



VIZAG – BUS RAPID TRANSIT SYSTEM

VIZAG

BUS RAPID TRANSIT SYSTEM



Submitted by

GREATER VISAKHAPATNAM MUNICIPAL CORPORATION

March 2007





URBAN TRANSPORT – VIZAG BRT



Introduction

- **Vizag - largest city of the nation in terms of land**
- **AP's second largest in terms of population and area**
- **Rapid industrialisation : Steel, Petroleum, Fertilizers, Pharma**
- **Grown at a very fast pace between 1991 and 2001.**





Existing Scenario

- Rapid growth → more people → more traffic → more congestion → constrained roadways → need for public transportation.
- City traffic is commuter-based, tourism- intensive and pilgrim-centered.
- Road network – dense, congested .
- High mixed traffic.
- Slow moving vehicles – Low speed.
- Accident prone.
- Less share of Public Transport – Increasing Private owned vehicles.





New View

- Development of Cycle Lane, Pedestrian Path Way, Parking
- DUAL LANE CARRIAGE WAY ON EITHER SIDE





CONSULTATIONS & DELIBERATIONS

- **Consulted APSRTC, Traffic Police and Academia**
- **Conducted discussions and BRT viability assessment.**
- **IIT Delhi's Advice was sought**
- **Vizag is committed to relieve congestion by enhancing the public transport.**
- **Consultants – ASCI, Hyderabad & A.U. College of Engg.**

CURRENT ROAD NETWORK

- **Major roads comprise 126 km out of a total road length of 1,007 km**
- **NH5 connects Kolkata and Chennai**
- **Roads and railways occupy only 6% of available land.**
- **Need for allocating more land for transportation**



Existing Characteristics

Socio-economic:

- 50% population below 25 years of age.
- Occupation - Students @ 31% and housewives @ 30.34%
- Average household monthly income – Rs.4200/-
- Economically weaker group (upto 2500) - 28.5%
- Low income group (2500 - 5500) - 32.5%
- Middle income group (5500 – 10000) - 27.25%
- Higher income group (Above 10000) - 11.5%
- Expenditure on transport - 11.4%



Traffic Analysis:

- **Volume count surveys conducted 19 locations in entire city**
- **O-D surveys, speed and delay surveys, parking surveys conducted.**
- **Annual growth rate of cars / jeeps at 17% and two wheelers at 11% from 2000-2006.**
- **Increase in growth of private vehicles – deficiency in public transport and non-coverage of sub-urban services.**
- **Peak hour peak direction trips (PHPDT) – from 3950 to 5970.**
- **Average occupancy : Two wheeler – 1.55, Cars – 4.7**
- **Average operating speeds : 14 KMPH to 25 KMPH**



VIZAG

A radial, Moderate Density-Sprawl City
Population Density – 2006 (P/Ha)

GVMC - 2685
VUDA - 1540

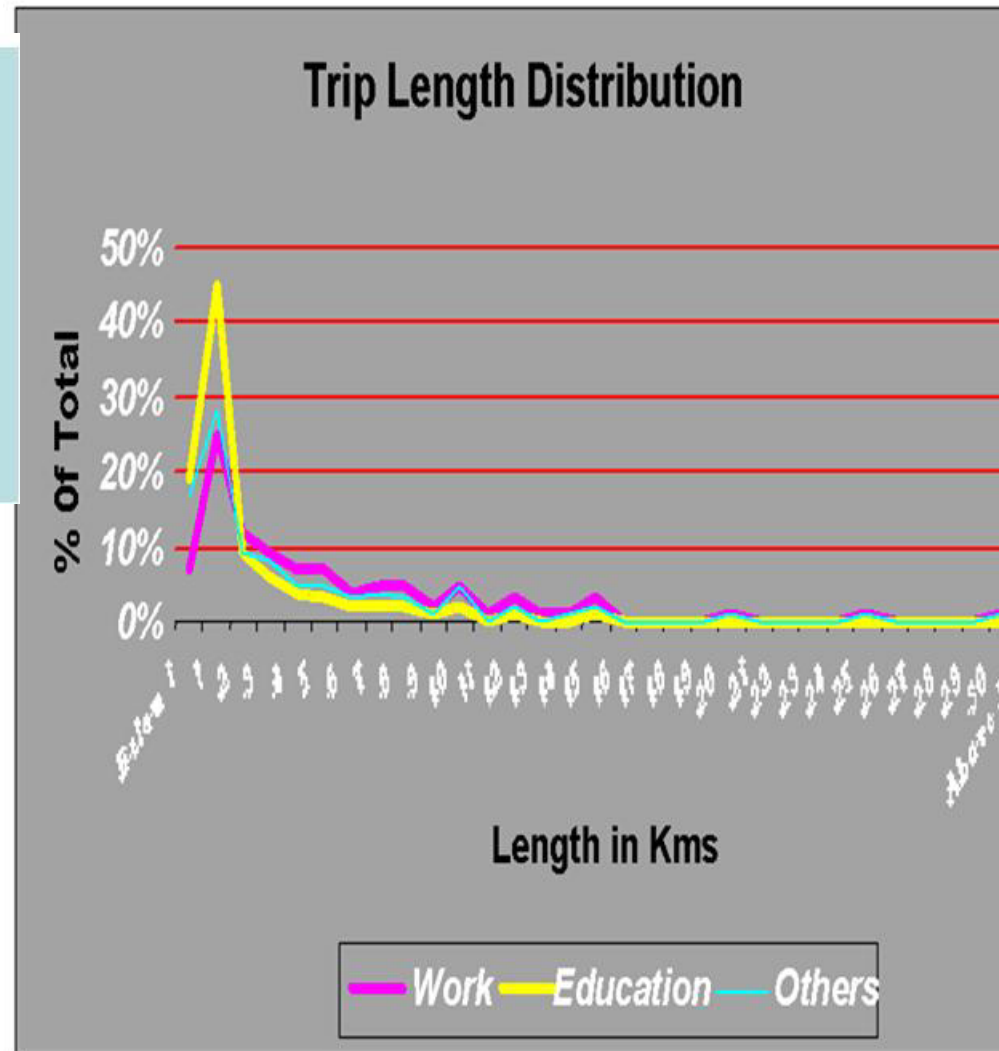
Average trip rate: 0.82 / person/day

Average trip length: 16.0

City Bus : 16 Km

Auto Rickshaw : 7 Km

Cycle Rickshaw : 3.5 Km



TRIP LENGTH DISTRIBUTION



Mobility:

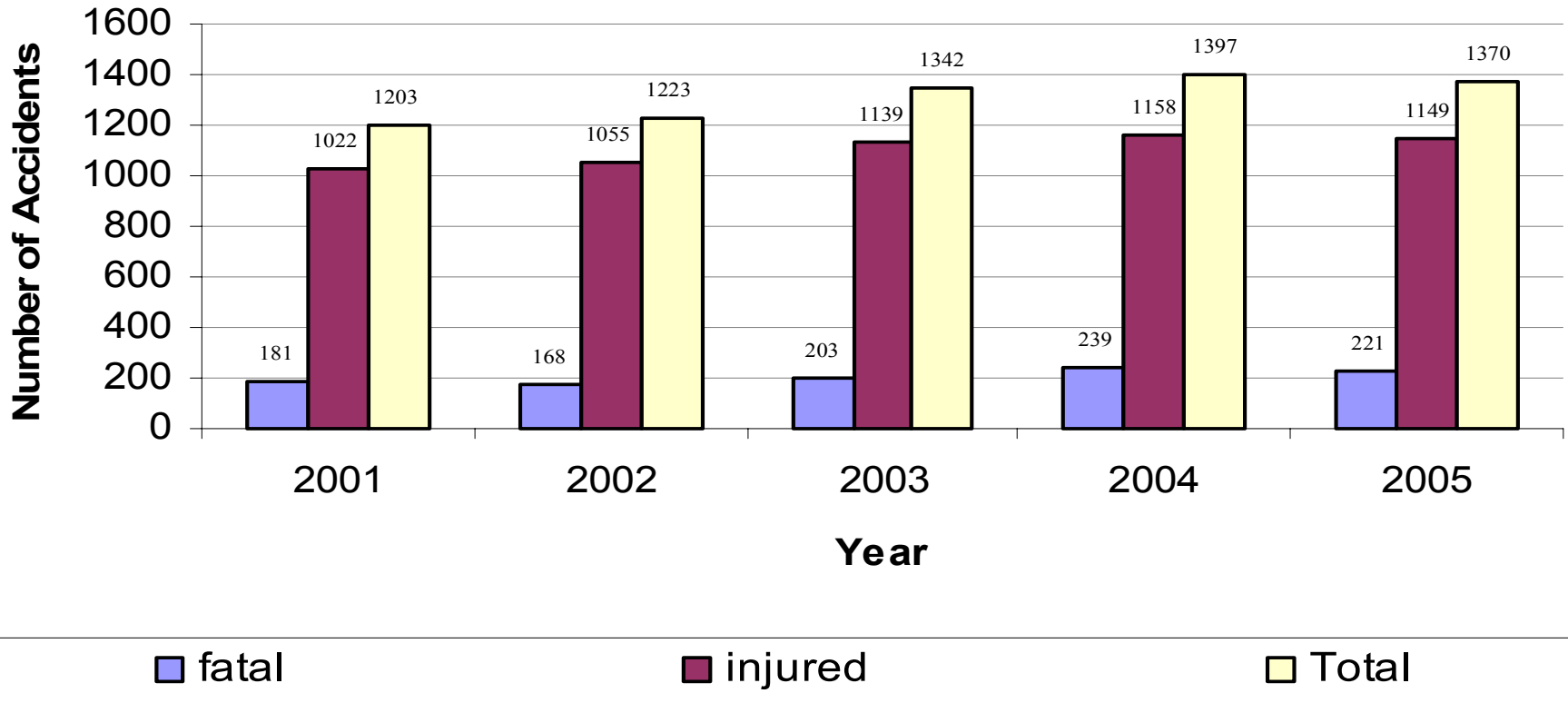
- **Population size: in 2021 - 20.99 Lakhs**
- **Per Capita Trip Rate (PCTR) :**
 - 2001 - 0.69**
 - 2006 - 0.82**
 - Projected 2021 - 1.35**



ROAD SAFETY



Accidents in Visakhapatnam



Fatal and injury cases have increased over the time.

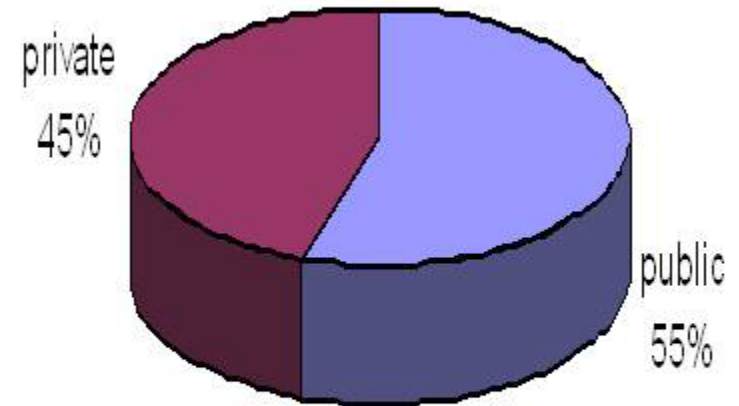


MODAL SHARE

Actual Modal Share public transport 20%



Benchmark



Public transport share of 35% vs Benchmark of 55%.



- 2 wheelers grew at 11%, Cars at 17%, auto-rickshaws at 11%, tempo at 162% and Maxi cabs at 735% between the years 2000 and 2006
- But public transport vehicles (APSRTC) grew at only 1% between the years 2000 and 2006
- There is increasing trend towards private motor-vehicle usage.

⇒ Inadequate road capacity ⇒ More congestion



CORRIDOR ANALYSIS



- Traffic data, transit ridership, lane Geometry and other information was analysed. Traffic surveys were conducted at 19 locations to assess travel pattern in the City.
- Several modes of travel were counted.
- Various axle categories were converted to PCEs.



TRAFFIC ANALYSIS



- Peak hours varied between 9 to 11 AM and 5 to 7 PM.
- Peak Hour Per Direction Trips (PHPDT) were computed. The PHPDT for the 8 identified corridors ranged from 3950 to 5970 . Assuming a very conservative growth rate of 5% a year, these values translate to a range of 5,750 to 9100 in year 2011.



