactor
3	**South-West**	Bhatar	1999	120	100	Conventional Activated Sludge
		Khajod	2009	25	-	Moving Bed Bio Reactor
4	**East**	Karanj	1999	100	95	Conventional Activated Sludge
5	**North**	Singanpore	2003	100	98	Conventional Activated Sludge
6	**South**	Bamroli	2002	100	65	UASB + Extended Aeration
		Total		**642.50**	**508**	

Sewerage System Existing Status

With the increase in the SMC limits from 112.274 Sq.km to 326.515 Sq.km the coverage of sewerage has gone down from 92% to 47%. But at the same time 81% population is being served by underground sewerage system.

Table 4-12 Sewerage system indicators

Description	2009
Area of SMC (Sq.Km.)	326.515
SMC total population (Lakhs)	28.77
Actual population served (Lakhs)	24.64
Underground drainage (% population served)	85
Drainage network area (Sq.Km.)	119.98
% of habitable area covered	59.70 %
Total length of drainage network (Km.) (On TP roads)	1062.50
Sewerage pumping stations installed	32

4.2.2 SEWERAGE PUMPING STATIONS

Out of total 32 sewerage-pumping stations 26 are main stations and the remaining six are auxiliary stations, which are of a smaller capacity and installed in an isolated manner. The diameters of the raising mains of the main stations vary between 600 mm to 1600 mm and those of the auxiliary stations vary from 250 – 500 mm. The depths of the stations vary from 9 to 15 metres for main stations and 4 to 9 metres for auxiliary stations.

4.2.3 SEWAGE TREATMENT FACILITIES

There are eight sewage treatment plants catering to the needs of all the six zones of the city and which have a total treatment capacity of 642.5 MLD of sewage. (Two more sewerage treatment plans are under execution.) The sewage collected by the South-East Zone, West zone, South-West East Zone, North Zone and the South Zone drainage schemes is treated at the Anjana, Bhesan treatment plants before being let out into river or Khadi. With the increased drainage network over the last three years, the entire sewage generated in the city can be treated before disposal by the year 2007.

The total capacity of the eight treatment plants is 642.5 MLD. Eight treatment plants are located at Anjana, Bhesan, Asarma Bhatar, Khajod, Karanj, Bamroli-Vadod and Singanpore. (Two plants are under construction at Variav-Kosad and Dindoli) At present, all the sewage treatment plants are running as per their designed facilities. The operation and maintenance of all eight sewage treatment plants has been carried out by private agencies. The contractual cost for the operation and maintenance of these STPs is Rs. 318.0 lacs per annum, which includes the cost of spares, chlorine and all other consumables except energy.

Treatment plants at Bhatar and Karanj have been augmented from the Extended Aeration Activated Sludge process to the Conventional Activated Sludge process facility. They have been augmented from 60 MLD capacities each to 120 MLD and 100 MLD capacities respectively. The treatment plant at Bamroli- Vadod is based on the Up flow Anaerobic Sludge Blanket process with extended aeration as polishing treatment and is one of the largest plants

of its kind in the world. The sewage treatment plant at Asarma and Khajod are based on the Moving Bed Bio Reactor process and are first of its kind in India. De-silting activity of manholes and drainage lines is privatized by SMC through contracts.

Table 4-13 Existing Sewerage treatment Plants (2009)

S.No	Location	Year of commissioning	Capacity (MLD)		Process
			Design	Utilizing	
1	Anjana	1995	82.5	55	Conventional Activated Sludge
2	Bhesan	1995	60	55	Conventional Activated Sludge
3	Bhatar	1999	120	100	Conventional Activated Sludge
4	Karanj	1999	100	75	Conventional Activated Sludge
5	Singanpore	2003	100	80	Conventional Activated Sludge
6	Bamroli	2002	100	50	UASB+ Extended Aeration
	Total		**562.5**	**415**	
7	Asarma	Under execution	15	-	Conventional Activated Sludge
8	Khajod	Under execution	25	-	Conventional Activated Sludge
	Grand Total		**602.5**		

Table 4-14: Zone wise Drainage Pumping Stations

Zone	Main pumping Stations	Capacity (MLD)	Nos	Auxillary stations	Nos
South East Zone (Limbayat)	Salabatpura Limbayat New Anjana Umarwada	65 41 12 14.50	4	Old Khatodara GIDC 1 MLD	1
West Zone (Rander)	Rander Adajan Pal Bhesan Pisad Pal-Palanpore	30 15 15 33 26 31	6	-	-
South West Zone (Athwa)	Nanpura Athwa Umra (N) Umra (s) Althan Piplod Khatodara Vesu Terminal	98 21 18.50 19.50 19 9 50 51	8	Vesu Intermediate 21 MLD	1
East Zone (Varachha)	Karanj Navagam	93 55	2	Modi Mohollo 3 MLD, Patel Nagar 2 MLD	2
North Zone (Katargam)	Paras Singanpore Kantareshwar	52 62 69	3	Old GIDC katargam 2 MLD, Shantiniketan 1 MLD	2
South Zone (Udhana)	Bamroli Pandesara GIDC	180 100	2		
Total Surat Municipal Corporation (SMC)			**26**		**6**

4.2.4 SEWERAGE SYSTEMS (ZONE WISE)

South-East Drainage Zone

Area (Sq.Km)	% Area Covered	Population (Lakhs)	% Population Catered
8.97	96.8%	413641	96.4%

At present, 96.80 percent area has been covered with sewage network serving 96.4% population. The sewage water is being treated as per the norms of Gujarat Pollution Control Board. After treating in a 82.50 MLD capacity sewage treatment plant at Anjana; the treated sewage is disposed off into the Mithi Khadi. Untreated sewage from remaining areas, along with wastewater generated from the local small-scale industries is discharged into the Koyali and Mithi Khadi through storm water drains. However, as per master plan, the sewage from the whole South-East Drainage Zone will be treated at the sewage treatment plant located at Anjana and proposed sewage treatment plant at Dindoli. The treated sewage will be disposed off into the Mithi and Bhedwad Khadi.

» **Sewerage Network**

Under South-East draiange zone, the area of Salabatpura, Anjana, Umarwada, Limbayat, Dumbhal and Dindoli (Part) are being catered. The sewerage network in the Salabatpura area was laid long back in 1958. The rest of the sewerage networks were laid between 1998 to 2003. The tenders are published for laying of sewerage network in rest of the south-east drainage zone, i.e. Dindoli, Parvat, Godadara and are expected to start the execution by January 2010.

» **Sewerage Pumping Stations (SPSs)**

The sewage from Salabatpura, Anjana, Limbayat and Umarwad SPSs is transmitted to the STP at Anjana. Whereas the sewage from Parvat, Dindoli and Godadara SPSs will be transmitted to Dindoli STP. The tenders of Parvat, Dindoli and Godadara SPS will be published in December 2009 and it is expected to commission these SPSs by March 2011.

» **Sewerage Treatment Plants (STPs)**

The primary sewage treatment plant at Anjana, with a capacity of 25 MLD and 51 MLD capacity was constructed in the year 1958 and 1984 respectively. The secondary sewage treatment plant, based on the Conventional Activated Sludge Process and with a capacity of 82.50 MLD was constructed and commissioned in the year 1996. Recently, It has been upgraded to meet the latest sewage disposal norms of Gujarat Pollution Contral Board. 0.5 MW biogas based power plant was commissioned at Anjana STP in May 2004, which was the 1st in its kind of in India. At Dindoli STP also, the provision is made for the 2 nos. of 0.375 MW power plant with the execution of sewage treatment plant.

As per the master plan, the STP at Dindoli, with a capacity of 32 MLD, will be augmented during 2021-26 in second phase.

East Drainage Zone

Area (Sq.Km)	% Area Covered	Population (Lakhs)	% Population Catered
27.82	96.80%	7.13	81%

At present, 96.80 percent area has been covered with sewage network serving 96.4% population. The sewage water is being treated as per the norms of Gujarat Pollution Control Board, in a 100 MLD capacity sewage treatment plant at Karanj and treated sewage is disposed off into the Karanj khadi. Untreated sewage from remaining areas, along with wastewater generated from the local small-scale industries is discharged into the Karanj Khadi through storm water drains. However, as per master plan, the sewage from the whole East Zone will be treated at the sewage treatment plant located at Karanj and proposed sewage treatment plant at Dindoli. The treated sewage will be disposed off into the Karanj/ Kankara Khadi.

According to the sewerage scheme of this zone, there will be a sewage treatment plant with an ultimate capacity of 150 MLD at Karanj and 98 MLD at Dindoli, seven sewage-pumping stations, a transmission line from each pumping station to the sewage treatment plant and a sewerage network of NP-3/ NP-4 class RCC pipes.

» **Sewerage Network**

With a sewerage network of Navagam and the part area of Karanj, Fulpada and Umarwada, was covered during the year 1990-1995.The part-area of Fulpada has been covered during 1999/2000. A network in the Karanj, Kapadra, Fulpada, Magob and Nana Varachha area was completed by end of 2001. The pipe laying work is under execution in rest of the east zone area, i.e. Magob, Puna, Sarthana.

» **Sewerage Pumping Stations**

The sewage from the Navagam area and a part area of Fulpada, Karanj and Umarwada is collected at the Navagam SPS and auxiliary SPSs at Patel Nagar and Modi Mohallo, whereas the sewage from the Karanj, part Fulpada, Nana Varachha and Kapadra area is collected at Karanj SPS. The collected sewage in these two SPS is then transmitted to STP at Karanj. The remaining area of the whole East zone will be covered under the pumping stations at Sarthana, Magob and Puna. The execution work will start for these pumping stations by October 2010 and it is expected to commission these SPS by January 2011.

» **Sewage Treatment Plant**

The sewage treatment plant at Karanj with a capacity of 100 MLD, based on Conventional Activated Sludge Process, was commissioned in 2003, whereas the work of sewage treatment plant at Dindoli, based on Conventional Activated Sludge Process, having a present capacity of 66 MLD is under execution and it expected to commission it by January 2011. 1.0 MW biogas based power plant was commissioned at Karanj STP in March 2008.

At Dindoli STP also, the provision is made for the 2 nos. of 0.375 MW power plants with the execution of sewage treatment plant. As per the master plan, during 2009-12, the capacity of

sewerage treatment plant at Karanj will be augmented by 50 MLD to a total of 150 MLD. The STP with a capacity of 32 MLD, at Dindoli, will be constructed during 2021-26 in second phase.

North Drainage Zone

Area (Sq.Km)	% Area Covered	Population (Lakhs)	% Population Catered
34.35	86.5 %	4.17	80%

At present 86.50 percent area and 80 percent of the population of the zone are covered by the sewerage network. The sewage water is being treated as per the norms of the Gujarat Pollution Control Board, in a 100 MLD capacity sewage treatment plant at Singanpore and the treated sewage is being disposed off into the river Tapi. Untreated sewage from remaining areas, along with wastewater generated from the local small-scale industries is being discharge into the river Tapi through storm water drains. However, as per the master plan, the sewage from the whole North Zone will be treated at the sewage treatment plant located at Singanpore and the proposed sewage treatment plant at Variav-Kosad. The treated sewage from Singanpore STP will be disposed off into the river Tapi, whereas the treated sewage from Variav-Kosad STP will be disposed off into Tena creek.

As per the sewerage scheme of this zone, there will be a sewage treatment plant with an ultimate capacity of 202.0 MLD at Singanpore and 132 MLD at Variav-Kosad, Elevan sewage-pumping stations, a transmission line from each pumping station to the sewage treatment plant and a sewage network of NP-3/ NP-4 class RCC pipes.

» **Sewerage Network**

The work of laying of sewerage network for Katargam-Tunki, Katargam-Ved and Dabholi-Singanpore, has been already commissioned May 2004. It covers the 21 sq.km. area of the north drainage zone. The pipe laying work is under execution in rest of the North drainage zone area, i.e. Mota Varachha, Utran, Kosad, Amroli, Chhaprabhatha, and Variav. It is expected commission these sewerage networks by end of 2010.

» **Sewerage Pumping Stations**

The sewage pumping stations at Katargam-Tunki, Katargam-Ved and Dabholi-Singanpore is in operation. The installed capacity of the three pumping stations is 71.0, 62.0 and 69.0 MLD respectively. The work of execution of sewage pumping stations at Mota Varachha, Mota Varachha-GEB, Utran, Kosad Railway, Kosad, Chhaprabhatha, Variav and Variav STP is under progress and expected to commission by end of the year 2010.

The transmission lines from Katargam-Tunki, Katargam-Ved and Dabholi-Singanpore sewage pumping stations to the Singanpore STP have been laid. The total length of these transmission lines is about 7.0 kms. Whereas the transmission line from Mota Varachha, Mota Varachha-GEB, Utran, Kosad Railway, Kosad, Chhaprabhatha, Variav and Variav STP sewage pumping station is under execution and expected to be completed by March 2010.

» **Sewerage Treatment Plant**

For a total of 202.0 MLD sewage expected to be generated at the end of design period, it has

been planned to construct a sewage treatment plant, based on the Conventional Activated Sludge Process, in two phases. The existing Singanpore STP with a capacity of 100 MLD is under operation since 2003. As per the master plan, works on augmentation of the capacity of the plant from 100 MLD to 150 MLD will be taken up during 2009-12. 1.0 MW biogas based power plant was commissioned at Singanpore STP in March 2008. The tertiary treatment facitlity of 150 MLD will be added to STP, to reduce the pollutants load in the river Tapi, will be also constructed during the year 2009-12

As per master plant, the sewage treatment plant of 132 MLD will be constructed at Variav-Kosad. The construction of 84 MLD capacity STP is under process and it is expected to commission by October 2010. The STP with a capacity of 48 MLD, at Variav-Kosad, will be constructed during 2021-26 in second phase. At Variav-Kosad STP also, the provision is made for the 2 nos. of 0.30 MW power plant with the execution of 84 MLD capacity sewage treatment plant.

South Drainage Zone

Area (Sq.Km)	% Area Covered	Population (Lakhs)	% Population Catered
53.12	84.28 %	4.04	69%

At present 84.28 percent area of the zone is now covered by sewerage network, which in turn caters to about 69 percent of the population of the zone. The sewage from the whole South zone area is treated at the Bamroli- Vadod STP except Pandesara GIDC area and the treated effluent from the same is disposed off into the Khajod Khadi. The untreated sewage from the remaining area, along with wastewater generated from small-scale industries as well as industrial effluent from processing houses, is being discharged into the Kakra Khadi/ Khajod Khadi through storm water drains.

According to the sewerage scheme of this zone, there will be one sewage treatment plant at Bamroli-Vadod, with an ultimate capacity of 240 MLD, one sewage pumping stations at Bamroli, transmission lines from pumping station to the sewage treatment plants and a sewerage network of NP-3/ NP-4 class RCC pipes.

» **Sewerage Network**

The sewerage network for Udhana, Govalak, Pandesara, Bhestan and Dindoli (Part) has been under operation since 2002. The tenders for pipe laying work in rest of the South drainage zone area, i.e. Bamroli, Unn, Vadod, Sonari, Jiav etc., has been invited and expected to start the execution by December 2009. It is expected commission these sewerage networks by March 2011.

» **Sewerage Pumping Stations**

The sewage pumping station of 160 MLD capacity at Bamroli-Vadod is commissioned. The existing effluent pumping station at Pandesara GIDC area is under run, whereas the new pumping station is ready for commissioning and will be put to operation in October 2009. The tender for sewage pumping station at Bamroli, Vadod-Jiav, Sonari, Unn-Sonari will be invited

in October 2009 and it is expected to commission these SPS by March 2011. The SPS at Bamroli is terminal pumping stations in the premises of the STP at Bamroli-Vadod. Hence, the length of the transmission line is negligible.

» **Sewerage Treatment Plant**

The sewage treatment plant of 100 MLD capacity at Bamroli-Vadod, based on the Upflow Anaerobic Sludge Blanket (UASB) system, was commissioned in 2002. It was upgraded with second stage treatment with Extended Aeration process in January 2008. The plant is one of the largest capacity UASB process based plants in the world.

As per the master plan, the industrial effluent collection and transmission lines along with the pumping station and common effluent treatment plant of 100 MLD capacity is under execution and it is expected to commission by March 2010. The STP at Bamroli-Vadod will be taken up for augmentation during 2011-13 from 100 MLD to 140 MLD. The tenders for 0.5 MW biogas based power plant will be invited in January 2010.

The tenders are invited on Public Private Partnership (PPP) basis to recycle the secondary treated sewage to nearby Pandesara Industrial Estate, as an Industrial Grade Water, after providing necessary tertiary treatment to it. It is expected to start the execution of this project by March 2010.

West Drainage Zone

Area (Sq.Km)	% Area Covered	Population (Lakhs)	% Population Catered
52.62	62.6 %	2.87	27%

Almost 62.6 percent of the area is covered by sewerage network catering to 27% population. The sewage is being treated in a 100 MLD capacity sewage treatment plant at Bhesan and the treated sewage is disposed off into the Tena khadi. In the area bereft of the network, the sewage along with wastewater from local small-scale industries is being discharged into the River Tapi through storm water drains or is being disposed through septic tanks and cesspools.

According to the sewerage scheme of this zone, there will be a sewage treatment plant at Bhesan and Asarma, with an ultimate capacity of 160 MLD and 31 MLD, Six sewage pumping stations, transmission lines from each pumping station to sewage the treatment plant and a sewerage network of NP-3/NP-4 class RCC pipes.

» **Sewerage Network**

Seventy Five percent of the area of the zone is provided with an underground sewage network. The sewerage network in Adajan and Rander area was commissioned long back in 1990s. Whereas the network of Jahangirpura, Jahangirabad, Pisad, Pal and Palanpore were recently completed.

» **Sewerage Pumping Stations**

The developed area of the zone has been provided with sewage pumping stations at Rander, Adajan and Adajan-Pal since 1995-96. Sewage pumping stations of 40.0 MLD capacity at

Jahangirabad-Bhesan and Jahangirapura-Pisad, were commissioned in the year 2006 and 2008 respectively. Whereas the Sewage pumping station at Pal-Palanpore is completed will be commissioned in October 2009.

The transmission line of the Rander, Adajan and Pal sewage pumping stations is under service since 1995-96 and the 3.5 km transmission line for Jahangirabad and Jahangirapura-Pisad sewage pumping stations was commissioned in 2008. The transmission line for Pal-Palanpore SPS is ready for commissioning and will be commissioned in October 2009.

» **Sewerage Treatment Plant**

A sewage treatment plant of capacity of 100 MLD, based on the Conventional Activated Sludge Process was completed and commissioned in 2008 at Bhesan. A sewage treatment plant at Asarma, having capacity of 15 MLD and based on Moving Bed Bio Reactor Process is completed and will be commissioned in October 2009. The tender for 0.75 MW power plant is invited and it is expected to start the execution by January 2010.

As per the master plan, it has been planned to augment the capacity of the Bhesan sewage treatment plant by 40 MLD during the year 2011-13.

South-West Drainage Zone

Area (Sq.Km)	% Area Covered	Population (Lakhs)	% Population Catered
117.48		2.45	75%

In this zone 82.4 percent of the area & 75% of population has been covered by the sewerage network. While sewage is treated in the 120 MLD capacity sewage treatment plant at Bhatar and the treated sewage is disposed off into the Kakra khadi. In the area bereft of the network, the sewage along with wastewater from local small-scale industries is being discharged into the River Tapi/Kankara khadi through storm water drains or is being disposed through septic tanks and cesspools.

According to the sewerage scheme of this zone, there will be a sewage treatment plant at Bhatar, with an ultimate capacity of 236.0 MLD and at Khajod with an ultimate capacity of 51 MLD, Nine sewage pumping stations, and transmission lines from each pumping station to the sewage treatment plant and sewerage network of NP-3 / NP-4 class RCC pipes.

» **Sewerage Network**

The sewerage network of Athwa, Nanpura, Khatodara and Umara were laid back in 1980s and 90s. As per Master Plan, the network within Athwa and Umra will be rehabilitated during the year 2009-12. The sewerage networks in the area of Vesu, Rundh, Magdalla are completed and will be commissioned in the October 2009.

In rest of the area of South-West drainage zone, it is planned to provide decentralised sewerage system to the underdeveloped and developing area, since it has scattered inhabitants as well as huge agricultural zone and air port land within the zone.

» **Sewerage Pumping Stations**

All the sewage pumping stations in the area are under operation since 1980s and 90s. except the sewage pumping station at Althan, which has been commissioned in May 2002. The pumping stations in Vesu area has been recently completed and will be put into operation from October 2009. The pumping station at Athwa and its rising main were rehabilitated in the year 2007.

» **Sewerage Treatment Plant**

The Bhatar sewage treatment plant of 120 MLD capacity and based on the Conventional Activated Sludge Process, is under operation since 2003 and is the largest capacity sewage treatment plant in the city. 1.0 MW biogas based power plant was commissioned at Bhatar STP in August 2008. The sewage treatment plant at Khajod, having 25 MLD capacity and based on Moving Bed Bio Reactor Process, is ready for commissioning and will put into operation from October 2009.

As per the master plan, the sewage treatment plant at Bhatar will be augmented by 60 MLD during 2011-13. Whereas the sewage treatment plant at Khajod will be augmented by 25 MLD during the year 2021-26. In the rest of the area, since it is proposed to provide the decentralized sewerage system, there will be stand alone pumping stations and sewage treatment plants in respective villages / developed residential clusters.

4.2.5 GREEN ENERGY GENERATION FROM SEWERAGE GAS: BEST PRACTICE

S.M.C. was consuming the electrical power for Operation and maintenance of the Sewage Treatment Plants from the Power supplier, which was imposed an additional financial burden on SMC's. As population has been increasing, the volume of sewage pumping and treatment is also increased which transitively increase the power requirement for sewage pumping and treatment as well.

As an initiative towards Green Energy Generation from Sewerage; Sewage Gas Based Power Plant at Singanpore, Karanj, Bhatar, Anjana STP has been setup.

In very short duration of ten months, these projects have been commissioned in 2007-08 and are now operational and providing electricity to respective plant equipments. Following table indicates total KWH generation at different Sewage gas power plants.

Table 4-15: Power generation till June 2008 at various sewage gas based power plant

Sr.No.	Installed Capacity of Power Plant	Year of Commissioning	MWH units generated since commissioned	Generation (in Crore Rs.)
Anjana	0.5 MWe	Oct-09	8293.364	3.7320138
Singanpore	1.0 MWe	Mar-09	1667.916	0.7505622
Karanj	1.0 MWe	Mar-09	2328.443	1.0477993
Bhatar	1.0 MWe	Aug-09	668.092	0.3006414
			12957.815	**5.8310167**

Source: PEARL, NIUA, May 2009

Followings are the technological reforms and benefits of Sewage gas based power plant.

- The Production of electricity through purely on sewage gas based engine generator technology have much more advantages and cost benefits over the earlier technology of duel fuel engine generator set;
- Power generation and utilization of it in sewage treatment plant reduce the electricity consumption of grid power;
- Saving in electricity bill will reduce revenue expenditure of Sewage treatment plant, which reduces municipal taxes to the citizens;
- Reduction of emission of green house gases for the protection of environment.

CDM and Sewage gas based power generation by SMC

The sewage gas based power generation at STPs at Karanj, Singanpore and Bhatar are eligible for assistance under clean development mechanism for the following reasons. The STPs are designed to generate the sewage gas by treating the sludge generated from primary and secondary clarifier of sewage in an anaerobic processing system (Digester) so as to restrict the atmospheric emission of methane gas. At the same time, the methane gas is recovered without leak in the atmosphere

Confirming to the advantages as described in above case study, it can be concluded that the power generation through sewage gas should be adopted as an integral part of sewage treatment system.

4.2.6 EMERGING ISSUES

- Outdated sewerage system in the walled city area, Athwa and Umra
- Mixing of sewage with storm water and solid waste in several areas
- Low number of sewer connections
- Low per-capita cost recovery
- Unavailability of comprehensive wastewater system in Industrial Areas

Future Requirements

Surat Municipal Corporation has prepared a master plan for comprehensive sewerage system (more than 1500 km of sewers and 10 sewage treatment works) to serve not only the domestic and commercial, but also the industrial developments for the year 2026. Wastewater generated from all this development is to be collected by a network of underground sewers and pumping stations and conveyed to sewage treatment works for physical and biological treatment to meet the parameters prescribed by the GPCB before discharge into the nearest watercourse.

Sewerage Network

Phase wise execution of the master plan will cover not only the present population of the city but also the population expected by the year 2026. Complete area coverage is expected to be achieved by 2006. This is apart from the revitalization of the entire sewerage network in the central zone, where the present system is outdated. Complete revitalization of the system in

the central zone is to be completed by 2012.

Recently, the underground drainage system is provided in the Pandesara GIDC area for wastewater collection network and it is expected to commission the network by October 2009.

Sewerage Pumping Stations

With the newly proposed sewerage pumping stations in North, South, South-East and East Drainage Zone, the sewerage pumping stations will total to 50. These are expected to cater to the needs of the population of the city till 2026. Few of the existing sewage pumping stations i.e. Umra, Anjana, Salabatpura shall be rehabilitated.

In, Pandesara GIDC area a new sewage pumping station will be commissioned by October 2009. Hence, total wastewater will be collected and transmitted to Common Effluent Treatment Plant.

Sewerage Treatment Plants

As per the master plan, to cater to the needs of the present population new sewage treatment plants are being executed at Variav-Kosad and Dindoli. But to cater to the needs of the population in 2026, the treatment capacities of the existing STPs in the city need to be augmented.

For Pandesara GIDC area, the work is going on for common effluent treatment plant and expected to commission by March 2010. Hence, the industrial wastewater directly flows to the nearby creek.

Green Energy Generation

After successful implementation of the Green Energy generation projects at Singanpor, Karanj, Bhatar, Anjana; various organizations, municipal corporations, private agencies & industries at national & international levels have visited the Anjana Sewage Treatment Plant. Presently, several municipal corporations in India, have implemented / taken up implementation of such kind of project at their sites.

Following the successful experience, SMC now incorporates bio gas based power plant along with construction of sewage treatment plant itself. So generation of electricity can start as construction work completed and receiving of raw sewage starts at treatment plant. Tender has already been floated for construction of new Sewage Treatment Plants by SMC at Dindoli & Variav, and installation of bio gas power plant has been incorporated with construction of treatment plant. The Work contract specifies the minimum electricity that should be generated from power plant based on incoming sewage quality and quantity; failing which the short fall in guaranteed generation will have to be borne by contractor.

This will reduce the power need of STP and revenue expense of the urban local bodies besides providing environmental benefits to the cities.

4.3 SOLID WASTE MANAGEMENT

Efforts to improve solid waste management in the city of Surat were made by the health department after the havoc of the plague in 1994. It is the only city of its kind in Gujarat where private contracting and private participation in solid waste management is being done. The city is divided into 7 zones for efficient management and the waste generated is collected throughout the city and dumped at the Khajod disposal site (200 ha).

Source segregation of recyclable waste is practiced and a large percentage of households practice storage of waste at source. About 96 percent of the households and 99 percent of the shops and establishment practice storage of waste at source.

At present in SUDA area, there is no scientific collection and disposal for solid waste available.

4.3.1 WASTE GENERATION & COLLECTION

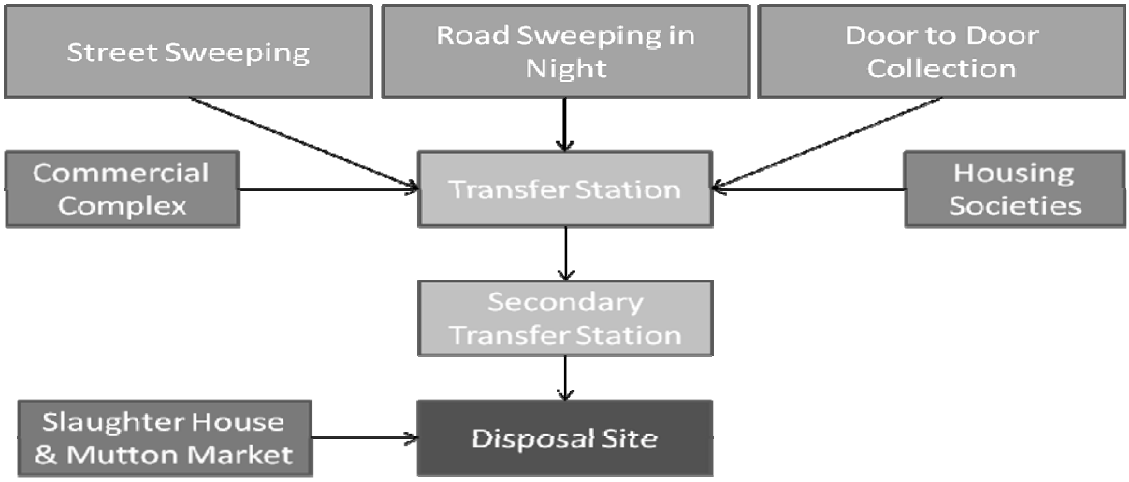


Figure 4-3 Process of Solid waste Collection to Final Disposal

There are 314 cradle type doorstep bins placed on roadside designated spaces. The total number of waste collection bins is 1170. These are mainly 4.5 cu.m in size with a capacity of 1.5 tonnes (4.5 cu. m)/ dustbin and cover the entire population of the city. The spacing between waste storage depots is about 100 m and there are about 5000 wheel barrows for carrying waste.

For door-to-door collection of waste 3000 bins are installed by private agencies. The cradle type would be designed in such a way that revenue generation through advertisement is possible. There are also initiatives for segregation of waste at source including awareness generation through pamphlets. At present there are 4503 sweepers engaged in the collection of waste across the seven zones of the city. Of the total waste collected, the corporation manages 96 percent while the rest is collected by rag pickers

Table 4-16 Solid Waste Management – Existing situation

Sr No	Head	2009
1	Generation of Waste in MT	1350
2	Refuse garbage collection per day (MT)	1192

Sr No	Head	2009
3	% garbage handled by D to D System	56%
4	% garbage handled by Other means	44%
5	Collection per person (gm/day)	310
6	Generation per person (gm/day)	350
7	% Efficiency (Collect/Generate)	88.29
8	Density of waste (kg/cu. m)	200 to 250
9	% Moisture content of waste	55 to 60
10	No. of dustbins (2-3 cu. m capacity)	139
11	No. of dustbins (4-5 cu. m capacity)	1120
12	Total capacity of dustbins (Cu. m)	5400 Cumt.

Table 4-17 Waste Generation & Collection

1	**Generation**	
a.	Tons Per Day	1350MT
b.	Gms/ capita/ day	350 gm
2	**Collection**	
a.	Corporation (TPD)	1192MT
b.	Rag picker (TPD)	150 MT

In 2005 the solid waste generation per capita per day was 390 gms which has increased to 400 gms in 2007 and further decreased to 350 grams in 2009.

Table 4-18 Waste Generation through Different Sources

Source	Percentage (2009)
Households	50-55
Shops and Establishments	6-7
Vegetable/Fruit/ Meet/Fish market	12-15
Construction and demolition material	6-8
Hotel/Restaurant waste	7-8

Waste is majorly generated at household constituting 55% of the total. At household level there is partly segregation of bio-degradable & recyclable waste.

Table 4-19 Composition of waste

S.No.	Type of waste	Percentage 2009
1	Combustible - Wood	20% to 21%
2	Recycle able	29% to 34%
A	Paper	8% to 9%
B	Plastic	9% to 10%
C	Metal	1% to 2%
D	Glass	2% to 3%
E	Brick Stone	9% to 10%
3	Food waste	15% to 17%
4	Vegetable	20% to 22%
5	Miscellaneous	8% to 9%
F	Cloth & Fabric	8% to 9%
G	Ash	20% to 22%
H	Ph	6 to 7
I	Moisture	55% to 60%

Door- to-door Collection

Handling of Door to Door Refuse / Garbage System is entirely carried out by SMC through its own budget. Hence there is no involvement of any partner in respect of financial collaboration / aid. However, initial investment on the procurement of vehicle is being made by the contractors/agency.

While inviting tenders due care was taken to include the clause for propaganda of Door to Door garbage collection system. This was the responsibility of agency to which the work of Door to door garbage collection is entrusted. As the agency is paid for the work executed on per M.T basis; it is always implementing innovative ideas for improvement in present practice of Door to Door garbage collection System. As part of innovative activities agencies are conducting survey at regular intervals and make changes in TPM schedule for maximum coverage.

Before the implementation of Door to Door garbage collection system it was normal practice to throw house hold waste in the street, from where it is collected by sweepers in handcart for its disposal in nearby containers. This resulted in overall filthy & dirty appearance in the street as well as around the container spot. On implementation of Door to Door garbage collection system; it has now become the practice of every citizen to store the huge household waste generated temporarily in dustbin till the time Door to Door garbage collection vehicle is arrived. This has improved the overall scenario and surrounding environment. On request form shop keepers this system is made operative in second shift from 5 pm to 11 pm to facilitate commercial units.

The area of door-to-door waste collection in Surat is one of the best practices to strengthen the Municipal Solid Waste (MSW) collection system in the area of urban local body *(As identified by 'Best Practices, Peer Experience and Reflective Learning- PEARL, NIUA, May 2009).*

The main aspect addressed by this best practice is compliance to MSW Rules-2000. This system has developed the garbage collection activity at doorstep of household there for it made householder to habituate themselves to store their garbage in a bin till vehicles of Door to Door collection system reaches to them.

Strategy Used / Activities Implemented to Achieve the Desired Goals:

- Selection of kind of vehicle based on width of road;
- Coverage of number of units in each route is between 1,000 and 3,000;
- Strengthening of the existing system of garbage collection;
- Creating public awareness on garbage management;
- Drivers and "Swachchhta Mitra" are provided with uniforms & identity cards;
- Concession period of this project is kept as Seven years keeping in mind the useful life of vehicle;
- All the garbage vehicles equipped with proper alarm system go to every door step regularly at scheduled time;

- Facility of second shift for collecting waste from commercial unit during 4.00 pm to 11.00 pm daily in each zone;
- First shift collection timing is 7.00 am to 1.00 pm daily for residential zone;
- This system operates for 365 days in a year;
- Creating Public Awareness through campaign is the part of contractor's scope of work;
- Centralized complaint management system at Head office at Mugalsarai & Contractor's office with modern communication facilities;
- Provision for segregated waste collection (Dry & Wet).

Before arriving at the present practice of making payment to the contractor on weight basis various options like lump sum base to cover city as a whole, to cover zone as a whole and payment on number of units covered were thought. The present practice of making payment on weight base is found appropriate.

The system of Door to Door garbage collection involves the huge cost of capital investment in procurement of vehicles for collection of garbage. It also involves the manpower component to run the system effectively and efficiently.

As such Municipal Corporation is paying to agency for the garbage collected from doorsteps of residential and commercial units on weight basis; it has become viable for agency to run the system effectively. Municipal Corporation is paying @ Rs.1800 lac per annum to various agencies against collection of 625 M.T. of garbage per day. The rate for first year of collection was kept as Rs. 630/- per M.T.

The major component in Solid Waste is Earth – Organic which consists of 42% of the total waste. The recyclable waste which majorly consists of plastic and paper constitute to 20%. The waste coming from vegetable market which is bio-degradable constitute to 22%.

Table 4-20 Existing fleet of vehicles (2009)

Type of Transportation Vehicle	Number	Capacity(T)	Trips per Day
Dumper placer	68	1.0	08/Day/Vehicle
Mini Lorries/ Truck	15	07	1 to 2 / Day / Vehicle
Tractor Trailers	35	03	1 to 2 / Day / Vehicle
3-wheeler auto tippers	89	0.7	2.5/Day/Vehicle
others, please specify **(Tata 407 & Equivalent)**	152	02 to 03	2.2/Day/Vehicle
Secondary Transportation			
Tipper Trucks	44	10	2 to 3 per day per Vehicle

Indicators

Collection Performance (% Collected to Generated)	**88.29%**
Total vehicle capacity to total waste generated	137%
% of total waste treated through MSW treatment Plant	33%

Table 4-21 Zone wise Solid Waste Generation

Zone	Area (Sq. Km)	Solid Waste Generation			
		2001	2007	2009	2021
Central	8.97	150.1	140	200	116.2
North	34.35	121.7	180	210	220.6
East	35.42	210.7	289	315	337.7
West	52.62	90.9	166	140	224.5
South	53.12	177.6	295	150	383.1
South East	19.72	59.2	98	200	127.7
South West	117.48	73.2	112	135	139.9
Total	326.515	**883.5**	**1280**	**1350**	**1549.7**

The waste generation per Sq.km in central zone is 22.30 tonnes which is highest due to high density whereas in south west zone the quantum of waste generated is very low as 1.15 tons per sq.km.

4.3.2 WASTE TRANSPORTATION AND DISPOSAL

Waste collected from all over the city is transported to the processing and disposal sites by 450 laborers and 104 drivers. The fleet of vehicles available for the purpose includes dumper placers, trucks, tractors, market vans and heavy machines which are 162 in total. 41 laborers are involved in processing and disposing waste at the Khajod disposal sites.

The frequency of transportation of waste from various waste storage depots is once or twice a day and the total capacity of the fleet is 980 M.T. The transportation process is partly mechanized in the form of loaders, bulldozers and breakdown vehicles. The mechanized process accounts for 27 percent of the total transported waste. The remaining 73 percent is manually transported.

The private sector is partly involved in the transportation of waste in terms of manpower or a transportation of garbage and vehicles. They are mainly involved in transportation of municipal solid waste by dumper trucks and by containers through dumper placers.

Primary Transportations

Primary transportation is related to the transportation of municipal solid waste from containers and door to door garbage collection to the nearby transfer station. Primary transportation of MSW from various areas to nearby transfer station is done by

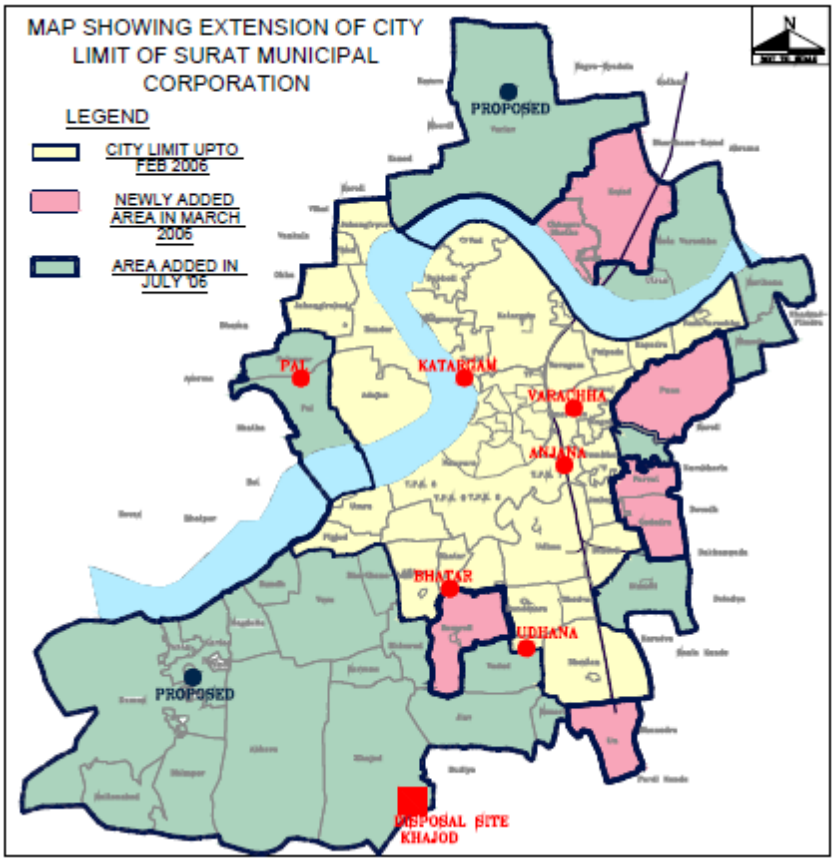
- Wheel burrows/Trolleys/Mini tempos
- Three wheeler tempos/ four wheeler tempos/Compactors of Door to Door
- Hydraulic dumper placers/Tractor with trailers/ Dumper trucks

MSW collected through various means reach to the nearby transfer station. The six transfer stations are working in the city in different six zones. Location of transfer stations and disposal site at Khajod is shown in Map No. 3 while zone wise details of transfer station are given in Table below

Figure 4-4 Transportation Facilities for Waste Collection

Transfer station - Processing and Disposal of Waste

Processing and disposal methods like incineration etc. are not used in Surat. Land available for treatment and disposal of waste, where the land filling is carried out, is about 10 km from the city. The life expectancy of land for the treatment and disposal of waste is 30 years at the Khajod final disposal site. There is sanitary landfill cell created and the cell is ready for its use for disposal of inert material obtained at the end of treatment process of MSW Treatment.



Map 4-1 Existing Location of Transfer-stations

One Bio-Medical Waste Treatment Plant is working on a BOOT basis from 2003. The agency to

which the work is granted is responsible for collection and treatment of Bio-Medical Waste. There are total 27 UHC, which are collection centers and Rs. 10 per kg is collected as charge.

4.3.3 BIO-MEDICAL WASTE TREATMENT: BEST PRACTICE

Centralized bio-medical Waste Treatment facility for treatment of bio medical waste generated from all medical institutes like clinics, hospitals, nursing homes, clinical laboratories, health centres, R&D centres and other generators of bio medical waste in Surat city has been installed on BOOT basis. This practice has been awarded best practice award (*As identified by 'Best Practices, Peer Experience and Reflective Learning- PEARL, NIUA, May 2009)*.

In the earlier days, when the impact of Biomedical waste was not much recognized as infectious waste, deep burial method was under practice for the purpose of disposal. The only drawback with the system was likely reuse of medical kit without proper sterilization. This may lead to serious out spread of transmissible diseases. On realization of the impact of infectious diseases, Government of Gujarat framed one umbrella act in 1986 covering various activities that have detrimental effect on surrounding environment. In case of Biomedical waste management a Common Bio Medical Waste Treatment Facility (CBMWTF) is perhaps the only feasible solution for environment protection and effective legal compliance.

Most of the hospitals, clinics and other bio medical waste generators of the city have been registered under this scheme. List of the same and total waste collected have been given in the table below. Bio medical waste generated in all organization is collected and brought to Centralised Facility and provided treatment as per 'Biomedical Waste (Management & Handling) Rules, 1998'.

Table 4-22: Total Member & Waste Report Year-wise

Year	Waste (Kg)	No. of Registered Members
2003-2004	133097	1354
2004-2005	325963	1457
2005-2006	182511	1579
2006-2007	195216	1650
2007-2008	144109	1835
2008-2009	244109	3067

This is the project which is first ever in the history of Surat Municipal Corporation that has been executed on BOOT base. Here the agency to whom the work is entrusted is allotted only a piece of land measuring 2400 sq. mt at the token rent of Re.1/- per sq.mt per annum and remaining all the other expenditures related to renovation and construction of housing facilities for treatment machines such as Incinerator, Autoclave and Shredder and their purchase is made by agency. At present the concession period of BOOT Contract is seven years which is expiring on 31st December 2009 and it has been already extended further on mutually agreeable conditions.

Figure 4-5: Bio medical waste treatment plant run by En-vision

Source: En-vision Enviro Engineers

Outcome of the Best Practice

As a matter of fact this project is the best example of symbiotic relationship between Municipal Corporation, agency and generators of Bio-medical waste. Municipal Corporation is benefited by the way of transferring burden of BMW treatment on to the shoulders of agency.To make the plant's operation and maintenance economically viable every occupier of the facility generating BMW is suppose to make the payment to agency for the quantity of BMW being treated. To make it further more viable agency is paid for minimum of 200 Kgs. per day of BMW irrespective of the actual quantity of BMW generated by SMC run hospitals / maternity homes, laboratories and urban health care centers.

4.3.4 EMERGING ISSUES

The havoc of plague in Surat helped to convert the city into one of the cleanliest cities of the country. This was made possible through a complete revamping of the entire solid waste management system. The system is working efficiently and effectively at present, wherein private sector is involved.

Bhatar waste disposal site which was used so far; is to be closed. Instead of that Kajod site is being used for disposal of solid waste. Moreover, the location of the site right within the city limits has exposed the entire process to the open air and life threatening parasites. Northern/ eastern part of the city also requires land of around 100 Ha for as land fill site.

Surat Municipal Corporation has been efficient in collecting the solid waste from all over the city and maintaining cleanliness. The need of the day is maintenance of the system in an efficient manner. For this purpose, it is required that the collection and disposal system be upgraded. To cater to the needs of the population in 2011 and 2021, when 1278 MT and 1550 MT of solid waste is expected to be generated everyday in the city, additional containers, collection and transportation vehicles, waste storage and transfer stations, and infrastructure at the new waste disposal site at Khajod are the immediate requirements.

Issues which can be identified associated to solid waste management; can be:

- Lack of effective technology for scientific disposal of solid as well as bio-medical waste, also agencies have tendency to hide generated biomedical waste as they have to pay according to the quantity of the same;
- Segregation is not happening at source;
- Lack of public awareness;
- Door-to-door garbage collection facility is not functional in Slums, as a result of which the garbage is being disposed off in nearby creaks;
- Lack of policy for use of bye-products generated from treatment of solid waste.

Strategies

Various strategies on policy and administrative levels need to be adopted for strengthening of Solid waste management in the city. Some of those can be:

- There should be planning for system strengthening, for example: up gradation of vehicles;
- All waste generated and collected has to be treated;
- Bhatar landfill site is to be closed (PPP initiative required)
- Separate Landfill site is required for disposal of dead animals. Three separate well developed land parcels need to be developed.
- Administrative charges which has not been upgraded since 1996; need to be upgraded and also advertisement rights on road side dustbins can be another mean of finance.

Future Requirements

Solid waste has increased and hence there is a need to plan for more compost plant, and workout techno economic feasibility for waste to energy systems. Also various models for reducing the waste need to be reviewed.

4.4 STORM WATER DRAINAGE & FLOODS

Up till now, there was no established full-fledged storm water drainage system in Surat city, except in some area in piece-meal manner. However, there are old peripherial wall in the walled area of the city and the moats outside this peripherial wall, which carried storm water of the city. Most of these moats are now covered with pipe drains or culverts and the land, so reclaimed, is utilized for roads and other development works. Though the storm water which ultimately being discharged into Tapi river or Kankra khari nearby, during rainfall in the city, some of the low lying area of the city are yet flooded during this period.

Due to its location on banks of the River Tapi near the estuary of the Arabian Sea, the land drainage in Surat City is relatively poor and in the past, during the monsoon months, many areas of Surat city suffered temporary flooding and blockage of storm water. The monsoon in

the region is seasonal and is active between the months of June to December. Rainfall during this period can be extremely intense. Hence, the SMC has laid an extensive network of storm water drains in the entire city.

4.4.1 RECENT FLOODS IN SURAT

In 2006, this was first time in the last 200 years that the city of Surat has seen floods of such a large magnitude. Due to incessant rains in Maharastra, the flood gates of the Ukai Lake were opened releasing the excess waters into Gujarat. A major portion of Surat urban area under the municipal corporation got flooded on both sides of the river banks. It created a big havoc and unprecedented loss of property adding to the misery of the vulnerable population.

It is frequent in Surat to experience floods affecting various areas of the city. Beside the frequent floods in the Tapi river basin, the city has network of creeks, which is a sub-system of larger hydrological system. The Mithi khadi floods have been frequents in the last decade. Along the creek there are number of settlements of industrial and migratory workers and thus, the impacts of the swelling of the creeks are also crucial. SMC have made attempts of diverting the inflow of the creeks in the river in the recent years.

This region has high rainfall and less number of rainy days. This has caused sudden accumulation of water in Ukai dam which were released in the downstream of the river flowing through the city. The river when passes through the city has limited basin width and depth. The existing slope has reduced flow of water. During high tide the back water from sea reduces further flow of water. It is estimated that there is certain rise in sea level. It becomes beyond the carrying capacity of the existing river basin which results in frequent flooding after release of water from ukai dam located at the upstream.

4.4.2 STORM WATER EXISTING SITUATION

The gentle slope of the city has greatly aided in the natural storm water drainage. By 2005, 85% of the city was covered with a storm water drainage network, but well built leader lines to support the natural system are lacking in most parts of the town except in the well-developed areas. Generally, the storm water flows through un-built open surface drains and joins the nearby khadi or the River Tapi.

These drains discharge storm water in to the River Tapi at 16 locations in 5 zones of the municipal corporation. The storm water outlets provided backwater entry to the floodwaters of River Tapi and thereby caused temporary flooding of areas from which they were carrying out storm waters.

Hence, it was felt necessary to provide flood protection gates at the outlets of storm water drains. SMC completed the construction of flood protection gates at 15 locations in the year 1999 at a total cost of Rs.210 lakhs. These works were completed in 3 months. A total of 22 cast iron manually operated vertical sliding gates were provided. Normally, these gates are kept open, but at the time of heavy floods in the River Tapi, these gates are closed to prevent the entry of floodwater in to the city.

At present the area outside Municipal Corporation does not have any storm water drainage system. SUDA has proposed storm water drainage system covering 68 TP schemes to be developed.

Table 4-23 Indicators of Storm Water Drains (2009)

Zone	Length of Storm Water Drains (kms)	Total length of roads (km)	% roads having storm water drains
West	83.35	195.27	42.64
East	80.38	185.20	43.41
North	63.17	82.42	63.17
Central	34.76	33.92	97.57
South	58.51	190.17	30.77
South-East	48.93	114.45	42.75
South-West	87.44	231.38	37.79
Total	**456.54**	**1032.81**	**44.09**

Source: SMC

List of ongoing projects related to extension of Storm Water drain pipes in various zones have been described in the table below. Total investment required for the same is 207.75 crores for installation of 1, 04, 700 m of length of pipes.

Table 4-24: Under construction Storm Water Drainage System

Sr. no	Name of the project	Date of Completion	Awarded Cost	Expend. till date	Grant Released by GOI	Remarks
1	**Storm water Drainage System for VESU Urban settlement**	Dec-09	5943.51	2750.67	1748.26	Out of 13 packages work of RCC pipe & RCC Box Drain in progress for 12 Packages, One package is Re invited.
2	**Strom Drainage System for Surat City**	May-10	11085.15	5492.55	2341.95	Out of 61 packages work for 29 packages are awarded. Remaining Tenders for all package are received
3	**Storm Water Disposal system for New East zone areas of Surat city**	Jan-10	2980.34	1428.66	1199.38	Out of 7 packages work for 4 packages are awarded.

Source: SMC

Proposed Projects

Projects identified for Storm Water system Upgradation has been described in the table below. These projects are to be covered with a total investment of 200.09 Crores with the total grant released by GoI of 52.89 Crores. By August 2009; 96.71 Crores have been spent on these projects. These are likely to be completed by the end of 2010.

Table 4-25: List of Proposed Projects

Zone	Length of Pipes in (RMT)	Length of Box in (RMT)	Total	Proposed Investement (Rs in Crores)
South East Zone	13678	1470	**15148**	19.30
West Zone	3775	9515	**13290**	35.78
South Zone	5960	1460	**7420**	18.50
North Zone	58705	10137	**68842**	134.17
Total			**104700**	**207.75**

Source: SMC

4.4.3 FLOOD PROTECTION SCHEME OF RIVER TAPI

After the ravaging floods of the River Tapi in 1968, the Government of Gujarat had decided to have a flood protection scheme to protect Surat city and its adjoining area. It was planned to provide flood protection for a total of 46.85 km. on both banks.

The Tapi embankment scheme was designed for a 10 lakh cusecs flood, which is inclusive of 1.5 lakh cusecs discharge, contributed from the catchment between the Ukai Dam which is about 80 km. upstream of Surat city. The flood protection works consist of raising of both banks of the river by construction of an earthen embankment/ brick masonry retaining walls with/without river slope pitching and also by constructing sluice regulators across natural creeks/drains etc. meeting the River Tapi.

Table 4-26 Detail of Storm Water Drain (2009)

Drain type	Length (kms)
Open Drains (Pucca)	70.25
Open Drains (Kutcha)	38.02
Closed Drains	455.70
Total	**563.97**

During the floods of 1994 and 1998, 5.25 lakh cusecs & 7.0 lakh cusec water spilled into the city. These floods submerged few low-lying areas of the city causing loss and damage to life and property. A majority of the slums do not have covered storm water drains. The household wastewater from slums flows to the nearby storm water drains. River Tapi is perennial which originates from Saputara Hills having a total catchment of 65,000 sq.km.

The major part of the scheme was executed by the Government of Gujarat from 1971 to 1995 at a total cost of Rs.1542 lakhs. But the long delay in completion of the project proved fatal during the floods of 1994 and 1998. The works of embankment/sluice regulators at village Chhaprabhatha, Variav and Tunki were not completed.

With technical guidance from the Narmada and Water Resources Department of the Government of Gujarat, SMC executed the flood protection works, which fall within the Surat city limit. The project cost of Rs.2406 lakhs is being borne equally by the Government of Gujarat and SMC. Initially, SMC will execute the works from its own resources and later on, the Government of Gujarat will reimburse its 50 percent share within 3-5 years depending upon the availability of funds. The works of the first phase have already been completed by

SMC and the remaining works are proposed to be taken up only after finalisation of the scheme/ design-drawings etc. by the Irrigation Department of the Government of Gujarat.

4.4.4 EMERGING ISSUES

Mixing of Sewer and storm water drains

With a very small number of sewerage connections in the city, large amounts of sewage are let out illegally into the storm water drains. The closed drains of the city amount to only 20.3 percent of the total length of surfaced roads. Solid waste is also dumped into the natural drains of the city in many areas near the slums. Due to this, the city witnesses frequent flooding of roads during the monsoon.

Delay in implementation of the Flood Protection Scheme.

The flood protection scheme of the River Tapi that started in 1971 is still under progress. This long delay on the part of the Government of Gujarat proved fatal during the floods of 1994 and 1998.

A large portion of the scheme falling under the city limits is still pending and is largely dependent on the availability of funds with SMC as the reimbursement from the Government is expected to come only at a later stage.

Silting of khadis and open storm water drains.

The city has the advantage of a good natural drainage pattern, which is not, unfortunately, exploited properly. Silting and constriction due to uncontrolled solid waste dumping and encroachments by the poor on the banks have interrupted the flow of wastewater and storm waters, thus, causing them to spill into neighboring areas. Never has there been an attempt to de-silt and clean the natural drains of the city. The open storm water drains are in a similar condition, with sewerage waters getting mixed with them at places.

SMC has constructed earthen embankments and sluice regulators at villages Tunki and Bharimata by spending Rs.356 lakhs during the first phase. SMC has already spent a total of Rs.530.50 lakhs including the land acquisition cost etc

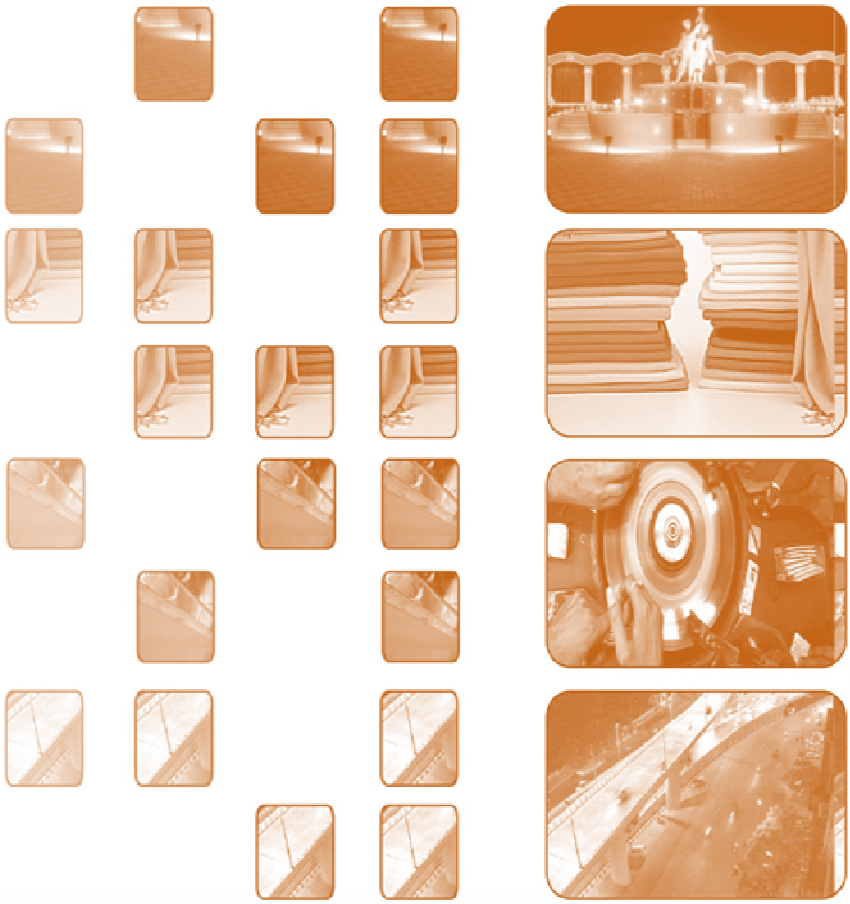
Due to scarce financial resources, Storm water drains get low priority as these projects capital intensive, skilled workmanship is required and is used for small duration of the year.

Under JNNURM Storm water Drainage project has been taken initially for the core city. Further the project for newly merged area of eastern zone of SMC has been sanctioned and the laying of storm water drains is in progress.

4.4.5 FUTURE REQUIREMENTS

The Surat Municipal Corporation has appreciated the importance of an effective storm water drainage wherein the current and future needs point to effective roadside storm water lines. This is in consideration of the fact that apart from draining the storm water they also help in maintaining the condition of the road surface. The present storm water drains are to be

extended to a minimum of 401.076 km by 2011 to effectively control flooding during the monsoon. This is also expected to assist the flood protection scheme of the River Tapi by reducing the sudden pressure on the system during emergencies. Also a Detailed Project Report is required to be prepared for South West Zone for up-gradation of storm water drain system in that area.



Chapter 5

Energy conservation in Basic Infrastructure Services

Energy Efficiency Cell

Issues in Energy Conservation & Initiatives of Energy Efficiency Cell

Re-engineering in water Supply routes and other Energy Saving Measures

Energy Conservation Activity in other Fields

Strategies for the Future

CHAPTER 5. ENERGY CONSERVATION IN BASIC INFRASTRUCTURE SERVICES

Cities world over have realized that there exists a strong link between water supply and energy consumption. Energy consumption in municipal water supply is one of the largest components of energy consumption for an urban local body. To provide the sustainable basic services at the optimum cost is the big challenge for Municipal Corporation as the sources of income are limited and rate of electricity are increasing every year. Energy conservation principles in water supply have been applied in numerous cities around the world, demonstrating that water efficiency measures repay themselves quickly and yield many rewards: immediate improvements in water service, increased water delivery, reduced water and energy consumption, and more revenue for system upgrades and new customer connections. Conservation of energy in water supply also pays quickly. The most promising areas for intervention within water supply systems are:

- Improving the pumping system,
- Managing leaks,
- Automating system operations, and
- Regular monitoring (preferably with rigorous metering of end use)

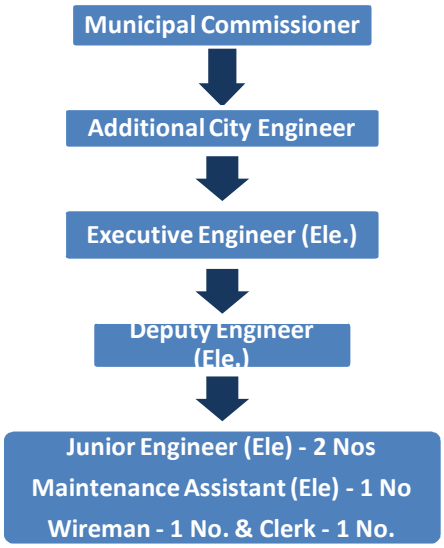
Due to huge increase of 145% in energy bill from year 1996-97 to 2000-01 and continual increment in the energy bill, SMC has realized that the Energy Efficiency is the key to meet this challenge. SMC has created “Energy Efficiency Cell” dedicated exclusively for energy efficiency related activities. This chapter explains in detail the various initiatives undertaken by the Energy Efficiency Cell of SMC and its future strategies for energy conservation.

5.1 ENERGY EFFICIENCY CELL

Long before Energy Efficiency Cell was created, SMC was keen on implementing energy conservation measures in its various services. Such as, conducting energy audits in year 1999, power factor rebate for HT services in 1999 and Switching “on” & “off” of streetlights are done as per local sunrise & sunset timings since so many years.

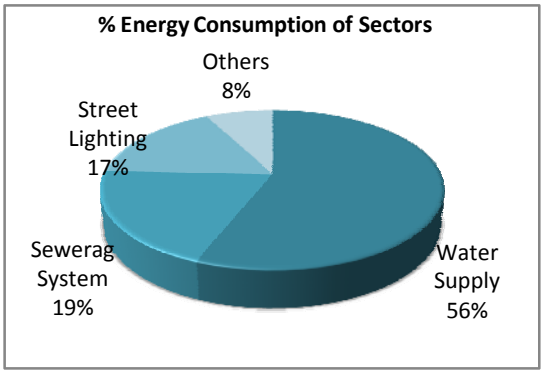
Practice of switching “off” 33% streetlights during low traffic hours was implemented on major roads since 2000. Looking at the importance of energy conservation in Water Supply System and other services “Energy Efficiency Cell”, was established in the Year 2001. The EE Cell has dedicated budget and designated technical manpower for improving energy efficiency. It oversees energy related issues in all departments The mission of the EE Cell is to optimize the specific energy consumption required to provide various services without affecting quantity and quality.

Figure 5-1 Organogram of Energy Cell



» **Functions:**

1. To conduct in house as well as external Energy Audit
2. To identify energy conservation projects and its feasibility
3. To find out sources for procuring power at lowest possible price
4. Feasibility study for own power generation from conventional & renewable energy sources



5. To do scrutiny of file having more than equal to 30 kW power loading.
6. To monitor the usages of electricity of entire corporation

5.2 ISSUES IN ENERGY CONSERVATION

1. Increase in Energy bills with increase in Water Demand: In 1996, Surat Municipal Corporation was supplying around 200 MLD of water to the entire Surat City through French wells (90 MLD capacity) at Sarthana Water Works, New Jack well (25 MLD capacity) at Head Water Works, 3 Conventional Water Treatment Plants (68 MLD capacity) at Head Water Works and more than 32 bore wells. Water Supply System being the major component in the energy consumption & contributing more than 61% of total energy bill of SMC, the total energy bill also increased.

2. Inefficiency of staff in operating the water supply system: As the size of the water supply system is increasing immensely, therefore, dedicated focus wasn't possible by the engineers involved in projects and operation & maintenance works of water supply system.

3. Inefficient and old pumping system for water causing wastage of energy

4. Streetlights consuming more power and operated when not required

Table 5-1Water supply - Electricity bills

Financial Year	Average Water Supply (MLD)	Electricity Bill for Water Supply (Crore Rs.)	Electricity Bill for Other Services etc. (Crore Rs.)	Electricity Bill of SMC (Crore Rs.)	% of Water Supply bill
1996-97	199	8.29	4.37	12.66	65.48%
2003-04	479	26.40	16.78	43.18	61.14%
% Increase	140.70%	218.46%	283.98%	241.07%	-----

Source: SMC, Energy Efficiency Cell, June 2009

5.3 INITIATIVES OF ENERGY EFFICIENCY CELL

After taking a review of the various issues faced in energy consumption, the energy efficiency cell came up with admirable initiatives for energy conservation. These initiatives are described below.

In case of water transmission and distribution activities, the energy conservation potential for a ULB can be divided into following three categories:

- System improvement / up-gradation to reduce the losses in the system.
- Effective control & remote monitoring system to operate pumping system at prescribed efficiency level
- Reduction in pumping head by rationalization of water transmission system for reduction of static and frictional head.

The SMC, initiated following activities for energy conservation,

- Energy Bill Monitoring System was established in June- 2003 to keep checks on the energy consumed by all departments of corporation and maintaining history records of monthly energy bills.
- To conduct energy audit work on regular basis for sewage treatment plants, water treatment plants, water pumping stations, drainage pumping stations, hospitals, schools and other premises of corporations. The Energy audit focuses on, Study of existing system and past record, Set the existing energy consumption benchmark, Study of system energy efficiency from source to consumer, Checking of equipment efficiency including pump, Check the process losses for energy efficiency, Preparation action plans for short, medium and long-term measures.
- To explore the ways to generate electrical power at cheaper rates by installing gas based Captive Power Plant(s), Wind based power plant(s) etc. Also, to explore the possibilities to purchase power at cheaper rates from agencies (like Gujarat State Electricity Generation Limited- GSEGL) other then Gujarat State Electricity Distribution Company (GSEDC earlier a part of GEB) & Surat Electricity Company (SEC). Feasibility study to establish captive power plant(s) and to purchase power from other agencies was done in Jan-2004.
- To explore ways or methods for possible energy saving and introduce it in various related departments so that considerable amount of energy saving can be achieved.

To find out the right energy saving product for the right machine so that maximum benefit can be availed with the minimum possible investment. To co-ordinate with the user department for purchasing and commissioning of right energy saving products.

» To establish contacts with various organizations (government/ semi-government/ non-government) dedicated to the energy saving field like Gujarat Energy Development Agency (GEDA), Electrical Research and Development Agency (ERDA) etc. To get familiar with the various incentive scheme offered by Government for making investment in energy saving area.

» To create awareness among the employees of Surat Municipal Corporation for energy saving and explain importance of energy saving.

5.4 RE-ENGINEERING IN WATER SUPPLY ROUTES & OTHER ENERGY SAVING MEASURES

5.4.1 DESCRIPTION OF INITIATIVE

The energy cost is accounting for more than 78% of total O & M cost as indicated in the survey report made by Ministry of Urban Development Department (MoUD). Energy is consumed in four major areas as:

» Raw Water Collection from Intake Wells/ (Filtered Water from Radial Wells)

» Filtration of Raw Water including chlorination

» Filtered Water Transmission

» Filtered Water Distribution.

Having examined all the above areas, it was found that scope of saving lies mainly in the filtered water transmission area and thus dedicated efforts in re-engineering the routes was made. Accordingly, following objectives have been planned: -

Energy Efficient Filtered water transmission routes:

» Data collection and analysis of Energy Audit of 14 sites were done (3 water works, 9 water distribution stations and 2 small water pumping stations)

» Verification of correctness of data of pump discharge, head, input power, efficiency of pump and motors made Data collection of water transmission and water distribution made

» Discrimination of energy consumption in various aspects from raw water collection up to water distribution

» Calculation of specific energy consumption for water transmission in existing situation was done

» Determining the economical channel to transmit water for all water distribution stations.

» Implementation of energy efficiency measures in Water Transmission Grid

Process Followed

(A) ***Re-engineering of filtered water transmission routes:*** This was mainly achieved by Calculation of Specific Energy Consumption to transmit Water in existing situation (2003-04) and then Determining the economical channel to transmit water for all water distribution stations. After verifying the data given in the energy auditor's report and electricity bills of all sites of water supply system, determination of energy consumption in various aspects from raw water collection up to water distribution was done. Accordingly, total Specific Energy (KWH/ ML) required (including Raw Water collection and filtration) to Transmit Water at the times was calculated. Accordingly, following typical routes were re-engineered: -

Table 5-2 Re-Engineering of Routes

Location	Ordinary routes before initiative (2003-04)	Specific Energy Consumption (KWH/ ML)	Energy Cons. (KWH / Day)	Re-engineered route	Expected Specific Energy Consumption (KWH/ ML)	Expected Energy Cons. (KWH/ Day)	Net Saving (KWH / Day)
Umarwada WDS	SWW→HWW→UMR WDS	315.59 {40.11 MLD}	12,658	SWW→ DUM-UMR WDS	165.67 {53 MLD}	8,781	7,992
	HWW→UMR WDS	319.27 {12.89 MLD}	4,115				
Athawa WDS	RWW→JOG WDS→ATH WDS	240.70 {32 MLD}	7,702	RWW→ATH WDS	207.28 {32 MLD}	6,633	1,069
Khatodara WDS	RWW→KHT WDS→ATH WDS	240.70 {20.8 MLD}	5,007	RWW→KHT WDS	207.28 {15.96}	3,308	1007
	KWW→KHT WDS	142.88 {53.20 MLD}	7,601	KWW→KHT WDS	142.88 {58.04}	8,293	
Udhna WDS	KWW→KHT WDS→UDH WDS	183.84 {31 MLD}	5,699	KWW→UDH WDS	128.05 {32 MLD}	4,098	1,601
Pandesara WDS	KWW→KHT WDS→PAN WDS	183.84 {27 MLD}	4,964	KWW→PAN WDS	128.07 {27 MLD}	3,458	1,506

Source: SMC, Energy Efficiency Cell, June 2009

Note: RW = Raw Water, FW = French Well, UGT = Under Ground Tank, WDS = Water Distribution Station

Results of Energy saving measures:-

Summary of Energy Efficiency Measures in Water Supply System (2003-04 onwards) are as below: -

Table 5-3 Re-engineering of filtered water transmission routes

Sr. No.	WEF	Brief Description of Activity	Recurring Energy Saving (KWH/ annum)	Recurring Energy Saving (Rs./ annum)

	Jul-2004	Change in UGT Filling Route for Umarwada WDS	4,048,564	16,375,227.00
	Sep-2005	Change in UGT Filling Route for Khatodara & Athawa WDS from Rander Water Works	2,134,375	8,537,500.00
	Jul-2007	Change in UGT Filling Route (Partial) for Udhna & Pandesara WDS from Katargam Water Works	551,287	2,232,712.00
Sub Total 1			6,734,226	27,145,439.00
Other Energy Saving Measures				
	Aug-2005	Installation of 12 Nos. of New Pump Sets at Katargam Water Works	1,439,820	5,758,407.00
	Jun-2004	Increase in Contract Demand at Joganinagar WDS	-----	86,213.00
	Apr-2004	Improvement of PF through Installation of Thyristor Based APFC Panel at Umarwada WDS	-----	227,174.00
	Jul-2004	Improvement of PF through Installation of Thyristor Based APFC Panel at Katargam WDS	-----	308,578.00
	Jun-2004	Coating of 1 No. of pump at Head Water Works	19,465	85,645.00
	Aug-2004	Installation of 4 Nos. of New Pump Sets at Khatodara WDS	178,200	801,900.00
		Installation of 1 No. of Energy Efficient Pump Sets at Head Water Works	20,404	89,776.00
	Jan-2005	Replacement of Impeller for 1 No. of Pump at HWW- Old Booster House	62,250	273,901.0
		Replacement of Impeller & Bowl Assembly for 1 No. of Pump at HWW- Raw Water	109,925	483,670.00
	Mar-07 to Aug-07	Installation of Total 21 Pump Sets at Frechwell-1 & 2 and Old Booster House at SWW and Jack well of Head Water Works	2,341,513	10,050,012.00
Sub Total 2			4,171,577	18,165,276.00
Grand Total (Realised Saving)			10,905,803	45,310,715.00

Source: SMC, Energy Efficiency Cell, June 2009

5.5 ENERGY CONSERVATION ACTIVITIES IN OTHER FIELDS

Surat Municipal Corporation has done significant energy conservation activities in the fields of Street Lighting & Sewage Disposal also. Brief details are as under: -

Summary of Energy Efficiency/ Conservation Activities done in Street Lighting

Earlier there were 23,395 nos. of 1 x 36 W fluorescent luminaries and out of these 19,570 nos. fluorescent luminaries having conventional FL lamp & copper wound ballasts consuming 50 W/ luminaries. These were converted in to energy efficient luminaries by replacing with hi-lumen fluorescent lamp & electronic ballast having total power consumption of 28 W/ luminaries keeping same light output. The implementation was done in Jan-2003. This has resulted in saving of Rs. 50.00 Lacs per annum. (15.37 lacs KWH/annum). After successful implementation, SMC has made a policy such that any new fluorescent luminaries in streetlight system are installed with electronic ballast and high lumen fluorescent lamp only. Energy Saving Realized: Rs. 35 Lacs per annum [10.7 lacs KWH/annum] till date. Adopted practice of switching “OFF” 50% streetlights on major 155 roads during low traffic period between 12:00 AM to morning. Energy Saving Released: Rs. 50.00 Lacs per annum [15.38 Lacs KWH/ annum]

Energy Generation from Bio Gas produced from Sewage Liquid Waste:

» **Potential of Power Generation of Sewage Treatment Plant**

Figure 5-2 Gas Based Power Plant at Anjana STP

Sewage gas usually contains about 60 to 70 percent methane, 30 to 40 percent carbon dioxide, and other gases, including ammonia, hydrogen sulfide and other noxious gases. It also is saturated with water vapor. Precautions are required to be taken while processing and handling the gas. It is highly explosive and difficult to detect. Sewage gas, which is methane and other gases, is also known as swamp gas, sewer gas and fuel gas. The calorific value of sewage gas is 4700 k Cal/cum to 5500 K cal/cum.

Table 5-4 Major gaseous components of Sewage gas are as described below

Particulars	% in Sewage Gas
Methane (CH4)	60 % - 70 %
Carbon Dioxide (CO2)	30 % – 40 %
Hydrogen Sulfide (H2S)	Less than 1 %
Water Vapor	3 % – 4 %
Other gases	Trace

Source: SMC, 'Green Energy Generation from Sewerage Gas'

SMC is the First Corporation of India to install 0.5 MWe capacity power plant based on bio-gas based generated from liquid sewage waste at Anjana Sewage Treatment Plant in Oct-2003.

Replication of Sewage Gas Power Plant

After successfully commissioning prestigious purely Sewage gas based power plant at Anjana STP, promptly SMC took quick actions to setup other Sewage gas power plants at three STPs at Singanpore, Karanj and Bhatar. Singanpore (100 mld), Karanj(100 mld) and Bhatar(120 mld) sewage treatment plant are set up on Conventional Activated Sludge process. Sewage gas (which contain 65 % to 70 % CH4 (methane), 30% to 35 % CO2, 1% H2S and moisture) is being generated in these sewage treatment plant by the process of anaerobic digestion. In very short duration of ten months, these projects have been commissioned in 2007-08 and are now operational and providing electricity to respective plant equipments. Following table indicates total KWH generation at different Sewage gas power plants.

Table 5-5 Power generation till June 2008 at various sewage gas based power plant

Sr.No.	Name of STP	Installed Capacity of Power Plant	Year of Commissioning	KWH units generated since commissioned	Power Generation (in Crores Rs)
1	Anjana	0.5 MWe	Oct-03	82,93,364	3.73
2	Singanpore	1.0 MWe	March-08	16,67,916	0.75
3	Karanj	1.0 MWe	March-08	23,28,443	1.04
4	Bhatar	1.0 MWe	Aug-08	6,68,092	0.30

Source: SMC, 'Green Energy Generation from Sewerage Gas'

The ever-increasing demand of energy and over-exploitation of fossil fuel resources has led to several environmental concerns. To counter these environmental problems, Governments, around the world are going in for clean energy technologies, stringent waste disposal system and supporting the energy generation from waste and other non-conventional or renewable sources.

The Sewage gas based Power plant projects are beneficial in sustaining the environment & reduce global warming in following ways;

- Prevent the free methane emission from the digester.
- Generate the electricity which reduces the use of grid power which will reduce use of fossil fuel for power generation.

Table 5-6 Grand Total of Energy Conservation Activities in the fields of Water Supply, Sewage Disposal System and Street Lighting 2003-04 to 2008-09

Table 6: ector	Energy Saving Released (KWH/ annum)	Energy Saving in Bill (Rs./ annum)	Cumulative Saving of Energy (KWH)	Cumulative Actual Reduction in Bill (Crores Rs.)
Water Supply System	11,951,636	52,427,458	38,056,785	17.11
Street Lighting	4,267,843	13,870,488	23,832,276	7.74
Sewage Disposal & Others	400,068	3,131,223	1,519,614	1.27
Total SMC	**16,619,547**	**69,429,168**	**63,408,675**	**26.12**

Source: SMC, Energy Efficiency Cell, June 2009

(1) Solid waste to energy

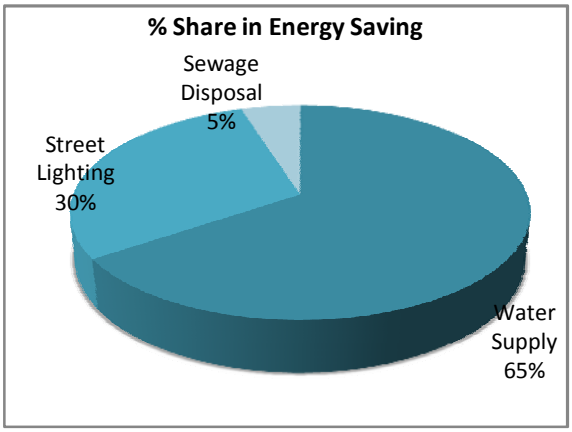


Figure 5-3 Energy Saving in Different Sectors

SMC is concerned with the growing problems of waste disposal with the scarce availability of land for disposal of waste and environmental remediation measures becoming ever more expensive, it is felt that processing of waste or extracting energy from the waste is a better option to all the major problems. SMC collects about 1,100 MT of municipal solid waste daily. The waste is transported for disposal to the landfill site at Khajod where Sanitary landfill site of capacity 0.125 million m^3 is available for receiving inert residues. Sanitary landfill site with 6, 25,000 m^3 capacity is under construction at same site.

SMC has undertaken the following actions for energy generation from solid waste:

- Waste to Energy: From 600 MT municipal solid waste along with 120 MT secondary sludge from STP with expected Power Generation: 24 MWe Expected Net energy generation: 106 million KWH/ annum
- Old landfill site at Bhatar, which is more than 25 years old is kept under scrutiny for methane gas generation, if found feasible nearby Bio Gas Power Plant at Bhatar shall be fed with generated methane gas.

Figure 5-4 Landfill Site at Khajod

Salient features of the waste to energy plant:

- Waste to Energy plant set up on BOOT basis. MSW has high calorific value of 2,500-3,800 k Cal/ kg
- Total Land, 25 hectares, provided by Municipal Corporation on token rent. Investment by agency for construction, operation and maintenance. Concession period agreed is 30 years.
- All the permissions, NOC, Consent to follow up the prevailing Rules and regulations are with the agency.
- Capacity of plant is 400 MT per Day against total generation of 1,200 MT per Day.
- Agency executing process plant is Hanjer Bio-Tec energies Pvt. Ltd.; Mumbai.

5.6 STRATEGIES FOR THE FUTURE

Issues in Energy Consumption:

- Increase in Energy bills with increase in Water Demand
- Inefficiency of staff in operating the water supply system
- Inefficient and old pumping system for water causing wastage of energy
- Streetlights consuming more power and operated when not required

Having inspired by the energy saving realised (recurring saving more than Rs. 4.50 Crores per annum), further steps of energy auditing at 15 sites is underway. Furthermore, energy saving being the objective for continuous improvement, all round efforts are put forth accordingly. SMC has shared these information(s) with State Government of Gujarat and other authorised bodies like BEE (Bureau of Energy Efficiency), GEDA (Gujarat Energy Development Agency) for the benefits of other Municipal Corporations and alike. SMC is becoming member in “Solar Cities” scheme of Government of India & ICLEI.

Operating Procedures adopted by SMC:-

- In order that every liter of water, which is processed and distributed to the citizens is economized for its expenses incurred therein and as such water supply is made self-sustainable, formulation of broader objective is necessitated. The objective should include and not exclude the following, which must be taken simultaneously and not in isolation: -

- Replacement of energy inefficient machineries by efficient ones
- Measurement, monitoring and controlling all process as well as energy parameters
- Upward revision of water supply charges from the existing
- Going for metered connections

o Pumps are major energy consuming device, to achieve optimum efficiency measurement and verification of pump efficiency needs to be done at site. Accordingly, tender conditions were formulated for the ongoing energy conservation projects.

o As the city population is increasing, the alternative arrangement of water transmission grid should also be economical in the cases like shut down of water works, power cut-off, natural calamities etc.

o Planning and reviewing must be done time to time by the Hydraulic Department & Energy Efficiency Cell for timely and successful implementation of energy efficiency improvement works.

o Database maintenance for the performance of the pumping machineries, water supply, electricity bills parameters is most essential.

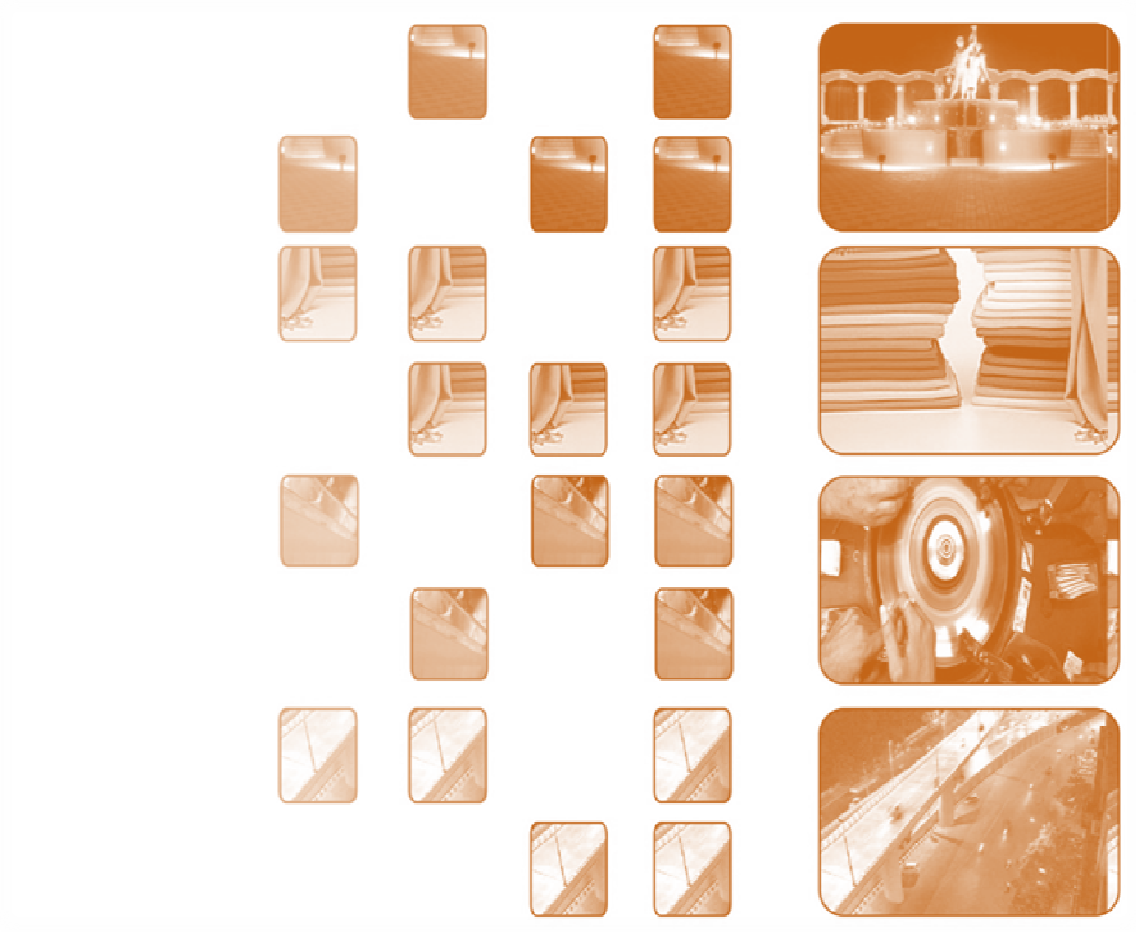
o Contribution of operating staff for the future projects.

SMC plans to adopt following activities as part of its Strategy for future:

- To reduce specific energy consumption in all operations and activities up to the standard prevailing in these fields. To adopt energy efficient technology / equipment for new projects.
- To maximize the use of renewable fuels and low energy level fuels.
- To replace old, outdated and inefficient machineries / equipments and methods and technology by the latest efficient machinery / technology continually.
- To monitor closely and control the consumption of various forms of energy through an effective Energy Usage Monitoring Systems.
- To carry out regular internal and external audits to identify and communicate areas of improvements.
- To promote awareness among employees and citizens through campaigns and publicity. To recognize the efforts of employees in energy conservation initiatives.

Specific Role of Various Departments in Energy Conservation / Efficiency Activities

- Hydraulic Department: Provides assistance in study of water supply transmission & distribution networks and to find out energy conservation areas.
- Drainage Department: Feasibility study & installation of bio gas (produced from liquid sewage waste) based power plants. Provides assistance in study of water disposal network and to find out energy conservation areas.
- Street lighting & other Departments: Provides assistance in study of the system and to find out energy conservation areas.
- Solid Waste Management: Feasibility study & installation of solid waste based power plants.



Chapter 6

Transporatation System

Introduction

Vehicular growth and Composition

Road Network & Regional Transport

Facilities for pedestrians and Non –Motorized Vehicles

Traffic Characteristics & Public Transport Services

Traffic Management & Impacts & Emerging Issues

Mass Transit Plan- Alternative Analysis

CHAPTER 6. TRANSPORTATION SYSTEM

6.1 INTRODUCTION

The city is well connected by road, rail and air transport. Several National and State Highways passes through the city. It is also connected through sea port. As a result traffic coming to as well as passing through the city is very high. The city transportation system is predominantly road based. With the absence of a public transport system, dependence on individual modes and intermediate public transport is high. Though roads are generally wide, network design and development is not complete. This chapter describes the components of urban transport system in terms of status, trends and gaps.

6.2 VEHICULAR GROWTH AND COMPOSITION

The vehicles registered in Surat RTO area has raised from four lakh in 1994 to fourteen lakh in 2008. Two wheelers comprise nearly 80% of the total number of vehicles while cars constitute about 10.3%. In terms of composition, there is a significant shift towards space consuming modes of transport. This shift is from bicycles to scooters and three wheelers; and from scooters to four wheelers.

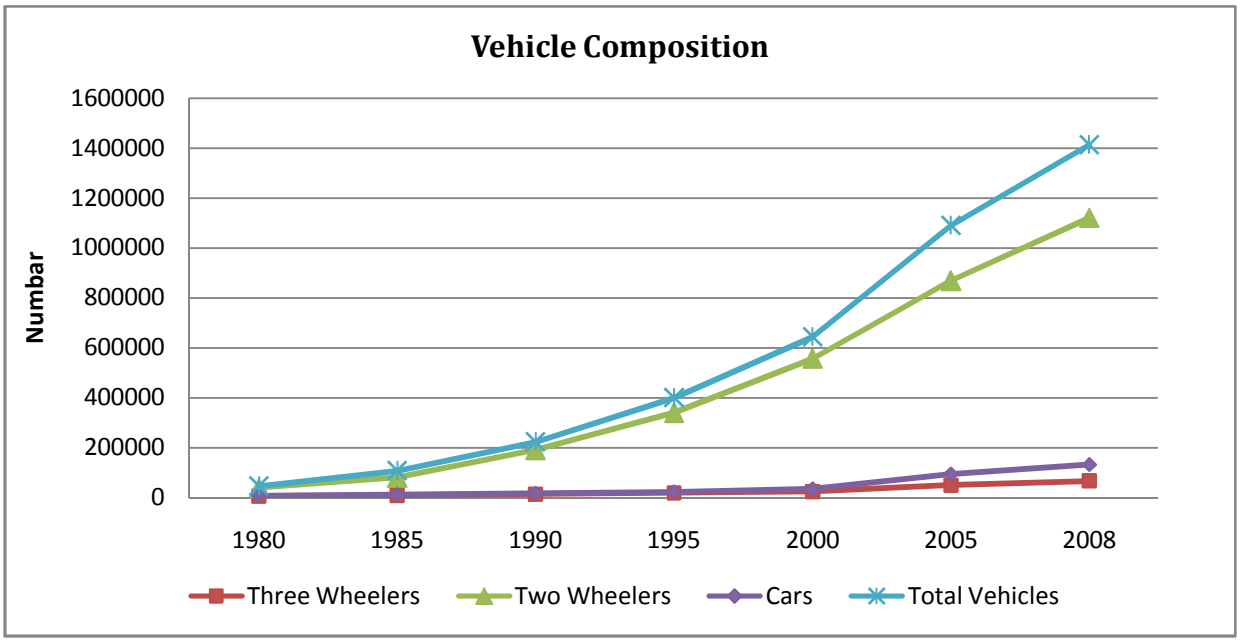


Chart 6-1 Growth of Vehicles Registered at Surat RTO

Presently there are about eleven lakh two wheelers and 67,000 Auto Rickshaws registered with Surat RTO. The percentage of personalized vehicles has increased from 70% to 88% within a span of twenty five years. The Table 5-1 provides the break-up of the vehicular composition in the city over the past three years.

Table 6-1 Vehicle Composition in Surat from year 2006 to 2008

Sr. No	Type of Vehicle	Number of Vehicles			% age Vehicles			Growth Rate	
		2006	2007	2008	2006	2007	2008	2006-7	2007-08
1	Motorcycle	964843	1062949	1120663	79.7	79.6	79.3	10.2	5.4
2	Auto	57851	63456	67541	4.8	4.8	4.8	9.7	6.4
3	Jeep	9885	10890	11629	0.8	0.8	0.8	10.2	6.8
4	Private Auto	1902	1929	1950	0.2	0.1	0.1	1.4	1.1
5	Motor Car	108334	121862	133574	8.9	9.1	9.5	12.5	9.6
6	Taxi Cab	1674	1743	1764	0.1	0.1	0.1	4.1	1.2
7	Maxi Cab	429	555	630	0.0	0.0	0.1	29.4	13.5
8	Stage	1081	1113	1118	0.1	0.1	0.1	3.0	0.4
9	School Bus	346	443	481	0.0	0.0	0.1	28.0	8.6
10	Private	285	313	320	0.0	0.0	0.0	9.8	2.2
11	Police Van	128	131	131	0.0	0.0	0.0	2.3	0.0
12	Goods Truck	14713	16189	17159	1.2	1.2	1.2	10.0	6.0
13	Tanker	673	691	707	0.1	0.1	0.1	2.7	2.3
14	Tempo	29	29	29	0.0	0.0	0.0	0.0	0.0
15	Other Light	24721	27472	29656	2.0	2.1	2.1	11.1	7.9
16	Transport	9130	9370	9515	0.8	0.7	0.7	2.6	1.5
17	Non Transport	57	57	57	0.0	0.0	0.0	0.0	0.0
18	Tractor	13814	14410	14771	1.1	1.1	1.0	4.3	2.5
19	Ambulance	262	276	289	0.0	0.0	0.0	5.3	4.7
20	Others	988	1247	1458	0.1	0.1	0.1	26.2	16.9
	Total	**1211145**	**1335125**	**1413442**	**100**	**100**	**100**	**10.2**	**5.9**

Source: RTO – Surat

The rate of growth has remained high at 10 to 11%. In the absence of public transport system in the city, the rate of increase in auto rickshaws has been rapid and increase in motor cars is at 12% per year. Also with the introduction of public transport in the city; the growth rate in the number of two-wheelers has reduced.

