

Session – II
Traffic Transportation And Parking

Session - II

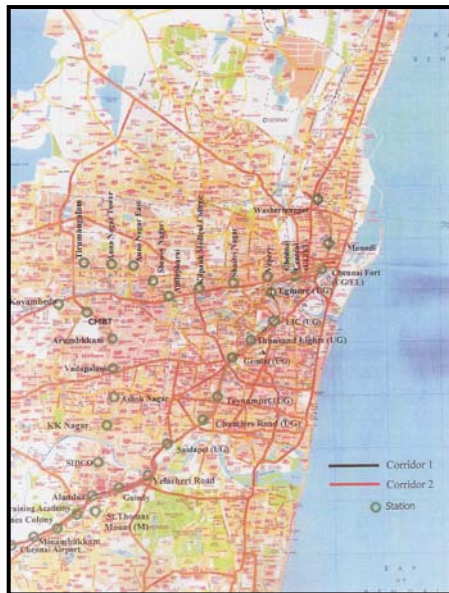
CHENNAI METRO RAIL PROJECT

*T.V.Somanathan, I.A.S.,
Secretary (Special Initiatives) / Secretary to Chief Minister(M),
Govt. of Tamil Nadu and Managing Director, Chennai Metro Rail Limited.*

Selection of Metro Corridors

- DMRC examined 7 corridors using data from Comprehensive Traffic and Transportation Study by CMDA
- 2 corridors suggested by DMRC for Phase 1 based on maximum need and potential for impact on transport needs
- State Government carefully considered national & international experience and emphasised need for learning from “best practices” and MTP experience
- Emphasis given to good links to buses, suburban rail, existing elevated MTP and inter-city rail “Park and ride” facilities, especially for 2 wheelers fare coordination

Chennai Metro Rail



List of interconnecting stations

1. Fort
2. Central
3. Egmore
4. Guindy
5. Alandur
6. St. Thomas
7. Airport
8. CMBT

Corridors

	Corridor 1	Corridor 2	Total
	(Washermenpet to Airport)	(Central to St.Thomas Mount)	
Under ground Length	14.300 km	9.695 km	23.995 km
Elevated Length	8.785 km	12.266 km	21.051 km
Total Route Length	23.085 km	21.961 km	45.046 km
Underground Stations	11	9	20
Elevated Stations	7	9	16
Total Stations	18	18	36

Gauge: Standard Gauge (1435mm)

Project Cost

- Project Cost: Rs. 11,124 Crores (excluding Central and State taxes, interest during constructions and pricing escalation)
- 60% of the cost is expected to be funded by Japan International Cooperation Agency (JICA)
- Balance of 40% will be funded by Central and State Governments





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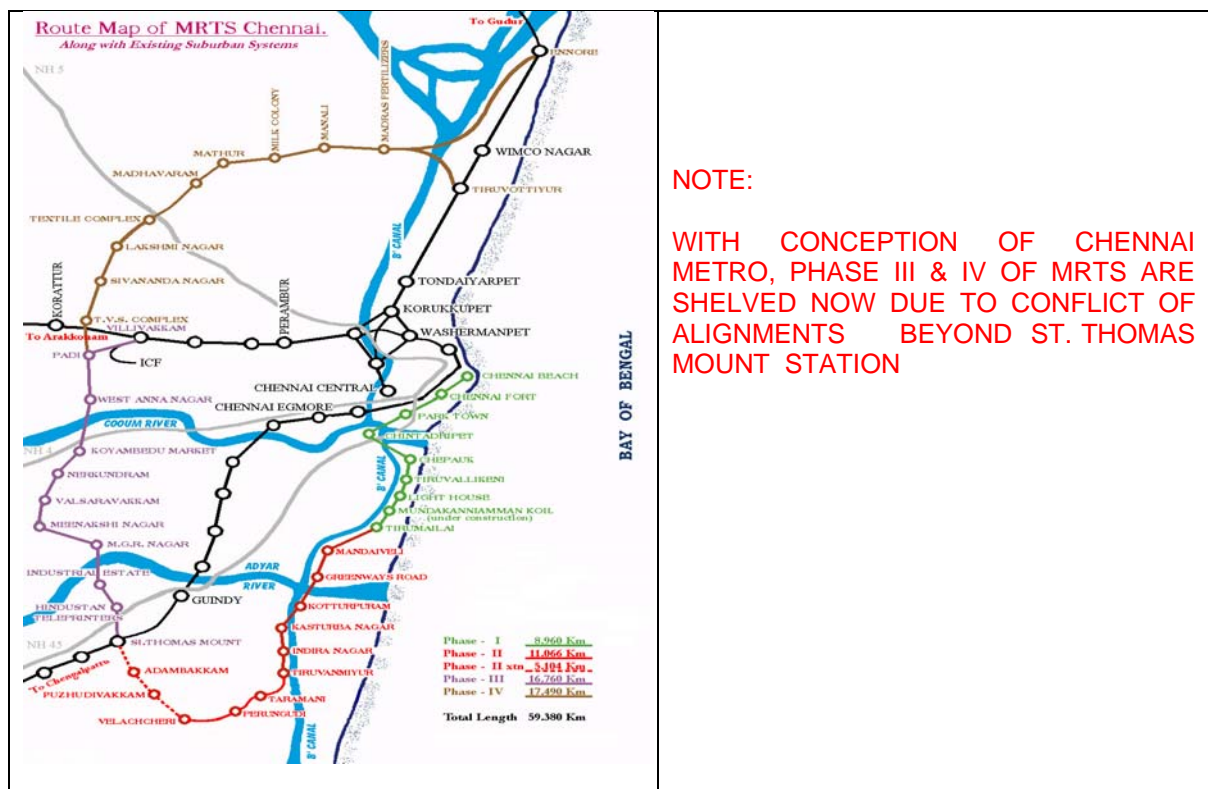
PRESENTATION ON MRTS / CHENNAI & RAIL FACILITIES IN AND AROUND CHENNAI

R.Ramanathan, IRSE

CAO, Construction & Metropolitan Transport Project, Southern Railways

OBJECTIVE OF MRTS CHENNAI

- The exponential growth in the city's population coupled with faster growth in the number of motorized vehicles in the City, poses a formidable problem to the city's planners for providing a transport system, which is **quicker, safer, more economical and also pollution free**. This led to the implementation of the Rail based MRTS for the Chennai City.



SALIENT FEATURES OF MRTS PHASE – I (Chennai Beach – Tirumailai)

- Length : 8.96 KMs
- Alignment :
- Chennai Beach to Park Town : Alignment is along the existing BG Suburban System 2.75 KMs – Surface
- Park Town to Tirumailai : Alignment is along the Buckingham Canal. 6.21 KMs – Elevated.

MRTS PH-I STATIONS

Chennai Beach	(0.00km)	Surface
Fort	(1.70km)	„

Park Town	(2.54km)	„
Chintadripet	(3.43km)	Elevated
Chepauk	(5.00km)	„
Tiruvallikeni	(5.74km)	„
Light House	(6.95km)	„
Mundakanni Amman Koil	(7.925km)	„
(New Station- Under construction)		
Tirumailai	(8.66km)	„

❖ **Date of Commissioning :**

Chennai Beach-Chepauk : 16.11.1995

Chepauk-Tirumailai : 19.10.1997

❖ Completion cost : Rs.269 Crs.

Works to be completed:

Work of Mundakanni Amman Koil (New Station) between Light House and Tirumailai at Km 7.925 is in progress and is expected to be completed by May '2009.

SALIENT FEATURES OF MRTS PHASE – II (Tirumailai -Velachery)

- ❖ Length : 11.376 KMs (Double Line)
- Elevated : 9.614 KMs
- Surface : 1.762 KMs
- ❖ Alignment :
 - Tirumailai to Tiruvanmiyur Along the Buckingham Canal
 - Tiruvanmiyur to Velachery Deviates from Canal towards west

MRTS PH-II STATIONS

Tirumailai	(8. 66km)	Elevated
Mandaveli	(9.699km)	„
Greenways Road	(11.02km)	„
Kotturpuram	(11.892km)	„
Kasturba Nagar	(12.824km)	„
Indira Nagar	(13.796km)	„
Tiruvanmiyur	(14.655km)	„
Taramani	(16.570km)	„
Perungudi	(17.713km)	Surface
Velachery	(19.340km)	„

❖ **Date of Commissioning :**

Tirumailai-Tiruvanmiyur (Up Line only) : 26.01.2004

Tiruvanmiyur-Velachery (Up Line) &

Tirumailai-Velachery (Down Line) : 19.11.2007

❖ Latest anticipated cost : Rs.877.59 Crs.

❖ Facilities Provided :

Passenger Amenities like Escalators, lifts, lighting, stair cases, drinking water, toilets, seating arrangements, parking facilities and inter-transport exchange facilities.

Balance Works in Progress at Various Stations

Stations	Major works yet to be completed	Target
Mandaveli	Finishing work, Steel Roof	Feb.09
Greenways Rd.	Finishing work, Steel Roof	Mar.09
Kotturpuram	Finishing work	Jan.09
Kasturba Nagar	Finishing work, Steel Roof Concourse III	Mar.09 Jun.09
Indira Nagar	Finishing work, Flooring, RCC Roof, Road work & Circulating area	May.09
Tiruvanmiyur	Finishing work.	Mar.09
Taramani	Finishing work, Steel Roof, RCC roof	Jun.09
Perungudi	All works completed	
Velachery	Finishing work, RCC Roof	Jun.09

Certain Additional Works Planned By Railways :

- EMU maintenance facility works at Velachery
- Bus Stand at Velachery
- Link Road from Velachery to Taramani (3 km long & 18 m wide)
- Link Road from Kasturba Nagar to Tiruvanmiyur (1.1 km long & 10-15 m wide)

Works planned by State Govt.:

- Development of Commercial Complexes at various stations
- Approach Roads for Velachery by the side of existing ROB
- Approach Road to Perungudi etc.

SALIENT FEATURES OF MRTS PHASE – II EXTENSION (Velachery – St.Thomas Mount)

Length : 5.00 KMs (Double Line) Fully Elevated

Alignment : Follows on the median of the Inner Ring Road upto 3.585 Km , except for a small portion near Medavakkam Road. Beyond 3.585 Km it deviates away from IRR & passes through private built up areas and terminates at St. Thomas Mount station at Km 5.00 at elevated level.



LAYOUT OF MRTS PHASE – II EXTN.

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MRTS PH-II EXTENSION STATIONS

Velacheri	(19.340km)	Surface
Puzhithivakkam	(21.190km)	Elevated
Adambakkam	(22.190km)	„
St. Thomas Mount	(23.980km)	„

➤ ESTIMATED COST : Rs. 495.74 Cr.

➤ TARGET FOR COMPLETION OF WORKS:

- ❖ FOUNDATION & SUB-STRUCTURE (VELACHERI TO 3.585KM)
 - 31.03.2009 Contract awarded. Work is in progress
- ❖ SUPER-STRUCTURE (VELACHERI TO 3.585KM)
 - 31.12.2009 Contract awarded . Mobilisation in progress.
- ❖ STATION BUILDINGS
 - 31.10.2010 Architectural consultancy contract fixed for two stations.
- ❖ Km 3.585 to 5.00
 - 1½ YEAR AFTER LAND IS HANDED OVER TO RAILWAYS.
- ❑ Land acquisition involved in this stretch affecting:
 - Houses – 35 nos.
 - Area - 6100 sq.m.

❖ PROBLEMS IN KM 22.050 TO 23.310

Land acquisition is yet to be done for about 700 m length from Km 21.844 to Km 22.544 by State Govt.

Land acquisition required to provide Escalator facilities. Till we get the land, Escalators will be only from Mezz. To P.F.

❖ PROBLEMS IN KM 23.310 TO 24.574

- Complete length of about 1.5Km is passing through densely built-up area. About 35 no. of houses and app. 6100 sq.m. of built-up area which needs to be acquired.
- Connectivity to St. Thomas Mount could be achieved only after above problems are sorted out.

❖ Integrated station For MRTS & Chennai Metro is being planned at St.Thomas Mount Station.

➤ FACILITIES PLANNED AT STATIONS:

Minimum Passenger Amenities like Escalators, lighting, stair cases, drinking water, toilets, seating arrangements, etc. will be provided at the stations. No commercial complexes are planned.

Parking Facilities at PHASE-I Stations

Parking Facilities at PHASE-I Stations

STATION	Surface/Elevated	Parking area in Sqm	Remarks
Chennai Beach	Surface	1500	Open
Fort	„	260	Open
Park Town	„	Nil	-
Chintadripet	Elevated	1150	Basement
Chepauk	„	1500	Basement
Tiruvallikeni	„	940	Basement
Light House	„	1010	Basement
Mundakanni Amman Koil	„	2400	Basement
(New Station- Under construction)			
Tirumailai	„	1050	Basement

Parking Facilities at PHASE-II Stations

STATION	Surface/Elevated	Parking area in Sqm	Remarks
Mandaveli	Elevated	1900	Basement
Greenways Road	,,	3300	Basement
Kotturpuram	,,	4312	Basement
Kasturbanagar	,,	3200	Basement
Indira Nagar	,,	8200	Open
		1350	Basement
Tiruvanmiyur	,,	5653	Open
		1392	Basement
Taramani	,,	9080	Open
Perungudi	Surface	8080	Open
Velacheri	,,	12250	Open

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- With Opening of MRTS Section upto Velachery, there is appreciable increase in the ridership
- Services upto Velacherry were introduced from 19-11-2007
- Night services were also introduced from 18-4-08

MRTS - SERVICES

Services

Up Line Services from Velachery to Chennai Beach : 63 Trains per day

Down Line Services from Chennai Beach To Velachery : 63 Trains per day

Rakes operated

4 Nos of 6 Cars and 3Nos of 9 Cars

: 7 Nos

Frequency

Peak Hours : Every 10 minutes One train
(8 to 10 and 18 to 20 hrs)

Non Peak Hours : Every 20 minutes One train

Timings

: From Beach 4.15hours to 21.35 hours
From Velacheri 5.00hours to 22.00 hours

RIDERSHIP FIGURES OF MRTS

	2007-08			2008-09		
Period	Passenger Tickets	Season Tickets		Passenger Tickets	Season Tickets	
		Monthly	Quarterly		Monthly	Quarterly
April	206122	6625	265	792177	14535	735
May	227496	6315	386	890744	15630	809
June	202690	6780	561	872635	17902	1404
July	207612	7168	879	904904	20330	2146
Aug	218908	7024	786	906318	19354	1543
Sept	197631	6945	653			
Oct	215955	7670	859			
Nov.	325792	10265	770			
Dec.	681500	12927	1016			
Jan.	759377	14475	1865			
Feb.	702810	14913	1040			
March	742860	16381	970			
Total	4423698	113455	9864	4370898	88571	6690
Avg. p.m.	502694	12448	1049	874180	17714	1338
Avg. p.d	18691	447	37	29139	590	45

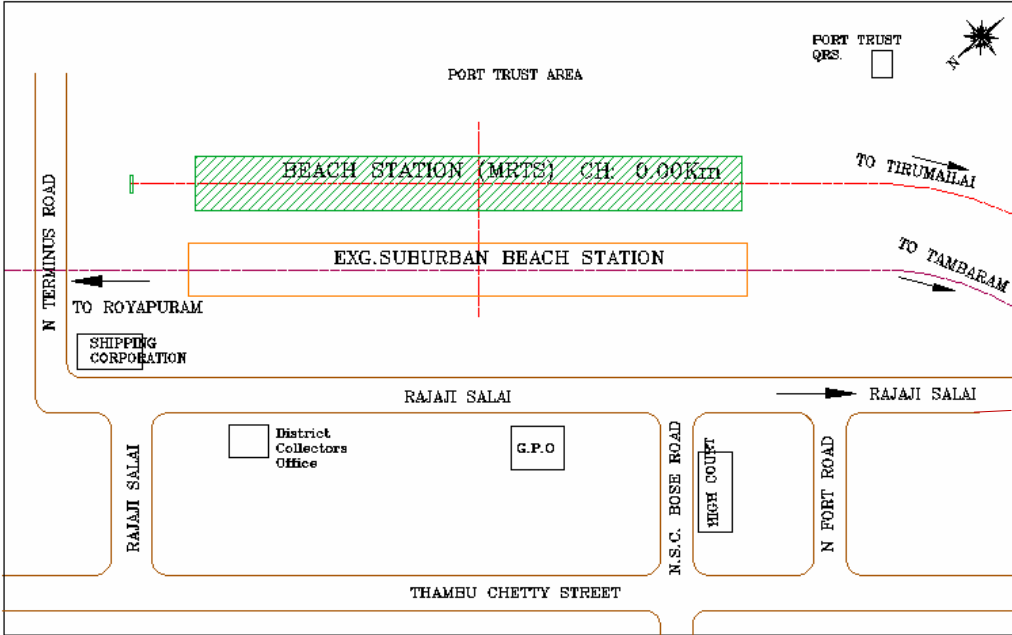
Services upto Velachery were introduced from 19-11-2007

Night services were introduced from 18-04-2008

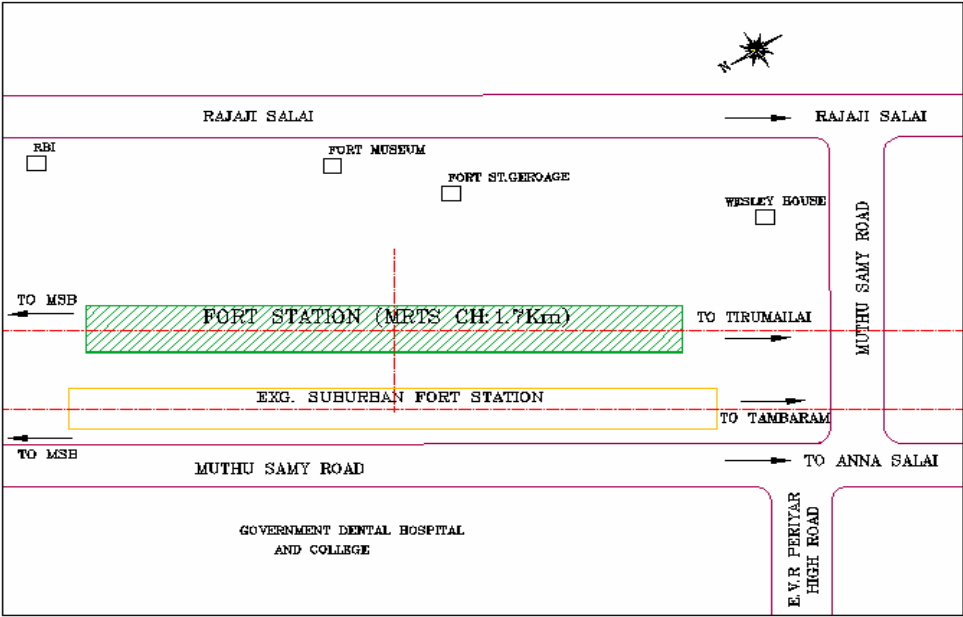
IMMEDIATE REQUIREMENTS FROM CMDA

1. MANDAVELI : Encroachments to be cleared near Venkata Krishna Road for providing wider approach road.
2. GREENWAYS ROAD : Encroachments are to be cleared West side of Station Building for providing wider approach road.
3. KOTTURPURAM : East side Encroachments to be removed for Compound Wall construction.
4. KASTURIBA NAGAR : Encroachments at Rear side of Station on Sardar Patel Road for Bell Mouth Connection.
5. INDIRANAGAR : Rear side Hutments to be removed for Construction of Compound Wall and 18 M wide Road.
6. TARAMANI : Clearance of Hutments required for Construction of Compound Wall .
7. VELACHERY : Approach Roads along R.O.B side to Station, Car Shed and Bus stand.
8. LAND : Land from Thirumailai to Velachery to be handed over.
9. VELACHERY – St. THOMAS MOUNT Land acquisition in balance portion