BRT IN VIZAG



- Vizag is one of the largest cities in terms of land; AP's second largest in terms of population
- Rapid industrialization : Steel, Petroleum, Fertilizers, Pharma.
- The City traffic is commuter-based, tourism – intensive and pilgrim – centered.
- Road network is dense and congested due to narrow roadways, high pedestrian traffic and slow moving vehicles.



Corridor Selection



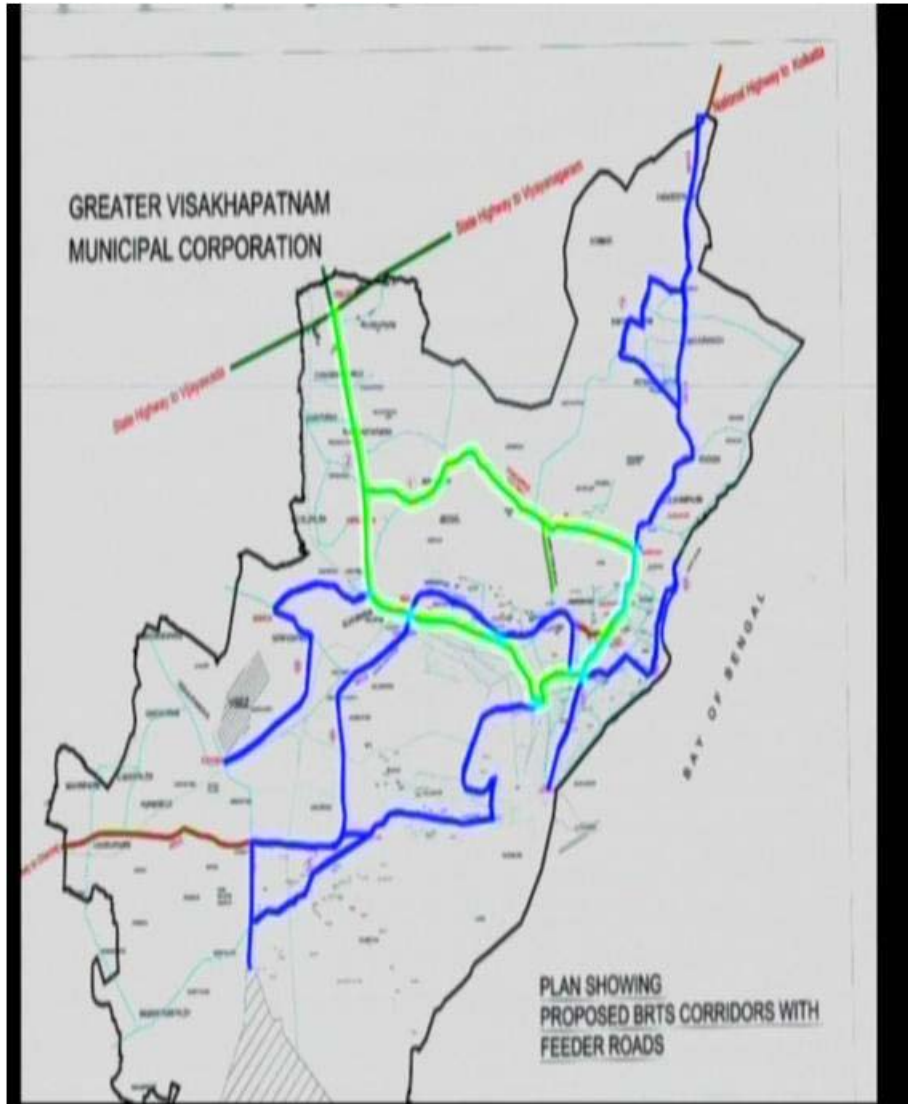
BASED ON STUDIES AND ANALYSIS CONDUCTED

- 8 corridors were identified for BRT deployment
- Selection based on ridership, land use and traffic considerations.
- Feasibility Report completed for all 8 Corridors to implement.
- Effective length of BRT of 8 Corridors – 105.7 KM
- Cost of Project for 8 Corridors – Rs.908.91 Cr.



IDENTIFICATION OF CORRIDOR

8 Corridors identified covering entire city



Corridor No.	Corridor	Length (km)
1	Vepagunta to Dwaraka Nagar VIA Simhachalam (Total Length = 23 km; Effective BRT Length = 20.5 km) with Tunnel through Simhachalam Hills (STC)	23
2	Pendurthi to Dwaraka Nagar VIA NAD Junction (PTC)	23
3	Old Post Office to Anandapuram (Portion is Simhachalam Corridor; Total Length 28.1 km; Effective BRT Length = 4.4 km) (existing NH5)	28.1
4	VSP to Dwaraka Nagar VIA Scinida Junction	30
5	Jodugullapalem to Dwaraka Nagar	8
6	VSP to Dwaraka Nagar VIA NH-5 (Total Length = 39.5 km with 38.1 of NH; Effective Length = 1.4 km)	39.5
7	Gopalapatnam to Duvvada	10
8	PM Palem to Kommadi Junction	10
	Effective Length	100



COST ESTIMATES FOR 8 CORRIDOR

Corridor No.	Corridor	Length (km)	Unit Cost (Rs. in Crores)	Total Cost (Rs. in Crores)
1A	Vepagunta to Dwaraka Nagar VIA Simhachalam (Total Length = 23 km; Effective BRT Length = 20.5 km)	20.5	8.21	168.31
1B	Tunnel under Simhachalam Hills			93.65
2	Pendurthi to Dwaraka Nagar VIA NAD Junction	22.6	8.45	190.97
3	Old Post Office to Anandapuram (Portion is Simhachalam Corridor; Total Length 28.1 km; Effective BRT Length = 4.4 km)	4.4	7.95	34.98
4	VSP to Dwaraka Nagar VIA Scinida Junction	30.4	7.25	220.40
5	Jodugullapalem to Dwaraka Nagar	8.1	6.10	49.41
6	VSP to Dwaraka Nagar VIA NH-5 (Total Length = 39.5 km with 38.1 of NH; Effective Length = 1.4 km)	1.4	8.30	11.62
7	Gopalapatnam to Duvvada	8	8.21	65.68
8	PM Palem to Kommadi Junction	9	8.21	73.89
	Effective Length	104.4		908.91