6.3 ROAD NETWORK

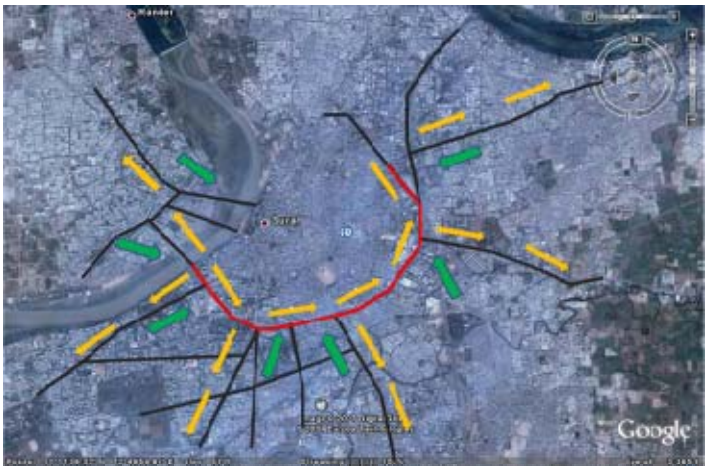
6.3.1 ROAD NETWORK: PATTERN, LENGTH AND DISTRIBUTION

As per the approved Development Plan, the roadway system of Surat is around 1150 Kms. Other than the National Highway Authority, which maintains National Highways, the State Roads and Buildings Department, the two urban local bodies; SMC and SUDA, are responsible for developing, operating and maintaining road infrastructure.

As per the land use Proposal, a total of 9.2 % of SUDA area is proposed under Transport and Communication, which is relatively less. The street network in Surat may be classified as ring-radial form and grid iron pattern is observed on the smaller roads of the local network. The rings and the radials are incomplete. As a result a small portion of the network acts as arterial road as depicted in Map 4-1. The paths of movement in Surat are very concentric, and roads

leading to these places are less. Majority of the vehicular load is taken by the inner ring road which connects to all important roads. This results in congestion on the ring road.

As far as Right of way (RoW) is concerned (Map 5.2), the city is well placed with about 35% of its network having width exceeding 30 meters. It is to be noted that many of these roads form part of NH/SH network. Another 25% of the network is wider than 18 meters. Within the developed area, road density is higher but roads are narrower.



Map 6-1 Ring Road - High levels of Congestion

In old city, the area under roads (area of 28.29 sq km) is about 25% of the total area of old SMC limits. The road length within this area is 967 km. However not all roads are developed to their full width. Ninety three percent of the road network is surfaced with asphalt and the rest with concrete. The conversion of asphalt roads into concrete started in the city since 2004. The road condition is generally good. *(Refer Annexure Map 6-1- SMC Roads Map- Width wise)*

Table 6-2: Existing Road Network (as on 31/3/2009)

Category of Road	ROW	Length in Km	% Share
Arterial Road	Above 36 m to 60 m	134.50	8.42
Sub Arterial Road	Above 24 m 36 m	163.50	10.23
Collector Road	Above 12 m & upto 24 m	254.50	15.35
Residential Street	Below 12 m	1055.55	66.00
Total		**1599.00**	**100.00**

All roads in the walled city are congested due to high volumes of traffic and constrained widths varying from 12m to 18m. Presently the ring road around the Walled City with a width of 60m carrying more than 10,000 PCU/hr is the only road that facilitates mobility from the congested streets of the walled city and connects to the other parts of the city.

Table 6-3: Road Length Details

Sr No	Road Name	Length km	BT Length	CC Length
1	Ring Road	11.40	11.40	-
2	Canal Road	8.80	8.80	-
3	Katargam Amroli Road	7.20	7.20	-
4	Varacha Road	6.70	5.40	1.30
5	Surat Navsari Road	11.00	5.00	6.00

Sr No	Road Name	Length km	BT Length	CC Length
6	Udhana Magdalla Road	4.50	1.00	3.50
7	Citylight Road	2.50	2.50	-
8	Hazira Road	3.00	2.30	0.70
9	Rander Road	6.00	2.80	3.20
10	Surat-Bardoli Road	2.40	0.30	2.10
11	Surat-Dumas Road	7.00	4.40	2.60
	Total	**70.50**	**51.10**	**19.40**

Source: BRTS Cell, SMC

6.3.2 BRIDGES AND FLYOVERS

At present there are 59 major and minor bridges and two underpasses for pedestrians in the city. There are eight bridges across River Tapi at various locations. One of them is a weir cum causeway and another is a railway bridge. The other six are major roadway bridges.

Table 6-4: List of Existing River Bridges

Sr No	Area Name
1	Nanavarachha – Mota -Varachha
2	Amroli Bridge
3	Singanpore Weir-cum-Cause Way
4	Nehru Bridge
5	Swami Vivekanand Bridge
6	Sardar Bridge
7	Magdalla Bridge (SH)

Source: Survey by CEPT Team

Under passes and over bridges have been constructed on fourteen locations in the city details have been provided in

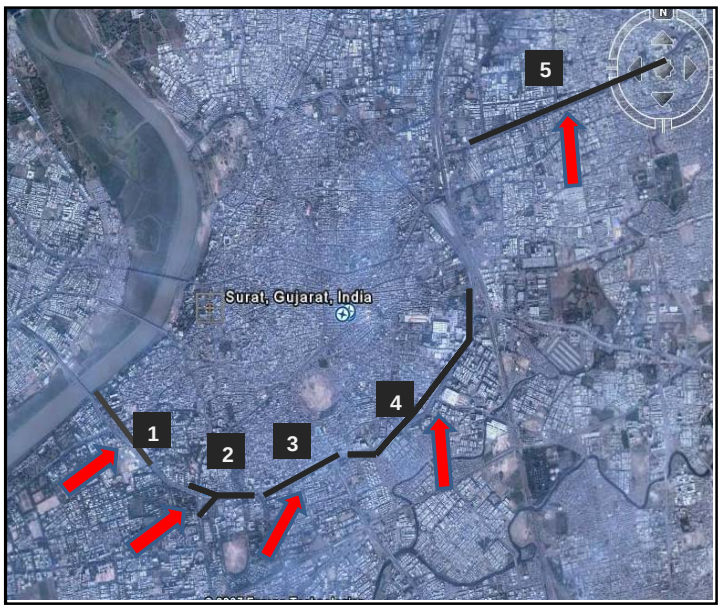
Table 6-5 Details of Existing/under construction Road Over Rail Bridges and Underpasses of this document. The lane configurations are inadequate on a few of the existing underpasses thereby resulting in congestion and forming bottlenecks.

Table 6-5 Details of Existing/under construction Road Over Rail Bridges and Underpasses

Sr. No	Detail/Link	Existing Lanes
1	Fulpada - RuB	4 Lane
2	Katargam Ashwinikumar – RoB	2 Lane
3	Suryapur Gate – RuB	4 Lane
4	Lambey Hanuman – RuB	4 Lane
5	Sahara Gate – RuB	4 Lane
6	Kamela Gate – Limbayat Road – RuB	4 Lane
7	Dindoli Road RoB	2 Lane
8	Sachin RoB (SH)	2 Lane
9	Amroli - Utran Link Road RuB (S)	2 Lane
10	Amroli - Utran Link Road RuB (N)	2 Lane
11	Rander - Olpad Road RoB (SH)	2 Lane
12	Udhna-Sanjaynagar RUB	1 Lane
13	Limbayat RUB	2 Lane

Sr. No	Detail/Link	Existing Lanes
14	Dindoli RUB	2 Lane
15	Anjana – Limbayat ROB (Under Construction)	6 Lane

There are 10 flyovers existing/ under construction in the city. Details of the existing flyovers have been summarized in Table 5-6. It is evident that the congestion level continues to increase at the different locations on and below the flyovers.



Map 6-2 Existing Flyovers

Table 6-6 Details of Existing Flyovers (2009)

Sr. No.	Location	Length (KM)	Reasons for Construction	Number of Lanes	V/C Ratio Peak Time
1	Athwa Gate	0.63	Congestion on the cross road below	2 lane two way undivided	1.2
2	Majura Gate	0.90	Congestion on the cross road below	2 lane (multi level)	N.A
3	Udhna Gate	0.50	Congestion on the cross road below	4 lane two way divided	1.2
4	Sahara Gate and Textile Market (Ring Road)	1.88	Congestion due to slow moving traffic	4 lane two way divided	1.3
5	Varacha	2.80	Congestion due to slow moving traffic	4 lane two way divided	0.7
6	Kadiwala Junction	1.1	Congestion due to slow moving traffic	4 lane two way divided	1.2
7	Majura Gate	0.43	Congestion due to slow moving traffic	4 lane two way divided	N.A
8	Kapodara	0.50	Congestion due to slow moving traffic	3 Lane (under construction)	N.A.
9	Nana Varachcha	0.45	Congestion due to slow moving traffic	6 Lane	N.A.
10	Parle Point	0.97	Congestion due to slow moving traffic	4 Lane (Under construction)	N.A.

Source: Survey by CEPT Team

Details of proposed River Bridges, RoBs and proposed flyovers have been given in table 5.7, 5.8 and Table 5.9 respectively. Total investment on these proposals is around 1307 crores. Out of which 9 River bridges are proposed with an investment of 480 crores.

Table 6-7: Details of Proposed River Bridge

Sr. No.	Code	Description	Carriageway Width (m)	Lanes	Length (m)	Cost in Crore (Rs)	Remarks
1	RB1	Utran-Kapodra	2X7.5	4	1091	72	Proposed
2	RB2	Third Ring Road (Nr. Varacha)	2X 11	6	825	51.98	proposed
3	RB3	Ved-Variav	2X 11	6	760	47.88	proposed
4	RB4	Dabholi-Jahangirpura	2X 7.5	4	1059	69.33	Under construction
5	RB5	Dhastipura-Jilani Complex	2X 7.5	4	1132	47.54	Proposed
6	RB6	Athwa-Adajan	2X 7.5	4	1233	143	Cable stay structure type
7	RB7	Pal-Umra	2X 11	6	825	51.98	Proposed
8		Piplod-Bhatha	2X 7.5	4	1000	60	Proposed
9		In place of Existing Hope bridge	7.5	2	600	30	Proposed

Source: Bride cell, SMC

Table 6-8 Details of Proposed RoB/ RuB's:

Sr. No.	Location on Road network	Across rail track	Proposed lane Conf.	Cost in Crores (Rs.)	Remarks
1	Ring C2	Surat- Bombay double track	6	30	Proposed
2	Ring C2	Surat- Bhusaval Single track	6	30	Proposed
3	Ring C3	Surat- Bombay double track	6	30	Proposed
4	Ring C3	Surat- Bhusaval Single track	6	30	Proposed
5	Ring C3	Surat- Ahmedabad Double track	6	30	Proposed
6	Ring C4	Surat- Bombay double track	6	30	Proposed
7	Ring C4	Surat- Bhusaval Single track	6	30	Proposed
8	Ring C4	Surat- Ahmedabad Double track	6	30	Proposed
9	Radial R-2 A Canal Road	Surat- Bombay double track	6	30	Proposed
10	Ring C5	Surat- Bhusaval Single track	6	30	Proposed
11	Radial R9- B: Amroli Police Choki Road	Surat- Ahmedabad double track	6	30	Proposed
12	Radial R9 – B: Bariya Junction Road.	Surat- Hazira Single track	6	30	Proposed
13	Inner link -2 Bhagal Char Rasta Road	Surat- Hazira Single track	6	30	Proposed
14	Sachin Rly Crossing	Surat- Bombay double track	6	30	Proposed
15	Surya gate – ROB	Surat- Bombay double track	6	30	Proposed
16	Anjana R.C. No. 440 A		6	30	Under construction

Source: Bride cell, SMC

Table 6-9 Details of Proposed Fly over bridges:

Sr. No.	Location on Road network	Across road	Prop. lane Config.	Cost in Crores (Rs.)	Remarks

Sr. No.	Location on Road network	Across road	Prop. lane Config.	Cost in Crores (Rs.)	Remarks
1	At Parle Point Junction	Dumas Road	4	59	Under construction
2	At Delhi gate junction on Ring Road	Ring Road	4	40	Proposed
3	At Gujarati Gas Circle, Adajan Road	Adajan Road	4	25	Proposed
4	At Socyo Circle, UM Road	Udhana- Magdalla Road	4	15	Proposed
5	At Bhatar junction, UM Road	Udhana- Magdalla Road	4	15	Proposed
6	At Daxeshwar junction, Surat Navsari Road	Surat- Navsari Road	4	20	Proposed
7	At Adajan Patiya and Rushabh junction on Rander Road	Rander Road	4	20	Proposed
8	At Rachna Soc. Junction, LH Rd.	L.H. Road	2	15	Proposed
9	At Katargam main road	Katargam Main Road	2	25	Proposed
10	Dabholi char rasta	Ved Road	4	20	Proposed

Source: Bride cell, SMC

6.4 REGIONAL TRANSPORT – FLOWS AND TERMINALS/NODES

6.4.1 PASSENGER FLOWS

Railways: Surat is served by the busy north-south line of the Western Railways connecting Gujarat with Mumbai and other important centers. Branches of the railway line serve areas of Udhna, Jalgaon and Bhestan. A dedicated goods line exists between Kosad to Hazira. Being located midway between Ahmedabad and Mumbai, the city is serviced by express, mail, passenger and local trains.

The main line carries a lot of freight traffic due to the industrial belt between Ahmedabad and Mumbai and the sea ports in Gujarat and Mumbai. Three railway stations fall within the city area. The main station (Surat Railway Station) is located just outside the walled city abutting the ring road. The railway station at Udhna is also an important transport node within the city. The third railway station located at Utran is not significant as the development pressure in the area is limited. Sachin and Maroli are located towards the south of Surat.

Road Transport: Gujarat State Road Transport Corporation (GSRTC) is the regional public transport operator in Gujarat. Following are the key facilities for its intercity and interstate services:

- The central depot is located near Railway Station (in the east);
- ST Terminal is located near Railway station (in the west). This is supported by linear terminal on ring road nearby;
- A terminal is located near Adajan Patiya (West of Nehru Bridge). This has additional facilities such as workshop, parking etc;

Near Udhna village, originally the bus depot was used for city bus services. With the start of

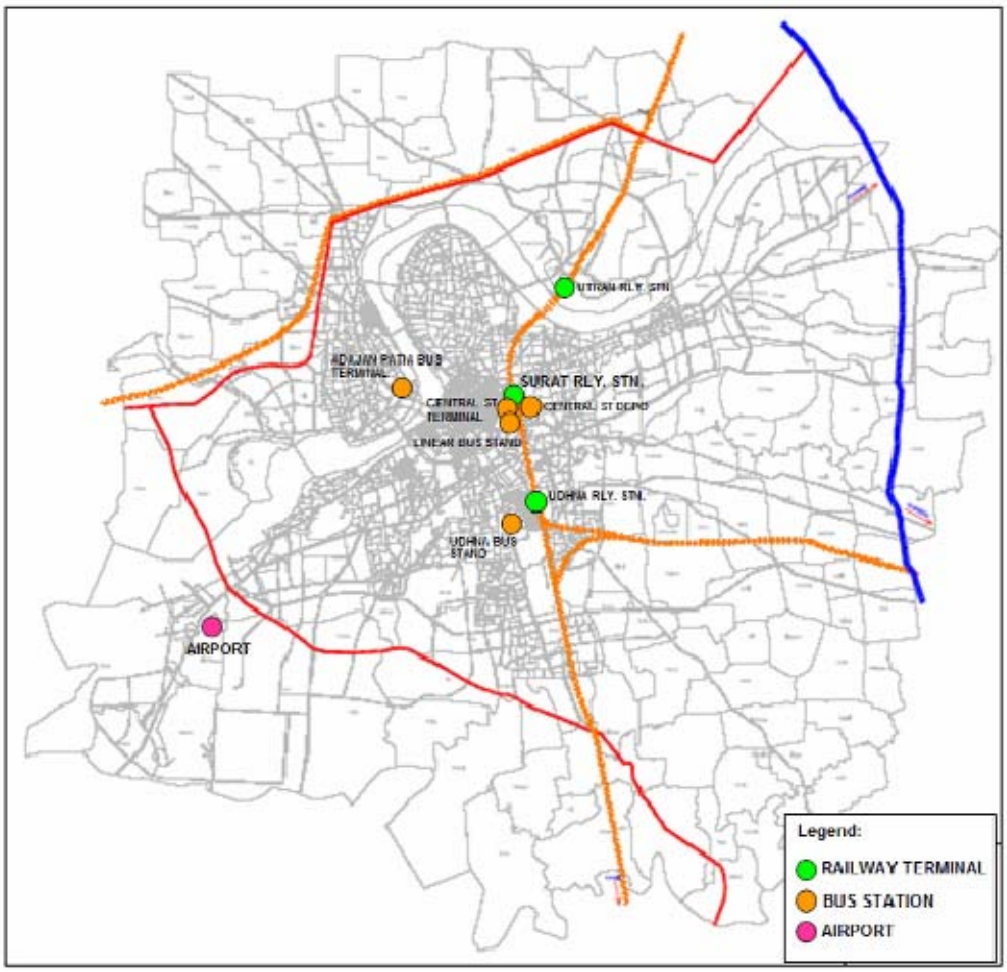
bus service, the city has started utilizing the place as terminal. The linear bus stand near railway station, Wadi Faliya and Kanskiwad were the main terminal points for city bus services. All these have been converted as city bus terminals started in August 2007.Jeeps and matadors operate passenger and goods services to the neighboring villages and towns. Private bus operations also provide inter-city bus transport to various cities from Sahara Darwaja.

In the absence of a separate bus terminal for private operators, their operations are in-front of their offices resulting in traffic congestion at Sahara darwaja.

Air Port: The existing airport catering to domestic traffic is located to the south-west on the Surat-Dumas radial road. Daily air services to Delhi have begun recently. Map 4-4 shows the location of transit terminals. *Refer Annexure Map 6-3 Existing and Proposed Bus Stops Map)*

Table 6-10 Number of Passengers Accessing the Terminals

No.	Terminal	Total Daily Passenger Flow		
		In-bound	Out-bound	In+Out-bound
1	Surat Railway Station	82,573	86,180	168,753
2	Udhna Railway Station	20,417	21,330	41,747
3	Central ST Bus Terminal	33,168	26,744	59,912
4	Linear ST Bus Stand	2,182	4,526	6,708
5	Adajan ST Bus Depot	5,615	4,412	10,027
6	Unapani Road Pvt. Bus Stand	561	2,535	3,096
7	Sahara Gate Private Bus Stand	202	885	1,087
Total Rail Passengers		102,990	107,510	210,500
Total Bus Passengers		41,728	39,102	80,830
Total PT Passengers		144,718	146,612	291,330



Map 6-3 Location of the Transit terminals in Surat City

Passenger Flows: CRRI has carried out a detailed study of passenger flows. About 3 lakh passengers use the rail and bus terminals every day (Table 4-6). Of this the Surat railway station (1.7 lakh passengers) and bus station (0.6 Lakh passengers) are important locations. Salient features of these trips are summarized below:

- Number of rail passengers increased from 1.3 lakh in 1988 to 2.1 lakh in 2004 (60% increase).
- Number of bus passengers increased from 69000 in 1988 to 96000 in 2004 (40% increase)
- Of the total visitors 60% are residents of Surat
- 47% of the trips are occasional trips and 10% of the trips are monthly trips.
- There are only about 16% daily trips (daily commuters)
- Auto-rickshaw is the major feeder mode to access ultimate destination/origin
- Average length of connecting trip is 6.4 kms.

6.5 FACILITIES FOR PEDESTRIAN AND NON-MOTORIZED VEHICLES

The transport infrastructure of the city is not friendly for non-motorized traffic as well as pedestrians, especially the walled city wherein large scale pedestrian movement can be observed. Recently SMC has initiated an Integrated Road Development Program (IRDP), which includes redesign of three of the major radial roads of the City. The road designs segregated carriageway and provision of adequate infrastructure for non-motorized vehicles and pedestrians.

Surat – Navsari

Surat - Dumas

Other schemes under consideration include; canal road redevelopment as part of BRTS corridor and 'Khadi'/Creek Redevelopment with provision of facilities for pedestrians and bicyclists.

Existing Canal

Existing Creek

6.6 TRAFFIC CHARACTERISTICS

Trip rates, trip length, purpose and mode are critical household choice elements influencing overall transport situation in the city. The characteristics and trends have been summarized based on the three surveys.

Table 6-11 Travel Characteristics

Parameters	CRRI	CRRI	CES
Year of Survey	1988	2004	2005
Households surveyed	5340	9000	12000

Parameters	CRRI	CRRI	CES
Trip Rate-Total	1.02	1.31	1.13
Trip rate-Motorised	0.55	0.78	0.73
Percentage Trips by Mode			
Walk	45.35	42.04	35.28
Bus	5.44	2.3	0.84
Rail	0.23	0.13	
Car	1.28	2.58	1.47
Two-Wheeler	21.28	28.39	29.3
Bicycle	19.24	13.44	9.88
Autorickshaw	7.17	10.81	20.98
Others	0.01	0.31	2.25
Total	100	100	100
Percentage Trips by Purpose			
Work Trips	50	52	57
Education Trips	29	39	29
Shopping Trips	21	7	8
Others		2	6
Total	**100**	**100**	**100**

Assuming the results to be consistent between 1988 and 2004 studies, comparisons have been made. Per capita trip rate have increased from 1.0 to 1.3. Increase in motorized trips is more significant and is around 0.8.

6.6.1 TRAFFIC COMPOSITION

Significant shifts from NMV and public modes to private modes observed.

- Share of walk trips have remained high (35-40%);
- Bicycle share has declined;
- Bus patronage declined and almost is close to 0% in 2005;
- Two wheeler shares increased from 20 to 30%;
- As expected, dependence on auto rickshaws has increased.

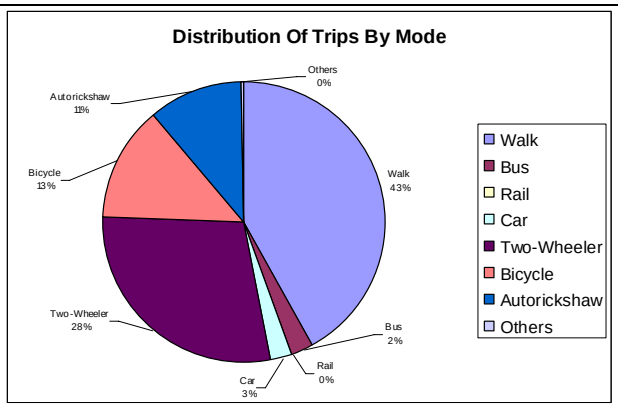


Chart 6-2 Distribution of Trips by Mode (Including Walk) – As per CRRI STUDY (2004)

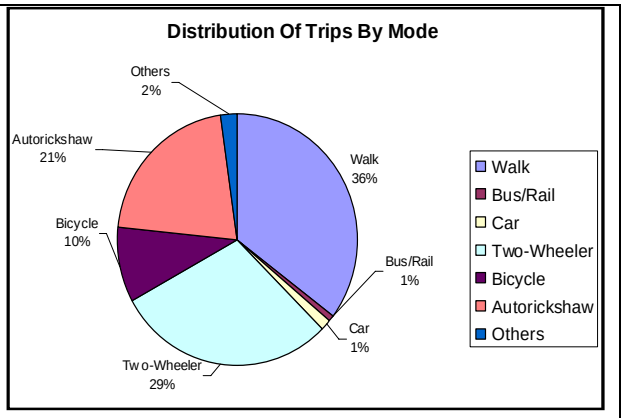


Chart 6-3 Distribution of Trips by Mode (Including Walk) – As per CES STUDY (2005)

Trip Purpose:

Work trips account for over 50% of the trips which in effect reflect higher work participation rate. Education trips constitute about 30%. About 90% of the trips are performed daily.

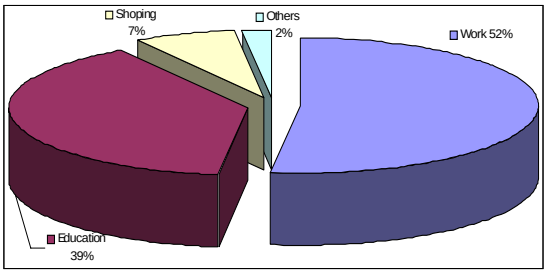


Chart 6-4 Estimated Trips by Purpose

Trip Length:

Average trip length is about 5.3 km. and reasonable for a compact city. Two wheeler, auto and bicycle users are potential users of transit, have trip lengths ranging between 4.5 to 5.5 kms. These lengths are not suitable for rail based transit modes.

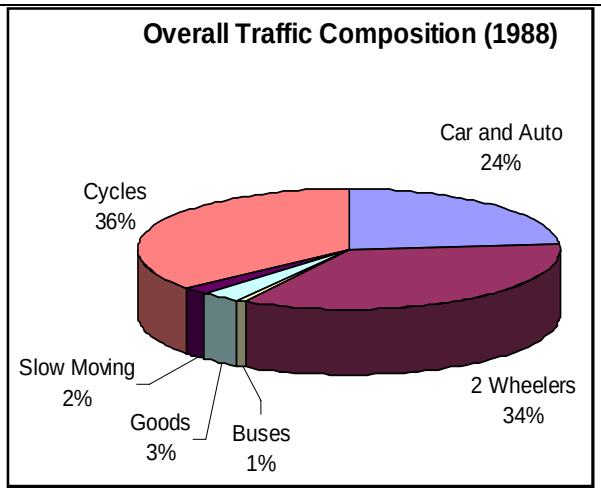
Table 6-12 Trip Length Avg. Trip Length of journeys by Mode (km)

Mode	CRRI 1988	CRRI 20041	CES 2005
Walk	1.6	2.9	
Bus	5.5	12.4	
Rail		9.3	
Car	3.8	9.7	
Two-Wheeler		5.8	
Bicycle	3.3	4.3	
Auto rickshaw	3.5	5.3	
Others		5.8	
HB trips by all vehicles	4.03		
NHB trips by all vehicles	5.2		
All modes including walk trips			4.11
All modes excluding walk trips		5.6	5.33

The average daily traffic for 24 hr and 16 hr Traffic Surveys have been conducted by CRRI in 1988, 2004 and 2005 by CES on varying locations in and outside the city limits. Screen line surveys were conducted on all river bridges and other locations (CRRI – 1988 and 2004). The variation in the overall traffic composition in a span of 15 years is presented in Figure 4-6. While on the one hand there has been a reduction in the share of bicycles, on the other hand the share of two wheelers, cars and auto has increased.

However, depending on the location composition varies. In poor localities bicycles still form majority of traffic. The variation in traffic composition for year 2004 is across sectors is presented in Table 5.13.

1 Work trips only



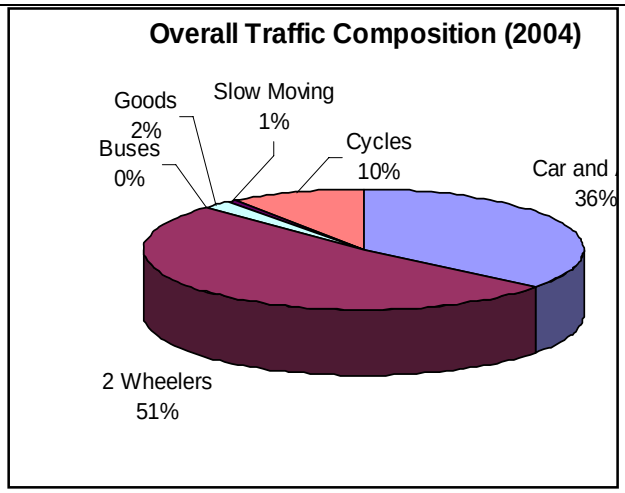
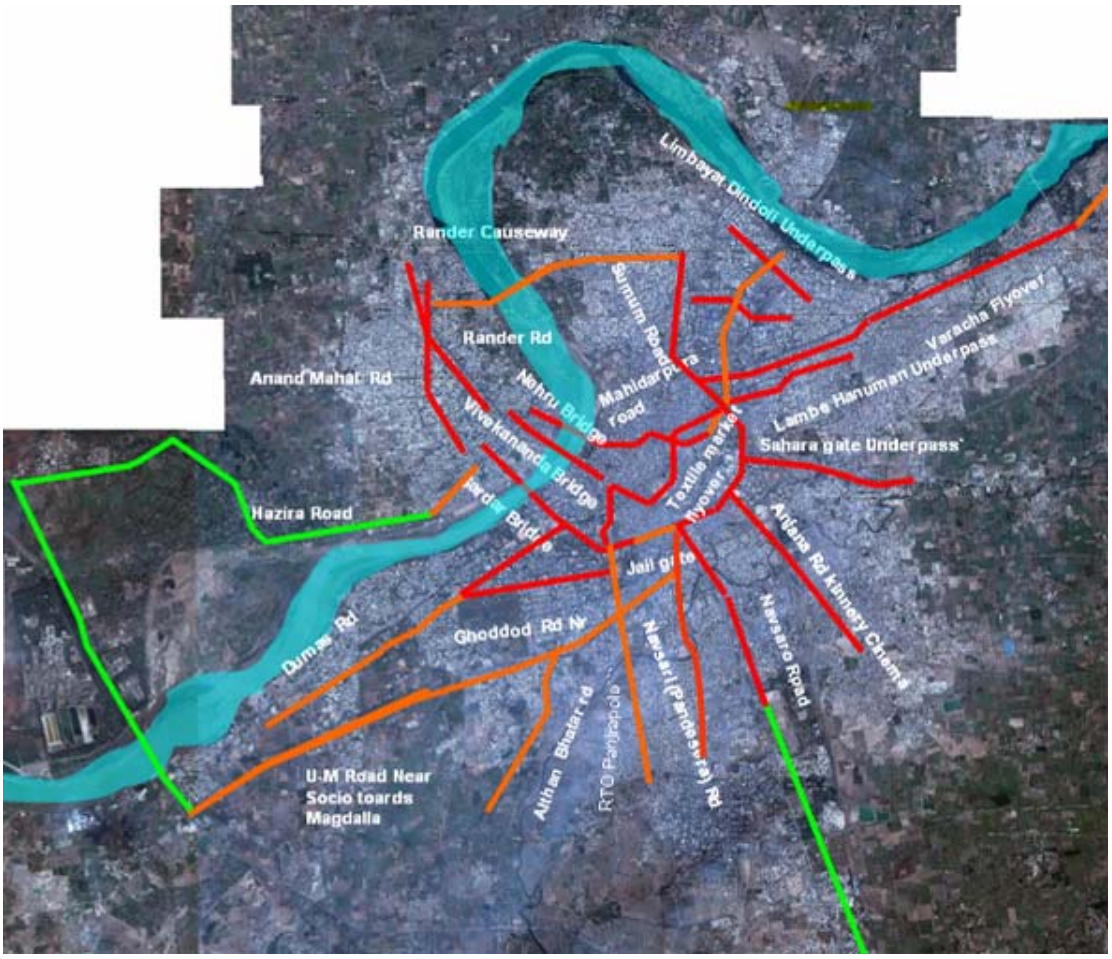
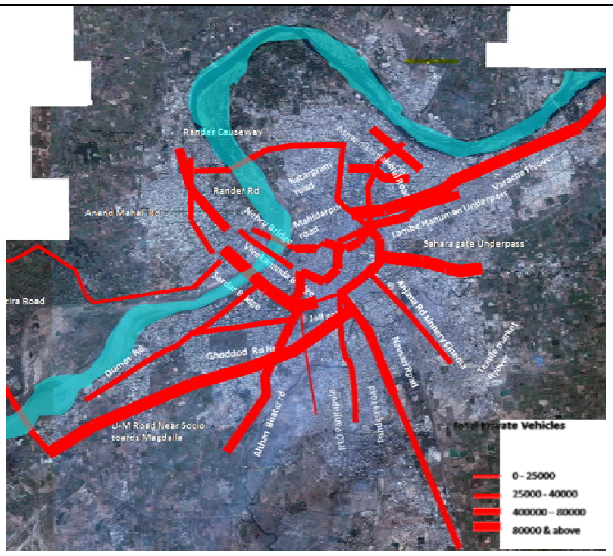


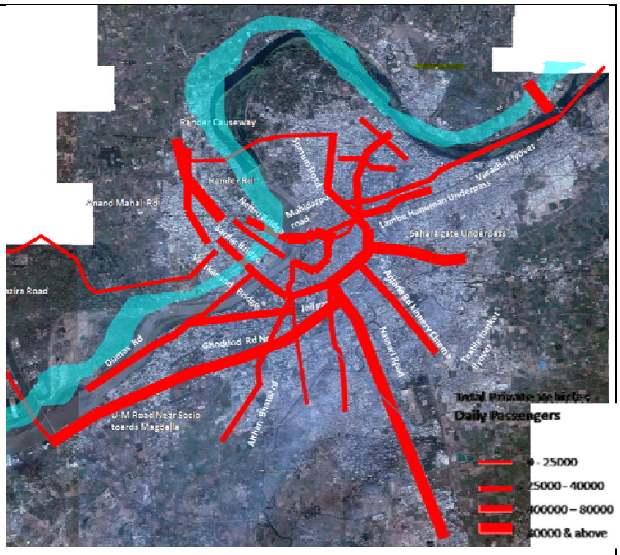
Chart 6-5 Figure 5 55 5 Overall Traffic Composition for year 1998 and 2004



Map 6-3 City Level Network having reached 80% Saturation (2006)



Map 6-4 Total Private Vehicle Volume



Map 6-5 Daily Passenger Volume

Table 6-13 Variation in Traffic Composition in Different Sectors

Sr. No.	Sector (Zone)	Traffic Composition (%)					
		Car + Auto	2 Wheelers	Slow Vehicles	Cycles	Buses	Goods Vehicles
1	Central	32	55	1	11	0	1
2	North	23	52	1	23	0	1
3	North-East	38	49	1	9	1	2
4	South-East	21	25	1	52	0	1
5	South	33	46	1	16	0	4
6	South-West	33	57	0	8	1	1
7	West	26	61	0	8	1	4

Source: Traffic and Transportation Study: CRRI -Vol II, May 2007

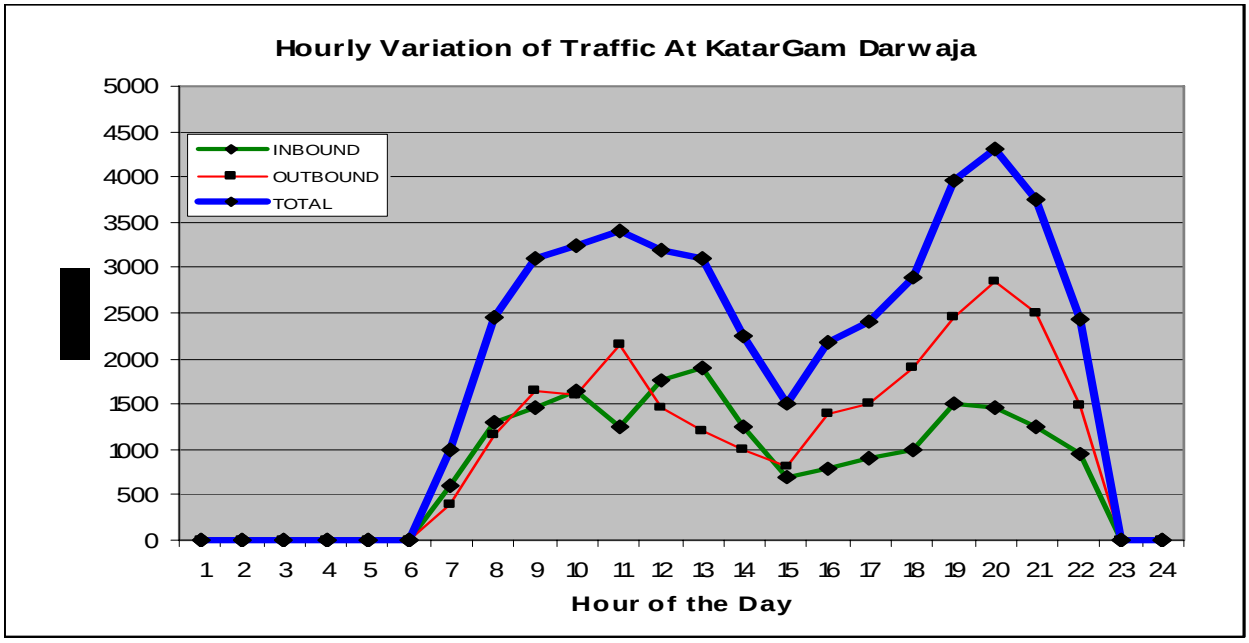


Chart 6-6 Hourly Variation at Katargam Darwaja

6.6.2 TRAFFIC DISTRIBUTION

Traffic distribution during the time of the day has been analyzed. Though, two peaks are evident, high volumes are observed throughout the day. This is mainly the character of a city with commerce as a major economic activity. *(Refer Annexure Map 6-4 Traffic Analysis Zones)*

Traffic Distribution by Time of the Day:

Peak factor vary from 9% to 13%. As expected, in central areas % peak traffic is lower while in industrial areas it is higher. Average occupancy rates are generally on the higher side showing more efficient use of vehicles.

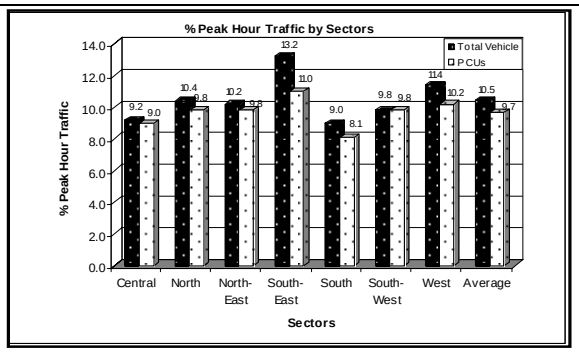


Chart 6-7 Figure 6 75 7 Peak Hour Traffic by Sector

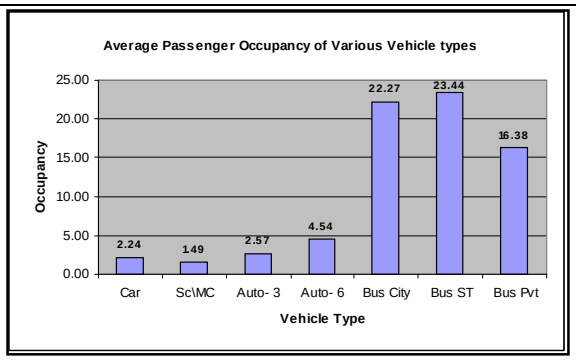


Chart 6-8 Passenger Occupancy by Vehicle Type

6.6.3 INTERSECTIONS

The efficiency of a transport is interpreted in terms of its operating speeds and capacities with a high level of safety and economy. They are often governed by performance of the intersections. The traffic and transportation study undertaken by CRRI provides a detailed analysis and improvement proposals for 31 intersections. In addition to traffic management measures, generally grade separated facilities have been suggested.

Table 6-14 Traffic Volumes at Key Intersections

Sl. No	Name of Intersection	Intersection Volume (PCU/hr)	
		Morning Peak	Evening Peak
1	Udhna Darwaza	13626	9145
2	Majura Gate	10965	11901
3	Kadiwala Junction	9804	8290
4	RTO	6191	6168
5	Athwa Gate	7777	5387
6	City light road junction	6379	5069
7	Elbee (Majura) junction	6273	4961
8	Circuit house	5605	6924
9	Ambika niketan	4646	3634
10	Ram chowk	4208	3793
11	Elbee (Bhatar) junction	4168	4373

6.7 PUBLIC TRANSPORT SERVICES

Bus Services:

Till 2004, the Gujarat State Road Transport Corporation (GSRTC) operated urban transport services in the city of Surat. This was provided through three depots of which Lambe Hanuman and Udhna Gam depots were used for within-intra city services and Adajan Patiya depot for inter city services. Over the years, the route served by city buses has increased, but fleet availability has reduced drastically and since May 2007, all urban services have been withdrawn. A new system under the overall supervision of SMC with private participation has been operationalised since August 2007. A total of 111 buses operate on identified routes 41 routes. With a total of 111 buses and 41 routes, buses in Surat carry about 58 thousand passengers per day. These buses perform 670 trips per day. Refer Annexure VII.

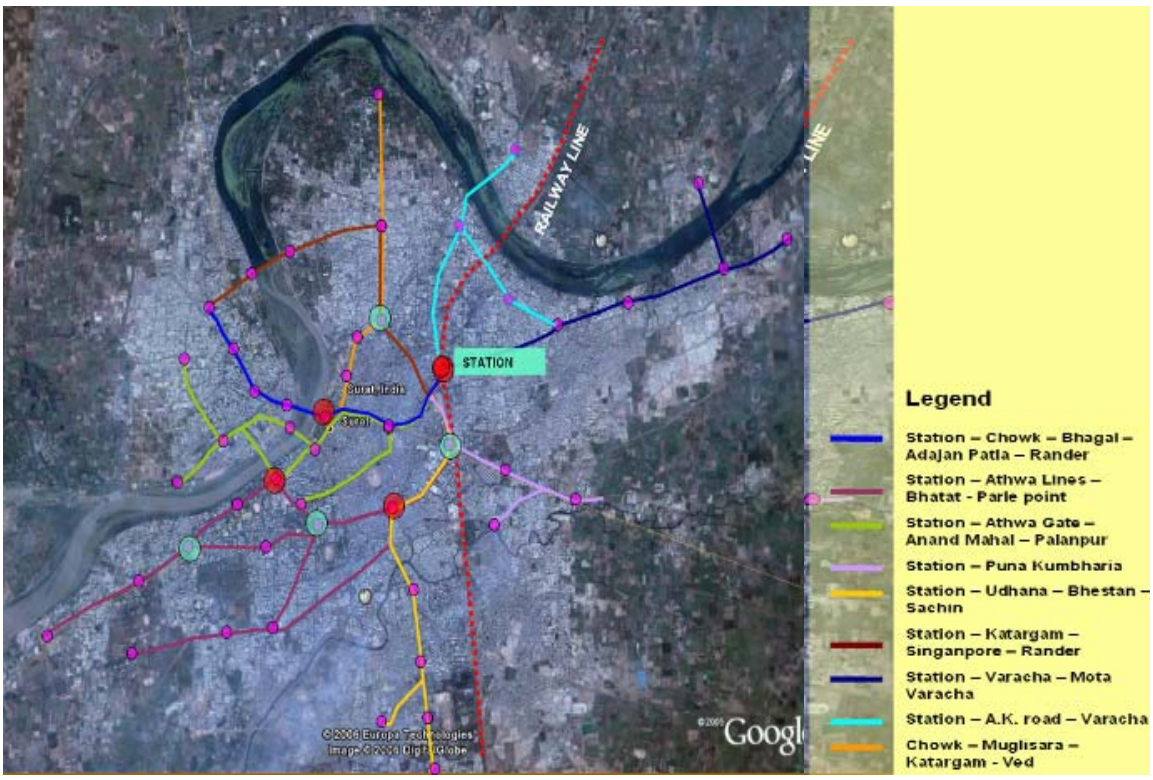
Source: SMC

Map 6-6 Existing Bus Routes

IPTS Services:

Absence of bus services has led to emergence of autos and smaller vehicle based IPT service. They operate, illegally, as point to point services. Based on the services it has been observed that there are 123 informal established routes.

An estimated 7.7 lakh passenger trips are performed by auto rickshaws. A list of 30 major routes is presented below. Map 4-12 presents the major corridors on which these services operate. The auto trip characteristics are summarized below.



Map 6-7: Showing existing major Auto-Rickshaw routes in the City

Source: Traffic and Transportation Study: CRRI -Vol II, May 2007

- Majority trips are for work/business (>80%);
- Most of these (95%) are performed using shared auto;
- They are generally daily users;
- 36% use auto because there is no bus. Other choice factors include, fast/reliable (22%), Comfort (10%), cheaper (18%);
- Average trip length is 5 Km;
- Average fare paid by passengers is Rs.5.30 (Rs. 1/km).

6.7.1 PUBLIC TRANSIT CHOICE

With provision of better transit facility large numbers of people are willing to shift. Nearly, 59% and 74% respondents have indicated their willingness to shift to an improved public transport system for work and education purposes, respectively. Willingness to shift from various mode used is presented below. The highest shift to an

improved PTS is from auto-rickshaw users followed by bicycle, 2-wheelers. The survey found that willingness to shift is not so sensitive to the work trip lengths. In terms of factors determining public transit choice, safety, comfort, and reliability have been ranked as important.

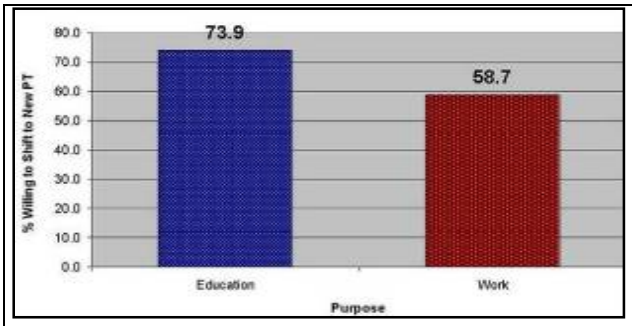


Chart 6-9 Willingness to Shift by Trip Purpose

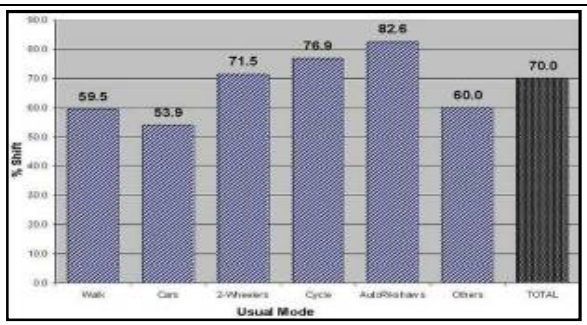


Chart 6-10 Willingness to Shift

The households were asked about the need for BRTS. Over 90% preferred starting of such a transit service in Surat. In terms of willingness to pay, about two third of the households are willing to pay Rs. 0.5 per kilometer. About 30% are willing to pay about a rupee or more. It is important to note that price is a determining factor.

Table 6-15 BRTS as a preferred Service

	Households	% of total
Yes	1010	92.07
No	87	7.93
Total	1097	100.00
Willingness to pay for Service like BRTS (City)		
Rs./km	General	% of total
50 Paisa	628	62.18
75 Paisa	64	6.34
1 Rs	297	29.41
2 Rs	21	2.08
	1010	100.00

6.8 TRAFFIC MANAGEMENT

Traffic management in Surat is carried out by the Traffic Police and SMC in a coordinated manner. Keeping in view the increasing traffic the city traffic police and SMC have redeveloped traffic islands, installed traffic signals and blinkers. The situation as on date is summarized below.

Table 6-16 Traffic Engineering

Description	Position as on Aug 2009
(i) Constructing Road Dividers	130.00 Kms
(ii) Installing Traffic signals (a) Microprocessor based (b) Solar Type	 24 4

(c) Vehicle Actuated systems (Converted)	7
(iii) Constructing Traffic Islands	Private sponsors :51 SMSS :59
(iv) Installing Traffic Blinkers	128 nos.
(v) LED Retrofits in Signal Aspects	1766 nos.
(vi) Gantry Signages (on BOT basis)	12 nos.
(vii) Count Down Timers	114 nos.
(viii) Variable Message System	23 nos.

Table 6-17 Traffic Management

Sr No	Details	Results
1	One way streets	47 streets
2	Parking Bays	118 places
3	Odd day parking/Even day parking	28 streets
4	Pay & Park sites	19
	Multilevel Pay & Park Site	3 (Allotted)+4 (Proposed)
5	No Parking Notifications	17 places
6	Heavy vehicles banned	36 roads
7	"U" Turn/ Right turn prohibited	7 locations
8	Parking Provided for 2 wheelers 4 wheelers	30,642.00 Sq. mt. 13,133.00 Sq. mt.

SMC has recently set up a Traffic Management and Awareness Institute. It should function effectively for proper Traffic Management in the city.

Traffic Police

For the purpose of traffic management, traffic police the city has been divided into 5 sectors, further divided in to 3 groups each. Overall the city is divided into 15 groups. There is one Assistant Commissioner of Police, four Police Inspectors, 8 Police Sub-inspectors and 291 traffic constables. Each group has a group office manned by 10-15 constables.

In terms of vehicles and equipments, ACP and PI have a jeep with wireless unit, group in charge are has a motor-cycle and walky-talky handset and each sector (5 sectors) has a police post with wireless and telephone.

6.8.1 PARKING IN DEVELOPMENT CONTROL REGULATION

The DCR is the only parking framework for the city and most parking is on street in nature. The predominant vehicular type and location are as follows:

- Tempo/ Truck and Tractors are parked in areas like Katargam, Varachha Zone, Bamroli Road etc leading to traffic congestion;
- Similarly Luxury/ Minidor /Chhakadas are parked on Unapani Road, Adajan Road, Matawadi Junction, Kapodra Char Rasta and Minidor & Chhakada;

- Rickshaw parking outside the schools (St. Xavier's School, Lourdes Convent School, S. D.A. School, R.D. Contractor High School, Tekrawala School, Gajera School and Bhulka Bhavan School);
- Private party and marriage plots are a major source of congestion as parking at these places is inadequate. A long list of such places has been identified by SMC and traffic police;
- Old city roads and ring road are areas where large amount of on street parking is observed both by passenger and goods vehicles. *(Refer Annexure Map 6-2 Ring Radial Roads Map)*

Elevated Parking in Surat

At present there are two multi storied parking facilities operating in the city. They are at National Textile Market and Surat Textile Markets on Ring Road. The facility at National Textile Market built in 2002 by the merchants association is having a capacity to accommodate 2000 two-wheelers and 450 cars. The facility is maintained by M/S Forrce Alpha Innovative Management Services through contractual arrangement. The charges are:

- For 2 wheelers up to 24 hours - 10 Rs
- For 4 wheelers up to 24 hours - 15 Rs.
- For association members an amount of Rs. 500 for 3 months per Car is charged.

Another facility at Surat Textile Market, built in 1974 by the traders association is a multi level parking facility having provide for 1200 two-wheelers and 450 cars. The charges are:

- For 2 wheelers up to 24 hours- 10 Rs.
- For 4 wheeler - 1 to 24 hours - 20 Rs.
- For STM members Rs. 300/month for 4 wheelers and Rs. 100/month for 2 wheelers.
- Each shop pays a maintenance charge of Rs. 900 Rs per month.

The current parking regulations of Surat are governed by development control rules formulated as part of the Development Plan and at the individual level and notification of designated parking areas by the SMC for public parking. However, the standards have not factored the increased ownership and use of vehicles. The impact of this gap between the reality and policy is the prominence of on-street parking in the city. This has also has implications in terms of the effective carriage width available for traffic.

Table 6-18 Parking Locations

Vehicle Type	Parking Location
Tempo/ Truck and Tractors	Katargam, Varachha Zone, Bamroli Road

Similarly Luxury/ Minidor/ Chhakadas	Unapani Road, Adajan Road, Matawadi Junction, Kapodra Char Rasta and Minidor & Chhakada
Rickshaw	Outside the schools (St. Xavier's School, Lourdes Convent School, S.D.A. School, R.D. Contractor High School, Tekrawala School, Gajera School and Bhulka Bhavan School
Off Street	Private party and Marriage plots are a major source of congestion as parking at these places is inadequate.
Other off Street parking	Old city roads and ring road

The urban development scene in Surat is changing with densification of activities within the city and expansion of urban activities to the periphery. Prevailing land market has encouraged the expansion of multi-storey buildings necessitating increasing number of parking spaces within the premises. Major commercial developments are coming up in many places attracting large number of cars and two wheelers. Big marriage halls and star hotels are built to accommodate high volume of visitors which again demand more parking spaces. Schools and colleges experience a different kind of parking demand, particularly at the time of opening and closing. The commuters who use the rail system use the park and ride concept. The rail station is presently overstrained with parking of two wheelers. However, the city has just two off-street multi level car parks near the commercial hub. Given the constraints, the present situation encourages vehicle users opt for on-street parking.

Table 6-19: Proposed Pay and Park Facility Locations

SR. NO.	NAME OF THE PAY & PARK	PLACE OF PAY & PARK	Parking Area (sq m)	DATE of COMPLETION
1	Zone-1 Under Dr. Baba Saheb Aambedakar fly over bridge	Man Darwaja Shoping center to Kamela Darwaja	5777.69	Sep-'09
2	Zone-2 Under Dr. Baba Saheb Aambedakar fly over bridge	Kamela Darwaja to sub-way (mahavir market)	7331.28	Feb-'10
3	Zone-3 Under Dr. Baba Saheb Aambedakar fly over bridge	Sab-way (Mahavir Market) to old Saradar Market	6113.0	Sep-'09
4	T.P.Scheme no. 4 (Ashvani Kumar-navagam) F.P.no. 269	East of Surat Railway Station	2630.0	Feb-'10
5	T.P.Scheme no. 8 (Umarwada), F.P. No. 147	Behind Millennium Market, Textile Market Area	2513.0	Feb-'10
6	T.P.Scheme no. 8 (Umarwada), F.P. No. 150	Sagar market, Textile market area	2670.0	Feb-'10
7	Dr.Shyam Prasad Mukharji Nature Park / before Zoo	Sarathana	5767.0	Feb-'10
8	T.P.Scheme no. 8 (Umarwada), F.P.no. 153	Opp. Anupam market, Textile arket area	1500.0	Non-'09
9	Surat-Dummas Road, Gaurav Path Zone-1	Rundh Jakatnaka to Vesu Patiya	1751.0	Feb-'09

SR. NO.	NAME OF THE PAY & PARK	PLACE OF PAY & PARK	Parking Area (sq m)	DATE of COMPLETION
10	Surat-Dummas Road, Gaurav Path Zone-2	Vesu Patiya to Kargil Chowk	3908.0	Sep-'09
11	Surat-Dummas Road, Gaurav Path Zone-3	Kargil Chowk to S.V.N.I.T. College	2080.0	Sep-'09
12	Ward No. 13 (Athawa), Nondh No./642	Chaupati, Athawalince	2381.0	Sep-'09
13	Ward no. 11, Nondh no.38	Chautapul Pani Ni Parab	165.0	Feb-'10
14	T.P.Scheme No. 6 (Majura-Khatodara), F.P.No. 12	Bhatar Road	3717.0	Oct-'09
15	Ward no. 7 , Unapani Road	Railway station	450.0	Sep-'09
16	Below Majura Gate Flyover	Majura Gate to Subjail Junction	4748.0	-
17	Majura Gate Junction or Kadiwala Junction	Beside Kariwala Junction,	4301.0	-
18	Ward No 12, Note No 393, 941-946	Near Lal Gate	209.0	-
19	Towards Tirupati Plaza to Atwada Juntion	Near Athwada Gate Junction	523.0	-

Source: SMC

Apart from these pay and park locations 10 other new pay and park sites have been identified in various zones. Three multi level parking with total parking area of 25132 sq.m.; have already been constructed and four new multi level parking sites have been identified. Details have been provided in and Table 6-21: Proposed Multi Level Parking Locations.

Table 6-20: Multilevel Parking Locations

SR. NO.	NAME OF THE PAY & PARK	PLACE OF PAY & PARK	Parking Area (sq m)	Remarks
1	TP Scheme No 4 (Ashvini Kumar Nava Gam): Mini Bazar	Varacha Raod Mini Bazar	7041	
2	TP Scheme No 4 (Ashvini Kumar Nava Gam): Sardar Smruti Bhavan	Infront of Zone Office	7501	
3	Ward No 6- Khan Shab ka Dela	Mahidar Pura	10590	

Source: SMC

Table 6-21: Proposed Multi Level Parking Locations

SR. NO.	NAME OF THE PAY & PARK	PLACE OF PAY & PARK
1	Ward No 11, Near Mahanagar Palika Main Kacheri	Behind Fire Station
2	Ward No 2, Note No 1445, 1446	In front of Jayant Pathak Garden
3	Ward No 11, Note No 17, 12, 13	Chauta Bazar, Vegitable Market
4	TP Scheme No 8m, FP No 147	Behind Millenium Market

6.8.2 RESENT PARKING MANAGEMENT SYSTEM

The agencies responsible for management of parking in SMA are listed in **Table 6-22 Agencies Responsible for Parking in SMC** along with their roles.

Table 6-22 Agencies Responsible for Parking in SMC

Agency	Roles and Responsibilities
Surat Urban Development Authority	Formulation of Development Control Rules (DCR) for SUDA Area; Formulation of off-street parking standards for various uses/activities
Surat Municipal Corporation	Implementation of off street parking standards as per the Development Control Regulations; Demarcation of on-street parking zones/parking lots; Fixation of parking fee; and arrange for collection of parking fee
Traffic Police	Co-ordinates with SMC in identification of on-street parking stretches Enforcement of parking regulations, particularly related to on-street parking;
Western Railways/ GSRTC	Provision of parking space and Parking management in the station areas

Surat Municipal Corporation has permitted on-street parking at select stretches and the city system consists of two multi storied parking arrangements. Development Control Rules for SUDA provides parking standards for various uses – residential, commercial, ware houses and wholesale stores, educational institutions, hospitals and nursing homes, industries and other uses. This has provided for planning multi level parking lots, besides giving details on the design of parking stalls.

Even though the authorities provide permission for development of buildings with a condition of providing the required parking spaces, many developers convert such parking spaces to other uses later, there-by depriving the buildings from having the required parking facilitates when fully developed.

Issues Identified and Strategies

Various issues which have been related to parking situation in the city can be identified as:

- Proper identified parking space to be provided in places like Bahumali and Textile Market;
- Rickshaw Parking stand is required at proper places in each zones (priority can be given to Central and Varacha Zones);
- Delivery Vehicle parking is to be provided at Textile Market as they park on road and unload;
- Schools & hospitals should be directed to park vehicles in respective compounds;
- Proper implementation of parking policy is to be insured;

- Off street parking areas should be located and designed so they are an integral part of the development of the site. Disabled parking facilities should be visible and conveniently located.
- Areas identified for parking should be easily accessible, well lighted and provided with proper signs and markings.

A good parking management system has a direct influence on development of an area by having efficient traffic circulation, promotion of economic activity, improvement in environmental quality, and increased safety for all road users. For example:

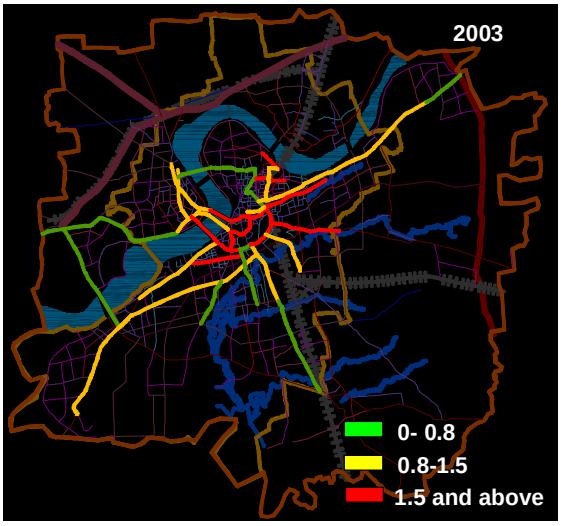
- Sydney in Australia has about 15,000 spaces (off-street) for public parking, 19,000 spaces (off-street) for tenant parking within the buildings. . In case of on-street parking, about 4000 spaces are made available during office hours and it is increased to 6500 spaces after office hours. The city centre alone has about 38000 parking spaces;
- In Singapore with a population of about 4 million, the Urban Redevelopment Authority manages a total of about 64,000 parking spaces (both on street and off-street).

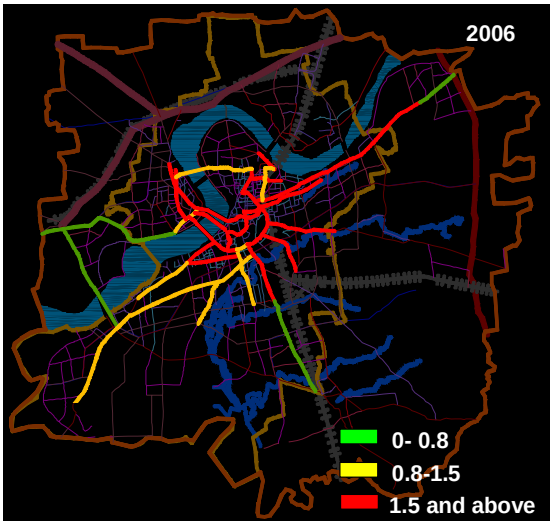
All these could lead to conclude that the Surat should plan for effective management of parking facilities and for which the city should have a comprehensive parking policy, supported by parking standards for different land uses. A suitable agency is also required to administer the parking policy evolved at the local body level which should be responsible for implementation of parking policy in the city. This agency should also initiate actions, which are necessary to achieve the objectives of the parking policy and improve overall quality of parking management system.

6.9 IMPACTS

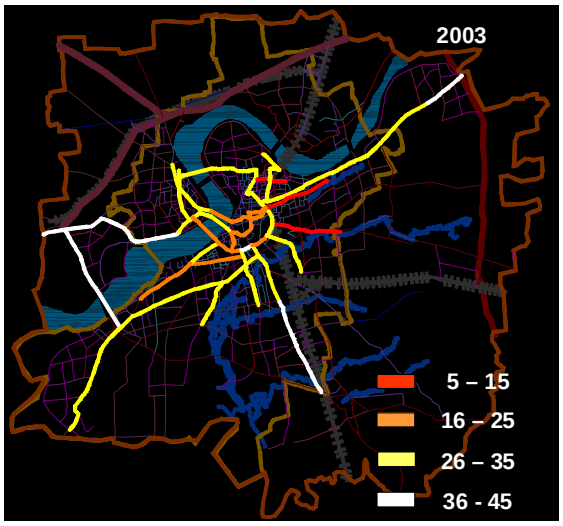
6.9.1 TRAVEL SPEEDS

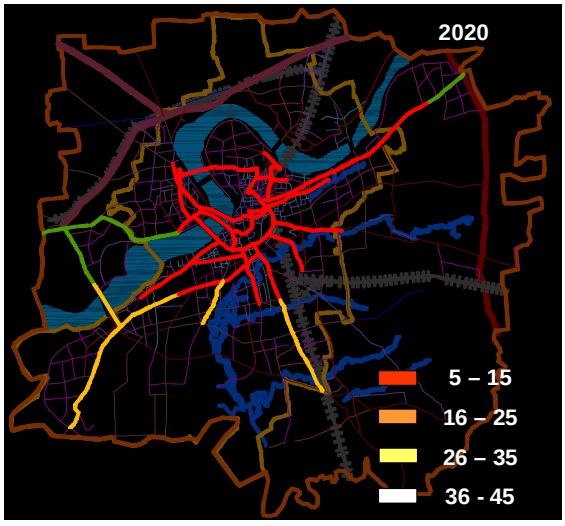
The average journey speeds on various sections of the road network in Surat Municipal Corporation is observed to be around 25 km per hour. The speeds on the roads in the inner city are much lower at 18 km per hour (CRRI – 2007). The number of vehicles in the inner city has increased. The figures below give a clear indication of the lower speeds on roads which are congested and have reached a saturation of 80%.





Map 6-8 Congestion levels (V/C ratio)





Map 6-9 Speed (Km/hr)

6.9 ITS

Road safety record of Surat is below par as the rate of accidents and road fatalities, when compared to other Indian cities, is on the higher side.

Table 6-23 Accidents in Surat

Sr. No.	Year	Accident Detail						
		Fatal		Serious		Minor		Accident Without Injury
		Case filed	Fatalities	Case filed	Injured	Case filed	Injured	
1	**2000**	138	146	369	424	408	546	295
2	**2001**	116	118	392	444	359	372	639
3	**2002**	139	148	425	485	375	435	825
4	**2003**	144	152	418	478	385	459	462
5	**2004**	168	171	481	605	397	497	438

6	**2005**	219	230	552	588	408	486	262
7	**2006**	253	262	557	611	345	354	222

Trucks are major contributors of fatalities in Surat accounting for over 45% of road fatalities. Pedestrians form half of the road fatalities. Surprisingly, about 15% of fatalities involve bus passengers.

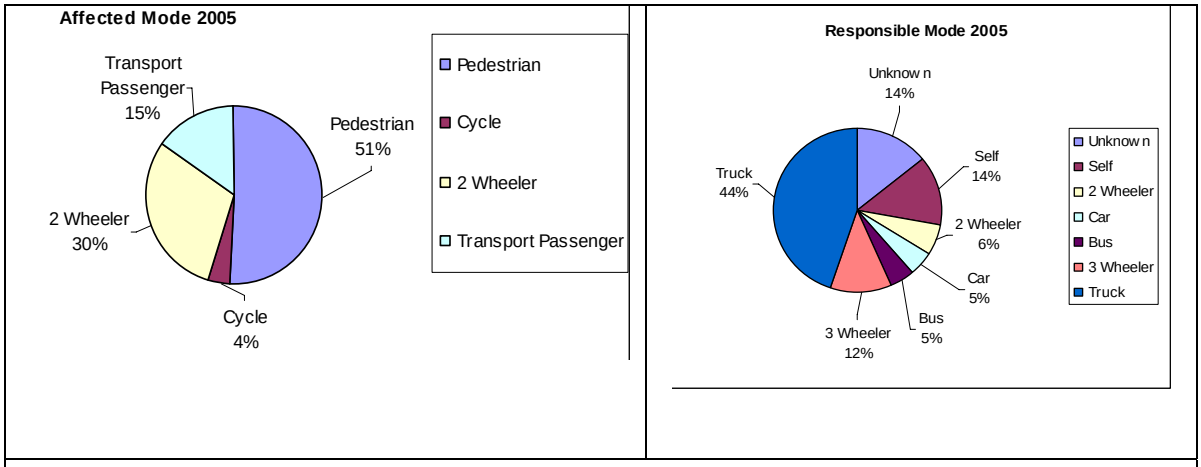
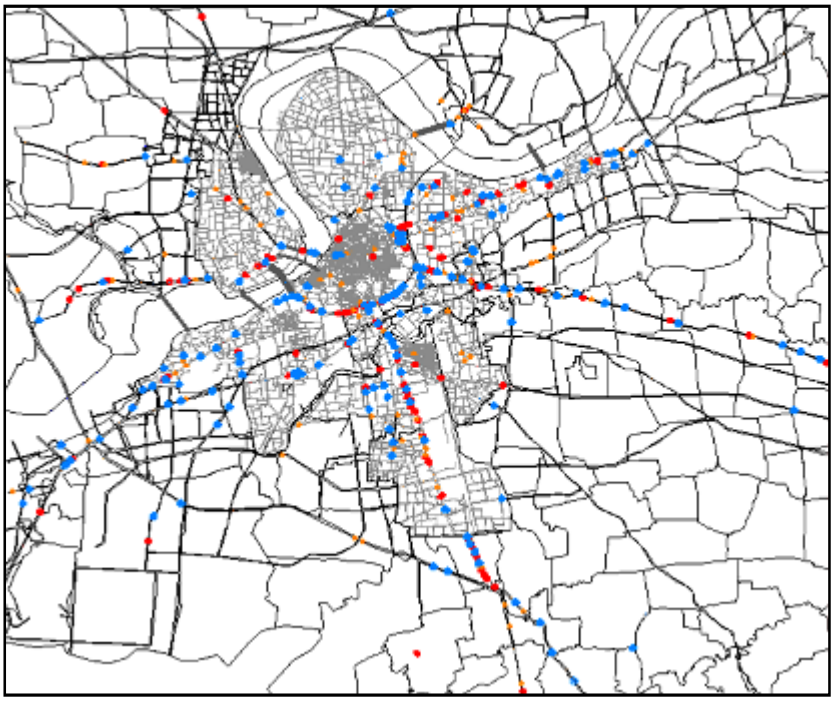


Chart 6-11 Responsible Mode & Affected Mode



Fatal Accidents 2004

Fatal Accidents 2005

Fatal Accidents 2006

Map 6-10: Fatality Accidents (2004, 2005, 2006)

6.10 EMERGING ISSUES

Incomplete Road Networks

As stated earlier, the road network is incomplete. Missing links, varying widths of ROW and carriageway, railway crossings are problems. Bridges across the river, canal and Khadis are inadequate. As a result, a small part of the network acts as major arterial

road of the city. Further, lack of parking facilities reduces road space available for traffic. As a result, congestion is observed at junctions. Connectivity to peripheral areas is limited.

Inadequate Public Transport:

Absence of public transport for over a decade has led to emergence of auto-rickshaws as a public transport mode. Increase in personalized vehicles has also been observed. Auto-rickshaws services operating point to point services is illegal, and as these operations are un-organized, cutthroat competition, over loading, poor services, pollution, overcharging and restricted service hours are problems faced by the people.

Road Condition:

The city receives intense rainfall during the monsoon and the black cotton soil of the region has made the roads with an asphalt/ bituminous top highly susceptible to damage. This results in excessive O&M expenditures. Since 2004, SMC has started making major roads with rigid pavement.

Traffic Management:

Poorly designed intersections, haphazard movement by two and three wheelers, in-sufficient parking and pedestrian facilities and inadequate enforcement has compounded traffic problems. Enhancement in both numbers and capacities of traffic police and related equipments is critical. A coordinated management system is functioning with initiative of SMC and Traffic Police.

Encroachments:

The margins of major roads and the footpaths are encroached upon in several sections for a variety of purposes including informal activities.

Excessive Regional and Goods Transport Entry in the City: Heavy vehicles, buses, and trucks pass through the city, resulting in congestion and fatality.

Transit Patronage:

Unlike its counterparts in the state of Gujarat, the increased use of individual modes and unorganized IPT is due to lack of a public transport system. The one that did exist, collapsed due to non expansion of capacities. Initiatives should be taken to build a strong public transport network and promote the IPTs as the spoke to the PT hub.

Cycling and Walking:

Cycling and walking constitute about 45% of the total trips and is a feature that needs to be integrated within the transport initiatives. About 75% of the low income group people use cycle and walk modes of travel. Pedestrians and cyclists are accident prone and hence there is a need to ensure safety.

System Improvement Focus:

The focus of the comprehensive plan is to provide accessibility and enhance mobility in the city through an integration of various modes of transport and enhancing transport infrastructure than a limited intervention through a public transport arrangement.

Resource Mobilization:

Public resources over the years have shrunk due to a other priorities of state and local governments. The issue is also in terms of constraining cost recovery mechanisms for infrastructure projects. Initiatives through public private partnerships need to be explored.

6.11 MASS TRANSIT PLAN – ALTERNATIVE ANALYSIS

6.11.1 TRAVEL DEMAND

As observed, with economic progress and increase in city size, trip rates tend to increase. Based on this it is assumed that the trip rates in Surat will increase from the present level of 0.75 to 0.8, 0.9 and 1 by 2011, 2021, 2031 respectively. However external trip rates are assumed to remain at the same level. Trip rates and total trips have been summarized below. In terms of goods trips, the rate at present is 0.06 PCU per person employed. Assuming similar rates to continue, overall goods flows have been estimated.

Table 6-24 Existing and Future Travel Demand (Excluding Walk Trips):

Year	Population	Passenger Trips		Passenger Trips		Total	Good Trips
		Internal	External	Internal	External		PCU
2005	3607596	0.75	0.5	2705697	1803798	4509495	80000
2011	4499006	0.80	0.5	3599205	2249503	5848708	101226
2021	6500003	0.90	0.5	5850003	3250002	9100005	149838
2031	8500000	1.00	0.5	8500000	4250000	12750000	201370

Source: BRT DPR, Phase 1

6.11.2 MASS TRANSIT PLAN – ALTERNATE ANALYSIS

With the objective of enhancing accessibility and mobility through a Comprehensive Mobility Plan, the Surat Municipal Corporation is considering various technology alternatives. This is over and above the efforts in terms of traffic management, road improvements etc.. The alternate scenarios considered are:

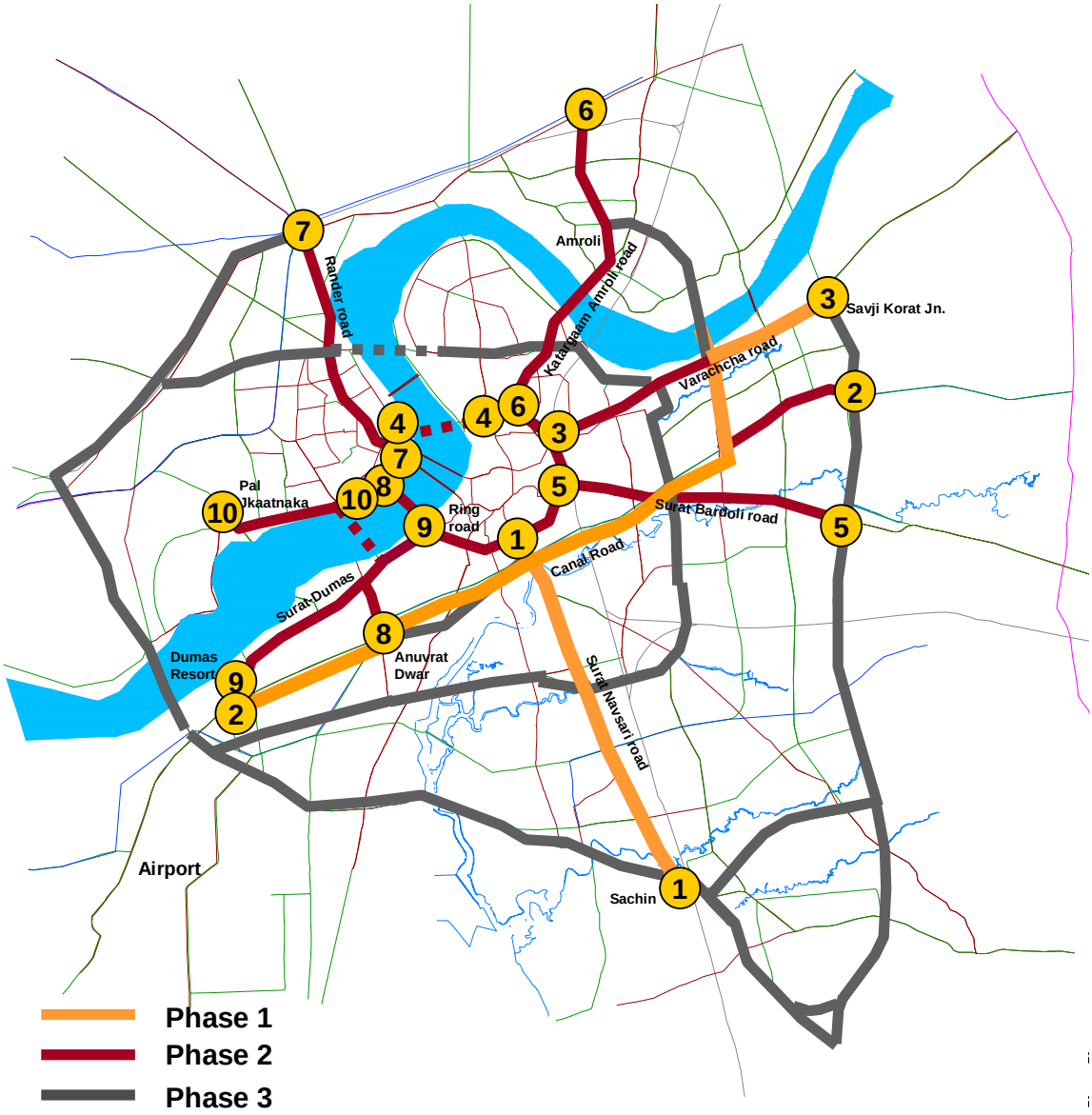
- Business as Usual
- Bus Improvement Programme
- Regular Bus System + BRT
- Regular Bus System + BRT +LRT

Business as Usual: Business as usual scenario has been developed as a base case where no major improvements are anticipated. The changes contemplated will be limited to regular road development works and traffic management measures. Bus passengers, in this scenario would include passenger using company buses, school buses etc.

Bus Improvement Programme: As part of this scenario, SMC, will continue with the initiative of introducing bus fleet. The services offered would be through a mix of mini and regular services with limited ITS and other applications.

BRTS Development: Over and above the initiative, the scenario includes development of BRT system over a stretch of 125 kms in three phases (33 kms, 50 kms and 35 kms) over the next 10-15 years. A detailed system plan will be included as part of the subsequent report.

Based on the demand models, a detailed assessment of selected corridors as possible candidates for BRT treatment was carried out. The desire lines of potential BRT passengers (IPTS passengers) is given in desire line map.



Map 6-11 Initial Phasing of Corridors

BRT and LRT Development: In this scenario, in addition to BRT, LRT for a distance of 26 kms is proposed. This is in line with recommendations by CES as part a study initiated by GIDB. The proposed LRT system would replace the BRT on some part of the network. The service is expected carry 2 to 4 lakh passengers per day. Corridor volumes are estimated to be 3000, 5500, 10000, 15000 and 20000 PHPD by 2015, 2020, 2025 and 2030. Total cost of the system is estimated to be Rs. 1600 Crores.

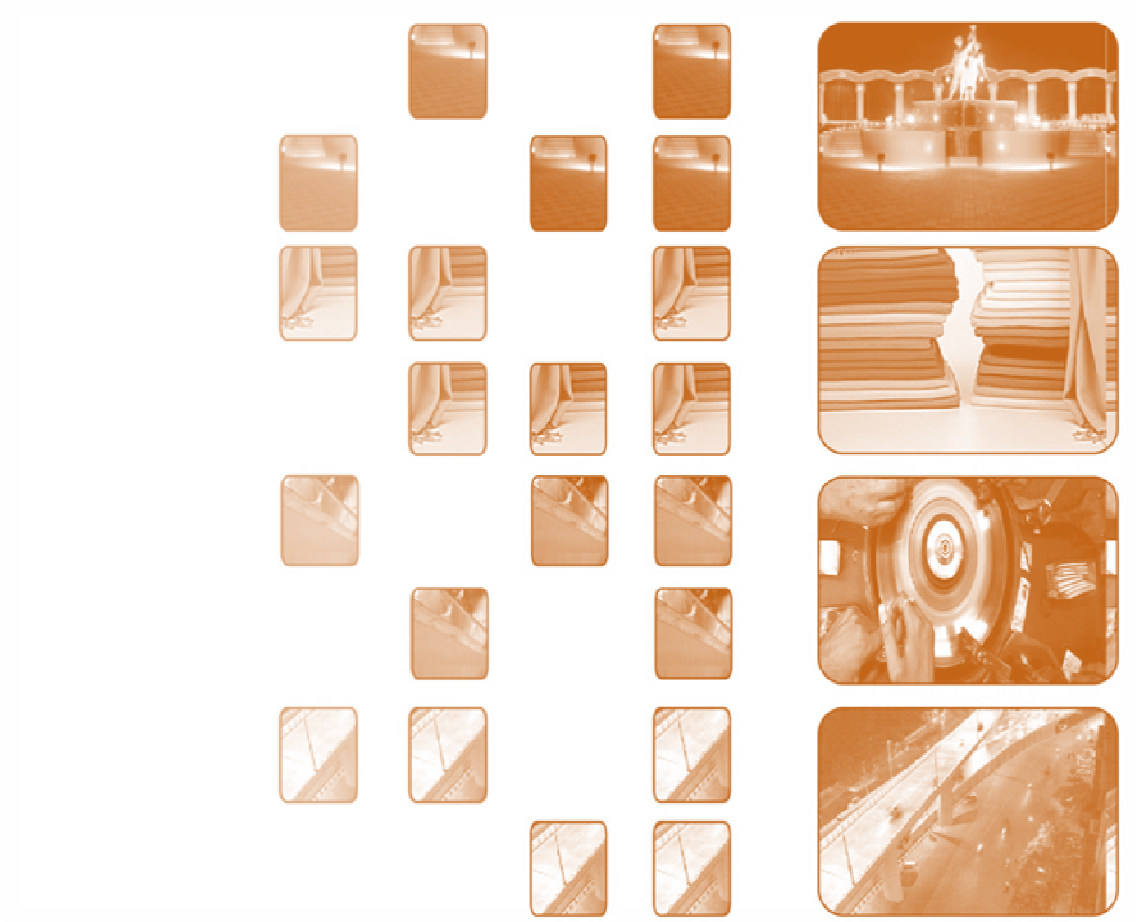
Year wise Phase- I budget outlay has been described in table below. Total project cost for BRTS Phase - I sanctioned under JnNURM is 469.02 Crores.

Table 6-25: BRTS Phase- I Budget Outlay (Rs in Crores)

Agency	% age	2008-09	2009-10	2010-11	2011-12	Total
GOI-JNNURM	50	-	41.00	137.50	56.01	234.51

GoG	20	-	16.40	55.00	22.40	93.80
SMC	30	-	24.60	82.50	33.60	140.70
Total	100	-	**82.00**	**275.00**	**112.02**	**469.02**
Percentage			**17.48**	**58.63**	**23.88**	**100.00**
Source: BRTS Cell, SMC						

A Comprehensive Mobility Plan and Detailed Project Report (DPR) have been prepared by CEPT for implementation of a Bus Rapid Transit System in Surat.



Chapter 7

Housing

Housing Scenario

Housing Growth

Supply and Demand

Emerging Issues

Recommendations

CHAPTER 7. HOUSING

A house is considered as bundle of services. It not only provide shelter to a household but also fulfill all basic utilities and needs of each member of household. Therefore provision of house for the entire population comprises in the city is essential. This chapter deals with the present housing status, housing need, housing issues and related strategies.

7.1 HOUSING SCENARIO

Since the inception of SUDA in late 70s, the City is growing at a rapid pace; with physical expansion of the town along five major corridors on the north, south, east, west and south-west till the end of 80's. Since the 90's the city has been growing rapidly on the eastern, southern and south-western sides.

The residential development in the city which is near about 57% of the total urbanized area. The growth in the city is taking place in the southern and north-eastern direction with major development of planned and unplanned colonies. Area under residential use has increased drastically, from 2695.6 Hectares in 1978 to 9806.18 Hectares in 2004, indicating the extent of the sprawl of the city. The percentage distribution of residential area is 57.54 % in 2004, which is on a slightly higher side then prescribed standards, which range from 40 % to 45 %. Area under slums covers 1.8% of total area of Surat Municipal Corporation in 2007. There are 406 slums covering an area of 579.15 Hectares of the total area of 32651 Hectares of SMC. Mainly these slums are near the medium industry in south and south-east side of the city.

The densest area of Surat is walled city with population density of 448 person per Hectare in 818 Hectare area. With respect to the area, the walled city comprises highest employment density and population and therefore it consist maximum residential development, developed vertically moreover, with permitted FSI of 2, whereas in other part of city FSI permitted is 1.8.

7.1.1 HOUSING STOCK

As per census 2001, the Surat city comprises population of 28.76 lacs, with total number of 752,441 of census houses. There are 63.46% of houses which are used for wholly residential use and 15.58% of houses are lying vacant in the city. The maximum population density (50,901 person per sq.km.) is in Central zone in mere 8.18 sq.km area. As discussed above the central zone provided maximum employment opportunities and formation of squatter settlements, which are the root cause of its densification.

The Southwest Zone is highly inhabited with population of 711,516 (25% of total population). In respect to the population and area the East zone consists maximum numbers of Houses with 70 % of it are optimally used for specifically residential purposes only. The table below is showing the total Housing Stock present in the city in the census year 2001:

Table 7-1 Total Housing Stock existing In the Year census- 2001

zone	Area sq.km.	pop	Density (person per sq.km.)	wholly residential	vacant houses	total no of houses
Central	8.18	416,370	50,901	69,487	28,717	145,008
Southwest	14.96	711,516	47,561	40,406	17,926	70,028
South	26	287,144	11,044	70,417	17,323	108,538
South east	9.11	407,980	44,784	66,403	12,822	100,853
East	13.86	242,466	17,494	117,548	16,599	166,969
North	20.54	397,257	19,341	63,929	8,614	87,633
West	19.63	413,641	21,072	49,318	15,235	73,412
Total	112.28	28,76,374		477,508	117,236	752,441

Source: Census 2001

7.1.2 HOUSING NEED

The housing sector needs to be catered for meeting the existing backlog as well as to meet the future demands of the expansion happening in the city. The present deficiency of housing is computed as below, assuming an optimum household size of 5 for the city, over the Census 2001 population data and future housing projections. The table below shows the total shortfall in number of Houses required for the population as per zones in the Surat city:

Table 7-2 Housing Shortfall existing In the Year census- 2001

Zones	2001			
	Population	Total Houses	Average Household	Shortfall
North Zone	416,370	63,929	6.5	19,345
East Zone	711,516	117,548	6.1	24,755
West Zone	287,144	49,318	5.8	8,111
South Zone	407,980	70,417	5.8	11,179
South west zone	242,466	40,406	6.0	8,087
South east zone	397,257	66,403	6.0	13,048
Central Zone	413,641	69,487	6.0	13,241
TOTAL	2,876,374	477,508	6.0	97,767

Source: Census 2001 and Derived

The deficiency in the census year 2001 is based on the optimum household size (5 person per Dwelling Units) thus is 97,767 households (Dwelling Units). The average household size is 6 person per household which is higher than the prescribed Household size (5 person per Dwelling Units) for any city.

The table below shows the total shortfall in the number of housing units for the total population in Surat city in coming years:

Table 7-3 Showing Total Housing Shortfall in the projected Years

	1991	2001	2009	2012	2017	2022
Population	1,499,560	2,876,374	3,884,599	4,363,913	5,210,969	6,196,870
Total No. Of houses	681,750	752,441	814,236	838,696	881,106	925,661
Total Houses – Residential Use	436,744	477,508	512,842	526,756	550,791	575,922
Total Vacant Houses	99,267	117,236	133,926	140,781	152,993	166,264
Housing Requirement	299,912	575,275	776,920	872,783	1,042,194	1,239,374
Surplus	136,832					
Shortfall		97,767	264,078	346,026	491,403	663,452

Source: Derived from Census Information

As per deficiency and surplus calculations, housing surplus supply is being only in the year 1991 and as the city expands in later decades the housing need increases with respect to population, therefore the current backlog in the year 2009 is 264,078 houses for the population of 3,884,599, and for the year 2022 the housing requirement is 1,239,374 houses for 6,196,870 population. Therefore the housing need for fulfilling the current housing backlog and the future housing requirements is of **1,503,452** houses by the year 2022 for the increasing population. As the population is increasing, the numbers of the "housing need" of population by is also increasing by 2022.

7.2 HOUSING GROWTH

The data below shows the properties use break up in each zone in the year 2008. Each zone has maximum number of properties which are residential which together comprises 57% of Residential use breakup for land use in the city.

As also discussed in housing stock section, East zone contains maximum number of residential properties (69.08%). Also as mentioned above central zone is the core of employment activities, therefore the breakup of others type of properties are maximum in this zone (42.81%). The residential development needs to be spread towards South and east zone, along with focus on education centres development in the city.

The table below shows the number of properties existing in different zones in Surat city:

Table 7-4 Number of properties type break up (2008)

	Residential	Industrial	Educational	Others
South west Zone	60.40%	5.24%	0.14%	34.22%
Central Zone	56.55%	0.48%	0.16%	42.81%
East Zone	69.08%	4.67%	0.10%	26.16%
North Zone	63.42%	8.58%	0.08%	27.92%
South East Zone	58.18%	4.59%	0.07%	37.16%
South Zone	56.17%	8.19%	0.07%	35.57%
West Zone	65.71%	0.16%	0.13%	34.01%

Source: SMC

As per legal Built up permissions given by SMC over the years, it can be observed that the maximum legal construction have taken place in south west zone. The spread is toward south west zone is due to spurt of commercial development towards Dumas road and also availability of the lower land prices.