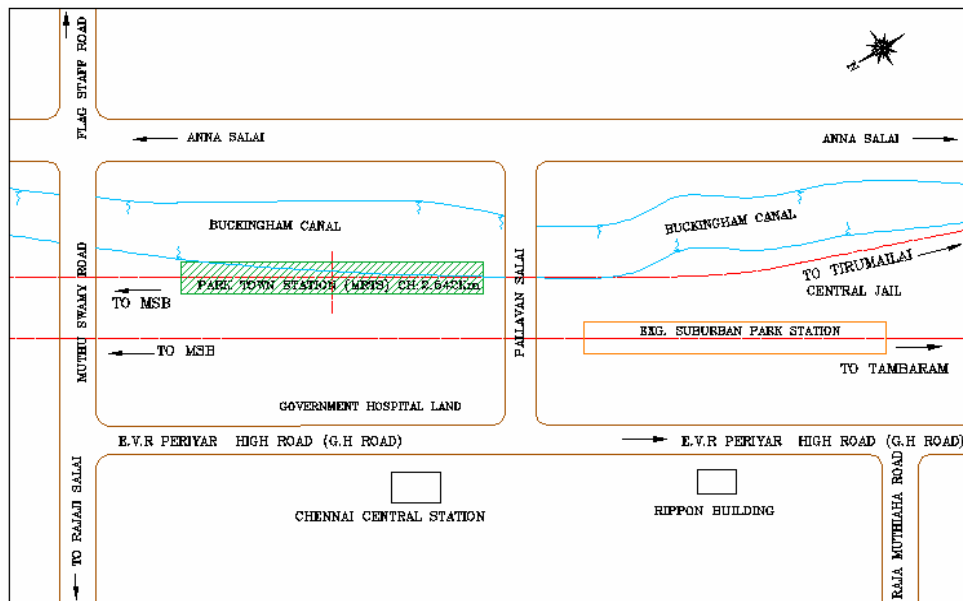
CHENNAI BEACH



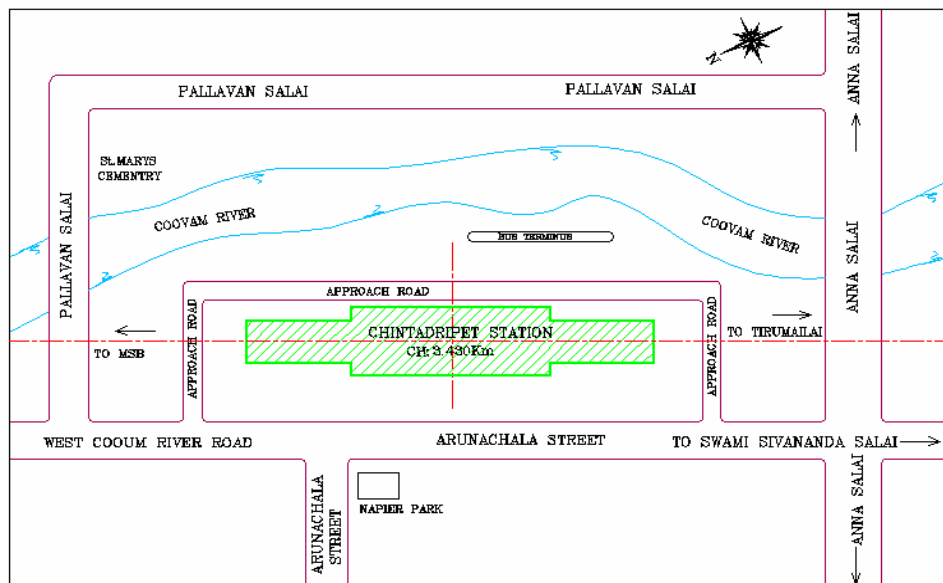
FORT STATION



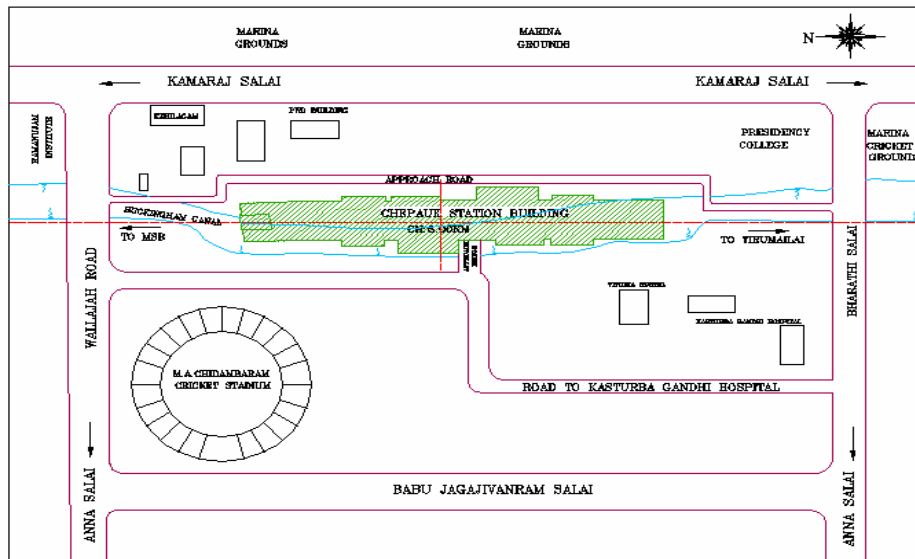
PARK TOWN STATION



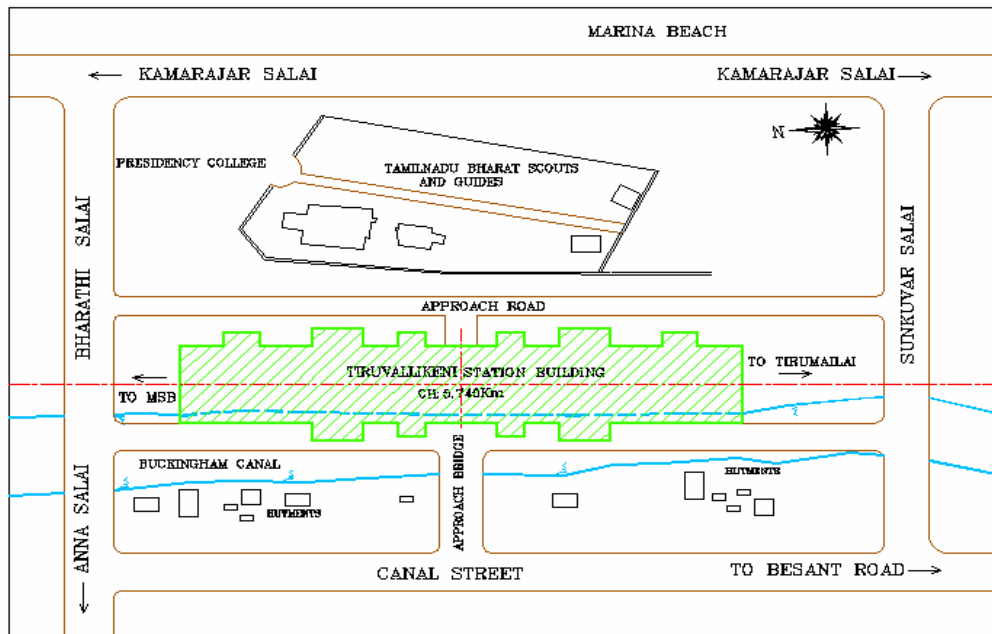
CHINTDRIPET STATION



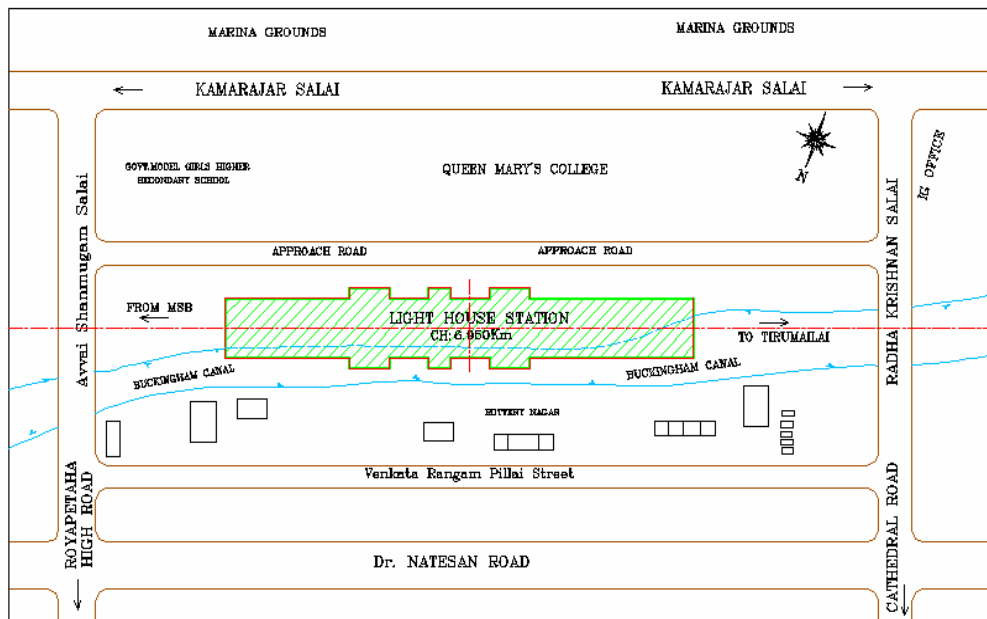
CHEPAUK STATION



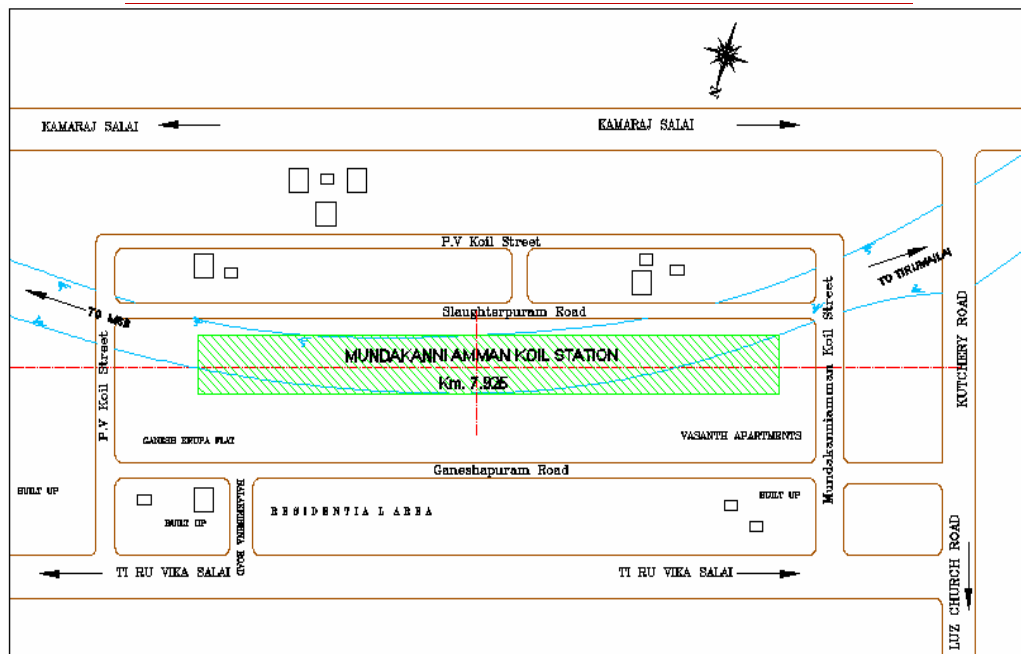
TIRUVALLIKENI STATION



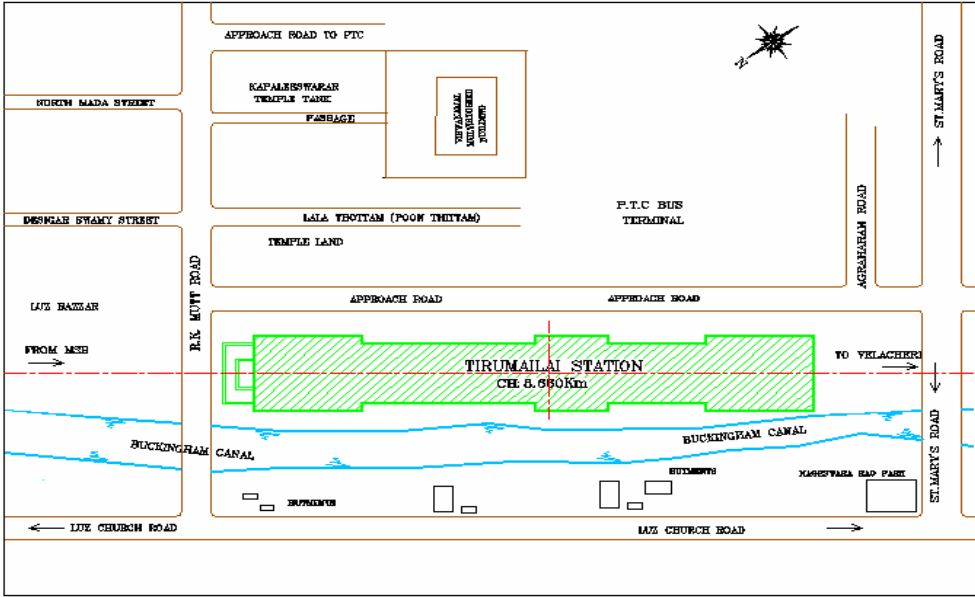
LIGHT HOUSE STATION



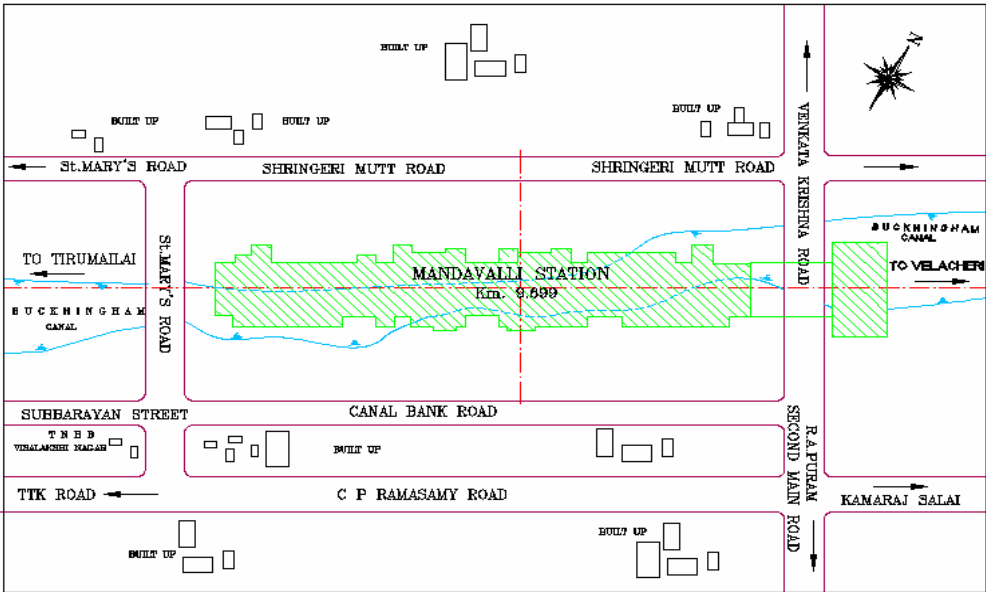
MUNDAKANNI AMMAN KOIL STATION



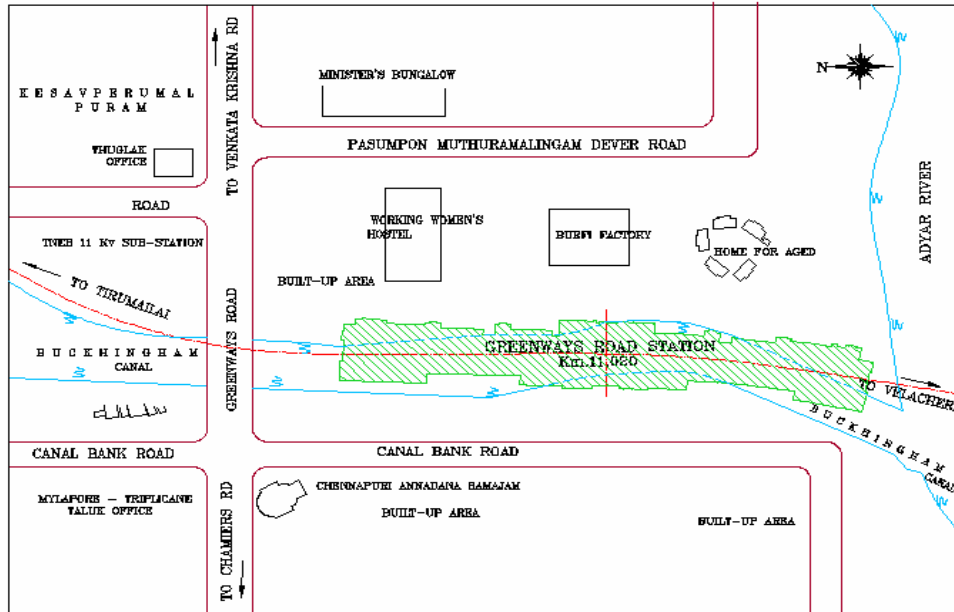
TIRUMAILAI STATION



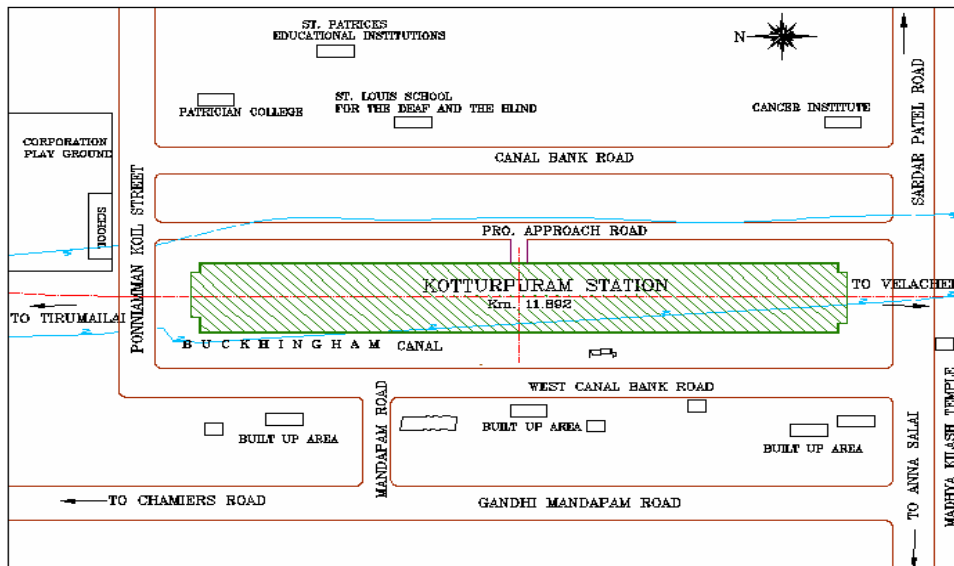
MANDAIVALLI STATION



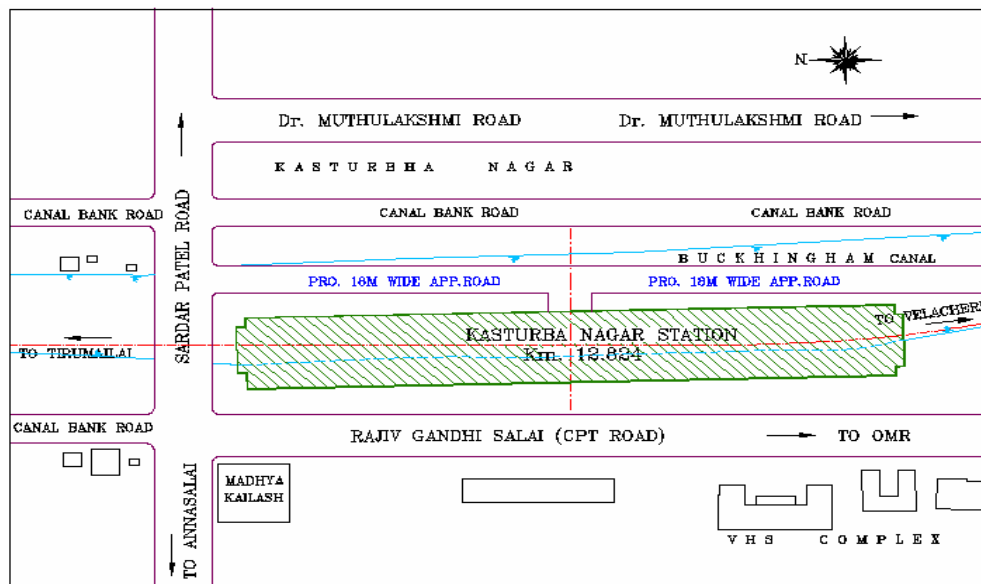
GREENWAYS ROAD STATION



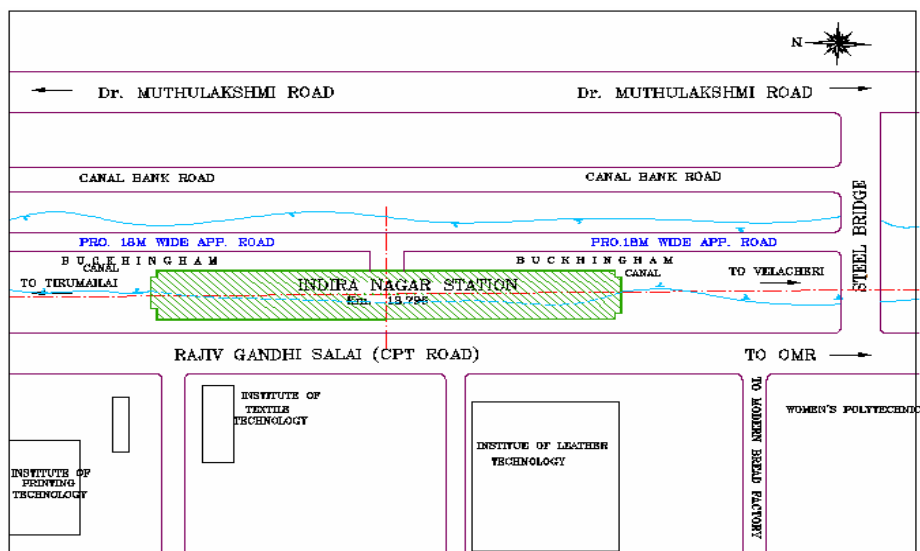
KOTTURPURAM STATION



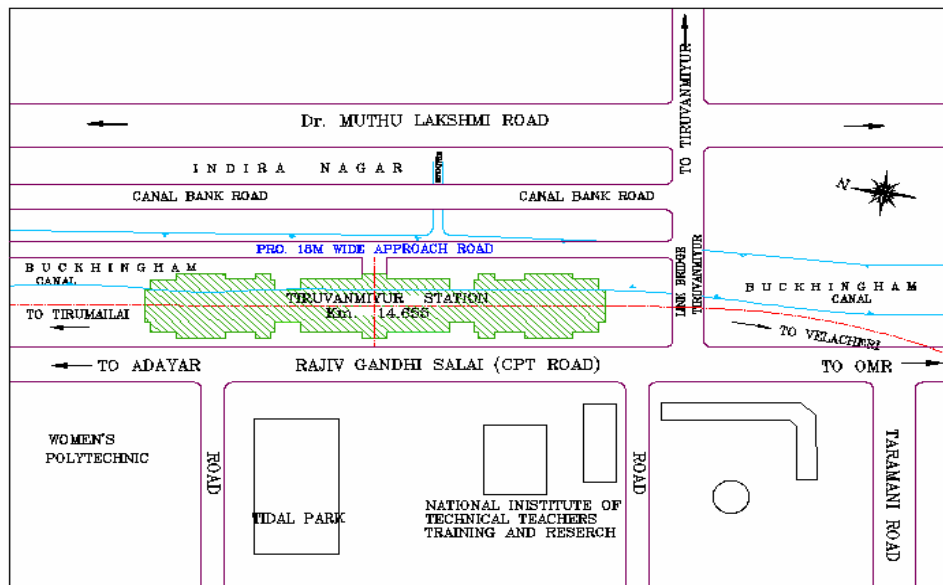
KASTURIBANAGAR STATION



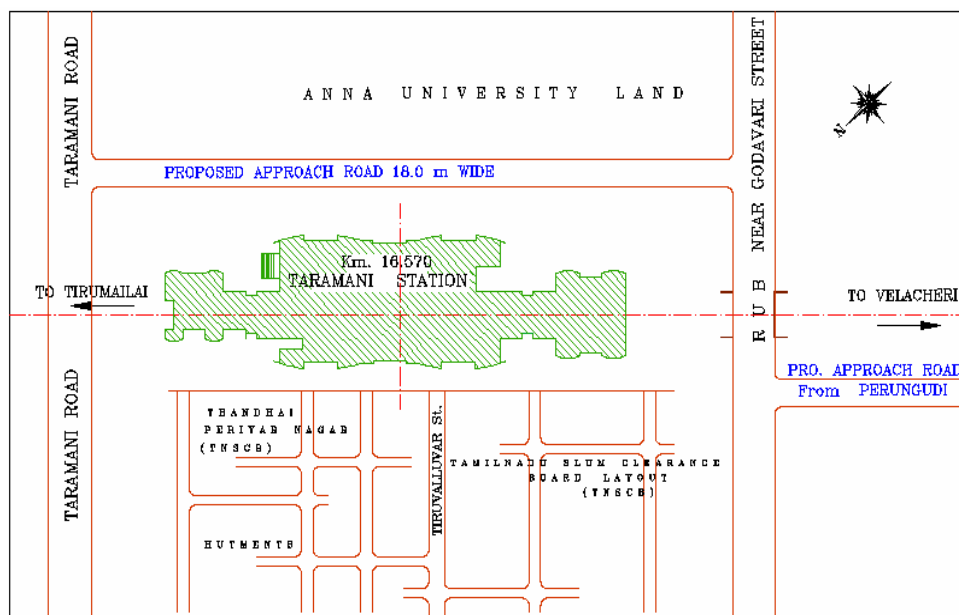
INDIRA NAGAR STATION



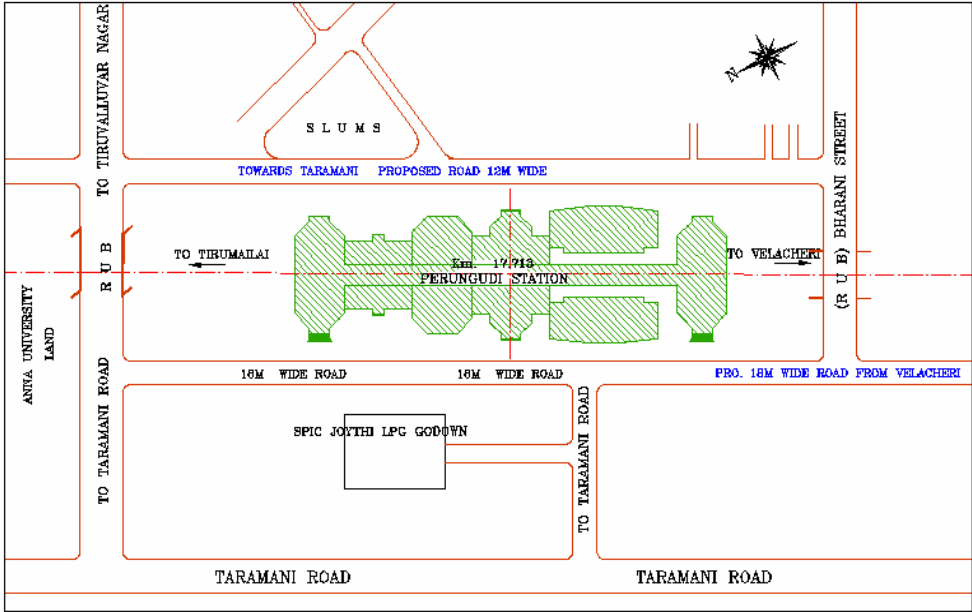
TIRUVANMIYUR STATION



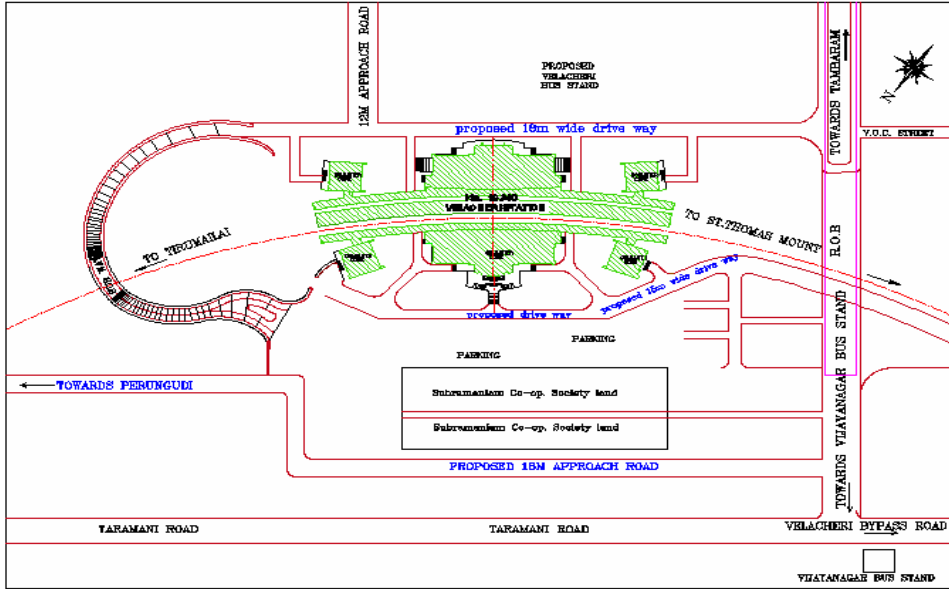
TARAMANI STATION



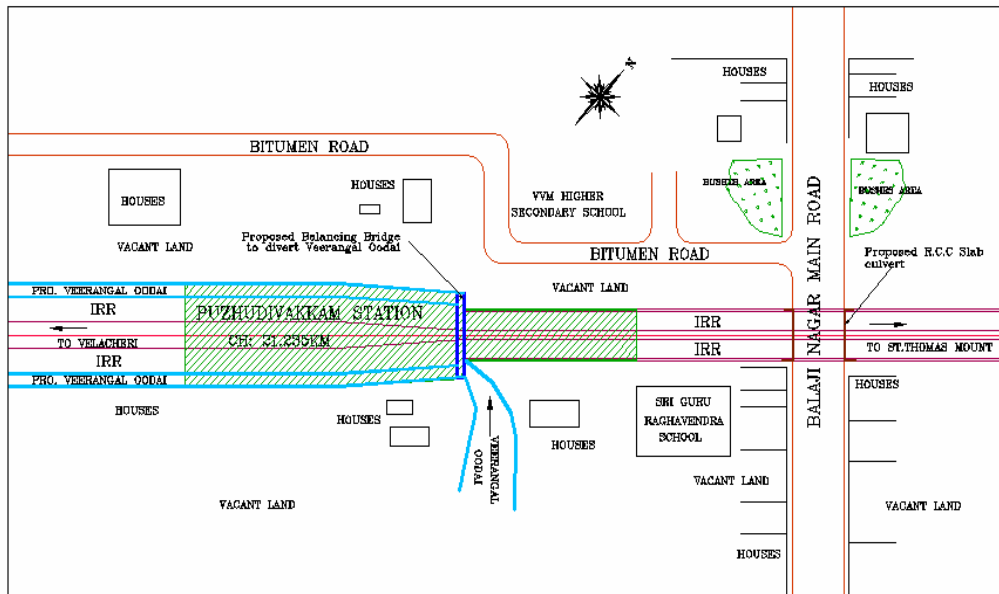
PERUNGUDI STATION



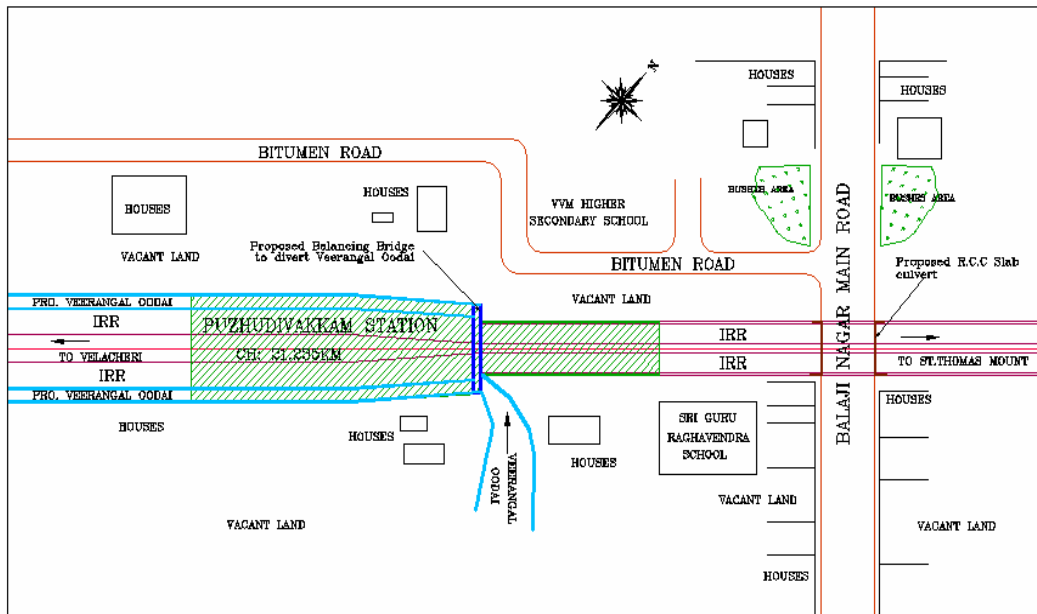
VELACHERI STATION



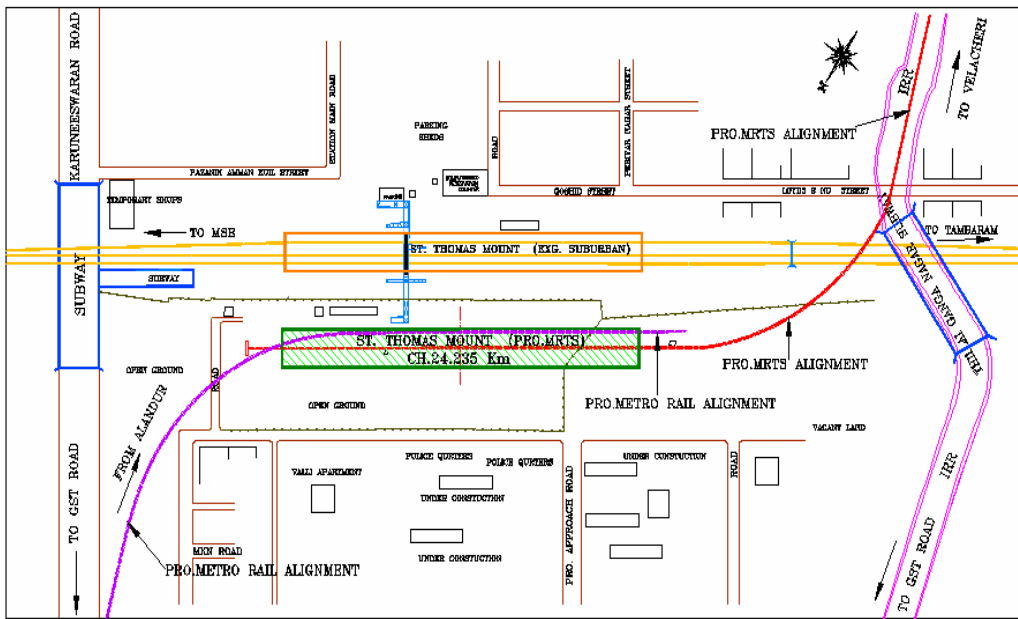
PUZHUDHIVAKKAM STATION



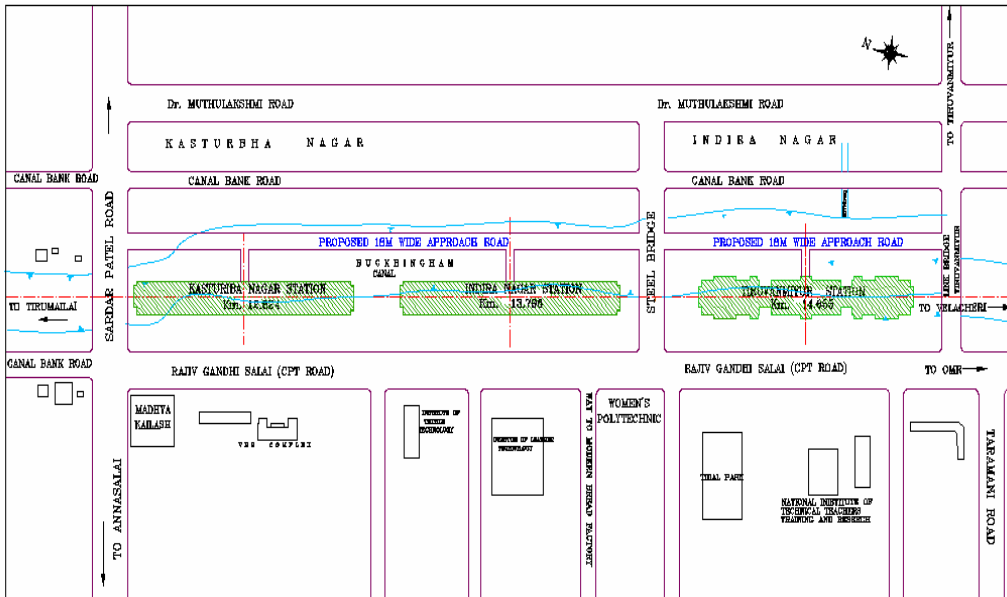
PUZHUDHIVAKKAM STATION



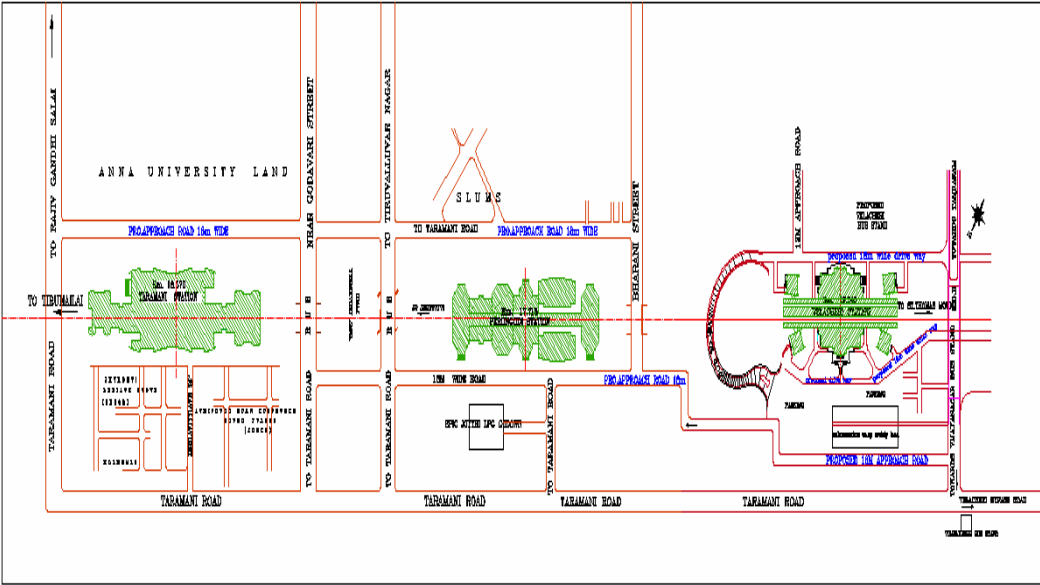
St. THOMAS MOUNT STATION



PROPOSED APPROACH ROAD FROM KASTURBA NAGAR TO TIRUVANMIYUR



PRO. APPROACH ROAD FROM TARAMANI TO VELACHERI



SUBURBAN RAIL TRAFFIC

CHENNAI

Sl.No.	Section	No. of pairs of trains per day at present .	No. of Passenger per day in lakhs in 2007-08.
1.	MSB - TBM	116	5.1
2.	TBM - CGL	36	0.7
3.	MAS - TRL	110	2.7
4.	RPM - SPE	40	0.8
5.	MRTS	63	0.26

Sanctioned Developmental Projects to augment Rail Capacity.

In and Around Chennai.

1.	Tiruvallur - Arakkonam (27 Kms)	3 rd line	Will be completed by 31.12.08.
		4 th line	Sanctioned in this year. Entrusted to RVNL. Target 31.12.10 provided, 34.4 hectares of land is handed over by the State Govt. early.
2.	Korukupet - Ennore (12 kms)	3 rd line	Will be completed by 31.12.08.
	Ennore - Athipattu (6 kms)	3 rd line	Will be completed by 30.06.09.
	Chennai Beach - Korukkupet (4 Kms)	3 rd line	Sanctioned but pending for want of Port land (2 hectares). Exchange of land under active consideration. Target - 2 yrs after getting the land.
	Chennai Beach - Athipattu.(22 kms)	4 th line	Pending for want of Port land as mentioned for 3 rd line.

3.	Chennai - Cuddalore New line via Mahabalipuram (180 kms)	-	Scope of project and Take off point under examination.
4.	Tambaram - Development of full fledged coaching Terminal at a cost of Rs. 25.5.crs.	-	Sanctioned in this year. Plan and estimate in progress.
5.	Tondiarpet, Kavaraipt and Korukkupet - Addl Goods facilities at Rs. 16.3 crs.	-	Sanctioned in this year. Plan and estimate in progress.
6.	Chennai Central - Egmore elevated Rail link . (Double line - 2.6 kms).	-	Sanctioned but kept pending as it is apprehended that this will interfere with Chennai Metro Rail and elevated road for Port.
7.	Athipattu - Puttur (88.3 kms)	New line	Sanctioned in this year. After getting land FROM Tamilnadu and Andhra Pradesh, in 3 years project can be completed. This route will relieve rail movements in already congested Chennai-Athipattu and Chennai - Arakkonam section enabling introduction of more Suburban services.

Long Term Projects being envisaged to augment rail capacity.

1.	Athipattu - Gummupundi	3 rd and 4 th line	26 km each
2.	Tambaram- Chengalpet	3 rd and 4 th line	30 km each