CORRIDORS PROPOSED IN THE 1ST PHAS

- Two Corridors prioritized
 - STC from Vepagunta via Simhachalam
 - PTC from Pendurthi via NAD Junction
- Priority based on
 - Travel demand
 - Future growth
 - Economic growth
 - Land usage for development
 - Availability of vast Govt. Land
 - Rider ship
 - Location of public utilities like Bus station, Railway station etc. on the Corridors.
 - Implementation - Easy



- **STC (Vepagunta to Dwaraka Nagar)**
 - Health City, LV Prasad Eye Hospital
 - VIMS (Visakha Institute of Medical Science)
 - Industrial Establishments like ACC Cement Factory
 - Simhachalam Pilgrim Centre
 - Info Cities like Satyam and WIPRO
 - AU College of Engineering and Architecture
 - Two Shopping malls like CMR, Spencer
 - Central Bus Station
 - Indoor Stadium
 - Tourism Spots like Mudasarlova, Kambala Konda etc.,



PROMINENT PLACES ON TWO PRIORTISED CORRIDOR

- **PTC (Pendurthy to Dwaraka Nagar)**
 - Industrial Establishments like LG Polymers, Coramandal Paints etc.,
 - Major Commercial activities at Gnyanapuram
 - Naval Defense establishments
 - Naval Science and Technological Laboratory (NSTL)
 - Railway Station
 - Shopping Malls like Big Bazar etc.,
 - Near to the Airport
 - Major Entertainment places like Cinema Theatres, Parks etc.,



SALIENT FEATURES OF 2 PRIORITIZED CORRIDOR

1) BRTS from Vepagunta – Dwaraka Nagar via Simhachalam (STC) along with Tunnel.

- Inside running BRT
- Signals synchronization based on the bus frequency.
- Lane for NMV on left side
- Bus stations close to inter sections
- Arrival time displayed at Bus stations.
- Dedicated Cycle track, Footpath & duct for utilities.
- Total Length of BRTS - 23 KM
- Length of Tunnel - 1.2 KM
- Right of way of BRTS - 60 M, 36 M & 30 M
- Cost of the Project incl. Tunnel - Rs.261.96 Cr.
- **Public Utilities**
 - e-Seva centres, Spot bill collection centres near the corridor



SALIENT FEATURES OF 2 PRIORITIZED CORRIDOR

2) BRTS from Pendurthi – Dwaraka Nagar via NAD Junction, Gnanapuram (PTC)

- Inside running BRT
- Signal synchronisation based on the bus frequency.
- Lane for NMV on left side
- Stations close to inter sections
- Arrival time displayed at Bus stations.
- Dedicated Cycle track, Footpath & duct for utilities.
- Total Length of BRTS - 22.6 KM
- Right of way of BRTS - 36 M to 30 M
- Cost of the Project - Rs.190.97 Cr.
- **Public Utilities**
 - e-Seva centres, Spot bill collection centres near the corridor



Typical Cross Section of Tunnel to Simhachalam hill



Length	1.2 KM
Two tubes	16.5 m (Each)
Three lanes	one BRT





CONCEPT OF BRT STATION





SYSTEM DESIGN CONSIDERATIONS

- Access management
- Shoulder improvements
- Concept of multimodalism
- Provisions for the pedestrian and the handicapped
- Safety improvements
- Transit signal priority
- Green space
- Communications and traffic monitoring
- Passenger information at Bus Stations



- **Platforms** – 19 m X 4.5 m
- **Weather protection** – canopy, screening
- **Amenities** – Seating, leaning rail, ash trays, bicycle racks, lockers, vending machines, utilities, route information
- **ITS** – Real time display, TVM, communications
- **Security** – CCTV cameras, Public telephone
- Artwork, **maintenance**, sustainability
- **Advertising** – Revenue source
- **Landscape** – Low maintenance
- **Accessibility** – Handicapped friendly



Off-board Fare Collection





RIDER PREFERENCES

- **Safety and Security – Lighting, Traffic**
- **Protection from weather**
- **Passenger information**
- **Better bus stops / stations**





BUS RAPID TRANSIT SYSTEM DESIGN OPTIONS

MEDIAN VS SIDE LANE SYSTEM

SIDE LANE

- Compatible with conventional bus door configuration on curb side (left side)
- Total road width occupied for bus lane is double.
- Capacity remains under-utilised.
- Cost intensive treatment is required at intersections to ensure free left turn movement for regular traffic

MEDIAN LANE

- Easy to integrate the bus flow with other flow at intersection
- Optimum road width for two direction movements
- Infrastructure created can be utilised even if BRTS is withdrawn
- Traditional bus door configuration can be retained
- Slight diversion to other traffic streams



• VIZAG B R T S

• BUS TECHNOLOGY



VEHICLE TYPE	NO. OF PASSENGERS	VEHICLE LENGTH(M)
Vans	10-16	3
Mini buses	25-35	6
Standard buses	60-80	12
Articulated buses	120-170	18
Bi-Articulated buses	240-270	24





- **Level Boarding/Alighting through 2 Doors for Improved Accessibility**
- **Station Platform with Passenger Shelter**
- **Larger Seating & Queuing Area for Improved Comfort**
- **Floor of the bus station and bus at same level**





- **40-feet long; capacity of 40 to 60 passengers**
- **Low-floor vehicles with a height of 380 mm**
- **Diesel-running; Air Conditioning for passenger comfort**
- **Adequate lighting inside the vehicle**
- **Passenger information and advertising inside**
- **Communication through voice for emergency response**
- **Durable and low-maintenance interior including physically-challenged friendly seating**