The table below shows the total building permissions given in different zones of Surat city from year 2002 to March 2009:

Table 7-5 No of Building permissions given by SMC (2002 – 2009 (March))

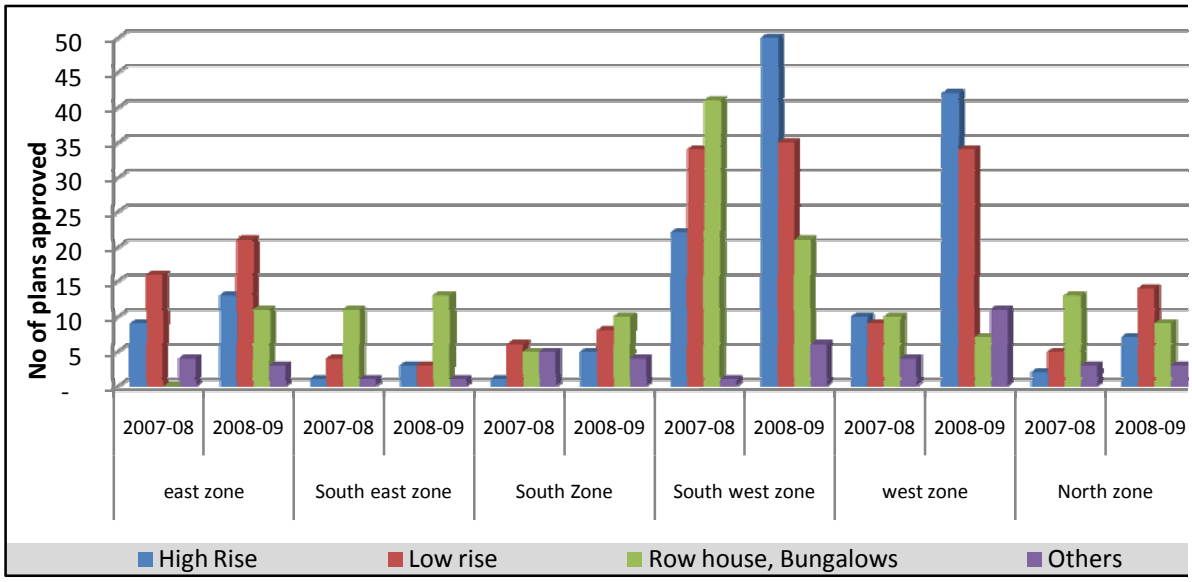
BUILDING PERMISSIONS								
Year	North Zone	East Zone	West Zone	South Zone	South west zone	South east zone	Central Zone	TOTAL
2002-03	3	4	10	2	17	4	17	57
2003-04	3	11	18	6	20	6	34	98
2004-05	7	15	28	6	23	6	28	113
2005-06	5	25	29	9	37	9	22	136
2006-07	5	13	15	7	33	6	25	104
2007-08	3	18	35	10	28	3	22	119
2008-2009(March)	4	14	25	4	37	2	14	100
TOTAL	30	100	160	44	195	36	162	727

Source: SMC

The permissions in the central zone are getting reduced by last three years due to the residential densities in the walled city have reached the saturation limit. The population density in areas within the old SMC limit outside walled city is also high. Building permissions and growth pattern of Surat indicates that the north Surat showing a tremendous growth in recent years. This also indicates the preference behaviour of the people for residential purposes.

If we look at chart 7-1 from 2007-08 the maximum building permissions are being granted for High rise Low rise and Row House and Bungalows in South west zone for both consecutive years. As discussed above due to spurt of commercial development on Dumas – Hazira road, the residential Apartments and bungalows is spreading more on this part of city which led to augmentation in land prices. Earlier in this the lands available was on cheaper rate which led to spurt of new constructions and development in this part of city. The Chart below shows the total Number of residential units building plans approved by SMC in different zones of Surat city for different typology of residential units for the ear 2007-09:

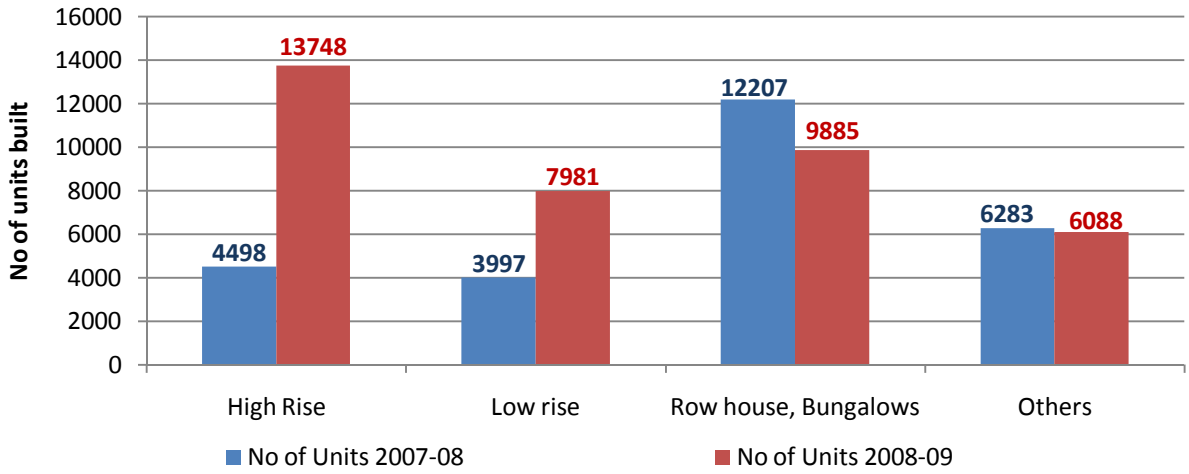
Chart 7-1 No of Building permissions given by SMC (2007-09) for types of buildings



Source: SMC

The central zone data is not available for the detailed Building permissions chart for residential buildings only. In western and northern part of city there are new construction taking place due to availability of land and with new connectivity projects coming up like BRTS, etc. The Chart below shows the total Number of residential Units Constructed in the year 2007-09 in SMC area:

Chart 7-2 No of Building Units constructed (notified under SMC) in year 2007-09



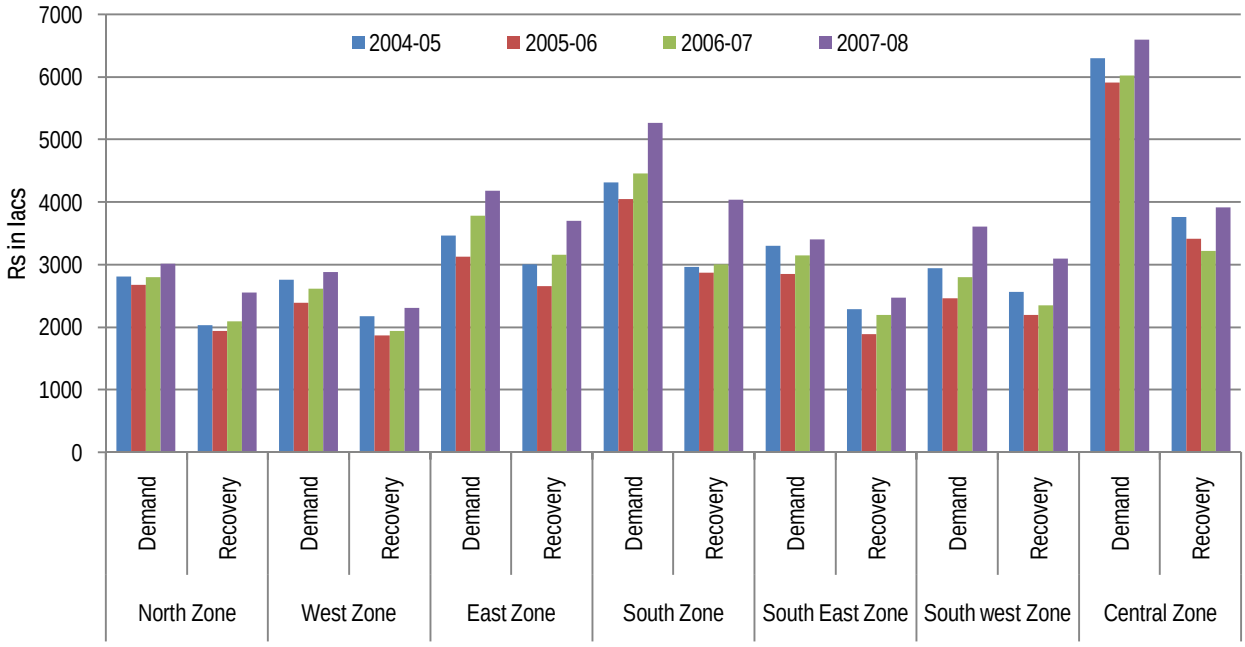
Source: SMC

According to SMC calculations for building statistics there should be 16.25 units per 1000 sq.m. of plot area for which building permissions are granted for. In the year 2007-08 maximum row houses and bungalows as building structure got permission to build in city. There were sudden abrupt growth of high rise structure unit can be seen. As the city have migrant population of 55% of total population (2001 census), city needs to spread horizontally as well as vertically to accommodate stable as well as floating population.

As per Property Tax Statistics of demand and recovery of property Tax in each zone, it can be analyzed as such that the central zone has maximum demand of property tax (Refer Map 7.1) but the recovery of tax is as much as equivalent to other zones. It is due to reason, the presence of squatter settlements in and around this zone which are accountable for paying tax but are not paying. The least tax is levied in the extreme south and Northern part of surat city as these areas are on verge of development, the tax levied is around 3000 Rs per sq,mt on an average in these zones. Therefore, as we move farther from central zone, the taxation value on property reduces *(Refer Annexure Map 7-1 – Property Tax Zones (2008).*

The Chart below shows the total Property Tax demanded by SMC in different zones and total property Tax recovered for the years 2004-2008:

Chart 7-3 No of Building Units constructed (notified under SMC) in year 2007-09



Source: SMC

Factors affecting the property tax:

Factor - 1: Factor depending upon the location; Factor - 2: Factor depending upon the duration of the year wise construction of property; (C) Factor - 3: Factor depending

upon the kind in case of residential property and use in case of Non-residential property.;Factor – 4: Factor depending upon usage person/entity.

As per land and property prices, the South west zone is on the highest side whose land prices are appreciating after the Hazira – Dumas road development and new industrial projects are coming up. The land prices depreciate in value as we move from South west to South east. As south east consist of few residential developments. The land prices in west zone and north zone increased on considerable rate in recent years due to land availability and connectivity projects like BRTS to the core of city.

7.3 SUPPLY AND DEMAND

The rising of Information Technology and Information Technology Enabled Services sector has changed the profile of the city and therefore city is emerging as a favourable investment destination. The city's infrastructure is improving steadily and it has recently seen the completion of a large number of road projects such as elevated roads and flyovers. Leading developers of the country are coming up with their residential and commercial projects in the city. Being the cleanest city of India and its accessibility from neighbouring cities such as Mumbai, Vadodara and Ahmadabad, Surat is catching attention of builders and investors.

The supply is being segregated into two sectors Public and private. The major part of Housing Supply is from Private Sector which incorporates around 98.6 % of total housing supply in the city in the year 2009. The public sector supply is solely contributed by Gujarat Housing Board, which is approximately 1-3% of total Housing supply. The Private sector supply is mainly targets to Middle Income Group (MIG), and higher income group only; because of this the lower income groups are often neglected.

The demand from Lower income Group for the required housing is on higher side, whereas options for them available in the market are at lower side. But post slow down, in year 2009, Real estate developers in Gujarat are eyeing the affordable housing market. Rising demand from lower middle-class population, easy availability of housing loans and low interest rates have made the developers turn to building low-cost 1BHK and 2BHK flats in the range of Rs 4 to Rs 10 lakh. Earlier, the builders focussed more on catering to the demand of the higher-income groups by building luxurious apartments, bungalows and duplexes

7.3.1 HOUSING PROJECTS BY SUDA

Under Aawas Yojana, the projects listed below are developed and constructed by SUDA by 2004:

Table 7-6 No of Housing Units developed by SUDA in Different T.P. Schemes.(2009)

Location	Income Group Category for house being Built for	No of Housing Units	Total Cost	Specifications of housing Units
Vesu T.P Scheme	LIG	398	740 Lakhs	2 room – kitchen
T.P. scheme no.1, F.P. no. 16, 187,198, and 199	LIG	700	21 Lakhs	1 room - Kitchen
Pal , T.P. Scheme No 10, F.P. No. 211, 212, 221, 226, 227	LIG	1192	3500 Lakhs	2 room – kitchen
Bhetsan	EWS	1028	-	-
Vesu	EWS	423	-	-

Source: SUDA

7.3.2 RESERVATION FOR EWS IN TP SCHEMES

The table below shows the list of T.P. Schemes having Reservation of Housing Plots and Area allotted for it:

Table 7-7 List of plots having Reservation for Housing units. (2009)

Name of TPS	Area of TPS in Ha	Reservation in Ha	% Reservation
T.P.S.NO.1 (Udhna-Majura)	141	2.90	2.06
T.P.S.NO.3 (Karanj)	185.75	2.72	1.47
T.P.S.NO.7 (Anjana)	191.79	8.22	4.29
T.P.S.NO.10 (Adajan)	113.2	1.16	1.02
T.P.S.NO.11 (Adajan)	88	0.48	0.55
T.P.S.NO.12 (Adajan)	109.4	1.29	1.18
T.P.S.NO.13 (Adajan)	155.66	2.75	1.76
T.P.S.NO.15 (Fulpada)	78.62	4.07	5.18
T.P.S.NO.16 (Kapadra)	88	7.55	8.58
T.P.S.NO.17 (Fulpada)	76.6	0.65	0.85
T.P.S.NO.18 (Katargam)	113.56	0.66	0.58
T.P.S.NO.20 (Nanavarachha-Kapadra)	107.06	1.97	1.84
T.P.S.NO.32 (Adajan)	72	3.07	4.27
T.P.S.NO.36 (Althan)	87	2.19	2.52

Source: SMC

Under JnNURM- BSUP Policy SMC is being constructing approximately 44091 Housing Units under 9 Development Project Reports (DPR) for redevelopment and relocation of Slum and underprivileged sections of society, to make Surat City as Slum Free City.

7.3.3 UPCOMING PROJECTS THROUGH MOU'S

Out of Rs 6,383 crore of MoUs to be signed by SMC in 2009, around 98 per cent are housing projects to be developed by private players in posh and newly-merged areas of the city. The housing projects include Rs 400 crore investment in Rundh by Rajhans Developers, Rs 110 crore project by Krishna Corporation at Piplod, Rs 109 crore project by Raghuveer Developers at Vesu-Magdalla, Rs 300 crore project by Sahkar Corporation at Mota Varachha, Simada and Sarthana, Rs 300 crore housing project at Dumas by Amar Shah Builders, Rs 150 crore project at Althan by Tejani Builders etc.

Therefore, it can be understood, that the share of Housing Supply in Surat City is majorly dominated by Private sector than Public Sector. The supply by Public Sector is mainly for EWS, LIG and underprivileged sections of society, but supply by private sectors are concentrating on all sections and also introducing the concept of Affordable housing for the lower income group.

7.4 EMERGING ISSUES

Over densification in Central zone

The central zone has reached to saturation level with respect to population and residential density. With increase of slum settlement in around the zone, the property tax cannot be collected appropriately. The agglomeration of population in this central zone needs to be controlled.

Unregulated and Speculative Land and Real Estate Market

Lack of implementation of T.P. Schemes and inadequate infrastructure in the newly developed (South west and Western part of city) areas has led to a speculative land market, wherein there is no differential pricing for developed and undeveloped areas. Insecure tenure, inappropriate regulation, pricing and taxation have all perpetuated the issue.

Concentrated Development

The residential development is unevenly spread between central zone and south west zone. Residential development need to be controlled and spread on evenly on all zones mainly in extreme north and south zone.

Lack of access to land for affordable housing

With the speculative real estate market and increasing demand for affordable housing has played a crucial role in raising the prices in the housing market. Affordable housing remains a distant dream for many pushing them to sub-standard housing. But recently since many MOUs being signed, which shows a good sign of upbringing and implementing this idea into whole.

Housing projects with public-private partnerships

Over the years, the municipal corporation has implemented various schemes of housing. With ever increasing demand and continuous migration to the city over the years, the housing demand is ever increasing. The government alone may not be able to cater to the existing housing demand. Thus, it is inevitable for the government to play a role of regulatory authority proving access to the land for affordable housing to the private agencies. The city requires many more housing projects and area improvement schemes in the newly added area of the city.

7.5 STRATEGIES

Spread of Employment Opportunities

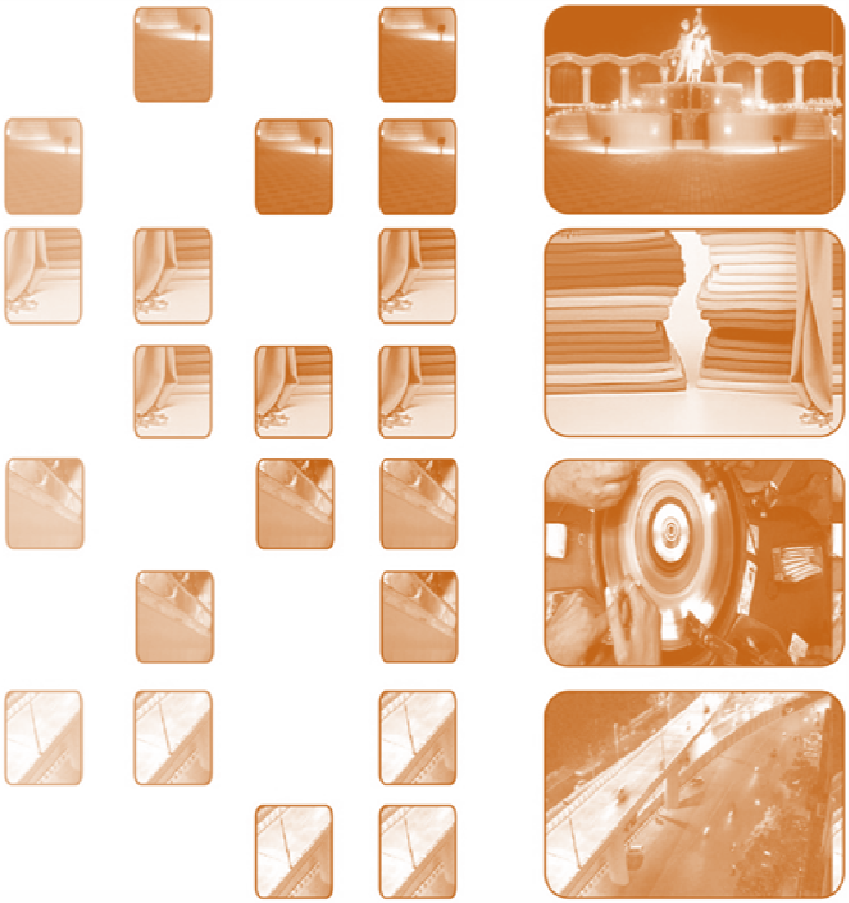
The spurt of Industrial, educational and employment opportunities in all zones evenly can lead to have controlled and evenly distributed land use and housing activities. Also the projects like BRTS can help to distribute population along with connectivity among all regions.

Introduction of various Housing options by Public Sector

The Housing Supply from Public Sector is at lower side, to increase that GHB and SMC can together incorporate to allocate various plots in T.P. Schemes, targeting all income groups. This option can facilitate to increase the Housing supply share in market.

Need for Housing projects with public-private partnerships or Regulatory Policy

SMC can introduce various Housing Schemes with Private partnership so as to provide innovative options for all masses. This may includes implementation of Policy measures such as to make mandatory for builders to provide 10 % of EWS houses in all housing schemes introduced into the city.



Chapter 8

Urban Poor

Overview

Characteristics of Slums

Demographic and Socio- economic Characteristics

SMC- Housing Policy for Urban Poor

JnNURM- BSUP policy & Reforms under BSUP

SMC's Other Efforts, Gap Identification & Key Issues

Recommendations & Action Plans and Goals

Inclusive Development Aspects for Urban poor

CHAPTER 8. URBAN POOR

8.1 OVERVIEW

According to Census of India, 2001, the slum areas broadly constitute of:-

All specified areas notified as 'Slum' by State/Local Government and UT Administration under any Act; All areas recognized as 'Slum' by State/Local Government and UT Administration which may have not been formally notified as slum under any Act; or A compact area of at least 300 populations or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities.

Slums are the agglomeration of unhygienic shelters arranged in congested manner without appropriate integral facilities like drinking water, roads, street lights and drainage being provided. Thus, conceptually slums are compact overcrowded residential areas (and not isolated or scattered dwellings) unfit for habitation due to lack of one or more of the basic infrastructure like drinking water, sanitation, electricity, sewerage, streets etc. These squatters are actually like blot on the urban panorama and also create unhygienic and dismal squalid environment and act as the source of spreading diseases in the city.*(Refer Annexure Map 8-1 Slum Locations in Surat (2005)*

Table 8-1 Slum Profile of Surat City for Year 1973-2031

	1983	1992	2001	2005	2007	2009	2012	2017	2022
Population (SMC)	8.50	15.70	28.76	34.23	35.83	38.85	43.64	52.11	61.97
Total slum population	1.87	4.34	4.91	5.69	5.92	2.94	1.03	0.18	0.03
% of total population	22%	28%	17%	17%	17%	8%	2%	0%	0%
No. of slum settlement identified	-	-	307	333	406	-			
Slum Settlement area (Ha)	-	-	483	-	579	-			
Slum pop. density (PPH)	-	-	1017	1179	1022	-			

Source: Slum Up-gradation Cell (SMC) and Derived

PAST EFFORTS BY SMC

SMC had adopted several policies and programs in last several years , considering the the need of providing the decent life to the Urban poor. Since 1991, SMC has been providing free water, drainage connection, sanitation facilities to urban poor. Upgradation of slums like provision of paved pathways, setting of stand- posts and street light and around 192 pay and Use toilets had taken by SMC. In 2001, around 307 Slum settlments were identified with total slum area occupied was around 482.6 Hactares.

Around 12000 families were shifted from slums to individual plots under site and service schemes , and about 8000 houses were built under various schmes to provide permanent hygeneic houses to the urban poor. SMC had also provided 270 primary schools incorporating 140500 students and 766 Aanganwadis and 82 balwadis.

Presently, around 44,000 households in slums and low income areas have been provided with indivdual toilets by the corporation and under state assisted schemes .

SMC had undertaken study- cum surveys in 2005 for assessment of all identified slums of Surat. The study includes application of various metrices of parameters for evaluating the status of slums with respect to land ownership, development pattern, socio-economic studies, etc. The assessments were divided into two phases.

» **Phase-I** assessment covered a slum level which included secondary data analysis to understand the demographic growth and socio-economic status of slums
» **Phase-II** assessment draws upon the data collected through primary sources in the city of Surat that shows the data up to house hold level. The analysis at household level covers
    a) Socio-economic characteristics of slum population,
    b) Access of slum population to basic needs and services,
    c) Opportunity costs incurred by households in accessing alternative mechanisms to overcome the shortfall in service, and
    d) The affordability and willingness to pay for improved services

The objectives of the exercise were

a. To identify essential issues in access of services and delivery to the poor and suggest strategies that would enable the concerned agency/authority fulfill its mandate, and
b. To identify strategies to integrate issues such as housing rights, tenure security and sustainable livelihoods to bring people out of poverty.

The table below shows the land tenure status of Slum settlements from the survey conducted in 2005 by SMC:

Table 8-2 Land Tenure status of Slum surveyed

Ownership of land	1983(%)	1992(%)	2001(%)	2005(%)	2007(%)
Private	43.7	37.3	26.3	35	33
Government/Railways etc.	4.7	13.3	20.1	21	30
Municipal Corporation	42.2	41	43.73	44	36
Others	9.4	8.4	9.87	0	1
Total Public Land (SMC + Government)	46.9	54.3	63.83	65	66

Source: Slum Up-gradation Cell, SMC

It is observed that the Encroachment on private land is getting decreased in recent years by SMC efforts of relocation and re-shifting of slums on Public Land. Therefore out to total land occupied by Slums, 66% is on Public land in 2007.

8.2 CHARACTERISTICS OF SLUMS

As per survey conducted in 2005 around 333 Slums were identified. Of these 333 slums settlements, a majority of slums (144) were located along the Major Roads or the River, almost 75 Slums were located in the Khadi region or along the Railway other slums are located in the Gardens or in other places around the city.

Amongst the residents of the Slums the composition of the slums is as 42.37% of the slum population is SC, 27.77% of the Slum population is ST, 18.24% of Slums is Baxi Panch and 10.31% of population contains of the general population.

8.3 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

Household Size

Results of the analysis from the primary survey conducted in 2005 by SMC, an average household size of 5.43 was indicated in Surat slums. The average household sizes in the slums are higher than that of the city average.

Literacy rate

Census 2001 indicates a total literacy level of 56.04 percent among slum population in Surat, which is significantly lower than the literacy at the city level (80 percent). Male literacy (64.14 percent) and female literacy (44.50 percent) were also found lower than the town level male and female literacy. Especially, the female literary rate is marginally low in the slums areas than the overall city level.

Education

The level of education among the sample slum population by age group shows Non-enrolment is high as being out of school. Dropout rates after primary as well as secondary school is also high and only two percent of the total sample is found to have completed their graduation.

The table below shows Population, Literacy and workforce participation of Slums settlements from the Census 2001:

Table 8-3 Population, Literacy and workforce participation of Slums (2001)

Sl. No.	Indicator	Census 2001
1	**Population**	2,876,374

2	**Average Household Size**	4
3	**Sex Ratio (Females per 1000 males)**	701
4	**Literacy**	56.04
5	**Male Literacy**	64.14
6	**Female Literacy**	44.50
7	**Workforce Participation Rate-Total**	42.05
8	**Workforce Participation Rate-Female**	4.56
9	**Dependency Rate**	2.37
Source: Census 2001		

Workforce Participation

The Census 2001 indicates that 67 percent of the slum population is unemployed, accounting for dependency ratio of 2.37 for slum population. Of the total working population, only 4.56 percent are women. However, both the figures are higher than the city level figures at 30 percent (total work force) and 12 percent (female work force) respectively.

Income Distribution

Income levels of households serve as an indicator of their affordability for housing and ability to pay for existing / improved services. As per Survey results of 2005 by SMC, (as reported by households) indicated that 42.07 percent of sample households earn less than Rs. 2,500 per month, while 39 percent earn between Rs. 2,500-5,500.

Hence, BPL and lower-income group is predominant among the slum population of Surat. The table below shows Percentage Distribution of Households by Wards and Income of Slums settlements from survey conducted in 2005 by SMC

Table 8-4 Percentage Distribution of Households by Wards and Income (2005)

Re no.	Slum No.with zone Code	No of Families having income < Rs. 2500/Month	No. of families having income >Rs. 2500or <Rs. 5500	No. of Families having income >Rs. 5500
1	WZ	4995	4319	1881
2	CZ	2294	2034	888
3	NZ	2831	2509	1091
4	EZ	6121	5429	2371
5	SEZ	11554	10244	4463
6	SZ	9221	8173	3563
7	SWZ	3547	3141	1370
Total		**40563**	**35849**	**15627**
Over all percentage		**42.07**	**38.94**	**16.97**

Source: SMC

8.4 SMC- HOUSING POLICY FOR URBAN POOR

Surat Municipal Corporation has prepared Slum policy considering Urban Poor as the prior issue of the city and tried to cover all aspects of housing sector, such as need for Housing, short fall, available land policies, criteria and the problem identification and solution for urban poor.

Main objective of the policy are.

- » To know the Socio-economic survey data of the Existing slum scenario in the city as whole & zone wise.
- » To analyze all existing data considering socio economic & physical parameters of existing slum settlements.
- » Frame out the housing policy for urban, urban poor through the rating analysis of the existing condition with future development and vision for 2020.
- » To prepare an Action plan for slum alleviation project sustainability in terms of Land and finance.
- » To work out practical and efficient public private partnership initialize models for slum free city.

Since the residents of these slums creates as major work force as laborers and are participating substantially in total productivity of market. Therefore Surat Municipal Corporation has recognized the contribution of the urban poor in helping to build city prosperity and decided to make sufficient provision for them to have access to affordable land, house site and services. The ultimate goal of SMC it make Surat city – as city without slums, and for this SMC has taken slum up gradation, relocation and rehabilitation programs. For this SMC has constituted Slum Up gradation cell to eradicate slums and to provide hygienic and aesthetical importance to Surat city.

- » **The main Function of Slum Up gradation Cell are-**

1. Slum Up Gradation
2. Slum Relocation
3. Slum Redevelopment

8.4.1 SLUM UPGRADATION:

Surat Municipal Corporation is providing basic infrastructure facilities like water supply, drainage, roads, street light, nursery schools etc. since many years. Under BPMC act 1949; section 63(2) the entire expenditure on these basic services is being borne by SMC in the case o slums on both private and public land. SMC has spent around Rs. 438 in last five years for provision of facilities.

Water Supply in Slum Areas

In 1995, SMC had launched the construction of toilets and till date 136 such complexes have been constructed by two NGOs, viz. Slab and Paryavaran. Functioning on the basis of 'Pay and Use', each toilet block has 8 WCs, 4 baths and 4 urinals separately for men and women.

By 1996, SMC had paved 75 percent of the internal roads in slums with Kota stone. The municipality sweepers clean these roads every day. After the plague, surface drains were constructed in all the slums and are cleaned every week. Almost 70% of the total hutments in the slum area are catered through piped water supply network and remaining hutments are served either by stand posts or tankers by 2007.

The table below shows the Status of the basic services provided to slum settlements from 1992-2007:

Table 8-5 Basic Amenities distribution in Slums

Amenities in Slums	1992	2001	2005	2007
Private water taps (% household)	18.93	20	77.56	73.74
Private toilets (% household)	20.93	27.5	43	50.27
Separate electricity connection (% house hold)	25.01	32	72.17	-
Private ownership of land (% house hold)	37.3	26.3	30	29
Drainage Facility (% slums)	40	68	88.49	73

Source: SMC

As per SMC, total 406 Slum Settlements were being identified in 2007. Approximately 73% households of total slum settlements were covered for provision of drainage facility, 51% households were covered for provision of Private toilets, and private water taps connection were being provided to 74% household.

Around 48 slum pockets were covered up till 2005, under the "National Slum Development Program". The Gujarat Municipal Finance Board (GMFB) has been sanctioning loans/ grant under this program to upgrade the existing environment in slums. Besides this, SMC is also administering a few centrally sponsored programmers for uplift of the poor and slum dwellers under the Integrated Child Development Scheme (ICDS), Urban Community Development (UCD) and Basic Services for Urban Poor (BSUP). The major thrust of the UBSP program is on health, nutrition, formal education, provision of clean potable water and disposal of waste. But the reach of most of these programs has been limited so far.

8.4.2 SLUM REHABILITATION:

Slum rehabilitation scheme is being conducted by SMC in two parts:

- **Site & Service Scheme**: Surat Municipal Corporation had started the site & service scheme on large scale from the year 1994. The slum pockets located on important

public roads as well as on important public lands required for city development was vacated by shifting the hutments. The effected hutments were shifted to other SMC land by providing them individual open plot of 3.0m x 5.0m size with all basic infrastructure facilities. About 12500 household have been rehabilitated on various sites with the total expenditure of Rs. 59 crores.

- **Built House Approach**: Surat Municipal Corporation has implemented several housing projects under Government's housing schemes for urban poor. Also, slum dwellers on road alignment and other such inappropriate location have been shifted to the houses built under these housing schemes. The built house approach for the rehabilitation of slum dwellers and urban poor is carried out under the following three categories.

  - » **LIG Housing**
  - » **EWS Housing**
  - » **VAMBAY Housing**
  - » **New Affordable Housing projects**

Surat Municipal Corporation had constructed RCC Pucca houses for the slum beneficiaries. The hutments, which are required to shift from its original place to another place because of city development works, such affected slum households are provided the Built Houses. The built house approach for the rehabilitation of slum dwellers is carried out for the three categories such as LIG, EWS & BPL housing.

1. LIG HOUSING

Under Government of India's 20 point program, the Government has given target to construct about 65 dwelling units. Against it, Surat Municipal Corporation has constructed 113 dwelling units on 2 different sites.

The housing design for L.I.G Category is Ground + Three Storied RCC framed structure. On each floor, there are four dwelling units. The total Built-up area of single Dwelling Units is 38.00 Sq.m. (i.e. 408.88 Sq.ft.). The unit has living room, Bed room, kitchen, W.C., Bath and balcony. The cost of the single dwelling unit is approximately Rs.2,00,000/- including land, construction & infrastructure cost. The average housing density is 376 Dwelling Units/Hectare (i.e.1880 PPH).The projects implemented by SMC are listed below.

2. EWS HOUSING PROJECTS

Under the Chief Minister's 15 point development program, and Government of India's 20 point program, the Government has given target to construct about 7754 dwelling units including target for the Year 2005 -2006. Against which the Surat Municipal Corporation has constructed 7424 dwelling units on 23 different sites.

The construction work of 7424 Dwelling Units has been completed and possession to the beneficiaries has been handed over. Around 3533 units were handed over to the beneficiaries by draw and in 3891 unit hutments on road alignment and such other inappropriate locations have been shifted.

The housing design for E.W.S. Category is Ground + Three Storied RCC framed structure. On each floor, there are four dwelling units. The total Built-up area of single D.U. is 22.45 Sq.m. (i.e. 241.00 Sq.ft.) The unit has single living room, kitchen, W.C., washing place and balcony. The land cost is not considered as part of total project cost. 1, 49,596 sq.mt. Land has been covered for 23 sites. The average housing density is 496 dwelling units/Ha (i.e.2481 PPH). Basic infrastructure like water supply, drainage, pucca roads and street lights are also provided by Surat Municipal Corporation.

3. VAMBAY HOUSING PROJECTS (BPL Housing)

The Central Government subsidized scheme Valmiki Ambedker Awas Yojana began in 2002-2003. This is the scheme specially design for the families those who are living in slums and are below poverty line. It is estimated that about 51,934 household are living below poverty line in Surat City. The VAMBAY Housing Scheme is directly benefited to these families. Around 228 row houses on 3 sites are designed with single multi-purpose room, attached with toilet unit. Front ottah and a small backyard have been provided. The total built-up area of single dwelling unit is 20.16 Sq. m. The table below shows the Number of Housing Units completed

Table 8-6 No of houses constructed under various schemes (2008)

Built house Approach by SMC	2001 -2004	2005	2006	2007	2008
EWS housing					
No. of Units Completed	7424	64	-	-	-
VAMBAY - BPL Housing					
No. of Units Completed		144	-	-	-
LIG Housing					
No. of Units Completed		113	-	-	-
JnNURM-BSUP Housing					
No. of Units Completed		0	80	1000	7200

4. NEW PROJECT OF AFFORDABLE HOUSING THROUGH PPP

Surat Municipal Corporation has recently approved (2009), the project of Satellite Residential Township of Bungalows along with EWS houses. The Location of proposed Housing is Moje Dumas. The Total Plot area is 51477.90 Sq.m. and total Plot area for development of 138 bungalows is 48732.13 Sq.M, and for EWS, total 140 houses is the plot area is 2745.77 Sq. M. which is 5.33% of total plot area.

8.5 JNNURM -BSUP POLICY

The government of India has launched the Jawahar Lal Nehru National Urban Renewal Mission Scheme for the selected cities of the country. The JnNURM scheme has two submissions namely urban infrastructure and Basic Service to the Urban Poor. Basic Services to the Urban Poor focus on access to infrastructure for the urban poor. This submission shall have a seven-point charter: Security of tenure, Housing, Water supply, Sanitation, Education, Health and Social security cover. Eligible cities proposing projects for investment support shall be eligible for Central assistance 50 %, State assistance 20 % and the 30 % contribution shall be of Urban Local Body/ beneficiaries. Under BSUP, SMC has received approval of & projects of construction of 42,175 houses for urban poor for relocation of slum dwellers in 2009.

Surat is one of the eligible cities under JnNURM scheme. The status Nine Detailed Project Reports Sanctioned under JnNURM of Basic Service to the urban poor for Surat Municipal Corporation is as under Table 8.8.

Under JnNURM-BSUP land cost is not financed so it is important to have adequate quantity of land on which the project can be planned & submitted for sanction. Following efforts are done for procurement of land for this purpose.

- Reservation: In Surat Municipal Corporation, at the time of preparing the new town planning schemes there is a provision for land required for housing for urban poor. Plots are kept reserved for this purpose.
- Purchase: Surat Municipal Corporation has purchased the land to construct the housing for urban poor. The details of major land purchased are as under.
- ULC land: Government of Gujarat have provided the surplus ULC land for housing of urban poor at token rate. Surat Municipal Corporation have prepared housing scheme for urban poor in these land;

The table below shows the details of major land purchased for rehabilitation of Urban poor by SMC in 2006:

Table 8-7 Major Land Purchased for Rehabilitation of Urban Poor (Purchased in 2006)

Land purchase details			
Location	**Area (sq.mt.)**	**Rate of Purchase per sq.mt Rs.**	**Total Purchase Cost (Rs. In Cr.)**
Kosad	1178976	425	50.1
Bhestan	132,343	800	10.59
Jahangirabad	58,119	195	1.13
ULC land at 21 site	78,854	25	0.19
Vadod	84,600	900	7.62
Total	**15,28,895**		**69.63**

Source: SMC

The table below shows the Status of Detailed Project Reports sanctioned under JnNURM - Basic Service to the urban poor for Surat Municipal Corporation till September 2009:

Table 8-8 Projects Submitted and Sanctioned Under JNNURM-BSUP

DPR NO.	Location	Date of Sanction by SMC	Dwelling Units	Awarded Cost(HSG only) Rs. in lacs	Exp till Date (Sept 09)	Total project Cost after completion Rs. in lacs
I	**20** different location	11/10/06	5575	6145.24	5581.54	6257
II	T.P.54, F.P.1/A - 1/B	28/09/06	5424	5850.63	3396.99	5851
III	Moje Kosad H1	28/11/06	5280	6990.97	7671.83	7872
IV	Moje Kosad H2- H3	28/11/06	6768	10171.8	8070.00	10172
V	Moje Kosad H4- H5	9/12/06	7392	11109.6	6890.50	11110
VI	Housing for Urban Poor at **11** various locations	26/09/07	4032	7338.00	0.00	7338
VII	Housing for Urban Poor at **15** various locations	13/09/07	7704	10753.1	301.75	11055
VIII	Udhna- Bhimnagar vasahat	21/01/09	1176	0	0	2263.29
IX	Kamrunagar , Limbayat	21/01/09	740	0	0	1858.71

Source: SMC

Under BSUP relocation Project 42175 Units to be constructed at cost of Rs. 583.59 Crore. Among which 9688 units have been completed, 1806 units have been allotted and 21458 units under construction. It is expected by SMC, that around Total 30746 units will be completed in up to 31.12.2009 and Total 42175 units expected be completed by 31/12/2010.

The Tender procedure for 2947 units under progress for relocation projects are in process. For In-situ redevelopment project 1916 units to be constructed for at cost of Rs. 53.29 Cr. Basic Infrastructures like Water Supply, Under Ground Sewerage, Solid Waste Collection System, Street Light & Internal Roads etc will be provided. Medical facilities Dispensaries, UCD Center, Anganwadi, Community Hall, Play Ground, Garden, Shopping Center, and Primary School etc are planned at major sites of DPR II, III, IV, & V and in housing the Two Room, Kitchen, W.C., Bath facilities are planned for provision.

Picture-1 Houses Constructed under BSUP relocation Project

NEW PROJECT OF AFFORDABLE HOUSING BY SMC

SMC have proposed Affordable housing scheme under JnNURM-BSUP at Moje Sonari F.P.No.41/C,40/B, 48, 50, 51, R-00. The numbers of housing units proposed are 2880 on

the Land Area of 76372 Sq.M. the Estimated Project cost is around 11372.03 Lacs and proposed cost per unit is 3.95 Lacs. Financial mechanism for this project is Approx. Cost per Dwelling Unit is decided as Rs. 3.95 Lacs with GoI subsidy of Rs. 1.06 Lacs, ISHUP Loan of Rs.1.00 Lac and Upfront cost of Rs. 1.00 Lacs with Other Loans of Rs. 0.89 Lacs.

» **Procedure of Allotment:**

A. Applications will be invited from EWS & LIG category applicants
B. The applicants who does not possess house or open plot on his/her name or spouse name within municipal limits will be eligible
C. After detail scrutiny the list of beneficiaries will be prepared through open transparent public draw

8.6 REFORMS UNDER BSUP

There are THREE key reforms under BSUP, which are as follows,

1. Internal Earmarking of funds for services to Urban Poor - Completed (20 % budget earmarked for urban poor.
2. Earmarking of at list 20-25 % of developed land -As per T.P. Act. Of Gujarat state 10 % of reserved land is reserved for EWS.
3. **Seven point Charter**: The basic services for the urban poor aim at integrated provision of basic amenities and services to the urban poor covering following facilities.
   - » **Security of tenure at affordable prices** - The houses will be allotted on Lease-deed basis to the beneficiaries with maximum contribution of Rs 35000.The Loan facilities will be provided for payment of affordable EMI in consultation with local banks. The Moratorium of 10 years on the spell of housing units.
   - » **Improved housing**- Provision of Earth Quake resistant frame structure type building with Water proofing on terrace. The Complete plumbing sanitation and electrification provision.
   - » **Water supply**- All houses being constructed under DPR I to VII will be provided with complete water supply network. Internal plumbing facilities are provided. Water will be supplied as per standard and norms maintained in supply of other citizens. At present, 78% existing slum area is covered with individual tap connection while more than 95% slum area is provided reliable water supply
   - » **Sanitation**-All houses being constructed under DPR I to VII will be provided with complete drainage network. All houses will be provided individual toilets. Around 84% existing slum area is covered with drainage network and 97% existing slum area is covered under solid waste management. SMC have maintained 160 pay & use toilets to prevent open defecation. Moreover Individual toilet facilities at free of cost is provided in existing slum areas

- **Education**- 100% slum area is provided with primary education facilities. Around 516 Anganwadies are running so as to cover almost all slums and 270 Primary Schools with 3246 class rooms for Gujarati, Urdu, Telugu, Udiya, Marathi etc. medium are started as per requirement, Recently, 9 Schools for Secondary & Higher secondary education are also started.
- **Health** – Presently, 100% area is covered with healthcare facilities. There are 28 Primary health centers & maternity homes are maintained by SMC. Other medical facilities Mobile dispensary facilities are also provided. SMC maintained Family welfare department, Immunization Department ,Vector Borne Disease Control Department, STD Care Project, National TB Control Program (DOTS) Major Hospitals - 750 bedded SMIMER Hospital and 120 bedded Maskati Hospital are being maintained with all health facilities
- **Social security**- All houses will be allotted with secured tenure rights (Ownership) along with Social Infrastructure facilities within & surrounding areas are provided. SMC have started its own city bus services. Necessary trips as per requirement shall be provided at reasonable rates.

8.7 SMC'S OTHER EFFORTS

8.7.1 PROJECT MONITORING AND QUALITY CHECKING-

The main key points of his programs are as under:

1. **Supervision by SMC**- All the BSUP projects are implemented through Slum Up gradation Department of Surat Municipal Corporation. SMC has its own Vigilance & Inspection Department for regular monitoring of projects
2. **Project Management Consultancy**
3. ***Third Party* inspection**
4. **Quality Checking** - Sardar Vallabhbhai National Institute of Technology (SVNIT) was deployed for regular quality checking of all DPR projects.
5. **IRMA** - State Govt. have appointed M/s Shrikhande Consultants PVT. Ltd., Mumbai as Independent Review & Monitoring Agency

Reconstruction of tenement:

During early seventies SMC have start building tenements on SMC acquired land with the help of world bank and another govt. schemes more than 5500/- houses were constructed in various areas of SMC. The houses were allotted to the urban poor by open draw at the very nominal price of Rs. 5000/- to 12000/-. Due to lack of maintenance of the buildings for urban poor, its physical condition got worsened.

As per policy of the SMC the maintenance is to be done by concern beneficiaries. The beneficiaries are not taking serious actions regarding maintenance of these building. So

for preventing any huge damages, the principal policy decisions were taken by SMC for preparation of a pilot project for reconstruction of tenements under PPP.

In short period, SMC will float EOI notice for Reconstruction of tenement buildings under this scheme. The existing holders of tenements (beneficiaries) will get the flat of minimum existing area, with latest structural and architectural design. The complete campus will be re-planned to create more social infrastructure facilities for tenement holders. The excess land available will be developed by private builder in co-ordination and as per condition of SMC. The new houses will be allotted at nominal price as cost decided by the authority.

8.7.2 EMPLOYMENT AND URBAN POOR DEVELOPMENT PROGRAMS

1. SWARNA JAYANTI SHAHERI ROJGAR YOJANA (SJSRY)- The SJSRY has been implemented from 1st December 1997. The SJSRY shall seek to provide gainful employment to the urban unemployed or under employed poor through encouraging the setting up of self employment ventures of provision of wage employment.

Components of SJSRY

- Training
- Bankable Loan Plan
- DWCUA (Development of Women & children in Urban Area) Group

Training Component

Mainly aimed at providing training to the urban poor, to acquire skills for self employment. As per 31 august 2009, goal was for 5000 and achievement of 2789, with % of achievement of 55.78%.

Benefits- Minimum 300 hrs training imparted and Maximum expenditure of Rs 2000 per trainer and total 1111 beneficiaries provided *machine bharat, hath bharat, beauty parlor, jardoshi* training, computer training, etc. through 49 units (till UMEED project started).

Table 8-9 Progress report of SRSJY Program for BPL families

year	Total BPL houses	Card availed to BPL houses	Card distributed to BPL houses
2006-07	37585	37585	32263
2008-09	14342	-	-
TOTAL	51934		

Source : SMC

Table 8-10 Financial report of SRSJY Program

Suvarna Jayanti Shaheri Rojgar Yojana (S.J.S.R.Y.)					
YEAR	Target	Total application no. send to bank	Passed Benefited no.	Paid Total loan Repaid.	Paid Total subsidy Repaid.

From the starting of scheme to 31-03-'08		10023	3089	92712877	17498991
Date 01-04-'08 to Date 31-03-'09	1500	783	160	1928035	577863
Date 01-04-'09 to Date 31-08-'09	1500	297	48	721500	204358
TOTAL …		11103	3297	95362412	18281212

Source : SMC

2. UMEED- Government of Gujarat introduced the scheme with the aim to provide employment directed training to unemployed to enable them to get employment.

Table 8-11 Progress at Umeed in Surat (Aug 09)

	Annual Target of trainee	Registration	Admission	Beneficial of Training	Beneficial of Placement	Payment detail paid by JUDM	
						Beneficial	Amount of Suman pana Fund
Date 01-03-'07 to Date 31-03-'08	4000	9589	4275	2943	1475	1537	1537000
Date 01-04-'08 to Date 15-02-'09	4000	6912	5327	4117	4567	1526	1526000
Date 01-04-'09 to Date 30-06-'09	4000	2518	2012	2789	2169	0	0
TOTAL …		19019	11614	9849	8211	3063	3063000

Source: SMC

3. PROJECT IMPLEMENTATION UNIT (PIU)- Surat Municipal Corporation have prepared and submitted a proposal for establishment of Project Implementation Unit for projects sanctioned under JnNURM.

» **Functions of PIU**

A. Biometrics survey & analysis
B. Co-ordination with Zones regarding scrutiny of application forms of beneficiaries to be rehabilitated
C. Arrangement of Allotment draw
D. Allotment of houses
E. Maintaining Data of allotment

4. RESIDENT WELFARE ASSOCIATION- To create the sense belongingness in minds of rehabilitated slum dwellers at their resident sites, it is necessary to establish RWA.

» **Functions of RWA:**

A. To maintain the common facilities on co-operative basis
B. To create unity in local residents

C. To collect monthly maintenance charge for common facilities
D. To maintain accounts of collected funds
E. To maintain common facilities and to carry out periodic maintenance works
F. To celebrate the festivals jointly.

» **Constitution:**
» One RWA per approx. 100 to 150 houses as per campus capacity
» One president, vice president & secretary is selected/elected from the group
» One member each from technical department, health department and from UCD is nominated from concern zones of SMC to help and guide the RWA.
» Surat Municipal Corporation has allotted 1806 houses and 5 (five) RWA are established with total membership of 500 families

5. SANKAT MOCHAN YOJANA:

The main Aim of this Program is to help people living below poverty line financially in time of crisis. If family is noted under B.P.L. then in case of natural / accidental death of main earning member Rs.10000/- is received as compensation under Sankat Mochan Yojana.

» **Main objectives:**
A. Minimize impact of disaster on human/animal life and property by providing immediate relief till the local / state authorities pitch in and take over.
B. Mobilize the local resources for managing disasters from each locality without asking/involving any funds and/or resources from any government or statutory body.
C. Mobilize and galvanize local untapped potential/expertise on voluntary basis to manage initial impact of any disaster.

Table 8-12 Table showing Progress of Sankat Mochan yojana

Year	Received Total Application	Beneficiaries no	Paid total subsidy	Cancel	Pending	Grant
Till 31-03-'08	3242	2376	21685000	587	279	24964000
Date 01-04-'08 to Date 31-03-'09	531	544	5450000	47	219	3610000
Date 01-04-'09 to Date 31-08-'09	307	263	2630000	0	195	0
TOTAL	4080	3183	29765000	634		28574000

Source: SMC

6. JUVENILE GUIDANCE PROGRAMS:

Progress reports of stated programs for five years are as follows.

Table 8-13 Showing progress for five years for JGP

Year	Total Number of students	Grant allocated for year	Expenditure incurred for year
2004-05	869	1,00,000	1,95,102
2005-06	754	1,89,206	2,23,229
2006-07	1144	2,49,378	2,14,165
2007-08	1132	1,35,000	2,91,469
2008-09	1813	1,88,500	2,82,454

Source: SMC

8.7.3 SURVEYS OF URBAN POOR UP GRADATION

1. Biometric Surveys- SMC carried household surveys of slums in 2007-08. Around 1.337 lacs being identifies for carrying out the surveys.

2. Socio-economic survey- the survey started in August, 2009 and expected to be completed by end of September 2009. About 1.35 lacs household are expected to be covered under the survey. Around 400 enumerators are expected to be engaged in surveys. SMC had sanctioned around Rs 12, 60,000/- for conducting this survey.

3. Slum Profile Survey - As per latest guidelines of Govt. SMC have started Slum surveys in prescribed formats. The survey work is carried out by UCD of SMC. More than 1, 35,000 houses are to be surveyed. Around 400 Surveyors, 35 supervisors, 7 coordinators and 30 data operators are engaged in this work. Local youth, Umeed trainees & UCD personals are also deployed for this work. Estimated expenditure of the survey work is Rs.15 Lacs.

8.7.4 POLICIES FOR URBAN POOR DEVELOPMENT

1. Slum Policy -SMC have prepred a draft slum policy for overall development of the slum dwellers, and the main vision of this document to make the city zero slum by the end of 2020.

2. Relocation and allotment Policy - SMC approved Relocation and allotment Policy by Standing Committee resolution No. 814/2009 dated 02.07.09. As per the policy the houses will be allotted to the slum dwellers as per following priorities.

1. **The slums located in and on bank of river Tapti and creeks.**
2. **The slums on canal corridors and on T.P. roads**
3. **The slums located on plots kept reserved for development works.**

The huts / houses of slums to be rehabilitated which is proved to be existed before cutoff date 20/07/2007 is eligible for getting house. The person who is enrolled during biometrics survey is allotted the house on the name of main woman of the house. The houses will be allotted at the cost of Rs. 25000/- to Rs. 35000/- as per category of the houses. The beneficiary shall have to pay 10 % upfront cost at the time of allotment.

Remaining amount can be paid by bank loan or by 120 EMI. The beneficiary who pays total beneficiary share at a time is liable to get 10 % discount.

SMC have adopted a very transparent system of allotment of houses to the slum dwellers. The chits containing name of beneficiaries are kept in one box. Another box contains flat nos. The name of beneficiary is selected from the box and declared. The beneficiary himself will lift the chit from box of flat no. chits to select flat number for him. This way the allotments of houses are very transparent. The allotment draw is done in presence of political leaders, Corporatist, officers and concern beneficiaries who choose to remain present in allotment function.

8.8 GAP IDENTIFICATION

As per taking optimum Household size (5 Person per dwelling Units), there are around 1,520 extra housing units supply to accommodate the total slum population in the year 2012 to eradicate slum totally from the Surat City. Therefore, according to tentative action plan discussed below the efforts by SMC will help to accommodate the total slum population by 2012 which includes all Slum Rehabilitation, redevelopment and Up-gradation Projects under JNNURM- BSUP Policy and SMC Housing Policy.

Table 8-14 Requirement and Gap Identification for Slums in Surat City

Description		Unit
Total Housing Units Completed under JNNURM - BSUP and SMC programs by 2009	64336	Housing Units
Slum Population Accommodated by 2009	321680	
Slum Population left to be accommodated	294,329	
Housing Requirement Left Population - 2009	58,866	Housing Units
GAP -2009	58,866	Housing Units
Slum Population -2012	103,171	
Housing Requirement	20,634	Housing Units
TOTAL BACKLOG - 2012	79,500	Housing Units
Total Housing Units to be completed in 2009-12 under JNNURM- BSUP program	81,020	Housing Units
GAP - 2012	1,520 (Extra Housing Units Supply)	

Source - Derived

So considering the existing projects by SMC, there will be a gap of **58,666** Households which will need access to redevelopment and rehabilitation program by SMC in 2009. But, if Rehabilitation, redevelopment and Up-gradation Projects programs are being provided in similar pace, the Slum Population would reach to null by 2022.

8.9 KEY ISSUES

Lack of information on services availability in slums

Though the corporation has set up a separate Slum Up-gradation Cell, lack of complete information on service availability in all the 406 slum settlements (2007) in the city has been hampering the implementation of slum improvement/ rehabilitation programs.

Major availability of land within the corporation area for slum relocation

Several slums, which are either along water bodies or transport corridors, have to be relocated as infrastructure cannot be provided in such areas and the amount of land available with the corporation is not adequate to relocate such a large number of slums.

8.10 RECOMMENDATIONS

Need for Slum networking programs

Urban poverty remains a scar in Surat's tremendous industrial and economic growth in recent years. It is a need of an hour to plan for innovative approaches for slum up-gradation and improving quality of life in slum settlements under SMC housing Policy and JNNURM – BSUP program.

Provision of Infrastructure and land together

As all slums cannot be upgraded, the adequate amount of land should be allocated to relocate the slums along with the provision of necessary infrastructure and facilities.

Provision of Employment and Skill development opportunities

The Relocated or rehabilitated models should also check the provisions of employment opportunities in and around the relocation site for easy access of urban poor to sustain their living.

8.11 ACTION PLANS AND GOALS

SMC is now preparing a Comprehensive paper on "Action Plan for Achieving Slum – Free status" for Surat City within five years. (2014)

The Action plan of SMC for making slum free city:

Sr. No.	Strategy	Action Plan
1	**Slum Rehabilitation**	• Site & Service Scheme – More than 12500 huts are shifted • Relocation – 7 projects for construction of 42156 houses are sanctioned by govt. The work for 39497 units are under taken • One more project of 3000 houses for urban poor is under preparation

2	**Slum Redevelopment**	• 2 projects for in-situ development of 1916 houses are sanctioned by GoI. • To encourage private builders for development of slums on private land one project for construction of 1500 houses is sanctioned by SMC. • Additional incentive in form of FSI and relaxation in DCR offered.
3	**Slum Up gradation**	Improvement in physical infrastructures network is undertaken.
4	**Others**	New satellite town ships in extended areas under PPP will be encouraged to prevent more slums

The detailed tentative action plans of SMC to achieve a slum free city is presented in Annexure IV

8.12 INCLUSIVE DEVELOPMENT ASPECTS FOR URBAN POOR

The unplanned neighborhoods are generally occupied by squatters which have no legal recognition or rights and they lack most basic municipal services, such as water supply, sanitation, waste collection or infrastructure, and thus are exposed to disease, crime and natural disasters.

One way is to prevent increasing the urban poverty which involves the relocation of residents to resettlement sites which were usually outside of the city. But, moving the people or replacing their physical facilities is not ineffective option as poor can find work more easily at city centers.

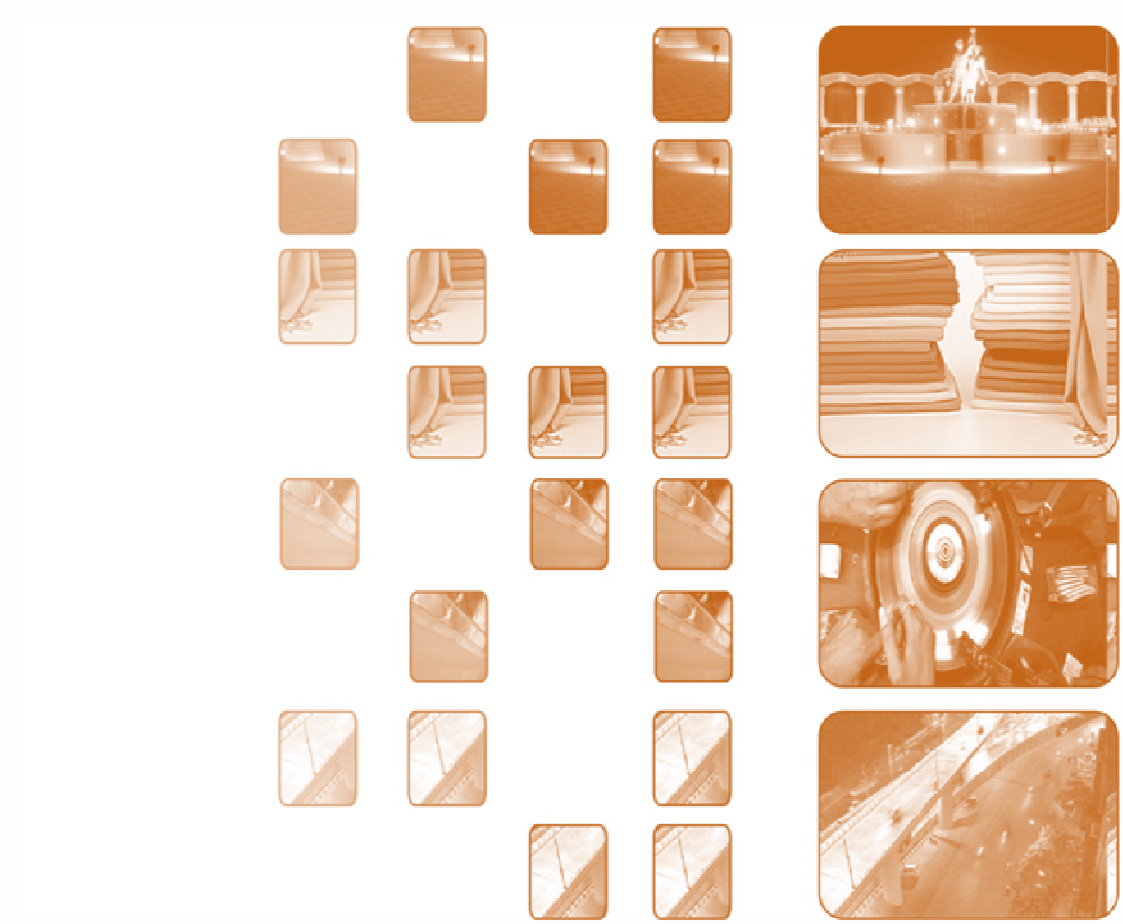
In tentative action plan towards making the city slum free about 134 slum consisting about 42175 households (DPR I- VII) situated at seven different zones are identified for the scheme to rehabilitate at different place like Rander, Althan, Uthana, Bhestan, Limbayat, Dumbhal, Moje Kosad and Nana Varacha. These locations where slums are to be relocated are distantly located from city centre. But, As per Stakeholder Consultation Survey, by SMC, it is being observed that Slum population in Central city area require Slum networking Programs instead relocation programs, which shows they don't want to move outside the central city area. Therefore, if slums from central zones are relocated, then, these locations should have some association with industries so that there should some employment options, or there should be some public transportation options can be provided to access city centre.

A second approach was clearance and redevelopment. It meant temporarily moving the slum residents, clearing the land and building new housing for them on the same site. The Redevelopment Programs includes DPR VII & IX in which redevelopment of slums will take place within city limits mainly on locations of Udhna, Bhimnagar, and Vasahat, Kamrunagar and Limbayat and redevelopment of about 181 slum pockets which are located on prime locations of the city, identified in SMC tentative action plan. The total of 48000 households will be provided well designed house on the same land by developing the Land. As per Stakeholder Consultation Survey, by SMC, the rehabilitation

or relocation of slums in flood prone areas should be done not on outer peripheral sites of SMC area but on nearby sites in side city area.

Another alternative is to moving people or replacing their homes is upgrading. Upgrading consists of improving the existing infrastructure, e.g. water reticulation, sanitation, storm drainage and electricity, up to a satisfactory standard. The upgrading does not involve home construction, since the residents can do these themselves, but instead offers optional loans for home improvements. Further actions include the removal of environmental hazards, providing incentives for community management and maintenance, as well as the construction of clinics and schools. Upgrading has significant advantages; it is not only an affordable alternative to clearance and relocation (which cost up to 10 times more than upgrading), but it minimizes as well the disturbance to the social and economic life of the community. As per Stakeholder Consultation Survey, by SMC, there is great need of More Pay & Use toilets near up-gradation sites.

Slum Networking is also an innovative approach for the improvement of slum, introduced in 1997 in Ahmadabad. Instead of treating slums as insignificant characteristics of city, Slum Networking Project aims at incorporating them into the fabric of city life by introducing participatory approach. The results of upgrading are highly visible, immediate and make a significant difference in the quality of life of the urban poor. An essential part of upgrading is transferring tenure rights to the occupants at prices they can afford. The security provided by transferring these tenure rights has been shown to motivate occupants to invest two to four times the amount of funds that the government invests in infrastructure improvements in a slum area. As per Stakeholder Consultation Survey, by SMC, there is a huge demand for Slum Networking Projects, which may includes development of small scale industries in these areas, where Builders should be made part of slum networking projects.



Chapter 9

Social Development

Education

Health

Recreation/ Open Spaces

Emerging Issues

Strategic & Action Plan

Action Plan/ Tasks

CHAPTER 9. SOCIAL DEVELOPMENT

9.1 BACKGROUND

Development of physical infrastructure cannot usher in overall development at the desired level if the social infrastructure is not simultaneously developed. Education, Health, Social security, public entertainment etc. sectors has to be developed to ensure proper social infrastructure. Social Development is usually referred to as the commitment towards realizing the vision of the city. The provision of infrastructure facilities such as educational institutes, health care facilities contributes in the socio-economic development of the city. This chapter reviews the provision of social infrastructure facilities in the city. It takes a review of the,

- **Educational Facilities**
- **Health Facilities**
- **Recreational Facilities**
- **Other Social Amenities**

9.2 EDUCATION

Education decides the development pattern of any city, it exhibits how urbanize a city is through its literacy level and exposure to different education facilities. Surat consist of educational facilities ranging from primary school to research level, which are provided by a host of agencies, ranging from the central government, state government and local government to the agencies aided by the state government as well as private institutions.

There 524 Primary Schools and 1,008 Secondary and Higher Secondary schools for the year 2008, for different language medium in Surat district as per District Education office. The Number of Students studying in Secondary and Higher Secondary schools are 599,892 and the total teachers for these students are 9,251, with ratio of 1 teacher for 64 Students. Out of total 599,982 students, 391,227 are in general category, 18,845 in SC category, 113,290 in ST category, and 77,670 in Baxi category.

There is 55% of total Secondary and Higher Secondary schools are being provided by mainly Private Sector itself. (Refer Table 9.3). The table below shows the number of Schools existing in Surat city by the year 2008, according to language medium of education.

Table 9-1 No of Primary schools for Surat District (Till 30.10.08)

Language Medium of Education	No of primary schools
Gujarati	262
English	112

Hindi	69
Marathi	20
Telugu	7
Udiya	5
TOTAL	**474**

Source: District Education Office-Surat

Table 9-2 No of Primary schools for Surat District (2009)

Area Name	No of primary Schools
Rander-adajan	53
Bhagan, katargam	97
Nanpura, bhatar, athwa lines	52
Udhana, pandesra, bamroli	161
Varacha, a.k. road, amroli	50
Puna, l.h. road, varacha	61
Total	474
New Primary schools Sanctioned as Non- granted School	
in June -2008	27
in June 2009	23
GRAND TOTAL	**524**

Source: District Education Office-Surat

The table below shows the total number of secondary schools, teachers and students existing in Surat District by year 2008:

Table 9-3 No of Secondary schools, Teachers and Students in Surat District

	No of students in secondary and higher secondary schools	No of teachers	No. of Secondary/higher Secondary Schools
Central Govt	5756	184	15
State Govt	3600	78	11
Social Welfare Dept.	7722	125	19
Muni. / Nagar Gram Panchayat	2418	285	4
Private Granted	435001	45	433
Private Non- Granted	145395	8534	526
Grand total	**599,892**	**9,251**	**1,008**

Source: District Education Office

Table 9-4 Proposed Projects by SMC (Rs in '000)

Zone	Project	Location	Estimated Project cost	Area Sq.mt.
North Zone	Primary Schools	EWS Qtrs. H1 package at Kosad	11000	
		EWS Qtrs. H2 package at Kosad	4500	
		EWS Qtrs. H3 package at Kosad	4500	
		EWS Qtrs. H1 package at Kosad	2500	
East Zone	Suman High School	Mohanni Chawl, Matawadi	9300	2000
South Zone	Primary School	T.P. 2 F.P. 77	8500	200
	Primary School	T.P. 54 Bhestan FP1/A	15000	2668
South East Zone	Schools	Dindoli	10000	3000
		D.T.P.S. 40 (Limbayat - Dindoli) F.P. 12	10000	1615
	Aaganwadis		7500	1500

Source: SMC budget 2009-10

There are 9 schools run By SMC by 2009, out which 7 have Gujarati language as education medium and 2 are of Marathi medium. There are 2 schools in South Zone, 2 in east zone, 3 in South East zone, and 1 each in North and West zone.

Apart from these there are 41 colleges by 2009, which are either affiliated or self financed. Professional Institutes located in the city are S.V. National Institute of Technology, Government Medical College and the SMC Medical College. The South Gujarat University is the local university and many colleges are affiliated with it. The Department of Business Administration under the university acts as a professional institute and offers a Masters in Business Economics. Center for Social Studies (CSS) is an ICSSR (Indian counsel for social science research) institute specializing in the social science practices.

When analyzed with respect to the UDPFI standards, Surat was found to be well endowed in terms of Secondary and Higher Secondary schools and Colleges. In terms of, Primary schools and Technical Institutes the city needs to incorporate more Facilities to fulfill the requirement with increasing population.

9.3 HEALTH

The city has emerged in recent years from decay to resurgence, as an example for other civic agencies to follow. Devastated by the plague in 1994, the city got increased and improved health facilities. A civil hospital has come up along with a new medical college-SMIMER set up by SMC.

Tapi River flooding in Surat is the causes of many diseases like malaria, filaria, dengue, etc, this problem is further compounded by the mosquitogenic condition of the city i.e. nearly 40% of the population of Surat leaves in slums; most of them are situated on or around these creeks, exposing them to very high risks of vector borne diseases. Therefore a separate department is created by SMC to look after impacts by Vector borne diseases. The role of Vector borne diseases control department is to control and prevent the spread of vector borne diseases.

Health Facilities

There were around 28 major hospitals registered under SMC in the year 2006-07, with capacity of all together 1119 beds, and staff capacity of total 2844 person consisting total 408 permanent doctors, 182 temporary doctors and 512 nurses.

Also there are Major hospitals, like SMIMER is 750 bedded hospital, with total staff of 1559 in the year 2006-07, consisting 254 permanent doctors and 312 nurses, and Maskati hospital, which is 120 bedded with total staff of 383, consisting 68 permanent doctors, 58 temporary doctors and 57 nurses.

The ever-increasing population in the city is expected to put pressures on the existing health facilities. By the year 2009, around 305 medical facilities are registered with the SMC, of these as many as 92.59 percent hospitals are run by private organizations. The table below shows the number of Medical health facilities registered under SMC by the year 2009:

Table 9-5 List of Health facilities registered under SMC zone wise– 2009

Zone	Number of Medical health facilities registered under SMC
Central Zone	89
North Zone	36
Zone	**Number of Medical health facilities registered under SMC**
East Zone	54
South Zone	10
South East zone	50
South West Zone	16
West Zone	48
TOTAL	**305**

Source: SMC, Surat

According to Bio-Vision Medical Waste collection centre in 2009, total 3250 Health related facilities are existing in Surat city, comprising of different range of health specialties, and treatment facilities. There are 4 blood banks, 158 dental clinics, 28 poly clinics, 2048 Clinics and dispensaries, 237 laboratories, 36 Urban Health centres which includes SMIMER hospital (Surat Medical College) and Maskati hospital, and total 738 Hospitals ranging from capacity of 5 - 150 beds. The table below shows the list of Hospitals having capacity of more than 100 beds in SMC area in the year 2009:

Table 9-6 List of Hospitals having capacity more than 100 beds (2009)

Name of Hospital	No of beds
Smt.R.B.Shah Mahavir Super Specialty Hospital	100
Dhameliya Kidney Hospital & Lithotripsy Centre	100
Navjivan Children & General Hospital	100
Gupta Hospital	100
Harikrishna Group Of Hospital	109
Gastro Intestinal Endoscopy Centre	110
Anmol Eye Hospital	120
Vasundhara Maternity Hospital	130
Amar Hospital & Maternity Home	147
Chovatiya Surgical Hospital & Laproscopy Centre	150
Pinkal Hospital -Katargam	150
Shivam Hosptal (Dr. Nitin T. Puroit)	150
Nijanand Neuro Care & Electrophysiology Centre	201

Source: Bio Vision Medical waste collection centre, Surat

Table 9-7 Proposed Projects by SMC (Rs in '000)

Zone	Projects	Estimated Project Cost	Area In Sq.Mt.	Cost per Sq.M.
Central Zone	Lakhpati Hospital	4,200	9,708	2.3
South Zone	Health Centre	4,000	672	0.2
South West	Emergency Response Centre	557,768		

Zone	(Disaster Management			

Source : SMC Budget 2009-10

Birth & Death Rates

Both the birth rate and the death rate have come down in the recent years, especially after the outbreak of plague in 1994. While the birth rate has stabilized at 16.65 births per 1000 population, the death rate is balanced around 4.12 deaths per 1000 populations by 2007. The table below shows the total Birth and deaths Statistics in SMC area for year 2001-07:

Table 9-8 Birth and Death Statistics in SMC area (2001-07)

	2001	2002	2003	2004	2005	2006	2007
Registered Births	47,114	49,204	53,452	55,521	55,907	62,633	63,213
Registered Deaths	10,198	10,208	11,255	11,921	12,633	14,915	15,714
Registered Infant Deaths	998	967	1,032	1,088	1,119	1,061	1,015
Registered Maternal Deaths	12	29	26	34	29	26	27
Registered Still Births	422	491	555	453	462	410	362
Crude Birth Rate	19	19	19	19	18	19	17
Crude Death Rate	4	4	4	4	4	5	4
Infant Mortality Rate	21	20	20	20	20	17	16
Maternal Mortality Rate	0	1	0	1	1	0	0
Still Birth Ratio	9	10	10	8	8	7	6

Source: SMC

The Chart below shows The Crude Death rate and Birth rate in SMC area for year 1985-2007:

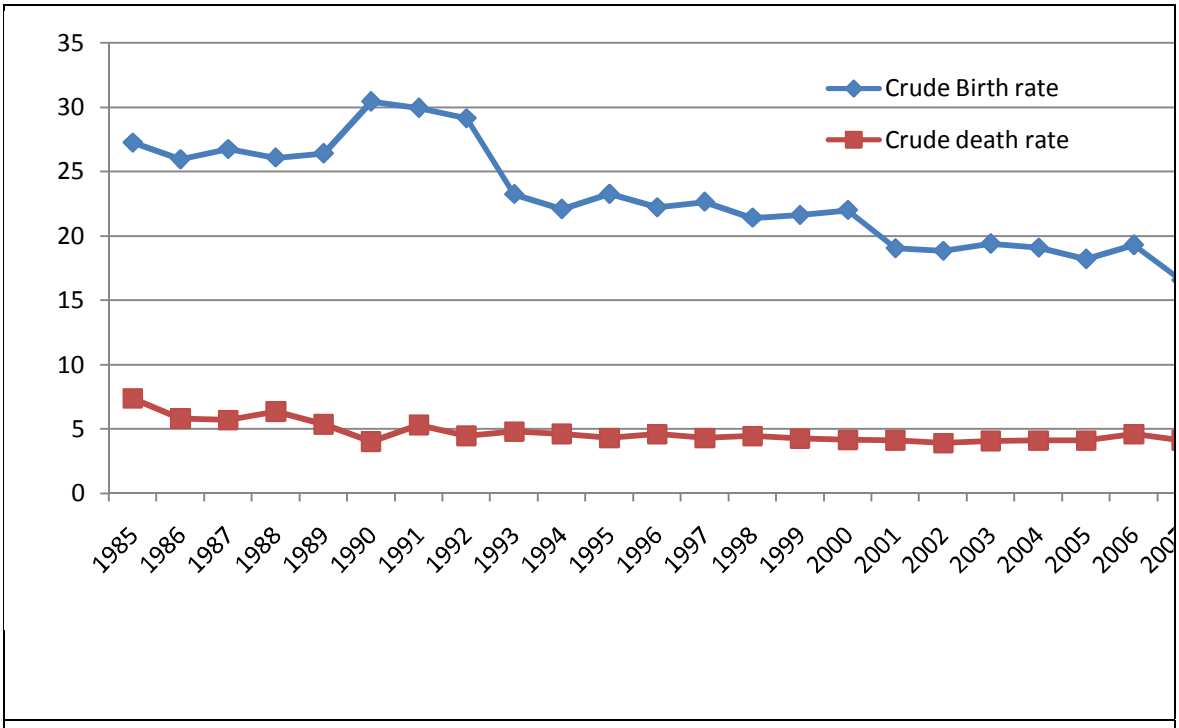


Chart 9-1 Crude Birth and Death Rate – (1985-2007)

Source: SMC

The birth rate, death rate and the infant mortality rate are far less than the state averages of Crude birth rate (23), Crude death rate (7), infant mortality rate (50), and, maternal mortality rate (1.72) in 2001. Infant Mortality Rate is 36.32 per 1000 live births in the year 1985, which reduced by 16.06 in 2007 and Maternal Mortality Rate, which reduced from 2.13 in 1985 to 0.43 per 1000 deliveries by 2007. The chart below shows the Infant and Maternal Mortality rate for the year 1985-2007:

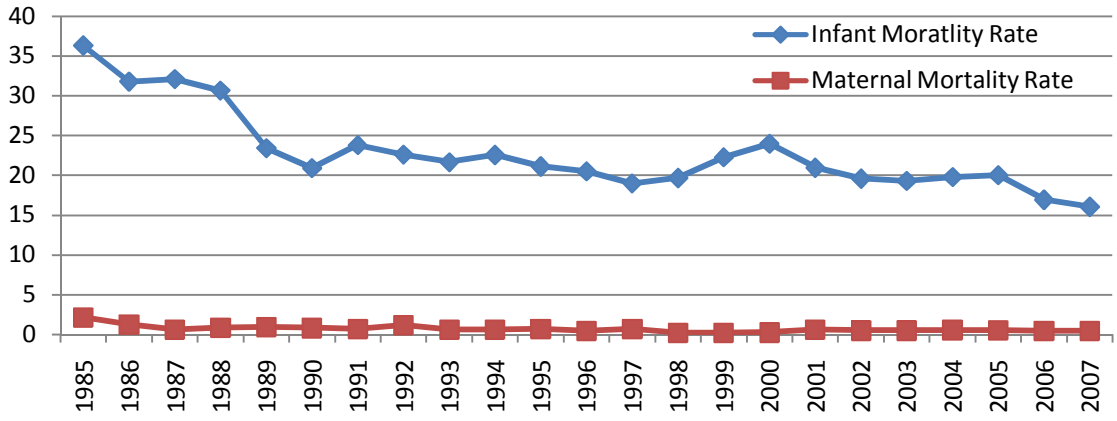


Chart 9-2 Figure 9 2 Infant Mortality and Maternal Mortality Rate – (1985-2007)

Source: SMC

Disease Pattern

The maximum number of reported cases in the city is of Malaria, Infective Hepatitis and Gastro Enteritis. This trend has been confirmed over the years. The fall in the reported cases of all the diseases after 1995 can be attributed to the cleanliness drive started by SMC in 1994.The table below shows the Number of cases in Surat city for major diseases (6 in no.) from 2002-April 09:

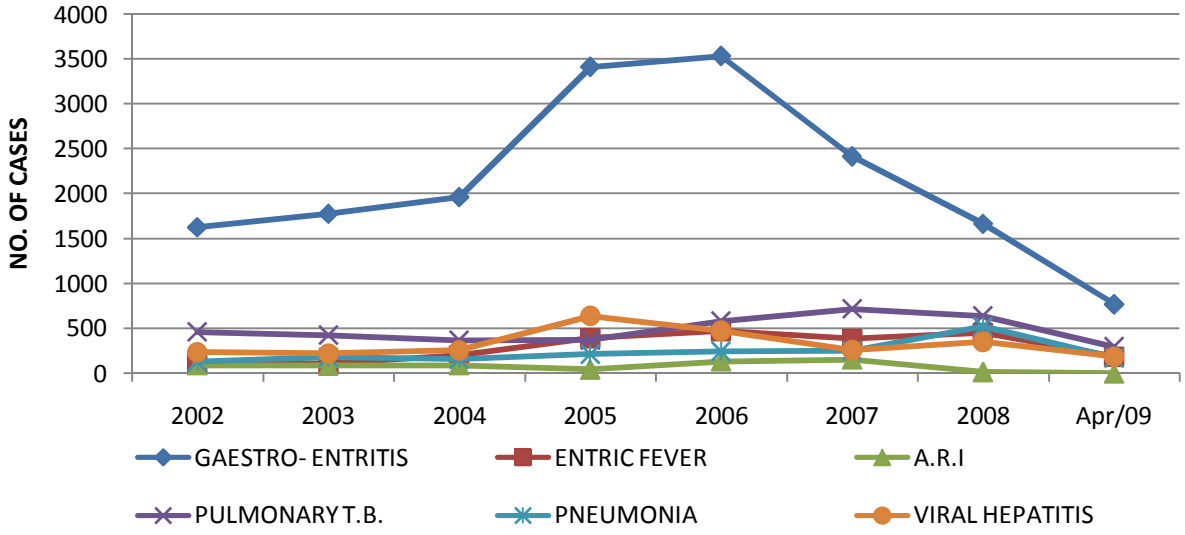


Chart 9-3 Number of cases for major diseases in SMC area (2002-April 2009)

Source: SMC

SMC employed paramedics who have been monitoring and treating minor ailments on a fortnightly basis and serious cases are reported to the government hospitals or the dispensaries. The numbers of reported cases proving fatal have come down significantly, especially of Gastroenteritis and Infective Hepatitis. *(Refer Annexure Maps 9-1, 9-2 and 9-3 – SMC diseases Maps)*

With the mortality rates having come down significantly, there has been a noticeable improvement in the health status of the city. The maximum numbers of deaths in the city are due to disorders related to the heart, lungs and kidneys. Surat has a very high incidence rate of heart attack and diabetes.

Present Health Services Requirement:

There are a total of 305 medical facilities are registered with the SMC by 2009, consisting with highest number of health facilities provided in Central zone, and minimum in South zone, which shows the increase in number of facilities with respect to population existing in respective zones. As per Urban Development Plan Formulation and Implementation guidelines, there is an excess provision of Small hospitals and dispensaries (including dental clinics) which are mushroomed in different part of city. Such extra facilities need to be upgraded or adjusted to cover other medical facilities shortfall in the city.

For primary health care, maternal and child health care, and family planning services, the norms of Government of India are to have one centre per 50,000 population. Accordingly, Surat city should have 41 Urban Health centers, whereas only 36 are existing.

But it can be seen that number of medical facilities are increasing after 1994 plague and 2006 Floods to serve the city to combat all type health hazards affecting the city health. Therefore, a decline in Death rates can be seen. Also, with various family planning programs and health education campaigns visible in the city there is a decline in birth rate too.

Organizational Structure

After the plague, various organizational measures have been taken up by SMC, which are also reflected in Health department. The decentralization of powers involved conversion of health workers from uni-purpose to multi-purpose workers (each health worker covers 10,000 people in the slum and slum like areas)

9.4 RECREATION/ OPEN SPACES

The Public Parks and Garden Department was established with a mission to provide the best environmental condition to live in by providing the citizens with recreational area by creating parks, garden, ponds and lake near their neighbourhood with reduced level of air and noise pollution by improving micro alignment at city level and to recharge ground water through ponds and lakes. The table below shows the Total number of Existing Parks allotted by SMC in various zones in SMC area:

Table 9-9 Total No of Existing Parks allotted by SMC -2009

EXISTING PARKS, GARDENS AND OPEN SPACES								
	East Zone	West Zone	North Zone	South Zone	South East Zone	Central Zone	South West Zone	TOTAL
No of Park, Gardens and open spaces	6	23	11	10	4	13	20	**87**
Total Area for Gardens allotted in TP Scheme (sq.m.)	99,245	168,800	76,156.16	45,078.68	3,799	41,193	1,850,42.66	**6,19,314.5**

Source: SMC

The major functions of the Public Park and Gardens Department are as enlisted below:

- Development of parks & gardens in reserve plots of T.P. schemes Development & maintenance of lakes, reservoir, ponds, river side gardens.
- Development & maintenance of recreational park, amusement park, botanical garden, and children's traffic park, etc.

- Development & maintenance of plantation & mass plantation along road side and road divider.
- Creating awareness towards benefits of tree plantation, parks and gardens.
- Distributing trees during monsoon period at free of cost.
- Plant distribution on token rate throughout the year.
- Disaster rescue operation carried out like tree cutting, pruning during heavy storm, rain, flood etc.

In the last four years itself (2005-09), the following work was carried out by the department:

- 45 nos. of gardens & 6 Nos. of lakes were developed in different zones.
- 2,67,237 Nos. of trees were planted along the road side & road divider.
- 3,28,778 Nos. of trees are planted in large open space as mass plantation for shelter belt & Green belt.

The table below shows the Total number of Proposed Parks by SMC in which are under recent development:

Table 9-10 Table 9 10 No of Proposed Parks (Under recent Development) by SMC -2009

Sr #	Description of Work	Estimated Cost (Rs)
1	Construction of Shantikunj Garden for Senior Citizens at T.P. Scheme No. 12 (Rander) near Hetal Apartment which is handed over to Surat Municipal Corporation	900,000
2	Related to Civil works of Shanti Kunj at T.P. Scheme No. 13, Adajan, F.P. No. 296	607,000
3	Construction of Shantikunj for Senior Citizen at Katargam Zone	432,000
4	Construction of Shantikunj for Senior Citizen at T.P. Scheme No. 35(Katargam), R-1.	216,000
5	Construction of Shantikunj at T.P. Scheme No. 20(Nanavaracha), F.P. No. 112, Krishna Industrial Estate	841,500
6	Various Civil Works for construction of garden at T.P. Scheme No. 12(Puna) F.P. No. 100	3,148,000
7	Various Civil Works for construction of Shantikunj near E.W.S Quarters, Kosad, Block No. 3, Garden No. 2.	508,000
	TOTAL	**6,652,500**

Source: SMC

The table below shows the total number of proposed Parks which are about to open to public by November 2009 by SMC:

Table 9-11 No of Proposed Parks (Opening in Nov 2009) by SMC

S.No.	Description of Work	Estimated Cost (rs.)	Area in Sq.Mt.
1	T.P. Scheme No. 35 (Althan) F. Plot No. 125 Garden, Magdalla Road,Near Sardar park Society, Garden	213,713	NA
2	T.P. Scheme No. 14, F.P. 29, Rander Road Talwadi, Near Sanskar Bharti School Garden	1,000,000	1520
3	Rander Nishant Society T.P. Scheme No. 23, F.P. No. 20, Garden	1,025,000	2,136

4	Construction od Garden at T.P. Schme No. 14, F.P. No. 103, Rander Road Anand Kunj Society	290,612	384
5	Development of Garden\Lake at T.P. Scheme No. 51(Daboli), F.P. No. 121,149	3,440,000	18,681
6	T.P. Scheme No. 34,R-7,Magobh Garden	3,780,000	NA
	TOTAL	**9,749,326.3**	**22,721**

Source SMC

Open spaces in Surat are categorized as open spaces, gardens, playgrounds, recreational areas and green belts. Playgrounds are mostly included within the school premises and the rest of the areas are open for public use.

Other than gardens there is, **Nature Park Sarthana** which is situated at the North-East corner of Surat City, which is approachable by Surat Kamrej Road. The site is covered with an area of 81 acres with river Tapi on the north side and Surat Kamrej road is on its south side. The aim and objectives of the Nature Park are enlisted below:

- To create awareness about wild life and its conservation among the visitors through exhibiting of animals in simulated habitat condition and by educational programs.
- To breed endanger & extinct species found locally, regionally and countrywide in planned manner.
- To protect endangered & extinct species of wild life and to conserve them in natural environment.
- To create conservation awareness among public to get their support for conservation - preservation.

Preservation of Water Bodies

Water bodies are an integral part of city open spaces and connected to various traditions and religious functions. At the same time it provides at time larger open space to the city. It also maintains eco-system. It provides immense potential to tourism in the city.

Many times human interface with the water front's of these water bodies May liable to contaminate and pollution. Therefore it is necessary to preserve and develop these large open spaces, water bodies. The Table below shows the existing water bodies present in Surat:

Table 9-12 Open Lakes in Surat -2009

EXISTING WATER BODIES			
Name of Water Body	**Description of Land**	**TP scheme allotted**	**Area in Sq.Mt.**
Government Pond, Adajan	Adajan	642	31,560
Name of Water Body	**Description of Land**	**TP scheme allotted**	**Area in Sq.Mt.**
Bhimtalao, Adajan	Adajan	59	2,219
Government Lake, Vania Talao, Ugat	Jahangirabad	167	85,710

Surat Municipal Corporation Lake, Subhash Sarovar, Mora Bhagol	Rander	111,115	18,877
SMC Lake, Kansanagar Lake, Katargam	Katargam	304/A/1/A/1	27,200
Government Lake, Dabholi	Dabholi	100	19,655
Gamtalao, Singanpore	Singanpore	23	2,385
Surat Municipal Corporation Lake	Majura-Khatodra	T.P.S.6 (Majura - Khatodra)F.P.161	9,841
SMC Lake	Bhestan	15	13,861
Dindoli Gram Panchayat Lake	Dindoli	352	9,105
Surat Municipal Corporation Lake, Lake View, Piplod	Piplod	T.P.S.6 (Piplod) F.P.99	14,007
Gam Talao, Althan	Althan	T.P.S.37 (Althan), F.P.2	34,564
TOTAL AREA			268,984

Source: SMC

The proposed development consists of Historical Vav conservation, development of jogging track including displaying old city cultural value and trades such as textile, jari & diamond Industry. The estimated cost of the development will be app. Rs.680 lacs.

Table 9-13 Water Body and Planning projects - 2009

Sr. No.	Name of Water Body	Area in Sq.Mt.	Details of development	Appx. Rs. in lacs
1	T.P.S.6 (Majura -Khatodra) F.P.161	9841	Garden & Recreation	30
2	Singanpore Lake	2385	Garden & Recreation	15

Source SMC

To preserve for water bodies it is necessary to control the development around the water bodies. The revised Development Control Regulations have also come into force with sanction of the Development Plan. Provision has been made in the regulations that no development be allowed within a distance of 9.0 mts. from the boundary of the talao, lake, water bodies etc.

In order to raise the sub-soil water, Surat Municipal Corporation has developed percolating bore well with rain water harvesting system on major projects sites. To enforce this the project under taken by the private developers, provision to construct recharging bore well with rain water harvesting system has been made in the revised development control regulations, which is being implement presently. The details of development projects of the water bodies, under SMC are:

Table 9-14 Proposed Garden & Recreation Projects in SMC areas (Rs in '000)

Project Code	Type of project	Location	Estimated Project Cost	Area in sq.mt.
C- 184/5644	Environmental Park	Bhestan	10,000	200,000
C- 439/5641	Garden Development	Kosad EWS	3,000	25,100
C- 439/5641	Garden Development	T.P. 34 Magob F.P. No. R-7	4,300	6,795
C- 439/5644	Botanical Garden - Civil Works	Vaniya Talav	59,720	165,000

C- 439/5644	Lake Development (SWZ)	Bhimragdam Talao	3,000	212,000
Project Code	**Type of project**	**Location**	**Estimated Project Cost**	**Area in sq.mt.**
C- 439/5644	Lake Development (SWZ)	Dumas Talao R.S. No. 83		63,500
C- 439/5644	Lake Development (SWZ)	Magdalla Talao R.S. No. 36		53,925
C- 439/5644	Lake Development (NZ)	Singanpore Talao T.P.S. No. 26, F.P. No. 23 -1, Kosad Block No. 596	3,000	4,047
C- 439/5644	Lake Development (EZ)	T.P.S. 20 F.P. 11 Puna Gam Talao	3,000	15,900
	Lake Development (EZ)	T.P.S. 12 F.P. 100 Puna Gam Talao		7,200
	Lake Development (EZ)	Mota Varacha gam Talao T.P. 18 FP 483		13,557
C- 439/5644	*Lake Development (SZ)*	Unn Gam Talao , R.S. No. 265 Block No. 339	3,000	16,700
C- 439/5644	Lake Development	Goradara Talao Block No. 214	3,000	15,000
C- 442/5645	Existing Zoo - Expansion		27,500	15,000
TOTAL AREA				**813,724**

Source – SMC Budget 2009-10

The Urban Development Plan Formulation and Implementation (UDPFI) guidelines recommend that the metro cities should have provision of 8-10 sq.mt. Open space per person for creating recreational facilities such as parks, maidan, playgrounds, botanical/zoological gardens or other multi-purpose open spaces. Whereas in Surat, only 1.9 sq.mt. Per person space is being allocated as recreational space.

Other Social Amenities:

1. Indoor Stadium: Surat city itself to have an exclusively air conditioned and indoor stadium with centrally air conditioned auditorium with 7000 seats capacity. The total cost of construction of the Indoor Stadium is Rs.21 Crores. This indoor stadium is named as Pandit Dindayal Upadhyay Indoor Stadium. The Stadium is a suitable place to for National, International level sports events such as Volley Ball, Table- Tennis, Gymnastics, Hand ball, Boxing, Wrestling etc.	
2. Gandhi Smruti Bhavan: It is a centrally air-conditioned theatre with a drama stage and an audience hall to seat over 800 person. It is an appropriate place where citizens of Surat can amuse themselves by engaging into various shows.	

3. Sardar Patel Smruti Bhavan: It is a centrally air-conditioned auditorium of total Plot Area of 5700 Sq.mts. used for Cultural Shows.	
4. Sardar Patel Smruti Bhavan : it is an open air theatre now, covered by applying a steel structure. This facilitates an audience of nearly 1400 persons to seat. The arena is stepped with floor made up of kota stone. It has a covered wooden stage with dressing rooms, stage area is 127.40 sq.mts. And audience area is 1351.90 sq. Mts	
5. Sardar Vallabhbhai Patel Museum: In India there are more than 600 museums, which include departmental and University museums. Out of these museums, there are about 62 museums in Gujarat. Sardar Vallabhbhai Patel Museum, a pride possession of Surat Municipal Corporation, turned 118 on 1st February 2008. Museums are "Visual and living history" reflecting all facets of civilization. Very few in the modern society have realized and understood the concept of preservation and conservation of the heritage, which is a part of our history.	
Planetarium: Owing to the technological advancement, it is now possible to view the night sky of the world over in a Planetarium ("Akash Darshan") within a span of 30 to 35 minutes. The concept of Planetarium is helpful not only to the students but also to the people interested in the science of astronomy.	