3.	Avadi - Sriperumpudur	New double line	27 km each.
4.	Sriperumpudur - Oragadam - Guduvancheri	New double line	27 km each.
5.	Sriperumpudur - Kanchipuram	New double line	33 km each.
6.	Chennai - Avadi	5 th and 6 th line	21 km each.
7.	Provision of addl. Suburban lines in MMC and streamlining receipt/dispatch of trains in various directions from Chennai Central/MMC Complex to avoid criss-cross movements.		

Other issues to improve rail/road traffic.

- Elimination of all LCs in the rail routes upto Chengalpet, Tiruvallur and Gummudipundi, by replacing them with ROB/RUBs.

Status of sanctioned ROB/RUB Works.

Chennai - Tiruvallur.

PROGRESS OF ROAD OVER BRIDGES/ROAD UNDER BRIDGES				
Sl No	KM. & Section.	ROB/RUB	Cost (Cr)	Present status
1	LC.No.1 (ICF Gate) @ km. 8/36A- 9/2.	ROB	14.7	GAD to be finalised.
2	LC No.2 @ km 9/ 24 - 26 (Red hills Road).	RUB	16.6	The LC is closed and work started.

3	LC No.4 (Villivakkam) @ km 11/ 30-32.	RUB	11.26	GAD appvd for RUB. State Govt. is now proposing modification of GAD.
4	LC No.5 @ km 13/ 4-16.	RUB	10.96	GAD yet to be finalized.
5	LC No.7 @ km 17/34-18/2.	ROB	16.90	GAD yet to be finalized.
6	LC No.9 at km 23/12-14.	ROB	18.96	GAD yet to be finalised
7	L.C.No.10 (Pattabiram) at km - 25/4-6.	ROB	9.94	Sub Structure work completed and super structure in progress. One approach span pending for land.
8	LC No. 12 (Tiruninravur) at km 28/22-24.	ROB	10.63	Sub structure work completed. Super structure in progress.

9.	LC No.14 (Veppampattu) at km 32/ 10-12.	ROB	11.25	Tender being called.
10	Additional lane (light vehicles) to the existing ROB No.36 at Perambur Loco Works	Deposit	-	Estimate under preparation.

CHENNAI - GUMMUDIPUNDI

1	LC.No.1 @ km. 6C-7D (Kathivakkam-Cocrairie basin bridge)	ROB	9.96	Substructure in progress.
2	LC.No.2 @ km. 2A / 40-42.	RUB	10.32	GAD appvd. This work can be taken up after completion of ROB at LC No.1.

3	LC.No.3 @ km. 7/ 400-500.	ROB	11.54	GAD to be finalised.
4	LC.No.4 @ km. 8/ 600-700.	ROB	12.54	GAD to be finalised.
5	LC.No.5 @ km. BB. 2/7 - 9.	RUB	13.57	Contract just fixed and work will start shortly.
6	LC.No.6 (Wimco Nagar) @ km. 10 / 10-12.	RUB	5.5	GAD appvd. Tender being invited.
7	Rebuilding of exg. ROB No. 9R @ km. 1/ 30-34 in Chennai Central yard (Elephant Gate ROB)	ROB	28.5	Work sanctioned in 2008-09.
8	LC.No.10 @ km. 13/ 2-3.	ROB	21.51	Work Completed and Commissioned on 30.7.08
9	LC.No.13 @ km. 20/ 28-30.	ROB	13.71	GAD to be finalised.
10	LC.No.33 @ km. 44 / 28-30.	ROB	12.34	GAD to be finalised.

CHENNAI - CHENGALPET.

SI No.	LC No.	KM	BET. STNs	DETAILS OF ROB/RUB	STATUS/TARGET
1	4	7/16-17	HARRINGTON ROAD (MSC-NBK)	RUB	COMMISSIONED
2	7	10/ 7-8	RANGARAJAPURAM (MKK-MBM)	ROB	IN PROGRESS. TARGET OCT -09
		10/15-17		RUB	WORK TO BE STARTED BY DEC -08. TARGET SEP-09
3	11	12/12-13	JONES ROAD (MBM-SP)	RUB	RLY. PORTION COMPLETED APPROACH WORK IN PROGRESS TARGET JUNE-09
4	13	15/14-15	LINK ROAD (GDY- STM)	ROB	RLY. PORTION COMPLETED. APPROACH IN PROGRESS. TARGET NOV -08

5	14	16/4-5	(GDY - STM)	RUB	GAD UNDER PREPARATION. TARGET - MAR 2010
6	18	18/11-12	(PZA)	RUB	GAD UNDER PREPARATION. TARGET 2010
7	20	20/8-9	(MNM-TLM)	RUB	GAD UNDER PREPARATION. TARGET- AUG-2010
8	22	21 /10-11	(TLM - PV)	RUB	GAD UNDER FINALISATION. PRO. TARGET FOR COMMISSIONING-DEC09
9	24	22/15-16	(TLM - PV)	ROB.	SUBSTRUCTURE COMPLETED. SUPERSTRUCTURE TO BE TAKEN UP BY DEC-08. TARGET MAY-09
10	24	22/15-16	(TLM - PV)	RUB	COMMISSIONED
11	25	23/ 9-10	DHARGA ROAD (PV -CMP)	RUB	IN PROGRESS. TARGET DEC 09.