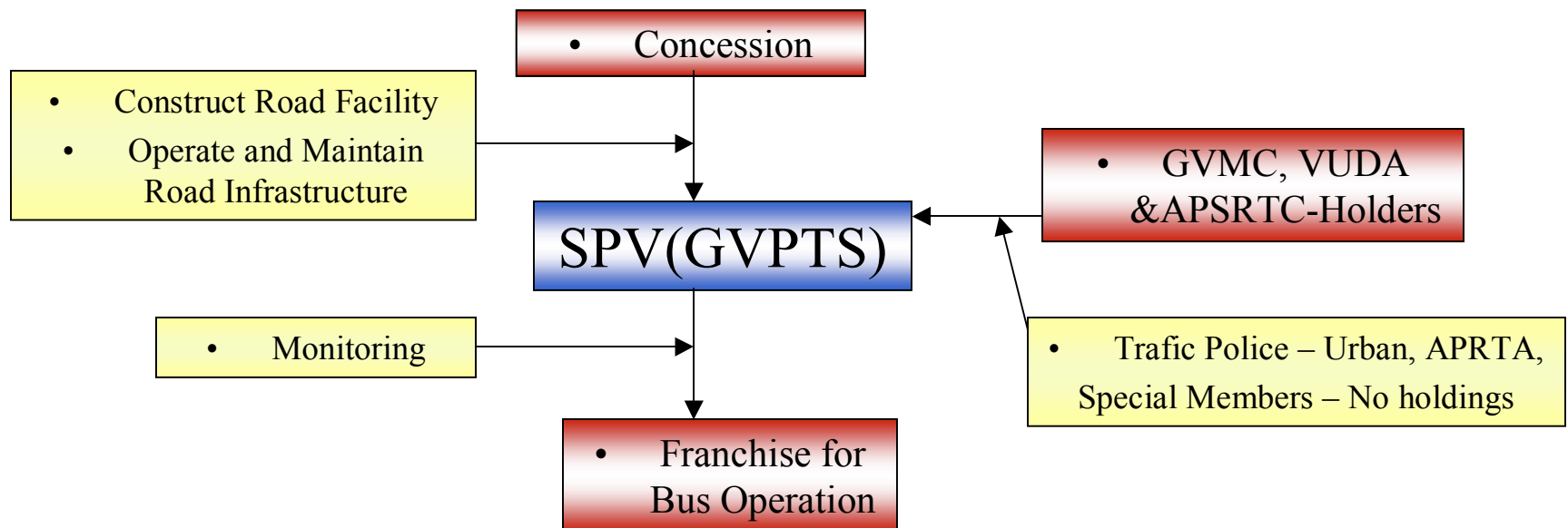
INTELLIGENT TRANSPORT SYSTEM

- **Transit signal priority for reduced travel times**
- **Loop detectors to sense vehicle movement**
- **Passenger information at bus stations, on the rolling stock and along the corridor**
- **GPS and AVL on all buses for tracking and monitoring vehicles**
- **Smart cards for passengers**
- **On-board electronic fare collection with provision for off-board ticket vending**



Implementation Framework

- The project will be operated through SPV - GVPTS
- SPV to Plan , Develop, Operate and Manage the BRTS
- SPV to Evaluate opportunities/ alternatives for BRT Improvement





- **Bus Fares**
- **Bus Stop / Terminal Franchising**
- **Advertisement Rights**
- **Commercial activity at terminals**
- **Leveraging land and asset development**
- **Parking facility revenue**
- **Impact Fees on new building construction**



BUSINESS MODEL

- **Fixed infrastructure – roads, bus stops, signaling devices etc**
 - **JNNURM funding at 50%**
 - **GoAP share at 20%**
 - **ULB share at 30%**
 - **Ownership by GVTA**
- **Through SPV under PPP – Parking lots, FOBs, Rolling stock**



PROJECT COSTING – JNNUR

For Two prioritized corridors

S. No.	Name of the Corridor(for road infrastructure complete)	Project Cost Under JNNURM (Rs.in Crores)
1	Simhachalam Transit Corridor (STC) including Tunnel	261.96
2.	Penduthi Transit Corridor (PTC)	190.97
	Both Corridors	452.93

- Method of financing for fixed infrastructure:
 - GOI Share @50% : 226.47 Crores
 - AP Govt share @20% : 90.59 Crores
 - GVMC share @30% : 135.88 Crores



PPP (PUBLIC PRIVATE PARTNERSHIP)

- **Under PPP** - Rs.82.40 Crore
 - Parking lots
 - FOBs
 - Rolling Stock

S.No	Corridor	PPP (Rs.In Crores)
1.	STC	46.50
2.	PTC	35.90



OVER ALL PROJECT COST

Rs.in Crores

Sl. No	Corridor	Fixed Cost under JNNURM	PPP	Total Project
1	Simhachalam Transit Corridor(STC)	261.96	46.50	308.46
2.	Pendurthi Transit Corridor (PTC)	190.97	35.90	226.87
	Total	452.93	82.40	535.33



JNNURM –FIXED INFRASTRUCTURE

Name of the BRTS Corridor	Project Cost (Rs. in Crores)	2007-08 (Rs. in Crores)			2008-09 (Rs. in Crores)			2009-10 (Rs. in Crores)		
		GOI 50%	GO AP 20%	UCB 30%	GOI	GOI AP	UCB	GOI	GO AP	UCB
STC	261-96	43.66	17.46	26.20	43.66	17.46	26.20	43.66	17.46	26.20
PTC	190-97	31.83	12.73	19.09	31.83	12.73	19.09	31.83	12.73	19.09
	452-93	75.49	30.19	45.29	75.49	30.19	45.29	75.49	30.19	45.29



- **Appointment of Project Management Consultant**
- **Work allocation among agencies**
- **Registration of the SPV**
- **Formalizing all revenue streams**
- **Fixing of tariff structure**
- **Formulation of operational guidelines and standards**
- **Shifting of utilities**
- **Widening of the road.**
- **Tender process for providing roads and other infrastructure.**
- **Construction of Bus stops**
- **Laying of the infrastructure**
- **Procurement of signaling systems and devices**
- **Procurement of rolling stocks**
- **Awareness and IEC**
- **Test runs and operationalization**



- EXECUTION PERIOD – 3 YEARS**

Item of work	2007-08			2008-09			2009-10		
Appointment of PMC									
Fixed (Road) Infrastructure									
A. Tenders									
B. Execution									
Rolling Stock ITS etc.									
A.Tenders									
B.Execution									
Trial Run									