Other Special Projects that are proposed in Surat City area as follows:-

- Science Center, Museum & Auditorium
- School
- Health Center
- Pay & Use Toilet
- Hospital, College
- Bus Stop Design

Table 9-15 Socio- Cultural Facilities Proposal in City (Rs '000)

Project	Location	Estimated project cost	Outlay	Area sq.mt.	Cost per sq.m.
Community Hall	T.P. No 11 F.P. No. 60/p	15,500	5,000	4,916	3.2

Project	Location	Estimated project cost	Outlay	Area sq.mt.	Cost per sq.m.
Ladies health club	T.P. no 12 F.P. no. 143	2,600	2,593	9,271	0.3
Art performance centre	T.P. no 72 F.P. no. 90	30,000	3,000	6,813	4.4
Health Club / reading Room	Salabat pura	10,400	9,400	1,850	5.6
Utility centre	Chhaprabatha	2,500	1,000		
Community halls	EWS qtrs. H1 package at Kosad	2,500	2,500		
Community halls	EWS qtrs. H2 package at Kosad	2,500	2,500		
Community hall	GHB cop no 17 Pandesra	7,500	7,500	1,000	7.5
Community hall	T.P. 54 Bhestan fp1/a	5,000	3,000	680	7.4
Community hall	D.T.P.S. 40 (Limbayat - Dindoli) F.P. no. 24 Paikee	15,000	10,000	1,850	8.1
Expansion of Narmad Central Library		34,581	5,000	10,250	3.4
Central science centre					
Diamond gallery		17,200	5,700		
Space gallery		6,500	4,000		
Textile gallery		5,000	4,000		
Fun science gallery		2,300	2,300		
Science centre plaza display		2,000	2,000		
Planetorium basement display		2,000	2,000		
Science centre thrill rider		12,500	12,500		
Other works		294,700	40,000		
Total cost		342,200	72,500		

Source : SMC budget 2009-10

As per UDPFI guidelines, there is a requirement of 259 community Halls, 39 recreational Clubs, 39 Music, drama and Dance centers and 4 Socio cultural centers. But at present only one Indoor stadia is provided which is not enough to serve the city for recreational purpose, and 3 theatres and auditorium are provided and only 2 Socio Cultural centre are provided. So there is huge backlog for socio cultural facilities which need to be accomplished.

9.5 EMERGING ISSUES

Lack of educational facilities in slums

- A spatial disparity is observed in the educational facilities with most of the primary, secondary and higher secondary schools in the city located in and around the central zone.
- Educational facilities in the slum localities of the city are also inadequate. For a city with a phenomenal growth rate the number of colleges and professional institutions is very low. There is also a need for research institutions

- As per stakeholder Consultation Report, the existing Municipal Schools needed to be upgraded to improve Educational Quality and reduce Child labor Practice. Also, there was a requirement of play grounds/ halls in Municipal schools.

Inadequacy of health facilities to cater to the needs of Population

- The numbers of Multi-disciplinary and Super specialty Hospitals are also inadequate. Apart from the New Civil Hospital there is only one cardiac super specialty hospital that has been recently set up in the city.
- The Civil Hospital is not easily accessible for a large number of slums spread throughout the city.
- Efficient management of health facilities after the Plague has helped to tackle the needs of the present city population but without additional facilities the future appears bleak.
- According to Stakeholders Consultation Report, there was requirement of more number of Maternity Homes in all Municipal Wards and more number of Special health centers focusing on industrial workers health in industrial area. Also, there's great need of more number of & Increase pay -use toilet. The Sewage Disposal Site in the city creates Unhygienic environment which need to be checked.

Lack of recreational facilities

- There has been a continuous decrease in the amount of open space present in the city over the past decade.
- In the past, the green belts, gardens and parks were put to different urban uses. At present inadequate facilities are present to cater to the recreational needs of the population.
- Huge insufficiency of Socio- Cultural facilities in the city
- As per stakeholders Consultation Report, there is a requirement of Old Citizens Sport organizations, and Senior citizens Parks in city, and, more number of gardens and Play grounds in different part of city.

9.6 STRATEGIES & ACTION PLAN

Education

- Emphasis on pre-primary education and good quality primary education for all, especially for the residents of slum localities.
- Ensuring a minimum level of learning through enhancement of opportunities towards access to literacy programs.
- Professional and vocational colleges to be given importance for setting up employment development resources through education and training programs.
- Ensuring education of the handicapped and development of self-supporting employment opportunities for them.

Health

- Reduction of health risks and practices leading to chronic and infectious diseases through effective implementation of sanitary programs, combined with regular inspection of food joints by the Food and Civil Supplies Department.
- Awareness on pre and post-natal care, and unhealthy practices leading to still-births and infant mortality shall be created through door-to-door education campaigns.
- Reduction of environmental threats and hazards to health through an integrated approach by various concerned organizations and departments towards enhancement of the environment of the city.

Recreation/ Open Spaces.

- Taking up a tree plantation program along the roads to make Surat a Green city.
- Tapi River-front to be developed and converted to act as an effective open space and recreational area.
- Private sector participation in revitalization of the existing waster bodies and green spaces of the city.
- Preservation of Water Bodies
- More Number of Socio-cultural Facilities to be provided as per population.

The Goal

The year 2021 envisages a “Completely Literate and Green Surat” with adequate lung space in all the localities and a “healthy Surat”, free of health risks with adequate health facilities to tackle any situation of emergency.

Institutions who can contribute:

- Government of Gujarat.
- Surat Municipal Corporation
- Private educational institutions
- REC, Government Medical College, South Gujarat University
- Citizen’s council
- Voluntary organizations
- NGOs, CBO

9.7 ACTION PLAN/ TASKS

Education

- Ensure 100 percent enrolment in primary schools.
- Adequate numbers of teachers to be employed in SMC run schools

- Night schools to be opened in slum localities in consultation with community development groups.
- Initiate the setting up of professional colleges in the fields of physiotherapy, dental medicines, tourism, hotel management, marine & aeronautical engineering.

Health

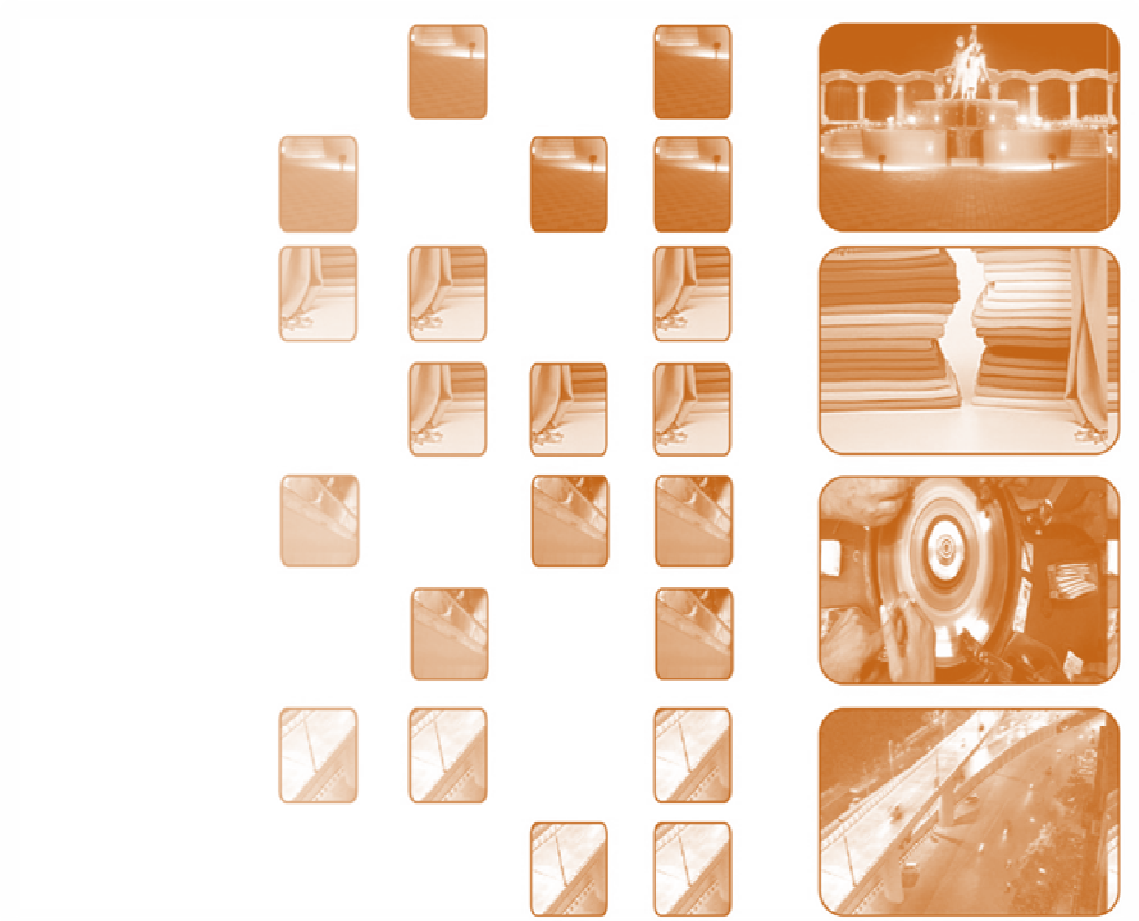
- Effective implementation of health programs in the slum areas of the city
- Augmentation of health facilities in Maskati hospital and increasing the number of urban health centers and the paramedics.
- Regular checks for water contamination in all water bodies of the city.
- Regular checks by the Food and Civil Supplies Department of food served at several eating joints in the city.

Recreation/ Open Spaces

- Provision for green belts in future development plans
- Encourage tree plantation among residents.
- Tapi River Front development plan to be prepared
- Private sector to maintain existing parks/ gardens
- Beautification of community level open spaces
- Preservation & development of water bodies & lakes
- New Health centers, Recreational clubs, Socio- cultural facilities to be developed in the city for increasing population.

Sustainability Indicators

- Number of students per primary school
- Number of students per teacher
- % slum areas without educational facilities
- Infant mortality rate
- Number of HIV cases
- % open space to total area
- % area under gardens & parks to total open space.



Chapter 10

Urban Enviornment

Natural Environment Baseline

River water & Ground water

Floods & Shoreline

Air & Noise

Pollution Control Mechanism

Environmental Improvement in SUDA Area

Emerging Issues

CHAPTER 10. URBAN ENVIRONMENT

The environment of a city is a critical determinant of the health of its inhabitants and consequently, urban productivity. This is in turn determined by the water and air quality. The Gujarat Pollution Control Board is responsible for monitoring water and air quality. It includes under its purview, testing of both surface water and ground water and testing the ambient air quality.

Surat has seen a change in its urban environment as projects in Sewerage, Urban Transport, Housing, Urban forestry, etc are taken up to improve its quality. These projects are in implementation stage or already implemented. Major rehabilitation of slums is in process as the housing units are being constructed. It is worthwhile to note that JnNURM has improved and still improving the quality of life of urban poor.

Surat Municipal Corporation has taken all possible efforts to tap funds under JnNURM and implement the Urban Infrastructure projects which have directly or indirectly helped in improving the quality of air & water and making functional the degraded lands by putting then to certain uses.

This chapter explores the environmental conditions in Surat, both natural and anthropogenic in nature. The first section gives an introduction on natural Environmental baseline which included baseline in and around the city. It gives brief description of climate, topography, drainage, soil, water resources and natural hazards. The second section gives man-made environment which includes air quality & water quality. The next section outlines the issues dominant in the city followed by brief description of the strategies to improve the urban environment.

10.1 NATURAL ENVIRONMENTAL BASELINE

Surat falls in Sub-humid zone and experience hot humid climate. It has comparatively high rainfall of 1143mm in Gujarat. The highest rainfall is recorded in the month of August (average 292mm). It has a perennial river Tapi flowing through the city. However River Tapi experience frequent floods because of its huge upstream catchment area of 62225 Sq.Km. The soil is majorly red & black cotton soil. The terrain is almost flat.

10.2 RIVER WATER IN SURAT

The water quality of the River Tapi is tested analyzed every month by GPCB. Over the years, three locations were selected for sampling viz. Ukai Dam, Mandvi and Kathor Bridge and now forth location i.e Sherulla Bridge is taken for sampling.

Surat and the nearby industrial areas account for 89 of the 563 large and medium water-polluting industries listed by the inventory of the Central Pollution Control Board (CPCB).

It has been stated by CPCB that the stretch of the River Tapi that passes through the city of Surat is moderately polluted. Tapi waters at Ukai Dam and at Mandvi were upgraded to Class A (drinking water source without treatment but after disinfection) in 1997 from class B (useful for outdoor bathing only) in 1991. The waters at Kathor Bridge after entering the city are put under class B. It has been observed that there has been a rise in the COD levels at all three locations in past. The following table shows the status of water quality in river Tapi (2006-07):-

Table 10-1 Status of River Water Quality in River Tapi

River and Location	Parameters	CPCB Standards[1]	Yearly Average				
			2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
River Tapi at Kathor Bridge	PH	6.5-8.5	8.33	7.98	8.18	8.25	8.23
	BOD (mg/l)	30	7.80	7.00	1.90	7.81	6.92
	COD (mg/l)	250	2.00	4.00	16.00	2.05	1.79
	DO (mg/l)	6	15.00	19.00	7.60	10.00	8.00
River Tapi at Mandvi Bridge	PH	6.5-8.5	8.37	8.12	8.18	8.25	8.17
	BOD (mg/l)	30	7.80	7.60	1.30	8.18	7.15
	COD (mg/l)	250	2.00	4.00	6.00	1.93	1.85
	DO (mg/l)	6	16.00	10.00	7.70	10.00	10.00
River Tapi at Sherulla Bridge	PH	6.5-8.5	8.28	8.01	8.14	8.15	8.09
	BOD (mg/l)	30	6.70	6.60	1.30	6.44	6.53
	COD (mg/l)	250	2.00	4.00	5.00	2.10	1.52
	DO (mg/l)	6	12.00	13.00	6.30	5.00	7.00
River Tapi at Kathor Upstream	PH	6.5-8.5	8.43	8.06	8.21	8.25	8.21
	BOD (mg/l)	30	7.80	7.10	1.60	7.73	6.38
	COD (mg/l)	250	2.00	4.00	6.00	2.14	2.01
	DO (mg/l)	6	12.00	14.00	7.60	8.00	9.00

Source: SMC

It has been observed that at Kathor Bridge DO is decreased from its 2005 level of 19 mg/l to just 8 mg/l in 2008-09. This is also the case at all other places, showing the amount of increased pollution level in the river. The present level of DO is still good enough as per the CPCB standards of 6 mg/l. All other parameters are also within the prescribed standards of CPCB.

It is estimated that Surat city generates 512 MLD of sewage. In 2007, it had treatment capacity of 415MLD and 97MLD of untreated sewage was discharged in to river Tapi. Under JNNURM Sewage Treatment Plant of 130 MLD is installed and commissioned recently. Further 40 MLD of Sewage Treatment Plant is under installation at Vesu & Pal-Palanpore. The commissioning of above mentioned capacities will help in improving the water quality in the down streams of south west part of the river by diverting the flow of raw sewage through STP. The functioning of the STPs will ensure the discharge quality of water to the desired standards[2].At the estuary of river Tapi the pollution levels of water

[2] *CPCB Standards of waste water discharge*

in terms of BOD, COD & FC is very high due to large number of sewerage outlets in the river. The commissioning of these STPs would find a change in pollution levels at estuary of river Tapi.

10.3 GROUND WATER IN SURAT

Ground water is the most precious and reliable source of water. Gujarat has 5.96 percent of India's land resources and roughly 2.63 percent of the country's fresh water resource. Utilizable ground water potential across South and Central Gujarat is 36%; North Gujarat is 25%, Saurashtra is 35% and Kachchh is 4%. Availability of ground water resource primarily depends on the litho logy and the recharging of the aquifers. Presence of hard & basaltic rock in the eastern part of the Surat disfavors the recharging of rain water and hence this part having limited aquifer recharge. In Alluvium area ground water withdrawal is done through tube wells while in hard rock area it is done through dug wells and dug cum bore wells.

Surat city accommodates different types of industries including Dyes, Rayon, Fertilizer, Textile process houses, textile power looms and other allied industries.

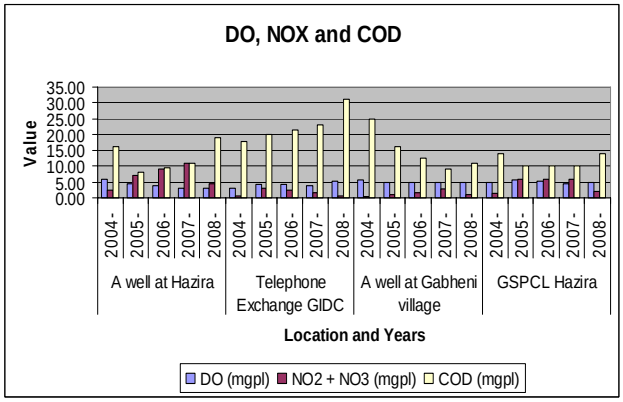


Chart 10-1 DO, NOx, COD in Ground Water

Surat City is considered to be a major center for the textile industries and polishing of diamonds. Areas where such development has taken place are Pandesara Industrial Estate, Bharat Houses. It accommodates about 4.5 lacs power looms for weaving of mainly polyester clothes. Except the Pandesara Industrial area, which is a designated industrial area, all other above areas has industries very close to the residential areas.

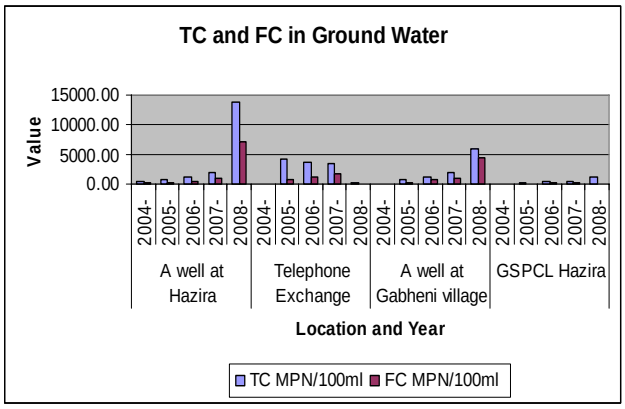


Chart 10-2 TC and FC in Ground Water

Except few industries including some textile houses located in the designated industrial area in the city limits, all other industries were set up long ago with probably no residence around. However, of late, the

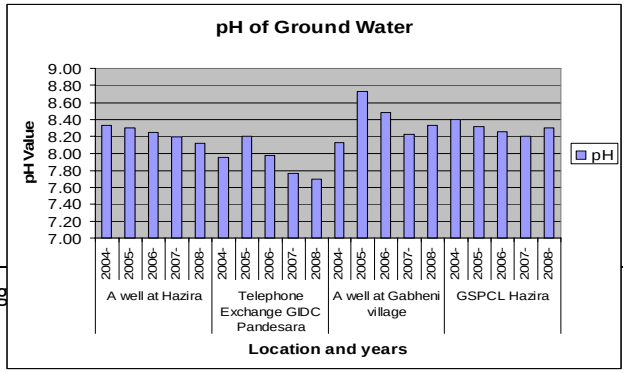


Chart 10-3 pH Value in Ground Water

residences have treated growing around these industrial areas; on account of various reasons like non-availability of proper land, proximity to work workplace, etc.

Most industrial effluent do not come to Municipal sewerage system and hence, find ways to the natural bodies through various earthen drains, for the eventual disposal into the Arabian Sea. Even, the domestic effluents generated from the different parts of City are discharged either partially treated or untreated.

The ground water quality is tested every month by GPCB. Over the years, four locations were selected for sampling viz. a well at Hazira, telephone exchange at GIDC Pandesara, a well at Gabheni Village and GSPCL Hazira.

Well at Gabheni village and GSPCL Hazira shows a higher pH value over the years but it is reducing over the time. COD is continuously increasing in the well at Telephone Exchange at GIDC, showing higher level of inorganic impurities. The wells at Hazira and Gabheni village shows a continuous increase in the Total Coliforms (TC) and FC (Faecal Coliforms) count over the years which is serious matter making the water non-potable without treatment.

Coastal areas covering Chorasi and Olpad Talukas are highly affected by sea-water intrusion hence are not feasible for any type of Ground water development. In this area quality of ground water ranges from 16000ppm of 4000ppm of TDS. [The permissible level of TDS in the water used for irrigation is 2000ppm]. Ground water mostly occurs under unconfined to semi-confined conditions in the area. The deeper aquifer is slightly saline. Area between Mandvi, Surat, Kamrej and Palsana is not feasible for deep tube wells as TDS ranges from 4,000 ppm to 10,000 ppm.

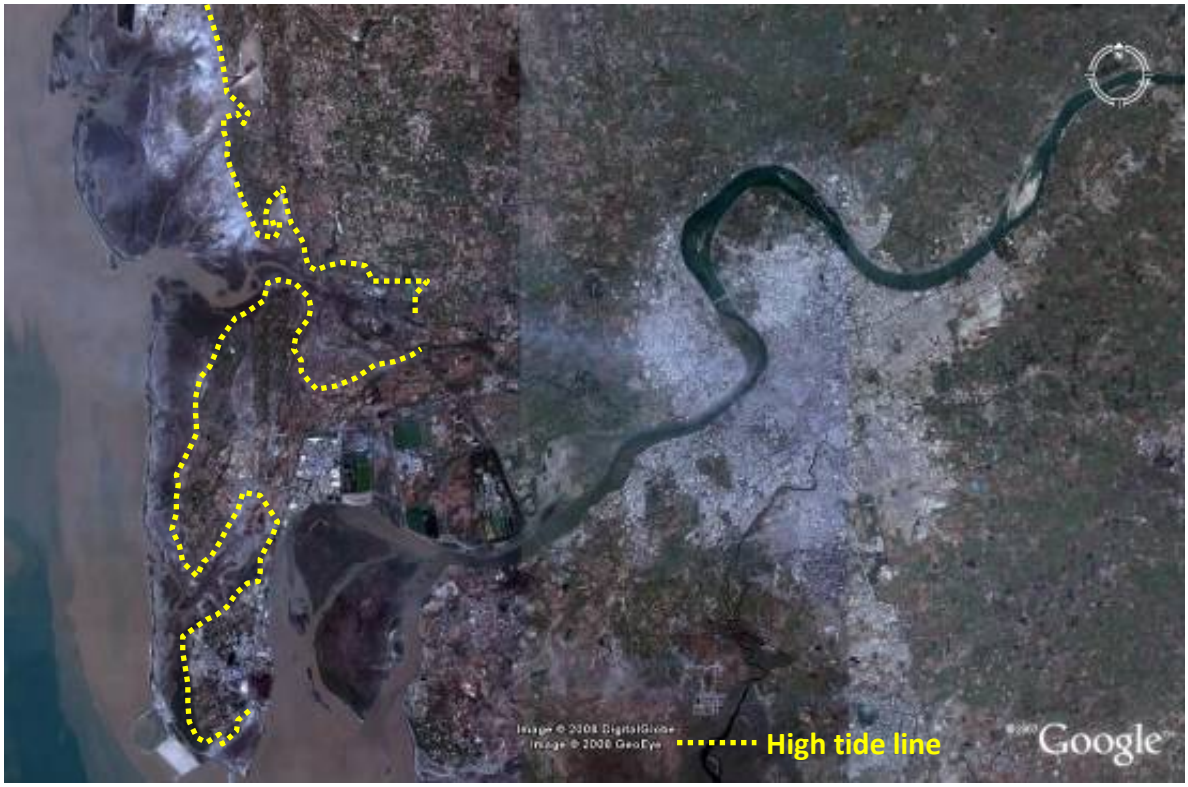
10.4 FLOODS IN SURAT

In 2006, this was first time in the last 200 years that the city of Surat has seen floods of such a large magnitude. Due to incessant rains in Maharashtra, the flood gates of the Ukai Lake were opened releasing the excess waters into Gujarat. A major portion of Surat urban area under the municipal corporation got flooded on both sides of the river banks. It created a big havoc and unprecedented loss of property adding to the misery of the vulnerable population.

It is frequent in Surat to experience floods affecting various areas of the city. Beside the frequent floods in the Tapi river basin, the city has network of creeks, which is a sub-system of larger hydrological system. The Mithi khadi floods have been frequents in the last decade. Along the creek there are number of settlements of industrial and migratory workers and thus, the impacts of the swelling of the creeks are also crucial. SMC have made attempts of diverting the inflow of the creeks in the river in the recent years.

This region has high rainfall and less number of rainy days. This has caused sudden accumulation of water in Ukai dam which were released in the downstream of the river flowing through the city. The river when passes through the city has limited basin width and depth. The existing slope has reduced flow of water. During high tide the back water from sea reduces further flow of water. It is estimated that there is certain rise in sea level. It becomes beyond the carrying capacity of the existing river basin which results in frequent flooding after release of water from Ukai dam located at the upstream. The following map shows the vulnerable areas under frequent flooding.

It has been observed and experienced that a tidal effect from the Arabian sea propagate beyond Varachha and Sarthana water works, bringing lot of salt and salinity. In order to prevent the tidal effect and to create an impoundage near the city of Surat a weir at Singanpore was constructed in the period of 1993 to 1996.



Map 10-1Map Showing Coastline around Surat City

10.5 SHORELINE

It has been observed and experienced that a tidal effect from the Arabian sea propagate beyond Varachha and Sarthana water works, bringing lot of salt and salinity. In order to prevent the tidal effect and to create an impoundage near the city of Surat a weir at Singanpore was constructed in the period of 1993 to 1996.

There are several reasons for change in shoreline. One of the major reasons for change in shoreline is the destruction of mangroves. The destruction of mangroves has also reduced the fish breeding. This has reduced fish considerably. The rise in mean sea level has also resulted sea water entering on main land. The main land vegetation in this area has seen a change. There is a salinity ingress in the nearby fertile agriculture land which has forced to change the crop or left the land barren.

10.6 AIR

Ambient air quality is being monitored by GPCB regularly at three locations in Surat. They are: Air India Building, SVR Engineering College and BRC Udhna (industrial). Monitoring stations were also set up at Dumas, Surat Station, Old Civil Surat, GIDC Pandesara and GIDC-Sachin from where monitoring was done during 1993-94 but was later discontinued from the succeeding year. The monitoring station at GIDC Sachin was reopened during 1998-99.

Vehicular pollution generally accounts for 60-70 per cent of total pollution loads of a city and the main cause is the two-stroke two wheelers, auto rickshaws and multi axle vehicles. Efforts have been made by the authorities to convert the auto rickshaws and state transport buses into CNG vehicles.

Based on AAQ Data, Central Pollution Control Board has identified six cities in Gujarat in 'Non-Attainment' category. The SPM and RSPM levels have been found to be relatively higher than as specified in the standards in most locations in the city.

The NO_x levels have always been below the CPCB prescribed standards but during the year 1998-99 there was a major rise in the values at all three locations. SO_2 levels, which were earlier above the prescribed limits have come down significantly and are now below the limits.

SMC has prepared Comprehensive Mobility Plan which envisages moving people and not vehicles. With this vision it is expected that Public Transit Systems will play a major role. With this it is expected that the SPM and CO_2 will be reduced substantially with the reduction in number of vehicles. SMC has got an approval for BRT sanctioned from Government of India under JnNURM and the work is in progress. The benefits of these can be accrued only after implementation of this system and is expected to be completed by mid of 2009. The following table shows the status of air quality.

Table 10-2 Status of Air Quality at various locations in Surat city

Location	Parameters	Yearly Average				
		2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
SVR Engineering	RSPM	106	121	98.50	76.00	74.00
	SPM	140	179	167.00	155.00	146.00

Location	Parameters	Yearly Average				
		2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
College	SO_2	19	18	15.96	13.92	13.18
	NO_X	25	23	22.39	21.77	20.67
Air India Building	RSPM	130	126	108.00	90.00	86.00
	SPM	173	186	186.00	186.00	170.00
	SO_2	23	22	20.14	18.27	16.67
	NO_X	32	27	27.25	27.49	24.21
BRC Udhna	RSPM	135	131	117.00	103.00	98.00
	SPM	180	194	203.50	213.00	192.00
	SO_2	24	22	22.22	22.44	19.89
	NO_X	33	27	27.81	28.62	25.60
GIDC Sachin	RSPM			62.50	125.00	135.00
	SPM	232	238	248.00	258.00	265.00
	SO_2	34	45	44.07	43.13	7.67
	NO_X	18	16	20.53	25.06	25.44
Traffic Point Railway Station	RSPM	108	91	86.00	81.00	75.00
	SPM	372	224	195.50	167.00	149.00
	SO_2	2	8	10.77	13.54	14.47
	NO_X	20	12	17.00	22.00	21.91

Table 10-3 National Ambient Air quality Standards (NAAQS) (Revised in Nov 2009)

POLLUTANTS	Time Weighted Average	Concentration of Ambient Air		
		Industrial Area Residential Rural and other area	Sensitive area	Method of Measurement
Sulphur Dioxide (SO2)	Annual Average	50µg/m^3	20µg/m^3	Improved west and Gacke Method
	24 hours	80µg/m^3	80µg/m^3	Ultraviolet fluorescence
Oxides of Nitrogen (NO2)	Annual Average	40µg/m^3	30µg/m^3	Jacab Hochheister modified (Na-Arsentire method
	24 hours	80µg/m^3	80µg/m^3	Gas Phase Chemilumine Scene
Suspended Particulate Matter (SPM) (size Less than 10µm)	Annual Average	60µg/m^3	60µg/m^3	High Volume sampling (average flow rate not less than 1.1 m^3/minute)
	24 hours	100µg/m^3	100µg/m^3	
Particulate Matter (size Less than 2.5µm)	Annual Average	40µg/m^3	40µg/m^3	Respirable particulate matter sampler
	24 hours	60µg/m^3	60µg/m^3	
Lead as Pb	Annual Average	0.5µg/m^3	0.50µg/m^3	AAS method after sampling using EPM 2000 or equivalent filter paper
	24 hours	1.0µg/m^3	1.0µg/m^3	
Carbon Monoxide	8 hours	2.0mg/m^3	2.0mg/m^3	Non dispersive

	1 hour	4.0mg/m^3	4.0mg/m^3	infrared spectroscopy
Annual Average : Annual Arithmetic Mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval				
24 Hours Average: 24-hourly/8-hourly values should be met 98% of the time in a year. However 2% of the time, it may exceed but not two consecutive days.				
1. The levels of air quality necessary with an adequate margin of safety, to protect the public health, vegetation and property.				
2. Whenever and wherever two consecutives values exceeds the limit specified above for the respective category, it shall be considered adequate, reason to institute regular/continous monitoring and further investigations. **(Source : Ministry of Environment and Forest)**				

The SPM levels have always remained above the prescribed limits for residential, industrial and rural areas. This can be mainly attributed to the high concentrations of dust and other construction materials in most parts of the city. Though the city is cleaned almost twice a day, the road side sand particles are the main reason for increase in particulate matter.

It is to be noted that these values do not reflect the situation in the entire city and during 1993-94, when monitoring was done at other places like Surat Station, Dumas, Old Civil Surat, GIDC-Pandesara and GIDC Sachin, the SPM levels at all the locations were above the prescribed residential and rural area limits.

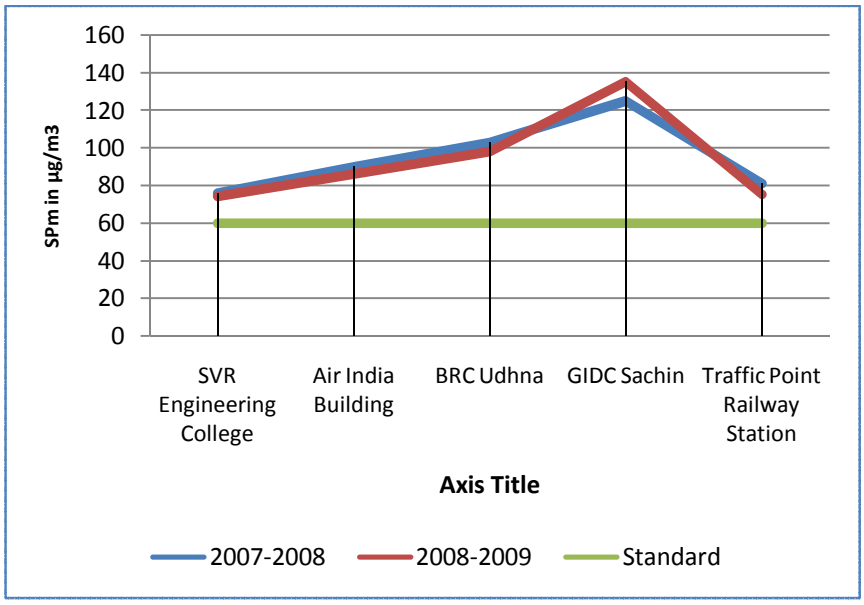


Chart 10-4 Suspended Particulate Matter in µg/m3 Level in Surat Noise

Noise is often measured in decibels (dBA). It has been recognised as ambient air pollutant. Standards in this regard are laid down under The Environment (Protection) Act, 1986 (and rules made there under) and under the Model Rules of the Factories Act, 1948 for occupational health and safety purposes. The ambient air quality standards in respect of noise as notified under the Noise Pollution (Regulation & Control) Rules, 2000 are as under:

Table 10-4 Standards Noise quality

Category of Area/Zone	Limits in dB(A) Leq	
	Day time (6 am to 10 pm)	Night time (10 pm to 6 am)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

Noise Pollution reduces energy level of human being very quickly. Noise pollution makes headache in the brain. For example, if you keep constantly hearing noise at more sound or you other type of pollution then you feel irritated and reduce in energy level. Medium to very high levels of noise have been observed in the residential areas very close to the industries. In fact, most of the textile power looms and the diamond polishing units were observed to have been located within the residences.

In the long run the basic problem is it to prevent noise before it occurs. This requires a strategy that goes after the sources of noise before they harm people, not after the fact. To begin with, the city doesn't adequately regulate new development in a way that can create noise-free environments. The city's land use regulations require that any major new development that is subject to city's land use review procedure undergo an environmental assessment. This should consider potential noise levels produced by the development and the noise levels that the project's occupants are expected to experience. If it's found that the new development may have a negative impact on noise levels, the developer may volunteer to implement measures to reduce or counteract the noise. For example, if a new apartment building is on a busy road with heavy traffic, the developer will typically agree to put in triple-pane windows. But this just blocks the noise for some while everyone else on the street has to suffer the traffic noise.

Thick windows and quiet neighbors in new apartments won't solve probably the biggest noise problem -- street noise. This requires another set of strategies to deal with the excessive volume of traffic on the streets. By improving the overall environment for people who walk, we can address the problems of noise, air pollution and safety, all of which are serious public health problems. Unfortunately, the city's traffic policy is mostly geared to moving more cars and trucks through the streets, which only creates more noise. It's really quite simple: less traffic, less noise and a better environment.

The benefits of traffic reduction would be especially great in congested areas like old city area, where fumes are furious and there's a honk a minute. Trucks and buses should have improved equipment to buffer noise. Truck deliveries could be limited to times of day when there are fewer pedestrians, a common practice in other cities around the world.

The following table depicts the yearly average of the noise in Surat city from 2004 to 2009.

Table 10-5 Average Noise Levels in Surat City

Sr. No.	Year	Average Maximum Noise in d.B. (A)	Average Minimum Noise in d.B. (A)
1	2004-2005	106.88	95.60
2	2005-2006	106.38	98.05
3	2006-2007	86.26	80.37
4	2007-2008	66.13	62.69
5	2008-2009	64.92	61.67

It shows that from 2004 till 2009 the maximum and minimum noise levels are gone down considerably but still they are high as compared to the standards prescribed by CPCB. These have to be further brought down.

10.7 POLLUTION CONTROL MECHANISMS

10.7.1 INSTITUTIONAL FRAMEWORK

The GPCB is the nodal agency that looks after the enforcement and implementation of environment laws in the city. The environmental management of the city is looked after by several agencies. All these agencies are to act under the co-ordination of GPCB.

GPCB implements pollution control laws in the entire state and is guided by the Central Pollution Control Board. Surat Municipal Corporation can now take up policy matters with respect to environmental protection under the 74th CAA's provisions. The SMC's role assumes significance as the provider and facilitator of any development in the city.

SMC has set up the ambient air monitoring van in partnership with the TIFAC centre under mission REACH at the cost of Rs. 120 lakhs in the year 2004.

State Public Works Department is responsible for the maintenance of the major water bodies in the city. The State Highways Department and the National Highway Regulatory Authority are responsible for the maintenance of the highways in the city. The Regional Transport Office in Surat has responsibility of managing issues due to the Vehicular growth in the city and the Surat Traffic Police is responsible for the implementation of traffic management initiatives.

As part of urban forestry, huge projects can be taken up either by the SMC or by the Deputy Conservator of Forest, Social forestry division, Surat. In the last four years itself, the following work was carried out by SMC:

- 45 Nos. of gardens & 6 Nos. of lakes are developed in different zones.
- 2, 67, 237 Nos. of trees are planted along the road side & road divider.
- 3, 28,778 Nos. of trees are planted in large open space as mass plantation for shelter belt & Green belt.

10.7.2 REGULATORY FRAMEWORK

GPCB is empowered to take legal action and punishable measures against law offenders under the EP Act. The Board can also monitor the industrial discharge and terminate the operations if an industry is found flouting the norms.

Note: Ambient Air Quality Standards (CPCB) for Industrial areas (24 hours).

- » SPM 100 µg / m3
- » SO2 80 µg / m3
- » NOx 80 µg / m3

The agencies looking after the pollution problems with respect to vehicular pollution, discharge of untreated sewage, etc. in the city are:

- » GPCB
- » SMC
- » PWD
- » Road & Building Department
- » National Highways Regulatory Authority
- » RTO, Surat
- » Surat City Traffic Police

The "Environmental Protection (Prevention & Control) Act, 1986"; Water Pollution (Prevention & Control) Act and the Air Pollution (Prevention & Control) Act govern pollution control and prevention activities in the city.

10.8 ENVIRONMENTAL IMPROVEMENT IN SUDA AREA

Several initiatives have been planned. These include the development of gardens, lakes, gas/electricity based crematorium etc. some to the details include:

One Garden in each T.P. Scheme will be developed for beautification of the area at the cost of Rs. 50 Lacks per Garden with a total cost of Rs. 33.5 Crores.

Existing 4 Lakes in SUDA Area will be developed at the cost of Rs. 5.5 Crores per Lake with a total cost of Rs. 22 Crores. The Lakes will be developed in such a way that the Water Bodies are preserved and are also useful in storing the Rain water and reducing the flooding of area. Two Crematoria in the SUDA Area will be constructed at the cost of Rs. 5 Crores each with a total cost of Rs. 10 Crores. The Crematorium will be run on Gas / Electricity to reduce the Pollution and to save the natural wood which is used in present Crematorium.

10.9 EMERGING ISSUES

WATER POLLUTION

Several reasons can be attributed to the pollution of the water bodies in the city. The most important of them are:

- Encroachments along major natural drains of the city resulting in obstruction of the natural flow of water. This results in flooding and stagnation of water, thereby rendering the surrounding areas susceptible to infections and communicable diseases.
- Till recently, the lack of comprehensive sewerage system has led to large quantities of untreated wastewater being drained into the River Tapi. This has led to degradation of ground water too.
- The letting out of wastewaters by several small-scale industries in the east and south zones, either into the nearby drains or dub-bores has polluted the surface as well as ground waters.
- There are no monitoring stations to estimate and assess the quantity and quality of wastewaters being generated in the city. The obvious results of all the above-mentioned reasons are health risks to the citizens of the city.

Under JnNURM sewerage treatment plants have been taken which would reduce the pollution level of river Tapi.

Air Pollution

All the air quality monitoring stations in the city has recorded very high SPM levels in the city. This is due to several internal and external factors of which the most important are: the high volume of dust suspension in the city is mainly due to the climatic conditions as well as the un-surfaced margins on almost all the roads in the city. In addition, Surat has a greater mix of land uses. The mix of small scale industries and residential neighborhood is common in many urban areas creating difficult situation for the residents. During the ward level consultations, many residents raised an opposing to the neighbouring industries which create noise and air pollution. Though, it is also noteworthy the mix of land use has made the city more compact in term of its size with all the advantages of being more accessible. However, the adverse land use leads to greater conflict of interest within the city.

Rapid growth of vehicular population during the past decade is also a concern. Most of these vehicles are mostly not compliant with the BHARAT-II norms and release dangerous exhausts. The climatic conditions of the city generally cause these exhausts to remain suspended in the air. In spite of the Bharat-III norms being made applicable in Surat since April 1, 2005 only the vehicles with CNG technology comply with the same.

Inadequate traffic management measures have reduced the average speed of vehicles on the roads thereby increasing the travel time and hence the vehicular pollution. Chaotic movements at junctions have increased the dimension of the problem. The small number of air quality monitoring stations in the city with an area of 326.515 sq.km and population of above 33 lakhs do not give the true picture of air pollution in the city.

Unaccounted discharge and pollution

The discharge from both textile dye stuff had already polluted water to a great extent. GPCB has already conducted a study to notify the industrial areas. These areas are demarked for air & water polluting and hence set the categories. The Costal Regulation Zone needs to be enforced to clearly demarcate the areas restricting it from various activates to conserve the ecosystem.

The ever increasing demand for industrial plots and the capacity of the environment to absorb the discharge has posed several unanswered questions. The industrialization has challenged the local ecosystem. On other hand the geographical location has a tremendous pressure for need of SEZs and industrial areas by GIDC.

Destruction of Mangroves

The increases in population along the coast and industrial development have tremendous pressure on fragile coastal ecosystem. On and off-shore construction, port development, recreation, Oil and Gas developments and other activities are causing modification and alteration on the coastal area. Mangroves at Hazira are at real threat and this has reduced the fish in the sea water. Also during high tide the sea water occupies several meters of land causing a problem of salinity ingress in nearby land. To prevent further salinity the plantation and protection of mangroves would help in preserving the ecosystem.

Hazira, though it is not in the jurisdiction of SMC or SUDA, requires clear plans to keep a check on industrial pollution and to mitigate future disasters. Mangroves near the Hazira jetty have decreased from 18 to 13 ha as quoted in Journal of the Indian Society of Remote Sensing. (Vol. 33, No. 3, 2005). For plantation and protection of mangroves, if required assistance from Bombay Natural History Society (BNHS) may be helpful.

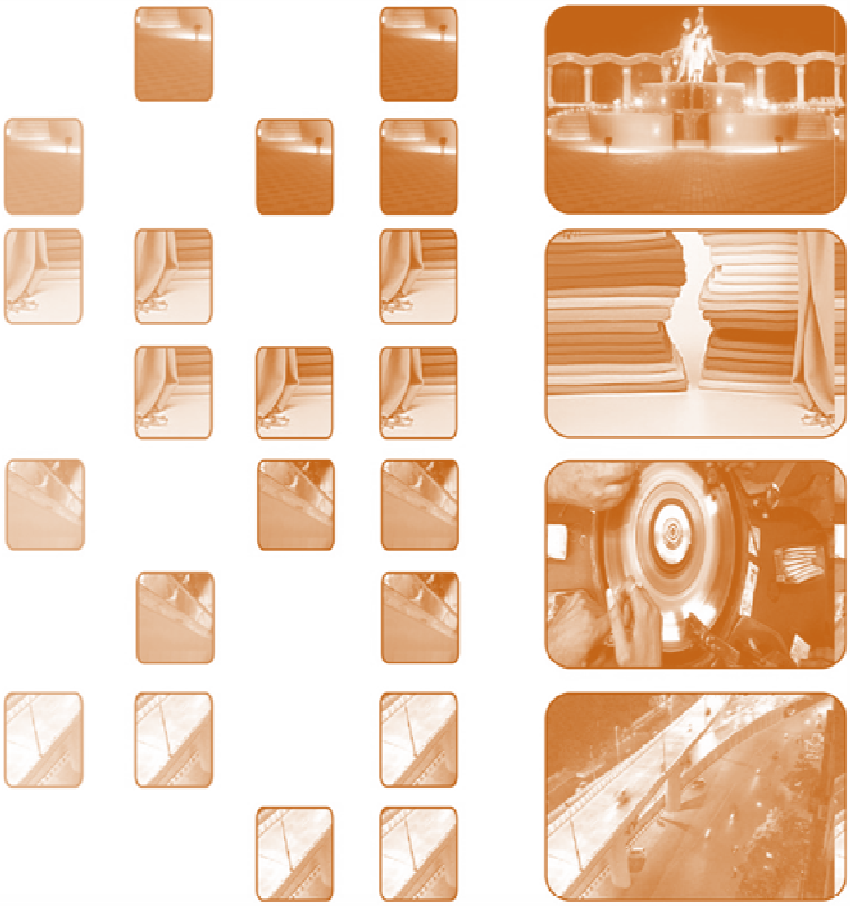
Climate change:

The location of Surat along with risks like floods due to river overflow, local high tide inundation, emergence of flood plain construction along Hazira corridor, vulnerability to further sea level rises, high number of vulnerable communities residing in the slums makes it one of the most vulnerable cities to climate change. Recently Surat and five other Indian cities are among the 17 from Asian Cities Climate Change Resilience Network (ACCCRN) selected by US-based Rockefeller Foundation under ‘International Climate Change Initiative' on a pilot basis. For this, initial grant of $50 million will be given to three Indian cities to prepare them to cope with the effects of climate change.

These cities are Surat, Indore and Gorakhpur. The foundation through ACCCRN initiative will provide clear plans and strategies for building resilience to the impact of climate change in the city.

Need for an Integrated environmental Planning

The Urban Environment plan with the regional plan indicating land capability and land suitability is very much a need of an hour. These plans will provide a base for action plan. Development of technologies has helped in various fields of applications like agriculture, coastal zone management, urban planning, forest and environment.



Chapter 11

Heritage and Conservation

Heritage: Setting the Boundaries

Built Heritage and Sites

History of Surat

Brief Inventory of Major heritage resources of Surat

Institutional Setup and Heritage Property

Issues & Strategies

CHAPTER 11. HERITAGE AND CONSERVATION

Surat city has a fairly strong historical background and heritage sites. It played a pivotal role in the National Freedom Struggle of India. Public and private buildings in municipal areas have heritage value. These sites are beautiful proofs of town history and it generates revenue in the long run. Therefore it is very important to conserve the heritage sites which are located in different parts of Surat and also it is the duty of all local governments to initiate inner city revivals. This chapter focuses on the need for identification of the heritage structures in the city and the strategies to be adopted for its preservation.

11.1 INTRODUCTION

Heritage means significant architectural monuments, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science. Heritage plays important role in the socio-economic and cultural profile of the city. Urban heritage comprises archaeological sites, remains, ruins, and monuments protected by the Archaeological Survey of India (ASI) and their counterparts in the States, and also a large number of unprotected buildings, groups of buildings, neighborhoods, and public spaces including landscapes and natural features which provide character and distinctive identity to cities.

Four Values of Heritage Structures:

As explained below, the following types of four values were identified by William D. Lipe (1984) for heritage structures.

A. **Historical Value/ Associative/Symbolic Value:** Cultural resources that are regarded as tangible links to the past. They are often valued as symbols or even mnemonics of past experience or heritage. The associative value comprises sites and artifacts that are perceived as important for group, national, or personal identity.

B. **Archaeological value /Informational Value**: This value is regarded as providing information, knowledge, or data, and emerges from formal research in a wide variety of disciplines (archaeology, art history, architectural history, geography, etc.). For many archaeologists this value is considered paramount, as it is the knowledge gleaned from archaeological sites that archaeologists pursue.

C. **Aesthetic Value**: This value derives primarily from an appreciation of style, beauty, and art. It is the value most appreciated by dealers, collectors, and many museum curators and perhaps by many in the general public as well. It is usually

gleaned from the physical object itself and generally does not require contextual information.

D. **Economic Value:** This value comprises a monetary benefit to the cultural resource or object. As examples one may include utilitarian uses, such as adaptive reuse of historical buildings; the use of artifacts as commodities, for example in the art market; and heritage or cultural tourism

11.2 HERITAGE: SETTING THE BOUNDRIES

Surat has some good heritage resources which are spectator of city growth. Urban heritage is classified under two categories.

11.2.1 TANGIBLE HERITAGE

This includes buildings and physical elements of architectural and historical significance. The foremost heritage assets are the Indo-Islamic monuments of the 15th to 17th centuries, British and Dutch buildings. Categorization of Surat's Tangible Heritage has been in the following ways.

» **Heritage Buildings**
- Religious : Temples, Mosques , Churches etc
- Institutional: Colleges. Schools, Offices
- Historic : Fort, Dutch Post office and buildings with associative significance

» **Group of Heritage Buildings: This category includes areas/precincts which are of heritage significance due to a Contiguous Heritage character.**
- Heritage Wards : Municipal Wards with high heritage content
- Heritage Streetscapes: Streets which have heritage significance due to cluster of heritage buildings.
- Riverine Heritage: This includes areas and structures associated with the River and its Archaeological sites, immediate surroundings including banks.

Many Monuments in Surat have been declared to be of national importance under the Ancient Monument and Archaeological Site and Remains Act, 1958.

Fortifications, Administrative Complexes:

Surat castle/fort, Surat Municipal Corporation Office.

Memorials, Tombs:

The Clock Tower, Gopi Talav, Kavi Narmad's home Saraswati Mandir, Khavaja Didar Dargah, Rander Islam Gymkhana.

Table 11-1 Buildings of National Importance

No.	Name of Property /Building	Location
1	The Mirjan Sami Mausoleum	Nr. Mughal Sarai
2	British Cemetery	Katargam Darwaja
3	The Tomb of Gerald Aungier	Katargam Darwaja
4	Mausoleum of Oxenden Brothers	Katargam Darwaja
5	Mausoleum of Baron Adrian Van Reede	Dutch Cemetery ,Nr. Katargam Darwaja
6	A Jovial Dutch-Man's Tomb	Dutch Cemetery ,Nr. Katargam Darwaja
7	The Armenian Cemetery	Nr. Katargam Darwaja

Source: SMC, 2009

Religious structures:

Parsi Fire Temple, Chintamani temple, CNI Christ Church, Ambikaa Niketan, Kantareshwar Mahadev Temple, Nausaiyid Mosque, Jumma Masjid, Hindu Milan Mandir, Kshetrapal Mahadev Temple, Agam Temple, Saiyidd Idrus Mosque, Kuvvat -e-Islam Mosque, Zakaria Mosque, Agam Temple.

Mughal Sarai

Kuvvat -e-Islam Mosque

Residence in Wall city

Urban Villages:

Urbanised historic villages or traditional settlements incorporated within the urban limits like Rander, Katargam, Singanpore, Ved, Fulpada, Vesu from that Rander was the principal commercial centre, long before Surat came into prominence. It was ancient town where Arabs and Kafa came and settled in 11th/12th century. They over powered Jain population and became rulers. Trading with Malacca, China, Sumatra, etc., spices, silk, musk and porcelain were the major business.

Living settlements such as the historic Walled City with its traditional mohallas/sheri/wad and historic housing stock including havelis, gala type houses e.g. Zapa Bazar, Gopi Pura, and Salabatpura.

11.2.2 INTANGIBLE HERITAGE

This comprises movable artifacts, handicrafts, folklore, myths, legends, spirituality, traditional knowledge, rites and rituals, festive events, visual and performing arts, music, literature, language, dialects, traditional medicine, culinary traditions etc. which are intimately linked to the built heritage.

In the recent initiative taken by the Surat Municipal Corporation towards Heritage Conservation has identified the Intangible Heritage in following categorizes

- **Arts and Crafts:** this category includes all traditional arts, crafts, plays, dances, music, literature, poetry, events and activities which are of any heritage significance. (E.g. Navsari weaving)
- **Cultures and Traditions:** This category includes significant and symbolic cultures and traditions of the communities of surat which are of Heritage significance (E.g. Kite Flying, Ghees Festival, Navratri Celebration)
- **Traditional Trade and Commerce**: This category includes all traditional trades/commerce of surat and the places, events, activities, traditional markets, associated with these traditional and commerce. (E.g. Zari trade, Power Looms, Diamond Industry)
- **Music, Plays, Poetry and Literature:** This category includes the literature and plays of Heritage significance. (E.g. Kavi Narmad's Granthawali, Parsi Natak)
- **Traditional Communities:** This category is associated with the communities present in surat with historical significance. (E.g. Bhoras, Jains, Parsis)
- **History of Surat:**
    - History related to associations with the events/persons like arrival of British
    - Trade and Commerce related History
    - Folklore. Literature, documents erlated to the evolution of the city.

Cultures and Traditions:

Surat is well known in India for its unique Surati cuisine. Some unique dishes of Surat include Surati Ghari, Locho, Surati Undhiyu, Rasawala Khaman, Cold coco, Surati 'Ponk' and 'Undhiyu'. Many of the popular dishes of Gujarat originated in this region. It is said thatall Surtis are proud to repeat "Surat nu jaman ane Kashi nu maran!" The most popular eating spots are roadside kiosks, called "laaris" or "rekdis". In the cooler winter months, Suratis converge at river Tapi's banks to eat Ponk; it is a roasted cereal that is available only in this part of the world.

Gujarati literature has enormous connection with Surat. Surat is birth place of eminent Gujarati Shayar Mariz and a famous poet, literate Veer Narmad. With the help of journalism and lectures Narmad tried to remove blind faith, rigidity, social taboos and inhibition. City also has other renowned personalities like the first ever Gujarati Novelist

Nandshankar Mehta, frontline educationalist Mahipatram and Ramanbhai Nilkanth, humorist Jyotindra Dave and leading columnist Dhansukhbhai Mehta.

Festivals

All major Indian festivals like Deepavali, Ganesh Chaturthy, Janmashtami are celebrated in Surat with great rejoice holding their traditions and culture. They celebrate festivals and events round the year.

Chandi Padvo: The celebration of Chandi Padvo which usually occurs around October and is a holiday unique to Surat. This day comes after one of the two biggest full moon days of the Hindu calendar year, "Sharad Purnima". On this day, Surtis buy almost 100 tons of Ghari and other Surti delicacies, then head to the city's seaside beach area, Dumas where they have dinner and a late night snack under the full moonlit sky.

Kite Flying Festival: One of the very popular festival in the city is the kite flying festival that have started in the year 1989 in Ahmedabad. The main highlight of this festival is kite flying competition and it is held on Makar Shankranti in the month of January. On this day, the sky is decorated with a plethora of colorful and designed kites. People of all age will participate in this event that continues from morning to the end of the day. During night, the sky is adorned with ‘tukkals’- a special kind of illuminated box kites that are strung together in a series. Though held in a smaller scale than Ahmadabad, Surat kite festival attracts specialists in kite flying from different parts of the district. Participants from France, Malaysia, Korea, Abu Dhabi, U.K, China and Israel and other countries also come here to take part in the event

Dang Durbar: Dang Durbar, is an annual fair which represents the old tradition of kings and chieftains who would visit the city of Surat to meet in the popular Durbar. It is held in the early months of spring (January/ February), few days before Holi festivals. Presently, it is the gathering of various tribal people from different parts of the district in their traditional attire and garments. The festival exhibits the arts and crafts of tribal and the festivities displays the culture and tradition of the region. Traditional dandia and garba dances are performed tuned to the popular music of the region called 'ras'. The atmosphere, marked by the sound of shehnai, makes the fair lively and pleasant. Traders from different regions attend this fair to display and sell their products.

Chauta Bazar

Navratri Festival

Cinema Road

Trade and Commerce:

From ancient time itself the city of Surat is remained as one of the major shopping centers in India. The city is the favourite shopping destination of Gujarat and a major trading center of Western India.

The city is known for the textiles and diamonds. A major part of worlds diamonds are cut and polished from here. It has a vast textile market with fine silks and exquisite brocades. The silk sarees from Surat are famous nationwide and it has a huge saree market. Besides the pure silk sarees, one can also find sarees adorned with works of Kinari and salma.

Shopping of traditional handlooms and handicrafts works will make a fantastic experience for the tourist. Surat is also famous for gold thread embroidery, brocades, gold and silver. It is of one of the most important zari-manufacturing centre in India. Woodwork is another specialty of the city. It is also famous for the dazzling and beautifully designed jewelery works.

The tourist can purchase variety of things from this highly commercialized and industrialized city. The city has a number of shopping malls and centers. One could also do shopping in the shops maintained by the Gujarat state government. Every year an Annual Expo of Surat textile is held in the city that showcases the entire range of textiles including dress materials, saris and fibers manufactured here.

Chuta Bazar: It is the well known old retail market in Surat which merged in the walled city's major corridors.

11.3 BUILT HERITAGE AND SITES

According to the Ancient Monuments and Archaeological Sites and Remains Act, 1958 :- "Ancient Monument" means any structure, erection or monument, or any tumulus or place of interment, or any cave, rock sculpture, inscription or monolith which is of historical, archaeological or artistic interest and which has been in existence for not less than 100 years and includes:

- **Remains of an ancient monument;**
- **Site of an ancient monument;**

Such portion of land adjoining the site of an ancient monument as may be required for fencing or covering in or otherwise preserving such monument, and the means of access to, and convenient inspection of an ancient monument.

However, for the purpose of documentation of Built Heritage under National Mission, the scope has been enhanced by defining any structure that belongs to pre-independence period and 1950 has been considered as the cutoff date. This has been

decided considering/ realizing the fact that heritage structures during pre-Independence period show the influence of colonial architecture and sometimes the typical traditional architecture of a region that are no more in continuity. Hence these are unique to our present architectural tradition. Further, such built heritage will be considered for documentation that is architecturally, historically, archaeologically or aesthetically significant for reconstruction of regional history.

11.4 HISTORY OF SURAT

Surat finds mention in the Mahabharata when Lord Krishna stopped here during his journey from Mathura to Dwarka with his cows. According to the Sanskrit scriptures, this area was under the control of the western Chalukyas in AD 610 and remained under Hindu kings till 12th century. The wealth and prosperity of the city started in the 12th century when Parsis first settled here. Long before Surat came into prominence, Rander was the principal commercial centre, south of Broach. It was ancient town where Arabs and Kafa came and settled in 11th/12th century. They over powered Jain population and became rulers. Trading with Malacca, China, Sumatra, etc., spices, silk, musk and porcelain was the major business. As prosperity of Rander declined in 16th century, on account of raids by Portuguese, Surat began to assume importance. The port of Surat enjoyed great prosperity in 16th, 17th and 18th centuries. With rise of Bombay, it ceased to be a port of importance.

11.4.1 SURAT BEFORE 15TH CENTURY

Surat city has glorious history dates back to 300 BC that time it was under the Mauryas of Magadha after them Various rulers came in surat Indo-Greeks, Kshaharata Kshatrapas, Abhiras, Guptas, Traikutakas. In old Sanskrit scriptures, reference of “Lata Pradesh" is prominent. This area comprised of the entire South Gujarat belt. Western Chalukyas conquered Lata Pradesh in 610 AD and thereafter Hindu domain continued upto 12th century, when Kutbb-Ud din-Aibak, General of the Muhammad Shahab-Ud-din Ghori raided Rander and Surat in 1194 A.D., Persian and Arab writers do not speak of Surat till after 12th century. As Abbe Reynal says, "At the beginning of 13th century, Surat was nothing more than a mean hamlet." Learned Brahmins called city of Surat as Suryapur (say around 15th/16th century) when Surat was already a city of great trade. Modern Surat is supposed to be built on the site of old Hindu town of Suryapur. Sir Monier Williams suggests that the old name of the town was "Suraj" (Sanskrit Surya) - city of sun. A Muhammadan ruler wishing to change its Hindu into one more significant Muslim domination converted "Suraj" into "Surat" (a chapter in Kuran). Subsequent to Muhammad Sahab-ud-din Ghori, the next mention of Surat is in 1347 A.D., in connection with the rebellion of Gujarat during the reign of Muhammad Tughlak (1325 to 1351). In 1373 A.D., the emperor Firoz Tughlak (1351 to 1388) is said to have built a fort at Surat to protect the town against Bhils.

11.4.2 SURAT -15TH -16TH CENTURY

In about 1496 to 1521, a rich Hindu trader called Gopi settled in Surat and he attracted other rich traders in the city. He built large houses, a garden and a beautiful lake. (Gopipura, Ranichakla, etc.are named after him).Portuguese chronicles describe “Mallik Gopi” as Governor of Surat.

In 1512, shortly before Barbosu was in Gujarat, Surat is said to have been burnt by the Portuguese. In 16th centuary, surat became a victim of various raids. The Portuguese raided Rander and Surat during 1512-1535. Annoyed by the destruction of Surat, the Sultan Mohammad- IIIgave order for building of a strong castle which was executed by Khudavand Khan (1540-41) in 1559-60 A.D. Changiz Khan came up to Surat and Portuguese sent him back. Surat fell into the hands of Mirza in 1572 A.D., then in the rebellion against the emperor Akbar. In January 1573, Akbar marched on to Surat and after a vigorous siege of about six weeks, the fort surrendered. At the time of this conquest, Surat district comprised of 993 towns or villages and yeilded annual tax revenue of Rs.0.4 million.

11.4.3 SURAT -17TH -18TH CENTURY

During Mughul regime, Surat generally enjoyed peace and rose to the level of one of the first and prosperous cities of India. However, during 49 years of Aurangzeb's regime (1658 to 1707 AD), Surat's prosperity was checked by :(i) Maratha raids, headed by Chatrapati Shivaji (1664 to 1685 A.D), (ii) by growing importance of Bombay (1677 to 1707 A.D) and (iii) 27 years of increasing disorders by local governors. The first sign of opposition to Portuguese influence on Surat coast was in August, 1608 when an English ship arrived at river Tapi and commander Captain Hawkins brought message of His Majesty for emperor Jahangir, who later allowed English people to trade through this port. Surat was witnessed many battles between English and Portuguese sailors during 1608 to 1615 for control over Surat coast.

In 1624, first trade with Holland was negotiated through Surat with export cargo of Indigo. During first half of 17th century (1608 to 1658 A.D), principal cargo of export from Surat was cloth, both silk and cotton. The cloth was used by all people from Cape of Good Hope to China. French arrived in Surat for the first time in 1620 A.D. and started international trade with a modest beginning. After Portuguese, English and Dutch, they became the fourth European community to settle and commence trading relations with this historically prosperous city. Outbreak of great plague affected social life of the city very badly from 1684 to 1690 A.D. Since centuries, Surat has been popular for gold based "Jari" business and weaving activities, in addition to providing an export outlet for agro based products from Magdalla port. In those days Surat was known to be almost the city of Kubera, the God of Wealth. In 1664 the Maratha leader Shivaji sacked and looted Surat. When Shivaji arrived at Surat he demanded tribute from the Mughal

commander and the small army stationed with him for port security. The tribute was refused and so after Shivaji took the city, he put it to sack.

Surat was second time taken by the British in 1759, and the conquerors assumed the undivided government of the city in 1800. Since the introduction of British rule, the city and the surrounding district remained comparatively tranquil; and even during the Revolt of 1857(also known as the first struggle for India's independence) peace was not disturbed, owing in great measure to the loyalty of the leading Muslim families to the British and to the largely mercantile interests of the local population.

Due to political and climatic problems and growing importance of Mumbai, Surat lost its prominence. In 1852, Surat became the first municipality of Gujarat and gradually it became a major business city famous for its textile industry.

11.5 BRIEF INVENTORY OF MAJOR HERITAGE RESOURCES OF SURAT

Name Of Property : Surat Municipal Corporation Office			
Historic Name : Mughalsarai or Musafarkhana			
Location: Govardhandas Chokhawala Road, Nr. Chowk Junction, Surat.			
Ownership: Public Owner: Surat Municipal Corporation			
Constructions Time : 1664 A.D.	Age : 363 Years		
Built By : Eshak Beg Yazdi (Hakikat-Khan)			
Uses : Present- Surat Municipal Corporation Office Past- Sarai, (Dormitory), Jail			
State of Preservation and Structural Stability	Excellent / Good / Fair / Showing Signs of Deterioration / Danger of Disappearance	Good	
	Threats:	-	
	Condition Description:	Good state of preservation	
Significance	This building was built for learned scholars, and pilgrims going to Macca and Madina and any other sacred or religious individuals intending to halt. During the period when it was in the charge of Britishers and utilised for storage of military weapons and also as a prison at later stage. Mugal Sarai was handed over by the government for using as a Municipal Office complex in the year 1864 at the instance of that President of Surat Municipality Mr. T.C was renovated it at a substantial cost. The clock tower at its entrance was added after this only.		
Physical Description & Decorative	This building with its considerable architectural qualities as disposed by the skilful composition of its various parts combined with harmonious combination of arches, cornices, decorated parapets, sculptured patterns on the exterior facade etc. each being disposed in an artistic and effective manner upon a		

Features	sound foundation with coherent strength is still intact.	
Architectural Value (A/B/C) : A	Historical Value (A/B/C) : A	Archaeological Value (A/B/C)

Name Of Property : British Cemetery			
Location: Katargam Darwaja, Surat.			
Ownership: Public Owner: Archaeological Survey of India			
Constructions Time : 1650-1700 AD		Age : 300 Years	
Built By : British ruler			
Uses: Present- Cemetery/Graveyard Past- Cemetery/Graveyard			
State of Preservation and Structural Stability	Excellent / Good / Fair / Showing Signs of Deterioration / Danger of Disappearance	Showing Signs of Deterioration	
	Threats:		
	Condition Description:		
Significance	Archaeological Survey of India charges a legacy of monuments and archaeological sites of national importance that these cemeteries are declared as protected monuments. The English cemetery reminds the visitor eloquently of many famous names in the historical narratives of the English factory at Surat who were the significant persons in the political history of the city.		
Physical Description & Decorative Features	As per the "Revised List of Tombs and Monuments of Historical or Archaeological Interest in Bombay and other Parts of the Presidency" published in 1912 there were about 19 tombs in the English cemetery during that time, many of which are still existing. In addition to these, there is large number of simpler structures, and inscription slabs-over the graves of less important persons.		
Architectural Value (A/B/C) : A		Historical Value (A/B/C) : A	Archaeological Value (A/B/C)

Name Of Property : The Clock Tower			
Location: Raj Marg, Nr. Bhagal Junction, Surat.			
Ownership: Public Owner: Surat Municipal Corporation			
Constructions Time : 1871 A.D.		Age : 137 Years	
Built By : Khan Bahadur Burjorjee Fraser			
Uses: Clock Tower			
State of Preservation and	Excellent / Good / Fair / Showing Signs of Deterioration / Danger of Disappearance	Good	

Structural Stability	Threats:	---	
	Condition Description:	Good state of preservation	
Significance	This Clock Tower was erected in memory of Merwanji Hormusjee Fraser, Usurp and for the inhabitants of Surat City by his son Burjorjee. Burjorjee Fraser was helped British Government in 1857 war.		
Physical Description & Decorative Features	The tower was the tallest building of the city and could be visualized anywhere from the city at that time. Tower is around 80 fts tall. It is an expose brick structure and all four sides having circular clock at upper part.		
Architectural Value (A/B/C) : B		Historical Value (A/B/C) : B	Archaeological Value (A/B/C)

Name Of Property : Dutch Cemetery-Mausoleum of Baron Adrian Van Reede			
Location: Gulam Faliya, Katargam Darwaja, Surat.			
Ownership: Public Owner: Archaeological Survey of India			
Constructions Time : 1691 A.D.	Age : 316 Years		
Built By : Dutch Ruler			
Uses: Mausoleum/ Tomb			
State of Preservation and Structural Stability	Excellent / Good / Fair / Showing Signs of Deterioration / Danger of Disappearance	Fair	
	Threats:	-	
	Condition Description:	Protecting base with new paving (Brick Lime)	
Significance	Baron Adrian Van Reede was the Director of the Dutch Company in the Indies was intended to rival and eclipse that of the Oxendens in English cemetery. There are three epitaphs in the monument, the one to Baron Van Reed being inscribed in a compartment on the wall opposite the entrance door.		
Physical Description & Decorative Features	This monument consists of a double cupola of great size, with a gallery above and below, supported on handsome columns. This monument was formerly ornamented with frescoes, escutcheons, and passages from the Scripture, and the windows were filled with beautiful wood carving.		
Architectural Value (A/B/C) : A	Historical Value (A/B/C) : A	Archaeological Value (A/B/C)	

Source: SMC

Some of the other places of tourist attraction

Sardar Patel Museum: Formerly known as Winchester Museum, Sardar Patel Museum is a multi faceted museum located in Sonifalia. Established in 1st February 1890, the museum has a collection of over 80,000 specimens of arts and crafts. The exhibits includes traditional textiles, oil paintings, stuffed specimens of animal and birds, miniatures, old manuscripts, sandal wood and artifacts made of wood, metal, stone, ivory, terracotta, porcelain, etc. All the specimens are classified in various section and are exhibited in different galleries. This museum brings forth the dormant history of Surat.

Old fort: Surat is famous for its monuments and the centuries old 'old fort' that stands tall in the city. It was built by Muhammad bin Tughlak in the 14th century to guard the city from Bhils attack. Known as Muhammad Kunhi by birth, he was the most cruel and cold-blooded sultan among the Mughal Emperors; but was very concerned about his men and brilliantly made this fort. The fort was invaded twice by the Maratha Emperor, Chhatrapati Shivaji. This exquisite architectural marvel with strong walls and iron bars is a place of worth a visit. The fort is now being used as the Municipal office of the city.

Jama Masjid, Rander: One of the oldest cities in South Gujarat, and the main city of the area before the center shifted to Surat, Rander lies across the causeway northeast of Surat. The four storey Jama Masjid, or Friday Mosque here was built in the 16th century reusing parts from the Jain temple that was on the site previously.

11.6 INSTITUTIONAL SETUP AND HERITAGE PROPERTY

11.6.1 INSTITUTIONAL SETUP

Surat has many good monuments which have architectural and historic value. For conservation of the city heritage local governments plays important role. But SMC still does not have any special cell or department for integrated heritage conservation. Currently the activities of heritage conservation in surat city are been taken care by the Sardar Vallabhbhai Patel museum. SMC Started Heritage Walk with help of heritage trust and other organization to explore the architectural and cultural heritage. But it was not successful. SMC organises one day tour 'Surat Darshan' on every Sunday by one mini bus which coveres heritage monuments along with the new structures. One voluntary trust 'Surat Heritage Trust' is working for protection of heritage buildings under the guidance of Mr. K.O. Shah at primary level.

11.6.2 ROLE OF SMC IN HERITAGE CONSERVATION

Mapping of Living Heritage of Surat:

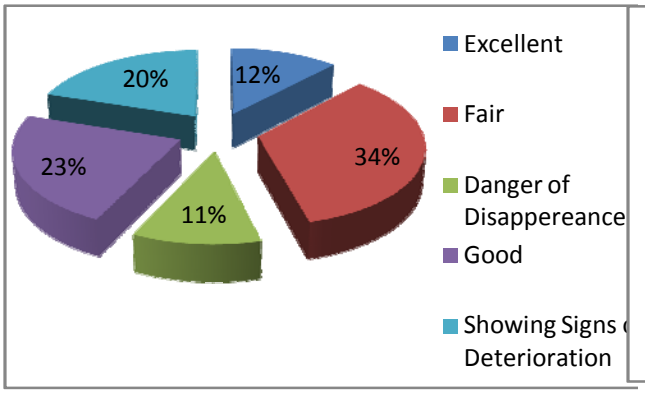
SMC has undertaken extensive and in depth study of heritage sites of Surat in collaboration with Urban Management Center, Ahmedabad (UMC). SMC is acting as a facilitator in inner city revival. The local government has easy accessibility and permeability to these people. The study also aims to put forward innovative ideas for revitalization of the sites. The project was launched by organizing workshop on "Surat Sona ni Murat" (Surat – The Golden Idol) with different stakeholder's with background of history, culture and heritage of Surat. The workshop enabled a deeper understanding among the UMC and SMC staff of heritage fabrics of the city.

The UMC team has prepared a comprehensive form for listing of heritage properties. The criteria among others include age of building, year of construction, ownership, nature of building, material of construction, architectural elements, special features in the built typology, community spaces, tree, gates and street furniture etc. Survey format has been finalized by consultative meetings with SMC representatives, field testing, selecting and training survey teams etc. UMC is also conducting secondary literature survey by meeting people who have knowledge of history, cultural fabrics or Surat. The results will be put up in GIS to generate thematic maps for further analysis and decision making by the Municipal Corporation. The study covers the Rander Ward and the all wards of the Central Zone of the city. Properties that conform with the identified Typologies and form a part of the architectural, social, cultural or historic heritage of the regions have been identified as the 'heritage' structures. The final number of properties is still under approval by SMC. Overall about 2400 properties in the central zone and 550 properties in Rander region have been identified. Also, a 'Heritage policy' is being prepared by the SMC with technical assistance by Urban Space Consultants. The policy is yet to be approved by the SMC.

11.6.3 HERITAGE PROPERTY

A great number of good monuments destroy in a fire and a flood in 1837 although there are 35 major monuments identified as heritage structure on the basis of primary survey (see Table 10.1 for detail) some of them have strong historic and architectural importance. In absence of any conservative action they are in very dreadful condition. 40% of Heritage monuments are 300 to 500 years old. There is 11% of structure having serious structural and masonry defects and at stage of destroy and 34% having plaster crakes and finishing problems. Most of religious places are maintain well by private trust.

Chart 11-1 Condition of Heritage Property



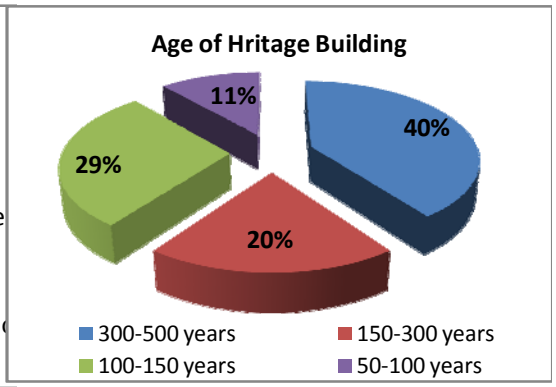


Table 11-2 : List of Heritage Monuments in the City

No.	Name of Property /Building	Location	Age (years)	Condition	
Excellent Working Condition					
1	Parsi Fire Temple	Nr. Mughal Sarai	184	Excellent	Working
2	Chintamani temple	Nr. Mughal Sarai	363	Excellent	Working
3	Amba Niketan	Parle Point	40	Excellent	Working
4	Swaminarayan Temple	Haripura main Road	139	Excellent	Working
Good Working Condition					
5	Surat Municipal Corporation Office	Govardhandas Chokhawala Road,	363	Good	Working
6	Sorabaji J.J. Training College	Chowk	136	Good	Working
7	CNI Christ Church	Chowk	188	Good	Working
8	The Clock Tower	Rajmarg, Bhagol	137	Good	Vacant
9	Nayatwada Badi Jumma Masjid	Rander-Hajira Road, Rander	93	Good	Working
10	Khavaja Dana Saheb Dargah	Bade kha Chakla	380	Good	Working
11	Hindu Milan Mandir	Gopipura, Nr Agam Temple	80	Good	Working
12	Kshetrapal Mahadev Temple	Rudharpura	90	Good	Working
Fair Working Condition					
13	Saiyidd Idrus Mausoleum	Saiyad pura	370	Fair	Working
14	Rander Islam Gymkhana	Rander	100	Fair	Working
15	The Mirjan Sami Mausoleum	Nr. Mughal Sarai	460	Fair	Working
16	Naginchand Hall & Andrews Library	Chowk	101	Fair	Working (Parlty)
17	Ambaji Temple	Wadi falia from Bhagol	225	Fair	Working

No.	Name of Property /Building	Location	Age (years)	Condition	
18	Gandhi Bagh	Chowk	138	Fair	Working
19	Kantareshwar Mahadev Temple	Katargam (Gamtal)	150	Fair	Working
20	Zakaria Mosque	Rander	100	Fair	Working
21	Agam Temple	Gopipura	62	Fair	Working
22	Kavi Narmad's home Saraswati Mandir	Amaliran, Gopipura	143	Fair	Vacant
23	Khavaja Didar Dargah	Rampura, Form Bhagol	475	Fair	Vacant
24	Nausaiyid Mosque	West bank of the Gopi Talav	250	Fair	Vacant
Showing Signs of Deterioration					
25	Kuvvat -e-Islam Mosque	Rander	214	Showing Signs of Deterioration	Working
26	British Cemetery	Katargam Darwaja	350	Showing Signs of Deterioration	Vacant
27	The Tomb of Gerald Aungier	Katargam Darwaja	300	Showing Signs of Deterioration	Vacant
28	Mausoleum of Oxenden Brothers	Katargam Darwaja	349	Showing Signs of Deterioration	Vacant
29	Dutch Cemetery-Mausoleum of Baron Adrian Van Reede	Katargam Darwaja	316	Showing Signs of Deterioration	Vacant
30	The Armenian Cemetery	Katargam Darwaja	325	Showing Signs of Deterioration	Vacant
31	Parsi Boy’s Orphanage	Shahpore	150	Showing Signs of Deterioration	Working
32	Surat Castle	Chowk	468	Showing Signs of Deterioration (part) and Danger of Disappearance	Working (Parlty)
Danger of Disappearance					
33	Hope Bridge	Chowk-Adajan Patia	131	Danger of Disappearance	Vacant
34	Dutch Cemetery-A Jovial Dutch-Man's Tomb	Katargam Darwaja	341	Danger of Disappearance	Vacant
35	Gopi Talav	Navsari Bzar Teen	500	Danger of	Vacant

No.	Name of Property /Building	Location	Age (years)	Condition	
		Rasta		Disappearance	
Note:					
Excellent		Maintain Regularly			
Good		Not found any threats			
Fair		Defect in finishing and plaster creaks			
Showing Signs of Deterioration		Structural defects-creaks in column/ beam			
Danger of Disappearance		Serious structural and masonry defects.			

Source: SMC, 2009

11.7 ISSUES

Lack of interest by local government in preserving the structures:

Since historical times, Surat is developing as an industrial and business centre. And the city has few sites of tourist which might be one of the reasons for less interest by local government and people, towards maintaining and preserving the heritage structures in the city.

Failure of Heritage Walk attempt:

SMC's attempt to start a Heritage walk in Surat City has not succeeded so far. The reason sought for the failure is absence of awareness in the residents of Surat city as most of the residents are migrated from other states and are not aware of the existence of the buildings of Heritage and architectural significance. As most of the residents of Surat are in the city for economic needs, they lack the interest in heritage structures.

Lack of facilities at the heritage sites:

Most of the heritage sites lack basic facilities like Parking, Drinking water, Sanitary blocks causing inconvenience and hence decrease in the number of potential tourists.

Lack of awareness in public:

Due to lack of information & publication and awareness among people about importance of heritage sites, structures, from tourism as well as economic point of view people are not bothered about preserving such structures. Many of monuments have been spoiled by local public by various ways. (E.g. British and Dutch Cemeteries)

Absence / Enactment of Rules and Regulations:

In absence / enactment of area planning rules and regulation around the heritage sites, at many places the neighborhood surroundings of the heritage site are encroaching into the site.(e.g. Gopi Taval, Mirja Shami no Rozo).

11.8 STRATEGIES

A Conservation Plan for preserving the heritage structures in the city:

The primary emphasis of the Conservation plan is to provide a living framework to guide conservation of cultural heritage sites in context to their urban and natural surroundings, as well as to identify potential economic opportunities for sustainable tourism.

It should focus on enabling consensus-building with key stakeholders and realizing economic development in harmony with a Site's aesthetic beauty and historic and cultural values. A Master Plan or Site Conservation Plan should form the basis for legislation and designation of a Site or region as a protected National Park, Monument or Preserve, and provide guidance in all conservation work and archaeological exploration. Conservation in the context of this Plan includes not only ensuring the physical survival of the archaeological sites and monuments, but also enhancing the visual character of their landscape setting and improving the interpretation and understanding of the whole Site as a cultural landscape to visitors.

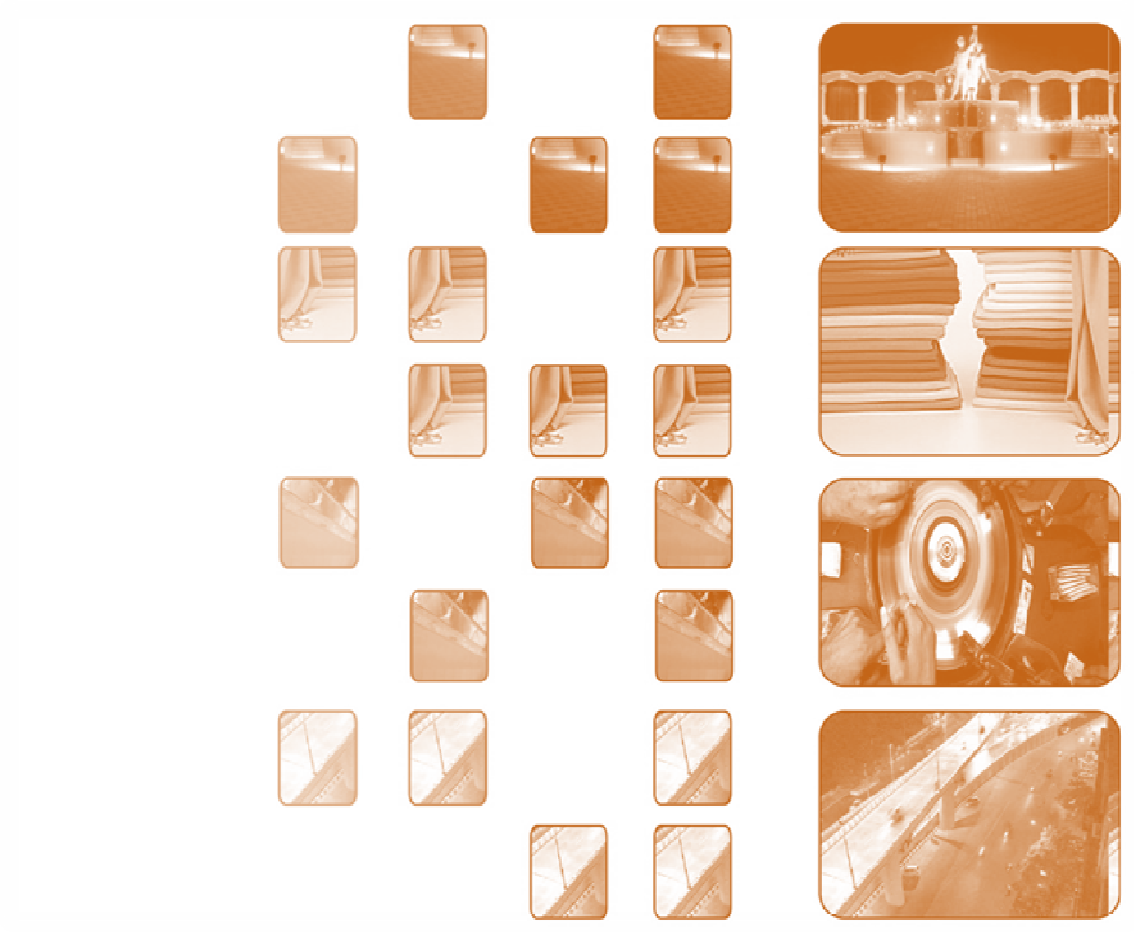
Objectives of the Conservation Plan:

It should be understood that the overall environment of the city is an important factor in heritage promotion and preservation.

- Provision of on-site infrastructure, e.g., lighting, provision of drinking water, toilets, internal road network, arrangements for waste collection, resting spaces, and the like, and off-site infrastructure, e.g., connectivity, public and private transport links, traffic directions and management; publicity and advertisement etc.
- Create a sustainable plan to the future management of the Site and landscape which balances the archaeological and nature conservation, visitor access and development interests.
- Provide an advisory policy framework, not statutory designation, for guiding and influencing current and planned site management initiatives.
- Endorsement by State culture and planning departments and key government decision-makers, as well as key stakeholders.
- Community Participation: Community participation models works best by creating public awareness as well as by helping avoid the public menace. Increase local community and public awareness and interest in the Site, and to promote educational and cultural value of the Site's archaeological landscape.
- Linkage between trade and heritage sites: Since historical times, Surat city being the popular trading centre, maximum visitors in the city are traders. Trading linked with heritage sites, could successfully attract traders and tourists at these places boosting development of tourism. Identify economic, social and cultural

benefits of the Site and work with partners in the local community to maximize these benefits without damaging the archaeological resource.

- Formation of Heritage Cell: A Heritage Cell should be created for implementation of the above plan and for the enactment of area planning as well as other applicable rules and regulations for preserving heritage sites / structures.
- The Heritage Cell focus on the Revenue generation e.g., using fee or charge for heritage sites and inspection and the adequacy of the financial support for the protection and maintenance of the heritage, and the extent to which decay or deterioration if any, in heritage protection is attributable to financial constraints.



Chapter 12

Urban Governance and Managament

74th Constitutional Amendment

Governing Structure of SMC

Recent Management Reforms & Summary of Optional reforms in SMC

Surat Urban Development Authority

Capacity Building Measures

Institutional Mechanisms

Emerging issue & Strategic Actions & Plans

CHAPTER 12. URBAN GOVERNANCE AND MANAGEMENT

The functioning of SMC is governed by the Bombay Provincial Municipal Corporations Act, 1949 (BMPC Act). SMC performs obligatory and discretionary functions, as incorporated in the said Act. The Hydraulic Department under SMC is responsible for providing and maintaining water supply and sewerage system in the city. The Gujarat Municipal Finance Board, (GMFB) incorporated under the Gujarat Municipal Finance Act, (year), (GMF Act) regulates all the finances to the ULBs including the loans, grants and central aid provided by the State and Central Government.

The governance of ULBs assumes importance with the enactment of the 74th Constitution Amendment Act, 1992, (CA Act) which delegates conduct of mandatory municipal elections and greater devolution of powers and functions to the city corporations for its management functions, operations and reforms. The current institutional arrangement of the elected and administrative wings of the ULBs is structured to perform these functions efficiently and effectively.

12.1 74TH CONSTITUTIONAL AMENDMENT

The CA Act has its essence in reforms and building new systems in the structural, functional and planning areas of municipal management and capacity building. The Government of Gujarat (GoG) as per the provisions of the CA Act carried out appropriate amendments to the Gujarat Municipalities Act, 1963 (GM Act) and the BPMC Act. The amended provisions of the Acts are as follows:

Structural

The State Election Commission (SEC), which is a statutory body, shall ensure regular and fair conduct of elections in the municipalities. The Twelfth Schedule of the Constitution has outlined a framework for assigning appropriate civic functions to the ULBs. Besides the core functions, the municipalities are now expected to play a crucial role in preparation and implementation of local development plans and programs for social justice. A Finance Commission shall be constituted, which will recommend to the state legislature, once in every five years, measures to improve the financial health of municipal bodies.

Functional

The BPMC Act has been amended in 1993 for delegating the functions like regulation of land-use, town planning with the Area Development Authorities , safeguarding the interests of the weaker sections, promotion of cultural, educational and aesthetic aspects etc. but these have still not been completely delegated to the ULBs.

Planning

The absence of Metropolitan Planning Committees in Gujarat, as envisaged by the 74th CAA has limited the functional role of the ULBs in planning and management to a series of sectoral and departmental plans and programs, which under no circumstances can lead to integrated planning and development of ULBs.

12.2 GOVERNING STRUCTURE OF SMC

The governing structure of SMC consists of both elected and administrative wings. The elected wing is a body of elected members headed by a Mayor. The Municipal Commissioner (MC), from the Indian Administrative Services (IAS) cadre, heads the administrative wing and is responsible for the strategic and operational planning and management of the Corporation.

12.2.1 ELECTED WING

The General Body is the Supreme Body of the Municipal Corporation constituted by elected members from each municipal ward of the SMC. The General Body has wide powers over all other authorities of the Corporation like Standing Committee & Municipal Commissioner. At present, SMC has 38 municipal wards and each municipal ward has 3 seats of municipal councilors. Thus SMC has a total number of 114 municipal councilors. Out of the total of 114 seats, 33 % of seats are reserved for women. Each councilor is elected for a term of five years and this term has all the 114 seats. All the Councilors are elected by General Election and every Councilor is eligible to be appointed in any of the Committees for a period of one year. The General Body is chaired by the Mayor who is assisted by the Deputy Mayor elected from amongst the corporators and their term is a for the period of five years.

The city is divided into seven adminsitrative zones, 38 election wards and 101 census wards. Ward Committees operate at the zonal level and consist of elected corporators of the respective wards and are headed by a chairperson. These Committees are responsible for assisting the Council in the planning and execution of development works at the zonal level.

Under the BPMC Act, powers are vested with three distinct statutory authorities of the elected wing, viz. the General Body, the Standing Committee and the Other Committees (Special and Adhoc Committees). There are 12 such committees formed by SMC for performing specialized functions.

The General Body of SMC has 76 male cooperators and 38 female cooperators representing various ward/constituency.

The Corporation has several statutory and non-statutory functional Committees to set out the obligatory and discretionary functions bestowed upon the Corporation by the 74th CAA. The Standing Committee is one of the 12 statutory committees under SMC and is vested with all powers. The Standing Committee has the powers to sanction and award major works costing more than Rs. 5 lakhs. The Committee is also vested with financial powers and has 12 members and is headed by a Chairman elected among the members of committee. The other twelve Committees look after specialized functions of SMC. The details of the various Committees in SMC is given in Table 12-1.