12	26	24/6-8	(PV - CMP)	ROB 1X35 PSC BOX - 2 Nos. (4 LANE)	SUBSTRUCTURE COMPLETED. SUPERSTRUCTURE IN PROGRESS. RLY.TARGET FEB -09. APPROACH BALANCE WORKS TO BE TAKEN UP. PRO. TARGET FOR APPROACH - NOV -09.
13	27	25/3-5	RADHA NAGAR (PV-CMP)	RUB	GAD UNDER FINALISATION. TARGET DEC- 09.
14	29	28/2-3	(TBMS-TBM)	ROB	RLY. PORTION COMPLETED. APP. IN PROG. TARGET MAR09
15	30	29/3-4	TAMBARAM -VELACHERY ROAD. (TBM-PRGL)	ROB	SUBSTRUCTURE COMPLETED. SUPERSTRUCTURE IN PROGRESS. APP. IN PROGRESS. PROPOSED TARGET JUNE 09.
16		29/A6- A7	(TBM-PRGL)	RUB	COMMISSIONED.
17	32	32/16-18	(TBM - PRGL)	ROB	GAD APPROVED.TARGET - MAR 2010.

18	33	32/24-26	(PRGL -VDR)	RUB	GAD APPROVED. TARGET - 2010.
19	34	35/5-6	(PRGL-VDR)	ROB	RLV. PORTION WORK TO BE STARTED IN NOV 08. APPROACH IN PROGRESS. TARGET JUNE 09.
20	36	36/6-7	(VDR-UPM)	ROB	GAD UNDER FINALISATION. TARGET - MARCH 2010.
21	37	37/1-2	(UPM-GI)	ROB	GAD UNDER FINALISATION. TARGET - MARCH 2010.
22	40	40/1-2	(GI)	RUB	GAD ISSUED. TARGET MAR 2010.
23	47	51/4-5	(SKL)	ROB	GAD UNDER FINALISATION . TARGET MAR 2010.
24	54	61/3-4	(CGL)	RUB	GAD APPROVED. TARGET - MAR 2010.

Assistance required to expedite the execution of ROB/RUBs.

- Provision of land.
- Removal of encroachments.
- Shifting of utility service lines.
- Preparation of General Arrangement Drawings. (GADs)
- Diversion of road traffic to take up the work.

-000-

Session - II

PLANNING FOR DEDICATED BUS LANES

*Prof. Dr. V. Thamizh Arasan
Transportation Engineering Division,
Department of Civil Engineering, IIT Madras.*

Introduction

- Buses, being relatively larger vehicles, find it difficult to maneuver through the mixed traffic and are subjected to frequent acceleration and deceleration leading to lower speed and discomfort to both the driver and passengers.
- This also results in enormous delay and uncertainty to bus passengers and consequently, the level of service of buses gets reduced considerably making the bus a less attractive mode of transport.
- Indian cities desperately need improved and expanded public transport service and not personal vehicles.
- This requires an increase, both in quantity as well as quality of bus transport service and effective application of demand as well as supply-side management measures.
- This goal can be attained by encouraging bus transport by assigning priority to it.
- One of the common bus preferential treatments is provision of reserved bus lanes on major urban roads, to facilitate faster movement of buses, which will make the mode more attractive.
- This presentation is about the findings of a research work done at IIT Madras on the subject matter.

Major Benefits : Exclusive Bus Lanes

- Facilitate enhancement of the level of service of buses, in terms of speed and reliability, which in turn, will attract a significant section of the users of other modes to buses.
- Reduce the level of heterogeneity of the mixed traffic, which may facilitate smoother movement of the other vehicles also in the traffic.
- Eliminate almost all the accidents involving buses.
- Help to achieve the global objectives of energy conservation, environmental protection and sustainability in urban transport.

Location of Bus Lanes

Curb Side Bus Lane

Bus lanes can be located at the near curb. It is hard to keep curbside lanes uncongested.

Median Side Bus Lane

Bus lanes can also be located near the median. Passenger platforms are usually on the right, and can be staggered to reduce the overall width needed.

Median Side Bus Lanes in Different Countries



Birmingham – UK.



Bogota, Colombia



Kunming in China

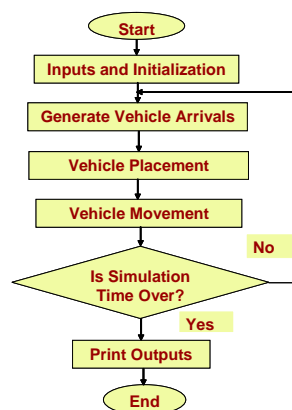


North Carolina - USA

Heterogeneous Traffic Simulation Model

- The essential requirement in planning for exclusive bus lanes is to quantify the level of service of bus before and after the introduction of exclusive bus lane.
- The quantum of increase in level of service of bus due to introduction of exclusive bus lane was determined using a simulation model of heterogeneous traffic flow (HETEROSIM), recently developed at IIT Madras.

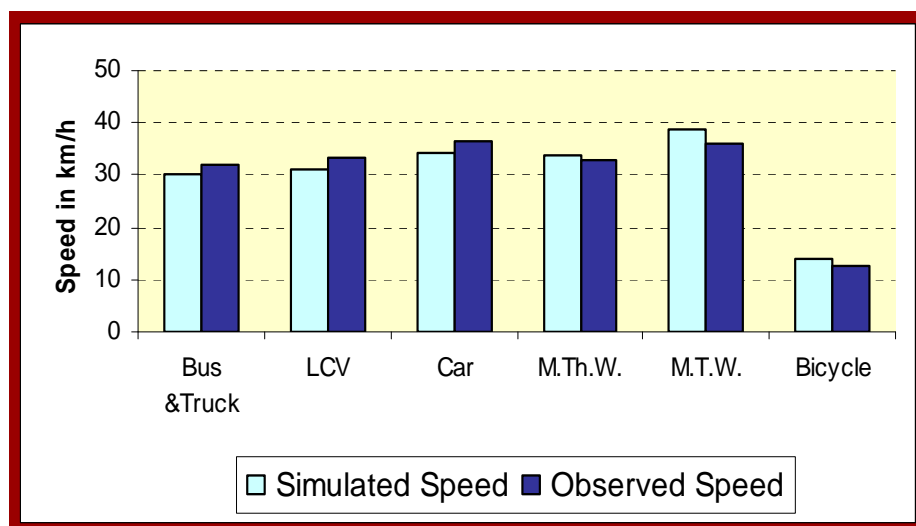
General Structure of the Simulation Model



Snapshot of Simulated Traffic Flow



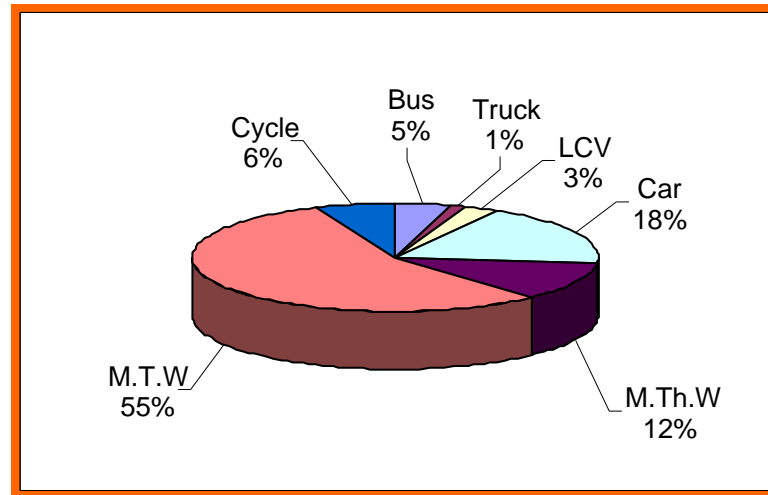
Observed & Simulated Speeds



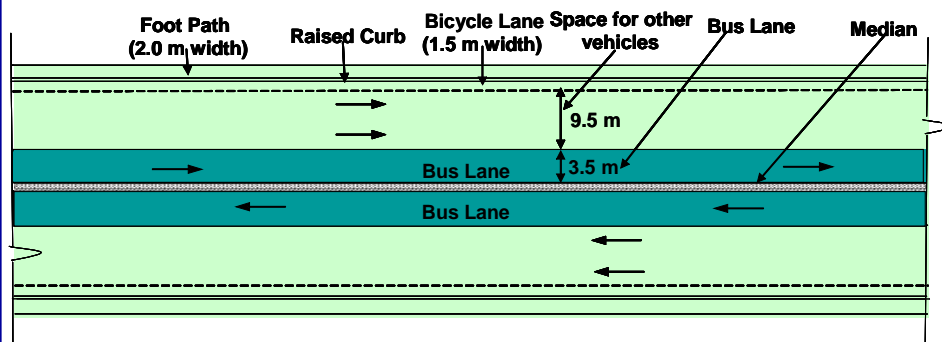
LCV- Light Commercial Vehicle, M.Th.W – Motorised Three Wheelers,
M.T.W - Motorised Two Wheelers

**Impact of Provision of Exclusive Bus Lane on Urban Road
A Typical Case Study**

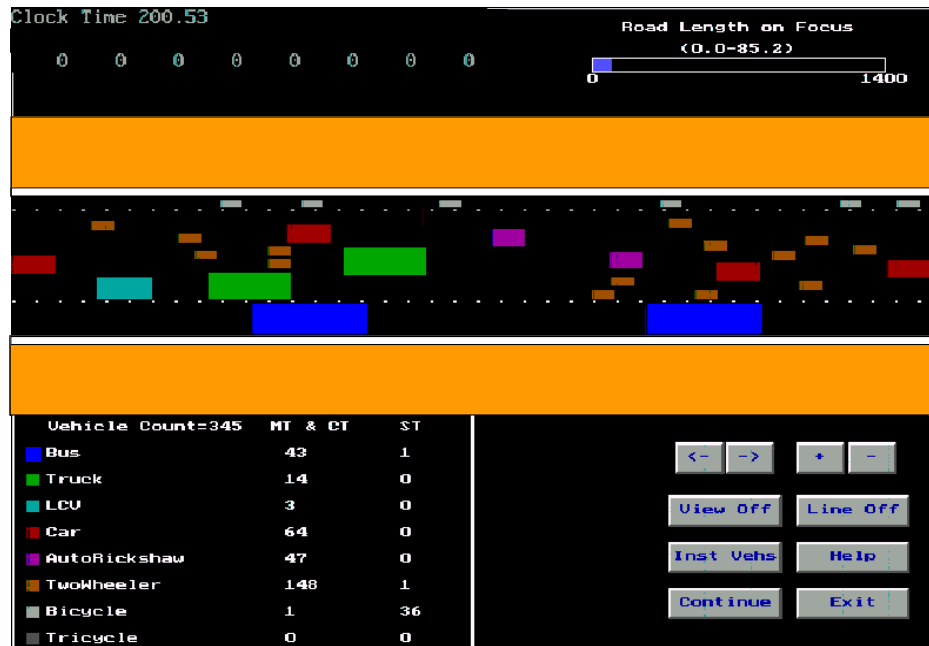
Representative Traffic Composition



**Schematic Layout of the Road Stretch with
Exclusive Bus Lane (14.5 m wide)**



Snapshot of Simulated Traffic Flow with Bus lane



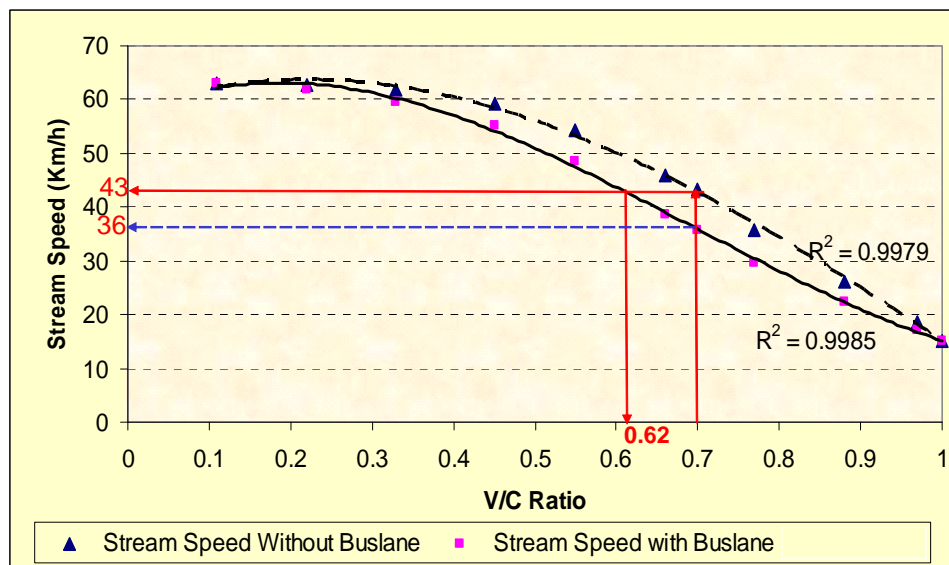
Speeds of Different Categories of Vehicles - With and Without Bus Lane

Traffic Volume (Veh/hr)	Road-way Condition	Speed Maintained by Vehicles in Kmph					
		Bus	Truck	LCV	Car	M.Th.W	M.T.W
1000	Without Bus Lane	65.44	56.83	61.82	73.60	49.29	62.93
	With Bus Lane	65.78	55.40	60.16	72.91	49.09	62.90
2000	Without Bus Lane	63.28	57.62	60.33	71.90	48.91	62.97
	With Bus Lane	65.52	53.26	57.29	69.90	48.18	62.58
3000	Without Bus Lane	58.66	54.26	58.53	69.37	48.34	62.47
	With Bus Lane	65.17	47.71	53.41	65.27	46.80	61.19
4000	Without Bus Lane	52.74	48.96	53.60	64.21	47.26	60.61
	With Bus Lane	64.96	40.58	47.18	56.97	44.71	57.55
5000	Without Bus Lane	45.58	41.65	46.59	55.60	44.78	56.67
	With Bus Lane	64.90	34.22	39.08	46.70	40.95	51.36
6000	Without Bus Lane	35.75	35.55	37.46	44.04	39.42	48.80
	With Bus Lane	64.52	29.00	31.05	36.00	34.17	41.21

Speeds of Different Categories of Vehicles - With and Without Bus Lane

Traffic Volume (Veh/hr)	Road-way Condition	Speed Maintained by Vehicles in Kmph					
		Bus	Truck	LCV	Car	M.Th.W	M.T.W
6300	Without Bus Lane	34.02	31.74	34.98	40.93	37.87	45.95
	With Bus Lane	64.41	26.91	28.23	33.14	31.91	38.03
7000	Without Bus Lane	27.61	25.94	28.07	32.56	31.98	38.25
	With Bus Lane	64.25	22.53	23.98	26.97	27.11	31.33
8000	Without Bus Lane	20.36	19.81	21.17	23.44	23.71	27.86
	With Bus Lane	64.09	17.75	18.80	20.27	20.93	23.70
9000	Without Bus Lane	15.04	14.72	15.62	16.90	17.37	19.71
	With Bus Lane	63.76	14.16	14.49	15.24	16.14	18.04
9500	Without Bus Lane	12.80	12.58	13.36	14.30	14.73	17.10
	With Bus Lane	63.11	12.38	12.81	13.96	13.62	16.08

Traffic Stream Speed on Roadway with and Without Bus Lane



Justification for Exclusive Bus Lanes

70 People are carried by



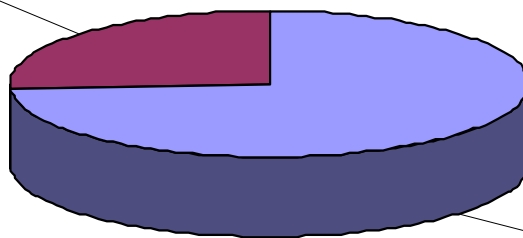
Either 35 Cars

OR

Only 1 Bus

Road Space Allocation at LoS 'C'

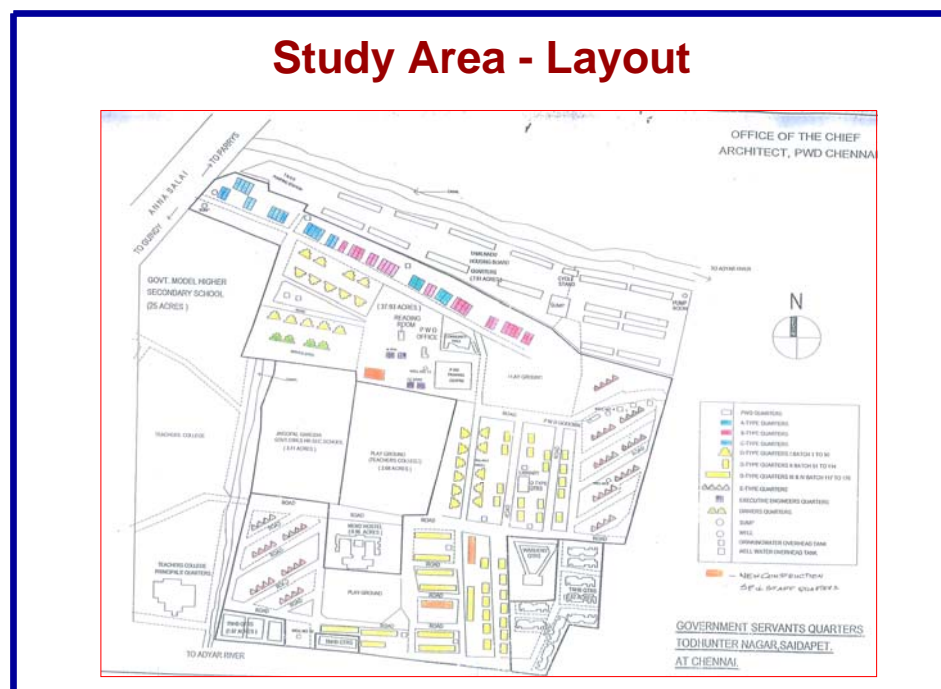
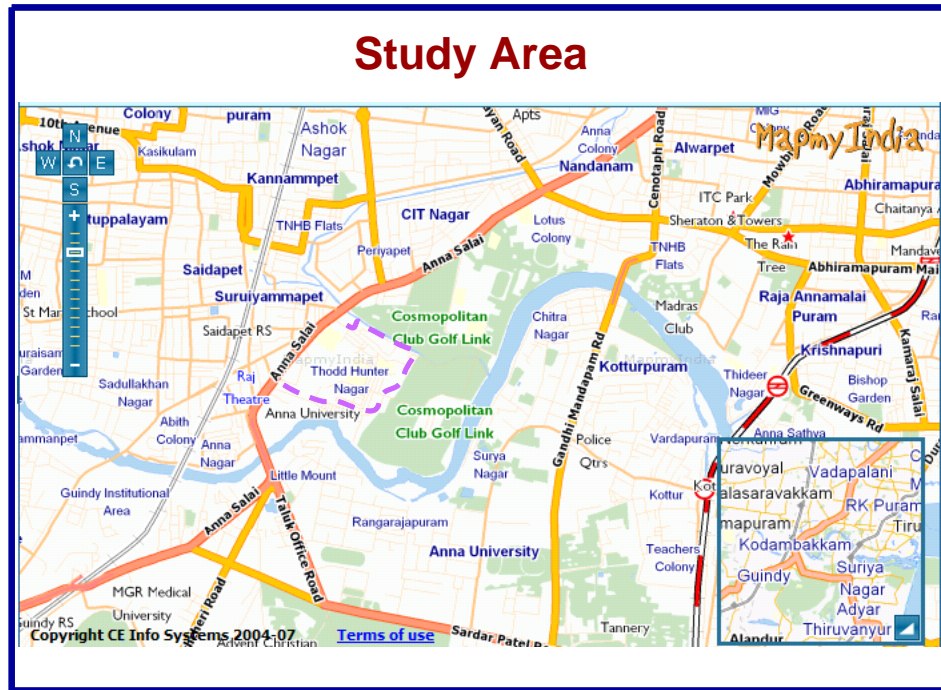
Bus Travellers
(66%) Using
26% of Road
Space



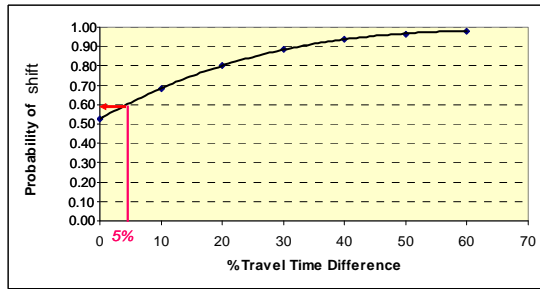
All other
Travellers
(34%) Using
74% of Road
Space

Shift of the Personal Vehicle Users to Bus

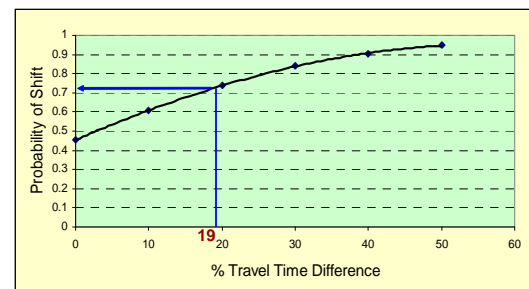
- Provision of exclusive road space, thus, will enhance the level of service of buses and this may also result in shift of some of the personal vehicle users to buses.
- This study is also concerned with estimation of the probable shift of the personal vehicle users to bus due to increase in its level of service after providing exclusive bus lanes.



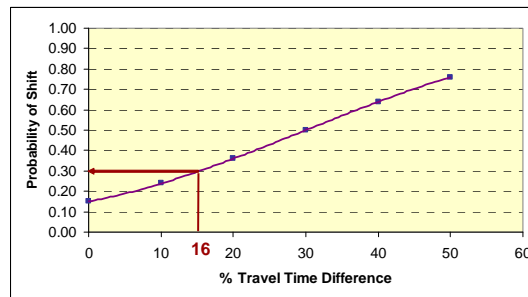
Probability of Shift of Two-Wheeler Users (V/C = 0.7)



Probability of Shift of Auto Users (V/C = 0.7)



Probability of Shift of Car Users (V/C = 0.7)



Conclusions

- The results of the study indicate that it is possible to introduce exclusive bus lanes on selected urban roads in Chennai to enhance the level of service of bus, without much of adverse impact on the level of service of other modes of road transport.
- The model will serve as an important decision making tool in managing the heterogeneous traffic on Indian roads and in several other developing countries, where similar traffic scenarios exist.
- The modal-shift-probability curve drawn, based on the modal shift model can serve as a user-friendly simple tool to estimate modal shift probabilities.

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Session - II

TRANSPORT USERS' PERSPECTIVE

Thiru Raj Cherubal
Co-ordinator, Chennai City Connect.