Completed
 Under process
 Target

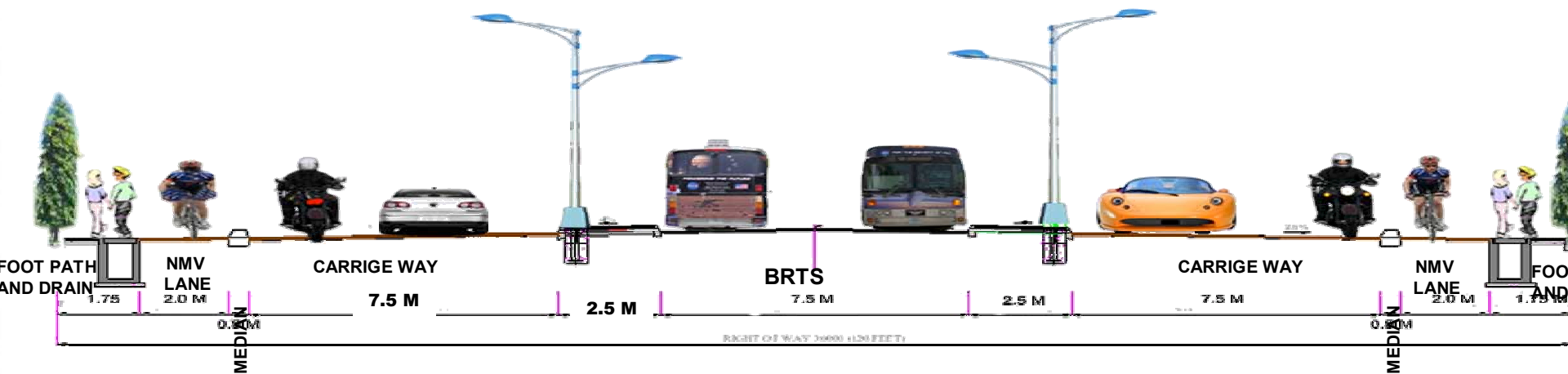


RECOMMENDATIONS OF APPRAISAL AGENCY

Report makes strong case for BRTS. Typical cross sections at mid block and at junction for the two corridors should be prepared showing NMV lanes

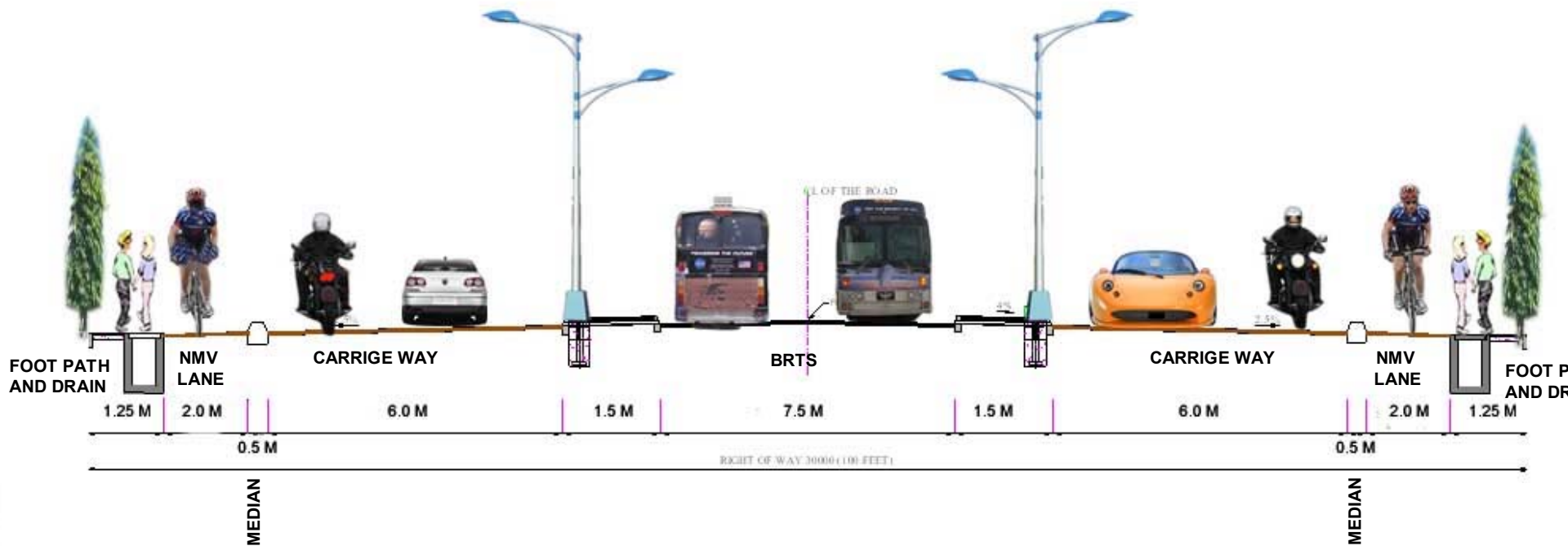
- As suggested the Typical cross sections duly showing the NMV lanes

• Typical Cross Section of 36 Mtr. (120')





Typical Cross Section of 30 Mtr. (100')





RECOMMENDATIONS OF APPRAISAL AGENCY

- **Route analysis and para transit system should be included for the selected corridors. Bus stop design should justify the capacity requirements**
 - STC and PTC are experiencing heavy ridership volumes – commuters, students, visitors
 - Peak ridership of about 60 to 70 people per bus
 - Bus frequencies ranged between 3 to 4 minutes
 - 7 / 3 seater auto rickshaws contribute 36% of travel demand
 - Two wheelers and NMVs (bicycles, Rickshaws) are in heavy use
 - 50% to 70% of para transit riders willing to shift to a reliable, comfortable and convenient public transport system
 - BRTS Bus frequency from 1.0 minute to 1.5 minutes.
 - Bus stop / station designed to accommodate minimum 150 persons at peak demand



RECOMMENDATIONS OF APPRAISAL AGENCY

➤ **Minimum and desirable vehicle specification may be prepared. If the proposal is to assign to SPV, this may be specified**

- Proposed to assign the procurement to SPV
- The general specifications are
 - o Length 60'
 - o Width 102"
 - o Roof Height 137"
 - o Electrically welded carbon steel structure
 - o Physically-challenged friendly
 - o Front and rear door wheel-chair access
 - o Chassis-mounted integral power steering





- IIT Delhi appraised the project on 07-05-2007
- CSMC, GOI sanctioned the project on 18-05-2007.
- Awaiting Sanction Orders.
- Consultancy (PMC) invited on 05-06-2007 for the following.
 - Phase – I: Detailed Engineering for 2 approved Corridors.
 - Phase – II: Construction Supervision and Quality Assurance for the above 2 Corridors.
- Consultancy for PMC for 2 Phases finalized– 29th August 2007.
- LOA issued, Agreement under conclusion.