Table 12-1 Details of Committees in Surat Municipal Corporation

Sr No	Name of Committee
1	Standing Committee
2	**SPECIAL COMMITTEES**
a	Health Committee
b	Public Works Committee
c	Water Works Committee
d	Town Planning Committee
e	Social Welfare, Recreational and Cultural Committee
f	Drainage Committee
g	Law Committee
h	Hospital, Medical Aid and Health Promoting Committee
i	Housing Project and Gardens Committee
j	Light and Fire (Extinguishing) Committee
k	Slum Improvement Committee
L	Gas Committee
3	**ADHOC COMMITTEES**
a	Khadi
b	Mayornidhi
c	Vyakhanmala
d	Agnyat Sainik Pratik Smarak Fund
e	Maskati Dharmarth Hospital Advisory
f	Cycle Racing
g	Child Swimming Competition

12.2.2 ADMINISTRATIVE WING

In Gujarat, the municipal administration comes under the purview of Urban Development and Urban Housing Department (UD & UHD). It is the policy making body for the urban sector in the state and undertakes the functions as specified in the local Acts.

After the 'Surat Plague' incident in 1994, significant changes were made in the administrative setup of SMC, from a vertical-rigid-hierarchical system to a horizontally-more-interactive system. There has been a shift to 'field level operations'.

Decentralization of administration is a major aspect of this change. The city has been divided into seven zones viz. Varachcha (East), Rander (west), Katargam (North), Udhna (South), Limbayat (South-East), Athwa (South-West) and Muglisara (Central). Each zone is vested with complete authority to address local problems and mitigate them at the source. Further, transparency and collective decision-making have become key elements of the administrative process.

12.2.3 DECENTRALIZED ADMINISTRATION: ZONES AND WARDS

During the last three decades, the city has expanded in all directions and for administrative purpose the area of SMC has been divided into seven zones. The zonal system came into existence in 1996 with six administrative zones and one zone was further bifurcated during May 2004. It envisages decentralization of activities and a more responsive administration at the zone/ ward level.

Each zone is headed by a Divisional Head, either in the rank of an Assistant Municipal Commissioner or a Deputy Municipal Commissioner. Depending upon the size of the ward, one or two Zonal officers work under the Divisional Head. About three to four Deputy Engineers work under each Zonal Officer.

Under the decentralized administrative setup the powers and functions at each level are clearly delegated to the Heads to perform their functions adequately. Even the Junior Engineers and other Inspectors working at the ward level are provided with adequate powers for effective execution of their duties. By decentralizing various public services provided by SMC a zonal system has been implemented. Please refer the structure of SMC Zones given below:

- » The central zone mainly consists of the old city (also called the inner city)
- » The east zone mainly consists of Varachha, Karanj, Fulpada

- The north zone mainly consists of Katargam, Ved, Dabholi and Singanpore
- The west zone mainly consists of Rander and Adajan
- The south zone mainly consists of Udhna, Pandesara, Bhestan and Bhedwad,
- The south east zone mainly consists of Anjana, Limbayat, and Dindoli,
- The south west zone mainly consists of Athwa, Umra, Piplod, and Bhatar.

Functions of a Zone Office

SMC provides various services to the citizens of the city through their zonal office. Functions of the various zonal offices are described below.

Health Department

The Department is responsible for overall cleanliness, sanitation and issue of various health related permits. Specific responsibilities are as follows;

- Cleaning and collection of waste from the entire area under respective zone,
- Clean choked, gully-trap and sewer traps,
- Food inspection, branch license permit,
- Vaccination, birth/death, registration, family planning,
- Control of stray animals, and
- Malaria control.

Assessment and Recovery Department

The Department is responsible for the assessment of properties and other revenue related activities. Specific responsibilities are as follows;

- Assessment of properties, recovery of property taxes, education tax, etc;
- Appeals regarding assessment and rent recovery from properties, and
- Registration of shops/firms renewal and court complaints regarding breach of law.

Engineering Department

The Department is overall in-charge of carrying out all capital works, repairs and maintenance of public assets and provision of services. Specific responsibilities are as follows;

- Build new roads, to widen the roads, to repair and re-lay the roads etc;
- Build society roads by raising public funds - to prepare new footpaths, to repair them, scraping etc;
- Build new buildings and to maintain the municipal properties;
- Build and maintain school buildings;
- Sanction water connections, repair work of main water pipelines up to 22";
- Maintain and clean temporary/ permanent drainage; storm water disposal

- Issuing permits for layout of low-rise buildings, procedure against illegal construction;
- Implementation of town planning scheme, recovery of betterment charges;
- Take action against public nuisance and damaged property;
- Issuing permits for mandap, banner, hoarding-collection of land-rent, property rent;
- Remove permanent / temporary encroachments, to make alternative arrangements for obstructing slums,
- Legal procedures for illegal connections and repair of polluted water connections,
- Issuing permits regarding stand posts, free connection hand pump, drainage, and
- Legal procedures against illegal drainage connections and illegal construction.

City Civic Centers

There are sixteen City Civic Centers established in the city with a state-of-the-art community services, with several counters.. The centers provide a single window facility to the citizen to access all the services provided by the municipal corporation.

Services Offered

- Birth & Death Certificates,
- Shops & Establishment registration,
- Self assessment of property tax,
- Complain Registration & Complain through Email,
- Booking of Municipal Halls & Open plots,
- Installment of Municipal tenement, EWS houses & shopping complexes,
- Part plan of Town Planning Schemes,
- Collection center for all type of applications, and

Distribution of all types of forms/ publications of S.M.C. Table 12.2 provides the details of the location of the Civic Centre in SMC limits.

Table 12-2 List of Civic Centers

Name of Zone	Name of Civic Center	Address
West Zone	West Zone	West Zone Office, Neat Tadwadi Char Rasta, Rander Road, Surat
	Adajan	Adajan Drainage Pumping Station, Nr. Bhulkabhavan School, Adajan-Hazira Road, Surat
Central Zone	Central Zone	S.M.C. Main Office, Muglisara, Surat
	Ring Road	Nr. Millennium Market, M. G. Road, Surat
North Zone	North Zone	Municipal Shopping Centre, Gotala Wadi, Katargam, Surat
	Ved	Near Akhand Anand College, Ved Road, Katargam , Surat

Name of Zone	Name of Civic Center	Address
East Zone	East Zone	Bhat Ni Wadi, Nr. Sardar Chowk , Varachha Road, Surat
	Karanj	Nr. Karanj Health Center, Rachana Soc. Road, Karanj, Surat
	Poona	Tekra Falia, Opp. Water Tank, Poona Gam, Surat
South West Zone	South West Zone	Athwa Zone Office, Gokuldham Dairy Road, Adarsh Society, Ghod dod Road, Surat
	Athwa	Vinayak Zariwala Swimming Pool, Athwalines, Chowpati, Surat
South Zone	South Zone	Udhna Main Road, Opp. Satyanagar Society, Udhna, Surat
	Bhestan	Bhestan Char Rasta, Surat-Navsari Road, Bhestan
South East Zone	South East Zone	Bh. Vatika Township, Model Township Road
	Limbayat	Sahid Bhagat Singh Chawk, Rustam Park, Limbayat
	Dindoli	Besides Municipal School No. 246-247, Dindoli Main Road, Nr. Ishwarpura Gam, Dindoli.

Functions of a Ward Office

Each municipal ward office is responsible to perform the following functions;

- Cleaning and sprinkling of pesticides,
- Transportation and final disposal of solid waste,
- Disposal of small and big carcasses,
- License renewal of non-edible things (matches, kerosene, coal, fireworks etc.) and edible things,
- Clean choked gully-trap,
- Cleaning of drip well,
- Chlorination of the well in use and chlorine test of water samples,
- Legal actions against citizens who are creating nuisance,
- Legal actions against citizens who are creating nuisance,
- Inspection of hotels, hawkers and small shopkeeper with hygienic point of view,
- Cleaning and maintenance of public urinals,
- Inspection of cinema halls, theatres and other public entertainment places form hygiene point of view,
- Gather details of the epidemic immediately inform higher authority regarding disease-controlling measures, and
- Issue license for eatables and non-eatable items under the BPMC Act, 1949.

12.3 RECENT MANAGEMENT REFORMS

Urban reforms are the main focus of good governance and service delivery to the citizens of the urban area. Several initiatives have been taken up at national level like 74th CA Act, 1992 and Model Municipal Law. Further at State Level, GoG has taken up several initiatives like creating investor friendly environment, repeal of Urban Land (Ceiling & Regulation) Act -1976 (ULCRA) etc.

At ULB Level, SMC had taken up several reforms and many of these are first of kind in country. Followings are the reforms carried out by S.M.C.

A. Financial & Taxation Reforms

- Accrual Based Double Entry Book Keeping Accounting System,
- Outsourcing of Services & Public Private Partnership (PPP) initiatives,
- Total Computerization of Accounts with Balance Sheet,
- Approaching Debt Free Financial Administration,
- Efficient Tax Collection, and
- Life time vehicle tax.

Summary of tax collection by SMC during the period 2004-05 to 2008-09 is given in Table 12-3 below;

Table 12-3 Summary of Tax Collection of SMC

Sr No.	Head	2004-05	2005-06	2006-07	2007-08	2008-09
1	General Tax	6438.34	5576.28	6086.26	7519.03	9283.79
	Conservancy Tax	3366.50	1890.26	2085.75	2489.67	NA
	Water Tax	928.06	516.74	546.78	635.06	NA
	Water Charge	506.68	552.73	588.05	692.06	2025.00
	Water Meter Charge	464.56	336.54	387.11	394.62	487.25
2	Other Direct Taxes*	2887.80	3239.94	3192.29	NA	NA
	Actual other direct taxes	**551.96**	**684.71**	**623.76**	**596.05**	**3260.79**

Source: SMC

B. Administrative & Technological Reforms

- Vision – 2020 Plan and City Corporate Plan
- Micro and Macro Action plans
- Standardization, ISO certification, SCADA and induction of modern gadgets
- DCR Revision
- Transparency in administration
- Training to employees, Biometrics attendance system

» E-Governance & GIS

C. Energy reforms

» Energy Audit (Internal and External), Energy Bill Monitoring, etc.
» Economical channel in Water Supply Grid, Demand Rationalization.
» Use of electronic ballast & hi-lumen fluorescent lamps.
» Power Factor Rebate
» Alternate street lighting during low traffic period
» Energy generation from Biogas produced at Anjana STP
» LED based retrofits for traffic signalling system

D. Disaster Management

» Disaster Preparedness and Municipal Response Plan
» Strengthened relief & rescue system

Continuous Monitoring System

Monitoring within SMC is done at four levels, namely, corporation level, zone level, ward level and on the field. Under the mandatory provision in the BPMC act there shall be a meeting of standing committee once in a week. Wherein all the heads to discuss their problems issues and mitigation measures.

Enhanced Powers

Under section 73(D) of the BPMC act 1949 different authorities are given powers of sanctioning the expenditure and estimates for the works to be taken up by the municipal corporation. The details of which is presented in the table below.

Sanctioning of	Up to Rs 1000	Up to Rs 5 lac	Greater than Rs 5 lac
Expenditure	Municipal Commissioner	Special Committee	Standing Committee
Estimates	Municipal Commissioner	Special Committee	General Board

Complaint Monitoring System

At the ward level, all complaints are lodged in a register and the registered complaints are given a white card for sanitation related complaints and red card for engineering and public works related complaints. These complaints can be registered between 7 a.m. to 6 p.m. on working days, either in person or on the phone to the city civic centers as well as it can be filed through internet on SMC website on any day. Complaint mitigation is carried out within a specific time period, a minimum of 24 hours with the upper limit as a week depending on the severity of the complaint.

Collective Responsibility

To promote collective responsibility, any official who observes something on the field is free to make suggestions or complaints. There is no water tight compartmentalization. All the officials are in a way responsible for all activities of the zone, in addition to their regular duties. There is perfect teamwork and all employees of SMC right from the

Municipal Commissioner to the karamchari are equal partners in administration. Further, all the senior SMC officials who are also members of the Standing Committee take decisions with respect to transfers, etc. within SMC. Therefore the SMC works as a seamless institution.

Improved Supportive Infrastructure

Communication has become far more efficient. Officials are provided with vehicles fitted with wireless sets and are expected to pass information to the Zonal Commissioner, if they find anything wrong, and are expected to visit the nearest ward office.

Public Participation

The present drive in Surat is to upgrade its status from the second cleanest city to the cleanest city of India. Each locality has a member chosen on a voluntary basis, and he/ she in turn interact with the SMC and try to mitigate the problems at the earliest. It is an attempt to take management to the masses.

Computerization

SMC is the first municipal corporation in India to develop an IT policy. SMC introduced computerization in all its departments' way back in 1998. Statistics are computerized on a daily basis and efforts are on to computerize the past records too. The town maps are digitized and details of each department are laid over. For the purpose SMC has imparted training to its staff through professional IT institutes.

The Information Systems Department (EDP) has adopted a 'Business Model' and dutifully carries out the functions listed below so as to achieve the objectives of providing better services to the citizen at his doorstep, reducing overall administrative response time for various tasks, reducing the total cost of operations for the SMC, providing centrally organized information dissemination, having speedy and effective communication system, establishing a knowledge repository for various processes and having an effective management information system and decision support system with utmost effectiveness and efficiency:

- Analysis of business processes of various departments of SMC and to design the information system for the same,
- Development of computerised systems for the information systems of the departments,
- Procuring the hardware and peripherals necessary to operate various computerised systems through tendering and providing it to the end users,
- Procuring the pre-printed stationery necessary for various computerised systems through tendering and providing it to the end users,
- Organizing the training of employees and officers for subjects related to information technology and computerization,

- Archiving the data and information of various computerized processes to reproduce it and provide it to the end user on their demand,
- Imparting training to the users of various systems developed at SMC,
- Providing support and maintenance to various hardware systems and peripherals and to the systems developed at SMC,
- Designing and developing the internet and intranet website of SMC,
- The EDP Department spearheads the information technology drive of the Surat Municipal Corporation with the mission *"To achieve overall efficiency in various fields of administration of SMC by using the Information Technology in the form of electronic computing devices, related gadgets, software, etc. so as to provide the citizens with better services and a dynamic and transparent administration",*
- Procuring the pre-printed stationery necessary for various computerized systems through tendering and providing it to the end users,
- Organizing the training of employees and officers for subjects related to information technology and computerization,
- Archiving the data and information of various computerized processes to reproduce it and provide it to the end user on their demand,
- Imparting training to the users of various systems developed at SMC,
- Providing support and maintenance to various hardware systems and peripherals and to the systems developed at SMC, and
- Designing, developing and maintaining the internet and intranet website of SMC

The Corporation has its own website (www.suratmunicipal.org) which boasts of updated information regarding the various departments under the SMC. The website has wide-ranging details regarding the progress of various development projects taken up. The site also facilitates downloading of forms related to shops and establishments, property tax assessment, water supply connections, land & estate, birth & death registration, town development and drainage connections. In addition to the various legislation pertaining to the corporation and details of services available to the citizens, 35 forms are available online.

12.3.1 IT POLICY

In line with the IT policy of the Government of India, the GoG enacted its own IT Policy on 9th March 1999. SMC has launched its own IT Policy and Plan for the next five years to usher in a citizen-friendly delivery system.

SMC's drive towards e-governance started way back in November '79. From then onwards SMC has always stood up to the challenges offered by the ever-evolving IT field. SMC is the frontrunner in IT among all the other government institutions and computerization at SMC still ranks among the best in the country; praised and appreciated by various international institutions. But now, this computerization has

reached such a stage that it requires streamlining to realize the SMC's organizational goal. The details of the computerization efforts are given in Table 12-4.

Table 12-4 Department: Partly or fully computerized by SMC

Sr No	Department	Sr No	Department
1	Accounts	**14**	Parks and garden
2	General system	**15**	Secretariat
3	Personnel	**16**	Municipal libraries
4	Revenue	**17**	Municipal theatres
5	Health	**18**	Municipal workshop
6	Information systems	**19**	Law
7	City engineer's special	**20**	Public lighting
8	Town development	**21**	Fire
9	Town planning	**22**	Audit
10	Drainage	**23**	Municipal press
11	Hydraulic	**24**	UCD
12	Public works	**25**	Vigilance
13	Bridge cell	**26**	PRO

Source: SMC, 2009

Information Online:

- Updated information regarding the various departments under the SMC
- The various legislations pertaining to the corporation and the citizens of the city
- The progress of various development projects taken up
- New tenders that are floated by the SMC

The budget for the ongoing financial year

A SWOT (Strength, Weakness, Opportunities and Threats) analysis of the existing scenario of SMC has been carried out and the outcomes formed the primary recommendations for the IT policy. A situational analysis of the major departments of the SMC was also carried out to identify the systems to be computerized so that requirements like operating skill sets, hardware, software, training, etc could be ascertained. The outcome of the analysis constituted the IT plan and policy of SMC.

It also covers the operational plan for the two years of focus wherein overall computerization will be targeted.

12.3.2 ONLINE COMPLAINS

Situation before the Initiative

- No interconnected & comprehensive Grievance Redressal System existed,
- No citizen specific guidelines existed for lodging complaints,
- No proper registration, receipt or compliance system existed, and
- Complaint formats were designed & decided by junior level officers, which lacked uniformity and holistic approach.

Strategy & Process Adopted

- Compulsory registration, receipt or compliance system for all grievance applications in a standard format,
- Round the clock, time bound & prioritized complaint Redressal system,
- Accountability fixed for disposable of complaints,
- Monitoring at class- I executive level, class I medical officer level and subsequently, weekly at top management level,
- Bifurcation of complaints into engineering related and public health & sanitation related, and
- Multiple modes and multi-language (English, Gujarati and Hindi) complaints.

The details of categories of complaints during the period 2006 to September 2009 are given in Table 12-5. It may be observed that in majority of the categories related to basic services there is a decline in the number of complaints. For instance the categories which have drastically improved are garbage removal, drainage, street lighting and removal of dead and stray animals. It is indicate of the fact the efficiency and effectiveness of the service delivery and municipal governance.

Table 12-5 Detail of Complains Registered (2006-2008-2009 Sep)

Services	No of Complains Registered (2006)	No of Complains Registered 2008	No of Complains Registered 2009 (TILL sep 09)
Garbage & Cleanliness	**1349**	**89**	**144**
Mosquito and Insects	**56**	**43**	**73**
Roads and Footpath	**184**	**179**	**138**
Water Supply	**301**	**83**	**87**
Drainage and Storm Drain	**7044**	**755**	**82**
Street light	**1282**	**74**	**87**
Dead and Stray Animals	**777**	**124**	**33**
Illegal Construction and Encroachment	**143**	**78**	**114**
Public Toilet	**9**	**8**	**3**
Hospitals and Dispensaries	**1**	**4**	**2**
Complaints against SMC Staff	**13**	**4**	**22**
property tax	**26**	**13**	**25**
Others	**189**	**97**	**114**
Over All	**11374**	**1552**	**924**

Source: SMC, 2009

12.4 SUMMARY OF OPTIONAL REFORMS IN SMC

12.4.1 ADMINISTRATIVE REFORMS

Desired Objective(s)

JNNURM requires the administrative reforms are undertaken in ULBs and other institutions engaged in urban sector management. Such administrative reforms should include – instituting better human resource management systems, reduction in establishment expenditure by introducing voluntary retirement schemes, non-filling up of posts falling vacant due to retirement, extensive use of outsourcing, performance review and management mechanisms, etc., and achieving specified milestones in this regard.

12.4.2 STRUCTURAL REFORMS

Desired Objectives

JNNURM requires the structural reforms are undertaken in ULBs and other institutions engaged in urban sector management. Such structural reforms should include – reviewing and revamping the organization structure of the ULBs to align it to current requirements, decentralization within the ULB where necessary, creation of trained cadres of municipal staff in specific technical disciplines, improved coordination

mechanisms amongst city level agencies, etc. and achieving specified milestones in this regard.

Current Status

- The organization chart of Surat Municipal Corporation is being periodically reviewed in the light of enhanced SMC Municipal limits from July-2006 onwards. The idea for the formation of a co-ordination committee (staff review committee) to overhaul the existing organization structure under the dynamic stewardship of Municipal Commissioner is being mooted**. (Organizational Chart of SMC is given in Annexure VI)**
- » The municipal corporation of Surat operates the zonal system since 1994. Currently there are 7 administrative zones that prevail in the city, which has been discussed in "Decentralized Administration" section of this chapter**.**
- » Function like Zonal administration of Assessment & Recovery of property tax, Engineering works related to maintenance or water & drainage networks, public health related services, registration of birth & death in the zonal areas. Registrations of Shops & Establishment, on line complaint etc. are being taken care of by these zonal offices. The zonal chief are duly delegated the General Administrative Powers as per the B.P.M.C. act-1949**.**
- The cadre of the staff employed in SMC is presented in the table below.

Cadre of staff	Functional area they are employed in the ULB	Method of selection	Average tenure in one ULB
Sr. Officers	General Administration, Finance and Accounts, Engineering, Public Health	On deputation from State Govt. Dept. as well as from of Municipal Administrative cadre.	2 years for the offices on deputation from state Govt. dept. & permanent for the statutory posts like Municipal Auditor, Municipal Secretary, Deputy Commissioner etc.
Sr. Officers municipal cadre	Across all departments being headed by officers from municipal administration cadre with a few exception where it has been headed by an officer on deputation.	By due process of recruitment rules i.e. publishing the advertisement to invite application from the suitable candidates from the outside and from within the cadres of SMC by the selection procedure of competitive tests/personal interviews by staff selection committee.	As per the rules of superannuating age of retirement. except for the officers on deputation which is generally for 2 years.

- Municipal commissioner of the Surat municipal corporation is also a member of a board of SUDA (Surat Urban Development Authority).

Table 12-6 Staff Details and Human Resource Management

Item	Class-I staff	Class-II staff	Class-III staff	Class-IV staff	Total
Total staff in the Corporation/ULB	212	876	6567	12011	19666
Permanent/Regular posts	212	876	6567	12011	19666
Occupied posts	141	708	5344	9946	15139
Temporary staff	-	-	-	-	-
Technical staff	20	447	1041	2181	3689
Non technical staff	121	261	4303	7765	12450
Vacant posts	71	168	1223	2065	3527
Number of new posts created during past five years	56	12	120	17	205
Number of recruitments done against the above posts	70	31	347	27	475
Number of posts fallen vacant due to retirement during the past five years	37	264	824	211	1336
Number of recruitments done against the above posts	144	239	766	415	1564
Number of retirement expected in the next five years	7	51	367	438	863

Source: SMC, 2009

As far as staffing pattern is concerned, there is still a huge gap observed between the requirement of staff and the actual posts filled. On an average 18% posts are lying vacant.

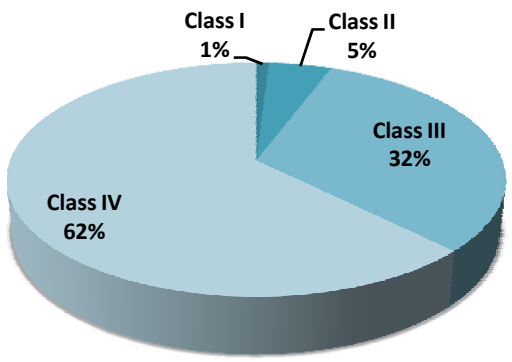


Chart 12-1 Staffing Pattern

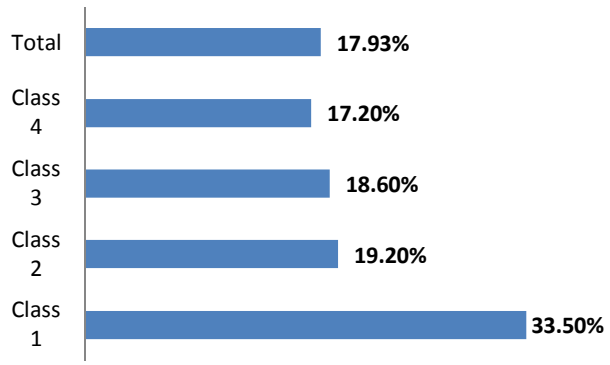


Chart 12-2 Vacant Posts in SMC

12.5 CAPACITY BUILDING MEASURES

Some of the capacity building measures being implemented in the administrative wing of the SMC are as follows.

- Decentralisation - 7 Zones formed – 38 election Wards and 101 census wards,
- Eleven Divisional Heads,
- Office to site: 'Seeing is Believing',
- Daily Meetings: 365 Days: 52 Sundays,
- Innovations in Plastic Waste Usage, Administration Charges,
- Computerization: Accounts, Budget, Taxes, Health, Personnel, Mapping, Engineering,
- Delegation of financial powers up to Rs. 2 lakh to Divisional Heads,
- More than 500 trained technical man power,
- Weekly monitoring of the projects, and
- Daily monitoring of the public grievances

Table: 12-7 Current Status of Reforms in SMC

	SR. NO.	REFORM COMMITTED	TARGET DATE	PRESENT STATUS
ULB Level Reform	1	E-Governance set up	2007-08	Achieved
	2	Shift to Accrual based Double Entry Accounting	2007-08	Achieved
	3	Property Tax (85% coverage)	2009-10	
		Property Tax (90% collection efficiency)	2010-11	
	4	100% Cost Recovery (Water Supply)	2011-12	
		100% Cost recovery (Solid Waste)	2011-12	
	5	Internal Earmarking of Funds for Services to Urban Poor		Achieved
	6	Provision of Basic Services to Urban Poor	2011-12	
STATE LEVEL REFORMS	7	74th CAA (Transfer 12 sch. Functions)		Achieved
		74th CAA (Constitution of DPC)	2007-08	Achieved
		74th CAA (Constitution of MPC)	2006-07	
	8	Transfer-City Planning Function		Achieved
		Transfer-Water Supply & Sanitation		Achieved
		Transfer-Public Transport		
	9	Reform in Rent Control	2009-10	
	10	Stamp Duty rationalization to 5%	2011-12	Achieved
	11	Repeal of ULCRA	NA	Achieved
	12	Enactment of Community Participation Law	2007-08	Achieved
	13	Enactment of Public Disclosure Law	2006-07	Achieved
OPTIONAL REFORMS	14	Introduction of Property Title Certification System in ULBs	To be indicated	
	15	Revision of Building Bye laws – streamlining the Approval Process	2005-06	Achieved
	16	Revision of Building Bye laws – To make rain water	2005-06	Achieved

		harvesting mandatory		
	17	Earmarking 25% developed land in all housing projects for EWS/LIG	2005-06	Achieved
	18	Simplification of Legal and Procedural framework for conversion of agricultural land for non-agricultural purposes	To be indicated	Achieved
	19	Introduction of computerized process of Registration of land and Property	To be indicated	Achieved
	20	Byelaws on Reuse of Recycled Water	2005-06	
	21	Administrative Reforms	2008-09	Achieved
	22	Structural Reforms	2006-07	
	23	Encouraging Public Private Participation	2005-06	Achieved

Source: SMC, 2009

12.6 SURAT URBAN DEVELOPMENT AUTHORITY

The organization chart of Surat Urban development Authority (SUDA) is presented below. Normally the Chairman is non-official representative from the area nominated by Government. Main functions of SUDA include development in systematic manner and to control unplanned and unauthorized development. To ensure aforesaid functions, SUDA prepares Development Plans and Town Planning Schemes. The Board of SUDA consists of elected members from SMC, Nagarpalika and district panchayat.

SUDA has carried out a number of management reforms in the organization for the benefits of the citizens. These reforms are: continuous monitoring system enhanced powers, complaint monitoring system, improved supportive infrastructure, public participation, computerization, IT policy, e-governance etc.

In SUDA they have various departments responsible to perform their respective functions. The details of which is presented in the table

Table 12-8 Department wise activities carried out in SUDA

Sr No	Department	Activities related to
1	Technical	Development Plans, Development permissions, License, etc
2	Project	Zoning-planning certificate, Housing Project, T.P Scheme, etc
3	Drawing	Development plans, development permission, zoning planning certificate, work related to T.P Scheme
4	Engineering	Construction/project work
5	Administrative	E.S.T, A.D.M, Land Acquisition, Court Cases, Meetings, summary of account, Dispatch, land titles etc
6	Illegal Construction	Cases related to illegal constructions
7	Accounts	All activities related to accounts

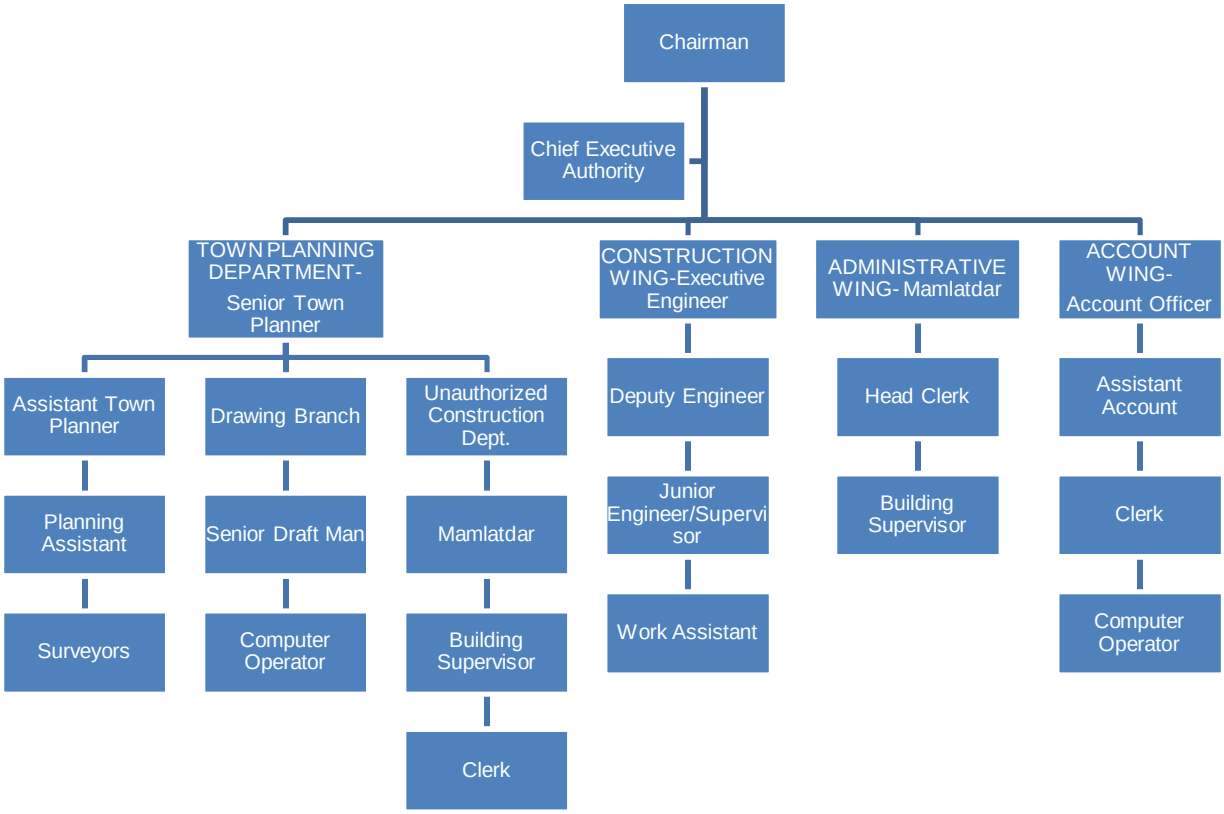


Figure 12-1 Organization Chart Of SUDA

12.7 INSTITUTIONAL MECHANISM

There are various governmental agencies involved in the developmental works of any urban area and they are assigned different functions in their own respective jurisdictions. The integration and co-ordination between these agencies determine the efficiency of urban management and quality of life to the citizens. SMC and SUDA are

the main institutions responsible for the delivery of various services in the whole area. The other institutions active in service delivery are as mentioned below:

National Highway Authority of India (NHAI): NHAI is responsible for development of National Highways within the city and maintain the same with a specified standard.

Gujarat Pollution Control Board (GPCB): The GPCB is responsible for implementation of the Air Act, 1981, Water Act, 1974, Environmental Protection Act, 1986 and other relevant acts in the whole SMC and SUDA area. It monitors the air, water and noise quality in the city and suggests and implements remedial measures as and when required.

Gujarat Industrial Development Corporation (GIDC): GIDC is responsible for the land development and provision of infrastructure facilities in the designated industrial areas; Pandesara, Khatodara, Udhana, Katargam, Sachin and Bhestan.

The institutional responsibility in service delivery within SMC limits is given in Table 12-9 below;

Table 12-9 Institutional Responsibility in Service Delivery

Urban Infrastructure	Planning and Design	Construction	Operation and Maintenance
Town Planning and development	SUDA / SMC	SUDA / SMC	SUDA / SMC
Water Supply	Hydraulics Department, SMC / Panchayats in SUDA area	Private Contractors through open tendering	Partly privatized and partly through inbuilt capacity
Sewerage	Drainage cell, SMC / Panchayats in SUDA area	Private Contractors through open tendering	Partly privatized and partly through inbuilt capacity
Storm Water Drainage	Drainage cell, SMC / Panchayats in SUDA area	Private Contractors through open tendering	Inbuilt capacity, SMC
Solid Waste Management 1. Collection 2. Transfer 3. Disposal	1. Private sector 2. Inbuilt capacity SMC 3. Panchayats in SUDA area	1. NA 2. Available vehicle fleet	1. Private sector responsible for Door to door collection 2. Partial involvement of private sector. Majorly through inbuilt capacity
Municipal Roads (including Flyovers)	Traffic cell, SMC / SUDA / Panchayats in SUDA Areas	Private Contractors through open tendering	Inbuilt capacity, SMC / Panchayats in SUDA area

Street Lighting	Street Lights Department, SMC / Panchayats in SUDA area	Inbuilt capacity	Inbuilt capacity

The SMC, has engaged private sector in service delivery and the details are given in Table 12-10 below;

Table 12-10 Role of Private Sector in Urban Infrastructure

Sr #	Urban Infrastructure	Role of Private Sector
1	Water Supply	» Operation & Maintenance of water treatment plants at Varachha, Sarthana, Katargam & Rander Works. » Valve operation in the different parts of the city. » Collection of water samples during the water supply period. » Housekeeping & gardening of Water Works & Water Distribution Stations » Cleaning of underground tanks » Leakage repairing of MS pipes » "Operation & Maintenance" contract for Water Distribution Station at Khatodara, Umarwada & Katargam.
2	Sewerage and Storm Water	» operation and maintenance of sewage treatment plants » Maintenance of some of the sewage pumping stations » Desisting of manholes and drainage lines in the different parts of the city
3	Solid Waste	» Door to door collection » Bio Medical Waste Treatment Facility » Partly involved in transportation of waste. (manpower and transportation of garbage vehicles)
4	Municipal Roads and Street Lighting	» Pay and park facility

12.8 EMERGING ISSUES

Sanctioning powers for major capital works.

Sanctioning powers and approvals of sanctions by Divisional Heads for major capital works are vested in the Municipal Commissioner. In a democratic set up the political interference is evitable but does affect the sanctioning process.

Multiplicity of line agencies.

In addition to the Corporation there are various other State and Central Government organizations that play a role in the city's management. Multiplicity of roles are observed under several functions like Town Planning, planning and design of the state highways and national highways, capital works of river front development, monitoring pollution and so on.

On both these counts the service delivery of SMC is affected.

12.9 URBAN GOVERNANCE – STRATEGIC ACTION & PLAN

Strategies

» **Drafting bye-laws to control pollution.**

The Corporation is now also responsible for the pollution control in the city, an issue that was hitherto only the responsibility of the Pollution Control Board. Hence, the new powers vested in the corporation shall be used to draft bye-laws to regulate and control pollution within the SMC limits like the discharge of industrial waste/sewerage into water body; the disposal of solid wastes. The GPCB shall be taken into confidence while drafting these byelaws.

» **Institutional strengthening and capacity building.**

These measures shall focus on identification of training needs for the staff of the corporation and preparation of a comprehensive programme to suit to the requirements. The programme shall include innovative practices of service delivery and the best practices of governance followed across the world.

» **Review of sanctioning limits at various levels to overcome undue delays.**

The sanctioning limits and powers of approval shall be further looked into. This shall be based on the review of the various projects taken the Corporation from the year when devolution of powers was initiated.

» **Integrated planning with other line agencies involved.**

Other line agencies involved like SUDA, GSRTC, GWSSB, GWRDC, GoG, GPCB, etc., involved in the city's management shall be taken into confidence during the formulation of programmes and projects. The projects identified as part of the City Development Planning shall also be discussed elaborately with these line agencies before actual implementation.

» **Creation of Geographical Information System of city.**

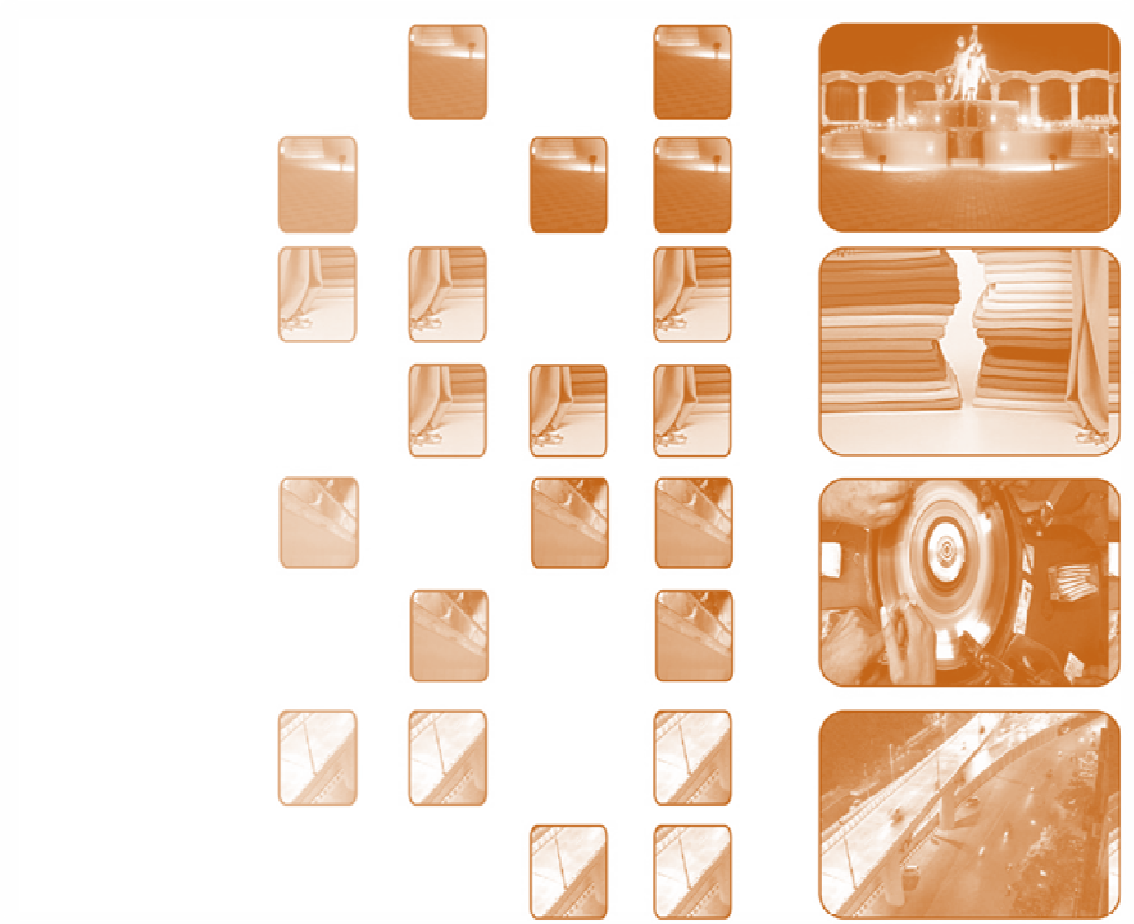
The Corporation shall also develop a comprehensive Geographical Information System (GIS) by plotting all the features of the city and its environs with necessary data to act as a tool in development planning.

» **Involvement of private sector in service delivery.**

The encouraging experience of part involvement of the private sector in service delivery shall be kept in view and it shall be extended to take up certain capital projects identified under the city development planning process. This shall be on a BOT/ BOOT basis as per the requirements framed.

» **Revisit Development Control Regulations**

The basic question is with regard to Sprawl versus densification and as a measure for efficient delivery of services and sprawl, there is need to revisit the DCR and also use the opportunity to integrated transit oriented development measures with the proposed expansion of BRT system.



Chapter 13

Disaster Management

Location

Disasters in Surat

Flood Protection Scheme in River Tapi

Emergency management legislations

Existing Disaster Management Framework

City Level Situation Analysis

Recommendations and Suggestions for Disaster Management Plan

CHAPTER 13. DISASTER MANAGEMENT

13.1 INTRODUCTION

The recent histories of disasters in Surat mainly relate to floods, and sporadic but serious incidents related to industrial hazards, crime, and fire and health issues. Although, the threat from severe extreme events such as earthquakes and cyclone is moderate, it cannot be ignored. The growth and development of the city compounds the problem further, and appropriate arrangements are need of the hour.

In order to reduce this risk to life and injuries, and lowering property and livelihoods/business losses, all three phases of a disaster cycle shall be addressed. These phases are:

1. **Mitigation,**
2. **Preparedness & Response, and**
3. **Reconstruction.**

The current DMP-2008 document very well delineates most hazards and thereafter focuses on response mechanisms by charting out responsibilities and resources. In order to lower the risk, the existing DMP-2008, therefore would need revision to encompass a bigger picture to include mitigation, and other refinements.

Based on an analysis of the severity of the existing hazards which the city faces - efforts are required towards - 1) lowering of vulnerabilities , 2) improvement in the capacities of the community and the government , and 3) streamlining the available resources towards tackling the evident risks.

In the current climate, total elimination of impact of all disasters or incidents shall be seen as a longer term vision. This plan looks at the best reasonably practicable measures in line with the vision of this CDP, when taken up for implementation.

13.2 LOCATION

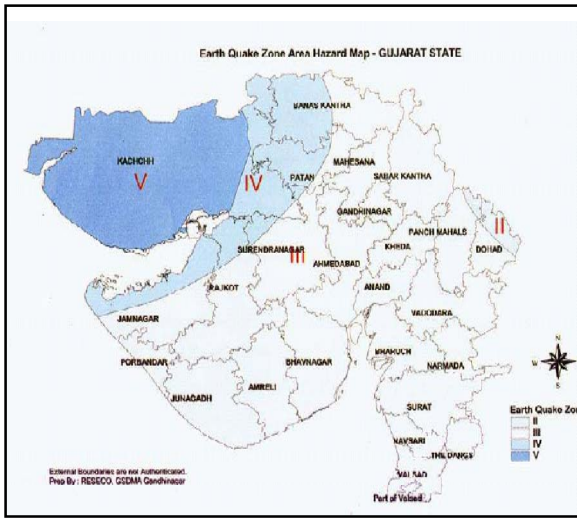
The city lies at a bend of the River Tapi, where its course swerves suddenly from the north-east to southwest. With the walled city at its centre, the city forms an arc of a circle, the bends enclosed by its walls stretching for about a mile and a quarter along the bank. From the right bank of the river, the ground rises slightly towards the north, but the height above mean sea level is only 13 meters. The topography is controlled by the river and the general slope is from north-east to south-west. The expanding city has engulfed five minor and one major creek, and another small river, Mindhola, flows on the south.

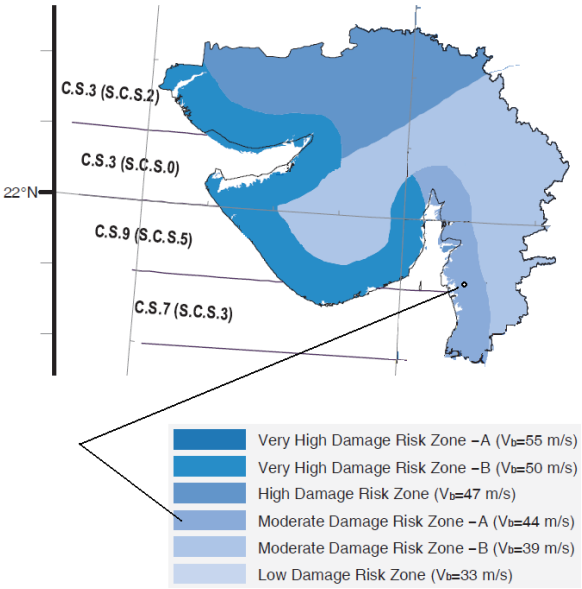
The summers are hot with temperatures ranging from 37.78° C to 44.44° C. The climate is pleasant during the monsoon while autumn is temperate. The winters are not very cold but the temperatures in January range from 10° C to 15.50° C. The average annual rainfall of the city has been 1143 mm.

Proximity to sea and lower ground levels, and frequent flooding has lead to deposition of alluvial soil and soft rock is found at much lower depths (at approximately 30/35m depth).

13.3 DISASTERS AND SURAT

Surat is prone to various kinds of natural or manmade disasters like floods, earthquake, cyclone and industrial. Surat falls under seismic zone III.

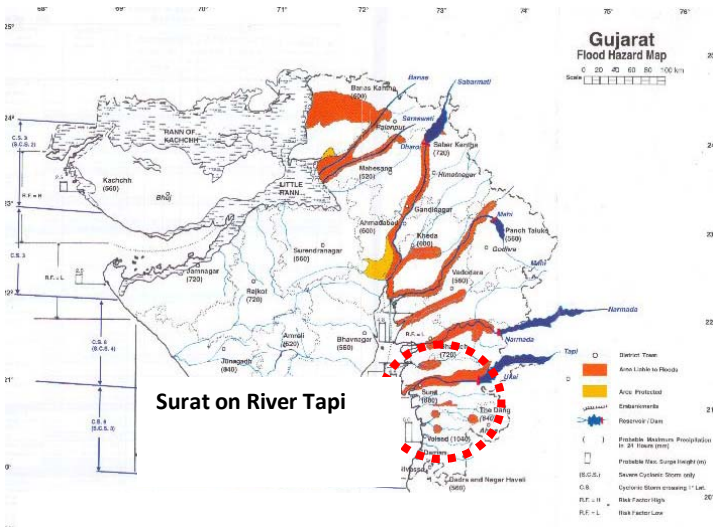




Map 13-1 Earth Quake Zone in Gujarat **Map 13-2 Gujarat Wind Hazard Map**

Located in South Gujarat coast the city of Surat is in the cyclone belt of Gujarat and as per GSDMA the city is located in moderate damage risk Zone.

The most severe among the disasters is frequently occurring floods. Surat has been prone to flooding since its birth and has faced many devastating floods, including big floods in 1968, 1994, 1998 and minor ones as recently as 2002. Barring the 2006 floods, the only other flood that is vividly talked about is that of 1968. It is known, only through stories however, that the 1968 flood was perhaps the most devastating flood Surat has ever seen. But it is also being said that the havoc that 2006 floods created, is perhaps unprecedented.



Map 13-3 Gujarat Flood hazard Map

13.3.1 1994 FLOODS

Though not well documented, there is some information available regarding the '94 flood. Around 20% of the entire city was affected in this flood. The water levels in the affected areas were around 5 ft. to 8 ft. at the maximum.

Around 50,000 people were affected and about 36,000 people were evacuated or relocated. 35 relief camps were made operational for the affected and 100,000 food packets were distributed to the affected.

After the waters receded, there was an epidemic outbreak and hence the authority had to undertake a vigorous cleaning operation which continued for around 20 days. About 300 people in supervisory capacity were mobilized to monitor the cleaning operations. Approximately 3785 sanitation workers on SMC payroll and another 700 were mobilized from among contractors and volunteers for the cleaning operations.

The total number of vehicles and machinery mobilized is provided in the following table:

Table 13-1 Vehicles Mobilized for Cleaning Operations in 1994:

Percentage of Area Under Cleaning	Vehicles (Trucks, Loaders, Tractors)		No of Days for Cleaning
	SMC	Contract	
20% of City Area	148	21	20

Source: SMC

In the 1994 floods, the daily garbage retrieval was around 1500 tones. The year of 1994 also saw the epidemic of 'Plague'2, following which one of the biggest city cleanup operations was undertaken to bring the outbreak of disease under

control. Following this somewhat of an historic epidemic, Surat went on to claim being one of the cleanest cities in the country.

13.3.2 1998 FLOODS

Surat was again engulfed in water in 1998 due to large releases of water from Ukai Dam. About 60% of the city was flooded with water levels of about 12 ft. to 15 ft. in some low – lying areas of the city. About 4,00,000 people were affected and around 63,115 took refuge with the Relief Camps. Around 250 electric sub – stations were submerged further complicating the situation. Water supply in almost half of the city was disrupted and sewerage systems were rendered dysfunctional. (*Refer Annexure Map 13-1- Vulnerable Areas)*

This threw up tremendous challenges before the SMC as well as the state government. The state government deputed senior officers to help speed up the operations and the SMC itself mobilized its entire staff and carried out relief and cleaning up operations on a war footing. A total of 6343 people were mobilized by the SMC to work on these operations. About 45 Loading Equipments and 343 transportation vehicles were mobilized to rid the city of muck. 2390 dead animals were also disposed off in the process.

A total of 36,155 tonnes of Solid Waste was removed and various preventive medical supplies were distributed viz. Malathion 5% (140 tonnes), Chlorine tablets (5500000) and Lindane (94 tons). A large scale dewatering operation was also carried out and about 73 dewatering pumps were deployed. This allowed for the dewatering of close to 720 locations in the city.

At many places the earthen embankments constructed in 1973 around city river edge were breached during the floods. Following the floods, these were repaired, strengthened, and flood gates to prevent flood water entering the city were installed.

13.3.3 2006 FLOODS

The 2006 Flood was perhaps the most devastating one that Surat witnessed. The only other flood that finds comparison with that of 2006 is the flood of 1968. About 128 Sq. Kms of city area was under various levels of submergence. Around 1.9 million people were affected, 155 deaths were reported and resultant economic losses have been unprecedented. (*Refer Annexure Map 13-1 Vulnerable Areas)*

These floods forced rescue of about 26000 people. The submergence lasted for over 3 days. An enormous 4,00,000 tonnes of muck and garbage has been removed from various affected areas in the city. About 250 medical teams are active post – floods and around 2542 tonnes of disinfectants in powdered form has been sprayed around the affected areas.

13.3.4 A COMPARISON BETWEEN 1998 AND 2006 FLOODS

If compared, the 1998 floods were not as devastating as the 2006 one. A quick quantitative comparison helps one understand that in 1998, 6.99 Lakh Cusecs of water was release for about of 16 hrs. While in the case of 2006, 6.00 to 7.5 Lakh Cusecs of water was released for duration of 13 hrs. and another 8.00 to 9.5 Lakh Cusecs for a duration of 42 hrs.

The total population affected due to flood was about 4,00,000 and 19,00,000 in 1998 and 2006 respectively. The total area under submergence was 23.5 Sq. Km and 128 Sq. Km in 1998 and 2006 respectively. The 1998 floods claimed only 20 lives while the 2006 floods claimed 155 lives (137 in Surat City alone and 18 in rural areas). In 1998, about 2390 animals perished while in 2006, the number is close to 4500. The number of rescued people was around 1958 in 1998 while in 2006, it was almost 26000. In 2006, most of the rescue works were carried out by the Army and CRPF, while it became necessary to airlift some.

Table 13-2 Submergence Levels and Area under Submergence in 1998 and 2006

Sr #	1998			2006		
	Level		Area in Sq.km (old City Limits)	Level		Area in Sq.km (old City Limits)
1	0'-2'		5.76	0'-3'		16.04
2	2'-4'		6.89	3'-5'		14.55
3	4'-6'		4.26	5'-10'		30.03
4	>6'		6.32	>10'		20.82
	TOTAL		**23.23**	**TOTAL**		**81.44**
A	**Deaths**		**Population Affected**	**Deaths**		**Population Affected**
B	**Humans**	**Animals**	400,000	**Humans**	**Animals**	1,900,000
C	20	2390		155	4500	

Source: SMC

13.4 FLOOD PROTECTION SCHEMES OF RIVER TAPI

After the ravaging floods of the River Tapi in 1968, the Government of Gujarat had decided to have a flood protection scheme to protect Surat city and its adjoining area. It was planned to provide flood protection for a total of 46.85 km. on both banks. The Tapi embankment scheme was designed for a 10 lakh cusecs flood, which is inclusive of 1.5 lakh cusecs discharge, contributed from the catchment between the Ukai Dam which is about 80 km. upstream of Surat city.

The flood protection works consist of raising of both banks of the river by construction of an earthen embankment/ brick masonry retaining walls with/without river slope pitching and also by constructing sluice regulators across natural creeks/drains etc.

meeting the River Tapi. The major part of the scheme was executed by the Government of Gujarat from 1971 to 1995 at a total cost of Rs.1542 lakhs. But the long delay in completion of the project proved fatal during the floods of 1994 and 1998. The works of embankment/sluice regulators at village Chhaprabhatha, Variav and Tunki were not completed.

With technical guidance from the Narmada and Water Resources Department of the Government of Gujarat, SMC executed the flood protection works, which fall within the Surat city limit. The project cost of Rs.2406 lakhs is being borne equally by the Government of Gujarat and SMC. Initially, SMC will execute the works from its own resources and later on, the Government of Gujarat will reimburse its 50 percent share within 3-5 years depending upon the availability of funds.

The works of the first phase have already been completed by SMC and the remaining works are proposed to be taken up only after finalization of the scheme/ design-drawings etc. by the Irrigation Department of the Government of Gujarat. *(Refer annexure Map 13-3 – Embankments Map)*

Table 13-3 Present status of Embankment works (Irrigation Department)

Sr. No.	Types of work along tapi river banks	Length in k.m.	Status of work	Remarks
1	Tapi Embankment works (10 packges) (Earthen embankment)	19.90 km.	100 % completed	
2	Retaining wall	3.89 km.	80 % completed	Work is in safe stage
3	Sluice Regulator	14 Nos.	In tendering stage	Divided in 4 packages. 2 - in approval stage 2 - in tendering stage By 1 st October work order of all 4 packages will be issued Time limit – 12 months
4	Construction of Flood control Structure on Varachha Creek near Tapi River	--	Tender Received	Estimated cost Rs. 679.66 Lakhs

Table 13-4 Bank Protection Works completed by SMC

Sr. No.	Location	Year	Project Cost (in Lacs)	Length (in Rmt)
1.	Construction earthern embankment & pitching work at Tunki	2000-01	136.14	725
2.	Construction of Sluice Regulator on Kotar No. 7 at Tunki	2001-02	214.50	-
3.	Bank protection work at Rander	2005-07	1635.00	600
4.	Bank protection work at Singanpor (Phase-I)	2005-07	1000.00	700
5.	Bank protection work at Bharimata	2005-07	1570.00	425
6.	Construction of Flood protection work on Bharimata bank (Phase-II)	2007-09	1371.13	675
7.	Construction of Flood protective wall on Rander Bank (Phase-II)	2009-10	723.45	1000
8.	Construction of Flood protective wall on Rander Panch Pipli Bank	2009-10	223.50	130
			6873.72	**4255**
	Total Effective Length			**2930**

Secondly storm water drains discharge storm water in to the River Tapi at 16 locations in 5 zones of the municipal corporation. The storm water outlets provided backwater entry to the floodwaters of River Tapi and thereby caused temporary flooding of areas from which they were carrying out storm waters. Hence, it was felt necessary to provide flood protection gates at the outlets of storm water drains. SMC completed the construction of flood protection gates at 15 locations in the year 1999 at a total cost of Rs.210 lakhs. These works were completed in 3 months. A total of 22 cast iron manually operated vertical sliding gates were provided. Normally, these gates are kept open, but at the time of heavy floods in the River Tapi, these gates are closed to prevent the entry of floodwater in to the city. At present the area outside Municipal Corporation does not have any storm water drainage system. SUDA has proposed storm water drainage system covering 68 TP schemes to be developed.

13.5 EMERGENCY MANAGEMENT LEGISLATION

The basic concept suggests that the same management strategies can be applied to all emergencies. Emergencies do not just appear one day, rather they exist trough out time and have a life-cycle of occurrence, and hence the management strategy should match the phases of an emergency in order to mitigate, prepare, respond and recover from its effect. There are four phases in Emergency Management: Mitigation, Preparedness, Response and Recovery. The four phases are visualized as having a circular relationship to each other (Emergency Management Cycle). The activities in one phase may overlap those in the previous one.

Mitigation refers to activities which actually eliminate or reduce the vulnerability or chance of occurrence or the effects of a disaster. Mitigation phase begins with conducting hazard identification and vulnerability analysis which are essential to the planning of all other phases. Hazard identification and vulnerability analysis is a two step process. First the hazard is identified which has the potential of affecting the population. Secondly, how people, property and structures will be affected by the disastrous event.

Preparedness is a state of being ready to react promptly and effectively in the event of an emergency. Response activities occur during and immediately following a disaster. They are designed to provide emergency assistance to victims of the event and reduce the likelihood of secondary damage. Recovery is the final phase of the emergency management cycle. Recovery continues until all systems return to normal, or near normal.

13.6 EXISTING DISASTER MANAGEMENT FRAMEWORK

The Gujarat State Disaster Management Act no. 20 of 2003 has been enacted to provide for effective management of disaster, for mitigation of effects of disaster, for administering, facilitating, coordinating and monitoring emergency relief during and after occurrence of disasters and for implementing, monitoring and coordinating measures for reconstruction and rehabilitation in the aftermath of disasters, in the State of Gujarat and for these purposes to establish the Gujarat State Disaster Management Authority and to specify other agencies and for matters connected therewith or incidental thereto.

Although enacted later, the Disaster Management Act, 2005 (DM Act, 2005) by the Government of India paves way for institutional and coordination arrangements required to draw and monitor implementation of DM plans, so as to respond to any disaster events.

Implementation of both these acts is still at its nascent stages. It has been observed that in the absence of monitoring mechanisms - issues related to hazard and disaster prevention and mitigation still needs a lot of efforts in order to be addressed adequately. Although there are guidelines and safety norms generally made available to the local authorities for reference during planning and implementation.

For the purposes of carrying out the objects of this Act, the following shall be the authorities, namely:-

a) The State Government,
b) The Gujarat State Disaster Management Authority,
c) Heads of Government Departments,
d) Commissioner,

e) Collector of a district,
f) Local authorities.

13.6.1 STATE GOVERNMENT

The State Government is required to perform the functions laid down in the Act. These functions range from developing of policy as well as guidelines, creation of a Crisis Management Group, ensuring that Local Authorities follow the guidelines in accordance with those laid down by the Authority, establishing communication networks, procurement of resources and equipments necessary for effective disaster management, ensuring adequate funds are available for disaster management as and when necessary, promotion of risk transfer and management mechanisms to ensuring development of recovery measures and mechanisms and taking steps to contain or minimise the effects of disaster.

The Act further provides that the State Government can call for suspension of any executive orders that prove to be a hindrance in coping with disasters.

State – level Incident Command System

A full – time Incident Command System at the State level has been in function for a long time. This system is primarily in the form of the Control Room at Gandhinagar that sends out distress signals immediately upon the occurrence of any incident. The first intimation goes to the Chief Minister's office and the GSDMA since its constitution in 2001. The CM has the discretion to call an Extraordinary Meeting of key officials for initiating response when the incident seems overwhelming.

The Gujarat State Disaster Management Authority (GSDMA)

Following the earthquake of 2001, the Gujarat State Disaster Management Authority (GSDMA) was constituted. The purpose of GSDMA is to build the capacity of the State and its various departments and bodies to deal with disasters effectively. To this effect, GSDMA has been active in providing the Municipal Corporations and Municipalities with equipments and kits which become critical during rescue operations, and has laid down the specifications and funding for a flood control room at the District Magistrates. Besides this GSDMA also keeps initiating various studies related to the vulnerability assessments and has also issued "Dos and Don'ts" and safety manuals for various kinds of catastrophes.

Besides this the GSDMA has also helped establish emergency protocols and will also be setting up Emergency Response Centres across the state which will allow for swift response in case of a catastrophe.

13.6.2 LOCAL AUTHORITIES

Local authorities are involved in the process of disaster management; the following are duties of such authorities-

1) For the purpose of disaster management, local authority shall, subject to such directions as the Authority may give and under the supervision of the Collector-
    a. Assist the Authority, the Commissioner and the Collector;
    b. Ensure that the staff of the local authority is trained;
    c. Ensure that all resources related to disaster management are so maintained as to be ready for use;
    d. Ensure that all buildings and other structures in the local area comply with the specifications laid down in this behalf by the departments of Government and the Authority;
    e. Carry out relief operations in the affected area subject to directions of the Commissioner;
    f. Carry out reconstruction and rehabilitation activities in accordance with the guidelines framed by the Authority;
    g. Prepare a disaster management plan setting out the following, namely:-
        i. The manner in which the concept and principles of disaster management are to be applied in local area;
        ii. Role and responsibilities of the local authority in the terms of the disaster management plan of the State;
        iii. Capacity of the local authority to fulfill its role and responsibilities;
        iv. Particulars of disaster management strategies; and
        v. Contingency strategies and emergency procedures in the event of a disaster, including measures to finance the strategies.
    h. Coordinate the preparation and the implementation of plan with those of the organizations of the State and stake holders;
        I. Regularly review and update the plan.
        II. Conduct disaster management drills periodically; and
    i. Provide such assistance to the Authority, the Commissioner and the Collector and take such other steps as may be necessary for disaster management.
2) Each local authority shall submit to the Authority and the Commissioner a copy of its disaster management plan proposed under sub-section (1) and any amendment thereto.

It is not possible to do away with the devastation due to natural hazards completely. However, destruction from natural hazards can be minimized by the presence of well-functioning warning systems, combined with preparedness on the part of the vulnerable community. Disaster management may be seen as a part of good governance.

13.7 CITY LEVEL SITUATION ANALYSIS

The major responsibility of disaster management lies with the Disaster Management and Emergency Control Cell in Surat. Surat city has developed a well defined organization structure for disaster management.

13.7.1 FIRE DEPARTMENT

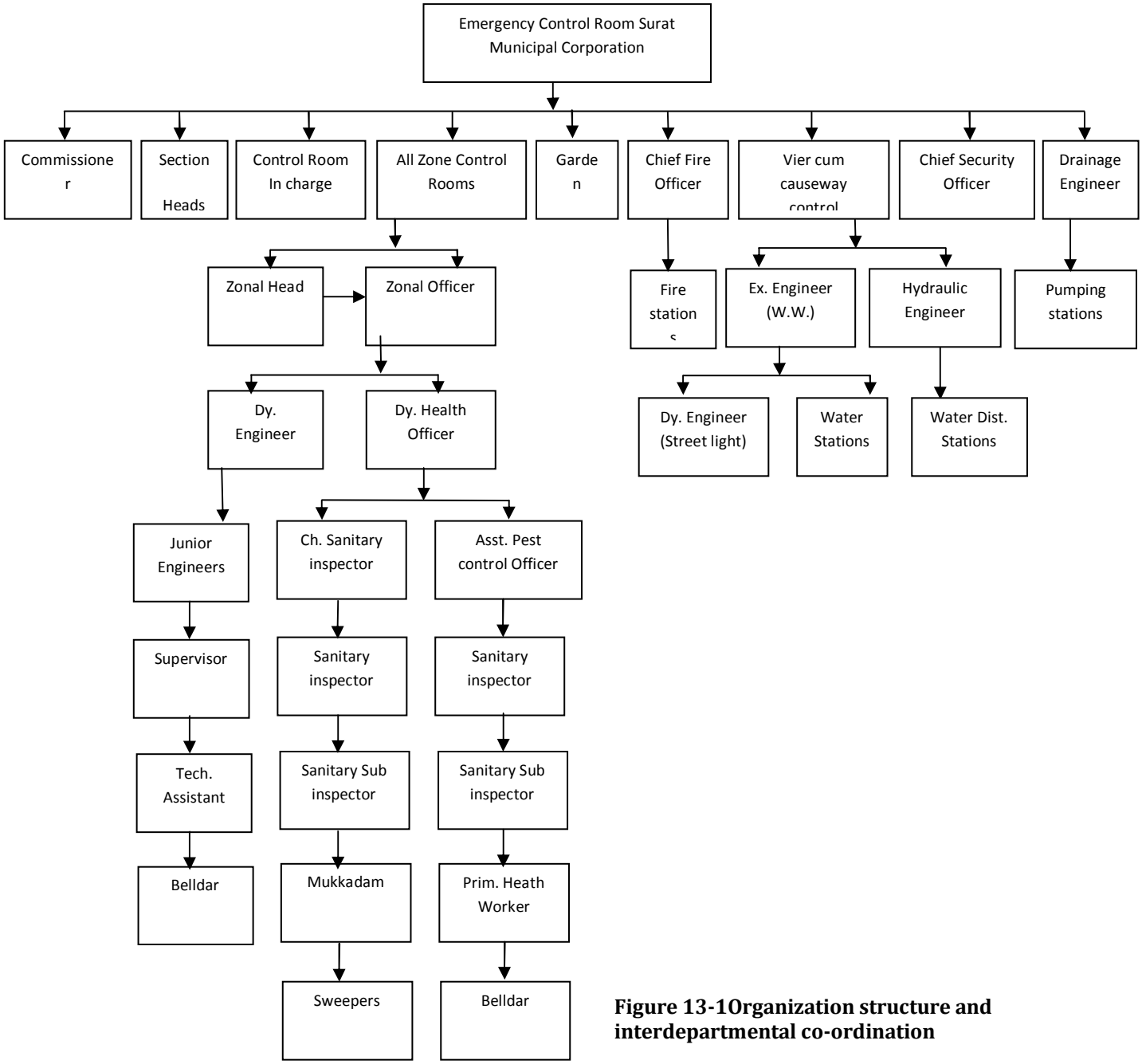


Figure 13-1Organization structure and interdepartmental co-ordination

The main department responsible for major rescue and rehabilitation work is the City Fire Department. There are twelve fire brigade stations in Surat city namely Muglisara Main fire station, Adajan Hazira, Kapadra, Ghachi Sheri, Katargam, Pandesara G.I.D.C., Maandarwaja, Gumbhal, Majura, Kosada , Mora Bhagol and Navsari Bazar fire station.

Fire department is responsible for all the rescue and relief vehicles, fire tenders, ambulance services, and rescue boats. They are responsible for maintaining registers of names and addresses of all the swimmers, private vehicles like JCBs, bulldozers, ambulances, caranes etc.

Fire department is also responsible for emergency warnings, emergency drills, public education and other trainings.

Fire incidences/ accidents, fire calls attended in past

The fire and rescue data helps the departments and Government to decide on type and quantum of facilities and staff required to fulfill the demand of the city.

Property and life lost and saved data is one of the most important performance indicators to measure the efficiency of fire department

13.7.2 HEALTH SANITATION AND SOLID WASTE MANAGEMENT

The Health, Sanitation and Solid Waste Management Departments are responsible for maintaining and improving the local condition for their respected services prior, during and post disasters.

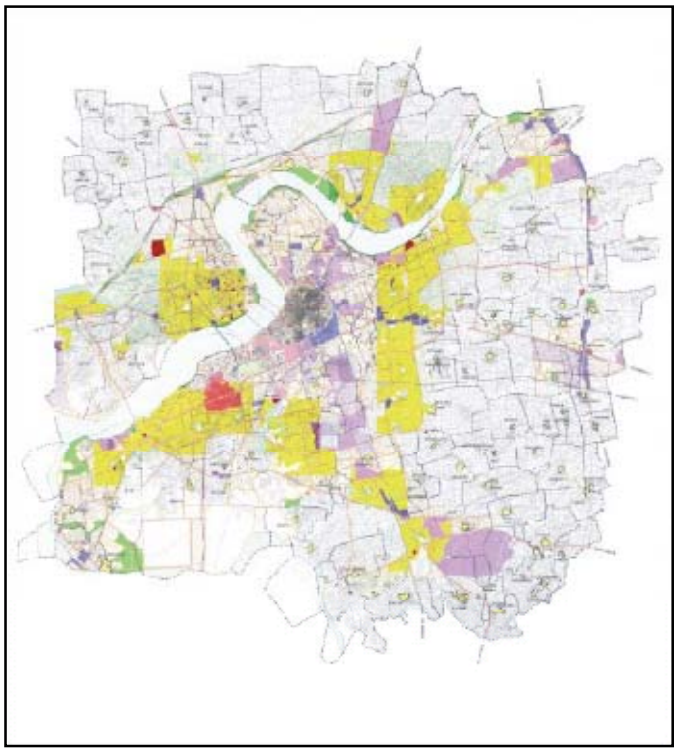
Health department is responsible to provide all the medical facilities, vaccination, providing first aid, disposal of bio-medical waste, regular fogging, sprinkling of pesticides and supervising other medical help related activities during and post disasters.

Sanitation department is responsible of providing basic sanitation facilities, cleaning and maintaining public toilets and urinals, cleaning of nallas and water channels etc.

Solid waste management department is responsible to clear all the solid waste, debris, muck, cleaning of water channels, disposal of bio-medical waste and all the other cleaning activities required during and post disasters.

13.7.3 LAND USE PATTERN

The Old Surat city is the most vulnerable part of the city as far as floods are consent as it is located between the loops of river Tapi. Also the Areas with the industries are more prone to health and chemical hazards. Scattered industrial and industrial developments in the proximity of the residential areas are the most vulnerable zones. Below **Error! Reference source not found.**4 shows land use vulnerable areas.



Map 13-4 Land use vulnerable areas

The roads in the city cover an area of 28.29 sq. km, which is about 25 percent of the total area of SMC. So far, 80 percent of the area of the city has been effectively connected through a total length of 1133.37 km. of road network. Of this, 93.5 percent of the roads are surfaced mostly with asphalt. Some of the related issues include:

Insufficient road widths for the movement of emergency vehicles

The Ring Road from Lal Darwaza to Ved Darwaza on the periphery of the walled city is discontinuous. Several other major roads in the north, west and south zones are also discontinuous leading to major traffic movement on other roads and minor roads in residential areas.

Improper connectivity in peripheral areas

While the peripheral areas in the west, east, south and south-west zones have grown considerably, the connectivity of these roads with the main corridors is inadequate. While nearly 80 percent of the city area is well connected, the rest lacks good linkages. Only 94 percent of the existing network is surfaced mainly with asphalt.

Encroachments and informal activities on major corridors of the city

The margins of major roads and the footpaths are encroached upon in several sections by small time street vendors, illegal parking and other informal activities. With no margins left, the extension and widening process of these roads is hampered.

Looking at the current development and location of the fire brigade station it is very evident that there are more fire stations required. It seems all the stations are located around the city and can cater the need for the city area only. Majority of the stations are located in the walled city area on narrow streets and does not meet any of the norms or guidelines specified

by the Statutory Fire Advisory Committee or the International Standards. The stations are facing problems in physical expansion and heavy traffic during day hours. Majority of the stations even do not have basic parking and repairing workshop facilities. *(Refer Annexure Map 13-2 – Fire Stations Locations Map)*

13.7.4 COMMUNICATION FACILITIES

Communication facilities are more or less satisfactory, the fire fighting vehicles, rescue vehicles and all other vehicles are equipped with wireless sets and connected with all the stations and central control room. All the stations are connected with central control room. All the officials are equipped with WLL and mobile phones.

Fire department is connected with police department and Airport Control Authority with a hotline.

Complaint flow mechanism and re-addressal mechanism

In case of emergency complaint is received by the control room. The complaint is then analyzed and decisions are taken by the operator and the officials for three aspects:

- Type of help to be required (rescue, ambulance, fire tender or combination of two or more)
- Nearest rescue and relief facility available from the place of incidence
- If event is more critical than order other stations to provide support

With the discussions with the fire department officials it seems the centralized system is very well worked out and working efficiently.

13.8 RECOMMENDATIONS AND SUGGESTIONS FOR DISASTER MANAGEMENT PLAN

With the support of the Gujarat State Disaster Management Act, Surat has prepared a detailed Disaster Management Plan for the year 2007. But there are some areas and issues to be addressed to further improve the DMP of Surat.

Risk Zoning of the city

This fire zones are the key governing factor to propose new locations for the fire stations and other facilities.

National Building Code specifies fire safety norms and guidelines. Part IV deals with demarcation of risk zones, restriction on construction of buildings, structural requirements for minimize danger to life from hazards.

The code suggests that the city should be divided in to distinct fire zones, based on the use and the hazard inbuilt in the buildings and structures.

Risk Zones as categorized by NBC:

Zone 1: Residential, Educational, Institutional, Assembly, Small Business, Retail Market

Zone 2: Business, Industrial other than high hazard industries

Zone 3: High hazard industries, Storage Buildings, Buildings for hazardous uses

The NBC does not provide any guidelines about location and numbers of fire stations; it only specifies fire safety of the buildings.

Land use

While preparing land use, the risk zones should be taken in to consideration, special emphasis on public places, entertainment complexes, exhibition venues etc.), congestion, and accessibility. Disaster safety guidelines should be made a part of the General Development Control Regulations and Building Bye-Laws.

The zone along the river Tapi should be protected and developed as a green or recreational zone. Mixed land uses also need to be redefined and the norms for height and bulk should be revised accordingly

Road network

- Should avoid any dead ends, missing links should be reinstated
- Should have ring roads available for free rescue vehicular movement
- Minimum road width to locate fire station should 30 m
- Higher category roads in the industrial or the heavy risk zone areas

Public awareness and communication

- Nature and language of Warnings need to be improved
- Clear instructions on what, how, when and where can be very effective
- Communication means of authorities need to be made robust
- Wireless sets and their placement during monsoons are some of the simple steps
- Regular updating of strategies to safeguard these means is very critical
- Responsibility Allocation can be more streamlined through simple measures
- Develop briefing (prior to deputation) and debriefing (completion of deputation) formats for officers
- Allows creating inventory of response experienced officers
- Also can help bring in useful suggestions to improve response mechanisms in future
- Media Management should be improved
- Frameworks for dealing with media should be prepared
- Exposure can bring in benefits in case of very adverse situation
- Relief distribution can be further improved through sophisticated IT tools and their usage
- Disaster Management Plans should be living documents especially in cases like Surat where floods are recurrent
- GIS based Information management and Emergency response system

Location of new Fire Stations

Looking at the growth and sprawl of the city, need for developing new fire stations and upgrading the existing fire stations has been felt. There are International Standards and Statutory Fire Advisory Committee Guidelines available to derive at the correct numbers and location of the fire stations.

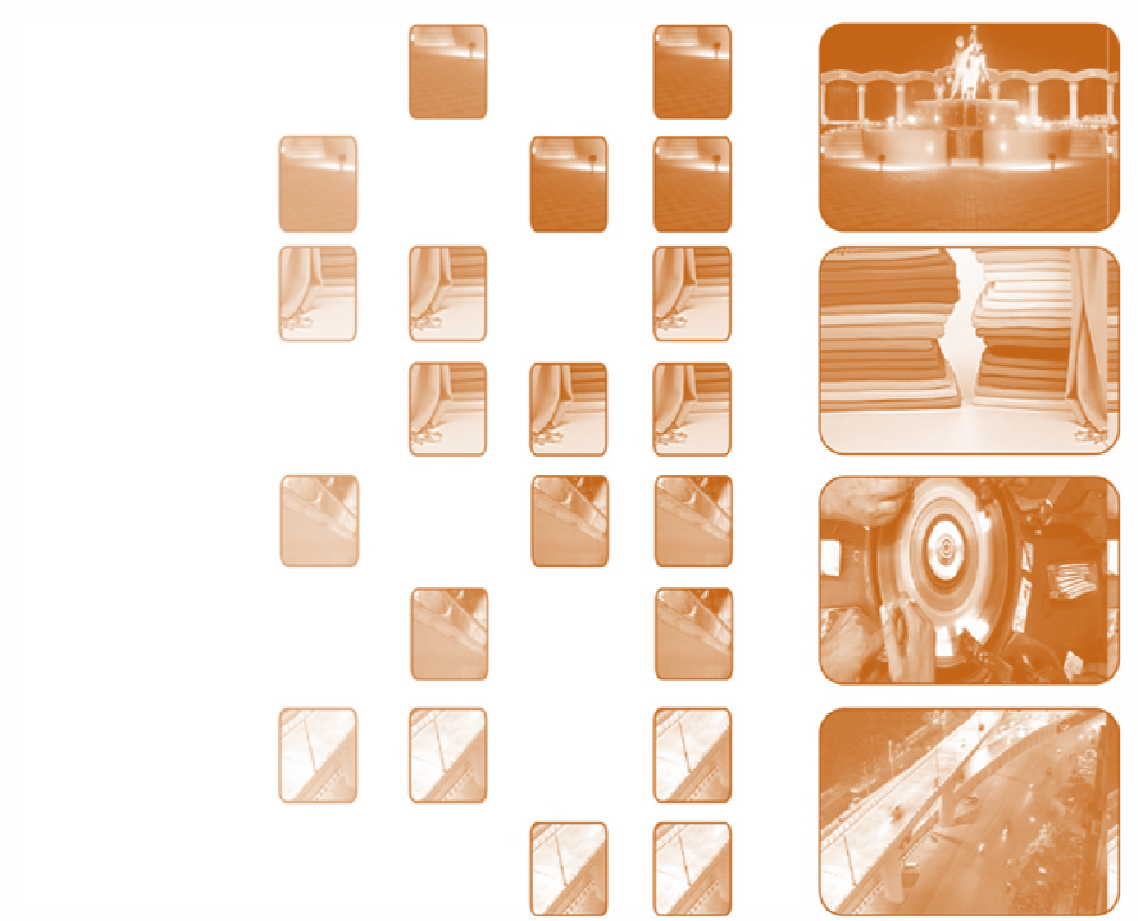
International Standards

The international standards for location of fire stations:

- Fire tenders should reach the spot of fire in five minutes in urban and in twelve minutes in rural areas.
- Should be located along the major road i.e. road having right of way greater or equal to 30m.
- Should be within the radius of two to three kilometres

The Statutory Fire Advisory Committee guidelines

- The Statutory Fire Advisory Committee guidelines specify numbers and location of fire stations, requirements of other machinery and equipments.
- One Fire Station per four square miles area
- One pumping (fire tender) unit for every fifty thousand population
- One rescue van for every 3-10 lakhs population and one van for every additional 10 lakhs population
- New stations need to be created based on the following parameters:
- Covering 100% of the city area
- The fire risk zoning (Special emphasis on public places, entertainment complexes, exhibition venues etc.)
- Response time less than 5 to 10 minutes in the peak time
- Major road with minimum 30-45m right of way



Chapter 14

Training Need Assessment

Background

Staffing Pattern in SMC

Training Need Assessment

Issues Identified

Strategies

CHAPTER 14. TRAINING NEED ASSESSMENT

Training Need assessment helps employees to develop their personal and organizational skills, knowledge, and abilities. It also helps in the expansion of human capital within an organization or a municipality, region, or nation. It includes such opportunities as training, employee career development, performance management and development, coaching, key employee identification, tuition assistance, and organization development. This chapter explains the initiatives of the Surat Municipal Corporation for training need assessment.

14.1 BACKGROUND

The Surat Municipal Corporation (SMC) has been regarded as one of the models of excellence in urban management after it transformed the image of the city from being one of the filthiest cities with the outbreak of plague in 1994 to one of the cleanest now. The SMC prepared a vision to project Surat as a "Global City with Global Standards and Values". With this vision in mind, the corporation has given a high priority to implementing managerial and administrative reforms.

14.1.1 OBJECTIVE

JNNURM requires the administrative reforms are undertaken in ULBs and other institutions engaged in urban sector management. Such administrative reforms should include – instituting better human resource management systems, reduction in establishment expenditure by introducing voluntary retirement schemes, non-filling up of posts falling vacant due to retirement, extensive use of outsourcing, performance review and management mechanisms, etc., and achieving specified milestones in this regard.

For achieving the above objective SMC had taken the initiative to undertake a training needs assessment exercise for its elected members and its officials.

The purpose of a training needs assessment is to identify performance requirements or needs within an organization in order to help direct resources to the areas of greatest need, those that closely relate to fulfilling the organizational goals and objectives, improving productivity and providing quality products and services.

The needs assessment is the first step in the establishment of a training and development Program. It is used as the foundation for determining instructional objectives, the selection and design of instructional programs, the implementation of the programs and the evaluation of the training provided. These processes form a continuous cycle which always begins with a needs assessment.

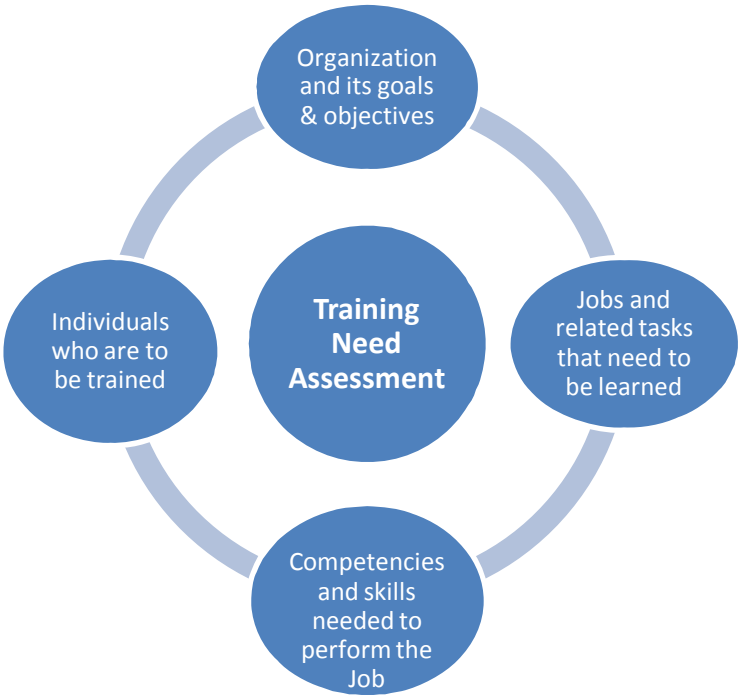
14.1.2 WHAT IS TRAINING NEED ASSESSMENT

Designing a training and development program involves a sequence of steps that can be grouped into five phases: needs assessment, instructional objectives, design, implementation

and evaluation. To be effective and efficient, all training programs must start with a needs assessment. Long before any actual training occurs, the training manager must determine the who, what, when, where, why and how of training.

The Training Need Assessment is based on the following criteria:

Figure 14-1 Training Need Assessment



There are three levels of needs assessment: organizational analysis, task analysis and individual analysis. Organizational analysis looks at the effectiveness of the organization and determines where training is needed and under what conditions it will be conducted. Task analysis provides data about a job or a group of jobs and the knowledge, skills, attitudes and abilities needed to achieve optimum performance.

Whereas, Individual analysis analyzes how well the individual employee is doing the job and determines which employees need training and what kind. Sources of information available for an individual analysis include Performance evaluation, Interviews, Questionnaires, attitude surveys and Checklists or training progress charts, listing of current skills.

The following objectives would be achieved by instituting effective training:

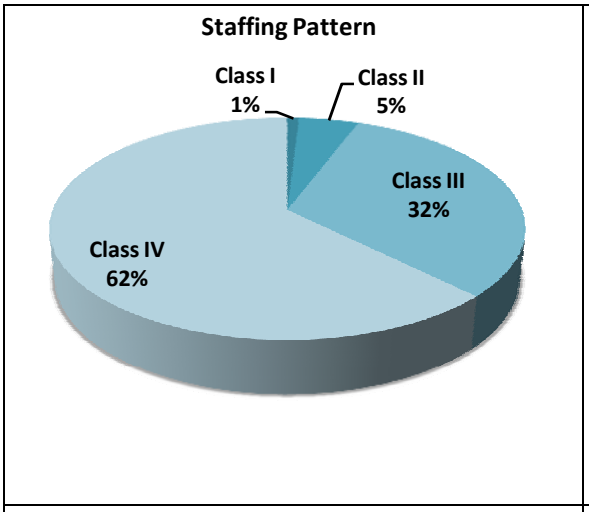
1. Provide opportunities for enhancing skill sets of existing staff to meet changing job requirements
2. Bridge the gap between current skills and knowledge sets with future requirements
3. Assists in achievement of functional skill sets which are currently not available
4. Facilitate attitudinal and motivational changes among staff as desired by the corporation
5. Identify and exploit existing skill sets
6. Include a sense of belonging among employees
7. Enable a performance oriented work culture
8. Help in better understanding technical, administrative, managerial, functional and attitudinal aspects of the corporation
9. Prevent stagnation of employees by providing refresher courses

14.2 STAFFING PATTERN IN SMC

The SMC is the second largest urban local body in Gujarat. The Municipality of Surat which was established in the year 1852 was converted to a municipal corporation in 1966. Since then both the population and area of Surat has increased manifold. In 1966 the SMC limits stood at 21.9 sqkm and the population was 3.8 lakhs. Whereas now the limits are extended upto 326.51 sqkm and the population is 28.77 lakhs as per 2001 census. As per the current data the total number of staff from Class I to Class IV cadre is 16139. The details of the staff and trainings they received are provided below.

Table 14-1 Staff Details in SMC (as on 09/10/09)

Item	Class I Staff	Class II Staff	Class III Staff	Class IV Staff	Total
Total Permanent / Regular posts in Corporation	212	876	6567	12011	19666
Occupied posts	141	708	5344	9946	16139
Vacant post	**33.5 %**	**19.2 %**	**18.6 %**	**17.2 %**	**23.0%**



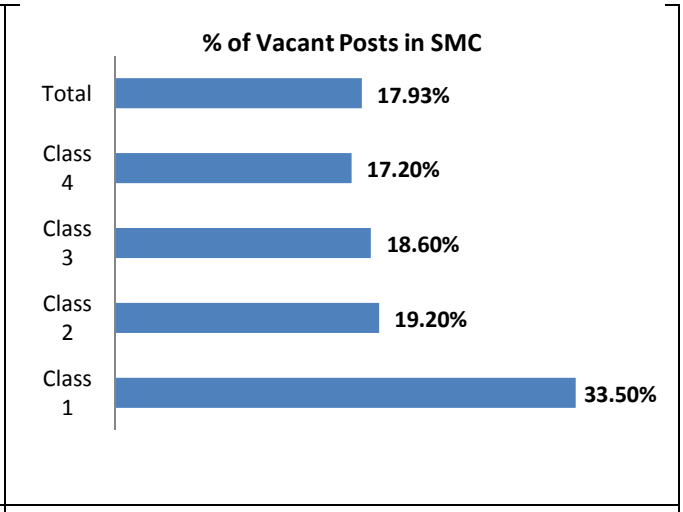


Chart 14-1 Staffing Pattern in SMC | **Chart 14-2 Class wise Vacant Posts in SMC**

It is clear from the above table that there is huge gap between the requirement and the actual filled posts in SMC. On an average 18% posts are lying vacant. There is a sudden fall in the number of staff per sqkm area after 2007-08. The staff strength has gone down from 154 per sq.km. to 60 per sq.km. This could be attributed to some extent to increased privatization initiatives and also non-recruitment within SMC.

Table 14-2 Growth Trends in SMC staffing Pattern

Year	SMC Area in sqkm	Total staff	Staff/sqkm
1980-81	55.55	4996	90
1985-86	55.55	6286	113
1990-91	111.15	11727	106
1995-96	112.28	15247	136
1998-99	112.28	17323	154
2008-09	326.51	19666	60

Source: SMC

Table 14-3 Budget allocation for Trainings

Department	Year ('000)		
	2005-06	2006-07	2007-08
Engineering Department	387	814	3245
Health Department	37	73	180
Revenue Department	-	2	190
Secretary Department	-	-	5
Social Welfare Department	6	12	30
Support Department (personnel, establishment and finance departments)	18	29	385
Total Expenses for Staff	448	930	4035

Source: SMC,2009

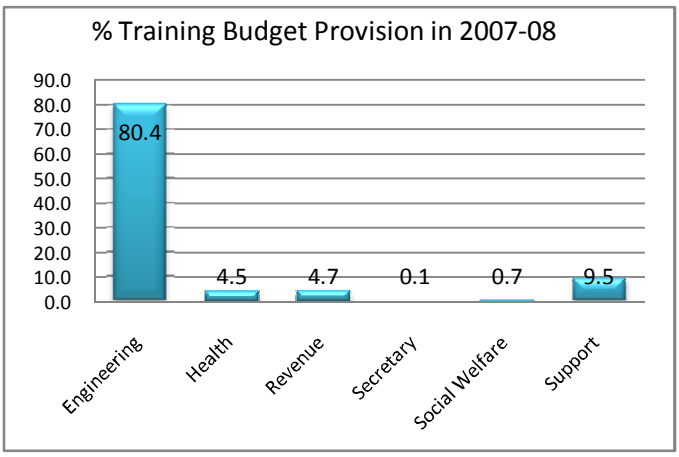


Chart 14-3 Training Budget Provision in 2007-08

It is commendable that SMC has department wise training budget provision for all departments. It is admirable that the budget provision covers all of the departments since 2007-08. However, the Engineering Department has the lion's share of budget allotment.

Training sessions:

All of the staff personnel were provided with different types of training, Technical training as well as soft skill training (Self-improvement, time management, etc.). The details of the same are provided in the Annexure V.

Table 14-4 Summary of Number of Participants in Different trainings in Last Three years

Category	Class 1 Staff	Class 2 Staff	Class 3 Staff	Class 4 Staff	Total
Participants in Soft skill Training	302	488	4649	40	5479
%	*5.51*	*8.91*	*84.85*	*0.73*	
Participants in Technical Training	21	97	78	0	196
%	*10.71*	*49.49*	*39.80*	*0.00*	

Source: SMC, 2009

It can be observed from the above table that the distribution of number of participants in various training sessions is very skewed. Out of total 196 participants in technical trainings, Class I cadre participants accounted only for 10.7% of the total participants. Whereas, Class 4 cadre officers have not been implied with any kind of technical training. The soft skill type of trainings such as Self Awareness, Attitudinal Change, Effective Leadership, Communication Skills, Time Management, Team Building, Personal SWOT Analysis have been attended by more than 75% of the Class II and Class III cadre officers.