Why I use my car

How to get me out of my car

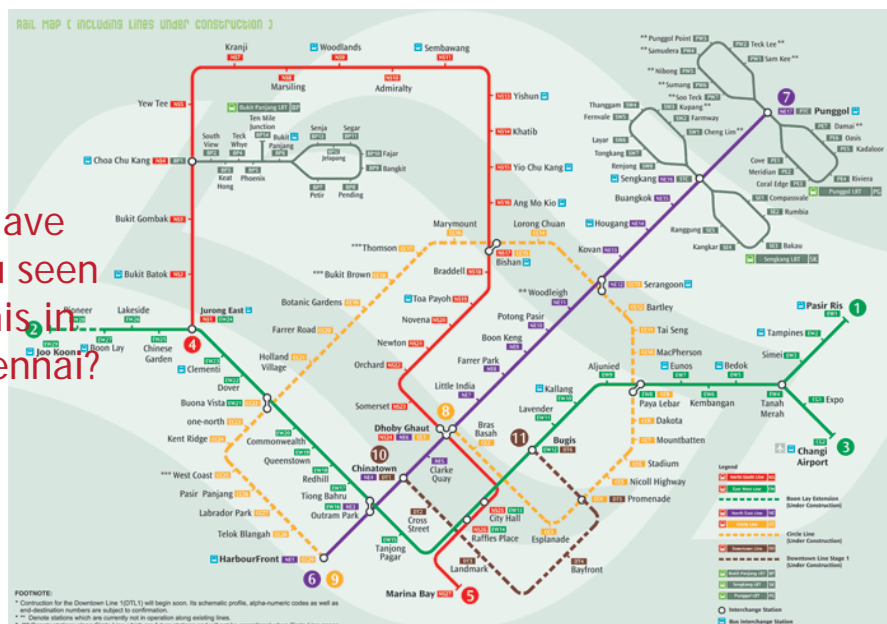
Adventures in public transport system

- Thiruvanimiyur to Tambaram
- Thiruvanimiyur to Kathipara

Cost of today's trip

- How much time did it take?
- How much did I have to walk?
- What was the condition of the walking?
- How many times did I switch modes to get here?
- How much did I wait between modes?
- How was the condition of the place of waiting?
- Was the trip and mode change predictable?
- What was the condition of the bus/train?
- Did it rain, if so what was the additional problems?
- Was it worth it?
- Will I get out of my car?

Have
you seen
this in
Chennai?



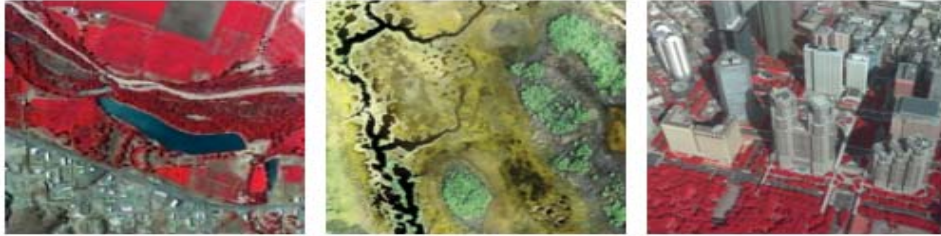
Few Solutions

- Integrate existing system
 - Footpath, Zebra Crossing, parking, one way, cycle,
 - Bus stand, bus bay, park and ride
 - Bus Depot, parking, feeder system
 - MRTS, with bus, feeder,
 - Train
- Integrate future systems—Metro, BRTS—with current system
- Communicate with users
 - Example: Land Transport Authority of Singapore
 - What does the customer want?
 - How do you plan to give what he/she wants?
- Integrate and communicate via indicators (example: corridor)
 - Reduce accident by 50%
 - Increase travel time by 30%
 - Increase percentage of public transport users by 20%
 - Increase economic value of reduction of congestion by 30%

-ooo-

Session - II
NATIONAL URBAN INFORMATION SYSTEM (NUIS) SCHEME

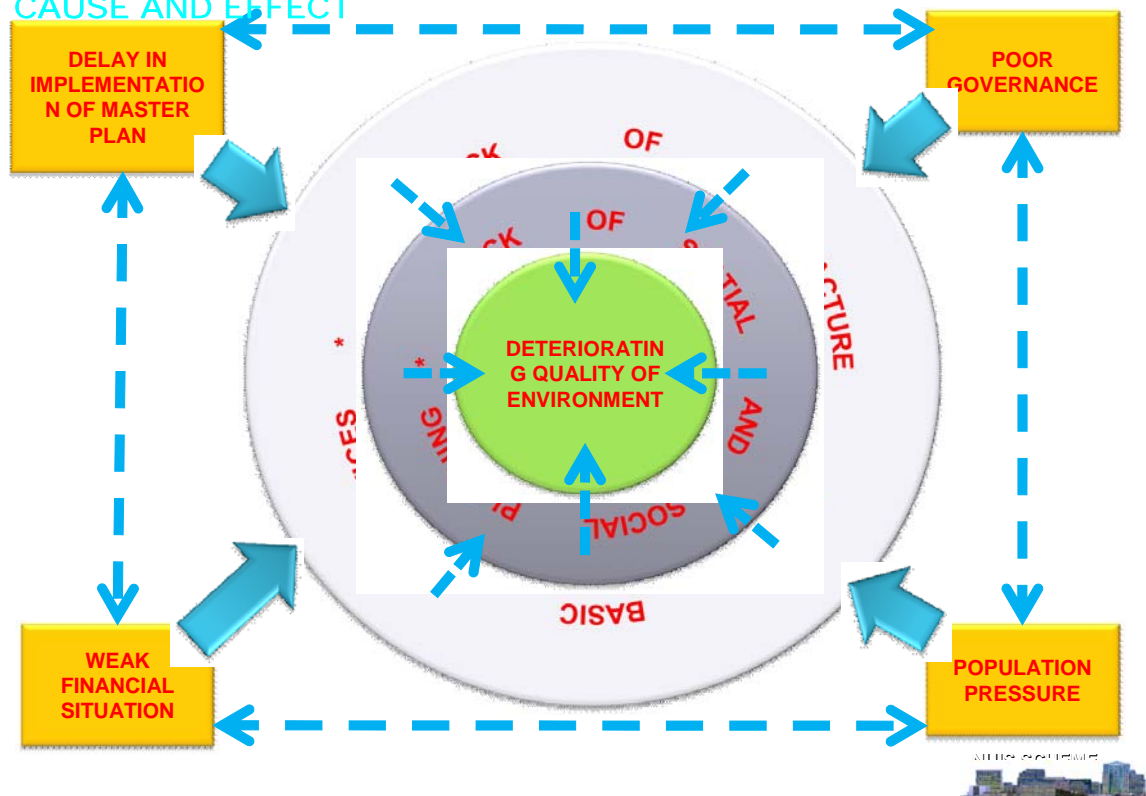
*Dr. SANDEEP KUMAR RAUT
Associate Planner, TCPO, New Delhi*



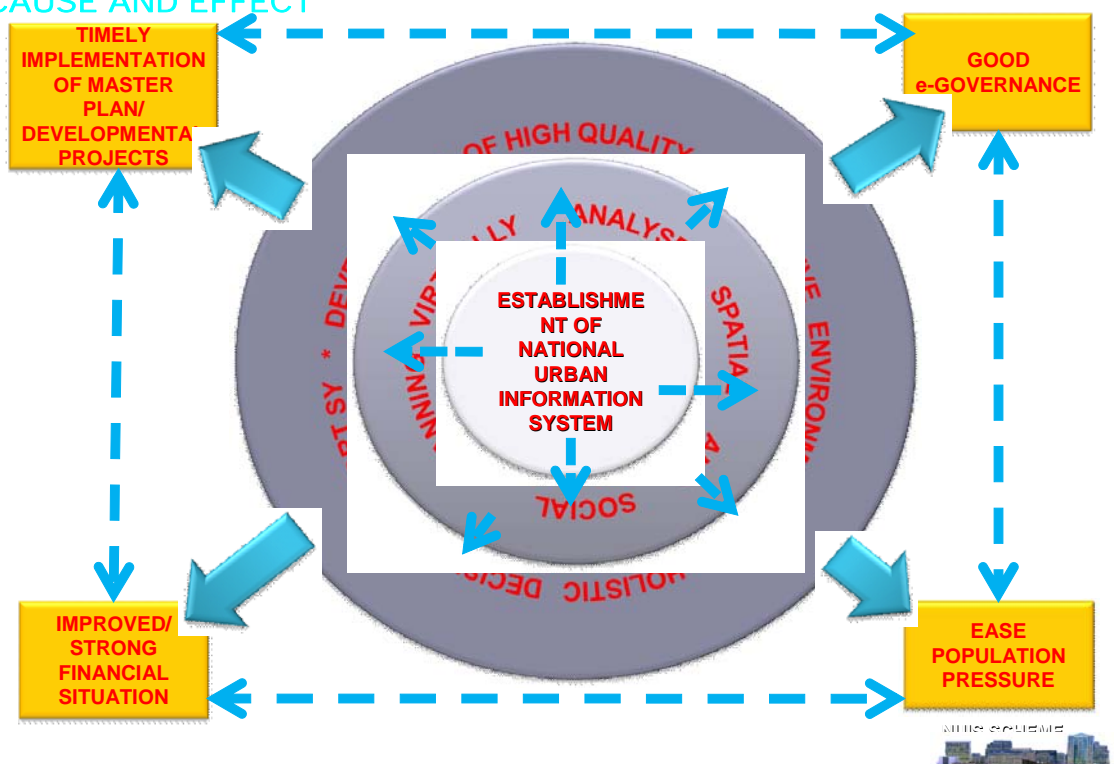
URBAN REALITY

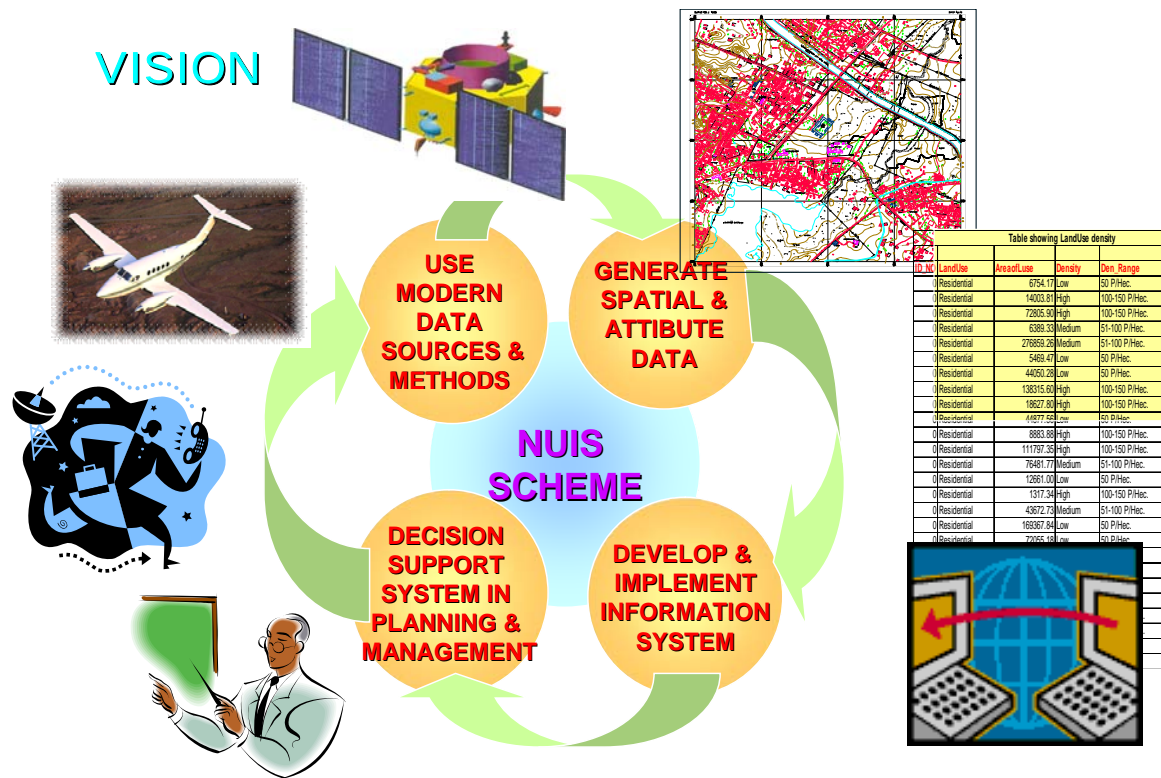


CAUSE AND EFFECT

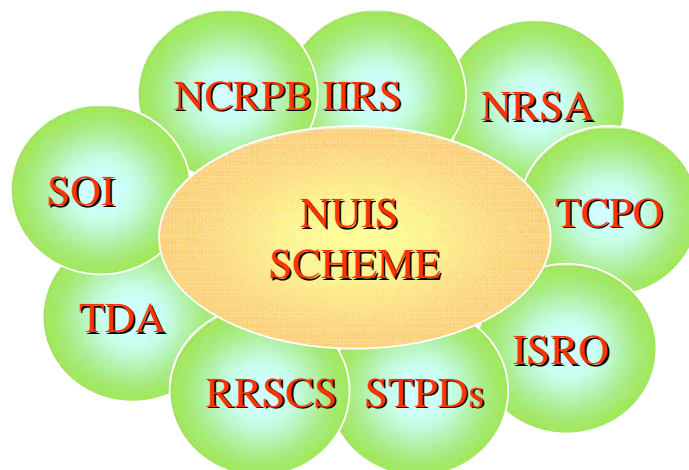


CAUSE AND EFFECT



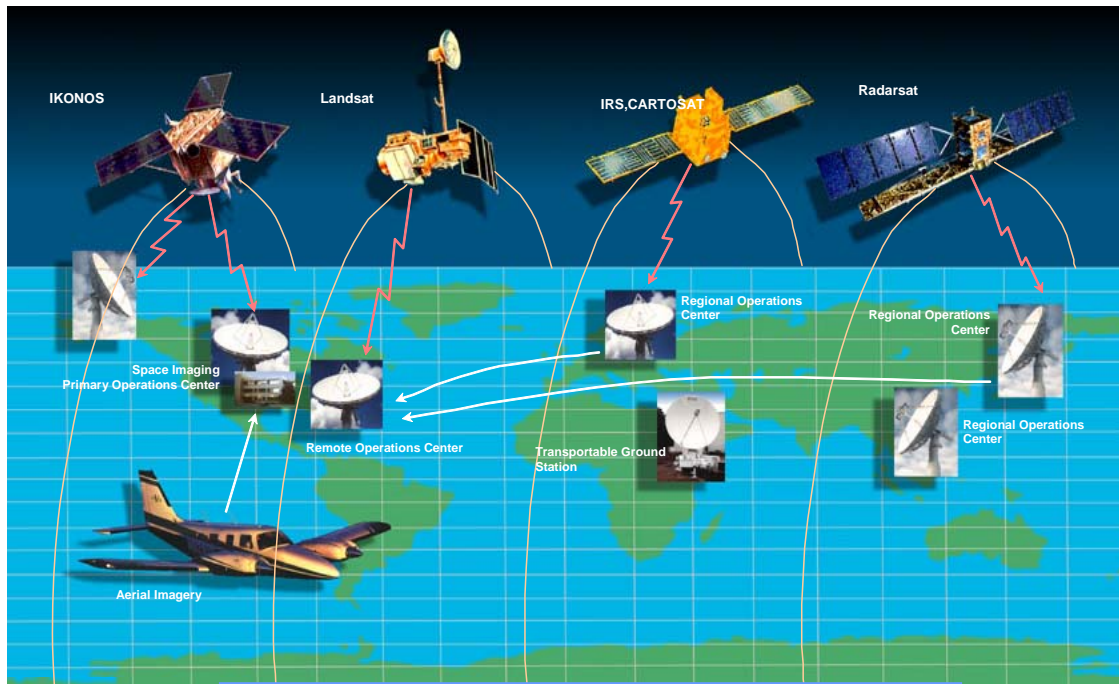


GINESIS



NUIS SCHEME APPROVED IN MARCH, 2006

Earth Imaging Sensors

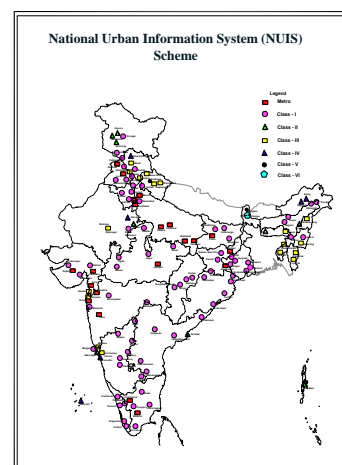


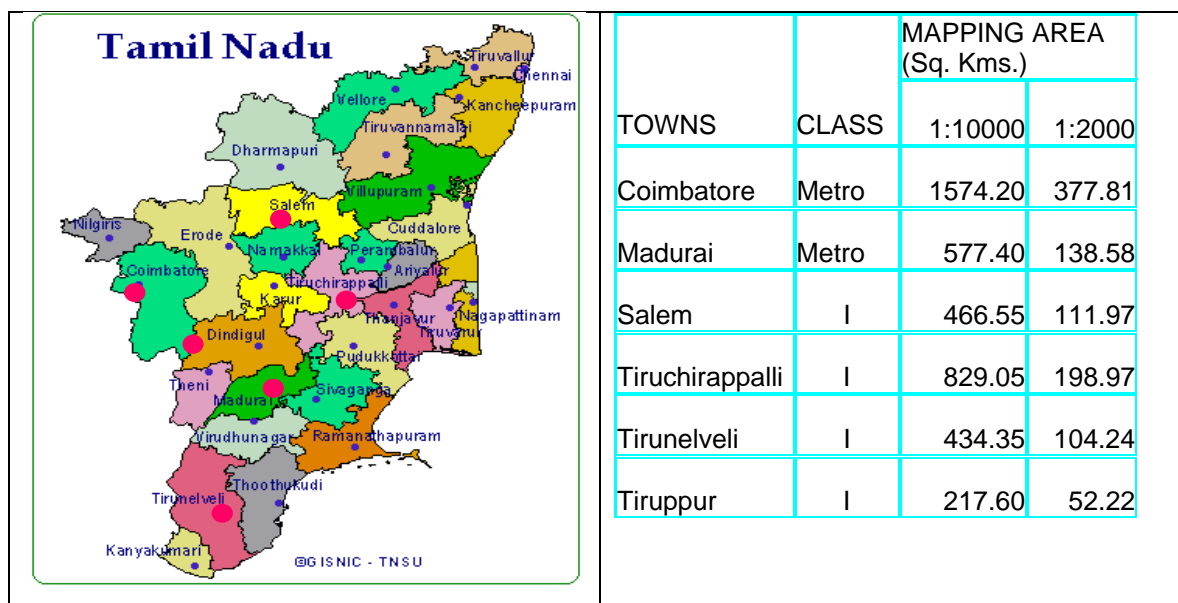
OBJECTIVES

- Develop attribute & spatial information base for various urban planning levels.
- Develop standards - database, methodology, equipment software, data exchange format etc.
- Develop urban indices to measure and monitor the health of the towns and cities.
- Build capacity in the use of RS/GIS among planners.
- Provide decision support system for various planning levels.

COVERAGE

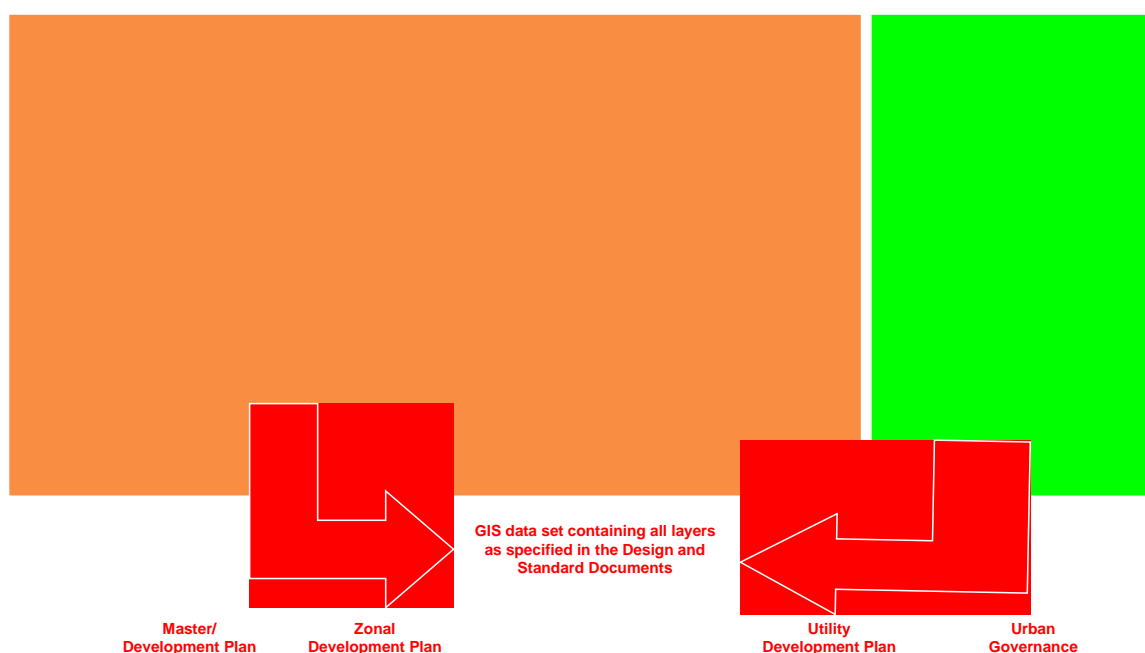
Class	No. of Towns and Cities
Metro	22
Class-I	77
Class-II	10
Class-III	19
Class-IV	6
Class-V	2
Class-VI	1
Total	137





METHODOLOGY

NUIS SCHEME



COMPONENTS

NUIS Scheme broadly comprises of two components :

- Urban Spatial Information System (USIS):
- National Urban Databank and Indicators (NUDBI): Data on periodic basis

The USIS components includes.

- System (HW/SW)
- Base Map and GIS Data Base 1:10,000 Scale & 1:2000 Scale
- Utility Mapping 1:1000 Scale
- Capacity Building
- Application Development

SYSTEM (HW/SW)

In case of procurement of HW/SW Central Share of 64% will be released whenever the matching State Share of 36% is made available.