- Public Private Partnership (PPP) model
- Advertising on buses and at bus stations
- Partnership with commercial establishments
- BRT Operations to be handled through a Special Purpose Vehicle
- Regular maintenance of fleet including passenger information and GPS systems
- Smart Card technologies for effective generation of cash to run the BRT operation



BRTS FEATURES

SYSTEM PERFORMANCE

Corridors
Segregated Bus
Lanes



Stops & Stations

Vehicles

Fare Collection



Intelligent Transportation
System

Service &
Operation
Plan



Travel Time Saving

Reliability

Identity & Image

Safety & Security

Capacity

GREATER VISAKHAPATNAM MUNICIPAL CORPORATION

Preparation of Detailed Project Report (DPR) including Planning and Design & Engineering and Construction Supervision & Quality Assurance including Human Resources for 2 BRTS Corridors

Presentation by :

SREI Infrastructure Finance Ltd.



CRAPHTS Consultants (I) Pvt. Ltd.

&



McCormick Rankin International





PRESENTATION LAYOUT

Credentials – SREI, McCormic, Craphts

Visakhapatnam – City Transport

Assessment of BRTS Corridors

Approach & Methodology



SREI Infrastructure Finance Ltd.

Infrastructure Finance & Project Advisory Company

Total assets under management Rs. 5000 crores

52 Offices in country + Russia + Germany + UK

Listed on the Leading Stock Exchanges of India & London

Profit making company paying dividend since inception (1989)

**CAGR of over 40% in revenues and about 54% in profits
during last 3 years**

**More than 600 permanent employees :
Engineers, MBAs, CA/CFA/ICWAs, Graduates, Others**

**Projects in Roads, MRTS, Power, Ports, Aviation
SEZs, JNNURM, Tourism, Financial Restructuring sectors**



McCormick Rankin International

A wholly owned subsidiary of McCormick Rankin Corporation

Over 300 professionals and technical staff

Undertaken more than 6500 transportation projects since 1957

Has extensive BRT experience in various cities across Canada, United States, Australia, New Zealand, UK and Nigeria

BRT Consulting covers : Strategic Planning, Facility Planning, Project Costing and Design Standards, Design & Construction Management, Intelligent Transportation Systems, Operational Planning, Vehicle Technology, Transportation Planning, Environmental Planning & Sciences, Highway Engineering, Structural Engineering etc.



CRAPHTS Consultants (I) Pvt. Ltd.

PLANNERS

ENGINEERS

ARCHITECTS

- Consultants in the field of Transportation Planning, Traffic Engineering, Traffic Management, Highway Engineering, Urban Design and Town / Regional Planning
- Empanelled with MORTH, NHAI, MOUD, PWDs & Development Authorities in various states
- In-house facilities comprising Computers, Printers, Plotters, Scanners, Design Softwares, Survey / Investigation equipments, Soil & Material Testing Laboratory
- Projects : Roads & Bridges, Flyovers / Underpass, Bus Corridors Improvement, Stations Design, Traffic & Transportation planning, JNNURM Sectors



Approach & Methodology

Scope of Work

- Phase I : Preparation of Detailed Engineering Project Report (DPR) including Planning, Design & Engineering
- Phase II : Construction Supervision & Quality Assurance (CSQA) including Human Resources for 2 BRTS Corridors, Flyover and Tunnel

Objective of the consultants' services :

- To ensure that high quality and timely preparation of DPR for two BRTS corridors and invitation of tenders for the construction contractors.
- Assist GVMC by ensuring effective and quality construction supervision in the implementation of the entire BRTS corridors, Flyover and Tunnel
- To ensure that all works are carried out in full compliance with the engineering designs, technical specifications and other contract documents within the stipulated time period



Phase – I : Detailed Engineering Project Report

The PHASE –I assignment will be undertaken in 2 Stages:

- Stage I: Preparation of Detailed Engineering Project Report including Operational and Conceptual Engineering Plan for Open, Closed or mixed system of Bus Operation along selected corridors and Detailed Engineering for the selected option including cost estimation, financial analysis and Risk analysis.
- Stage II: Preparation of Bid Documents and Bid Process Management upto the stage of appointment of Implementation agency.



Phase – I : Detailed Engineering Project Report

STAGE – I: Detailed Engineering and Operational Planning

- Task 1 : Mobilization & Reconnaissance
- Task 2 : Secondary Data Collection
- Task 3 : Primary Data Collection
- Task 4 : Engineering Concept Plan
- Task 5 : Detailed Engineering Design
- Task 6 : Environmental Impact Assessment
- Task 7 : Social Assessment
- Task 8 : Cost Estimates
- Task 9 : Economic Viability
- Task 10 : Financial Viability



Phase – I : Detailed Project Report

STAGE–II: Bid Document PREPARATION and Bid Process Management

Task 1 : Preparation of Bid Documents

- Pre-Qualification Documents
 - Organization Structure
 - Financial Statements
 - Permanent Technical and Managerial Staff
 - Plant & Machinery available for the Project
 - Experience in Similar projects, projects completed/ongoing
- Bid Documents
 - Request for Bid (Forms of bid / Conditions of Contract)
 - Bill of Quantities
 - Specifications
 - Drawings
 - Draft Agreements

Task 2 : Pre- Bid Conference

- Assistance to GVMC to conduct the pre-bid conference, answer queries raised by the contractors and prepare the minutes of the pre-bid meeting.
- Preparation of tender addendum based on outcome of pre-bid meeting, if required



Task 3 : Report on Evaluation of Bids

- Evaluation shall be of technical as well as financial proposals
- Analysis & recommendations on the acceptability of each bid separately.
- Bid Evaluation Report along with Recommendations to be submitted within the stipulated period

Task 4 : Negotiations/ finalization of Agreement

The Consultant shall attend the negotiations between the Contractor and the GVMC and give the necessary advice to the GVMC. Once the negotiations are concluded, the Consultant shall assist the GVMC in preparing the Contract agreement.