Table 14-5 Participants in technical trainings in last three years (2005-2008)

Topic	Class 1 staff	Class 2 staff	Class 3 staff	Class 4 staff	Total
Disaster Management	4	20	3	0	27
Governance and Planning	5	21	66	0	92
Infrastructure	2	15	3	0	20
IT Skills	2	18	5	0	25
JnNURM Related	5	5	0	0	10
Other	2	8	1	0	11
PPP	1	10	0	0	11
Grand Total	**21**	**97**	**78**	**0**	**196**

Source: SMC, 2009

Table 14-6 No of Training Sessions conducted in last three years

Year	Disaster Mgmt	Governance & Planning	Infrastructure & JnNURM	IT Skills	Other	PPP	Grand Total
2005-06	1	2	5		2	1	11
2006-07	1	4	5	1	2	2	15
2007-08	8	4	2	2	2	2	20
Grand Total	10	10	12	3	6	5	46

Source : SMC

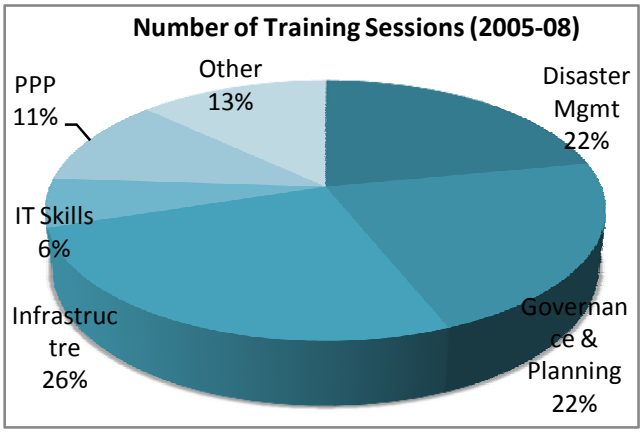


Chart 14-4 Percentage of Topic wise Training Sessions

It can be observed from the above table that efforts for capacity building through implying training sessions were boosted in the year 2007-08. In last three years maximum training sessions were conducted on disaster management, governance & planning and infrastructure related topics.

14.3 TRAINING NEED ASSESSMENT

The National Institute of Urban Affairs (NIUA) in association with the Urban Management Centre (UMC) conducted a study for Training Need Assessment. The overall objective of the Training Needs Assessment exercise is to identify training needs of existing manpower of the SMC and to identify specific training modules. In order to capture both- the qualitative discussions and the individual capacity of the SMC, the study team used the SWOT tool and conducted comprehensive individual questionnaire. Detailed discussions with several department officials were also conducted.

Department specific SWOT discussion was also conducted. The departments consulted were planning & engineering; social infrastructure; finance and administration. The elected members were also consulted separated, to get their specific inputs on the study. Individual meetings were conducted with key decision makers viz.-Mayor, Municipal Commissioner and divisional heads. Additionally more than 50 officials and 45 elected members filled up a self administered structured questionnaire. Respondents were selected by SMC, by position and their responsibility and also by ensuring appropriate women representation.

Picture Training Sessions in SMC

14.4 ISSUES IDENTIFIED

As per the study conducted by NIUA, a detailed analysis into the trainings provisions reveal that although it is commendable that the SMC has separate training budget provisions for each department, the overall training budget is only 0.01% of the total revenue expenditure. Maximum trainings have been provided in the area of legal understanding (mostly RTI related) followed by computer trainings and disaster management. It is commendable that sixteen officials were provided training in the area of efficient functioning and management of the organization which seldom receives importance and priority among other technical sectors.

The figures of number of people trained also highlight the fact that class I officials have received the least training. Across departments, the engineering department has received the maximum opportunities to attend any training programs.

With SMC's JnNURM projects focusing primarily on improving basic amenities like water supply, drainage, transportation, only two Class II officials received training in water supply management. It was also seen that no cross-sectoral training for efficient coordination and project management was provided. E.g., the importance of providing training to department for improving their knowledge base with respect to public-private partnerships and contract management. It was also seen that over the years, the ratio of staff per sq. km has gone down considerably from 154 in the year 1998-99 to merely 60 in 2007-08. The study also recommends that the SMC undertake a rationalization of overall organization structure and reorganization of departments to become an efficient and effective service oriented institution.

As far as Human resources and development is concerned, some weaknesses have been identified during the study as listed below:

A. Recruitment Procedure:

- Unable to recruit from open market
- No work load analysis
- No forecasting for manpower recruitment / planning

- Lengthy process and no flexibility in process
- Manpower is looked as cost and not investment
- Curtailment of revenue expenditure

B. Attitude/motivation within the human force:

- Insignificant role of annual confidential reports of the staff
- No forum/institutions for addressing grievances of staff
- Employees union's are not encouraged
- Hierarchy is strong / rigid
- No independent assessment for manpower planning
- Do not have any control on time /work because other departments/officials engage staff in different work, thereby appropriate time is not given to complete assigned tasks
- No incentives offered and the staff is Over loaded

C. Capacity building needs assessment:

- Lack of a proper system or Training calendar
- Details of training is not sent to personnel department on time
- Due to overload of work, staff is unable to attend trainings
- No orientation of SMC when recruited, On job learning
- No specific budget allocate

14.5 STRATEGIES

SMC has very well understood the importance of training need assessment and capacity building of its staff for providing better services to the citizens. Based on the discussions with the SMC staff and the study conducted by NIUA for training need assessment, SMC should implement the following recommendations:

- It is suggested that a separate department should be formed to look after the 'Human Resource development and capacity building of the staff' functions.
- Filling up of vacant posts: this will improve the efficiency of the staff as they will not be overloaded
- Annual Training calendar should be maintained for all category of staffs
- Mandatory induction training – the induction training should be made mandatory for all the staff in the first year itself.
- Pre-retirement training - there should be tailor made training programs for officials more than 55 years of age to prepare them for post-retirement options and to assist them find a new vocation. They could receive a phasing out schedule whereby they can reduce their working hours the SMC work and on the other hand increase the time devoted on the new vocation, over a period of last three years of their service.
- Class I officials have received insignificant amount of training due to pressures of work within the organization. And hence it is recommended, that class I employees receive more training.
- Budget for training: It is also recommended to make a policy to allocate a percentage of revenue earned in a year for training and capacity building. It could be 2-3%, as a

guiding principle. The same could be reviewed periodically.

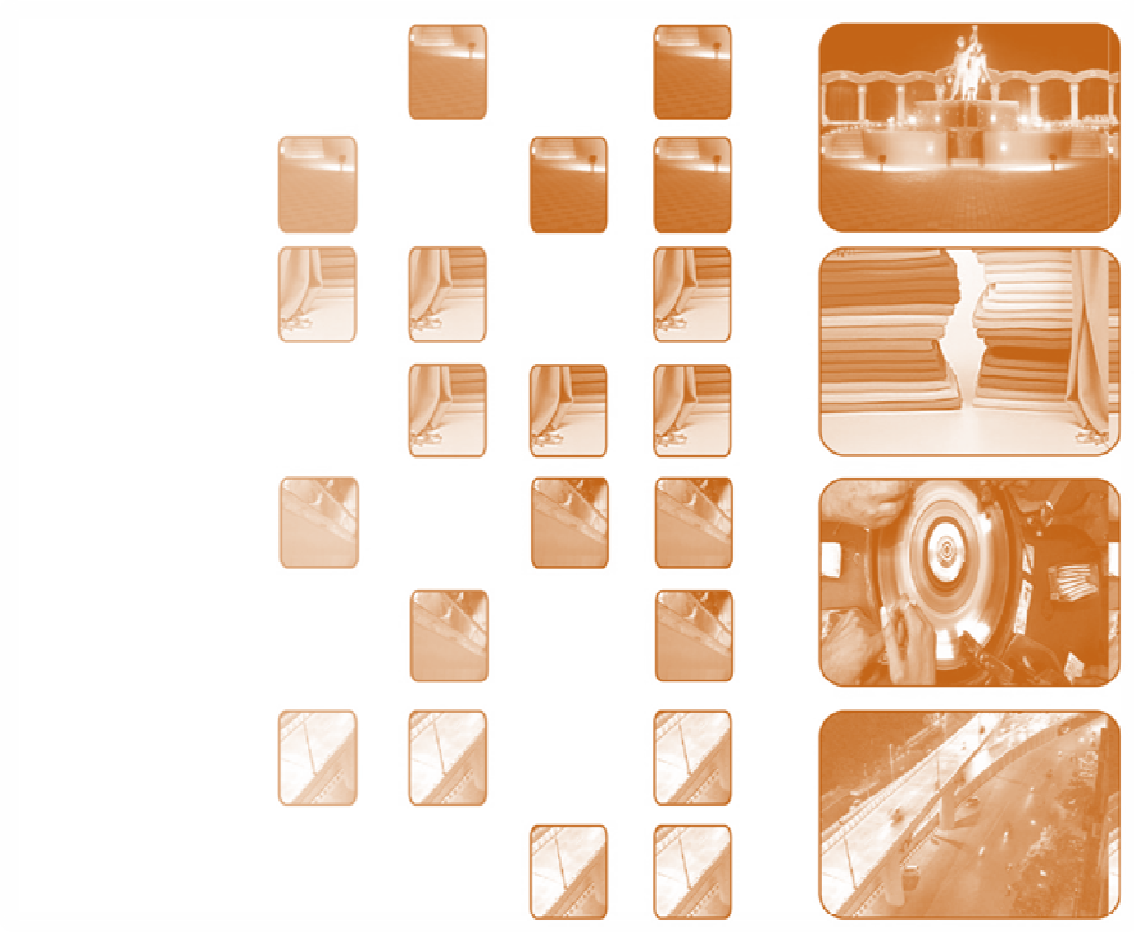
- Prioritized Sectors for training- maximum respondents mentioned that they would like to receive training in areas of urban planning, roads and bridges, financial management, contracts management and slum Upgradation. Almost all these priority sectors are important for successful implementation of JNNURM projects and to ensure sustainability of initiatives and hence should be given priority in the short term (0-1 year). Similarly, other training sectors have been categorized in medium (2-3 years) and long term (4-5 years).
- Performance evaluation to be based on Training: SMC may initiate a process of accreditation whereby employees who have undergone training get some points. Minimum person days of annual training and or points collected could be made mandatory for employees for promotions or salary upgrades.
- Internal staff newsletters – Internal newsletter should be prepared in Gujarati and disseminated across departments and across classes. These fortnightly newsletters are also a tool for imparting information on upcoming trainings, best practices from other municipal corporations, articles on self help, personal development etc.
- Merit based competitive open selection for long term professional development programmes- professional development programmes are large investments for an organization. The staff trained should become assets to the organisations, and hence there could be a bond signed to serve the organization for a certain period, in exchange of the investments made.
- Announcement for courses/training programs. Announcements for training/capacity building programs seldom reach the aspiring participant. And hence a training department inventory of participants would assist the information flow.
- Feedback to parent department- SMC's training department (when constituted) should keep parent departments informed of participant's progress, based on the performance evaluation
- SMC to enter into partnership with training organizations to ensure that training is demand driven and specific. SMC could work out the schedule with these institutions to receive special rates and customized programs for its staff.

Some of the issues identified in implementing the JnNURM reforms which need attention, are given in the Table 14-7 below :

Table: 14-7Issues which need attention for undertaking Reforms

JnNURM Dimension	Issues in Process
E-governance	Lack of expert manpower Additional computerization for MIS No dedicated manpower for maintenance Annual maintenance contracts are not streamlined Software not updated with technological advancements Lack of staff as recruitment process does not allow market rates remuneration to staff Tendering process – Lowest bidder gets accepted
Community Participation Law - Formation of area committee	No budgetary sanctions
- Formation of ward committees	Cooperators themselves from the ward committee (do not have participation of NGOs, citizens, CBOs, experts in different fields) No provision of option
Simplification of the building plan permission process	In majority of cases, average time needed for acquiring building plan permission is about 3 months Need at least double the number of staff that is existing Mostly staff is busy with encroachment issues- which needs to be separated from planning functions Other departments like law enforcement should take it up Need training for computerization and GIS
GIS based property tax systems	Not integrated with GIS planning
Levy of user charges to recover O&M costs	No formal survey has been conducted to know citizen's willingness to pay Lack of database for household water connections (size of connection) and maps Complaints are not linked to the map
Project management Standards of working – updated work/instructions manuals/ standard operating procedures Timely availability of data / decision making Performance indicators at all level	No job descriptions No workload analysis No use of software – PERT/CPM Need more staff
Procurement management	Flexibility of contracting should be built into system Technical engineering staff is involved in preparation of tenders, execution and procurement For procurement management a separate department is required Need training for engineering and managerial staff
Quality Assurance	Vigilance cadres are at lower level than the executing staff Requirement for labs for quality testing
Maintenance Management	No preventive maintenance schedule (in case of fire, other calamities) Shortage of staff, engineers also handle projects and maintenance
Contract Management	Lowest tenders gets accepted Low workable rates Quality of work is not accounted for Lack of appreciation Inadequate supervisory staff for contractors

Source: Extracted from Report on 'Training Need Assessment of Surat Municipal Corporation', NIUA, 2008



Chapter 15

Municipal Finances

Introduction to SMC accounts

Revenue Account & Capital Account

Status of Municipal Finance

Efficiency Parameters

Key Issues

SUDA Accounts

CHAPTER 15. MUNICIPAL FINANCE

15.1 INTRODUCTION TO SMC ACCOUNTS

This section would review and analyze the actual accounts from 2004-05 to 2008-09 obtained from SMC. The chapter would proceed with in depth analysis of major income and expenditure heads of Revenue and Capital accounts. It would also observe the status of municipal finance and key efficiency parameters at the end.

To start with, the following exhibit provides a hawk eye view to SMC accounts over the past five years.

Table 15-1 Summarized SMC accounts from 2004-05 to 2008-09

Particular	2004-05	2005-06	2006-07	2007-08	2008-09	CAGR
Rs. Lakh						
Opening balance	**3662**	**5085**	**3223**	**5011**	**4399**	
Revenue Account						
Revenue Income	62042	67347	80245	89658	98766	**12%**
Revenue Expenses	34515	37826	45367	51300	58655	**14%**
Revenue surplus / deficit	**27526**	**29521**	**34878**	**38358**	**40110**	
Capital Account						
Capital Income	4669	4663	5253	20033	42756	**74%**
Capital Expenditure	17387	32563	34237	55375	73188	**43%**
Capital surplus / deficit	**-12718**	**-27900**	**-28984**	**-35342**	**-30432**	
Increase/decrease in cash due to increase/decrease in current assets/current liabilities[3]	13386	3483	4106	3627	10784	
Closing balance	**5085**	**3223**	**5011**	**4399**	**3294**	

Source: SMC/ Author's analysis

It can be seen that despite of major discontinuity like removal of octroi, the revenue account has shown steady growth trend. It primarily owes to increase in state government grant as compensation for octroi while major expenses such as salary and wages being stable. However the capital expenditure and income have been soared up in 2005-06 and 2007-08 respectively due to influx of JnNURM projects and grants. The SMC has maintained surplus funds throughout the period because of sturdy sources of revenue income. The revenue surplus has been around 40% of the total revenue in each year given above while revenue expenses varies from 55% to 60% of total revenue income throughout above years.

The revenue and capital accounts are discussed further in detail.

[3] As a major reform, in 2006-07, SMC had changed its book keeping system from single entry to double entry system. As a result many accrual base transactions (for income & expenses both) have been taken place. Thus actual figures of surplus/ deficit are not reflected in actual cash and bank balance. It is learnt that as the transaction is made on accrual basis, it is booked in either on current liability side or current asset side. Thus such adjustment has been made to match actual cash and bank balances for cash flow prepared for projection of Financial Operating Plan (FOP)

15.2 REVENUE ACCOUNT

Revenue account comprises records of operating income and expenses. As discussed above, revenue income and expenses of SMC have grown at rates of 12% and 14% respectively. The following exhibit depicts major account heads of income and expenditure.

Table 15-2 Summarized revenue account of SMC from 2004-05 to 2008-09

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
Rs. Lakh					
Revenue Income					
Tax income	49423	52179	62127	50096	22275
% of total Income	*80%*	*77%*	*77%*	*56%*	*23%*
Non tax income	4235	4501	4297	5402	6212
% of total Income	*7%*	*7%*	*5%*	*6%*	*6%*
Grants and transfers	4409	5510	8287	25986	63783
% of total Income	*7%*	*8%*	*10%*	*29%*	*65%*
Interest income	1808	2651	3228	4738	3827
% of total Income	*3%*	*4%*	*4%*	*5%*	*4%*
Other income	2167	2506	2306	3436	2670
% of total Income	3%	4%	3%	4%	3%
Total	**62042**	**67347**	**80245**	**89658**	**98766**
Revenue Expenses					
Establishment Expenses	17693	19271	21639	26190	31297
% of total Expenses	*51%*	*51%*	*48%*	*51%*	*53%*
% of total Income	29%	29%	27%	29%	32%
Administration & General Expenses	8176	9011	10482	10861	12759
% of total Expenses	*24%*	*24%*	*23%*	*21%*	*22%*
% of total Income	*13%*	*13%*	*13%*	*12%*	*13%*
Repairs & Maintenance of Fixed Assets	4018	4540	7007	7395	7539
% of total Expenses	*12%*	*12%*	*15%*	*14%*	*13%*
% of total Income	*6%*	*7%*	*9%*	*8%*	*8%*
Service & Programme related Direct Expenses	2269	2675	3604	3823	4013
% of total Expenses	*7%*	*7%*	*8%*	*7%*	*7%*
% of total Income	*4%*	*4%*	*4%*	*4%*	*4%*
Finance Charges	681	465	486	494	363
% of total Expenses	*2%*	*1%*	*1%*	*1%*	*1%*
% of total Income	*1%*	*1%*	*1%*	*1%*	*0%*
Grants and Contributions	1667	1859	2141	2505	2675
% of total Expenses	*5%*	*5%*	*5%*	*5%*	*5%*
% of total Income	*3%*	*3%*	*3%*	*3%*	*3%*
Prior period expenses	11	5	9	33	9
% of total Expenses	*0%*	*0%*	*0%*	*0%*	*0%*
% of total Income	*0%*	*0%*	*0%*	*0%*	*0%*
Total	**34515**	**37826**	**45367**	**51300**	**58655**

Source: SMC/ Author's analysis

It reveals from the above table that revenue income of SMC has grown steadily. The tax revenue was the major contributor up to 2006-07. With elimination of octroi in 2007-08, contribution from tax revenue has started declining. At the same time transfers from the State Government increased in lieu of octroi, which also reflects in the above table. However, other income sources such as non tax revenue and interest income have earned stable share in total income. The revenue income is dug out further in very next point.

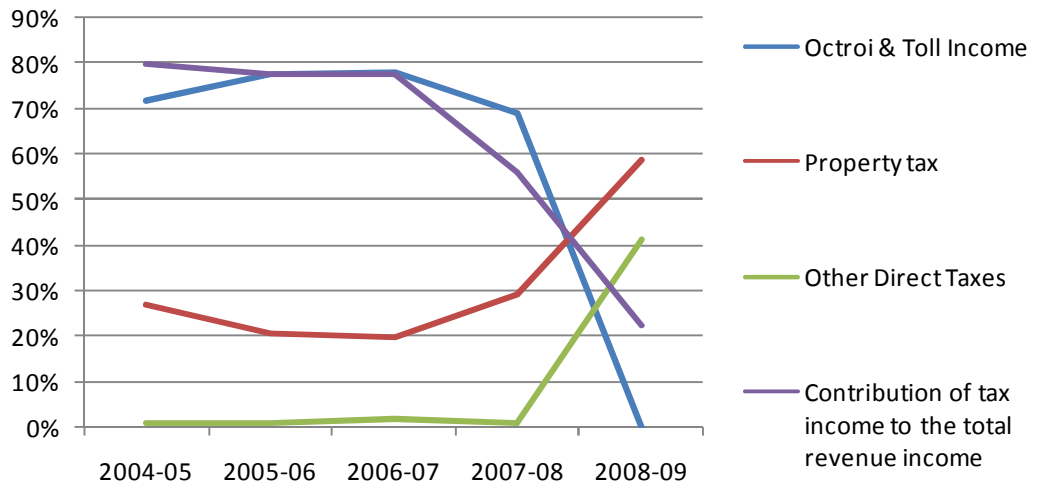
Around 50% money is being spent on establishment including salary and wages. It vanishes around 29% of the total revenue income and has increased up to 32% in 2008-09 due to introduction of Sixth pay commission and increase in contribution in pension fund. Other major expense from administration and general activities has been observed to be steady in terms of % contribution in revenue expenses and % use of fund against total revenue income. Despite of stable contribution in revenue account, repair and maintenance related expenses are tend to be increase in the next five years owing to influx of new capital projects. Financial charges are mainly the interest payable on the outstanding loans while grants and contribution represents the fund given to the SMC's education committee to run various municipal schools. However the revenue expenses are analyzed further in the second next point.

15.2.1 REVENUE INCOME

As seen above, revenue income mainly comprises of Tax revenue, Non tax revenue, Grant and transfers and Interest income. Other income includes sales proceed and miscellaneous income. Following discussion extracts each of the above heads.

Tax Income

Chart 15-1 Percentage of contribution of various sources in tax income



(Source: Author's analysis)

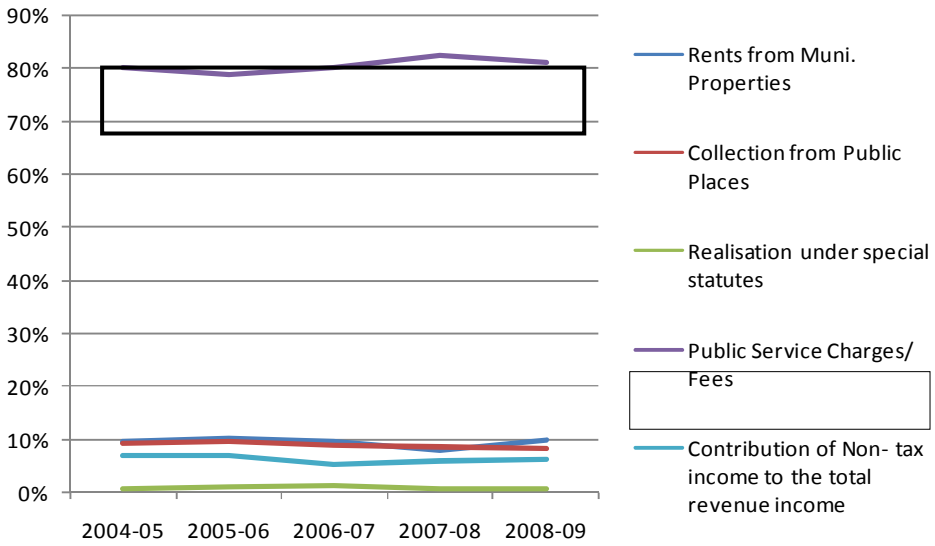
It is apparent from the chart besides that octroi income was the prime source of income since years. However, it is also clearly visible in the above table that decline in % contribution of tax income in total revenue income closely related to decrease in octroi income. In absence of octroi, property tax has emerged as in major income source in 2008-09. Main taxes covered under property tax are General tax (around 50% of total property tax), Conservancy tax

(around 17%-20%) and water meter charges as per agreement (around 20% to 25%). Though, the tax rates for the property tax have not been increased since a long time, it is being increased with 12% CAGR.

Prime reason behind such growth is inclusion of new properties and assessment area as well as increase in the collection efficiency from 70% to around 78% in last five years. In spite of being major revenue generator, its contribution has remained limited to up to 56% in the previous year. The main reason is the conservancy tax is removed in 2008-09 and has been segregated in three other direct taxes namely Sewerage charges, Water charge and Solid waste management charges. Thus the contribution of other direct tax revenue is grown in the 2008-09. Other key heads of direct tax in 2008-09 are mechanical vehicle tax (Rs. 42 cr), professional tax EC and RC (Rs. 30 cr) and theater tax (Rs. 0.07 cr).

Non- Tax Income

Chart 15-2 Percentage of contribution of various sources in non -tax income

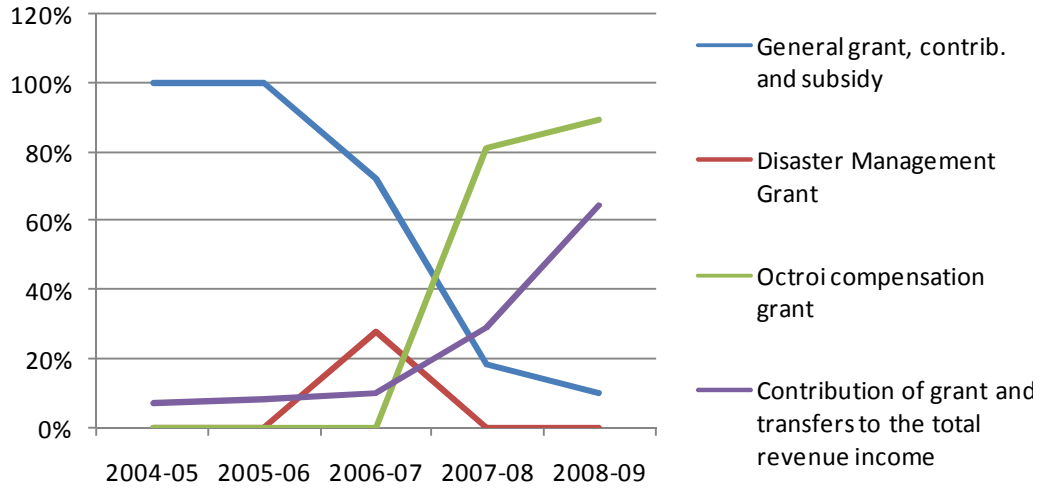


(Source: Author's analysis)

Public service charges mainly comprise of fees collocated from the patients in various health centers run by SMC. It is major non tax income. Other income such as fees collected at public garden and museum, rents from municipal properties etc are contributing meager in the income. However the public services charges have remain stable source of growth over the years and also growing steadily at 10% CAGR.

Grants and transfers

Chart 15-3 Percentage of contribution of various sources in grants and transfer

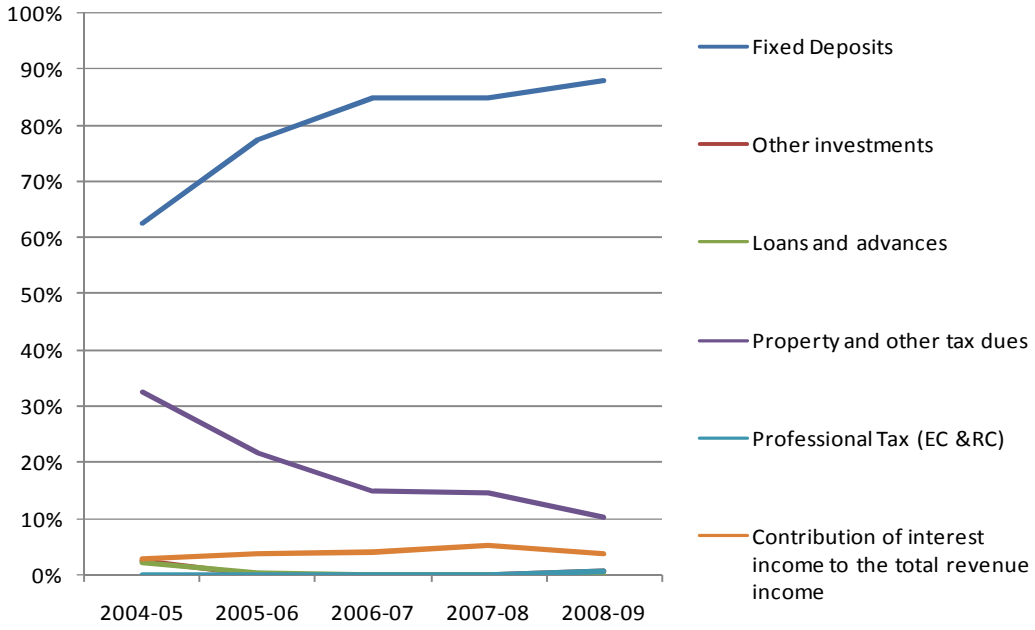


(Source: Author's analysis)

As discussed above, the State government grant as compensation to Octroi has been introduced since 2007-08. Thus contribution of grants and transfers in total revenue income has been increased in four folds from 7% to 65%. However, general grant and subsidy from the state government is stable over the years, its contribution is falling short against the Octroi compensation.

Interest income

Chart 15-4 Percentage of contribution of various sources in interest income



(Source: Author's analysis)

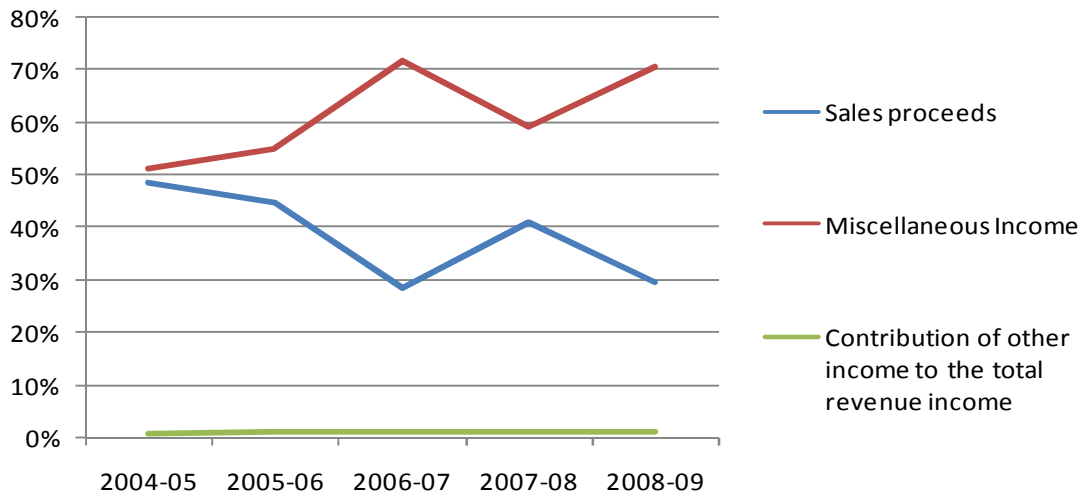
Investment in fixed deposits is earning a huge amount as interest. It is contributing around 90% of the total interest income. Interest on dues of property tax and other direct tax is declining as a sign of increase in collection efficiency of SMC. From 2008-09, interest on unpaid professional tax is also calculated. Considering the amount, It could be other sources

of interest income along with interest on other direct taxes.

Other income

Other incomes are mainly sporadic in nature. These incomes come from the sales proceeds and other miscellaneous income. The miscellaneous income mainly comprises various claims and penalties. As these income adds nominal to the total revenue their volatile nature do not affect the steady growth of revenue account.

Chart 15-5 : Percentage of contribution of various sources in other income



(Source: Author's analysis)

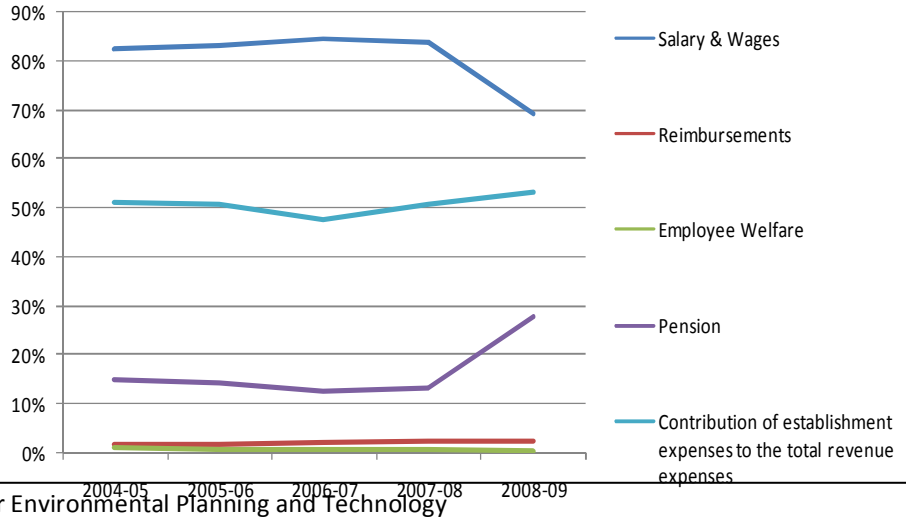
Key rationale for robust growth of revenue income is 1) increase in tax revenue due to addition in no. of assessments as well as increase in tax collection efficiency of SMC. 2) Regular payment of octroi compensation grant by state government and successful implementation of professional tax system. The revenue expenses are assessed further.

15.2.2 REVENUE EXPENSE

As seen earlier, revenue expenses mainly consist of expenses related to establishment, administration, repair and maintenance of fixed assets, finance charges, expenses on service and program and grants/ contribution given by SMC. Further all the above heads discussed in detail.

Establishment Expenses

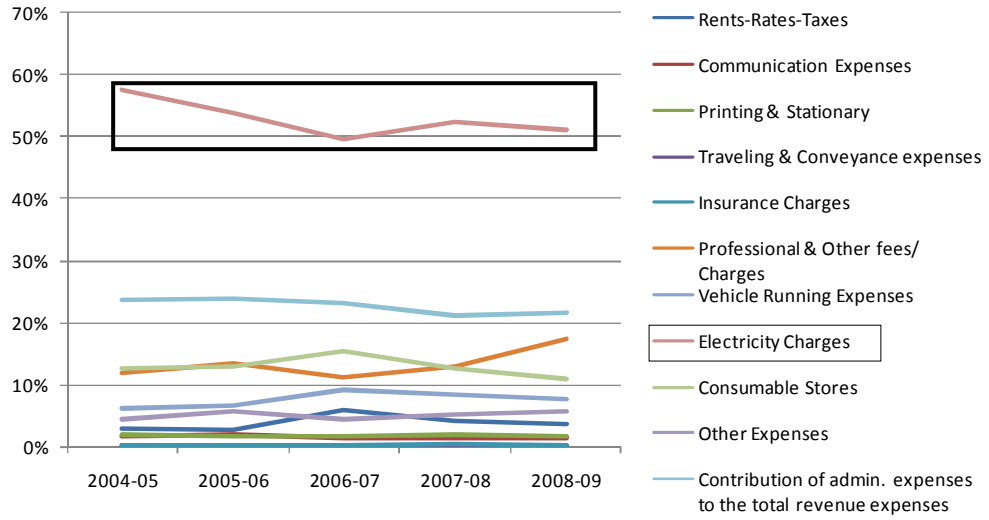
Chart 15-6 Percentage of contribution of various expenses in Establishment expense (Source: Author's analysis)



Salary and wages has been main outlay for the years for any government set up. Here too, it consists of around 80% of the total revenue expenses. However its contribution has been disturbed in 2008-09 due to a discontinuity in pension fund. SMC has put a huge amount of money in it. From 2009-10 the salary and wages can increase owing to disbursement of new salary as per Sixth pay commission so its proportion. As can be seen, the total establishment expenses have remained 50% of the total revenue expenses and 29% of total revenue income over the years.

Administration and General Expenses

Chart 15-7 Percentage of contribution of various expenses in admin expense



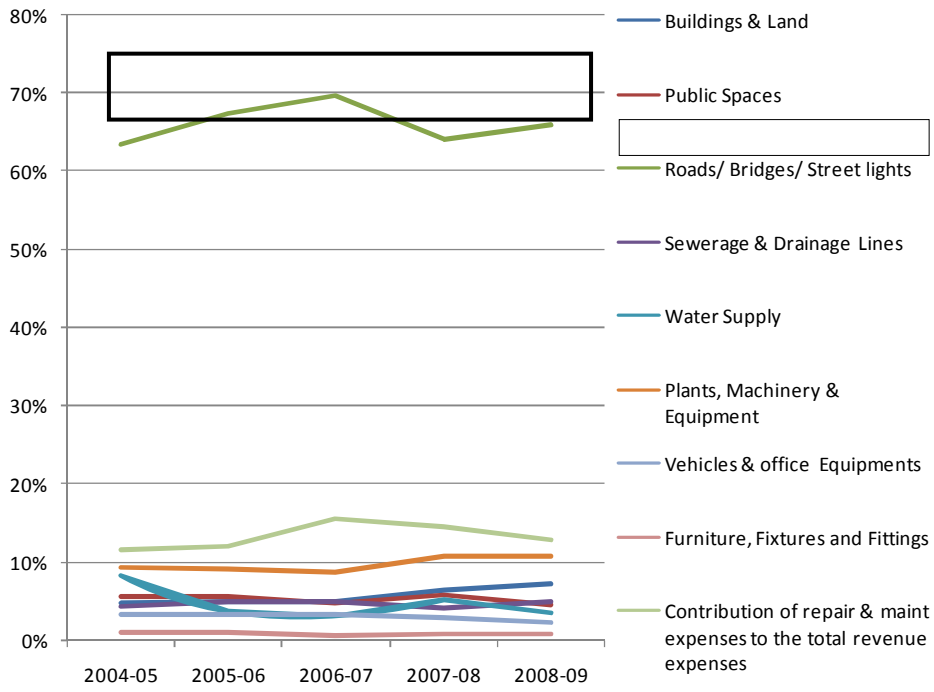
(Source: Author's analysis)

Electricity is mainly consumed in water supply and street lights. Electricity bill is the highest administrative expense followed by consumables. It mainly comprises chemicals for water and sewerage treatment and spare parts. Though, these are maintenance costs, have been considered as admin expenses. Other big costs are professional and other charges and vehicle running expenses. Overall administrative cost comprises 21% to 24% of the total revenue expenses and around 13% of the total revenue income in last five years.

Repair and Maintenance of Fixed Assets

Over last five years maintenance of roads and bridges (mainly flyovers) is the costlier for SMC. It represents around 65% of total repair and maintenance expenses of the corporation. However the cost comprises only civil and major replacement work as costs of electricity manpower and consumable are considered under separate expense heads. Otherwise the scenario as given in the chart might have been different.

Chart 15-8 % of contribution of various expenses in maintenance expense



(Source: Author's analysis)

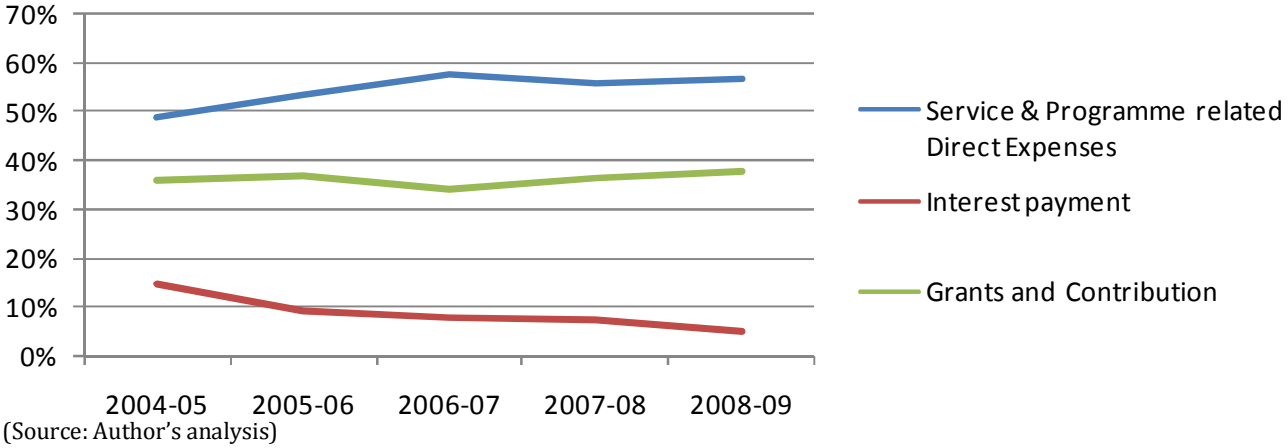
Thus other major repair and maintenance expenses occur in maintenance of plants and machineries, buildings and land, public space and sewerage and drainage lines. These are far behind from the R&M for roads and bridges. Repair and maintenance expenses are around 12% to 15% of the total revenue expenses and 6% to 9% of the total revenue income since 2004-05.

Other key expenses

The service and program related expenses and grants are stable expenses. The grants are mainly given to education committee for schools and education institute run by SMC. However interest income is showing decreasing trend as the most of the out standing debt is repaid while remaining debt as of now is scheduled to be repaid by 2012-13. The above expense heads contributes 7%, 1% and 5% to the total revenue expenses and 4%, 0.6% and 3% of total revenue income, consecutively.

It could be said that revenue expenses are tend to grow at constant rate and its proportion to total revenue income is stable over the years. However interruption such as new pay scale, additional repair and maintenance costs etc. could influence the trend, but not for the long time. The revenue expenses would remain around 45% to 50% of the total revenue income.
Further the capital account of SMC has been evaluated

Chart 15-9 % of contribution of various expenses



(Source: Author's analysis)

15.3 CAPITAL ACCOUNT

Capital account records source and use of capital fund of Municipal Corporation. The following exhibit showcases the capital account of SMC since 2004-05 to 2008-09.

Table 15-3 Summarized capital account from 2004-05 to 2008-09

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
Rs. Lakh					
Capital Income					
Own Sources	1834	1489	486	1254	1200
% of total Income	39%	32%	9%	6%	3%
Grant and Contribution	2835	3174	4768	18779	41557
% of total Income	61%	68%	91%	94%	97%
Total	**4669**	**4663**	**5253**	**20033**	**42756**
Capital Expenditure					
Land	574	7033	2717	2185	5406
% of total Expenditure	*3%*	*22%*	*8%*	*4%*	*7%*
Buildings	1766	2886	3845	13431	19796
% of total Expenditure	*10%*	*9%*	*11%*	*24%*	*27%*
Public Places	260	550	646	1072	1667
% of total Expenditure	*1%*	*2%*	*2%*	*2%*	*2%*
Roads/ Bridges/ Street lights	6812	12598	14325	15888	15982
% of total Expenditure	*39%*	*39%*	*42%*	*29%*	*22%*
Sewerage & Drainage Lines	1563	1603	2305	6223	13222
% of total Expenditure	*9%*	*5%*	*7%*	*11%*	*18%*
Water Supply	3928	4467	3144	5677	7005
% of total Expenditure	*23%*	*14%*	*9%*	*10%*	*10%*
Plants, Machinery & Equipment	1850	2496	5718	7386	8938
% of total Expenditure	*11%*	*8%*	*17%*	*13%*	*12%*
Vehicles & Transp. Equipments	115	326	1105	2587	511
% of total Expenditure	1%	1%	3%	5%	1%
Other	519	604	432	926	661
% of total Expenditure	*3%*	*2%*	*1%*	*2%*	*1%*
Total	**17387**	**32563**	**34237**	**55375**	**73188**

Source: SMC/ Author's analysis

Capital income from the own sources mainly comprises betterment charges and installment of fixed assets sale. Income from own sources has shown higher contribution in 2004-05 and 05-06 owing to installments of sale of fixed assets. It had a deep for a year but boosted again in 2007-08 and 08-09 due to increase in betterment charges. However the very source of capital income is irregular by nature.

The capital grant and contribution includes regular state government grants for capital work, impact fee- which is terminated from 2009-10, and JnNURM grant (GOI+GOG). The additional infrastructure fee is introduced in 2008-09. This fee tends to be periodic source of income. The capital grant has soared up high in 2007-08 and 08-09 owing to influx of JnNURM grants. However, barring the JnNURM grant other sources of capital income are very petite against huge capital expenditures by SMC. Thus it depends highly upon the revenue account surplus.

It is apparent from the above exhibit, that in last five years, SMC has spent a huge amount of funds on roads and bridges. It comprises 20% to 39% of the total capital expenditure made in since 2004-05 to 2008-09. Apart from the above, a significant collective investment has been made in basic services like sewerage - drainages and water supply. The investment on basic services varies from 9% to 18% (in Sewerage and storm water drainage), 10% to 23% (in Water supply) and 11% to 12% (in sewerage and water treatment plants, pumping stations etc) of total capital expenditure. Other major investment is made in creation of buildings, mainly EWS housing schemes, schools and hospitals. It ranges between 10% and 27% of aggregate capital expenditure in last five years. It has increased in the last two years owing to implementation of EWS schemes under JnNURM.

It could be concluded from the assessment of SMC's capital account that the local body has executed balanced use of own funds (revenue surplus + capital income) through investment in health care, education, modernization of basic services, provision of hygiene facilities for the urban poor through EWS housing schemes. As said above that the SMC has also spent a hefty amount in construction of quality roads, bridges and road side furniture and fixtures compare to other urban amenities. Further, the overall status of the municipal finance has been observed in brief.

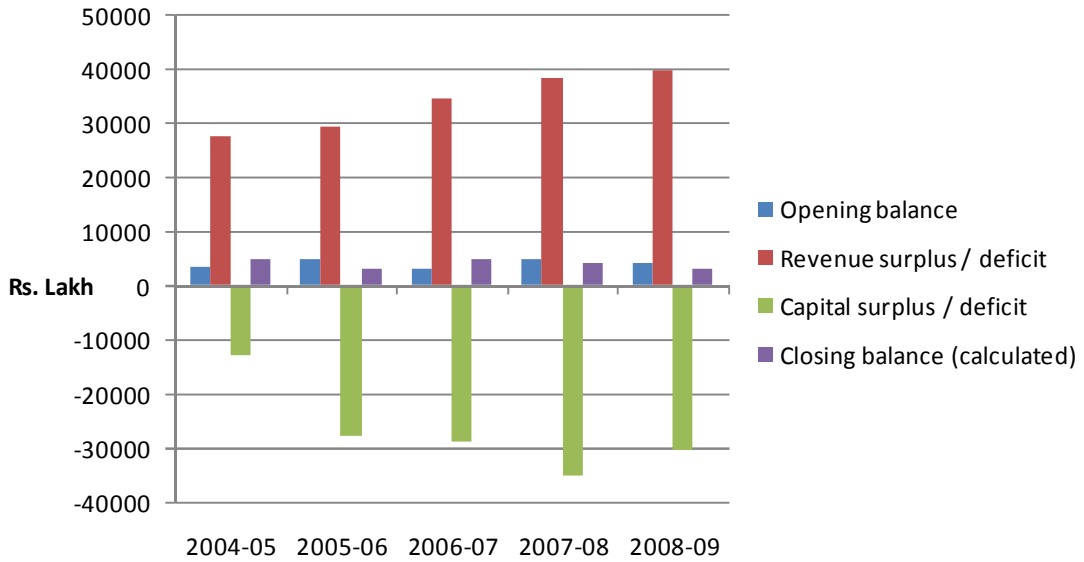
15.4 STATUS OF MUNICIPAL FINANCE

SMC has maintained cash and balance around Rs. 5000 lakh over the last five years. However revenue account had generated 40% to 43% surplus, it was transferred to the capital account to fill up the deficit. The following exhibit shows status of balance in SMC's account in last five years.

The revenue surplus has been around 100% of the capital expenditure upto 2006-07. It has been reduced by around 40% as new projects owing to capital works in newly merged SUDA area and new projects of capacity refurbishment and augmentation took place according of city development plan.

However the deficit arisen out of new investment was compensated through additional capital grants from GOI and GOG under JnNURM. The efficiency parameters have been judged in the next point.

Chart 15-10 Summarized status of municipal finance from 2004-05 to 2008-09



Source: Author's analysis

15.5 EFFICIENCY PARAMETER

Based available financial details obtained from SMC, key performance and efficiency parameters are assessed hereby and are shown in the following exhibit.

Table 15-4 Key performance and efficiency indicators

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
Resource mobilization					
Per Capita revenue Income Rupees	1834	1933	2236	2425	2594
Per Capita capital Income Rupees	138	134	146	542	1123
Per Capita own income	1703	1774	2005	1722	919
Growth in Income Sources (CAGR)	12%				
Growth in Tax Receipts (CAGR)	10%				
Growth in Own Sources (Tax + Octroi + Other)Receipts (CAGR)	-12%				
Expenditure Management					
Per Capita revenue expenses	1020	1085	1264	1388	1540
Per Capita capital expenses	514	934	954	1498	1922
Growth in revenue expenses (CAGR)	14%				
Growth in capital expenses (CAGR)	43%				
Liability management					
Outstanding Debt per Capita Rupees	33.41				
O/S debt to own sources in 2008-09	84.89%				
Operation					
Operating ratio	44%	44%	43%	43%	41%
Revenue income to revenue expenses	180%	178%	177%	175%	168%

Capital utilization ratio	**3.72**	**6.98**	**6.52**	**2.76**	**1.71**
Overall Tax collection efficiency	78%	78%	72%	82%	71%

Source: Author's analysis

In resource mobilization, although per capita revenue from own source has gone down due to elimination of octroi, overall per capita revenue income of SMC is increased and quite matching with the other counterparts in the country and state. Per capita capital income has increased because of JnNURM grants. As discussed above, revenue from own sources, has negative CAGR in last five years while overall revenue has grown with 10+ CAGR. However it is owing to the octroi compensation grants released by the State government.

On expense side, per capita revenue expenses are up to the standards of other growing Municipal corporations while the sudden jump in per capita capital expenditure reflects arrival of JnNURM projects so in the CAGR for capital expenditure in last five years.
Capital utilization ration is higher in the last two years while lower in 2004-05. it shows that capital income is being used more efficiently in last year. However the tax collection efficiency is around 75% which is lower than other big Municipal Corporations in the state like Ahmedabad and Vadodara.

15.6 KEY ISSUES

- Revenue expenditure is growing at a higher rate than revenue income; this could be area of attention if it continues in future. However it is also dealt with in the FOP, the FOP reflects projections of the past trends.
- In revenue account State government grant constitutes 65% of revenue income. It points out dependence outside source of revenue stream. While major income through own sources is property tax which is only 23% of the total revenue.
- Current collection efficiency of property tax stands at about 75%. There is scope for improving collection efficiency and also for bringing a large number of properties under the tax net.
- The bulk of capital expenditure is financed through internal surplus. There is no new fund has been borrowed. It may cause pressure on available surpluses (it is also reflected in the FOP where in 2010-11 and 2011-12 the closing balance goes negative)

15.7 SUDA ACCOUNTS

Revenue streams of SUDA are very sporadic in nature. Finance of SUDA is mainly depends on capital income. Key capital income of SUDA since 2004-05 was recovery from various EWS housing scheme constructed by the authority. Other major capital income heads were development charges levied by SUDA, contribution from SMC, amenities fee and income from sale of land. Government grant and long term borrowings also contribute significant to the capital income but periodically.

Main income of the revenue accounts are Zoning, licence, scrutiny etc. fees and interest

income from fixed deposits with a state government undertaking. While on expense side salary - wages and general office expenses are the major heads. Summarised revenue account of SUDA is given in the exhibit below.

Table 15-5 Summarized revenue account of SUDA from 2004-05 to 2008-09

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
Re. lakh					
Revenue income					
Zoning map/license fees / scrutiny fees / premium / misc income	355.29	471.13	468.45	368.79	204.18
% of total revenue income	70%	62%	58%	71%	18%
FSI Infrastructure Fee					45.86
% of total revenue income	0%	0%	0%	0%	4%
Other Income		136.51			54.74
% of total revenue income	0%	18%	0%	0%	5%
Interest Income	150.25	150.00	333.78	150.32	831.54
% of total revenue income	30%	20%	42%	29%	73%
	505.54	**757.64**	**802.23**	**519.11**	**1,136.31**
Revenue expenses					
Salary & Wages	85.00	76.22	86.6	107.14	106.86
% of total revenue expenses	9%	6%	30%	39%	21%
% of total revenue income	17%	10%	11%	21%	9%
Daily Wages	12.00	26.42	37.90	39.76	33.07
% of total revenue expenses	1%	2%	13%	14%	7%
% of total revenue income	2%	3%	5%	8%	3%
TP unit salary / allowances expenses		113.63	73.66	24.05	10.12
% of total revenue expenses	0%	9%	25%	9%	2%
% of total revenue income	0%	15%	9%	5%	1%
Audit fee	1.50	1.18	2.50	4.51	4.01
% of total revenue expenses	0%	0%	1%	2%	1%
% of total revenue income	0%	0%	0%	1%	0%
Contingency Expense- general office expenses	65.55	58.75	50.17	67.30	50.09
% of total revenue expenses	7%	5%	17%	24%	10%
% of total revenue income	13%	8%	6%	13%	4%
Labor cess				0.00	123.87
Office Buildings Maintenance Expense	22.43	22.83	9.85	12.86	5.88
% of total revenue expenses	2%	2%	3%	5%	1%
% of total revenue income	4%	3%	1%	2%	1%
Contribution to Pension/ salary Leave	4.00	0.46	0.25	0.88	0.37
% of total revenue expenses	0%	0%	0%	0%	0%
% of total revenue income	1%	0%	0%	0%	0%
Dumas - Vesu - Kamrej - Sarthana Street lights maintenance expense	701.75	6.90	27.90	9.84	10.01
% of total revenue expenses	74%	1%	10%	4%	2%

% of total revenue income	139%	1%	3%	2%	1%
Staff Quarters Maintenance Expense	1.85	5.23	4.21	0.96	2.62
% of total revenue expenses	0%	0%	1%	0%	1%
% of total revenue income	0%	1%	1%	0%	0%
T P S Preliminary Expense	60.00	78.61			151.05
% of total revenue expenses	6%	6%	0%	0%	30%
% of total revenue income	12%	10%	0%	0%	13%
Lake Development Expense		0.63			
Income Tax		852.19	0.00	8.72	0.63
	954.08	**1,243.04**	**293.04**	**276.02**	**498.58**

Source: SUDA/ Author's analysis

The magnitude of income and expenses keep changing as SUDA does not have an operational area, for a long time. By virtue of its existence, SUDA has to plan the greater city area, create Town planning schemes (TPS) and provide basic services to those TPS against fees and charges. After that it has to handover that area to SMC. Hence, the operational and capital activities of SUDA are limited up to area available with it. Within few years after that new TPSs are introduced. Those TPS would be under SUDA which would lead to high operational and capital activities. Thus streams of income and expenses are uneven. It is also apparent from the above table.

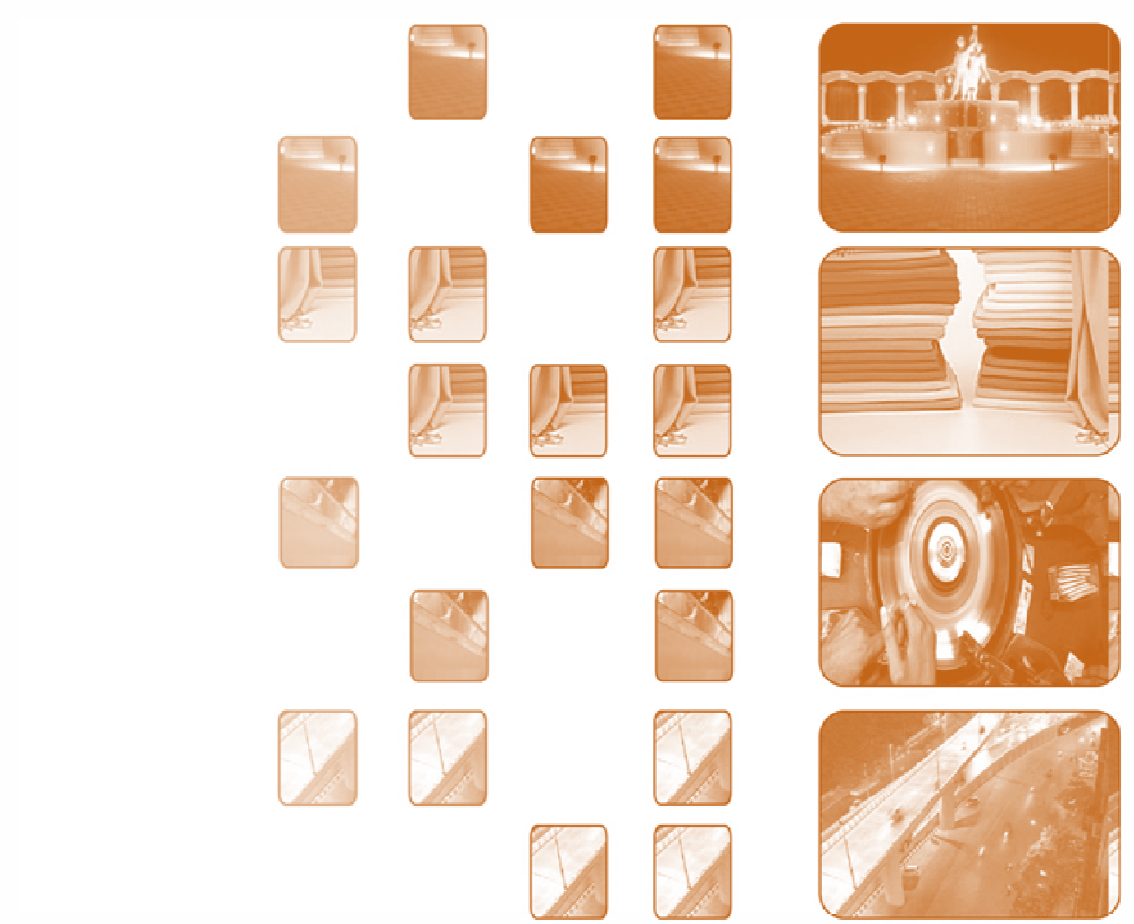
Table 15-6 Summarized Capital account of SUDA from 2004-05 to 2008-09

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
Rs. Lakh					
Own Sources					
Development Charge SUDA	240.00	330.84	379.05	213.65	160.58
% of total capital income	17%	8%	4%	4%	4%
Development Charge SMC	147.00	158.07	313.78	146.03	174.27
% of total capital income	11%	4%	4%	3%	5%
Amenities Fee	-	1293.01	1527.90	2185.28	1228.47
% of total capital income	0%	30%	17%	41%	34%
Unauthorized Construction (impact fee)	48.00	46.71	41.45	6.29	0.60
% of total capital income	3%	1%	0%	0%	0%
TPS / income from sale of land	300.00	1535.66	2016.86	215.15	
% of total capital income	22%	35%	23%	4%	0%
Recovery from various EWS housing schemes	392	316	2,377	912	432
% of total capital income	28%	7%	27%	17%	12%
Water Connection Income			3.45		
Total of own sources	**1,126.52**	**3,680.48**	**6,659.61**	**3,678.13**	**1,996.08**
% of total capital income	*82%*	*85%*	*76%*	*68%*	*56%*
Grant and Contribution	18.90	292.10	713.06	783.79	1,399.09
% of total capital income	*1%*	*7%*	*8%*	*15%*	*39%*
Long Term and short term Borrowings	231.80	379.71	1,382.81	917.20	182.58

% of total capital income	*17%*	*9%*	*16%*	*17%*	*5%*
Total Capital Income	**1,377.22**	**4,352.29**	**8,755.48**	**5,379.12**	**3,577.75**
Capital expenditure					
Land	43.46	11.94	0.00	0.00	0.00
% of total capital expenditure	2%	0%	0%	0%	0%
Buildings	602.00	474.16	331.43	1532.23	4216.16
% of total capital expenditure	23%	11%	7%	20%	77%
Public Places	20.81	15.90	29.53	80.84	46.13
% of total capital expenditure	1%	0%	1%	1%	1%
Roads/ Bridges/ Street lights	100.00	1799.74	3439.16	3833.71	742.48
% of total capital expenditure	4%	43%	70%	50%	14%
Sewerage & Drainage Lines	39.13	139.35	52.54	2.90	0.00
% of total capital expenditure	1%	3%	1%	0%	0%
Water Supply	1512.00	1238.40	415.14	156.54	40.35
% of total capital expenditure	58%	29%	8%	2%	1%
Plants, Machinery & Equipment	1.80	11.94	1.93	3.25	0.83
% of total capital expenditure	0%	0%	0%	0%	0%
Grants and contribution	20.00	0.00	145.75	0.00	0.00
% of total capital expenditure	1%	0%	3%	0%	0%
Loan Repayment and disbursement	102.10	386.50	40.80	205.89	36.62
% of total capital expenditure	4%	9%	1%	3%	1%
Town Planning Scheme expense (all)			219.17	208.04	158.95
% of total capital expenditure	0%	0%	4%	3%	3%
Repayment of deposit	186.00	150.79	240.86	1599.73	257.15
% of total capital expenditure	7%	4%	5%	21%	5%
Total Capital expenditure	**2627.30**	**4228.73**	**4916.31**	**7623.13**	**5498.67**

Source: SUDA/ Author's analysis

SUDA has observed strong fund flow from its own income sources. As can been seen in the above table, that recoveries from various EWS housing schemes, amenities fees, Income from sale of land and development charges collected by SUDA are the key sources of own capital income. While long terms and short term borrowings are major outside fund apart from State government grants. In last five years, SUDA has made huge investments in EWS housing schemes, roads and bridges and water supply. However Sachin ROB is part of JnNURM project while Sachin, Magdalla ROB is being built with cooperation of Indian Railway. A big project of ring road is still facing hurdles. It is still under planning stage, land has not been acquired. It seems that the project may not be implemented in the next few years. As of now SUDA does not have any major capital projects until new TPSs are not approved. A list of projects on hand is given in the Capital Investment Plan (CIP) chapter.



Chapter 16

Capital Investment Plan

Introduction

Institutionalizing the CIP Process

CIP for SMC

CIP for SUD

CHAPTER 16. CAPITAL INVESTMENT PLAN

16.1 INTRODUCTION

The Capital Investment Plan (CIP) would discuss about various projects identified under the revised CDP for SMC and SUDA along with phasing of capital investment and means of finance for those projects. These projects are mainly for urban infrastructure and Basic Services to Urban Poor identified under JnNURM or by SMC and SUDA.

First CIP was prepared in 2005, for both SMC and SUDA. At present, area covered under SUDA at that time, is merged with SMC. Considering the fact, the CIP is revised. In continuation with previous CIP, SMC has Re-identified the projects which are proposed under previous CDP and assessed each of them in accordance with new need of the city,

Further, various issues related to urban facilities and governance have been discussed with the public and analyzed against applicable norms and standards for infrastructure services.

- Agreed and recommended reasonable and realistic options for sector wise development
- Undertook phasing for capital investment based on detail studies of the financial resources availability (for new investments and O & M), technical capacity of SMC for construction and O & M activities and priority for city development.
- Justified and provided rationale if the chosen option is not within the existing service level standards.
- The phasing/ scheduling of investments have been carried out through an iterative process. Following principles of phasing have been taken into account.

16.1.1 PRINCIPLES OF PHASING

» Priority based selection of projects in each sector.
» Completion year of 2012-13 set for all projects is aligned with the JnNURM guidelines to complete projects under the scheme in the above stipulated time limit
» Inter-sectoral linkages are taken into account for reasonable phasing

The CIP includes identified projects to cater to the demand of the city populace by the year 2040. However sustainability of municipal accounts is assessed up to financial year 2013-14.

16.2 INSTITUTIONALIZING THE CIP PROCESS

The Capital Investment Plan is an important element and is significant in terms of the city's management process and sustainability with regard to the delivery of basic services. While the CIP provides a framework for the annual budget cycle, for that purpose alone the CIP

presented in 2005 is updated and rolled forward for a further five-year period.

The need for updating is on account of:

- Reassessment of city growth and infrastructure needs (to be carried out once in five years)
- Detailed feasibility/ engineering studies carried out of new projects.
- Rescheduling of investments on ongoing projects due to cost and/ or time overruns.
- Reassigning priorities within the constraints of available financial resources

16.3 CIP FOR SMC

Updated Capital Investment Plan and forecasted future needs for provision of capital facilities under each identified sector is presented below.

16.3.1 CAPITAL INVESTMENTS

Projects' Identification

The projects identification has been done based on the strategies listed out under each of the service sector as identified by SMC. The projects derived based on the SMC estimates are aimed at ensuring optimal and efficient utilisation of existing infrastructure systems. Other developmental projects include projects other than those for core service sector viz. system modernisation, river conservation etc. Such projects are also based on lists and/ or reports prepared by SMC.

The total estimated capital investment required for providing efficient services to the population of SMC by the year 2040 is about Rs. 316573 lakh at the constant price. The table below presents the summary of sector-wise investment requirements.

Table 16-1 Summary of Investment phasing

Name of the sector	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Water supply	14473	12607	11125	10150	0	48355
Sewerage	9706	23545	23545	23545	0	80342
Storm water drainage	5574	6813	6869	6869	4579	30704
Solid waste management	1285	1285	1285	0	0	3856
Transportation System - Roads and bridges	13025	52223	2100	0	0	67349
Transportation System - Urban Transport (BRTS)	8200	27500	11202	0	0	46902
Housing/E.W.S (VAMBAY)	5390	23238	2622	0	0	31250
Social Development -Central Science Centre & -High-tech entertainment	737	1475	1475	0	0	3687
Flood protection and Disaster management & Tapi River Front Development	3560	570	0	0	0	4130
Total	**61950**	**149257**	**60223**	**40564**	**4579**	**316573**

Source: Author's Analysis *Figures in Rs.*

Investment as much as 47%% is emerging in 2010-11. It is owing to 29% of the total investment in Sewerage sector (which contributes the highest investment in total CIP) is planned in this year along with other investment in Roads and bridges (78% of the total investment), EWS/WAMBAY scheme (74%), first phase of BRTS (59%), Social development projects (40%). Collectively, all the above investment planned in 2011-12 represents 40% of the total size of CIP. It also can be seen from the above table that the highest investment as much 25% is proposed in sewerage and sanitation projects nearly followed by roads and bridges project (21%), BRTS Phase 1 and water supply (15% each) as well as Housing under EWS/ WAMBE schemes and storm water drainage (10% each). It is to be noted that Rs. 222203 Lakh (around 70%) of the investment under CIP is to be funded under JnNURM.

While, SMC would fund remaining whole investment of Rs. 94371 Lakh (30%). However, as discussed earlier SMC also has to manage 30% of fund for the projects under JnNURM. Thus, around 51% of the total investment proposed under this CIP would be financed through SMC. Around 35% of investment would be granted from the Central Government and 14% of the fund would be flow from the State Government. Aggregate finance from Central and State Government would be around 49%. However, the break up of SMC's own sources such as surplus, debt and private participation are discussed in the FOP. Sector wise summary of means of finance is depicted as follows;

Table 16-2 Sector wise summary of means of finance

Name of the sector	GOI (NURM)	GOG	SMC	Total
Water supply	22949	9180	16226	48355
Sewerage & Sanitation	39778	15911	24653	80342
Storm water drainage	3904	1562	25238	30704
Solid Waste Management	1928	771	1157	3856
Transportation System - Roads and bridges	3467	1387	62495	67349
Transportation System - Urban Transport (BRTS)	23451	9380	14071	46902
Housing/E.W.S (VAMBE)	15625	6250	9375	31250
Social Development -Central Science Centre & -High-tech entertainment	0	0	3687	3687
Flood protection and Disaster management & Tapi River Front Development	0	0	4130	4130
Total	111102	44441	161031	316574

Source: Author's Analysis *Figures in Rs. Lakh*

About 36% of the given JnNURM fund (Rs. 222203 lakh) is flowing in sewerage and sanitation projects while 21% of the above fund shall be invested in water supply projects and BRTS phase 1. EWS housing shall draw 14% of the total investment and SWM, roads and bridges and SWD would grab 2%,3% and 4% of the total JnNURM funds consecutively. Major investment under non JnNURM projects is planned in development of roads and bridges (64%) and SWM (24%). Further, sector wise summarized CIP is discussed in brief.

1. Water supply

Water sector comprises 15% of the total investment. Summarized break up of investment in water sector is as follows,

Table 16-3 Water Sector summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing				Means of finance		
		2009-10	2010-11	2011-12	2012-13	GOI (NURM)	GOG (NURM)	SMC
DPR 1	10148	3198	2780	2534	1635	5074	2029	3044
DPR 2	15642	4433	4259	3475	3475	7821	3128	4693
DPR 3	20109	5027	5027	5027	5027	10055	4022	6033
Other	2456	1815	540	88	13	0	0	2456
Total	**48355**	**14473**	**12607**	**11125**	**10150**	**22949**	**9180**	**16226**

Source: Author's Analysis *Figures in Rs. Lakh*

Around 54% investment would be made in implementation of water distribution system. While, around 42% fund would be invested in augmentation of existing water works. A detail project shelf for the water sector is given in the Annexure VIII.

2. Sewerage and Sanitation

Sewerage and Sanitation contributes 25% of the total investment. Brief detail of phasing of investment is as follows;

Table 16-4 Sewerage and sanitation sector summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing				Means of finance		
		2009-10	2010-11	2011-12	2012-13	GOI (NURM)	GOG (NURM)	SMC
Augmentation of Drainage system for Old city area	22500	300	7400	7400	7400	11250	4500	6750
Drainage Pipelines at various locations	636	204	144	144	144	-	-	636
Equipments	150	25	42	42	42	-	-	150
Drainage System for New East Area	7557	2335	1741	1741	1741	3778	1511	2267
Drainage facilities in New south west area	20000	50	6650	6650	6650	10000	4000	6000
Drainage facilities in New south area	6700	100	2200	2200	2200	3350	1340	2010
Drainage facilities in New south East area	4500	0	1500	1500	1500	2250	900	1350
SCADA System	2700	1500	400	400	400	1350	540	810
Sewerage System in new Northern Zone area of Surat Municipal Corporation	15598	5192	3469	3469	3469	7799	3120	4679
Total	80342	9706	23545	23545	23545	39778	15911	24653

Source: Author's Analysis *Figures in Rs. Lakh*

Again, augmentation of the existing system in the Old City comprises around 28% of the total sectoral investment followed by new sewerage system in new South West Zone (25%) and new North Zone (19%). A detail list of project is attached as Annexure IX

3. Storm water drainage

The sector consists of 10% of the total CIP with single project. However the project is in form of summation to small projects identified for the entire study.

Table 16-5 SWD sector summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing					Means of finance		
		2009-10	2010-11	2011-12	2012-13	2013-14	GOI (NURM)	GOG (NURM)	SMC
Pipelines in New South East area	1930	-	386	579	579	386	-	-	1930
Pipelines in New West area	3578	-	716	1073	1073	716	-	-	3578
Pipelines in New South area	1850	-	370	555	555	370	-	-	1850
Pipelines in New North area	13418	-	2684	4025	4025	2684	-	-	13418
Pipelines in Vesu area	1524	1524	-	-	-	-	762	305	457
Pipelines in Old City area	4988	3200	1788	-	-	-	2494	998	1496
Pipelines in New East area	1297	850	446	-	-	-	648	259	389
Pipelines in New South West area (Excluding Vesu)	2120	-	424	636	636	424	-	-	2120
Total	**30704**	**5574**	**6813**	**6869**	**6869**	**4579**	**3904**	**1562**	**25238**

Source: Author's Analysis *Figures in Rs. Lakh*

All the proposed projects are pertaining to laying of drainage lines in new and old city areas. Around 84% of the total investment would be made in to newly added area.

4. Transportation System

The sector, in aggregation of projects like development of roads & bridges and urban transport, comprises of around 36% of the total investment. Following is the summary of investment phasing and means of finance.

Table 16-6 Transportation system sector summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing			Means of finance		
		2009-10	2010-11	2011-12	GOI (NURM)	GOG (NURM)	SMC
Roads, Bridges and Flyovers	67349	13025	52223	2100	3467	1387	62495
Urban Transport (BRTS Phase 1)	46902	8200	27500	11202	23451	9380	14071
Total	**114251**	**21225**	**79723**	**13302**	**26918**	**10767**	**76566**

Source: Author's Analysis *Figures in Rs. Lakh*

It is apparent that major Roads, bridges and flyovers projects are major contributors in terms of investment. Around 47% out of total investment under transportation system is planned for construction of new bridges and flyovers in new areas added to the SMC boundary. A detailed list of project is given as Annexure X.

5. Housing for urban poor

Nature of the projects for this sector is mainly construction of houses for urban poor at various locations and redevelopment of existing slums. The sector consists of 10% of the CIP. Investment phasing and means of finance are as follows

Table 16-7 Housing sector summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing			Means of finance		
		2009-10	2010-11	2011-12	GOI (NURM)	GOG (NURM)	SMC
Construction of houses for the Urban poor at various different locations	27128	5340	20788	1000	13564	5426	8138
Redevelopment of Slums within City Limits.	4122	50	2450	1622	2061	824	1237
Total	**31250**	**5390**	**23238**	**2622**	**15625**	**6250**	**9375**

Source: Author's Analysis *Figures in Rs. Lak*

It can be seen that construction of new houses under various scheme of Central and State government. SMC has also proposed plans for redevelopment of existing slums in the city limit. Annexure XI shows project proposals under EWS housing scheme.

6. Social development

Social development projects mainly comprise of Entertainment Park, theme based galleries and Science Centre projects which provide recreational and leisure activities to the citizens. However the sector contribution to the entire CIP is around 1%, it is very much significant in terms soft aspect of urban development. The phasing of investment and means of finance for the sector are as follows;

Table 16-8 Social development sector summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing			Means of finance		
		2009-10	2010-11	2011-12	GOI (NURM)	GOG (NURM)	SMC
High-tech Entertainment Park	200	200	-	-	-	-	200
Diamond Gallery	57	57	-	-	-	-	57
Space Gallery	40	40	-	-	-	-	40
Textile Gallery	40	40	-	-	-	-	40
A) Pro & Fix, various light fixtures, CCTV PA system, Fire alarm system B) Interior work in Science centre & Art gallery and C) civil work	3350	400	1475	1475	-	-	3350

Total	3687	737	1475	1475	-	-	3687

Source: Author's Analysis *Figures in Rs. Lakh*

7. Flood protection - disaster management and Tapi River embankment projects

The sector comprises 1% of the total CIP. Investment phasing and means of finance of the sector are as follows;

Table 16-9 Flood protection and Tapi river embankment projects- summary of investment phasing and means of finance

Project	Proposed Investment (Rs. Lakh)	Investment Phasing		Means of finance		
		2009-10	2010-11	GOI (NURM)	GOG (NURM)	SMC
Construction of flood protective Work on the River Tapi	2630	2630	0	-	-	2630
Construction of Sluice regulator	700	600	100	-	-	700
River embankment road	350	200	150	-	-	350
Transportation and Flood protection and civil structure for water sports activities	450	130	320	-	-	450
Total	**4130**	**3560**	**570**	-	-	**4130**

Source: Author's Analysis *Figures in Rs. Lakh*

The above projects are meant to prevent floods of Tapi River, which have hit the city for the years. Detail list of project is given in Annexure XII. Further, Sustainability of investment for all the above sectors has been assessed under Financial Operating Plan (FOP) and strategies have been suggested accordingly

16.4 CIP FOR SUDA

In 2005-06, SUDA had handed over most of the TPSs to the SMC. Since then, no major capital projects are being carried out by the authority. New TPSs have been proposed. They are likely to be approved in the next two to three years. New projects would come up only after the approval of TPSs. A list of project on hand with SUDA, their capital phasing and means of finance are given in the following Table:

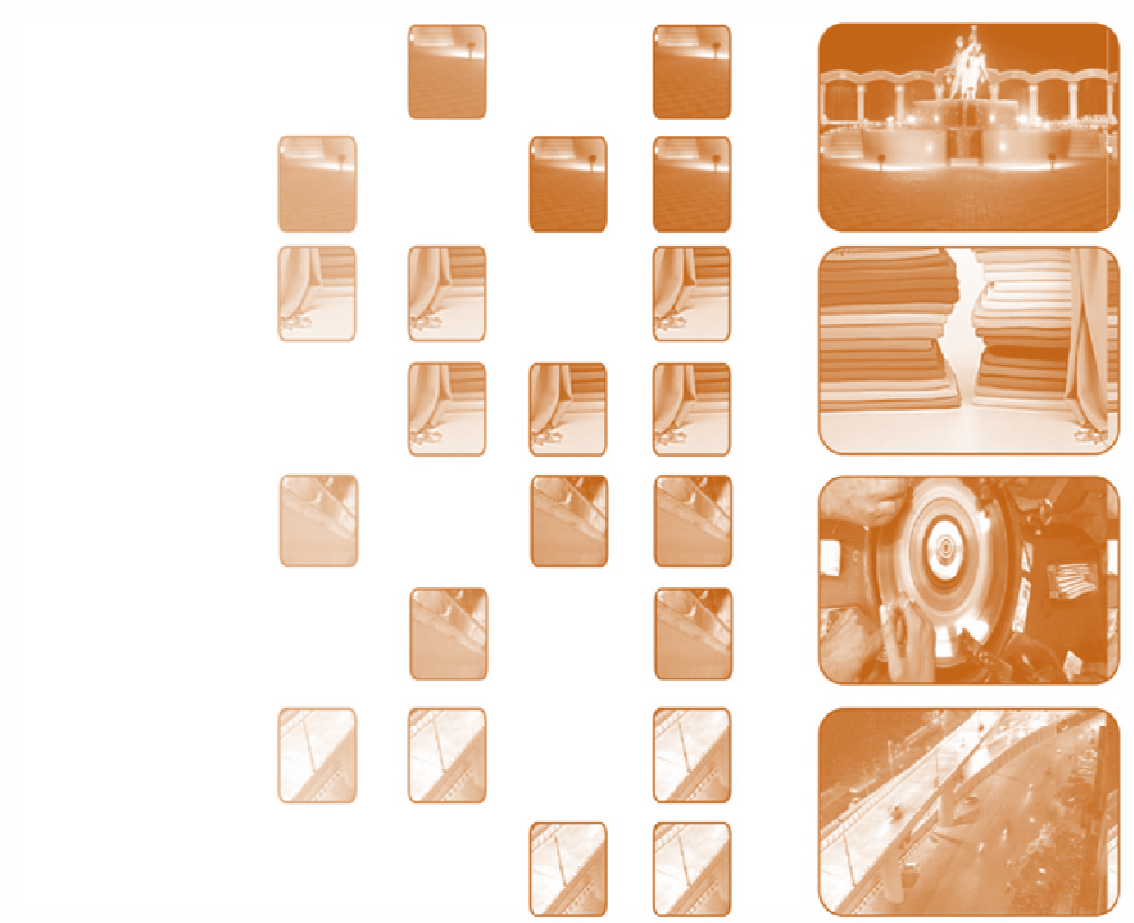
Table 16-10 SUDA - Phasing of capital and means of finance for projects

Name of the Project	Phasing of investment					Means of finance			
	2009-10	2010-11	2011-12	2012-13	Total	GOI (JnNURM+ Others)	GOG	SUDA	Total
Sachin - Magdalla - Navsari railway over bridge	360	900	540	0	**1800**	900	360	540	**1800**
Sachin Rail over bridge	166	830	664	0	**1660**	830	0	830	**1660**

Beatification of various lakes in SUDA area	0	400	800	800	**2000**	0	0	2000	**2000**
Development of SUDA Corporate Office	80	400	320	0	**800**	0	0	800	**800**
Total	**606**	**2530**	**2324**	**800**	**6260**	**1730**	**360**	**4170**	**6260**

Source: Author's Analysis *Figures in Rs. Lakh*

The Sachin ROB would be constructed with 50% contribution from Indian Railway. The project of development of corporate office of SUDA is facing hurdles in acquisition of land. It can be said the size of project shelf very small as of now. However a provision for unidentified investment has been kept in FOP apart from the above list of project.



Chapter 17

Financial Operating Plan

Objectives of FOP

Approach and Methodology

Key Assumptions

Strategies for Sustenance

FOP for SUDA

CHAPTER 17. FINANCIAL OPERATING PLAN

This section would evaluate the sustainability of the SMC and SUDA finance to carry out new capital investment, identified under the revised CDP, and Operation and Maintenance (O&M) cost would be occurred owing to that investment.

The chapter would proceed with discussion on objective of development of Financial Operating Plan (FOP), approach and methodology adopted for the FOP for SMC, key assumptions taken for projection of actual SMC cash flow and strategies for sustenance of FOP for SMC. Evaluation of SUDA finance is given at the end of the chapter.

17.1 OBJECTIVE OF FOP

The objectives of FOP are as follows;

- To assess the strength of the Municipal finance to execute capital investment and to sustain the new assets through proper O&M.
- To suggest strategies for sustenance of overall Municipal finance, if the projections of cash flow provide weak guidance.

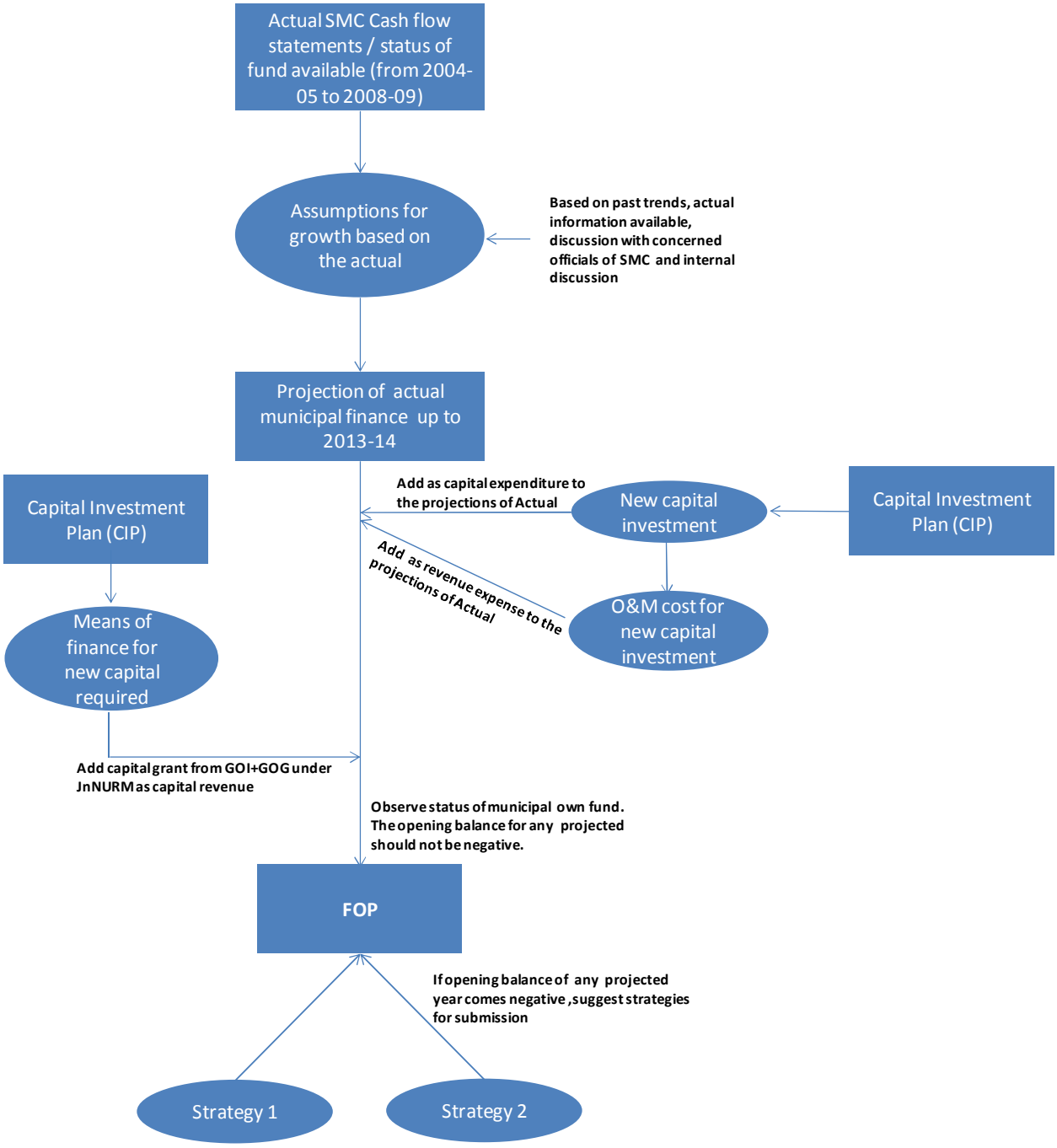
Further, FOP for SMC is discussed in detail while FOP for SUDA is given then after. Approach and methodology adopted for FOP for SMC are given in the next point.

17.2 APPROACH AND METHODOLOGY FOR FOP FOR SMC

The FOP is projected only up to the next five years which is 2013-14 because financial projections beyond five years might not be that accurate considering present dynamic situation of development in urban sector.

As mentioned in the above chart, assumptions for revenue and capital accounts are mainly based on the past trend and actual information on revenue and expenses, for the next five years, available with the concerned departments. The assumptions are taken with the consent of the all department heads and finance department of SMC. Major assumptions for the FOP are discussed further.

Figure 17-1 Approach and methodology for FOP



17.3 KEY ASSUMPTIONS FOR FOP

As said above, the assumptions are based on past trend. However, in many cases the past trend was either negative or showing extraordinary growth. Considering such volatile nature of growth, it could not be ascertained for many income and expenses heads that they would grow as per their past trends. Thus a range of growth rates has been fixed between 1% and 15% to mitigate the risk of over or under estimation of any income or expense.

Major assumptions taken for the FOP are discussed in detail further.

17.3.1 ASSUMPTIONS FOR REVENUE ACCOUNT

Key assumptions for revenue income and expenses are as follows

Assumptions for revenue income

The following exhibit shows assumptions taken for the revenue heads comprising around 94% of the total revenue income.

Table 17-1 Key revenue income assumptions

Income heads	Growth rate	Rationale
General Tax	12%	CAGR of General tax is 10% yet it is assumed to be grown at 12% considering increase in collection efficiency and upward revision in tax rate. All Other taxes shall grow with 10%.
Water Meter Charge as per agreement	10%	
Professional Tax (E.C.)	10%	
Professional Tax (R.C.)	10%	
Water Charge	10%	
Sewerage Charge	10%	
Solid Waste Disposable Charge	10%	
Road Reinstatement Charges	9%	The charges considered to be grown with past trend
Students Fees	10%	Although it is growing with high CAGR it is assumed to be increased with less growth rate. It is revealed from discussion that student fees might decrease in near future.
General grant, contribution and subsidy	9%	Operational grant is projected with past trend.
Octroi compensation grant	The octroi compensation grant is calculated based on following formula : For 2008-09 (Average of total octroi income of last three years from 2007-08) * 15% annual growth rate	
Interest income from fixed Deposits with Banks	10%	Considering stable trend of short term and long term fixed deposits.

Source: Discussion with SMC/Author's analysis

Assumptions for revenue expenses

Assumptions for revenue expenses are discussed in three parts. 1) General key assumptions 2) O&M related assumptions 3) Interest and debt repayment related assumptions. All the above assumptions consist of 90% of the total revenue expenses. Key general assumptions are as follows

Table 17-2 Key revenue expenses related assumptions

Expense heads	Growth rate	Rationale
Establishment Expenses		
Salary & Wages	8%	It is assumed that the salary expense would grow with past trend however in 2008-09 it would be hiked up to 38%. Also arrear of Rs. 131 crore and Rs. 80 crore to be paid in 2009-10 and 2010-11
Medical expenses	15%	It would grow with the past trend
Pension	3%-5%	The growth rates vary to rationalize the projected figures.

Pension fund		SMC wants to put Rs. 25 crore in each year of 2009-10 and 2010-11. The pension fund is also considered while creating scenario.
Administration expenses		
Consultancy charges	5%	Although high growth rate in last five years it is assumed to be grown at lower rate as most of the proposed projects have reached at bidding stage, thus consultancy fees would be less.
Vehicle running charges	14%	It assumed to be grown with past trend
Grants & Contributions		
Compulsory grants and contribution	11%	It assumed to be grown with past trend

Source: Discussion with SMC/Author's analysis

Assumptions for O&M have been taken separately for existing assets and for new capital investment to be made in next two to three years. Among the sectors in which new investment has been proposed in the CIP, it is learnt that there would not be O&M cost for next five years in sectors like roads and bridges, EWS housing and flood protection and disaster management projects. There would be additional O&M costs for other investment sectors such as water supply, sewerage, SWD, SWM, BRTS and Central Science Centre. The methodology of calculation of additional O&M costs for each investment sectors described in CIP is described in brief.

Table 17-3 : O&M cost related assumptions

Sectors	O&M for	Methodology for O&M
Land Maintenance	Existing assets	It is assumed that it would grow with past trend (15%, upper limit, for next to years and would decline up 5% in last years of projection)
Buildings	Existing assets	It is projected as per past trend (15%)
Public Spaces	Existing assets	Projected as per CAGR of 9%
Roads/ Bridges/ Street lights	Existing assets + new assets	It is assumed that due to new roads and bridges O&M of street lights would be increased. Thus the growth rate is taken little higher than the past trend
Water Supply	Existing assets + new assets	Each component of O&M in water supply such as electricity, repair cost, consumable and O&M of treatment and distribution system (plant and machinery) identified and proportion of each component to demand of water the has been calculated. It is assumed that SMC would be able to generate capacity to cater demand of water up 2040 with implementation of proposed projects by 2012-13. Thus the demand of water supply would be equal to the capacity being utilized for the next five years. Demand of water supply for the next five year has been estimated based UDPFI norms and O&M cost for water supply is calculated by multiplying proportion of each component to the existing demand with projected demand

		The additional O&M cost in water sector has been introduced in FOP from 2012-13 thus existing O&M of water supply is projected with 5% which is inflation rate.
Sewerage & Drainage Lines	Existing assets + new assets	Considering same assumptions as water supply, the generation of sewerage is accounted 80% of the total water supplied. All other calculations are the same as water sector
Storm water drainage	Existing assets + new assets	O&M of additional pipelines is calculated based on slandered norms given by SMC. It is Rs. 30000/KM/Year. The schedule of pipeline is identified and the O&M cost is calculated based on that. The O&M cost of existing lines is inflated with 5% inflation rate
Vehicles & Transp. Equipments	Existing assets + new assets	It is assumed that the O&M of existing assets would grow with the past trend. However due to solid waste management projects it may increase by 2% later.
BRTS (Phase 1)	New assets	The BRTS project is also a revenue generating project. Thus the O&M cost for BRTS is considered after deducting projected revenue.
Central Science Centre	New assets	The O&M cost of the central science centre would be Rs. 156 crore. However it is assumed that it would generate revenue up to 70% of the total O&M cost.