The Proposed amount for HW/SW

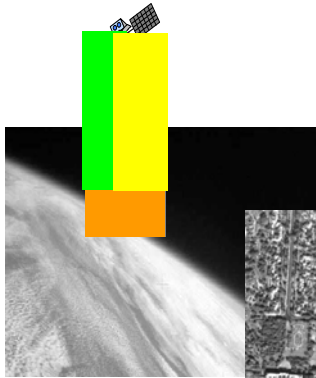
State Nodal Agency	=	20 Lakh
Each Town	=	5 Lakh



Release State Share to SNA for HW/SW

Base Map and GIS Data Base 1:10,000 Scale & 1:2000 Scale

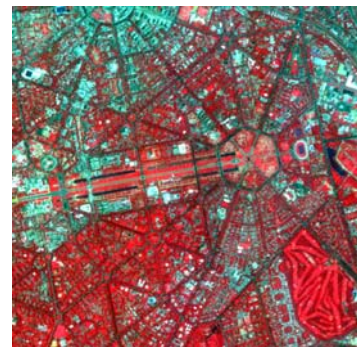
SATLITE DATA CARTOSAT-1



- Two Pan cameras - fore with 26 deg. and aft with -5 deg tilt
- Better than 2.5 m resolution
- Swath 27.5 km for stereo and 55 km for monoscopic mode.
- 8 km overlap between adjacent paths
- Facility for across track tilt to give better revisit



Part of Delhi - CARTOSAT-1



RESOURCESAT-LISS IV (MX)

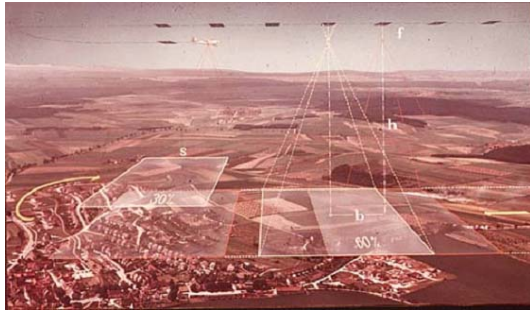
AERIAL PHOTOS



PHOTOGRAPHY

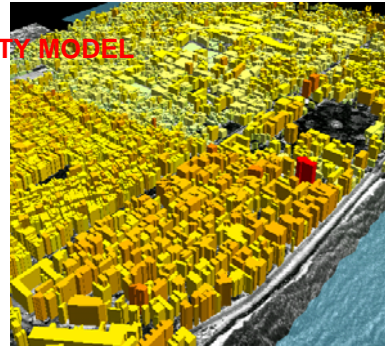


Aerial Photograph of Khammam



STEREOSCOPIC COVERAGE

3D CITY MODEL



Part of Pondicherry

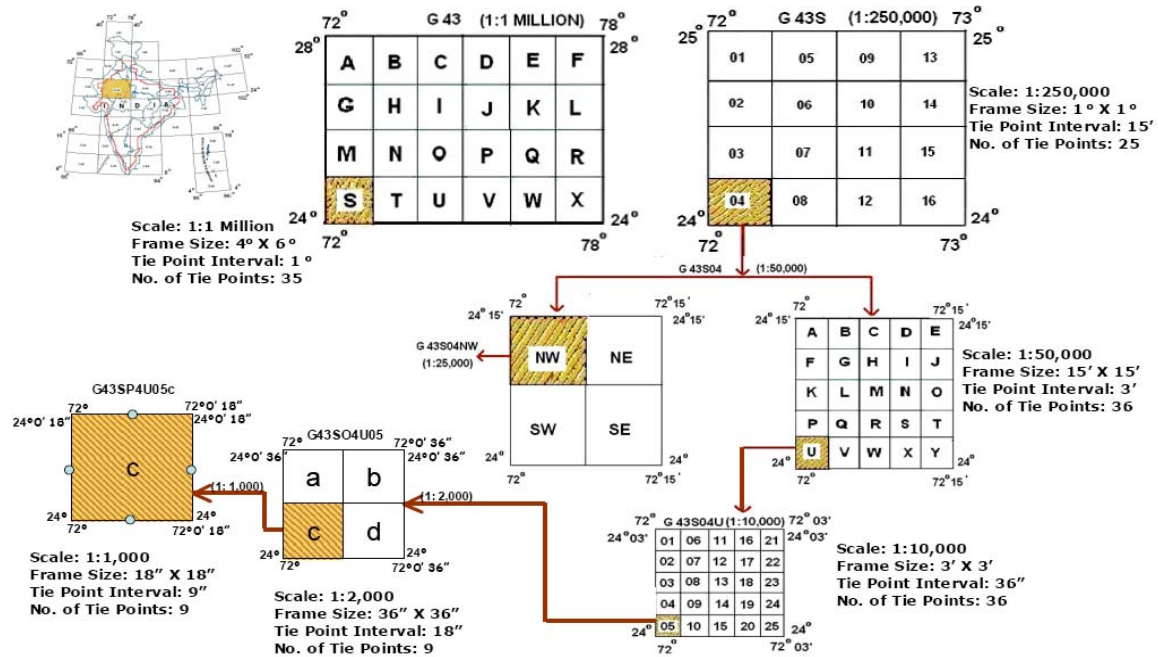
IMAGE SAMPLES



MAP FRAME AND TIE POINTS FOR NUIS SCHEME

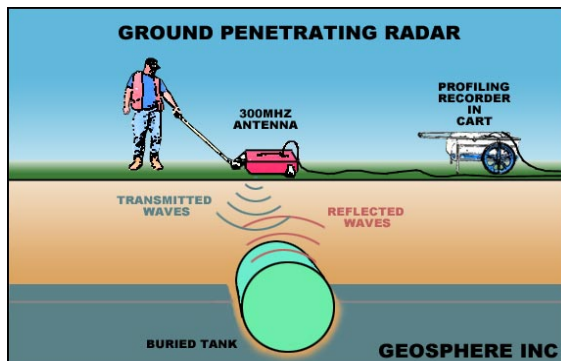


MAP FRAME AND TIE POITS FOR NUIS SCHEME

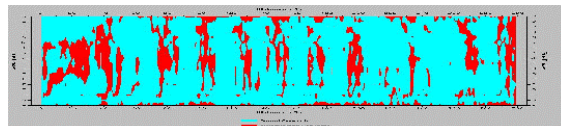


UTILITY MAPPING

- GPR determines sub surface conditions by sending pulse of high frequency electromagnetic waves into ground from a transmitted antenna located on the surface
- Subsurface structures cause some of the wave energy to be reflected back to the surface, while rest of the energy continue to penetrate deeper.
- The reflected wave energy is picked by receiver antenna on the surface.



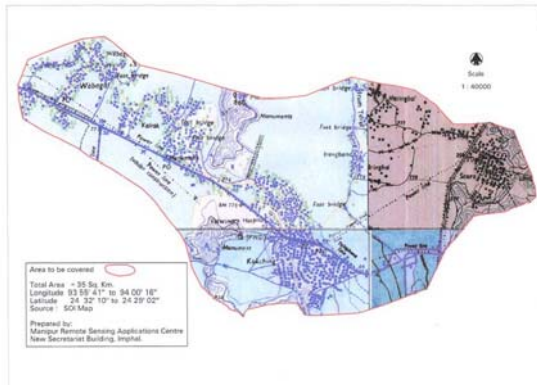
Ground Penetration Radar (GPR) data will form the base for mapping underground utilities on to 1:1000 scale for surveying Water supply and Sewerage networks.



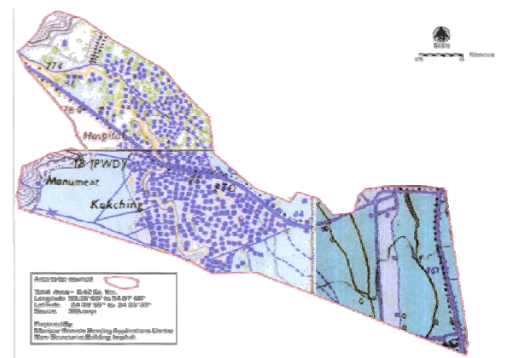
Itanagar (AP), Aizwal (Mizoram), Gangtok (Sikkim) TOWNS WILL BE TAKEN FOR UTILITY MAPPING FOR TAMIL NADU STATE .

GENERATION OF BASE MAP AND GIS DATA BASE

1:10000 Scales



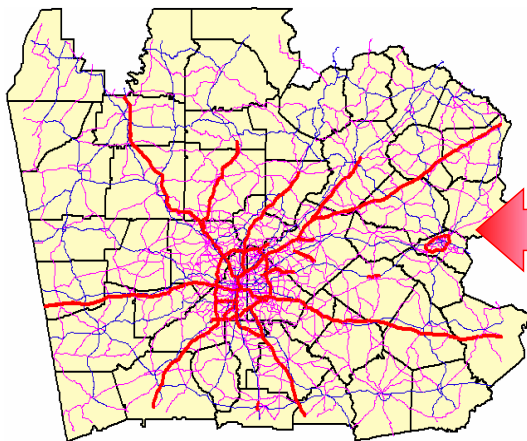
1:2000 Scales



Demarcation of Areas for mapping at 1:10000 & 1:2000 scales

NATIONAL URBAN INFORMATION SYSTEM (NUIS) SCHEME

URBAN SPATIAL INFORMATION SYSTEM (USIS)



NATIONAL URBAN DATABANK & INDICATOR (NUDB&I)

atlantacnty Properties	
Attributes	
Name	Value
NAME	Cherokee
STATE_NAME	Georgia
STATE_FIPS	13
CNTY_FIPS	057
FIPS	13057
AREA	433.9877
PRIMARY	24.17
SECONDARY	1.66
LOCAL	168.69

LINK

NUDB&I

To collect data

socio-economic
development

Transportation

land use

Housing

infrastructure

environment

To Analyze

Indicator

Master/
Development Plan

Zonal
Development Plan

Utility
Development Plan

NUDBI Database

- NUDBI Database consists of 22 files (Tables)
- Under 12 Broad Subjects

SOURCE and PERIODICITY OF DATA

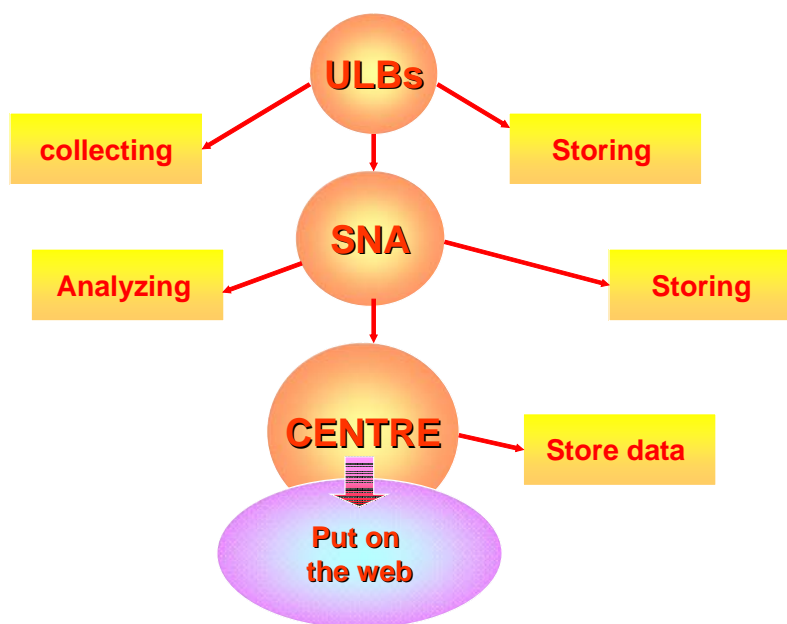
Sl. No.	Subject	Table No & Name	Source	Periodicity of Updating
1	LOCATION	1. PHYSICAL <i>nn</i> .DBF	Master Plan and Meteorological Department	10 years
2	DEMOGRAPHY	2. DEMO <i>nn</i> .DBF 3. OCCU <i>nn</i> .DBF	Census	10 years
3	ECONOMY	4. INDUSTRIAL <i>nn</i> .DBF	District Planning Office/Industrial Centers	5 Yeras
4	LANDUSE	5. LANDUSE <i>nn</i> .DBF	Master Plan	10 years
5	AMENITIES & SERVICES	6. WATER <i>nn</i> .DBF 7. POWER <i>nn</i> .DBF 8. COMM <i>nn</i> .DBF 9. EDFAC <i>nn</i> .DBF 10. MEDFAC <i>nn</i> .DBF 11. SEWAGE <i>nn</i> .DBF 12. S_WASTE <i>nn</i> .DBF 13. COMUNITY <i>nn</i> .DBF 14. LAW <i>nn</i> .DBF	Municipal records Electricity Board Telephone Exchange District Education Office District Medical Office SPCB Police Stations	Yearly

6	HOUSING	15. HOUSE nn.DBF	Housing Boards Town Planning Departments	5 Year
7	PUBLIC PRIVATE PARTNERSHIP	18. PPP nn.DBF	Municipal records/ Municipal Board	5 Year
8	LAND OWNERSHIP	16. LOWNER nn.DBF	Town Planning Departments	
9	ENVIRONMENT	17. CALAMITY nn.DBF 21. ENVI nn.DBF	State Pollution Control Board	Yearly
10	SLUMS	19. SLUM nn.DBF	Municipal Board	5 years
11	TRANSPORT	20.TRANSPORT nn.DBF	RTO	Yearly
12	GOVERNANCE	22. GOVT nn.DBF	Local Body	5 years

Note: nn - Year of Census/Data Collection
DBF - File Extension Name

STRUCTURE FOR PHYSICAL ASPECTS Physical nn.Dbf**

Field Name	Type	Width (Dec.)	Description
SCODE	Character	5	System “link” code
TCODE	Numeric	5	Town Code
WCODE	Numeric	4	Ward Code
TNAME	Character	30	Name of the town
DNAME	Character	30	Name of the District
SNAME	Character	30	Name of the State
TS	Character	5	Town status/size
CS	Character	10	Civic Status of the Town
ARAIN	Numeric	5	Annual rainfall in millimeters
TEMP	Numeric	5	Temperature in centigrade
AREA91	Numeric	5	Area of the town in 1991(in Sq.Kms.)
AREA01	Numeric	5	Area of the town in 2001(in Sq.Kms.)
DSHQ	Numeric	5	Distance in kms from State Head Quarters
DDHQ	Numeric	5	Distance in kms from District Head Quarters
DTHQ	Numeric	5	Distance in kms from Tahsil/ Head Quarters
DNC	Character	5	Nearest city (having 1 lakh and above population)
DNRS	Numeric	5	Nearest Railway Station
DMR Note: (*) nn indicates year of data.	Numeric	5	Nearness/Distance of Major River/Canal



NUDB&I

In case of NUDB&I first instalment (50%) of central share will be released on recommendation of State Coordination Committee.

The Proposed amount for NUDB&I

State Nodal Agency = Rs. 6.0 Lakh
Each Town = Rs. 1.0 Lakh

Release State Share to SNA for NUDB&I (Rs. 3.00 Lakh)

NUDB&I

The screenshot displays the NUDB&I Proforma, a form used for data collection. It includes several tables and sections for recording information:

- Section 1.1:** Physical Aspects and Locational Particulars. Includes fields for Name of the Town, Name of the District, and Name of the State.
- Section 1.2:** Physical Aspects of the Town. Includes fields for Physical Aspects of the Town, Physical Aspects of the District, and Physical Aspects of the State.
- Section 1.3:** Demographic Data. Includes fields for Total Population, Male, Female, and Total.
- Section 1.4:** Occupational Classification. Includes fields for Occupational Classification, Male, Female, and Total.
- Section 1.5:** Characteristics of State Workers. Includes fields for Characteristics of State Workers, Male, Female, and Total.

To Collect attribute data for NUDBI as per NUDBI Proforma

COST COMPONENT WISE

Sl. No.	ITEMS OF EXPENDITURE	QUANTITY	Total Cost (Rs. Lakhs)
	(A) USIS		
1	Computer System (HW&SW)	137 towns & 35 St. Nodal Agency	1385.00
2	GIS Data Base 1:10,000 Scale	137 towns	1672.66
3	GIS Data Base 1:2,000 Scale	137 towns	2007.20
4	Utility Mapping (24 towns)	24 Towns	606.00
5	Capacity Building		118.00
6	Application Development		350.00
7	Miscellaneous		50.00
8	Project Management		100.00
	(A) TOTAL USIS	137 towns	6288.86
	(B) NUDBI		
1	National level Seminar & reviews		10.00
2	Regional Workshops		8.00
3	State NUDBI	35 States	168.00
4	NUO (137 Towns)	137 Towns	137.00
5	Global Sample Cities–UNCHS	16 Towns	16.00
	(B) TOTAL NUDBI		339.00
	(A+B) TOTAL USIS & NUDBI		6627.86

KNOWLEDGE UPGRADATION

The training is anticipated at 3 levels:

- Operators and Technicians level – which will be mainly to train State/Town personnel on how to generate inputs, maintain and operate the NUIS Scheme and database. Details of design of NUIS Scheme will also be covered. This will be of 4-weeks duration.
- Planning level – mainly to train State/Town personnel on using the NUIS Scheme and database for generating inputs for urban planning and management. This will be of 2-weeks duration.
- Administrators level – mainly as an orientation on NUIS Scheme. This will be of 3-days duration.

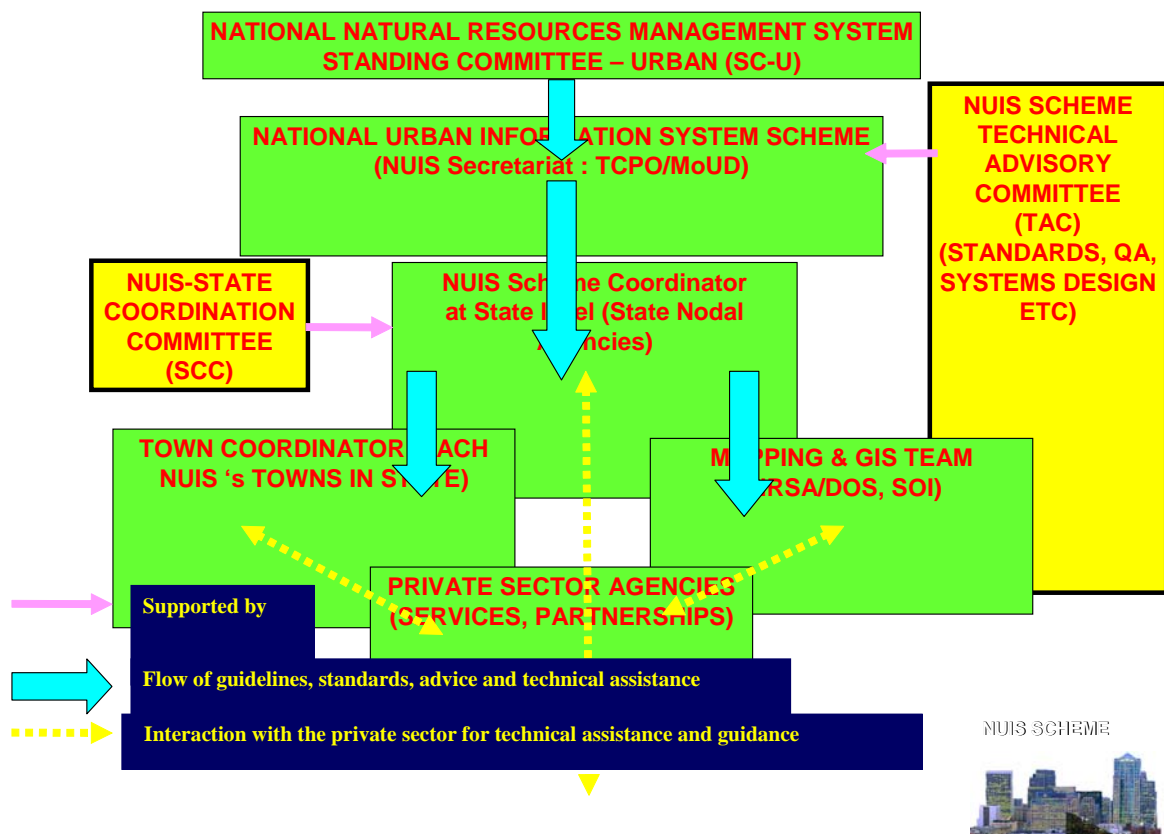
Identify Personnel for Capacity Building

FUNDING PATTERN

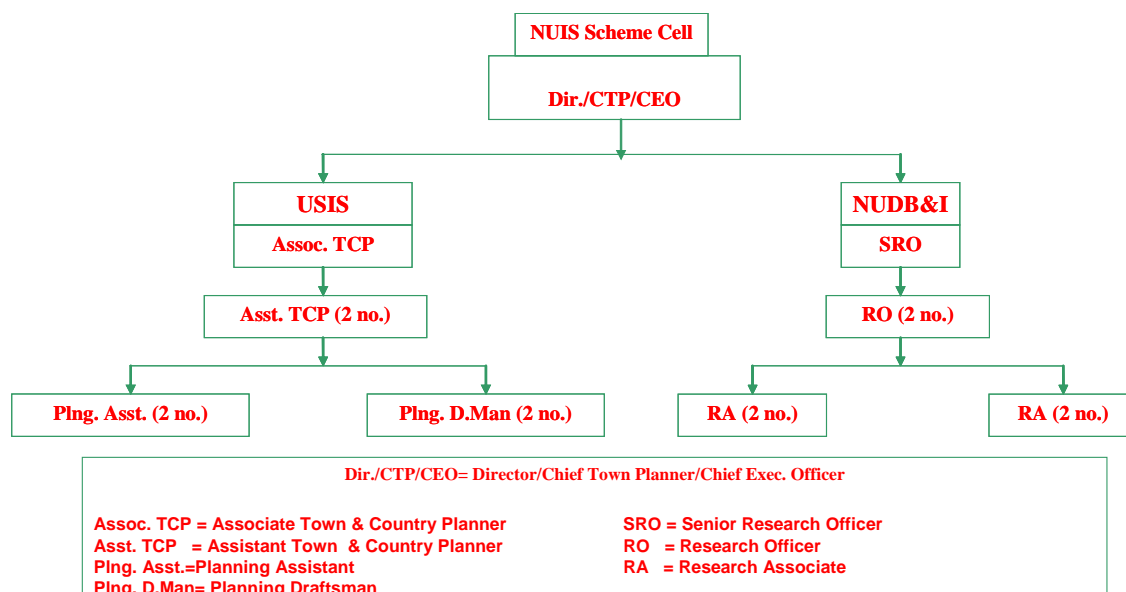
- Centrally Sponsored Scheme with a funding pattern on the basis of matching grant in the ratio of **75% Central Assistance** and 25% State contribution
- The budget estimated for completion of NUIS Scheme (Phase I) to cover 137 towns is Rs 66.28 crore.
- Funds related to GIS Data Base (for 1:10,000, 1:2,000), Utility Mapping (1:1000 Scale), Capacity Building, Application Development, Project Management, System (HW/SW), NUDBI and National and Regional Workshops under NUDBI will be managed and released at the Central level by MoUD

- Funds related to GIS Data Base would be released by MoUD to the agencies undertaking the job in three installments of 50%, 40% & 10%. The balance 25% of the state share will be paid by the respective State Govts. to the agency undertaking the job
- The release of subsequent instalment from the Central Government will depend on
 - (a) Physical and financial performance of the project
 - (b) Submission of utilisation certificate against the funds released earlier.
 - (c) Review and recommendation of the NUIS Scheme by State Coordination Committee (SCC)
 - (d) Availability of State Share