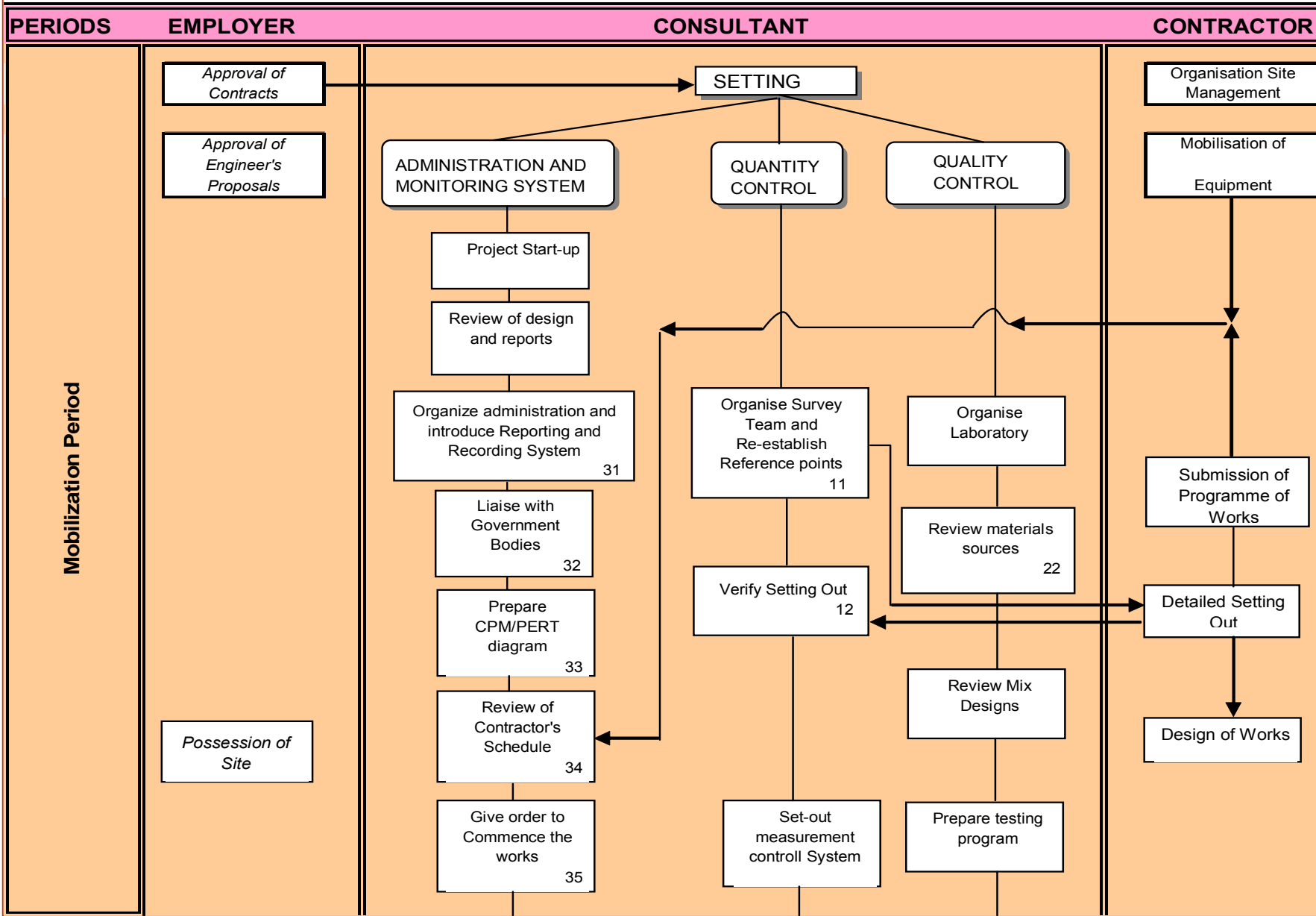


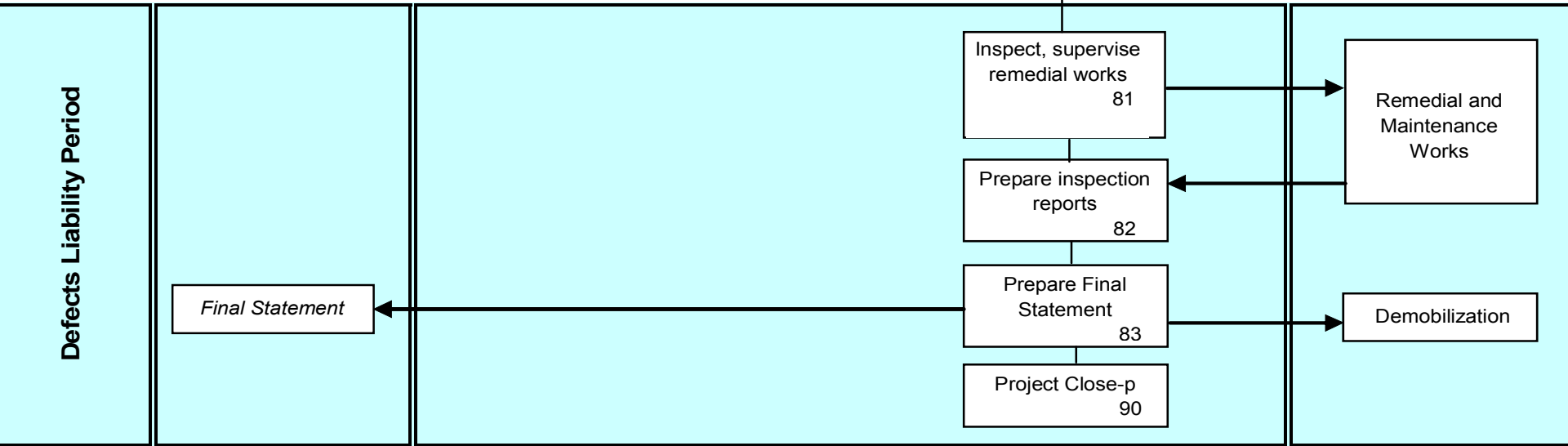
Phase II: Construction Supervision & Quality Assurance with Human Resources for 2 BRTS Corridors, Tunnel through Simhachalam Hills and Flyover at Asilimetta

- Assist GVMC in Supervision of Construction as well as Quality Assurance
- Monitor quality of the works
- Monitor progress of the works and submit periodic reports
- Prepare Traffic Management Plan for the BRTS Corridor and its link roads
- Prepare Progress Reports
- Make Presentations as and when required on the project
- Impart Training to the GVMC Staff on the project implementation and monitoring
- Prepare O&M Plan for the project



FLOWCHART OF ACTIVITIES FOR CONSTRUCTION SUPERVISION





Detailed Bar Chart of Activities for BRTS Vizag

Schedule of Reports



THANK YOU