Source: Discussion with SMC/Author's analysis

Liability of interest on outstanding debt to the SMC for the next five years is given in the following exhibit

Table 17-4 Interest payable for next five years

Instrument	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Loan	40.44	33.26	26.13	18.88	11.69	130.40
Debenture	24.15	0.00	0.00	0.00	0.00	24.15
Debenture	21.67	21.67	0.00	0.00	0.00	43.33
Debenture	42.60	42.60	42.60	0.00	0.00	127.80
Total	**128.86**	**97.52**	**68.73**	**18.88**	**11.69**	**325.68**

Source: SMC *Figures in Rs. Lakh*

The key assumptions for capital account are explained further.

17.3.2 ASSUMPTIONS FOR CAPITAL ACCOUNT

Key assumptions for capital income have been described below;

Assumptions for capital income

Assumptions in capital account are made mainly for own sources of capital income. Other key heads like capital grant and capital expenditure are based on results of preparation of CIP. Among own sources of capital income, the betterment charges are assumed to be grown with 15% CAGR while Non refundable registration/ premium fee and installment of sale of fixed

asset would increase with 10% and 1% CAGR.

Capital grants are scheduled as given in the CIP. The following exhibit again displays the schedule of capital grant for the next five years.

Table 17-5 Schedule of capital grant

Grant from	2009-10	2010-11	2011-12	2012-13	Total
GOI (NURM)	21792	47808	24753	16749	**111102**
GOG (NURM)	8717	19123	9901	6699	**44441**
Total	**30508**	**66932**	**34654**	**23448**	**155542**

Source: Discussion with SMC/Author's analysis *Figures in Rs. Lakh*

Assumptions for capital Expenditure

Amount of capital expenditure in each year is discussed in CIP in detail. The following exhibit depicts the summarized plan of capital investment for various projects in the next five years

Table 17-6 Phasing of capital investment

Name of the sector	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Water supply	14473	12607	11125	10150	0	**48355**
Sewerage	9706	23545	23545	23545	0	**80342**
Storm water drainage	5574	6813	6869	6869	4579	**30704**
Solid waste management	1285	1285	1285	0	0	**3856**
Transportation System - Roads and bridges	13025	52223	2100	0	0	**67349**
Transportation System - Urban Transport (BRTS)	8200	27500	11202	0	0	**46902**
Housing/E.W.S (VAMBE)	5390	23238	2622	0	0	**31250**
Social Development -Central Science Centre & -High-tech entertainment	737	1475	1475	0	0	**3687**
Flood protection and Disaster management & Tapi River Front Development	3560	570	0	0	0	**4130**
Total	**61950**	**149257**	**60223**	**40564**	**4579**	**316573**

Source: Discussion with SMC/Author's analysis *Figures in Rs. Lakh*

Although most of the capital investment would be made by 2011-12, it is assumed that some amount of capital work would continue thereafter. In the past, prior to JnNURM, SMC had spent around Rs. 300 crore annually as capital expenditure. On completion of JnNURM projects in 2011-12, SMC would revert to normal investment levels but at slightly less around Rs. 250 Crore per annum as there would not be major investment requirement there after.

Assumptions for capital maintenance

Capital maintenance is required in the various infrastructure facilities for sustainability. Following are the assumptions taken for capital maintenance.

Table 17-7 Assumptions for Capital Maintenance

Sectors	% of capital investment required on cumulative asset block
Water supply	o.25% per annum
Sewerage	0.5% per annum and 2.5% every five years
Storm water drainage	1% pa
Solid waste management	25% every 5 years

Source: Discussion with SMC/Author's analysis

Table 17-8 Principal repayment schedule

Instrument	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Loan	106.50	106.50	106.50	106.50	106.50	532.50
Debenture	210.00	0.00	0.00	0.00	0.00	210.00
Debenture	0.00	190.00	0.00	0.00	0.00	190.00
Debenture	0.00	0.00	380.00	0.00	0.00	380.00
Total	**316.50**	**296.50**	**486.50**	**106.50**	**106.50**	**1312.50**

Source: SMC *Figures in Rs. Lakh*

17.4 STRATEGIES FOR SUSTENANCE

Based on the all above assumptions FOP has been created. It was observed that due to high intensity of investment, deficit of Rs. 48689 lakh and Rs. 24534 lakh occurs in the opening balance of 2011-12 and 2012-13 respectively. The following exhibit shows the status of municipal finance at business as usual situation.

Table 17-9 Status of municipal finance at business as usual

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Opening balance	**3293.84**	**6014.90**	**-48689.91**	**-24534.62**	**-6201.13**
Revenue Income	110932.47	125062.86	141116.97	159364.48	180113.61
Revenue expenditure	79579.20	93683.95	89439.63	97902.80	106031.72
Revenue surplus / deficit	**31353.27**	**31378.91**	**51677.34**	**61461.67**	**74081.89**
Capital income	34358.08	71035.36	39043.37	28158.16	5071.41
Capital expenditure	65505.82	154603.56	66565.42	71286.34	35886.67
Capital surplus / deficit	**-31147.73**	**-83568.20**	**-27522.05**	**-43128.18**	**-30815.26**
Closing balance	**3499.37**	**-48689.91**	**-24534.62**	**-6201.13**	**37065.49**

Source: Author's analysis *Figures in Rs. Lakh*

To mitigate the situation various strategies to sustain the investment has been thought out. The strategies were

1) Phase back investment – The strategy has been ruled out as the projects have to be implemented as by 2012-13 as per JnNURM guidelines.

2) Phase back investment in Non JnNURM projects – this strategy is also denied as many non JnNURM projects are link between the two JnNURM projects. Thus it is necessary to

implement those projects along with JnNURM.

3) Execute option for PPP – the strategy is defused owing non viability of projects on commercial basis.

Considering the above situation, following strategies has worked out for sustainability of municipal finance.

17.4.1 STRATEGY 1

A) Term loan to be borrowing from the market for whole deficit and to be repaid in the next three years

B) Discontinue investment in pension fund and gratuity funds in year 2009-10 and 2010-11. With this SMC would be able to save around Rs. 6000 lakh and further be able to reduce the burden of out side loan. The following exhibit shows the minutiae of the above discussion.

Table 17-10 Brief detail of Strategy 1

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Less: Pension and Gratuity fund from revenue expenditure for the particular year	3000	3000	0	0	0
Amount to be borrowed	0	52000	0	0	0
Debt repayment schedule					
O/S loan amount	0	52000	52000	34667	17333
Interest (12% PLR)	0	6240	4160	2080	0
Principal repayment (3 yrs)	0	0	17333	17333	17333

Source: Author's analysis *Figures in Rs. Lak*

For the debt repayment schedule given above, it is assumed that principal would be repaid in the beginning of the year while interest shall be calculated at the end of the year.

The situation of municipal finance after implementing above strategy is exhibited below;

Table 17-11 Status of municipal finance according Strategy 1

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Opening balance	3293.84	6499.37	3070.09	5732.04	4652.20
Revenue Income	110932.47	125062.86	141116.97	159364.48	180113.61
Revenue expenditure	76579.20	96923.95	93599.63	99982.80	106031.72
Revenue surplus / deficit	**34353.27**	**28138.91**	**47517.34**	**59381.67**	**74081.89**
Capital income	34358.08	123035.36	39043.37	28158.16	5071.41
Capital expenditure	65505.82	154603.56	83898.75	88619.67	53219.67
Capital surplus / deficit	**-31147.73**	**-31568.20**	**-44855.38**	**-60461.52**	**-48148.26**
Closing balance	**6499.37**	**3070.09**	**5732.04**	**4652.20**	**30585.83**

Source: Author's analysis *Figures in Rs. Lakh*

Few inferences from the above analysis are noted down below;

Inferences:

- It can be seen that loan is required only for 2011-12 to fulfill the deficits.

- The loan amount considered is higher than the deficit. It is to maintain the amount of closing balance as per the trend observed in the past.
- Even though the amount of loan to be borrowed is huge, the SMC is far capable of bearing its interest and principal repayment burden.
- The DSCR of SMC is around 15000 times in 2011-12 with this strategy.
- The SMC would have to bear total interest cost of Rs. 125 crore.

17.4.2 STRATEGY 2

A) Increase revenue income through increase in various taxes and fees/charges can be levied and increased by SMC for 1.2 times. It could be difficult for SMC to hike any rate and tax more than 20%. The taxes and charges can be increased are property tax, other direct taxes, rents on municipal properties, Public services fees and charges as listed in the FOP given in the Annexure XIII. However collection from public places is not proposed to increase as these are mainly gardens, museums, zoo etc require for recreation of all types of citizens.

B) Term loan to be borrowing from the market for whole deficit and to be repaid in the next three years

C) Discontinue investment in pension fund in and gratuity funds in 2009-10 and 2010-11.

The following table 17-12 describes the above discussion.

Table 17-12 Brief detail of Strategy 2

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Increase in tax revenue and fees					
Total of tax and fees income	0	34052	0	0	0
1.2 times of above	0	40862			
Less: Pension fund	3000	3000			
Amount to be borrowed	0	45000			
Debt repayment schedule					
O/S loan amount	0	45000	45000	30000	15000
Interest (12% PLR)	0	5400	3600	1800	0
Principal repayment (3 yrs)	0	0	15000	15000	15000

Source: Author's analysis *Figures in Rs. Lakh*

Inferences apart from strategy 1 are as follows;

» **Inferences:**

- The DSCR of SMC is around 12000 times in 2011-12 with this strategy.
- The SMC would have to bear total interest cost of Rs. 88 crore.
- The revenue income in 2010-11 increases by 5%.

17.4.3 CONCLUSION

Considering the above strategies, it is concluded that in Strategy 2 the loan amount is around Rs. 70 crore less. Thus interest burden to SMC comes down. Increase in own sources of

revenue income is also considered in most possible terms. The second strategy saves around Rs. 17 crore of interest cost. Thus it proposed that the Strategy 2 is more suitable for sustenance of SMC finance. The detail FOP as per strategy2 is given as Annexure XIII

17.5 FOP FOR SUDA

As discussed in CIP, at present SUDA does not have any major capital projects. Also there are no new TP schemes are on for development. There is uncertainty prevailing for approval of new TPS in next few years. According to discussion with SUDA, it is learnt that the no major development shall be occurred in the next five years until the TPSs are get approved. Yet here it is assumed that new TPSs would be approved in 2012-13.

With this background the section would proceed with discussion on key assumptions taken for FOP.

17.5.1 KEY ASSUMPTIONS

Key assumptions for projection of FOP are as follows;

Revenue Income

Revenue income related assumptions are as follows;

Income heads	Growth rate	Rationale
Zoning map/license fees / scrutiny fees / premium / misc income	-2% to 2%	The particular income head is affiliated especially with new TPSs. Thus it is assumed that it would decline initially and would be revamped as new TPSs approved in 2012-13.
F S I Infrastructure Fee	5%	The sale of FSI would continue in the existing SUDA area.
Interest Income	9% on Fixed deposit	It is revealed while calculating the FOP that a huge surplus of funds remains at end of each year. Thus it would be deposited with GSFS[4] (a GOG enterprise)

Source: Discussion with SUDA/Author's analysis

Revenue Expenses

Key assumptions related to revenue expenses are given in the following table.

Table 17-13 : SUDA - Revenue expenses related assumptions

Expense heads	Growth rate	Rationale
Salary & Wages	10%	It would grow with the past trend. However the salary would be increased about 28% in 2009-10 due to implications of the 6th Pay commission. The arrears of Rs. 20 Lakh shall be paid in five

[4] According to a resolution stipulated by the State Government, all the PSUs having surplus, must deposit it with GSFS as fixed deposit. GSFS would offer interest rate 1% higher than the Public Sector Banks.

		installment from 2009-10.
Daily Wages	2% to 5%	The daily wages are mainly associated with development of new TPSs. Thus it is assumed that it would grow with 2% initially considering misc work going on in existing TPs and would increase up to 5% in 2013 when new TPSs are assumed to be come up
TP unit salary / allowances expenses	-2% to 4%	Again TP related expense. It would increase as and when TP scheme would be announced.
Audit fee	10%	It would grow with past trend
Office Buildings Maintenance Expense	1%	All the expenses are assumed to grow with past trend
Contribution to Pension/ salary Leave	1%	
Dumas - Vesu - Kamrej - Sarthana Street lights maintenance expense	1%	
Staff Quarters Maintenance Expense	7%	

Source: Discussion with SUDA/Author's analysis

Capital Income

The capital income related assumptions can be bifurcate as general assumptions, estimations for recovery from various EWS housing scheme and Government grants and contributions. Following are the general assumptions

Table 17-14 SUDA – Capital income related assumptions

Income heads	Growth rate	Rationale
Development Charge SUDA	1% to 4%	It assumed that development charges would increase after new TPSs arrive.
TPS / income from sale of land	Rs. 1733 lakh / year	For three years
SMC contribution (Joint work)	1%	As per past trend

Source: Discussion with SUDA/Author's analysis

Following exhibit shows estimation of recovery from various EWS housing scheme

Table 17-15 : SUDA – Estimation of recoveries from various EWS schemes

Housing Schemes	No. resi. Units	Monthly installments(Rs)	Annual Installments (Rs. Lakh)	2009-10	2010-11	2011-12	2012-13	2013-14
Recovery from Bhestan 1028 beneficiaries	1028	400	49.34	49.34	49.34	49.34	49.34	49.34
Recovery from Vesu 483 beneficiaries	483	400	23.18	23.18	23.18	23.18	23.18	23.18
Recovery from LIG 182 beneficiaries	182	1250	27.30	27.30	27.3	27.3	27.3	27.3
Contribution to LIG 182 beneficiaries	182	0	0.00	0.00	0	0	0	0
Recovery from LIG 112 beneficiaries	112	1550	20.83	20.83	20.83	20.83	20.83	20.83
Recovery from LIG 286 beneficiaries	286	1900	65.21	65.21	65.20	65.20	65.20	65.20

Pal T P -10 L I G 1192 res. units	1192	3000	429.12	429.12	429.12	429.12	429.12	429.12
Vesu T P -1 L I G 700 res. Units	700	3000	252.00	84.00	252.00	252	252	252
Total	**4165**			**698.99**	**866.99**	**866.99**	**866.99**	**866.99**

Source: Discussion with SUDA

Tenure for all the above investment is 15 years. Estimated Government grant and contribution is shown in the following exhibit,

Table 17-16 SUDA – Estimation government grants

Grant from	2009-10	2010-11	2011-12	Total
GOI (JnNURM + Other)	263.00	865.00	602.00	**1730.00**
GOG (JnNURM)	72.00	180.00	108.00	**360.00**
Total	335.00	1045.00	710.00	**2090.00**

Source: Discussion with SUDA

Capital expenditure

As said above, SUDA does not have any major capital investment on hand. However few projects including two ROB are in progress. List of those projects is produced in the CIP is shown below

Table 17-17 SUDA –Phasing of capital expenditure

Name of the Project	2009-10	2010-11	2011-12	2012-13	Total
Sachin - Magdalla - Navsari railway over bridge	360.00	900.00	540.00	0.00	**1800.00**
Sachin Rail over bridge	166.00	830.00	664.00	0.00	**1660.00**
Beatification of various lakes in SUDA area	0.00	400.00	800.00	800.00	**2000.00**
Development of SUDA Corporate Office	80.00	400.00	320.00	0.00	**800.00**
Total	**606.00**	**2530.00**	**2324.00**	**800.00**	**6260.00**

Source: Discussion with SUDA

17.5.2 FOP

It is also assumed that, apart from above investment, small expenditure would be occurred during projection period. Also with assumption that in 2012-13 new TPSs would come up, the capital investment would be ramped up. While, the nature of such investment is not identified, it is plugged as Unidentified Capital Investment in FOP.

Based on the all above assumptions FOP for SUDA has been developed. It was observed that SUDA would have surplus fund in next five years. Thus it is proposed to put those funds as fixed deposits with GSFS. The amount of FD is decided as per past trend of closing balance. As per past trend, SUDA keeps around Rs. 5000 lakh as closing balance for each year.

To observe the situation of SUDA finance with above application of funds three scenarios have been created. The scenarios are as follows;

Table 17-18 SUDA – Scenario for FOP

Particular		2009-10	2010-11	2011-12	2012-13	2013-14
						Rs. Lakh
Scenario 1	Unidentified Capital Investment	500	500	500	5000	5000
	State Government Grant	0	0	0	0	0
	Amount for FD with GSFS	4000	1800	2000	-3500	-3400
	Cumulative FD	4,000	5,800	7,800	4,300	900
	Interest on cumulative FD	360	522	702	387	81
	Total Interest gained	**2052**				
Scenario 2	Unidentified Capital Investment	500	500	500	5000	5000
	State Government Grant	0	0	0	2500	2500
	Amount for FD with GSFS	4000	1500	1000	0	0
	Cumulative FD	4,000	5,500	6,500	6,500	6,500
	Interest on cumulative FD	360	495	585	585	585
	Total Interest gained	**2610**				
Scenario 3	Unidentified Capital Investment	0	0	0	0	0
	State Government Grant	0	0	0	0	0
	Amount for FD with GSFS	4200	3000	2500	2000	3000
	Cumulative FD	4,200	7,200	9,700	11,700	14,700
	Interest on cumulative FD	378	648	873	1053	1323
	Total Interest gained	**4275**				

Source: Author's analysis

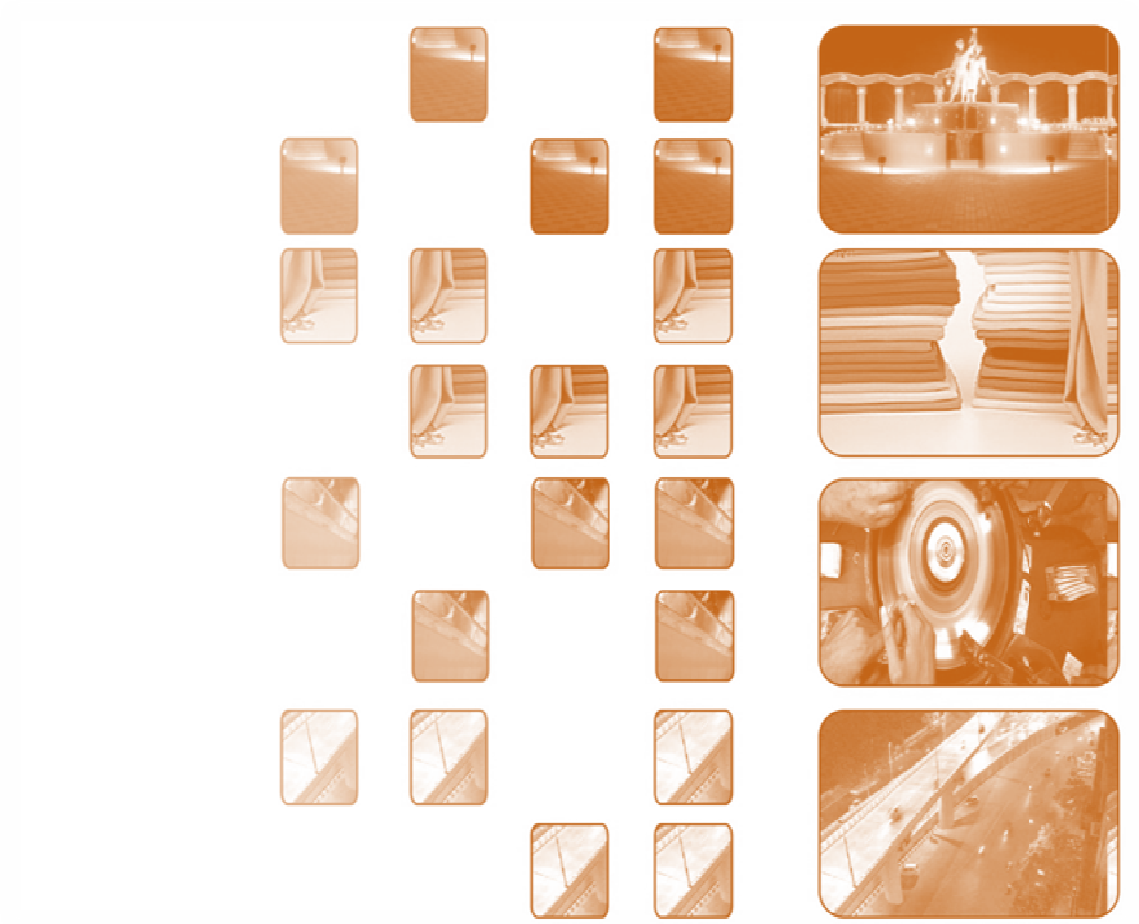
Among the above scenarios, scenario 2 seems the most likely situation if TPSs are introduced in 2012-13. SUDA would also gain modest interest over the five years compares to other two. The status of SUDA finance based on scenario 2 is given in the following table 17-19.

Table 17-19 SUDA – Status of SUDA finance with scenario 2

Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Opening balance (A)	**5,135.88**	**4,623.50**	**5,135.36**	**6,060.43**	**5,088.73**
Revenue income (1)	1,763.99	1,423.18	1,511.79	1,518.29	1,524.99
Revenue expenses (2)	527.04	563.64	604.22	583.19	548.77
Revenue surplus / deficit B = (1-2)	**1,236.95**	**859.55**	**907.57**	**935.10**	**976.23**
Capital income (3)	3,356.67	4,182.31	3,841.50	3,893.20	3,879.23
Capital expenditure (4)	5,106.00	4,530.00	3,824.00	5,800.00	5,000.00
Capital surplus / deficit C= 3-4	**(1,749.33)**	**(347.69)**	**17.50**	**(1,906.80)**	**(1,120.77)**
Closing balance (A+B+C)	**4,623.50**	**5,135.36**	**6,060.43**	**5,088.73**	**4,944.19**

Source: Author's analysis

It can be said that SUDA is financial sustainable to carry out projects on hand and unidentified projects by 2013-14. The detail FOP based on scenario 2 is attached as Annexure XIV.



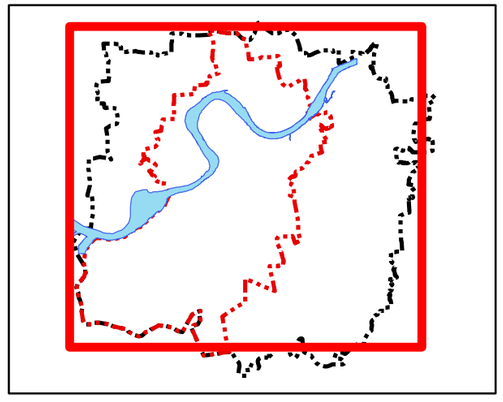
Maps

SURAT CITY DEVELOPMENT PLAN (2008-2013)

LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- Old SMC Limits (112 sq km)
- New SMC-boundary (722 sq km)
- SUDA-Boundary (326.5 sq km)

SOURCE - SMC



DRAWING TITLE: EXTENT OF OLD SMC, NEW SMC AND SUDA LIMITS	MAP NO. 2 - 1
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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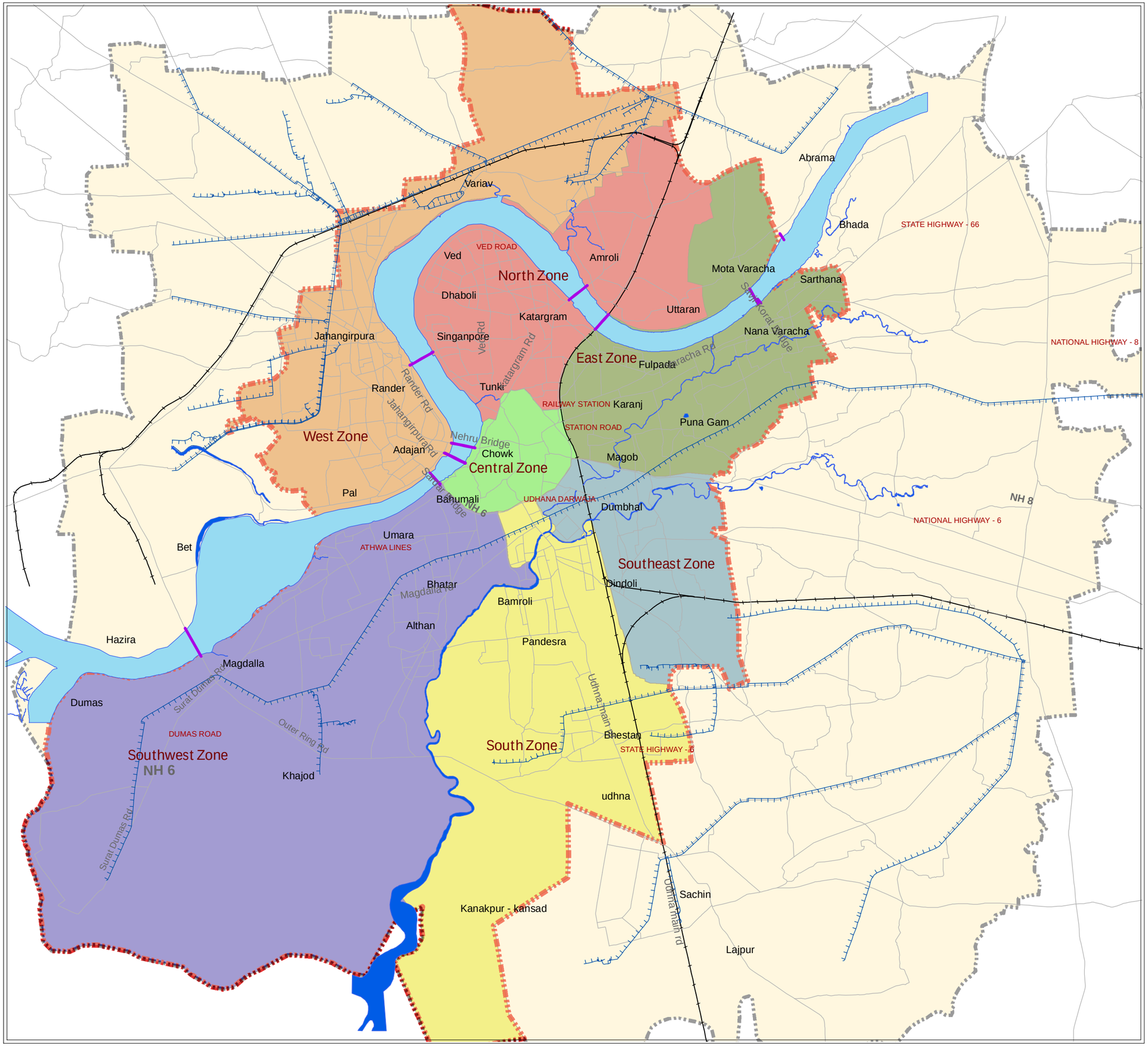
SURAT CITY DEVELOPMENT PLAN (2008-2013)



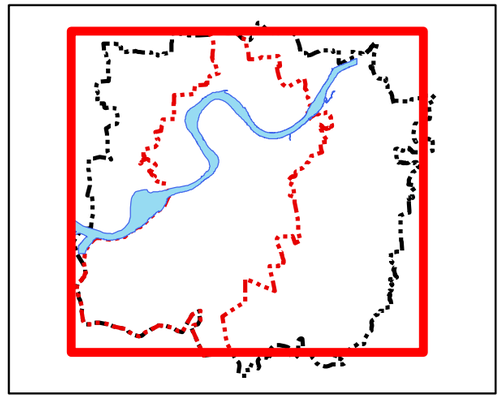
LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary

SMC Zones

- Central Zone
- East Zone
- North Zone
- South Zone
- Southeast Zone
- Southwest Zone
- West Zone

SOURCE - SMC



DRAWING TITLE:	MAP NO.
ADMINISTRATIVE ZONES (2009)	2 - 2
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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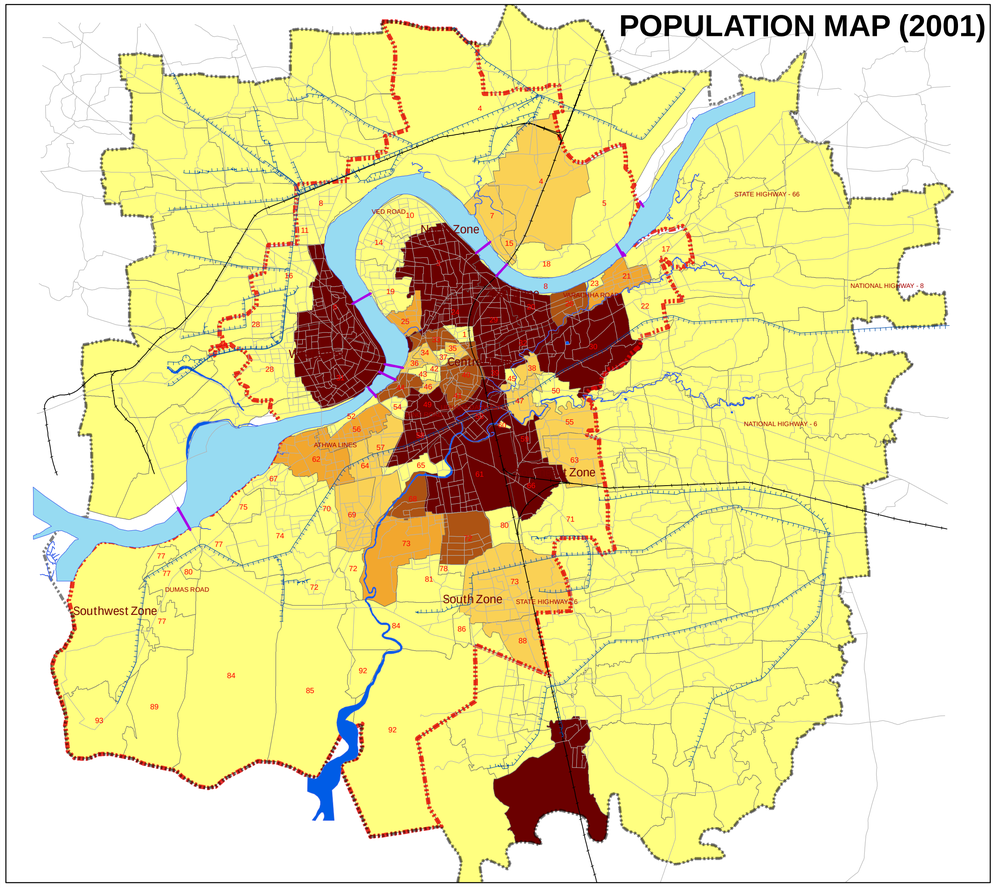
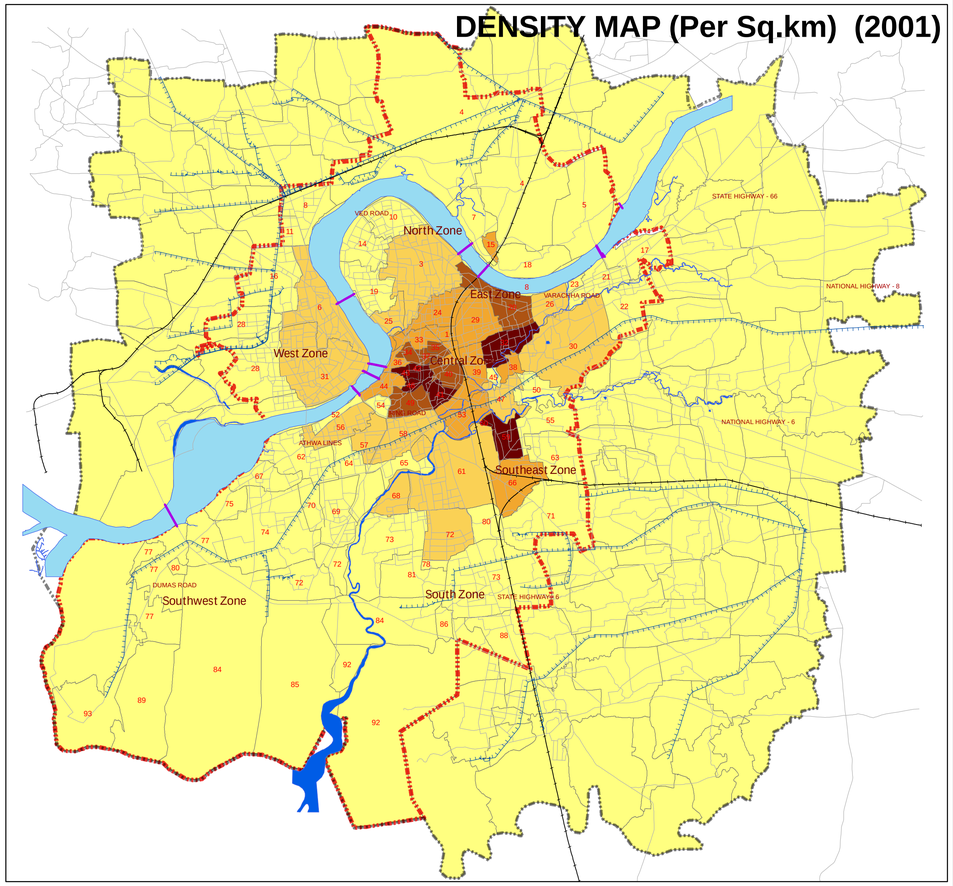
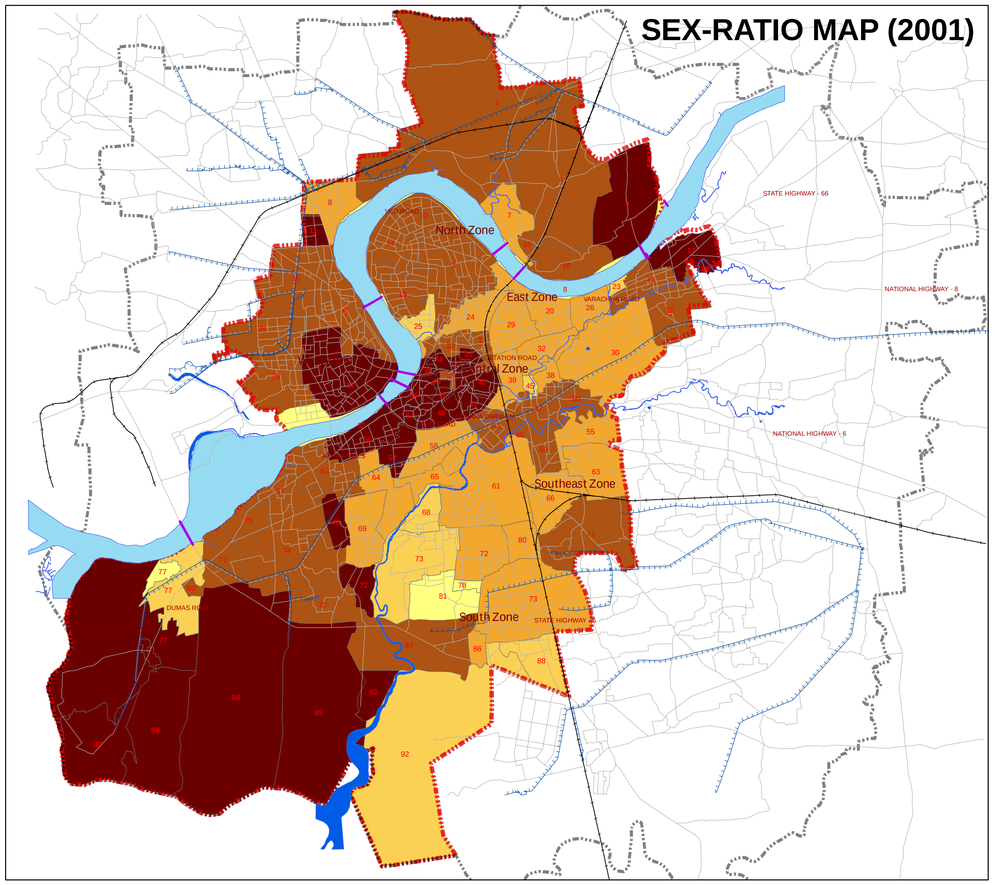
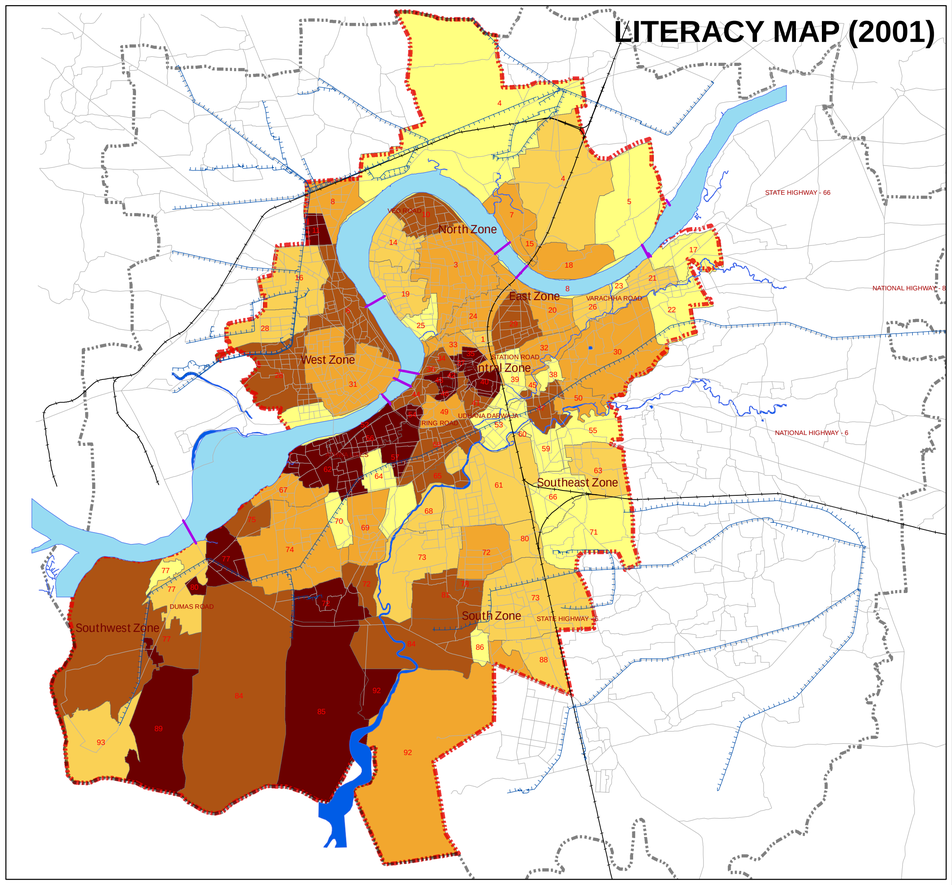








LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary

Population

- 0 - 15000
- 15001 - 30000
- 30001 - 45000
- 45001 - 60000
- 60001 - 198482

Density (Per Sq.km)

- 0 - 15000
- 15000 - 30000
- 30000 - 45000
- 45000 - 60000
- 60000 - 110875

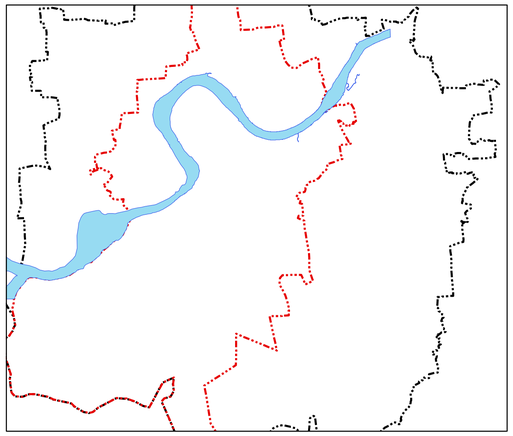
SexRatio

- 0 - 237
- 238 - 541
- 542 - 758
- 759 - 876
- 877 - 1008

Literacy

- 0 - 65
- 65 - 70
- 70 - 74
- 74 - 78
- 78 - 87

SOURCE - SMC



DRAWING TITLE:	MAP NO.
DEMOGRAPHIC PROFILE (2001)	3 - 1
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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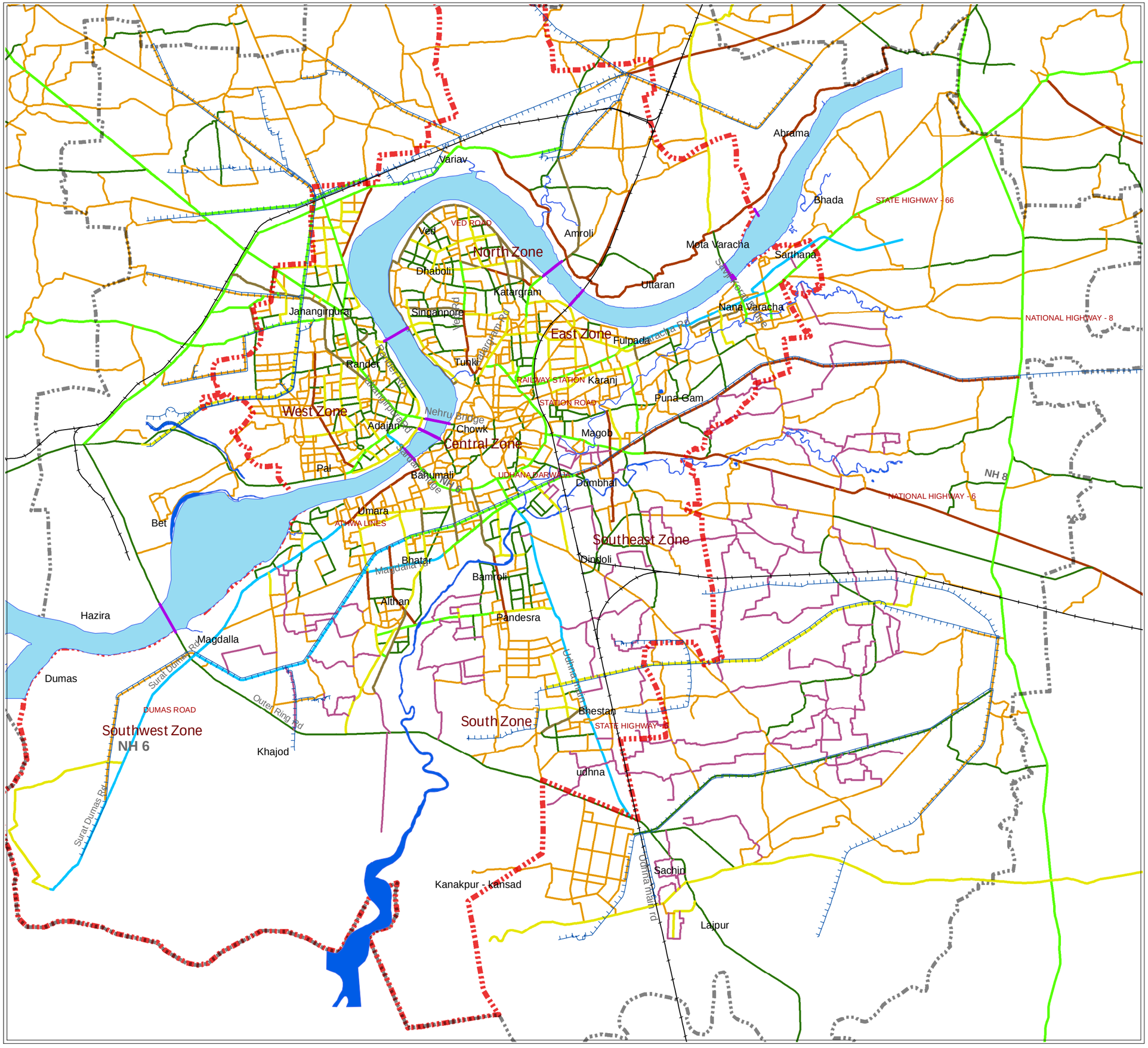


SURAT CITY DEVELOPMENT PLAN (2008-2013)

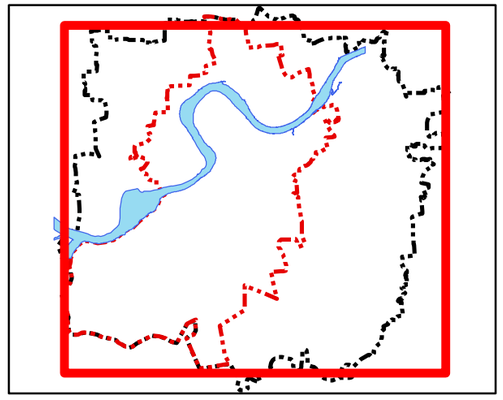
LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Railway Lines
- SUDA-Boundary
- New SMC-boundary

Roads Width Wise

ROADWIDTH (M)	TOTAL STRETCH (KM)
9	214
12	700
18	271
24	128
30	34
36	78
45	180
60	58
GRAND TOTAL	1606

SOURCE - SMC



DRAWING TITLE: SURAT ROADS MAP (Width Wise) (2005)

MAP NO. 6 - 1

SCALE: 0 0.5 1 2 3 4 Kilometers

NORTH:

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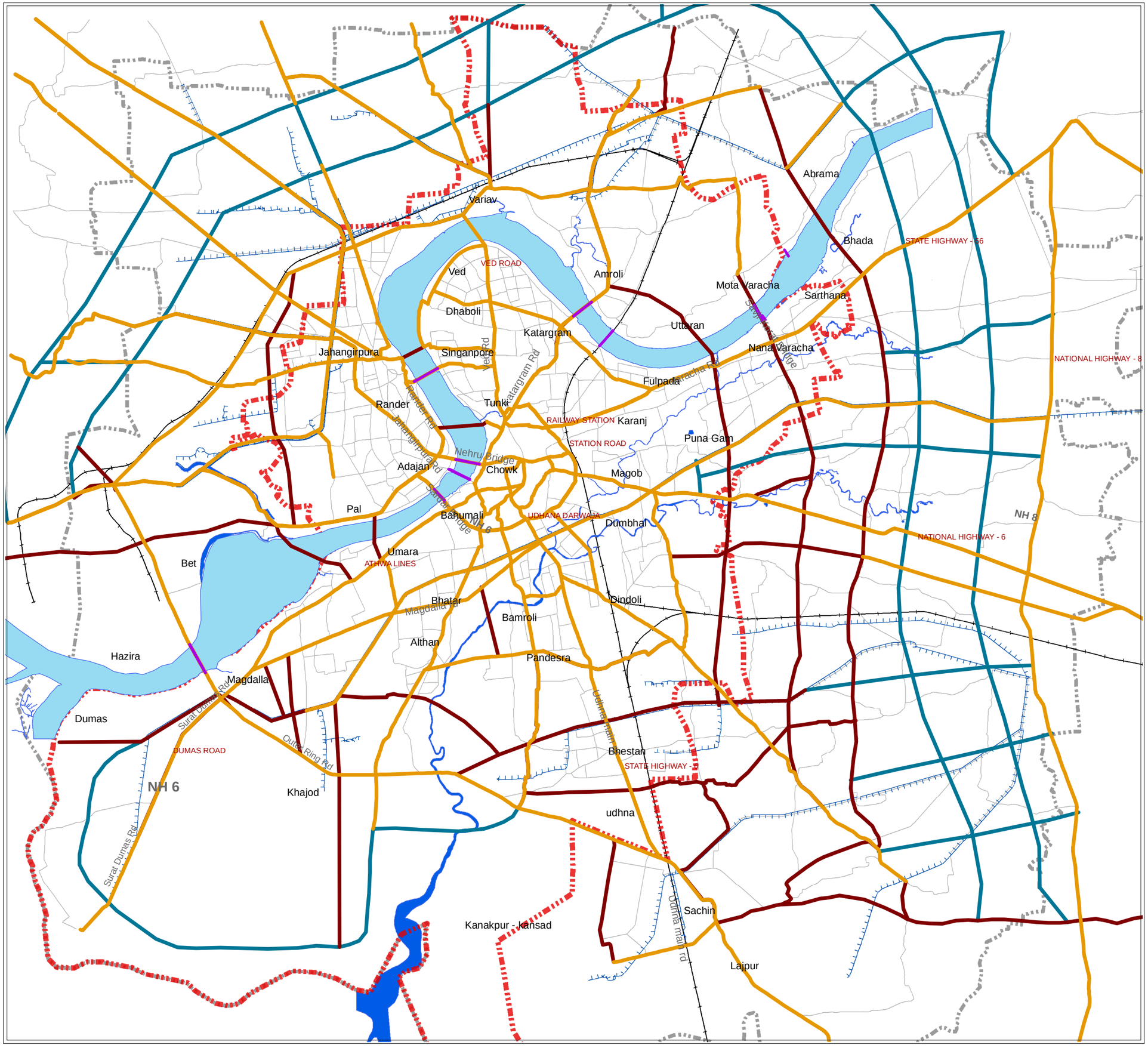
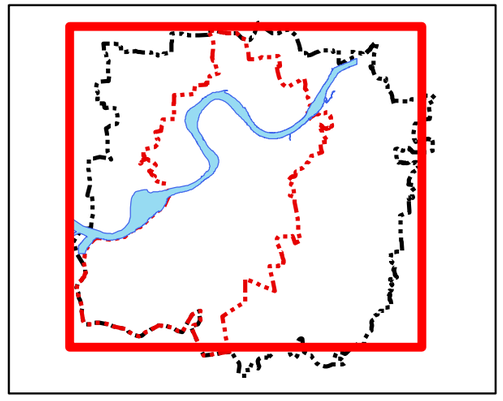
SURAT CITY DEVELOPMENT PLAN (2008-2013)



LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- Existing Ring Radial Road
- Proposed Road by 2016
- Proposed Road by 2035
- New SMC-boundary
- SUDA-Boundary

SOURCE - CMP SURAT (2005)



DRAWING TITLE: EXISTING AND PROPOSED RING RADIAL ROAD MAP	MAP NO. 6 - 2
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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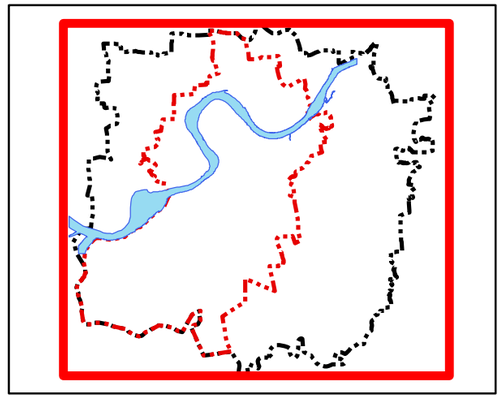
SURAT CITY DEVELOPMENT PLAN
(2008-2013)

LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary
- TAZ Zones (154)

SOURCE - SMC



DRAWING TITLE:	MAP NO.
TRAFFIC ANALSIS ZONES MAP	6 - 4
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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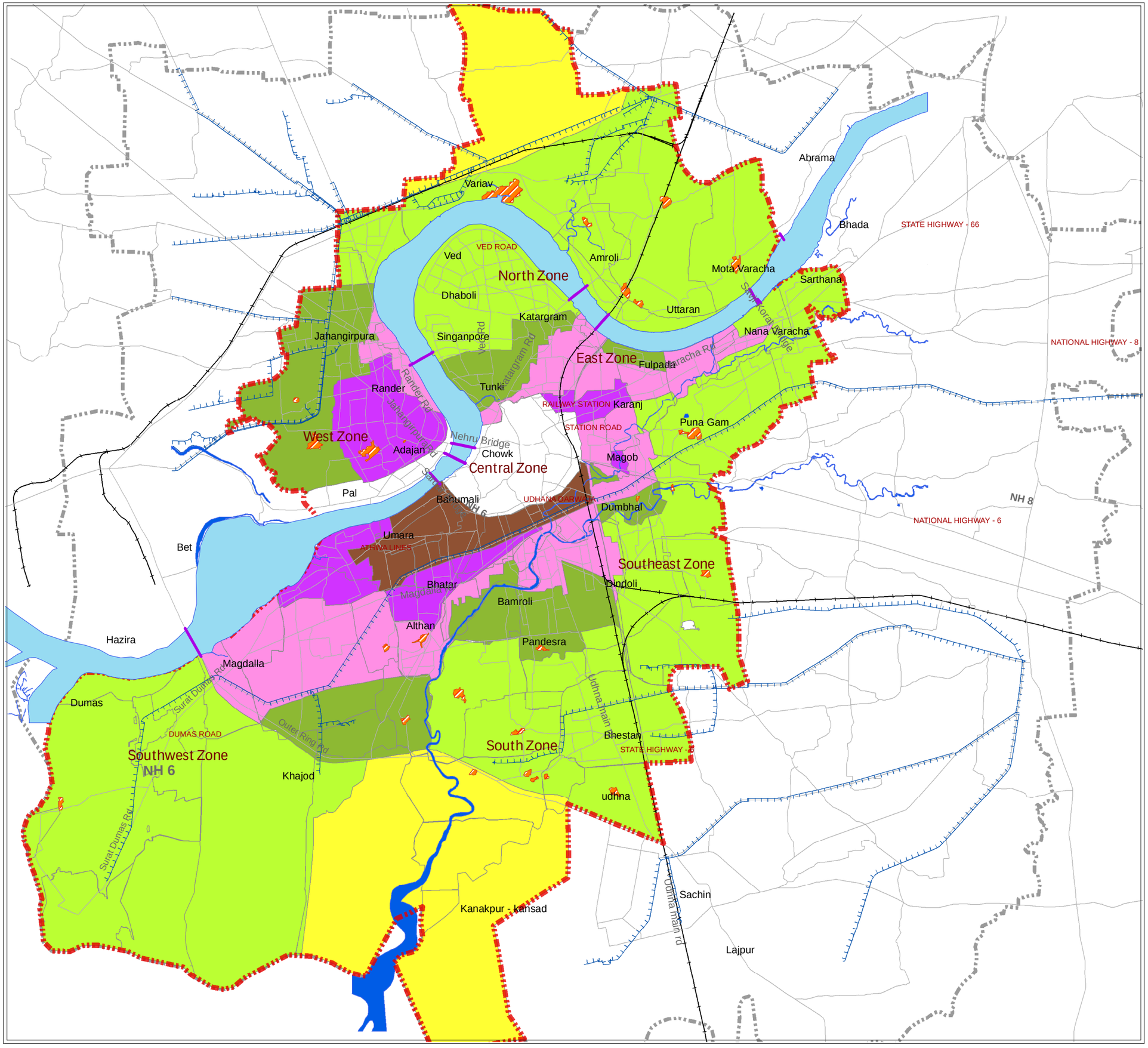
(2008-2013)



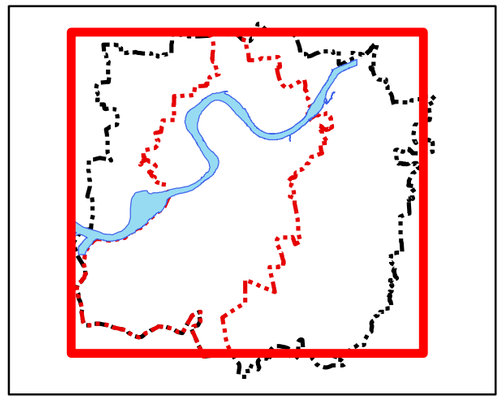
LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary
- GAMTAL

Property Tax

VALUATION (Rs./Sq.Mts.)	ZONES
3000	F
5000	E
8000	D
10000	C
12000	B
15000	A

SOURCE - SMC



DRAWING TITLE:	MAP NO.
PROPERTY TAX ZONES (2008)	7 - 1
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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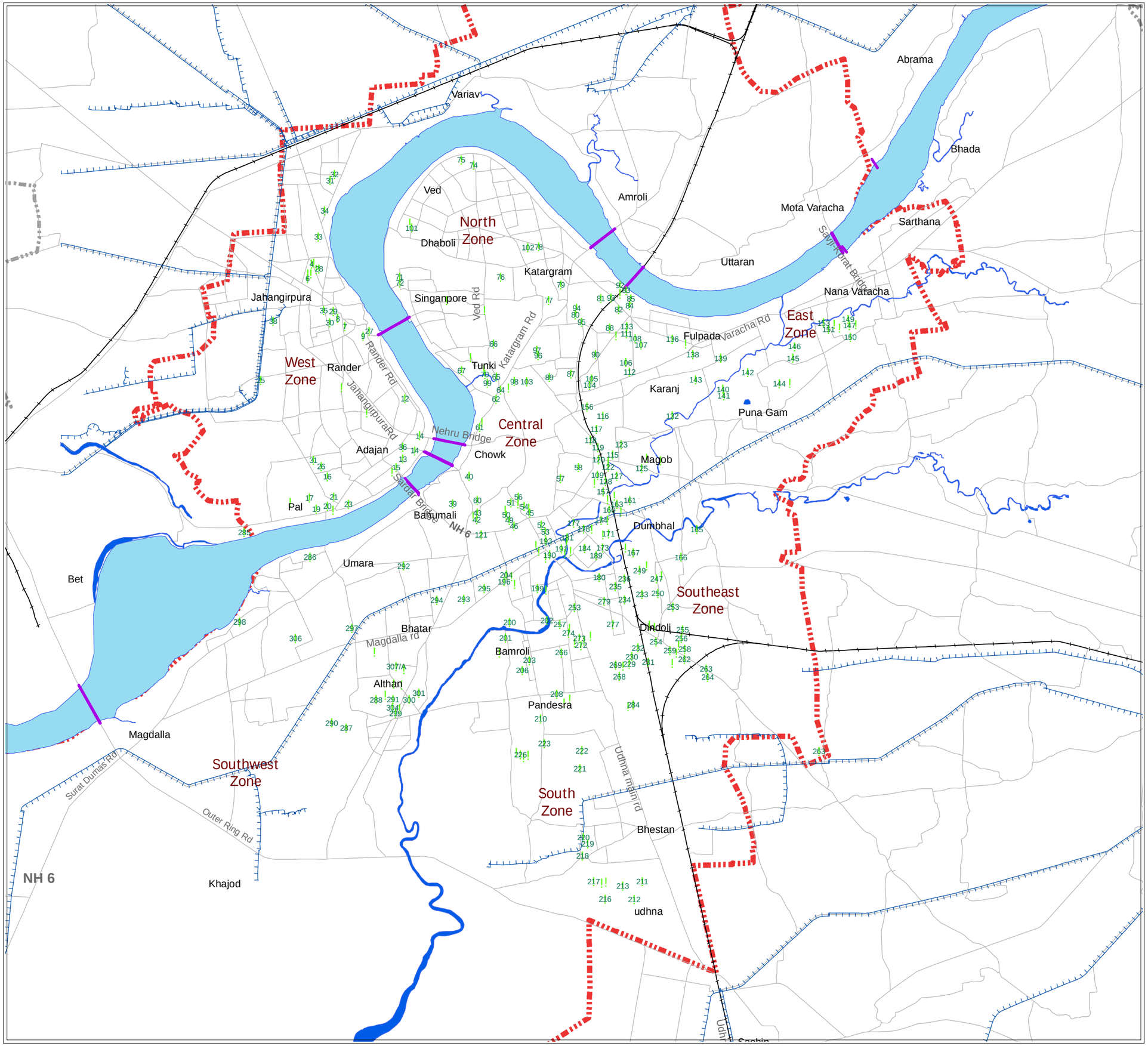
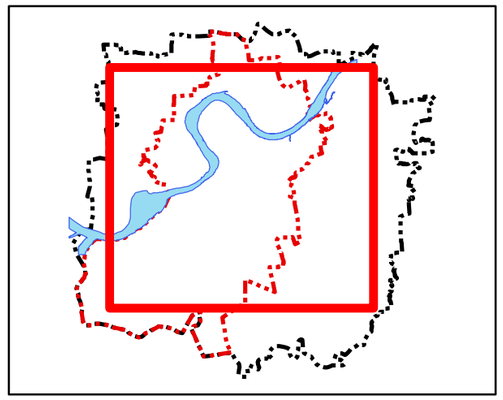
SURAT CITY DEVELOPMENT PLAN
(2008-2013)



LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary
- SLUM POCKETS

SOURCE - SMC



DRAWING TITLE:	MAP NO.
SLUM LOCATIONS - SURAT (2005)	8 - 1
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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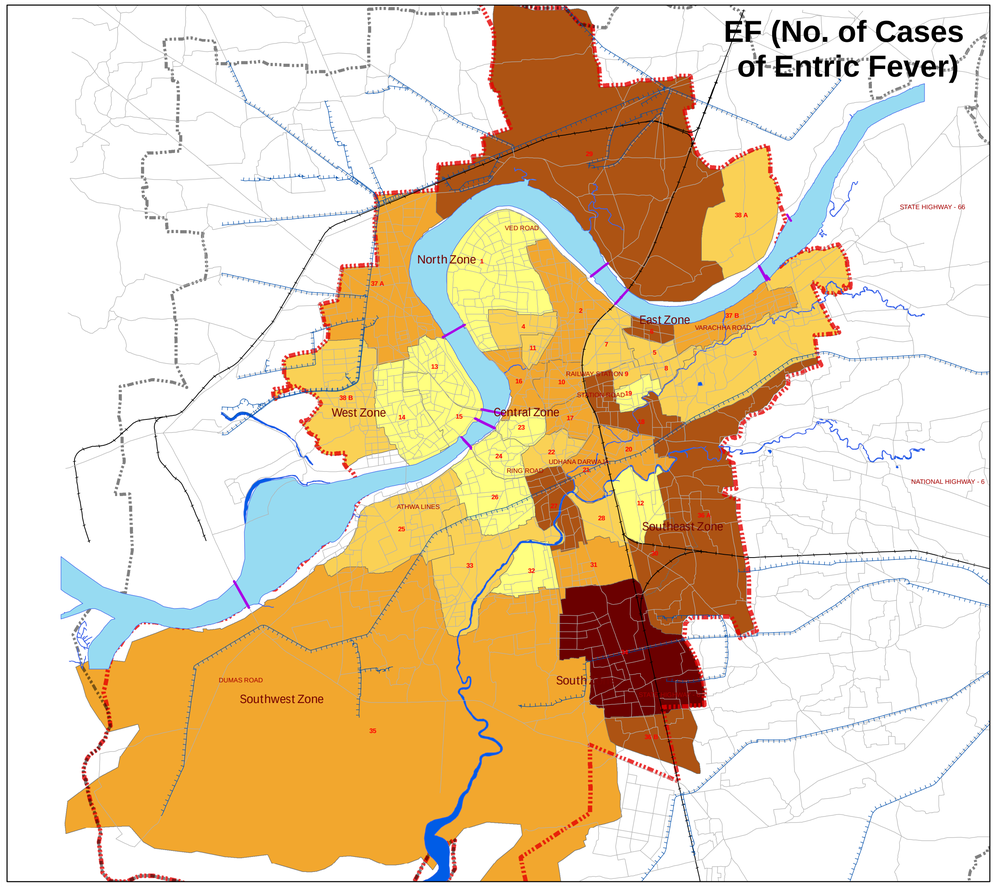
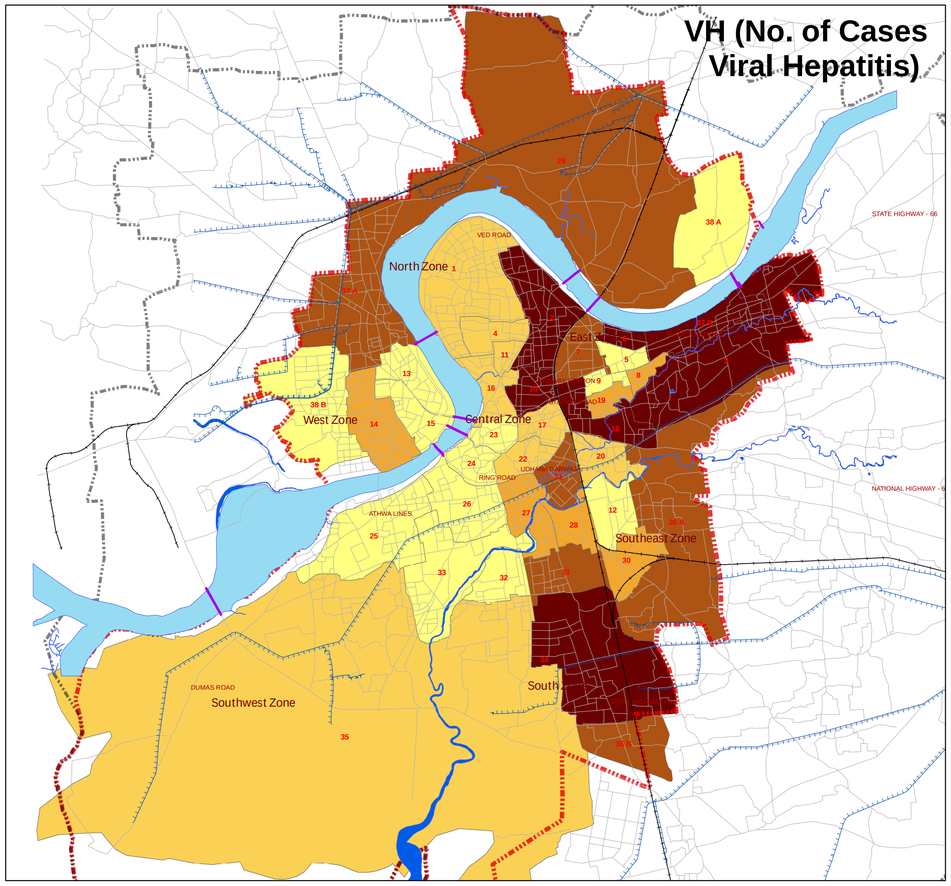
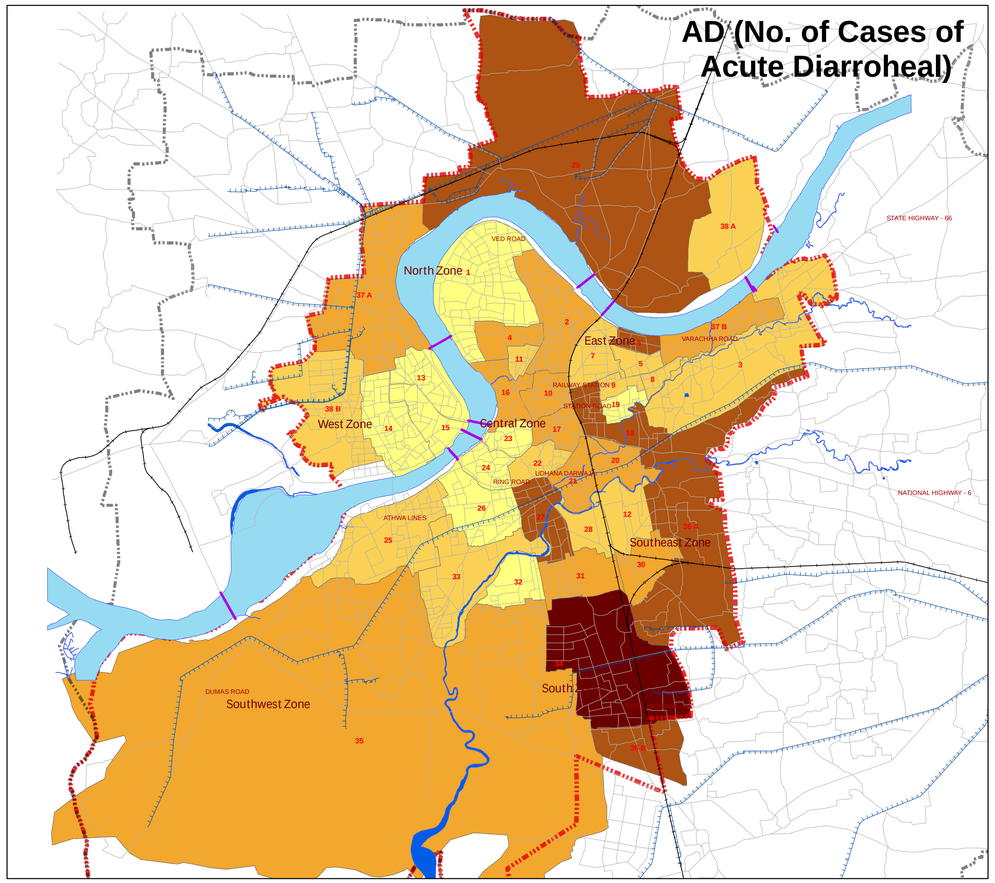
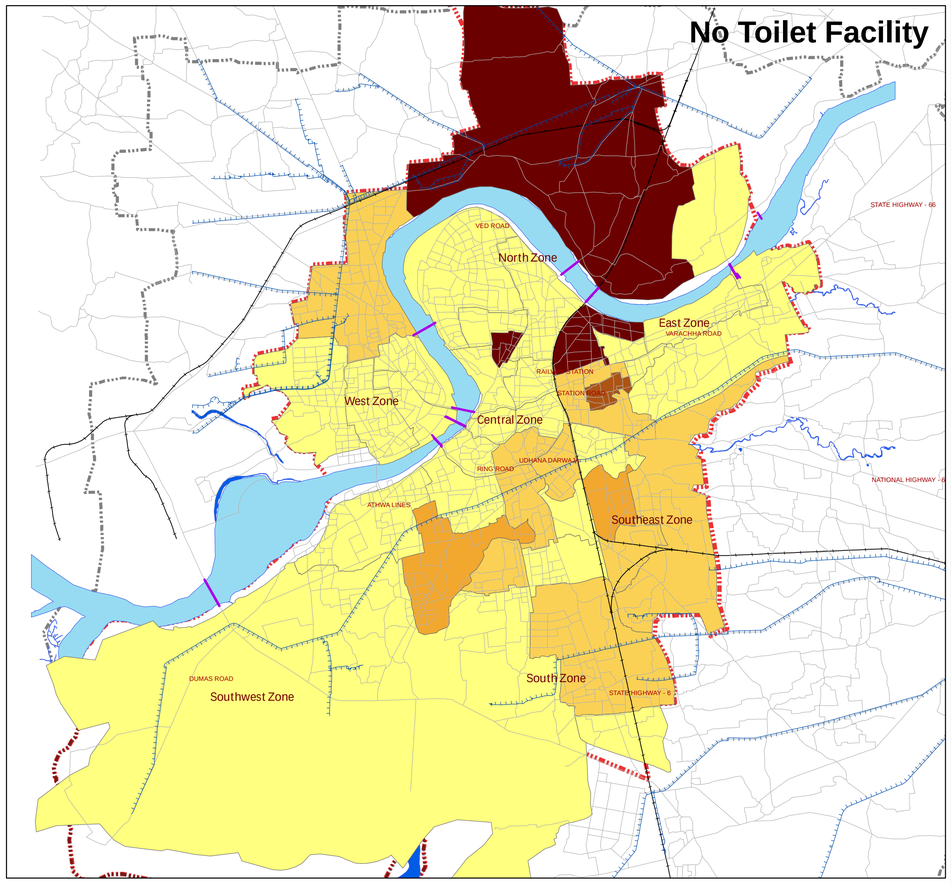
SURAT CITY DEVELOPMENT PLAN
(2008-2013)









LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary

SMC Election Wards Boundaries

EF (No. of Cases of Entric Fever)

- 0 - 4
- 5 - 14
- 15 - 26
- 27 - 41
- 42 - 62

VH (No. of Cases Viral Hepatitis)

- 0 - 3
- 4 - 7
- 8 - 11
- 12 - 15
- 16 - 21

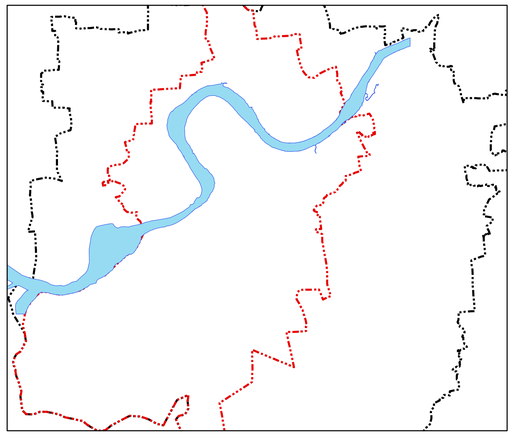
AD (No. of Cases of Acute Diarroheal)

- 0 - 3
- 4 - 9
- 10 - 22
- 23 - 32
- 33 - 52

No_Toilet_Facility

- 0 - 18
- 19 - 33
- 34 - 50
- 51 - 80
- 81 - 100

SOURCE - SMC



DRAWING TITLE:	MAP NO.
HEALTH MAP (2008 - 2009)	9 - 1
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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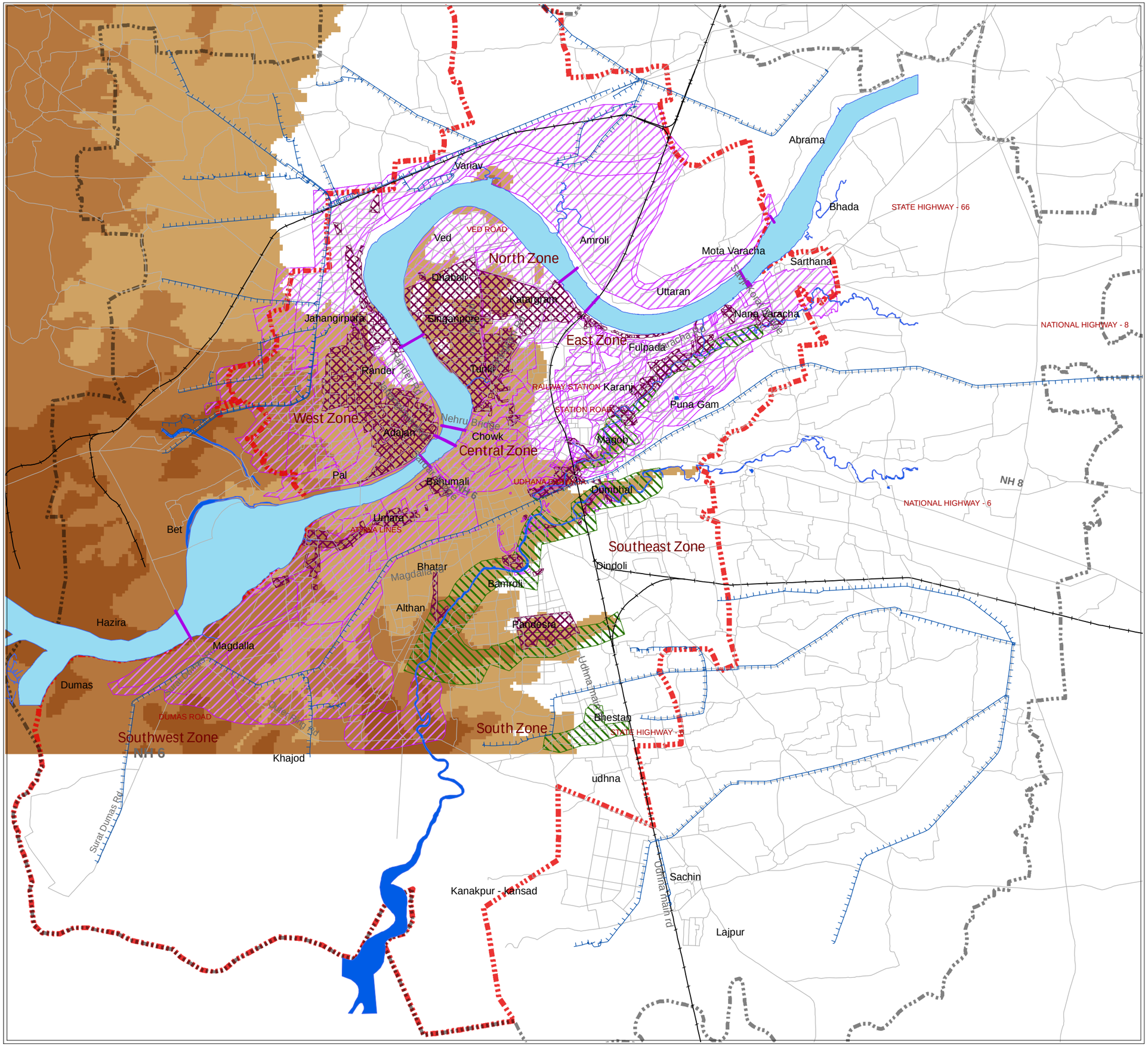
SURAT CITY DEVELOPMENT PLAN (2008-2013)



LEGEND

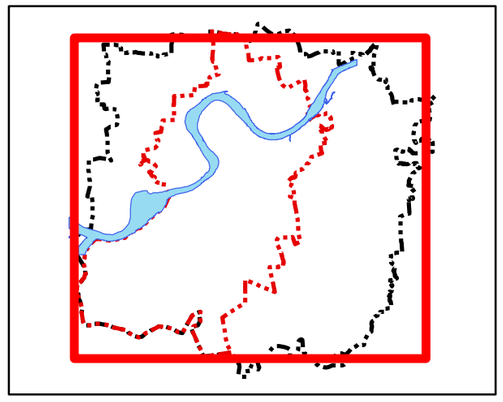
- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary
- Floods (1998)
- Floods (2004)
- Floods (2006)

Low Lying Area

Elevation < 9.5 m

- 3 - 5
- 5 - 7
- 7 - 9.5

SOURCE - SMC & SOI



DRAWING TITLE: SURAT VULNERABLE AREAS	MAP NO. 13 - 1
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

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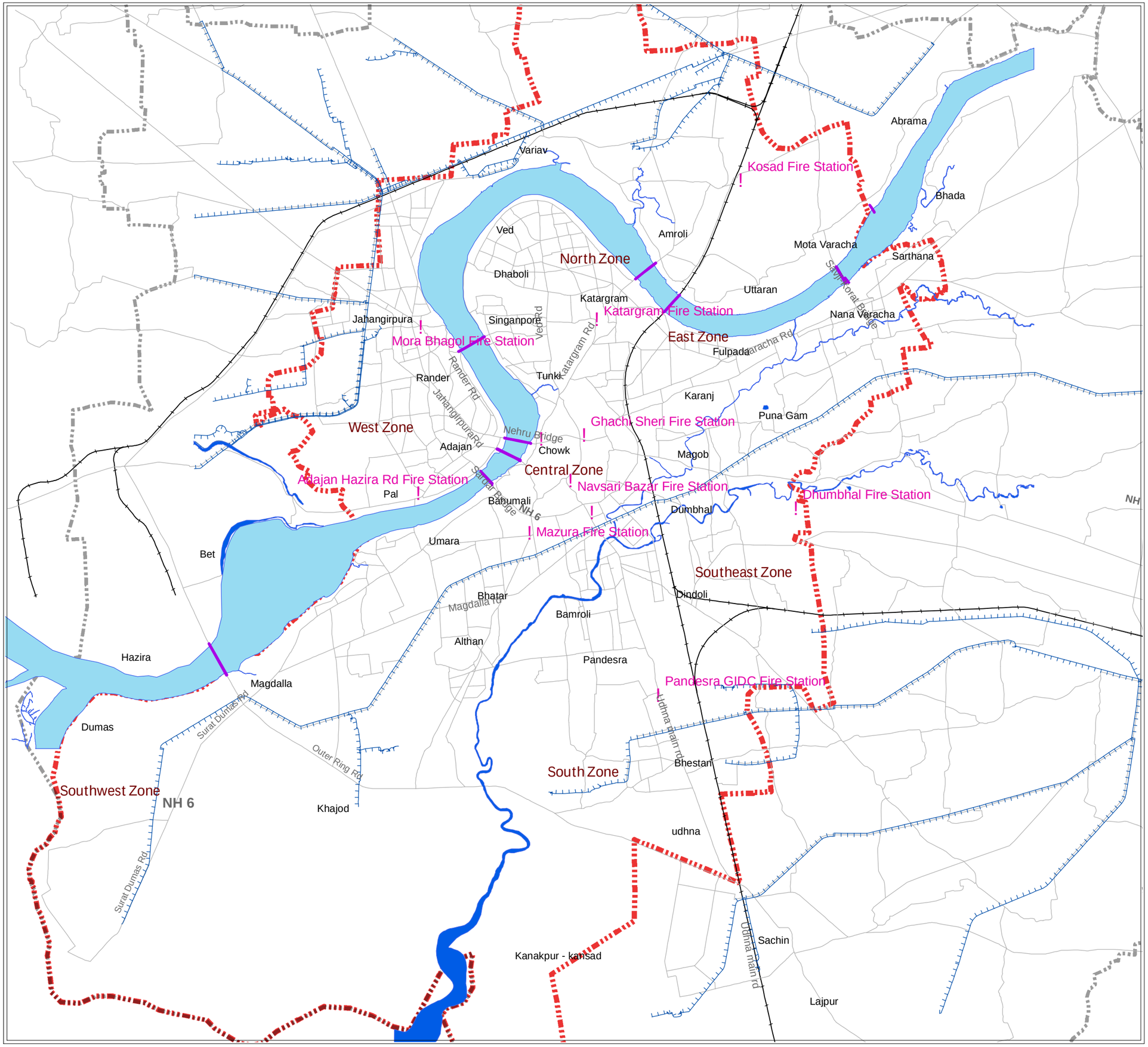
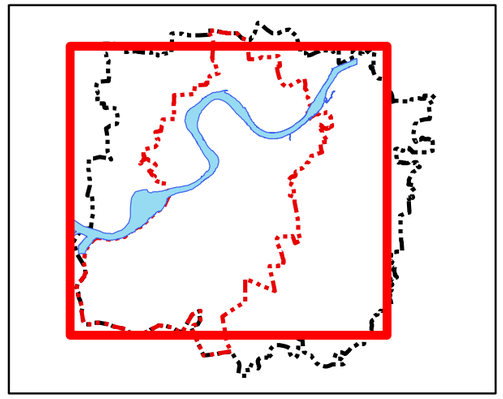
SURAT CITY DEVELOPMENT PLAN (2008-2013)



LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary
- Fire Station Locations

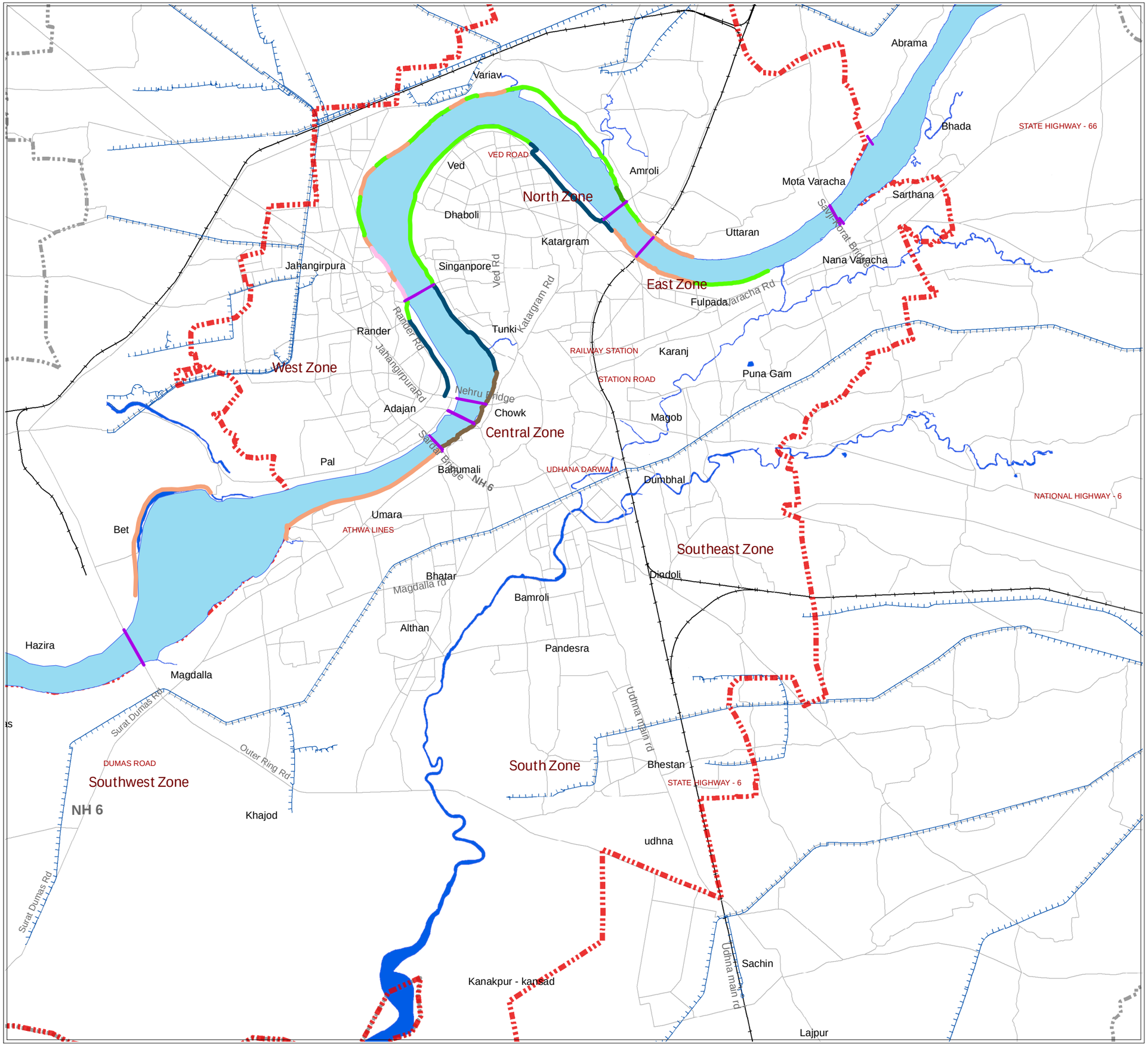
SOURCE - SMC



DRAWING TITLE: FIRE STATION LOCATIONS MAP	MAP NO. 13 - 2
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

SURAT MUNICIPAL CORPORATION
Mughali Sarai , Surat
+91-261-2423751/126
www.suratmunicipal.org

SURAT CITY DEVELOPMENT PLAN (2008-2013)



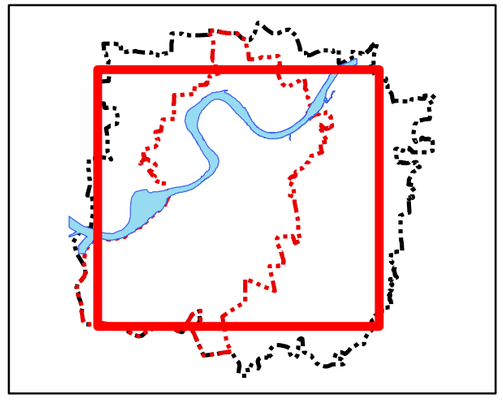
LEGEND

- Tapi River
- Creeks
- Canal
- Bridges
- Roads
- Railway Lines
- SUDA-Boundary
- New SMC-boundary

Embankment

- Earthen Embankment (Height More than 3m)
- Earthen Embankment (Height Upto 3m)
- Earthen Embankment (incomplete)
- Old City Wall
- Retaining Wall
- Retaining Wall (incomplete)

SOURCE - SMC



DRAWING TITLE: EMBANKMENTS MAP	MAP NO. 13 - 3
SCALE: 0 0.5 1 2 3 4 Kilometers	NORTH:

SURAT MUNICIPAL CORPORATION
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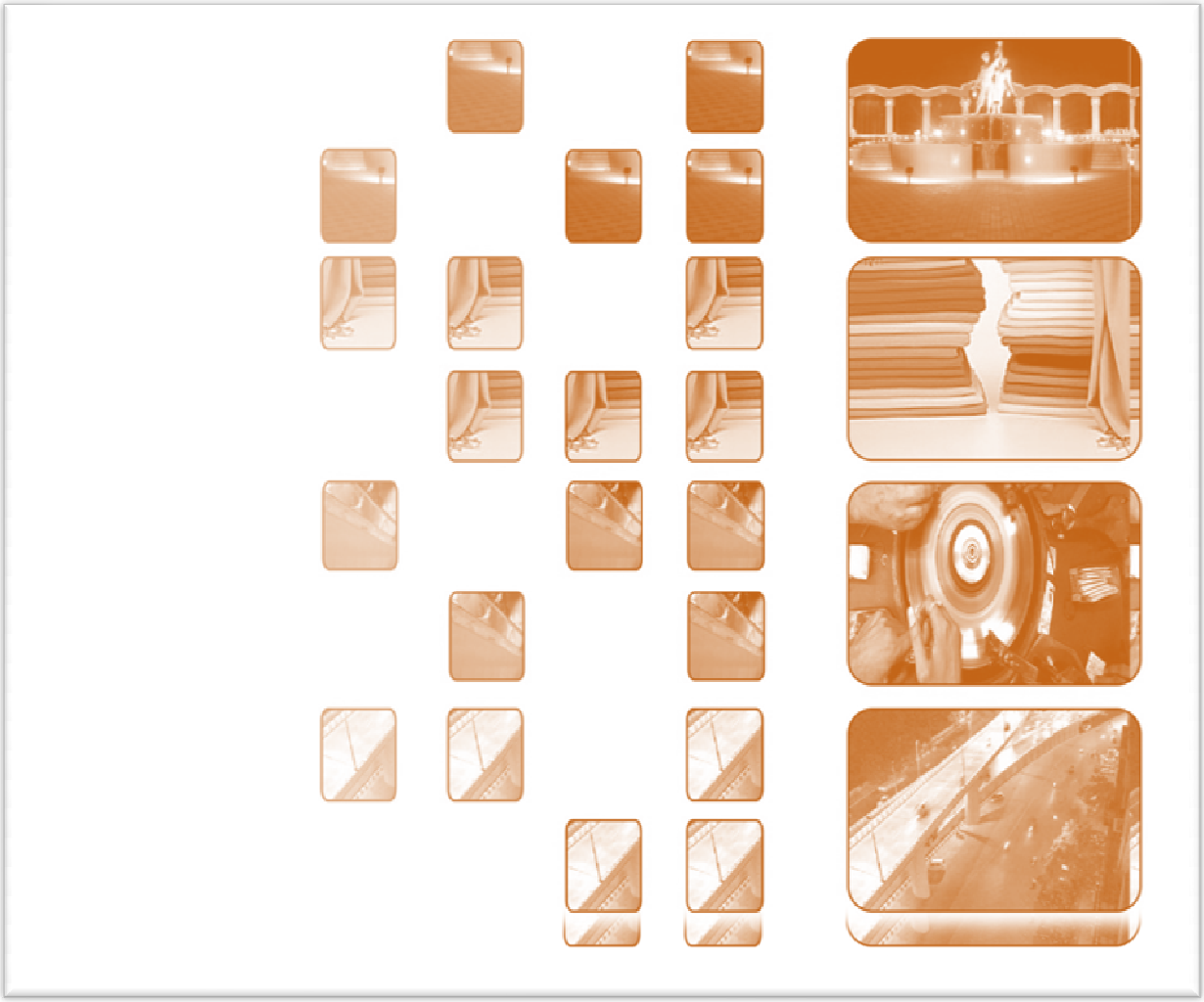

Annexures

Annexures

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ANNEXURE I SUMMARY OF PUBLIC CONSULTATIONS

LEVEL 1 - HOUSEHOLD SURVEYS

The objective of the household survey was to know users perception of the level of services delivery based on which the ward wise consultation can be built upon. And thus, the household surveys are looked at as reconnaissance survey that would support the ward wise consultation process. This is a conventional method of finding out users' perceptions about service delivery.