PROJECT IMPLEMENTATION



- Identify the State Nodal Agency (SNA)
- Establish NUIS Cell comprising USIS & NUDBI Units



PROPOSED COMPOSITION OF SCC

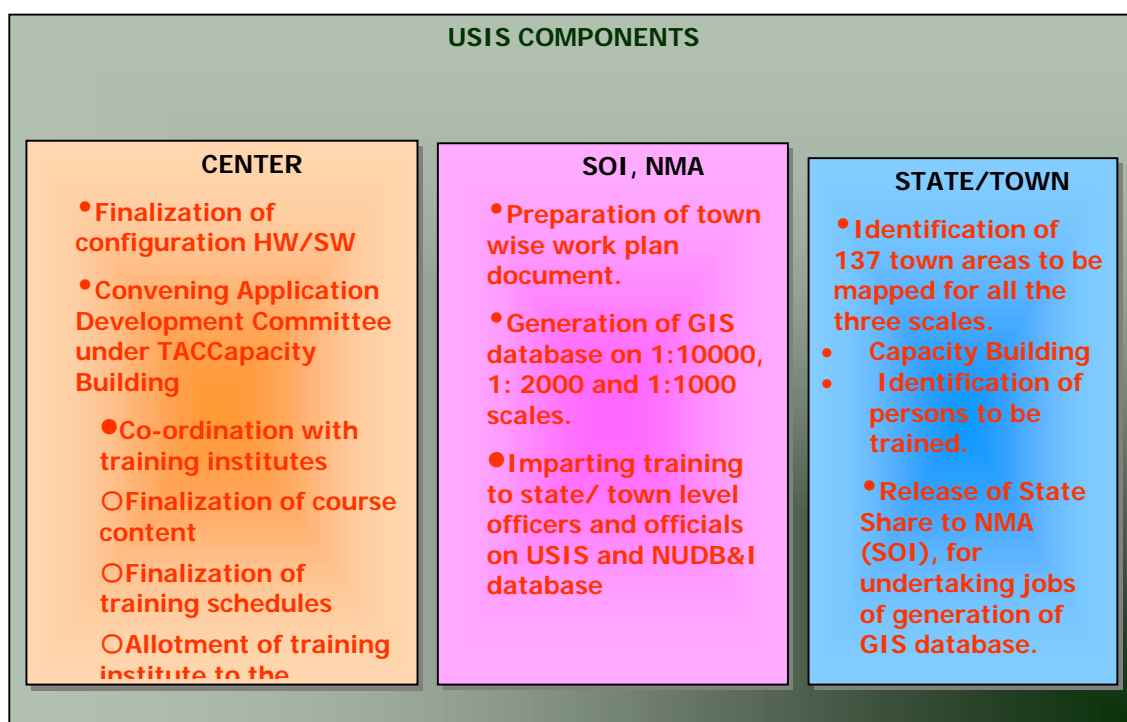
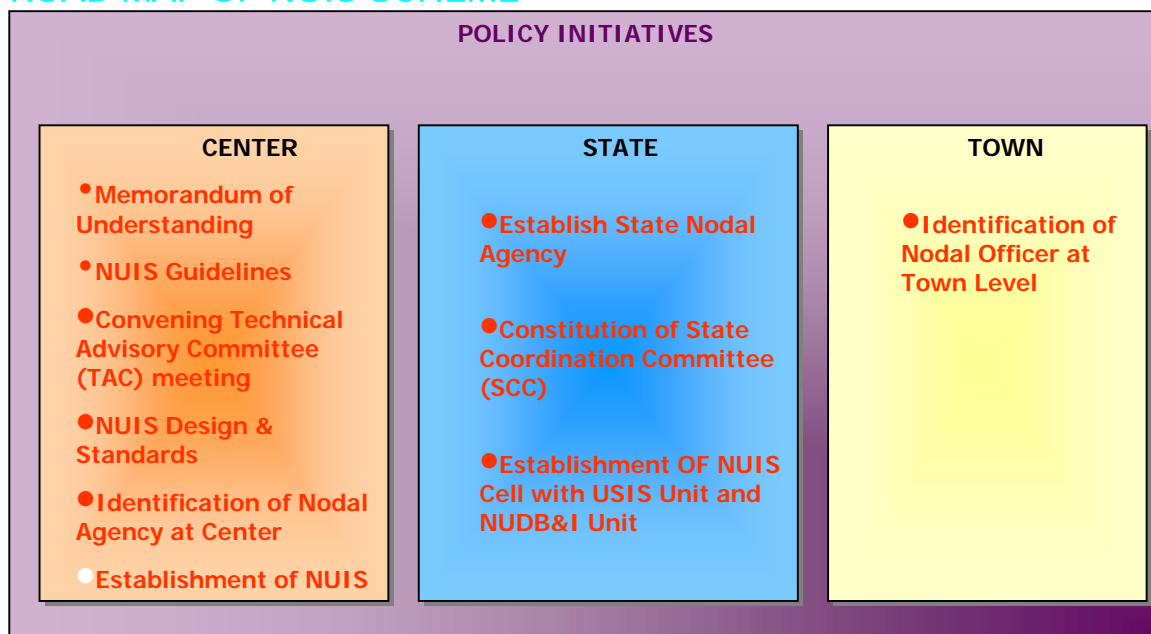
Secretary, Urban Development /Urban Local Bodies/Public Works	Chairman
Secretary, Finance of the State/UT Govt	Member
Secretary, Planning of the State/UT Govt.	Member
Secretary, IT State/UT Govt.	Member
Engineer-in-Chief Of PWD /Public Health Engineering Water Supply and Sewerage, Electricity, Telecom Departments of State/UT	Member
Representative of TCPO & MOUD.	Member
Representative of Planning Commission	Member
Representative Central Statistical Organisation/National Sample Survey Organisation	Member
Representative State/UT Revenue Department of the Unified Scheme in the State/UT	Member
Director, State Town & Country Planning Department	Member
Representative/ nominated professionals of major Stakeholders	Invitee
Chief of the Sate Nodal Agency	Member Secretary

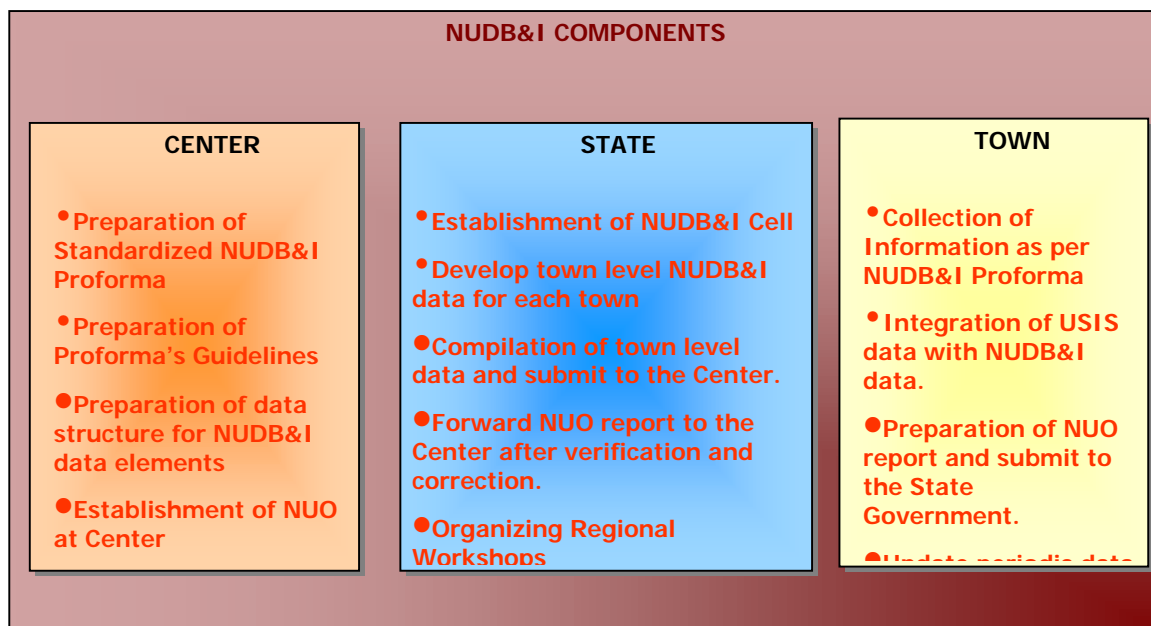
Constitution of State Coordination Committee (SCC).

ROLE AND FUNCTIONS OF SCC

- Consider the appraisal reports submitted by the State Level Nodal Agency.
- Approve and recommend the release of Central assistance through TCPO/MOUD.
- State Coordination Committee (SCC) may recommend and encourage involvement of the private sector for preparation of NUO reports and collection of NUDB&I data.
- Periodically monitor the progress of funds mobilization and implementation of various projects taken up under the Scheme;
- Review the implementation of the Scheme keeping in view its broad objectives and ensure that the programmes taken up are in accordance with the guidelines laid down.
- Consider issues raised by the implementing agencies from time to time and take appropriate action; if necessary obtain the advice of MOUD/ TCPO.

ROAD MAP OF NUIS SCHEME





ACTIONS OF IMPLEMENTATION

- Identification of the State Nodal Agency
- Demarcation of area for mapping
- Release of State Share for generation of GIS database
- Release of State Share for NUDB&I component
- Release of State Share for HW/SW component
- Identification of personnel for Capacity Building
- To Collect attribute data for NUDB&I as per questionnaire circulated
- Constitution of the State Coordination Committee (SCC).
- Establish NUIS Cell comprising USIS & NUDBI Units

ACTIONS TAKEN BY CENTRE FOR IMPLEMENTATION

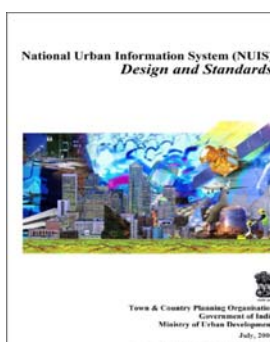
<http://urbanindia.nic.in/moud/programme/ud/main.htm>



MOU



NUIS Guidelines



Design and Standards



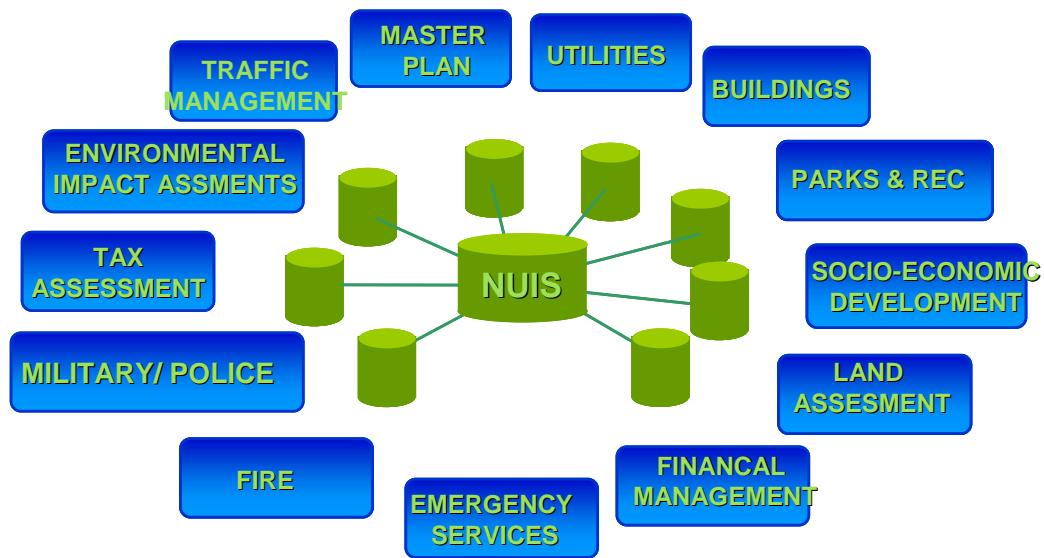
Road Map of NUIS

APPLICATION OF NUIS SCHEME

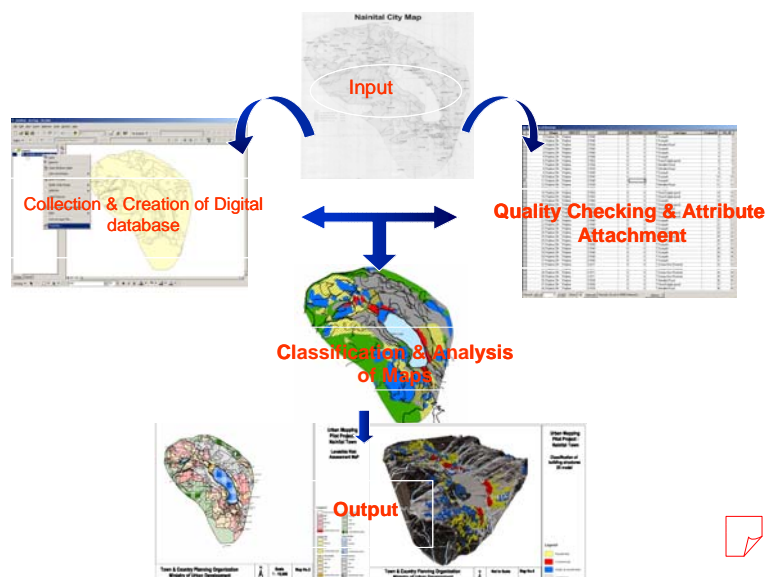
- Preparation of Master/Development Plans for all selected urban settlements by an integrated analysis of landuse, growth potential, population distribution, network and socio-economic parameters.
- Preparation of city/town ground water potential maps.

- Preparation of hazard potential maps for planning disaster mitigation and preparedness.
- Incorporation existing Master plans into the new database.
- Environmental analysis.
- Support the planning and management requirements of various city governance deptts. such as traffic, crime, sanitation, utilities etc.
- Contribute to development of urban indices for the National Urban Observatory Programme.

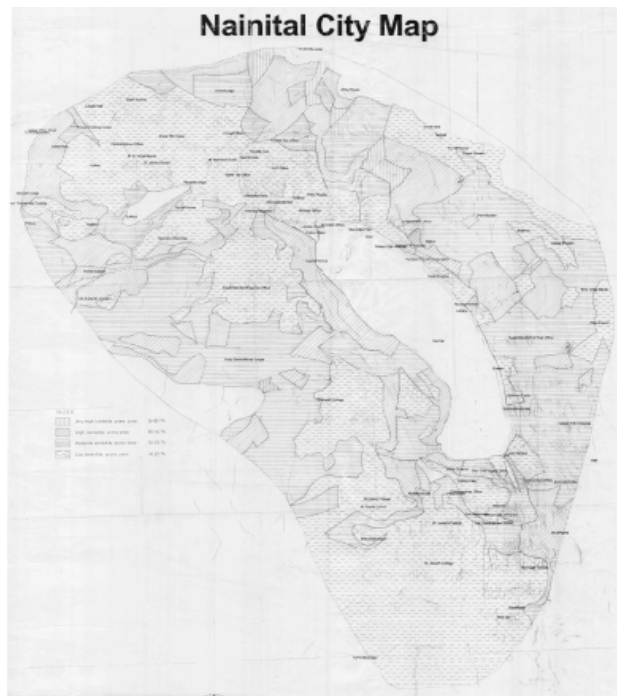
Application



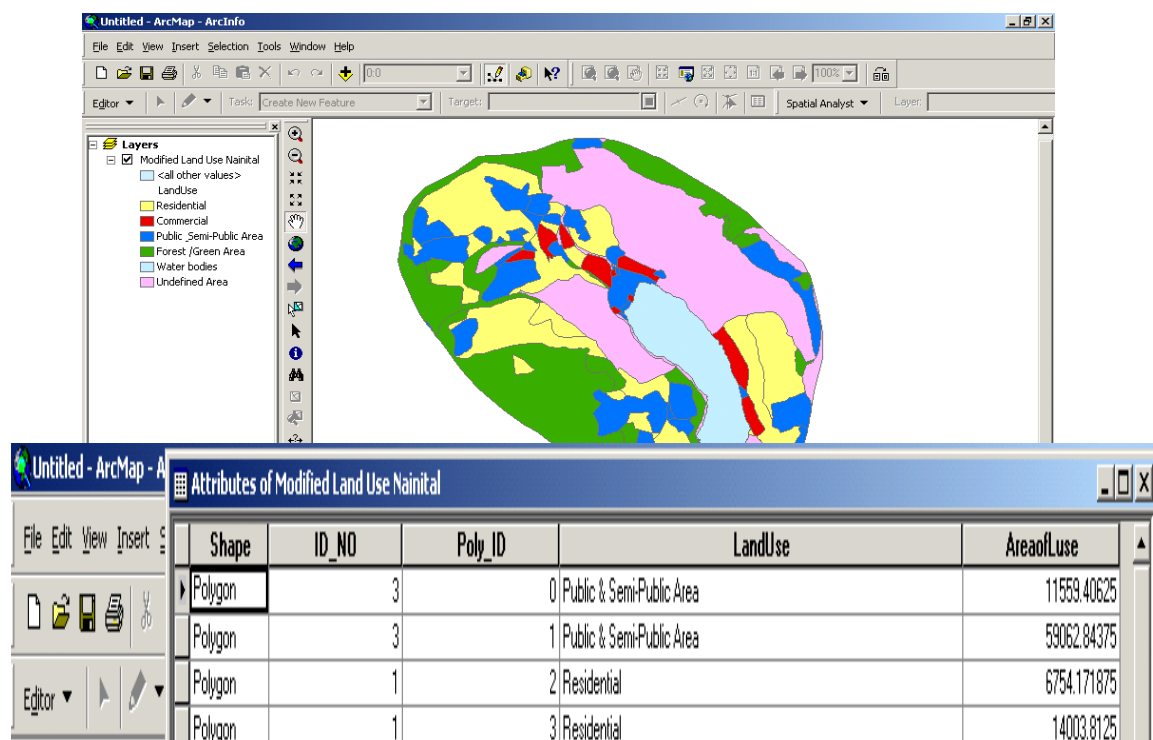
APPLICATION OF GIS FOR IDENTIFICATION OF LAND SLIDE PRONE AREA IN NAINITAL TOWN



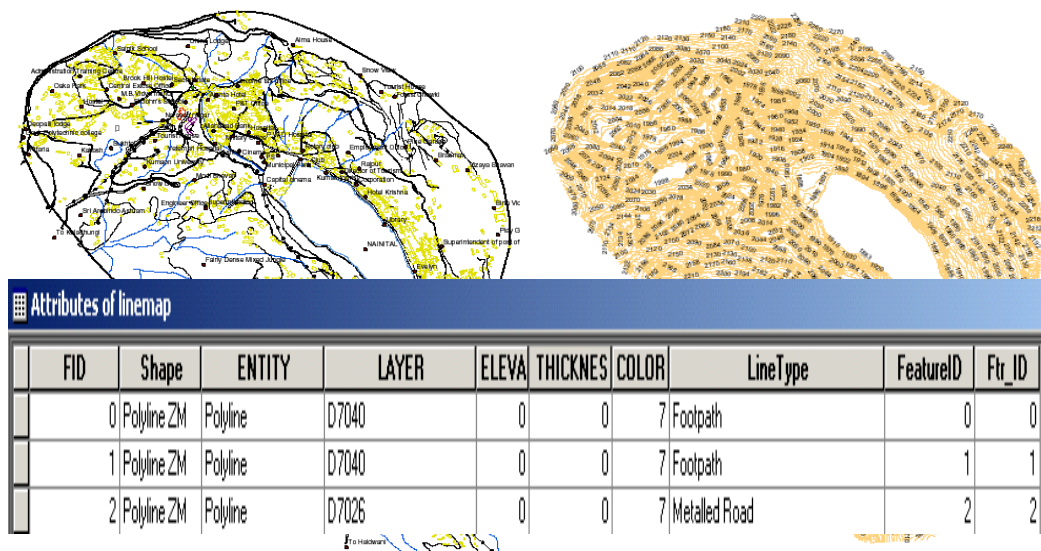
SCAN LANDUSE MAP OF Nainital Town



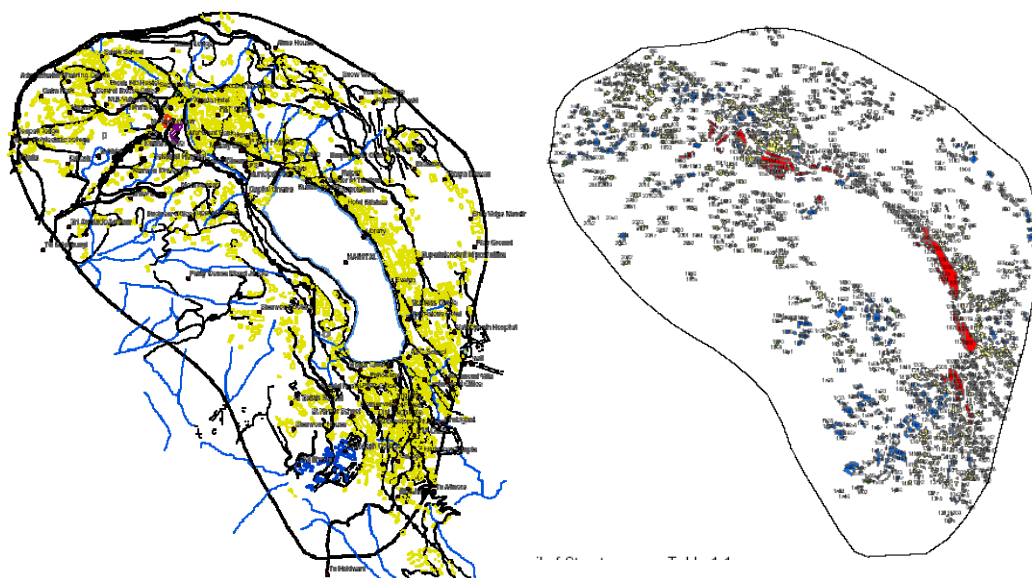
Land use map of Nainital Town



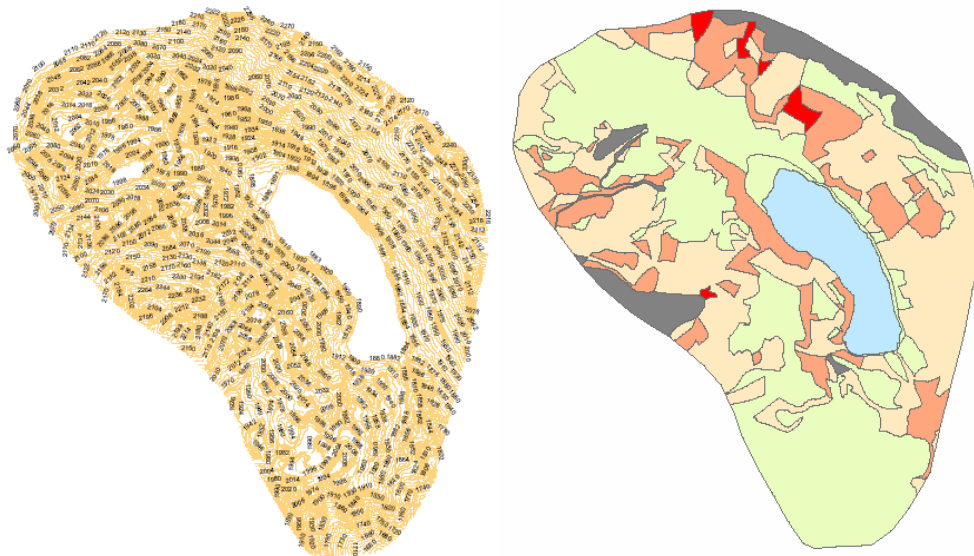
Line and contour maps



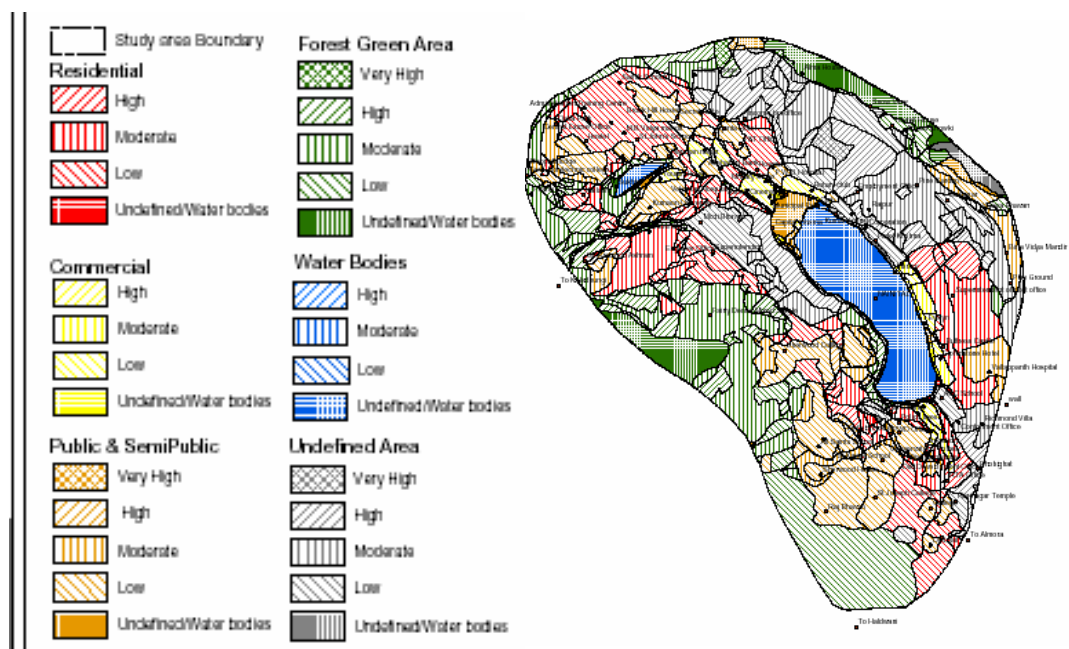
Clasifcation of buildings

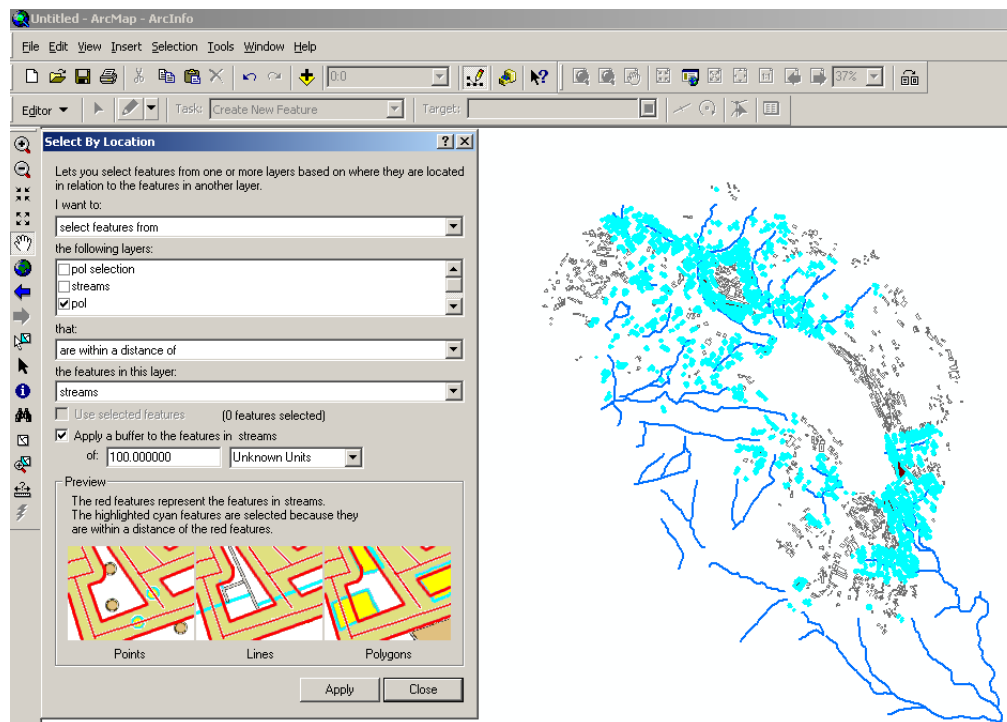


Slope analysis map with the help of 3D Analyst

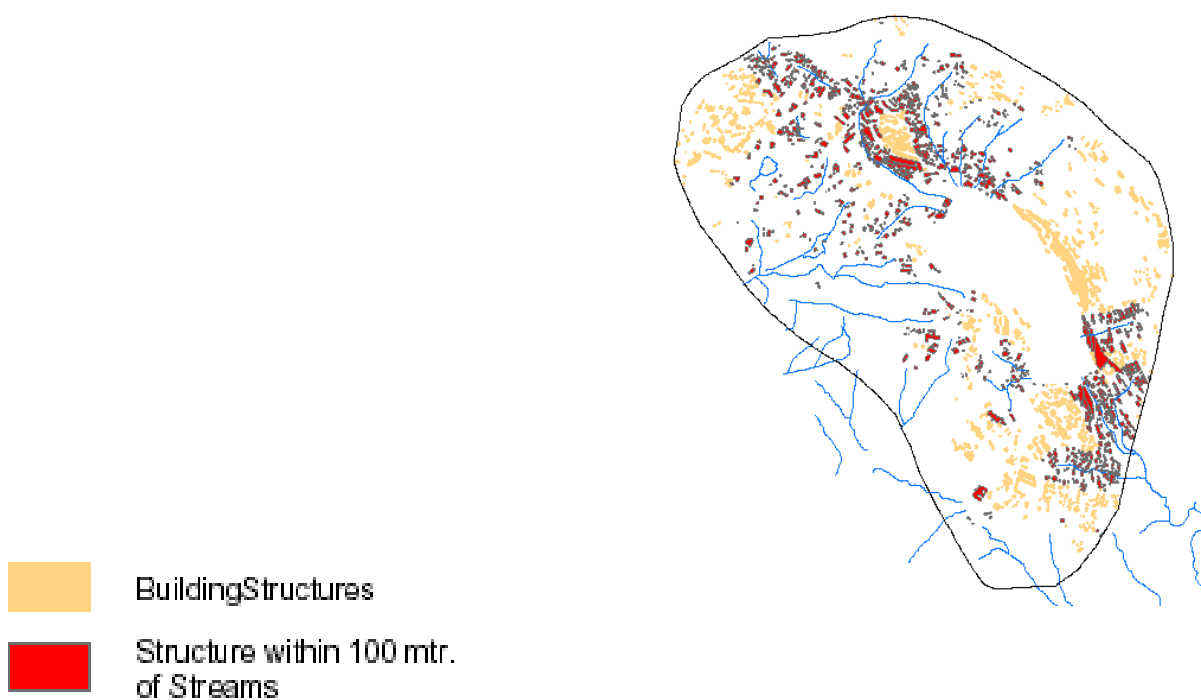


Land slide zonation map

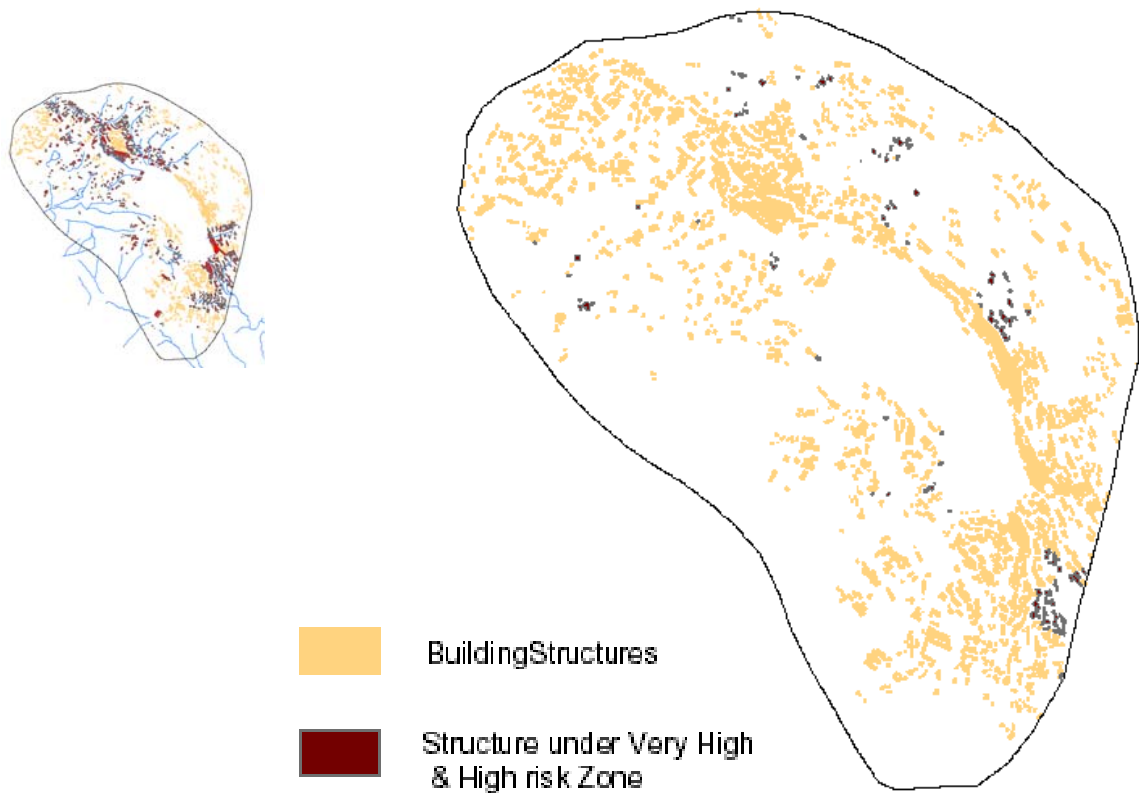




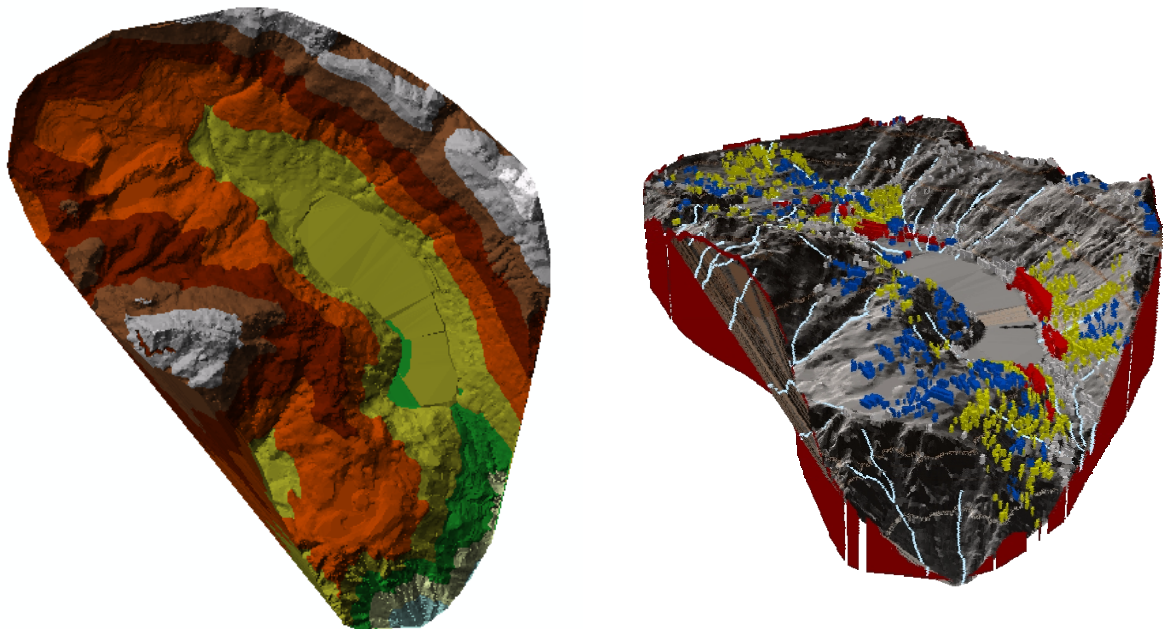
Structure within 100 mt of the streams



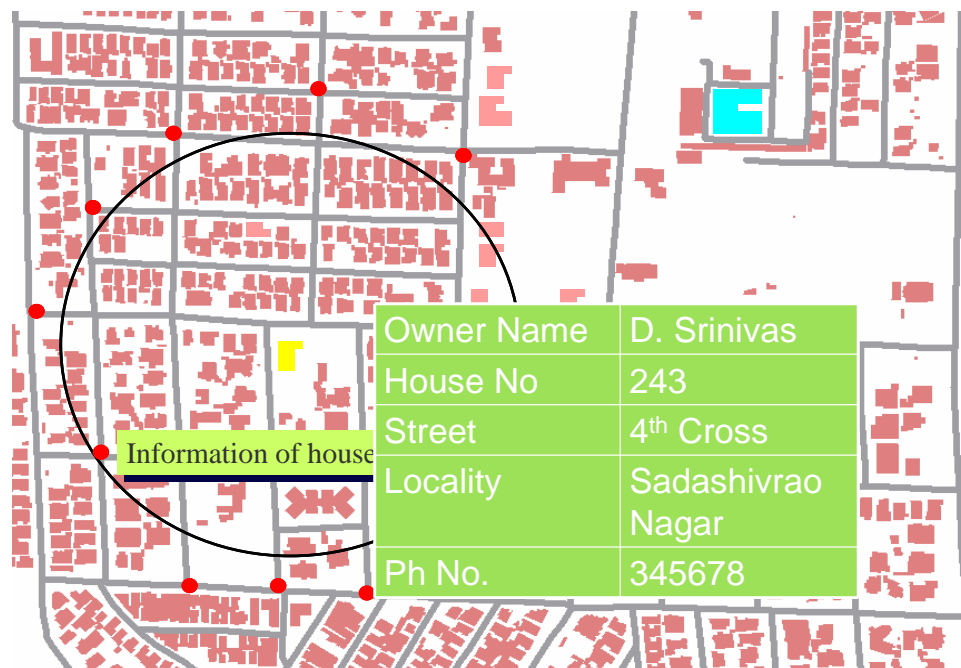
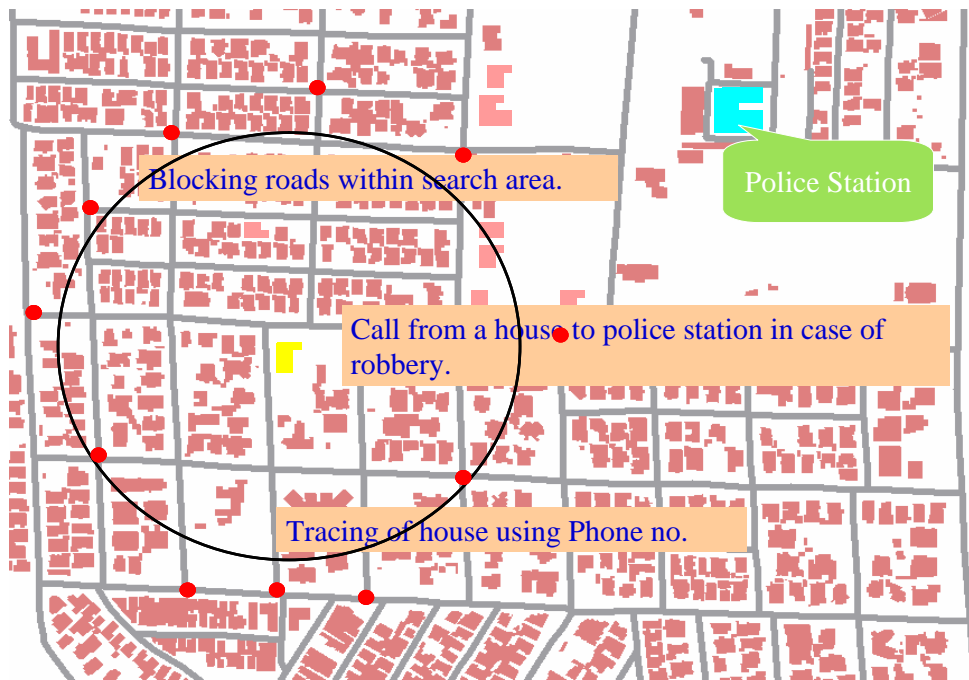
Structure within very high risk zone

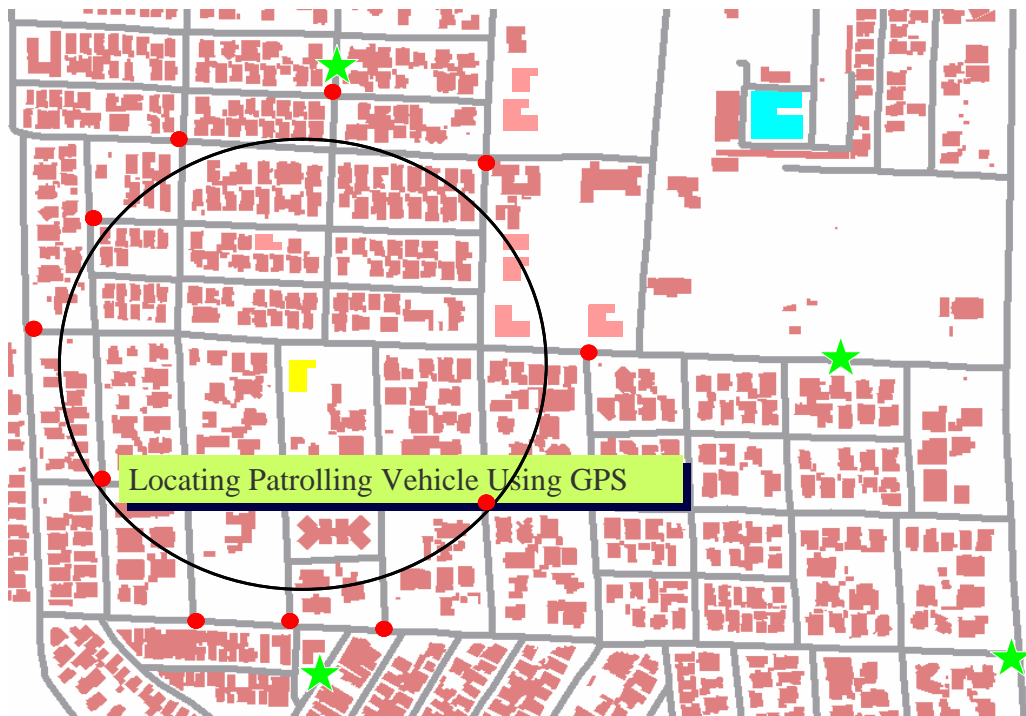


TIN image

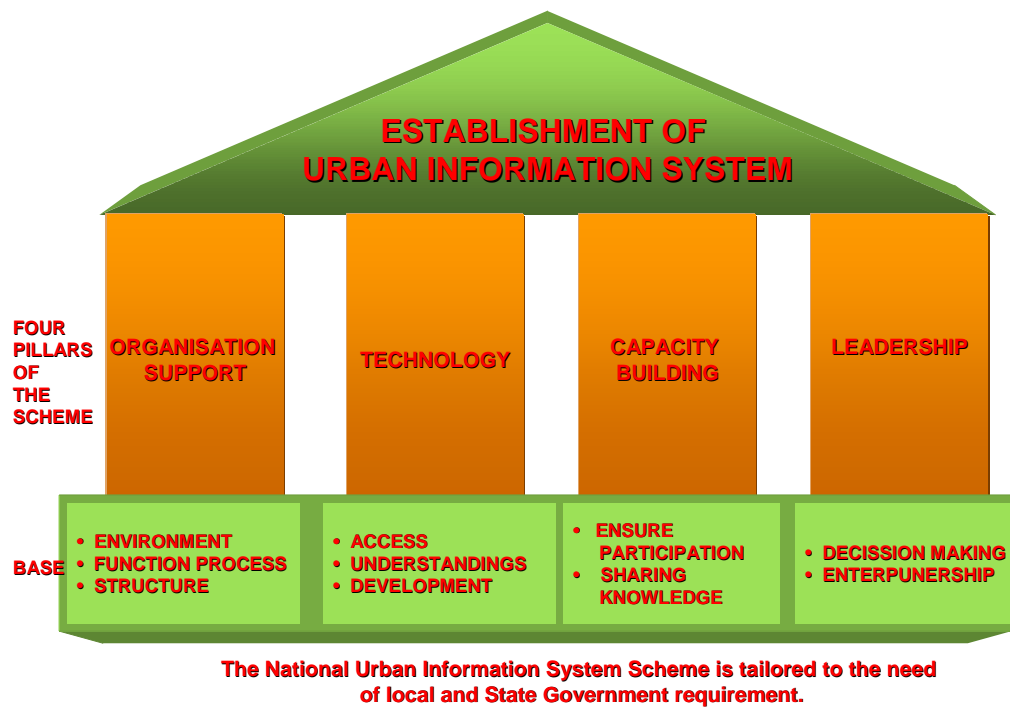


Application for Police to take Action





SUSTAINABLE DEVELOPMENT OF TOWN



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