Election wards as basic units for sampling:

The samples for the household survey were selected from each ward in the SMC area. Wards have been taken as a basic unit for sampling. The populations of the wards were factorized and the sample size was determined.

Sampling Methodology:

Election wards are basic units of administration in the municipal corporation. The total Sample Size of 1100 was administered in SMC and SUDA area. The samples were selected using Stratified Random Sampling technique. The number of households in each election ward was taken as a base to decide upon the sample size to be administered in each area. The sample size had reflection of the population of the election ward. The sample was further stratified on the basis of different housing typologies in the ward. Housing typologies predominantly seen are chawls, slum quarters, row houses, tenements, low rise and high rise apartments and bungalows along with gala type units (singular span row houses) of the old city area. Ratio of the total number of households to the households in each ward was worked out, and sample would be distributed ward wise based on the percentage population to the total population in SMC area.

Based on the visual survey and consultation with the municipal officials, different typologies within neighborhoods were selected in each ward. End of the day, the filled up forms were collected and checked to determine the tasks for the next day and to supervise the quality of surveys. Besides, the household survey was also randomly cross-checked by the supervisors through telephone calls in other units and through personal site visits in the slum quarters. In order to focus on the basic services of the urban poor, additional sample of 100 households were collected from the slums. This was in addition to other 196 household surveyed through various election wards in the city. The table on next page shows the distribution of the sample across the wards and across the housing typology.

Table -1: Ward wise Distribution of Samples

No.	Spatial Units - Wards	2001 Population	% of Total Pop.	HH Survey Samples	Sample Distribution as per Housing Typology							
					Bungalows	High Rise Apt.	Tenement	Low Rise Apt.	Row houses	Gala type	Slums/ Chawls	Comm. complex
1	Ward No. 1 (Rander – Jahangirabad – Pisad)	64269	2.2	24	2	3	3	4	6	2	4	0
2	Ward No.2 (Ved road)	77132	2.7	29	1	0	4	2	6	10	5	1
3	Ward No.3 (Katargam Gotalawadi – Fulpada(Gam)	78226	2.7	30	5	2	0	4	5	6	5	3
4	Ward No.4 (Ashwini Kumar– Navagam)	76906	2.7	29	5	3	1	6	8	0	4	2
5	Ward No.5 (Fulpada– Hirabag)	68602	2.4	26	7	3	0	5	6	0	4	2
6	Ward No.6 (Fulpada North)	70492	2.4	26	2	2	4	3	8	0	4	4
7	Ward No.7 (Kapadra– Nana Varachha)	74741	2.6	29	4	2	3	4	9	1	4	2
8	Ward No.8 (Karanj West – Kapadra Shrijee Nagar Soc. Area)	75756	2.6	29	4	2	2	2	10	0	5	4
9	Ward No.9 (Karanj North – Navagam Sadhna Soc. Area)	68439	2.4	26	4	3	1	2	9	0	4	3
10	Ward No.10 (Haripura – Mahidharpura-Rampura – Laldarwaja)	69363	2.4	26	2	1	3	2	2	9	5	0
11	Ward No.11 (Kuber Nagar)	76287	2.7	29	1	1	10	5	4	5	2	3
12	Ward No.12 (Katargam : Valinatha Chowk)	78599	2.7	30	3	0	4	3	7	9	2	2
13	Ward No. 13 (Rander road – Gorad)	61205	2.1	23	3	6	1	3	5	0	3	2
14	Ward No. 14 (Adajan West)	63213	2.2	24	4	5	0	5	7	0	2	2
15	Ward No. 15 (Adajan East)	61793	2.1	23	4	4	2	3	6	0	2	2
16	Ward No.16 (Nanavat – Shahpore – Saiyed Pura Tanki – Dhastipura)	78217	2.7	30	1	0	3	4	2	11	6	3
17	Ward No.17 (Navapura – Beguampura)	78208	2.7	30	1	1	3	3	0	14	6	0
18	Ward No.18 (Umarwada – Magob – Navagam Rail Way Colony)	71195	2.5	27	3	3	4	2	7	0	3	5
19	Ward No.19 (Karanj South)	73976	2.6	28	8	2	2	3	7	0	2	4

No.	Spatial Units - Wards	2001 Population	% of Total Pop.	HH Survey Samples	Sample Distribution as per Housing Typology							
					Bungalows	High Rise Apt.	Tenement	Low Rise Apt.	Row houses	Gala type	Slums/ Chawls	Comm. complex
20	Ward No.20 (Dumbhal – Mithi Khadi)	78530	2.7	30	1	0	8	2	6	0	7	6
21	Ward No.21 (Part) (Anjana)	70797	2.5	27	0	0	7	1	0	0	11	8
22	Ward No.22 (Sagrampura – Salabatpura)	76059	2.6	29	2	1	3	6	2	11	4	0
23	Ward No.23 (Gopipura – Wadifalia – Sonifalia – Badekha chakla)	68045	2.4	26	2	0	1	5	1	12	3	2
24	Ward No.24 (Nanpura – Timaliyawad – Rudarpura)	68796	2.4	26	1	4	3	4	5	3	4	2
25	Ward No. 25 (Athwa – Umara – Piplod)	68114	2.4	26	7	8	0	5	2	0	0	4
26	Ward No. 26 (Athwagate – Majura)	66384	2.3	26	10	5	3	4	0	0	2	2
27	Ward No. 27 (Khatodra – Udhana North West)	69361	2.4	27	1	3	7	3	4	0	4	5
28	Ward No. 28 (Udhana Udhyog Nagar)	71376	2.5	27	0	0	8	6	3	0	6	4
29	Ward No. 29 (Limbayat – Dindoli)	78175	2.7	30	0	0	8	5	4	0	10	3
30	Ward No. 30 (Dindoli)	76518	2.7	30	0	_	8	6	5	0	7	4
31	Ward No. 31 (Udhana South)	69029	2.4	27	0	2	4	5	6	0	6	4
32	Ward No. 32 (Bamroli – Pandesara Housing Board)	68829	2.4	26	0	0	6	6	5	0	6	3
33	Ward No. 33 (Althan – Bhatar – Majura New Area)	67272	2.3	26	5	5	2	4	4	0	3	3
34	Ward No. 34 (Bhedwad – Bhestan – Pandesara)	69931	2.4	27	0	0	4	3	6	0	8	6
35	Ward No. 35 (New Ward)	102738	3.6	41	6	1	11	12	0	0	7	4
36	Ward No.36 (New Ward)	103204	3.6	40	2	0	10	3	7	5	12	1
37	Ward No.37 (New Ward)	118691	4.1	45	5	0	8	2	3	14	13	0
38	Ward No. 38 (New Ward)	118774	4.1	46	5		7	4	11	7	11	
	Total Ward wise (SMC)	**2877242**	**100**	**1100**	**111**	**72**	**158**	**151**	**188**	**119**	**196**	**105**

Table 2: Ward wise Distribution of Samples

No.	Spatial Units - Wards	2001 Population	% of Total Pop.	HH Survey Samples	Sample Distribution as per Housing Typology							
					Bungalows	High Rise Apt.	Tenement	Low Rise Apt.	Row houses	Gala type	Slums/ Chawls	Comm. complex
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Inferences of Household surveys

Surveys were conducted in slum and rest of the city areas as the expected urban services for these two sections of the society would differ in terms of need for amenities, quality & quantity. These urban amenities if provided / made accessible to the individual would improve or bring radical changes in lifestyle of the people. Apart from need for Urban Amenities the household report attempts to capture pricing for services, so that operating cost are met in the form of user charges. An average household income of the People living in the city is Rs.8000/- per month.

Surat has a very high growth rate and there is a huge influx of population of about 1000 people daily entering the city in search of jobs. The city offers a tremendous potential for trade and commerce activity. These people need all the urban amenities. In Surat, people living in rented tenements are as high as 37%. People mostly live in tenement duplex type of dwelling units on an average area of 576 sq ft built-up area with three rooms, whereas in slums the average area is 250 sqft built-up area with 1.6 rooms.

Table 1: Priority for Improvement

Priority for Improvement	Type of Infrastructure Service
1st	Water Supply
2nd	Sewerage Connection
3rd	Door-to-Door Waste Collection, Solid Waste Management
4th	Public Transit System
5th	Road Infrastructure, Storm Water Drainage

Water supply is one of the most important municipal functions. Surat has 76% coverage for municipal water supply with its newly added areas. Previously it had more than 90% coverage for Municipal household connection. People have rated the municipal water quantity, quality & pressure as 'Good'. But at certain wards due to increased household connections low water pressure is experienced. People on an average pay water charges mainly in the range of Rs. 200-400/- but 13% of the people having water supply problems are ready to pay extra charges, provided the services are improved. People have rated this sector at no.1.

The coverage of sewer lines in the city is 76% (as per the survey analysis) with the newly areas merged in the Municipal boundaries but prior to this it was more than 85%. The rest of the areas uncovered under the Municipal drain of which 68% households have Septic tank and soak pit arrangement. Rest of them dispose it in the nearest low-lying areas. People have prioritized this sector at no.2.

Surat has door to door collection of solid waste; still 13% of the areas have community bin system. People have rated the door to door system of waste collection as 'Good'. They have prioritized this sector at no.3 for having better coverage, so that the outbreak of diseases can be avoided in slum areas particularly in the monsoon.

The city has storm water drains in 74% of the areas. There are some areas which have been reported to frequent flooding. Such areas although has storm water drains but still the area gets flooded. People have prioritized Storm Water drainage at no. 5.

The city has good road network coverage. Only 16% people in the Municipal limits have reported for unpaved access road. 81% roads have street light facilities but people are still not satisfied on the illumination levels. 5th priority is given for development of Road infrastructure. People prefer to have a strong public transport system for the Surat with wide coverage. 94% people are willing to have BRTS in the city. People have given 4th priority sector for development of Public Transit System.

Every monsoon there is a huge outbreak of malaria in the city. In last monsoon 23% households were affected by malaria. 3% H/H in the city was affected by Chikungunya & another 3% by Typhoid during last monsoon. People have prioritized development of health facilities at no. 7 and thus followed by education which is prioritized at no.8.

Surat displays a wide ranging disparity between the rich and the poor. The condition of urban poor remains a growing concern in the city. Some urpan poor households expressed their concerens beyond the service delivery which were of social welfare, access to finance and health-education needs.

LEVEL 2 - WARD WISE CONSULTATIONS

The ward level consultations are aimed at taking a close look at basic service delivery and urban infrastructure. For the purpose of the consultations, two or three wards with similar characteristics were grouped together. Each ward has unique socio-economic characteristics. The identification of the stakeholders was done in such a way that it represents the predominant characteristics of a particular area. Based on the discussion with the municipal officials, key stakeholders at the ward level were invited for the ward level meetings and it remained open for all the citizens of the ward. As per the predominant characteristics of the area, the representatives of various community groups were invited representing diverse age groups, religious community, migrant population, different income levels, various occupations etc.

After the comments of ward level assessment of basic services and social development, it was followed by a discussion on defining priority areas, action plan and mission statement.

Identification of Stakeholders

Identification of stakeholders who represent of a cross section of social groups, economic classes, and organizations is important for gauging the city needs and priorities. Towards this, the stakeholders have been categorized into three broad groups, viz, civil society, elected representatives and service delivery institutions and private sector institutions /service providers.

Table 3: Identification of Stakeholders

No.	Stakeholders Group	Stakeholders	Focus of Consultation	Consultation Mechanism
1	Civil Society	Community Members: Poor and slum dwellers, Women, Students, Elderly Citizens Representatives of Industries Academic Institutions Trade and Commerce Institutions NGO/CBOs working for Social Development or Environmental Issues Public Health Consultants	Present service delivery levels and quality Priorities for new developments, up gradation and improvement City Vision	Ward wise Consultations Household surveys – 1100 no.s Focused Group Discussion
2	Elected Representatives and Service Delivery Institutions	Elected representatives of ULBs Officials and staff of government departments (state and city level) Public sector providers of urban services	Policy issues Technical information and operational issues Financial details Qualitative and quantitative work City Vision	Ward wise Consultations Focused Group Discussion Workshop
3	Private Sector Institutions and Service Providers	Private sector organizations such as industrialists, service providers	Quality improvement issues in service delivery and measures of improvements City economic and infrastructure needs City Vision	Focused Group Discussion Workshop

FORMAT OF WARD LEVEL CONSULTATION

Part 1 - Public Opinions

The ward level consultations were initiated by introducing the exercise briefly. The first part of the ward level public consultation focuses on getting diverse opinions from people of the ward or group of wards. The co-ordinators of the meeting introduced this endeavour inviting the people to speak about various issues on sectors like water supply, sewerage, storm water drainage, solid waste management, roads and transport, street lights etc. The main thrust here was to 'listen to' wide variety of issues that affects the 'quality of life'. This technique also helped the people to open up leaving behind inhibitions of any sorts.

Part 2 - Building Consensus

Consultation at Katargam

Discussion going on at Bhestan

Corporate participated at Old city

Consultation at Udhana

Urban poor sheared problems at varachha

Citizen gives suggestion

After the first rounds of comments, the co-ordinators briefed the stakeholders about the state of infrastructure in their wards along with on-going and proposed projects in each sector. Based on the brief, second rounds of comments were invited. Along with this, an opinion form is designed in the format of a questionnaire that covers specific sectoral issues, cause of the problems and possible suggested actions. In the opinion form, citizens were also asked to identify and suggest relevant projects for mitigation of the problems in the city as mentioned by them. Based on the major identified issues in specific sectors, two or three working groups were formed.

Part 3 - Working in Groups

The ward level meeting would finally be terminated as 'focused group discussions' to avoid over generalization the group activity form is prepared sector wise. In each sectoral form, there were three sections viz. – Problems, Solutions, and Sustainability of the solution. In the section of problems, citizens were asked to discuss and mention problems, causes and their effects related to the sector. The section of solutions asks for the concrete solutions and targets required achieving the desired results from the suggested solution. The third section of sustainability is meant for making the suggestions more pragmatic as it raises discussions on institutional, financial and political aspects related to the suggested measures.

Table **Error! No text of specified style in document.**-4: Schedules of Ward level Public Consultations

No.	Name Of Consultation Area	Election Wards Covered	Zone Covered	Date of Consultation
1	Athawa- Umra-Piplod	25, 26, 33 (part)	South-West	26/3/2008
2	Adajan and others	14,15, 13 (part)	West Zone	26/3/2008
3	Rander, Jahangirabad	1,13(Part),38(part)	West Zone	27/3/2008
4	Old City Area- Gopipura, Nanpura	22,24, 23(part)	Central Zone	27/3/2008
5	Old City Area-Saiyadpura, Mahidharpura, Salabatpura, Rustampura	10, 16, 11(part), 17, 22 (part)	Central Zone	28/3/2008
6	Katargam, Ved, Dabholi	2,3,11(part),12,16 (part), 38(Part)	North Zone	28/3/2008
7	Ashwanikumar-Hirabaug-Karanj (North)	4,5,6,8,9,18(part), 19(part)	North Zone	29/3/2008
8	Kapodara-Sarthana	7, 8(part), 37	East Zone	29/3/2008
9	Dubhal, Anjana, Karanj (South)	18(part),19(part),20,21,27 (part), 36(Part)	South East Zone	30/3/2008

10	Udhana-Limbayat	27(Part),28,29,30,31(part), 36(Part)	South Zone	30/3/2008
11	Pandesara-Bamroli-Althan	31(part), 32, 33(part), 34, 36(Part)	South zone/ South-West	31/3/2008
12	Piplod vesu, Bamroli, Rundh	35	South / South-West Zone	31/3/2008

Summary of issues discussed at Public Consultations

People are proud of basic service coverage and expanding road infrastructure of the city. The grievance redressal is very effective and quick actions are taken on the complaints registered. There exists an inherent respect and gratitude towards the municipal corporation among people in general. The people presenting their issues never forgot to mention the effectiveness of the municipal services in the beginning. The Table 1.4 below highlights the issues raised in the ward level consultations in various areas of the city.

Table 4: Summary of Issues: Area wise

Area Sector	Old City Area Gopipura, Nanpura, Saiyadpura, Mahidharpura, Salabatpura, Rustampura Election Wards: 10, 11(part), 16(part), 17, 22, 23, 24	Peripheral and Industrial Area Jahangirabad, Dubhal, Anjana, Karanj, Udhana, Limbayat, Pandesara, Bamroli, Althan, Dumas, Abhava, Khajod, Bhimrad Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36	Core City Area Athawa, Umra, Piplod, Adajan, Joganinagar, Katargam, Ved, Dabholi, Ashwanikumar, Hirabaug,Kapodara,Varachha,Sarthana Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36
Transportation	-To procure recycling machine for repairing of old roads-Decentralize RTO-River side drive-way-Local train facility to Hazira railway line -Effective Regulation of hawing and vending activities. -Enforcement of approved parking lots	-Need for fast and reliable mass transport system -Canal road development -Making footpaths walkable -More Foot-ways and Sub-ways on ring road. -Effective regulation of hawing and vending activities -Foot-over bridges for pedestrians. -Widen the bridge-creek at Bamroli -Bridge joining Unn and Dabholi gets submerged during monsoon, so construct a new bridge with more height. -Provide International air-port	-Decentralization of Railway Network -River side drive-way -Making footpaths walkable. -Need for fast and reliable mass transport system -Widen roads. -Enforcement of approved parking lots in residential and commercial buildings -Enforcement of approved parking lots in commercial buildings -Effective regulation of hawing and vending activities
Urban Planning and Zoning	-Gradual shifting of Industries from residential locality -To control on uses zoning and remove dying mill from residential area. -Make necessary changes in FSI	-Residential localities in the industrial areas are affected - Udhna, Pandesara, Limbayat, Bhestan.	-Control on uses zoning and shift Embroidery machines from residential area. -Rapid finalization of T. P. scheme

Area / Sector	Old City Area Gopipura, Nanpura, Saiyadpura, Mahidharpura, Salabatpura, Rustampura Election Wards: 10, 11(part), 16(part), 17, 22, 23, 24	Peripheral and Industrial Area Jahangirabad, Dubhal, Anjana, Karanj, Udhana, Limbayat, Pandesara, Bamroli, Althan, Dumas, Abhava, Khajod, Bhimrad Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36	Core City Area Athawa, Umra, Piplod, Adajan, Joganinagar, Katargam, Ved, Dabholi, Ashwanikumar, Hirabaug,Kapodara,Varachha,Sarthana Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36
Basic Services	-Water Pressure issue need to be resolve. -Expand Storm water drainage networks -Encourage for Water harvesting	-To achieve satisfactory level in water supply. -Install water meter -Expand drainage networks. -To achieve satisfactory level in basic services in Pandesara, Sitanagar areas. -Bring raw water from Ukai directly. -Water logging issue need to be resolve - Rundh, Magdalla and adjoin area of Khadi	-Water Pressure issue need to be resolve. -Expand Storm water drainage networks -Water Quality issue need to be resolve. -Install water meter -To remove old dustbins as the door-to-door garbage collection is working well. -An alternative source for drinking water -Produce electricity from garbage.
Khadi Development Project	-To develop creeks and make gardens there.	-Dumbhal creek- creating retaining walls	-Developed khadi by creating retaining walls,
Housing, Slum Redevelopment and networking	-Development of slum networking projects - Industrial association should be made part of slum networking projects.	-Provide proper place for cow herd owners -Rehabilitated slum on the same site with public-private partnership projects -Development of slum networking projects - Industrial association should be made part of slum networking projects	-Low rental houses for migratory. -Increase pay & use toilet in slum area. -Rehabilitation of settlements in high flood prone area to a nearby site -Development of slum networking projects. - Builders should be made part of slum networking projects
Education	-To take help of NGO's to improve educational quality. -Municipal schools should be upgraded.	-Child labor is practiced more and education is almost nil. -Start Gujarati medium school. -Regulation of commercial activities on the play grounds/ halls of municipal schools. -Child labor is practiced more -Infrastructure in municipal schools should be	-Institution for Industrial worker & health -Infrastructure in municipal schools should be upgraded -Improve educational quality. -Increased SUMAN schools -Provide play grounds. -Adult education classes should be revived.

Area Sector	Old City Area Gopipura, Nanpura, Saiyadpura, Mahidharpura, Salabatpura, Rustampura Election Wards: 10, 11(part), 16(part), 17, 22, 23, 24	Peripheral and Industrial Area Jahangirabad, Dubhal, Anjana, Karanj, Udhana, Limbayat, Pandesara, Bamroli, Althan, Dumas, Abhava, Khajod, Bhimrad Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36	Core City Area Athawa, Umra, Piplod, Adajan, Joganinagar, Katargam, Ved, Dabholi, Ashwanikumar, Hirabaug,Kapodara,Varachha,Sarthana Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36
		upgraded	
Public Health	-To improve condition of Government Health Centre.	-Survey area & Increase pay -use toilet. -Special health centers focusing on industrial workers health in industrial area -Environment is polluted with fly ash. -Unhygienic environment due to sewage waste disposal site -Health center should cover all municipal wards	-High prevalence of mosquito -Provide Maternity homes. -Health center should cover all municipal wards.
The River and its environs	-Dredging and de-silting are at most necessary	-Cleaning and dredging on the upstream of the river	-To undertake dredging and break water projects -Cleaning and dredging on the upstream of the river
Recreation		-To encourage old sports organizations -Provide Garden and Swimming pool -Provide Sport Complex and Swimming pool	-Senior Citizen parks -Play Ground

Area Sector	Old City Area Gopipura, Nanpura, Saiyadpura, Mahidharpura, Salabatpura, Rustampura Election Wards: 10, 11(part), 16(part), 17, 22, 23, 24	Peripheral and Industrial Area Jahangirabad, Dubhal, Anjana, Karanj, Udhana, Limbayat, Pandesara, Bamroli, Althan, Dumas, Abhava, Khajod, Bhimrad Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36	Core City Area Athawa, Umra, Piplod, Adajan, Joganinagar, Katargam, Ved, Dabholi, Ashwanikumar, Hirabaug,Kapodara,Varachha,Sarthana Election Wards: 1,18(part),,20,21,27,28,29,30,31,32,33,34,35,36
Heritage	-Conservation and Adaptive re-use of important heritage buildings -Redevelop Heritage garden and Dutch garden,-Heritage Walk		

ANNEXURE II

Projects Submitted and Sanctioned Under JnNURM in UIG Sub Mission – I (Status till July 2009)

(Rs in Crores)

Sr. No.	Sector	Name of Project	Project Cost Sanctioned by Govt of India	Awarded Cost	Completion month as per DPR	Revised Date of Completion	Share of (GoI)	Share of (ULB)	Share of (GoG)	Total Release	Work completed (Physical)- Nov 2008	Work completed (Physical)- May 2009	Expenditure till Nov 08 end	Expenditure till may 09 end
1	Sewage	Upgradation of Anjana Sewage Treatment Plant	10.98	14.06	May-07	October -07	5.49	2.19	8.04	15.72	100%	100%	15.18	15.72
2	Sewage	Augmentation of Adajan Sewerage System	11.93	13.23	March-08	March-08	5.97	2.38	4.19	12.54	100%	100%	12.54	12.54
3	Sewage	Augmentation of Bhesan Sewage Treatment Plant	15.09	22.18	May-07	March-08	7.55	3.02	16.64	27.21	100%	100%	26.45	27.21
4	Sewage	Secondary Sewage Treatment Plant at Bamroli(100 MLD)	13.22	13.84	May-07	March-08	6.61	2.64	9.32	18.57	100%	100%	17.89	18.57
5	Sewage	Proposed Sewerage system for T.P. Schemes No. 1, 2, 3, 4, 5, 6, 7 and 13 for Vesu of SUDA AREA (Phase-I up to 2019 AD)	34.37	52.96	March-08	June-09	8.58	3.44	30.29	42.31	70%	98%	26.88	41.11
6	Sewage	Proposed Sewerage system for T.P. Schemes No. 8, 9,10,14,15,16 of Pal-Palanpor of SUDA area	21.28	32.3	March-08	June-09	7.98	3.19	17.1	28.27	75%	98%	21.27	28.27
7	Sewage	Sewerage System for New Eastern Zone of SMC	110.65	79.62	January-11	March-11	13.83	5.53	9.5	28.86	2.00%	27%	2.3	28.86

(Rs in Crores)

Sr. No.	Sector	Name of Project	Project Cost Sanctioned by Govt of India	Awarded Cost	Completion month as per DPR	Revised Date of Completion	Share of (GoI)	Share of (ULB)	Share of (GoG)	Total Release	Work completed (Physical)- Nov 2008	Work completed (Physical)- May 2009	Expenditure till Nov 08 end	Expenditure till may 09 end
8	Sewage	Automation/ SCADA of existing sewage pumping stations and sewage treatment plants of SMC.	30.63	26.15	August-09	August-10	3.83	1.54	0.45	5.82	—	3%	Tenders are under sanction.	1.25
9	Sewage	Sewerage System in new Northern Zone area of Surat Municipal Corporation	184.04	138.09	September-10	March-11	23.01	9.21	1.1	33.32	1.60%	13%	3.52	17.99
10	Solid Waste	Upgradation of Solid Waste Management in Surat City	52.5	52.41	June-10	March-10	6.56	2.62	4.26	13.44	15.30%	24%	7.98	14.87
11	Storm water	Storm Water Drainage Scheme in Vesu	49.95	59.43	January-08	December-09	12.48	5	20.14	37.62	20.37%	78%	10.18	37.63
12	Storm water	Storm Water Drainage Scheme of Surat city for SMC area.	133.83	99.98	April-09	May-10	33.45	13.38	11.4	58.23	8.00%	60%	11.91	54.93
13	Storm water	Storm Water System for New Eastern Zone of SMC	34.26	29.8	January-10	January-10	8.56	3.43	5.02	17.01	7.00%	55%	2.78	17.01
14	Transport	Proposed Bridge across River Tapi joining Dabholi and Jahangirpura	65	69.33	March-09	December-09	24.38	9.75	20.14	54.27	47.78%	77%	31.52	53.07
15	Transport	Fly-over bridge near Nana Varachha	7.58	8.9	November-07	February-08	3.79	1.52	3.4	8.71	100%	100%	8.44	8.71
16	Transport	Fly-over bridge on Kapodara fire station junction	9.32	10.13	January-08	December-09	2.33	0.93	2.53	5.79	23.06%	54%	2.48	5.79
17	Transport	Bridge across Kankara Khadi between Udhna Magdalla road and Bamroli	8.41	9.08	March-09	March-09	3.16	1.26	5.35	9.77	75%	100%	6.83	9.02

(Rs in Crores)

Sr. No.	Sector	Name of Project	Project Cost Sanctioned by Govt of India	Awarded Cost	Completion month as per DPR	Revised Date of Completion	Share of (GoI)	Share of (ULB)	Share of (GoG)	Total Release	Work completed (Physical)- Nov 2008	Work completed (Physical)- May 2009	Expenditure till Nov 08 end	Expenditure till may 09 end
18	Transport	Construction of 4 lane Railway over bridge on Sachin Magdala State Highway in SUDA area	20.77	-	August-09	June-10	2.6	1.03	0.7	4.33		NA	0.7	0.7
19	Transport	Construction of Railway over bridge at Gothan - Surat DP Road	14.27	-	August-09	June-10	1.78	0.71	0.09	2.58	—	NA	0.09	0.09
20	Transport	BRTS plan for Surat	469.02	-	March-11	March-11	58.63	23.45	35.18	117.26	—			0
21	Water Supply	Water Supply Distribution systems for T.P. Schemes No. 1 to 7 of Vesu of SUDA area (Phase-I up to 2019 AD)	19.19	15.39	June-09	March-09	9.6	3.84	4.08	17.52	80%	95%	15.38	17.54
22	Water Supply	Water Supply Distribution systems for T.P. Schemes No. 8, 9,10,14,15,16 of Pal-Palanpor of SUDA area (Phase -I up to 2019 AD)	9.95	12.22	June-07	February-09	4.98	1.99	3.87	10.84		100%	13.47	10.84
23	Water Supply	Augmentation of Sarthana, Katargam and Rander water works of SMC.	140.68	146.63	March-09	December-09	52.76	21.09	45.2	119.05	60.66%	78%	85.34	110.27

(Rs in Crores)

Sr. No.	Sector	Name of Project	Project Cost Sanctioned by Govt of India	Awarded Cost	Completion month as per DPR	Revised Date of Completion	Share of (GoI)	Share of (ULB)	Share of (GoG)	Total Release	Work completed (Physical)- Nov 2008	Work completed (Physical)- May 2009	Expenditure till Nov 08 end	Expenditure till may 09 end
24	Water Supply	Water supply scheme for new North Zone of SMC	167.43	78.52	February-11	March-11	20.93	8.37	16.75	46.05		24%	Work awarded -78.52 lac Tender for remaining works in progress.	46.05
25	Water Supply	Water Supply Distribution System for South East Zone areas of SMC	201.09	-	August-11	-	25.14	10.05	-	35.19		NA		0
		Total (Sub-Mission-I)	**1835.44**	**984.25**			**353.98**	**141.56**	**274.74**	**770.28**			**323.13**	**578.04**

ANNEXURE III

Projects Submitted and Sanctioned Under JnNURM- BSUP in Sub Mission – II (Status till September 2009)

(Rs in Crores)

Project Code	project	Location	Estimated Project cost	Outlay	Status
C 713 /5617	Construction of 5572 Housing Units For EWS	Rander, Althan, Udhana, Bhestan, Limbayat, Dumbhal and Nana Varacha (DPR I)	60.29	10	4940 Units Completed by March' 09 and 632 expected to be completed by dec. '09
C 715 /5617	Construction of 5424 Housing Units For urban poor	T.P.S. 54 Bhestan F.P. 1/A & 1/B (DPR II)	58.52	32	1606 completed by March '09 and 3802 units to be completed by Dec. '09
C 729 /5617	Construction of 5280 Housing Units For urban poor	Moje Kosad H-1 (DPR III)	69.91	3.5	Completed
C 731 /5617	Construction of 6768 Housing Units For urban poor	Moje Kosad H-2 & H-3 (DPR IV)	102.73	42	6768 Units expected to be completed by Dec. '10
C 733 /5617	Construction of 7392 Housing Units For urban poor	Moje Kosad H-4 & H-5 (DPR V)	112.22	60	7392 Units expected to be completed by Dec. '10
C 737 /5617	Construction of 4032 Housing Units For urban poor	(DPR VI)	81.42	24	Work At progress
C 739/5617	Construction of 7704 Housing Units For urban poor	(DPR VII)	132.6653	25	Work At progress
C 741/5617	Redevelopment of Slums within city limit	Udhna, Bhimnagar , Vasahat(DPR VII)	30	10	Submitted for Sanctioning
C 761/5617	Redevelopment of Slums within city limit	Kamrunagar, Limbayat T.P. 39, F.P. 41 and R-31 (DPR IX)	25	10	Under Preparation
	Total (Sub Mission II)		**672.7553**	**216.5**	

ANNEXURE IV

The Action plan of SMC for making slum free city:

Sr. No.	Strategy	Action Plan
1	Slum Rehabilitation	• Site & Service Scheme – More than 12500 huts are shifted • Relocation – 7 projects for construction of 42156 houses are sanctioned by govt. The work for 39497 units are under taken • One more project of 3000 houses for urban poor is under preparation
2	Slum Redevelopment	• 2 projects for in-situ development of 1916 houses are sanctioned by GoI. • To encourage private builders for development of slums on private land one project for construction of 1500 houses is sanctioned by SMC. Additional incentive in form of FSI and relaxation in DCR offered.
3	Slum Up gradation	• Improvement in physical infrastructures network is undertaken.
4	Others	• New satellite town ships in extended areas under PPP will be encouraged to prevent more slums

Source: SMC

The detailed tentative action plans of SMC are as follows:

TENTATIVE ACTION PLAN TOWARDS MAKING THE CITY SLUM FREE									
Sr. No.	Details	Year wise Expenditure (Rs. In Lacs)							
		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	Total
[A]	Slum Up gradation								
-1	About **118 slums** consisting about **30000 households** of Limbayat, Bhestan, Varacha, Katargam area will be provided with basic infrastructure facilities like individual w/s, drainage connection, road, streetlight etc. @ cost of Rs. 8,000/- per house hold.	0	0	0	500	500	600	600	2200
-2	Pay to Use Toilets 30 Pay & Use Toilets are required Estimated Amount 6.60 Lacs/Toilet	0	0	0	60	60	60	20	200

-3	Nursery School (Anganwadi)	0	0	0	25	20	20	10	75
	Area - 40.00 sq. tm.								
	Estimated amount 2.50 lacs/No.								
Total		**0**	**0**	**0**	**585**	**580**	**680**	**630**	**2475**
[B]	**Slum Rehabilitation**								
-1	About **134 slum** consisting about **42175 households** situated at seven different zones are identified for the scheme The hutments will be shifted to well-designed and well-built houses with all infrastructure facilities as per priorities decided by Competent	962.87	8676.5	16106.2	21650	15000	5475	0	67870.52
	Estimated cost - Rs. 1.50 Lac / unit								
	Infrastructure - Rs. 11,000 / unit								
	Area - 20.69 to 25.64 sq.mt / unit								
-2	**Primary School**								
	No. of schools -10	-	-						
	Area - 15,000 sq. ft/school								
	Estimated Amount - 50.00 lacs / school			0	250	150	50	50	500
-3	UCD Center								
	No. of UCD Center - 10	-	-	0	40	24	8	8	80
	Estimated Amount - 8.00 lace/unit								
-4	Community Hall								
	No. of Community Hall - 6	-	-	-	100	100	50	50	300
	Area - 15,000 sq.ft .								
	Estimated Amount - 50.00 lacs/Hall								
-5	Work Places for the lively hoed program 2No. 5								
	Estimated Amount - 8.00 lacs/unit	-	-	0	16	8	8	8	40
-6	Anganwadi								
	No of Anganwadi - 15	-	-	0	15	5	5	5	30
	Estimated Amount - 2.0 / unit								
Total		**962.87**	**8676.5**	**16106.2**	**22071**	**15287**	**5596**	**121**	**68820.52**

[C] Slum Redevelopment									
				0	10000	26500	26500	26500	89500
	Area of unit - 25.50 sq.mt.								
	Estimated cost - Rs.1.75 lac /unit								
	Infrastructure - Rs. 11,000 / unit								
	Total			0	10000	26500	26500	26500	89500
	Total (A+B+C)	**962.87**	**8676.5**	**16106.2**	**32656**	**42367**	**32776**	**27251**	**160795.52**

Source: SMC

ANNEXURE V

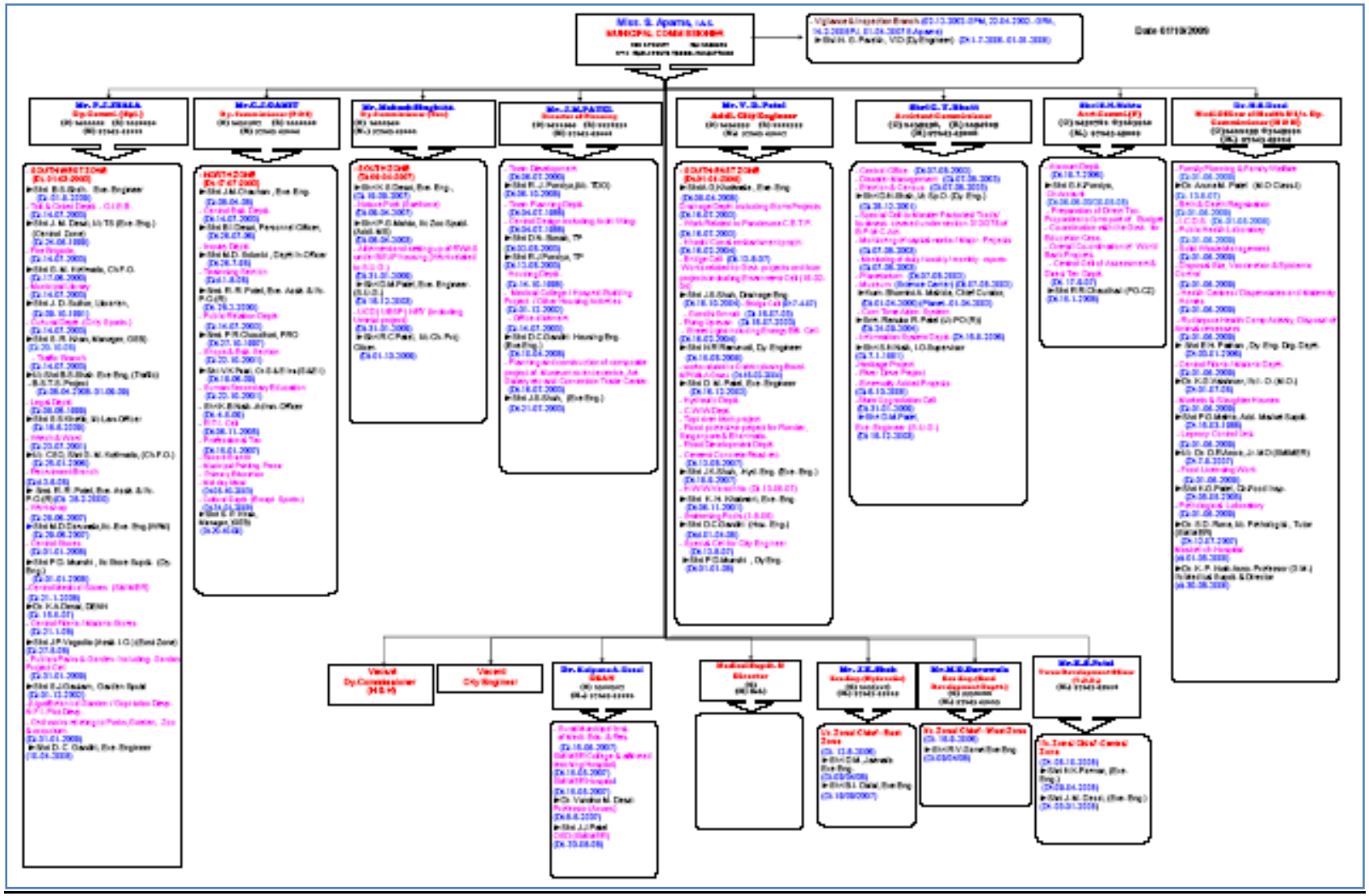
Table 1: Details out the Initiatives taken for HR management and performance management under taken in the past two financial years

Initiative	Date	Details	Achievements				
			Class-I	Class-II	Class-III	Class-IV	Total
In-house Training	2005-2006	(Soft Skill Training) Self Awareness, Attitudinal Change, Effective Leadership, Communication Skills, Time Management, Personal SWOT Analysis, etc.	105	92	629	40	866
		Role of Ideal Doctor, Doctor-Patient Relationship	00	32	00	00	32
		Health & Hygiene,Common disease and simple way to prevent them.	24	173	00	00	197
	2006-2007	The Art of Positive Thinking	00	79	00	00	79
		Shri Shir Yoga Course	00	25	25	00	50
		Orientation Programme	00	52	30	00	82
		Governance	00	00	3965	00	3965
	2007-08	Confrontation Meeting	153	00	00	00	153
		Right to Information Act-2005	20	35	00	00	55
		Total	302	488	4649	40	5479
Nominations for Seminars/ Workshops/ Trainings, etc.							
Nominations for Seminar / Workshop & various training on National & International	2005-06	55th ISI Conference, Sydney	01	-	-	-	01
	2005-06	Soil Investigation & improvement Techniques in Road Construction – Hydrabad	-	02	-	-	02
	2005-06	Future Energy Mix and Issues in inter Connection with Grid – Surat.	-	03	-	-	03
	2005-06	Urban Drainage Management state of the Art Course – Mumbai	-	03	-	-	03
	2005-06	Problems & resolution of Migrated tribal labours	-	01	-	-	01
	2005-06	Annual Safety conference and safety Exhibition – Surat	-	01	-	-	01
	2005-06	Capacity Building Programme on Private Sector Participation in Infrastructure projects in principals & practices, Ahmedabad.	01	01	-	-	02
	2005-06	CDM Capacity Building workshop for municipalities and urban local bodies – Mumbai	01	01	-	-	02
	2005-06	9th Annual International Conference and on GIS Technology & Application – New Delhi	-	01	01	-	02

Initiative	Date	Details	Achievements				
	2005-06	Short term training course on Anaerobic Industrial Waste – water Treatment at ITFAC centre, Surat.	-	02	01	-	03
	2005-06	Commonwealth Local Government Good practice Scheme partnership Project with Wasa Amensi District Assembly, Ghana	03	-	-	-	03
	2006-07	Microsoft Windows 2000 Server & Microsoft SQL Server 2000-Surat.	00	13	05	00	18
	2006-07	G.C.S.R. Rules-Surat	00	03	41	00	44
	2006-07	International conference on Role of Socio. Economic & Spatial planning in national Development, New Delhi.	-	02	-	-	02
	2006-07	Capacity Building Advance Programme in Private Sector Participation in Infrastructure Project, Ahmedabad.	-	03	-	-	03
	2006-07	JnNURM Training Workshop New Delhi.	02	03	-	-	05
	2006-07	Domestic Waste Water Treatment Technique Japan.	01	-	-	-	01
	2006-07	Advance Course on Private Sector Participation in infrastructure projects, Ahmedabad	-	01	-	-	01
	2006-07	5th Annual International Conference on Urban Health – Netherlands	01	-	-	-	01
	2006-07	Energy Recovery from Industrial Wastes & Effluents – Ahmedabad	-	02	-	-	02
	2006-07	Evaluation of Cable – Vadodara	-	-	02	-	02
	2006-07	Disaster Mitigation Strategy for River flood A case study – Surat.	-	01	-	-	01
	2006-07	Man & Time Management – Ahmedabad	-	02	-	-	02
	2006-07	Contract Management & Dispute Resolution – Ahmedabad	-	02	-	-	02
	2006-07	Mapping Urban Deprivation and inclusion of poor in urban Governance for Local Development, Pune.	02	01	-	-	03
	2006-07	Workshop on Detailed Project Report (DPR) Preparation followed by sector Specific Technical session	03	02	-	-	05
	2007-08	Public Private Partnership in Infrastructure projects its principals & Practice-Ahmedabad	00	03	00	00	03
	2007-08	Emergency Operation Centre EOC-Ahmedabad	01	01	00	00	02
	2007-08	Urban Flood Management-Ahmedabad	01	02	00	00	03
	2007-08	Man & Time Management-Ahmedabad	00	08	00	00	08
	2007-08	Fiscal Decentralization and Local	00	02	00	00	02

Initiative	Date	Details	Achievements				
		Governance in India-New Delhi					
	2007-08	Private Sector Infrastructure Projects-Ahmedabad	00	02	00	00	02
	2007-08	"C" Programming & JAVA - Surat	00	02	00	00	02
	2007-08	Improvement of Work Environment-Ahmedabad	00	03	00	00	03
	2007-08	Basics of Disaster Management-Ahmedabad	00	02	00	00	02
	2007-08	Water Supply Management-Nasik	00	01	00	00	01
	2007-08	Benchmarking & Water Utilities-Chennai	00	01	00	00	01
	2007-08	Urban Earthquake Vulneradibility Reduction programme-Ahmedabad	00	04	00	00	04
	2007-08	Emergency Medical Response-Ahmedabad	02	03	00	00	05
	2007-08	Accounts & Audits-CPA-18-Ahmedabad	00	02	00	00	02
	2007-08	CCC+ -Surat	02	03	00	00	05
	2007-08	Right to Information Act.2005-Surat	00	00	25	00	25
	2007-08	Disaster Preparedness and Management- Daman	00	04	00	00	04
	2007-08	Planning for Cities-Surat	00	02	00	00	02
	2007-08	Disaster Management in Major Building Collapse- Ahmedabad	00	02	00	00	02
	2007-08	Trainers on Cyclone Risk Mitigation and Management	00	00	03	00	03
		Total	21	97	78	00	196

ANNEXURE VI



ANNEXURE VII

City Bus Service Route Details

S. No.	Route No.	Route Details			Route Length (km)
		Start point	End point	Via	
Route 1	115	Railway Station	Jahangirpura	Chowk, Palanpur Patia	11.00
Route 2	122	Railway Station	University (Icchanath)	Udhana Darwaja	9.40
Route 3	123	Railway Station	University	Makai Pul, Athwa Gate	11.50
Route 4	523	Udhana Station	University	CNG Junction	8.60
Route 5	131	Railway Station	Pandesara Housing	Sahara Darwaja, Udhana	7.40
Route 6	125	Railway Station	Rundhnaka	Athwa Gate, Piplod	11.90
Route 7	142	Railway Station	Sarthana Naka (Kosmadi Patia)	Baroda Prestige, Nana Varacha	8.80
Route 8	500	Railway Station	Railway Station	Kartargam, Amroli	7.40
Route 9	113	Railway Station	Palanpur Patia	Makai Pul	7.70
Route 10	414	Railway Station	Palanpur Jakatnaka	Athwa Gate Junction	10.20
Route 11	112	Railway Station	Pal Naka	Udhana Darwaja	8.70
Route 12	121	Railway Station	Parle Point	Wadi Falia, Navsari Bazar	8.10
Route 13	135	Railway Station	Godadra	Sanjay Nagar	7.00
Route 14	134	Railway Station	Didoli Gam	Udhana Railway Station	9.50
Route 15	200	Railway Station	Railway Station	Makai Pul, Chowk, Delhi Gate	
Route 16	318	Railway Station	Rander Gam	Lal Gate, Palanpur Patia	9.10
Route 17	313	Railway Station	Palanpur Gam	Chowk, Palanpur Patia	6.20
Route 18	133	Railway Station	Sachin GIDC	Udhana Gam, Unn	15.50
Route 19	127/2	Railway Station	Bharthana	Wadi Falia	9.60
Route 20	657	Kashkiwad	Dabholi	Ved Darwaja	5.70
Route 21	153	Railway Station	Ved	Laxmi Narayan Nagar	7.80
Route 22	144	Railway Station	Puna Gam	Parbat Patia, Puna Patia	5.00
Route 23	144/1	Railway Station	Puna Gam	Lambe Hanuman Road	5.00
Route 24	426	Amroli	MTB College	Chowk	9.70
Route 25	128/1	Railway Station	Dumas Lungar	Chowk	21.00
Route 26	113/2	Railway Station	Bhesan Gam	Adajan Patia	12.20

S. No.	Route No.	Route Details			Route Length (km)
		Start point	End point	Via	
Route 27	353	Chowk	Ved	Muglisara	6.70
Route 28	428	Jahangir Pura	Dumas	Chowk	23.80
Route 29	156	Railway Station	Kosad	Sumul Dairy Road	8.70
Route 30	143	Railway Station	Mota Varacha	Varacha Road	10.90
Route 31	158	Railway Station	Chaparabhata Variyav	Sumul Dairy Road	6.90
Route 32	157	Railway Station	Uttran Power House	Ashwini Kumar Road	7.30
Route 33	500/1	Railway Station	Ashwini Kumar		2.90
Route 34	115	Adajan Patia	Jahangirpura		5.30
Route 35	127	Railway Station	Sarthana	Ring Road	9.80
Route 36	826	Kartargam	MTB College/ Chowpati		6.60
Route 37	402	Sarthana Naka	Ambaji		
Route 38	428	Navyug	Rundhnaka	Icchanath, Rundnaka	10.30
Route 39	428/1	Rander	Dumas	Athawa Gate, Makkai Pul	22.30
Route 40	333	Chowk	Sachin GIDC	Udhana	16.20
Route 41	733	Railway Station	Sachin GIDC	Wadi Falia	16.20

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ANNEXURE VIII

List of projects for water sector

Sr. No.	Project name	Project code	Project under JnNURM (YES/NO)	Specification	Unit	Project cost (Rs. Lakh)	Likely Year of completion
1	Construction of intake well, pump house, approach bridge and pipeline work at Katargam and Sarthana.	DPR 1	Yes	360	MLD	1050.40	2012-13
2	Construction of intake well, pump house, approach bridge and pipeline work at Katargam and Sarthana.	DPR 1	Yes	263	MLD	840.32	2012-13
3	Construction of WTP at Sarthana, Katargam and Rander HW.	DPR 1	YES	50	MLD	807.91	2012-13
4	Construction of booster house at Sarthana and Katargam HW.	DPR 1	YES			13.37	2010-11
5	Construction of booster house at Sarthana and Katargam HW.	DPR 1	YES			44.51	2011-12
6	Construction of Mechanical and Electrical works at intake wells and booster houses.	DPR 1	YES			85.89	2011-12
7	Construction of Mechanical and Electrical works at intake wells and booster houses.	DPR 1	YES			85.42	2011-12
8	Construction of Mechanical and Electrical works at intake wells and booster houses.	DPR 1	YES			38.82	2013-14
9	Supplying, lowering, laying and jointing of Transmission lines.	DPR 1	YES			6407.43	2013-14
10	Providing, Supplying, Conveying, Lowering & Laying of 1626 mm dia. / 1524 mm dia. M.S.Pipe and 750 mm dia. D.I.Pipe for Transmission line from Sarthana Water Works to Varachha Water Works & Varachha Road to Mahavirnagar Bridge	DPR 1	YES			78.56	2010-11
11	Providing, Supplying, Conveying, Lowering & Laying of 1626 mm dia. / 1524 mm dia. M.S.Pipe and 750 mm dia. D.I.Pipe for Transmission line from Sarthana Water Works to Varachha Water Works & Varachha Road to Mahavirnagar Bridge	DPR 1	YES			35.69	2010-11

12	Providing, Supplying, Conveying, Lowering & Laying of 1524 mm dia. M.S.Pipe for transmission line near Mahavirnagar Bridge to Umarwada Water Distribution Station	DPR 1	YES			49.06	2010-11
13	Providing, Supplying, Conveying, Lowering & Laying of 1524 mm dia. M.S.Pipe for transmission line near Mahavirnagar Bridge to Umarwada Water Distribution Station	DPR 1	YES			38.94	2013-14
14	Transmission main at Anjana	DPR 1	YES			2.48	2010-11
15	Transmission main from Katargam WW to Ved WDS & Interconnection pipe between old & new booster house	DPR 1	YES			98.03	2010-11
16	Transmission main from Katargam WW to Ved WDS & Interconnection pipe between old & new booster house	DPR 1	YES			30.00	2011-12
17	Providing, Supplying, Conveying, Lowering & Laying of 1167 mm dia. M.S.Transmission line from Khatodra Water Distribution Station to Pandesara Water Distribution Station in Udhana, Surat.	DPR 1	YES			36.17	2011-12
18	Providing, Supplying, Conveying, Lowering & Laying of 1524 mm dia. M.S.Transmission line from Rander Intake well to Rander Water Works	DPR 1	YES			13.60	2010-11
19	Providing, Supplying, Conveying, Lowering & Laying of 1524 mm dia. M.S.Transmission line from Rander Intake well to Rander Water Works	DPR 1				25.17	2010-11
20	Providing, Supplying, Conveying, Lowering & Laying of 1524 mm dia. M.S.Transmission line from Rander Intake well to Rander Water Works	DPR 1				18.99	2011-12
21	Providing, Supplying, Conveying, Lowering & Laying of 1422 mm dia. M.S.Pipe for transmission line from Rander Water Works to Joganinagar Distribution Station	DPR 1				13.40	2010-11
22	Providing, Supplying, Conveying, Lowering & Laying of 1422 mm dia. M.S.Pipe for transmission line from Rander Water Works to Joganinagar Distribution Station	DPR 1	YES			26.93	2010-11
23	Providing, Supplying, Conveying, Lowering & Laying	DPR 1	YES			27.58	2011-12

	of 1422 mm dia. M.S.Pipe for transmission line from Rander Water Works to Joganinagar Distribution Station						
24	Providing, Supplying, Conveying, Lowering & Laying of 1016 mm dia. M.S.Transmission line from Athwa gate to Athwa Water Distribution Station, Surat.	DPR 1	YES			53.85	2010-11
25	Providing, Supplying, Conveying, Lowering & Laying of 1016 mm dia. M.S.Transmission line from Athwa gate to Athwa Water Distribution Station, Surat.	DPR 1	YES			14.02	2011-12
26	Procurement of Pipelines & Valves	DPR 1	YES			54.10	2013-14
27	Civil works	DPR 2	YES			1107.99	2013-14
28	Civil works	DPR 2	YES			21.05	2013-14
29	Construction of WTP	DPR 2	YES			563.04	2013-14
30	Construction of WTP	DPR 2	YES			1536.98	2013-14
31	Construction of UGSR & ESR at WDS. (UGSR)	DPR 2	YES			279.05	2013-14
32	Construction of UGSR & ESR at WDS. (UGSR)	DPR 2	YES			366.06	2013-14
33	Construction of UGSR & ESR at WDS. (UGSR)	DPR 2	YES			212.30	2013-14
34	Construction of UGSR & ESR at WDS. (UGSR)	DPR 2	YES			233.92	2013-14
35	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			816.96	2013-14
36	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			185.01	2013-14
37	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			227.69	2013-14
38	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			227.31	2013-14
39	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			227.31	2013-14
40	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			1037.47	2013-14
41	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			136.55	2013-14
42	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			136.55	2013-14
43	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			585.08	2013-14
44	Construction of UGSR & ESR at WDS. (ESR)	DPR 2	YES			611.52	2013-14
45	Mechanical and Electrical works at intake wells and booster houses.	DPR 2	YES			209.89	2013-14
46	Mechanical and Electrical works at intake wells and booster houses.	DPR 2	YES			423.90	2013-14
47	Mechanical and Electrical works at intake wells and booster houses.	DPR 2	YES			146.46	2013-14
48	Mechanical and Electrical works at intake wells and booster houses.	DPR 2	YES			192.47	2013-14

49	Mechanical and Electrical works at intake wells and booster houses.	DPR 2	YES			413.60	2013-14
50	All MS Trunk mains & Transmission Pipelines & Valves etc.	DPR 2	YES			2259.43	2013-14
51	Procurement of Pipelines & Valves	DPR 2	YES			45.61	2013-14
52	Procurement of Pipelines & Valves	DPR 2	YES			0.31	2013-14
53	Procurement of Pipelines & Valves	DPR 2	YES			11.15	2013-14
54	Outer guniting of all MS pipes	DPR 2	YES			73.36	2013-14
55	Outer guniting of all MS pipes	DPR 2	YES			43.52	2013-14
56	Inner CM lining work of MS pipeline	DPR 2	YES			33.03	2013-14
57	Rising Mains from all WDS to ESR & Dist. Network of all WDS - DI Pipelines	DPR 2	YES			1567.36	2011-12
58	Rising Mains from all WDS to ESR & Dist. Network of all WDS - DI Pipelines	DPR 2	YES			173.72	2010-11
59	Labour work for laying of Rising Mains	DPR 2	YES			20.12	2013-14
60	Labour work for laying of Rising Mains	DPR 2	YES			17.22	2013-14
61	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			22.62	2013-14
62	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			32.81	2013-14
63	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			33.18	2013-14
64	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			35.02	2013-14
65	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			17.76	2013-14
66	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			14.18	2013-14
67	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			16.29	2013-14
68	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			17.69	2013-14
69	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			29.91	2013-14
70	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			19.36	2013-14

71	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			28.96	2013-14
72	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			28.62	2013-14
73	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			22.24	2013-14
74	Labour work for laying of Distribution network inc. valves, specials etc.	DPR 2	YES			27.84	2013-14
75	Crossing of Railway, canal & khadi etc.	DPR 2	YES			131.90	2013-14
76	Misce. Works like compound wall etc.	DPR 2	YES			361.28	2013-14
77	Water meters	DPR 2	YES			659.80	2013-14
78	Construction of intake well, pump house, approach bridge	DPR 3	YES			1296.40	2013-14
79	Construction of intake well, pump house, approach bridge	DPR 3	YES			27.23	2013-14
80	Construction of WTP	DPR 3	YES			1679.18	2013-14
81	Construction of UGSR & ESR at WDS.	DPR 3	YES			419.93	2013-14
82	Construction of UGSR & ESR at WDS.	DPR 3	YES			222.48	2013-14
83	Construction of UGSR & ESR at WDS.	DPR 3	YES			251.67	2013-14
84	Construction of UGSR & ESR at WDS.	DPR 3	YES			235.38	2013-14
85	Construction of UGSR & ESR at WDS.	DPR 3	YES			707.91	2013-14
86	Construction of UGSR & ESR at WDS.	DPR 3	YES			389.68	2013-14
87	Construction of UGSR & ESR at WDS.	DPR 3	YES			630.15	2013-14
88	Construction of UGSR & ESR at WDS.	DPR 3	YES			407.44	2013-14
89	Mechanical and Electrical works at intake wells and booster houses.	DPR 3	YES			436.97	2013-14
90	Mechanical and Electrical works at intake wells and booster houses.	DPR 3	YES			386.43	2013-14
91	Mechanical and Electrical works at intake wells and booster houses.	DPR 3	YES			175.52	2013-14
92	Mechanical and Electrical works at intake wells and booster houses.	DPR 3	YES			210.21	2013-14
93	Mechanical and Electrical works at intake wells and booster houses.	DPR 3	YES			178.96	2013-14
94	Raw Water Trunk Main from Intake well to WTP at Dindoli(TP -62)	DPR 3	YES			4881.17	2013-14

95	Treated Water Transmission main from WTP at Dindoli to WDS-SE2 , WDS-SE3 & WDS-SE4	DPR 3	YES			2256.37	2013-14
96	Rising Mains from all WDS to ESRs	DPR 3	YES			341.37	2013-14
97	Rising Mains from all WDS to ESRs	DPR 3	YES			365.84	2013-14
98	Rising Mains from all WDS to ESRs	DPR 3	YES			255.73	2013-14
99	Rising Mains from all WDS to ESRs	DPR 3	YES			123.75	2013-14
100	Distribution network etc.	DPR 3	YES			3427.44	2013-14
101	Crossing of Railway, canal & khadi etc.	DPR 3	YES			553.44	2013-14
102	Surge Control Device & chamber	DPR 3	YES			22.77	2013-14
103	Water meters	DPR 3	YES			225.63	2013-14
104	Interconnection of New (under construction) UGSR with existing UGSRs by MS pipeline & valves at Head Water Works, Varachha.	Other	NO			75.00	2010-11
105	Construction of 110 Lakh liter capacities UGSR with Booster House at Proposed Ved Water Distribution Station.	Other	NO			314.01	2011-12
106	Construction of 112.5 Lakh liter capacities UGSR with booster house at Head Water Works.	Other	NO			33.81	2011-12
107	Refurbishment & restructuring of inefficient pumping machinery in the entire water supply system. As amy be indicated by Energy Auditor.	Other	NO			400.00	2010-11
108	Conversion of outdoor HT Panel to Indoor type VCB panel along with HT cable and equip. at Udhna WDS.	Other	NO			35.00	2010-11
109	Centralized chlorine storage building are underway for the two water works, works of various safety related equipments like scrubber, leak detectors, automatic change over valves, sirens, pipes will be installed.	Other	NO			44.50	2013-14
110	SITC Of Microbiological Safety Cabinet and supply of Residual Aluminum Analyzer.	Other	NO			50.00	2011-12
111	Construction of Electric Sub-station building with switchyard at Sarthana Water Works	Other	NO			40.00	2010-11
112	Supply Erection Testing & Commissioning of VT Pump sets & Elect. Equipments at Head Water Works - Booster	Other	NO			17.65	2011-12
113	Conversion of outdoor HT Panel to Indoor type VCB	Other	NO			35.00	2010-11

	panel along with HE Cable and Allied equip. at Sarthana Water Works.						
114	Construction of Electric Sub-station building with switchyard at Katargam Water Works	Other	NO			40.00	2010-11
115	Construction of centralized Chlorination Plant (Shed) at Katargam Water Works	Other	NO			40.00	2011-12
116	Conversion of conventional Star-Delta Starter to Soft Starter in LT Panel of Intake Well at KWW.	Other	NO			35.00	2010-11
117	Prov. & Laying 1016 mm dia. MS transmission pipeline from Althan to Vesu WDS	Other	NO			390.00	2011-12
118	Providing & Laying 813 mm MS pipeline from Patel Pragati Mandal, Honey Park Road to Pal WDS via LPSavani School.	Other	NO			256.00	2011-12
119	Construction of 112 lac liters capacity UGSR for central zone	Other	NO			400.00	2011-12
120	Water Supply for Puna-Simada-Sarthana area	Other	NO			250.00	2012-13
Total						**48355**	

ANNEXURE IX

List of projects for Sewerage and Sanitation

Sr. No.	Project name	Project code	Project under JnNURM (YES/NO)	Project area	Specification	Unit	Project cost (Rs. Lakh)	Likely Year of completion
1	Drainage Pipeline	C-381	NO	Athwa	1.68	Km	43.98	2013-14
2	Drainage Pipeline	C-381	NO	Athwa	6.1	Km	242.00	2013-14
3	Drainage Pipeline	C-381	NO	Surat Navsari Road & Juni Khatodara GIDC	4.8	Km	150.38	2013-14
4	Drainage Pipeline	C-381	NO	Kadarsani Nal	1	Km	25.00	2013-14
5	Drainage Pipeline	C-381	NO	Pal	1.5	Km	175.00	2013-14
6	Equipments	C-389	NO	Umra South	19	MLD	150.00	2013-14
7	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	10.25	Km	442.31	2013-14
8	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	22.25	Km	395.63	2013-14
9	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	34.5	Km	822.70	2013-14
10	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	19	Km	449.04	2013-14
11	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	11	Km	1339.45	2013-14
12	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	9	MLD	551.03	2013-14
13	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	32	MLD	253.26	2013-14
14	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	53	MLD	523.34	2013-14
15	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	9	MLD	125.00	2013-14
16	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	30	MLD	74.17	2013-14
17	Drainage System for New East Area (Puna,	C-749	YES	New Eastern Zone	53	MLD	400.00	2013-14

	Simada)							
18	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	9	MLD	201.35	2013-14
19	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	32	MLD	250.00	2013-14
20	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	53	MLD	127.76	2013-14
21	Drainage System for New East Area (Puna, Simada)	C-749	YES	New Eastern Zone	66	MLD	1601.63	2013-14
22	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	22.8	Km	334.85	2013-14
23	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	33	Km	693.74	2013-14
24	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	11.5	Km	300.72	2013-14
25	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	32.3	Km	1157.48	2013-14
26	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	39.25	Km	634.26	2013-14
27	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	10.71	Km	277.67	2013-14
28	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	16.6	Km	438.61	2013-14
29	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	24.9	Km	578.04	2013-14
30	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	0.76	Km	9.91	2009-10
31	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	0.53	Km	18.28	2009-10
32	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	0.42	Km	22.1	2009-10
33	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	5.02	Km	152.88	2009-10
34	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	5.02	Km	132.37	2009-10
35	Sewerage System in new Northern Zone	C-751	YES	New Northern Zone	1.56	Km	58.9	2009-10

	area of Surat Municipal Corporation Phase 1							
36	Sewerage System in new Northern Zone area of Surat Municipal Corporation Phase 2	C-751	YES	New Northern Zone		Km	34.24	2009-10
37	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	1.21	Km	42.68	2009-10
38	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	1.17	Km	19.27	2009-10
39	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone		Km	27.01	2009-10
40	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	0.45	Km	23.45	2009-10
41	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	10.5	Km	1949.87	2013-14
42	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	28	MLD	276.32	2013-14
43	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	37	MLD	259.49	2013-14
44	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	57	MLD	349.50	2013-14
45	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	83	MLD	282.83	2013-14
46	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	37	MLD	334.80	2013-14
47	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	49	MLD	348.90	2013-14
48	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	11	MLD	66.36	2013-14
49	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	28	MLD	109.40	2013-14
50	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	37	MLD	95.50	2013-14
51	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	57	MLD	147.55	2013-14
52	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	83	MLD	229.47	2013-14
53	Sewerage System in new Northern Zone	C-751	YES	New Northern Zone	37	MLD	128.69	2013-14

	area of Surat Municipal Corporation							
54	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	49	MLD	159.69	2013-14
55	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	11	MLD	18.16	2013-14
56	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	28	MLD	23.95	2013-14
57	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	37	MLD	23.48	2013-14
58	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	57	MLD	46.02	2013-14
59	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	83	MLD	113.69	2013-14
60	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	37	MLD	41.32	2013-14
61	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	49	MLD	60.72	2013-14
62	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	84	MLD	4234.89	2013-14
63	Sewerage System in new Northern Zone area of Surat Municipal Corporation	C-751	YES	New Northern Zone	NA	NA	1341.12	2013-14
64	SCADA System	C-753	YES	Surat City	34	Nos	2700.46	2013-14
65	Augmentation of Drainage system for Old city area (112.28 Sq.km) ph 1	C-763 (a)	YES	Old City surat	37	Sq Km	22500.00	2013-14
66	Providing drainage facilities in New south west area (dummas, Sultanabad, Magdall etc)	C-765	YES	New South West area	25	NA	20000.00	2013-14
67	Providing drainage facilities in New south area (Uun, Bamroli, Gabheni, etc)	C-767	YES	New South area	15	NA	6700.00	2013-14
68	Providing drainage facilities in New south East area (Parvat, Goladara, Dindoli, etc)	C-769	YES	New South East area	9.18	NA	4500.00	2013-14
TOTAL (Rs. Lakh)							80342	

ANNEXURE X

List of projects for Roads bridges and urban transport

Sector	Sr. No.	Project name	Project code	Project under JnNURM (YES/NO)	Project area	Specification	Unit	Project cost (Rs. Lakh)	Likely Year of completion
Transport	1	Cable Stayed Bridge from athwa to adajan	C-163	NO	Athwa, Adajan	700	Mt	8887.86	2011-12
Transport	2	Bridje joining Kapodara and Uran	C-163	NO	Kapodara, Uran	700	Mt	7217.00	2011-12
Transport	3	Bridge joiningPalia Kotar no.9 & Jilani Complex-rander road	C-163	NO	Palia Kotar no.9, rander road	1000	Mt	7000.00	2011-12
Transport	4	Bridge across creek in Varachha area	C-165	NO	Varachha	97	Mt	50.00	2009-10
Transport	5	Bridge across creek in Nana Varachha area	C-165	NO	Nana Varachha	90	Mt	150.00	2011-12
Transport	6	Bridge Across Khadi	C-165	NO	Dantora Jakatnaka	84	Mt	126.27	2011-12
Transport	7	Bridge Across Khadi in Pandesara	C-165	NO	Pandesara	119	Mt	265.64	2011-12
Transport	8	Bridge Across Khadi in Pandesara GIDC	C-165	NO	Pandesara GIDC	125	Mt	151.00	2011-12
Transport	9	Bridge across khadi near swaminarayan temple	C-165	NO	Varachha	NA	Mt	200.00	2011-12
Transport	10	Construction of Bridge on Creek nr Unn Ghabeni	C-165	NO	Unn Gabheni	110	Mt	100.00	2011-12
Transport	11	Bridge on Various Creeks	C-165	NO	Amroil, Kosad, chhaparabhata	110	Mt	210.00	2011-12
Transport	12	Bridge Across Creek in Dindoli area	C-165	NO	Dindoli	NA	Mt	200.00	2011-12
Transport	13	Construction of FOB at delhi gate	C-165	NO	Delhi Gate	1580	Mt	480.00	2011-12
Transport	14	Construction of ROB at anjana joingin Dumbhal and Anjana area	C-165	NO	Anjana Railway	1020	Mt	5500.00	2012-13
Transport	15	Construction of FOB near parle point	C-165	NO	Dumas Road	1042	Mt	5900.00	2011-12
Transport	16	Construction of ROB surat Bhusaval Line	C-165	NO	Dindoli /	850	Mt	2300.00	2011-12

		near Dindoli / Limbayat			Limbayat				
Transport	17	Construction of slab @ rly cult	C-165	NO	Sahara Darwaja, Lambe Hanuman Road, Suryapur road	11.4	Mt	650.00	2011-12
Transport	18	construction of FOB at Gujarat Circe	C-165	NO	Hazira road	1250	Mt	4350.00	2011-12
Transport	19	construction of FOB at Fire station	C-165	NO	Kapodara	505	Mt	1073.40	2011-12
Transport	20	construction of bridge across river tapi near existing bridge at amroli	C-583	NO	Amroli	904	Mt	2405.32	2011-12
Transport	21	Bridge across river tapi joining Dabholi and Jahangirpura	C-707	YES	Dbholi, Janhagirpura	1573	Mt	6933.08	2011-12
Road Development Department	22	Resurfacing the existing roads by "ACC MARG" Tech.	C-167	NO	Surat City	160000	Sq.m.	156.00	2010-11
Road Development Department	23	Integrated Road Development Project	C-171	NO	A)Vikas Path, B)Kranti Path, C) Ahinsa Path, D)Pavan Path.	387900	Sq.m.	3711.64	2011-12
Road Development Department	24	Pack III C.C. Rd. a) Udhna Magdalla Road (L- 4.5 Km) b) Adajan Road from Dhabkar circle to Hazira Octroi post (L - 2.5 Km) Package IV C.C. Rd. a) Varacha Rd from Kapodara FOB to Sarthana oct post (L-3.2 km) b) Rander road from Ramnagar to Saroli octroi post (L-3.5 km)	C-178	NO	Udhna Magdalla Road , Adajan Road , Varacha Rd, Rander road	374400	mt	7331.40	2011-12
Road Development Department	25	PacK: V C.C. Road a)Sita chowkdi to Kadodara b) Ved Darwaja to Paliya Ground c)Midel Ring Road 45 M.	C-178	NO	Sita chowkdi , Ved Darwaja and Midel Ring Road	NA	mt	2000.00	2011-12
Urban Transport (BRTS) Phase 1	26	Construction of BRTS Road	C- 771	YES	BRTS corridor		NA	46902.00	2011-12
Total (Rs. Lakh)								**114251**	

ANNEXURE XI: LIST OF PROJECTS FOR EWS / VAMBAY HOUSING SCHEMES

Sr. No.	Project name	Project code	Project under JnNURM (YES/NO)	Project area	Specification	Unit	Project cost (Rs. Lakh)	Likely Year of completion
1	Construction of houses for the Urban poor at 20 different locations	C-713	YES	Rander, Althan, Udhana, Bhestan, Limbayat, Dumbhal & Nana Varacha (DPR-1)	5575	Nos.	563.70	2010-11
2	Construction of Houses for the Urban poor	C-715	YES	TPS No 54 (Bhestan) F.P. No. 1/A & 1/B (DPR II)	5424	Nos.	2453.64	2010-11
3	Construction of Houses for the Urban poor	C-731	YES	Moje Kosad (H-2 & H-3) (DPR-IV)	6768	Nos.	2101.81	2010-11
4	Construction of Houses for the Urban poor	C-733	YES	Moje Kosad (H4-H5)	7392	Nos.	4219.13	2010-11
5	Construction of Houses for the Urban poor at 11 different locations (DPR -VI)	C-737	YES	Surat City	4032	Nos.	7338.00	2011-12
6	Construction of Houses for the Urban poor at 15 locations	C-739	YES	Surat City	7704	Nos.	10451.34	2011-12
7	Redevelopment of Slums within City Limits.	C-741	YES	Udhna, Bhimnagar, Vasahat (DPR- VIII)	1176	Nos.	2263.29	2011-12
8	Redevelopment of Slums within City Limits.	C-761	YES	Kamrunagar, Limbayat T.P. 39, F.P. 41 & R-21 (DPR IX)	740	Nos.	1858.71	2011-12
TOTAL (Rs. Lakh)							**31250**	

ANNEXURE XII: LIST OF PROJECTS FOR FLOOD PROTECTION AND RIVER EMBANKMENT

Sr. No.	Project name	Project code	Project under JnNURM (YES/NO)	Project area	Project cost (Rs. Lakh)	Likely Year of completion
1	Construction of flood protective wall on Rander bank of river Tapi , Surat	C- 256	NO	Rander bank of Tapi River	799.00	2010-11
2	Construction of flood protective Work	C- 256	NO	Bharimata bank near Sluice regulator No. 7 & 9 of river Tapi, surat	1590.00	2010-11
3	Construction of flood protective Wall	C- 256	NO	Panch Pipli rander bank of River Tapi, Surat	241.00	2010-11
4	Construction of Sluice regulator	C- 256	NO	Varacha Bank of River Tapi, Surat	700.00	2011-12
5	River embankment road	C- 256	NO	Amroli bridge to Chawk	350.00	2011-12
6	Transportation and Flood protection	C- 595	NO	River Drive Road	100.00	2010-11
7	Civil structure for water sports activity	C- 597	NO	Singanpore bank	350.00	2011-12
Total (Rs. Lakh)					**4130**	

ANNEXURE XIII: PROJECTED FINANCIAL OPERATING PLAN (FOP) FOR SMC

Revenue Income

	Particular	2009-10	2010-11	2011-12	2012-13	2013-14
	Rs. Lakh)					
	Municipal Rates and Taxes					
1	**Octroi & Toll Income**	0	0	0	0	0
	Sub Total	**0**	**0**	**0**	**0**	**0**
2	**Property tax**					
a	General Tax	10397.84	11645.59	13043.06	14608.22	16361.21
B	Conservancy Tax	0.00	0.00	0.00	0.00	0.00
C	Water tax	0.00	0.00	0.00	0.00	0.00
D	Water Charge	12.00	12.00	12.00	12.00	12.00
E	Water Meter Charge	535.98	589.57	648.53	713.38	784.72
F	Water Meter Charge as per agreement	3592.62	3951.88	4347.07	4781.78	5259.96
G	Water Charge through tankers	17.10	17.27	17.44	17.62	17.79
	Sub Total	**14555.54**	**16216.31**	**18068.10**	**20133.00**	**22435.68**
3	**Other Direct Taxes (Mech. Veh Tax & Theatre Tax)**					
A	Mechanical Vehicle Tax	436.44	440.81	445.21	449.67	454.16
B	Theatre Tax	7.69	7.92	8.16	8.41	8.66
C	Professional Tax (E.C.)	1425.08	1567.59	1724.35	1896.79	2086.46
D	Professional Tax (R.C.)	1824.45	2006.89	2207.58	2428.34	2671.18
E	Water Charge	2214.30	2435.73	2679.30	2947.23	3241.96
F	Sewerage Charge	1207.38	1328.12	1460.93	1607.03	1767.73
H	Solid Waste Disposable Charge	2974.61	3272.07	3599.28	3959.20	4355.13
	Sub Total	**10089.96**	**11059.14**	**12124.82**	**13296.66**	**14585.27**
	Total - Municipal Rates and Taxes - A	**24645.50**	**27275.45**	**30192.92**	**33429.67**	**37020.95**
	Non-Tax Revenue					
	Rents from Muni. Properties					
a	Lease Rent from Land (Long Term)	151.31	174.00	200.10	230.12	264.63
b	Lease Rent from Land (Short Term)	225.99	257.63	293.70	334.82	381.69
c	Residential Bldgs	6.39	6.58	6.77	6.98	7.19

d	Commercial Bldgs	88.30	90.95	93.68	96.49	99.38
e	Public Bldgs	147.26	153.15	159.28	165.65	172.28
F	Temporary structures	10.66	12.26	14.10	16.21	18.65
g	Vehicles & Transp. Eqip	22.75	22.97	23.20	23.43	23.67
h	Other Properties	6.13	6.19	6.25	6.32	6.38
	Sub-Total	**658.79**	**723.74**	**797.09**	**880.02**	**973.87**
	Collection from Public Places	543.66	575.08	609.47	647.17	688.61
	Realization under special statutes	57.25	61.77	66.81	72.44	78.74
	Public Service Charges/ Fees					
a	Notice Fee	34.89	37.18	39.62	42.23	45.00
b	Warrant Fee	141.33	142.93	144.54	146.18	147.83
c	Water Connection/ Disconnection Fee	84.49	97.16	111.74	128.50	147.77
F	Hoarding Charges	288.96	326.65	369.24	417.39	471.82
g	Road Reinstatement Charges	1801.62	1958.45	2128.92	2314.24	2515.69
k	Health Service Charges & Fee	343.98	394.69	452.87	519.62	596.22
m	Inspection Fee	240.26	276.30	317.74	365.40	420.21
n	Solid Waste Dumping Charges	133.69	152.74	174.51	199.39	227.81
p	Animal Slaughtering/ Market Fee	53.64	56.33	59.16	62.13	65.25
u	License/ Permit Fee	711.97	719.09	726.28	733.54	740.88
aa	Students Fees	1391.89	1531.07	1684.18	1852.60	2037.86
ac	Revenue from Central Science Centre and Hightech entertainment	49.14	68.80	90.29	113.77	139.37
	Other income	262.07	291.09	323.91	361.06	403.13
	Sub-Total	**5537.92**	**6052.47**	**6623.02**	**7256.06**	**7958.84**
	Total – B	**6797.62**	**7413.06**	**8096.39**	**8855.69**	**9700.06**
	Other Sources					
	General Grants, Contributions, Subsidies					
a	General grant, contrib. and subsidy	7232.04	7853.81	8529.03	9262.30	10058.62
c	Disaster Management Grant	0.00	0.00	0.00	0.00	0.00
d	Octroi compensation grant	65690.88	75544.51	86876.18	99907.61	114893.75
	Sub-Total	**72922.92**	**83398.31**	**95405.21**	**109169.91**	**124952.37**
	Interest	3831.47	4173.65	4549.64	4962.84	5416.96
	Sales Proceeds	315.01	328.65	343.26	358.91	375.68
	Miscellaneous Income	752.30	789.41	828.37	869.28	912.22
	Sub-Total-C	**77821.69**	**88690.02**	**101126.48**	**115360.93**	**131657.23**
	Appropriation					

	Prior Period Income	1667.65	1684.33	1701.17	1718.18	1735.36
	Total Revenue Income	**110932.47**	**125062.86**	**141116.97**	**159364.48**	**180113.61**

Revenue Expenses

	Particular	2009-10	2010-11	2011-12	2012-13	2013-14
	Rs. Lakh)					
	Establishment Expenses					
1	**Salary & Wages**					
1	Salary & Wages	42746.94	54207.90	49949.06	53993.13	58364.62
2	Stipend to Trainees	201.61	231.85	266.62	306.62	352.61
	Sub-Total	**42948.55**	**54439.74**	**50215.69**	**54299.75**	**58717.23**
2	**Allowances**					
	Sub-Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
3	**Reimbursements**	906.78	1044.05	1202.23	1384.55	1594.71
4	**Employee Welfare**	154.20	157.89	161.74	165.76	169.95
5	**Pension**					
1	Pension	3045.00	3197.25	3293.17	3391.96	3493.72
2	Pension Fund	2500.00	2500.00	0.00	0.00	0.00
3	Gratuity	500.00	500.00	500.00	500.00	500.00
4	Additional Gratuity	202.00	204.02	206.06	208.12	210.20
5	P.F. Contribution	0.00	0.00	0.00	0.00	0.00
6	F.P.S. Contribution	0.00	0.00	0.00	0.00	0.00
7	Funeral expenses	0.16	0.16	0.16	0.17	0.17
	Sub-Total	**6247.16**	**6401.43**	**3999.39**	**4100.25**	**4204.09**
	Sub-Total - A	**50256.69**	**62043.12**	**55579.06**	**59950.30**	**64685.98**
	Administration & General Expenses					
1	**Rents-Rates-Taxes**	433.77	457.44	482.91	518.12	549.83
2	**Communication Expenses**	207.70	221.41	237.00	254.75	274.98
3	**Printing & Stationary**	217.92	228.51	239.65	251.37	263.70
4	**Traveling & Conveyance expenses**	30.43	33.65	37.28	41.37	45.99
5	**Insurance Charges**	49.55	56.26	63.98	72.85	83.04
6	**Professional & Other fees/ Charges**	2346.23	2483.18	2628.43	2785.59	2952.24

7	**Other Expenses**	9899.25	10231.71	10596.01	11772.59	12429.24
	Sub-Total - B	**13402.77**	**13940.68**	**14524.91**	**15948.01**	**16862.72**
	Repairs & Maintenance of Fixed Assets					
1	Land Maintenance	24.97	28.71	31.58	33.16	34.82
2	Buildings	607.94	699.13	804.00	924.59	1063.28
3	Public Spaces	372.81	404.77	439.47	477.14	518.05
4	Roads/ Bridges/ Street lights	5466.33	6012.96	6614.26	7540.25	8595.89
5	Sewerage & Drainage Lines	**279.00**	**229.00**	**303.00**	**298.90**	**309.18**
6	Water Supply	**222.00**	**386.00**	**268.00**	**322.78**	**333.88**
7	Plants, Machinery & Equipment	**812.03**	**820.15**	**828.35**	**882.94**	**911.02**
8	Vehicles & Transp. Equipments	153.90	163.13	174.55	186.77	199.84
9	Office Equipments	15.96	16.15	16.35	16.55	16.76
10	Furniture, Fixtures and Fittings	36.24	38.59	41.09	43.76	46.60
11	Upkeep of Livestocks	27.28	29.19	31.23	33.41	35.75
12	Miscellaneous Fixed Assets	0.00	0.00	0.00	0.00	0.00
	Additional O&M costs					
	Storm Water Drainage	0.00	176.94	190.41	190.41	176.94
	BRTS	0.00	0.00	0.00	469.02	492.47
	Central Science Centre & Hightech entertainment	163.80	171.99	180.59	189.62	199.10
	Sub-Total - C	**8182.24**	**9176.71**	**9922.88**	**11609.32**	**12933.57**
	Service & Programme related Direct Expenses	4466.72	4981.19	5564.70	6227.13	6979.80
	Finance Charges					
1	Interest on existing debt	128.86	97.52	68.73	18.88	11.69
2	Interest on new debt (as per scenario)	0.00	5400.00	3600.00	1800.00	0.00
	Sub-Total	**128.86**	**5497.52**	**3668.73**	**1818.88**	**11.69**
2	**Charges**	185.34	186.53	187.73	188.94	190.15
	Sub-Total -E	**314.20**	**5684.06**	**3856.46**	**2007.82**	**201.84**
	Other Expenses					
1	**Grants & Contributions**	2947.91	3249.45	3582.79	3951.31	4358.78
	Appropriation	8.67	8.75	8.84	8.93	9.02
	Total revenue Expenses	**79579.20**	**99083.95**	**93039.63**	**99702.80**	**106031.72**

Capital Income

	Particular	2009-10	2010-11	2011-12	2012-13	2013-14
	Rs. Lakh)					
	Capital Income					
	Own Sources					
1	Betterment Charges	860.92	990.06	1138.57	1309.36	1505.76
2	Non-Refundable Registration/ Premium Fee	41.08	45.38	50.14	55.39	61.19
3	Installments on Fixed asset sale	417.83	422.01	426.23	430.49	434.79
	Sub-Total	**1319.83**	**1457.45**	**1614.93**	**1795.24**	**2001.75**
	Grant and Contribution					
1	Capital Grant/ Contributions & Subsidies	889.40	989.50	1100.86	1224.76	1362.60
2	Capital Contribution from Public	0.00	0.00	0.00	0.00	0.00
3	Impact Fee	0.00	0.00	0.00	0.00	0.00
4	Capital Contribution from SMC/JnNURM	0	0	0	0	0
5	JnNURM Grant (GOI+GOG)	30508	66932	34654	23448	0
6	Additional Infrastructure Charges	1640.45	1656.86	1673.43	1690.16	1707.06
	Sub-Total	**33038.26**	**69577.91**	**37428.44**	**26362.92**	**3069.66**
	Borrowings					
1	**Long Term Loans**	0	45000	0	0	0
2	**Short Term Loans**					
	Sub-Total	**0**	**45000**	**0**	**0**	**0**
	Total Capital Income	**34358.08**	**116035.36**	**39043.37**	**28158.16**	**5071.41**

Capital Expenditure

	Particular	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
	Rs. Lakh)					
	Sector wise capital investment					
	Water supply	14473	12607	11125	10150	0
	Sewerage	9706	23545	23545	23545	0
	Storm water drainage	5574	6813	6869	6869	4579
	Solid waste management	1285	1285	1285	0	0

	Transportation System - Roads and bridges	13025	52223	2100	0	0
	Transportation System - Urban Transport (BRTS)	8200	27500	11202	0	0
	Housing/E.W.S (VAMBE)	5390	23238	2622	0	0
	Social Development -Central Science Centre & -High-tech entertainment	737	1475	1475	0	0
	Flood protection and Disaster management & Tapi River Front Development	3560	570	0	0	0
	Capital maintenance	2516	4256	4981	5651	6134
	Other Capital investment	0	0	0	24000	24000
	Total of Sector capital investment	**64466**	**153513**	**65204**	**70215**	**34713**
	Repayment of Borrowings					
	Principal repayment for existing debt	317	297	487	107	107
	Principal repayment for new debt (as per scenario)	0	0	12333	12333	12333
	Total of repayment of borrowings	**317**	**297**	**12820**	**12440**	**12440**
	Other Capital expenditures					
	Loss on sale of Fixed Assets	0	0	0	0	0
	Office Equipments	515	584	662	750	850
	Furniture, Fixtures and Fittings	209	211	213	215	217
	Miscellaneous Fixed Assets	0	0	0	0	0
	Total Capital Income	**65506**	**154604**	**83899**	**88620**	**53220**

ANNEXURE XIV: PROJECTED FINANCIAL OPERATING PLAN (FOP) FOR SUDA

	Particular	2009-10	2010-11	2011-12	2012-13	2013-14
Rs. Lakh						
	Revenue Account					
	Revenue income					
1	Zoning map/license fees / scrutiny fees / premium / misc income	200.09	196.09	192.17	196.01	199.93
2	FSI Infrastructure Fee	48.15	50.56	53.08	55.74	58.52
3	Interest Income	834.21	495.00	585.00	585.00	585.00
4	Labor cess	93.69	93.69	93.69	93.69	93.69
5	Income Tax	587.85	587.85	587.85	587.85	587.85
	Total Revenue Income	**1,763.99**	**1,423.18**	**1,511.79**	**1,518.29**	**1,524.99**
Revenue Expenditure						
1	Salary & Wages	133.53	167.62	205.12	246.37	291.75
2	Daily Wages	33.74	34.41	35.10	36.85	38.70
3	TP unit salary / allowances expenses	9.92	9.72	10.01	10.41	10.93
4	Audit fee	4.41	4.85	5.33	5.87	6.45
5	Contingency Expense	50.06	50.03	50.01	49.98	49.95
6	Labour cess	125.11	126.36	127.62	128.90	130.19
7	Office Buildings Maintenance Expense	5.94	6.00	6.06	6.12	6.18
8	Contribution to Pension/ salary Leave	0.37	0.37	0.38	0.38	0.39
9	Dumas - Vesu - Kamrej - Sarthana Street lights maintenance expense	10.11	10.21	10.31	10.41	10.52
10	Staff Quarters Maintenance Expense	2.81	3.01	3.23	3.46	3.72
11	T P S Preliminary Expense	151.05	151.05	151.05	84.43	
	Total Revenue Expenses	**527.04**	**563.64**	**604.22**	**583.19**	**548.77**
	Capital Account					
	Capital income					
	Own Sources					
1	Development Charge SUDA	162.19	163.81	165.45	172.06	178.95
2	Development Charge Corporation	211.36	177.22	187.62	192.07	185.63

3	Amenities Fee	200.00	180.00	162.00	145.80	131.22
4	Unauthorized Construction (impact fee)	-	-	-	-	-
5	TPS / income from sale of land	1,733	1,733	1,733	-	-
6	Recovery from Bhestan 1028 beneficiaries	49.34	49.34	49.34	49.34	49.34
7	Recovery from Vesu 483 beneficiaries	23.18	23.18	23.18	23.18	23.18
8	Recovery from LIG 182 beneficiaries	27.30	27.30	27.30	27.30	27.30
9	Contribution to LIG 182 beneficiaries	-	-	-	-	-
10	Recovery from LIG 112 beneficiaries	20.83	20.83	20.83	20.83	20.83
11	Recovery from LIG 286 beneficiaries	65.21	65.21	65.21	65.21	65.21
12	Pal T P -10 L I G 1192 res. Units (Installments)	429.12	429.12	429.12	429.12	429.12
13	Vesu T P -1 L I G 700 res. Units (Installments)	84.00	252.00	252.00	252.00	252.00
15	Water Connection Income	-	-	-	-	-
	Sub-Total	**3,005.87**	**3,121.35**	**3,115.38**	**1,376.92**	**1,362.79**
	Grant and Contribution					
1	State Government Grant (other)	-	-	-	2,500.00	2,500.00
2	State Government Grant (JNNURM)	72.00	180.00	108.00	-	-
3	Central Government Grant (JNNURM+ Other)	263.00	865.00	602.00	-	-
4	S M C contribution (Joint work)	15.80	15.96	16.12	16.28	16.44
5	Subsidy for Bhestan EWS houses	-	-	-	-	-
	Sub-Total	**350.80**	**1,060.96**	**726.12**	**2,516.28**	**2,516.44**
Total Capital Income		**3,356.67**	**4,182.31**	**3,841.50**	**3,893.20**	**3,879.23**
Capital expenditure						
	Sachin - Magdalla - Navsari railway over bridge	360.00	900.00	540.00	0.00	
	Sachin Rail over bridge	166.00	830.00	664.00	0.00	
	Beutification of various lakes in SUDA area	0.00	400.00	800.00	800.00	
	Development of SUDA Corporate Office	80.00	400.00	320.00	0.00	
	Unidentified Capital Investment	500.00	500.00	500.00	5000.00	5000.00
	Fixed Deposit with GSFS	4000.00	1500.00	1000.00	0.00	0.00
Total Capital Expenditure		**5,106.00**	**4,530.00**	**3,824.00**	**5,800.00**	**5,000.00**