

A

Seminar report

On

## **Monorail System**

Submitted in partial fulfillment of the requirement for the award of degree  
Of ECE

SUBMITTED TO:

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## Acknowledgement

I would like to thank respected Mr..... and Mr. ....for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a seminar report. It helped me a lot to realize of what we study for.

Secondly, I would like to thank my parents who patiently helped me as i went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs.

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Next, I would thank Microsoft for developing such a wonderful tool like MS Word. It helped my work a lot to remain error-free.

Last but clearly not the least, I would thank The Almighty for giving me strength to complete my report on time.

## Preface

I have made this report file on the topic **Monorail System**; I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to .....who assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

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## **Introduction**

- City not fit to live due to improper town planning
- Solution is to provide improved transportation technology
- Present solution: Metro rail, but is it possible in congested area?
- Monorail is possible in congested areas.
- As name implies : single rail on which train transport system runs
- Monorail is unique mass system
- It can be put up in any congested area
- Provide ease of transportation
- Connects arteries and veins of the city.

**Salient features of Monorail system:**

1. In Monorail System train runs on a narrow Guideway Beam, wheels of which are gripped laterally on either side of the beam.
2. Monorail is a Light Weight System and its cost of execution is less compared to heavy rail systems and it takes approximately 1.5 to 2 years for execution.
3. Mono rail System requires 1.00 m wide space (Column Size 0.8 m X 1.5 m) the space of a footpath or a divider and it rests on a single pillar of height 6.5 m without disturbing the existing traffic.
4. Capacity of 4 cars Monorail System is 8000 to 12000 PHPD.
5. Monorail System can achieve  $\pm 6\%$  gradient and turning radius upto 50 m.
6. As compared to other systems Monorail produces less noise and is eco-friendly and hence easily acceptable in dense residential locale.
7. Monorail System is in use in Tokyo (Japan) from 1963, in Kuala-Lumpur (Malaysia) for last 5 years and in china for last 3 years.
8. Monorail System is Safe and reliable system.

MMRDA proposes to implement a proven and established Monorail System in various parts of Mumbai Metropolitan Region (MMR). It is proposed to initially take up implementation of about 20 kms Monorail System from Sant Gadge Maharaj Chowk – Wadala – Chembur station as a Pilot Project. Completion period of the full project is 30 months.

**Salient features of the corridor:**

- **Length of Pilot Corridor:**
  - Section no. 1 = 11.28km (Jacob circle – Wadala)
  - Section no. 2 = 8.26km (Wadala – Chembur)

Cost of the Project	Rs. 2716 crores	
	<u>2016</u>	<u>2031</u>
Peak hour peak direction traffic	7400	8300
Corridor Ridership per day(lakhs)	1.25	3.00
Design Headway	3 minutes	
Train Composition	4 cars	
Train Capacity (4 cars)	568 Max	
Design Speed	80 kmph	
Scheduled Speed	31 kmph	
Operation Hours	0500 Hrs- 2400 Hrs	
Journey Time		
Section no. 1	25 minutes	
Section no. 2	19 minutes	

**GUIDEWAY:**

Two Beams on Single Column Structure	
Generally on median of the Road	
94% Alignment on Gradient	
9kms on curves (93 Curves) in 20 kms.	
Horizontal Curve Radius Main Line	100m (Nominal)
	50m (Minimum.)
Pre-cast curved beams	
Design Life 120 Years	
Special Crossings Arrangements at	
	Harbour Line Crossing at Wadala
	Central Railway Crossing at Curry road
	Crossing at Trombay Yard
	Ambedkar Marg flyover
	Flyover of APLR

**STATIONS:**

No. of stations	18 Nos
Section 1	11 Nos
Section 2	7 Nos

Around 11.5m Above Ground Level	
Entry – Exits along Sidewalks	
Lifts & Stairs, Escalators (Future)	
Safety as per NFPA 130	

**TRACTION SYSTEM & POWER DEMAND:**

- 750 V dc
- Power Rails fixed on both side of beams
- 33kV Receiving Sub-Stations
  - Lower Parel
  - Chembur
- Traction Sub-stations 5 Nos. (6MVA each)
- Power Demand ( 2031) (13.39 MVA)
- SCADA Monitoring



**SIGNALING SYSTEM:**

- Computer based Centralized Train Operation & Management
- Computer Based Interlocking
- ATC and Line Side LED Signals
- ATP with Train Describer
- Traffic Control at OCC & Station Control Room

**COMMUNICATION SYSTEM:**

- Optical Fiber Based Transmission Media
- Digital Trunk Radio Technology (TETRA Standards) Communication between Motorman, Central Control / Station, Depot, Maintenance Parties, Security Personnel. Mobile Radio Communication
- Telephone Exchange of 500 lines
- Passenger Announcement System from Stations & OCC
- Centralized Clock System
- CCTV for Surveillance

**Projects**

**MUMBAI MONORAIL PROJECT**





## SANT GADGE MAHARAJ CHOWK–WADALA – CHEMBUR STATION (20 km)

Considering the increase in population, increased travel demand and narrow road networks running through congested structures, there is a need of a system which will occupy less space as well as reduce travel time.

With the objective, to support public rapid transit system such as suburban rail system and metro rail system and where public rapid transit system is not available or impossible to provide such system and where widening of roads is not possible due to structures on either sides, Mono Rail system is proposed to be implemented by MMRDA/GOM.

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Recent Monorail systems:



**Chongqing, China**

- Length: 17.4 km



**Kuala Lumpur, Malaysia**

- Length: 9 km

- Operation Since: 2005
- Current PPHPD: 17,000
- Operation Since: 2003
- Current PPHPD: 5,000

How Mumbai monorail may look like:



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#### ROLLING STOCK:

- Train Composition -4 cars
- Requirement of Trains for 2021 -15 Nos
- Shell of Extruded Aluminum ( painted)
- Driving Cab at Both Ends of 4 Car Train
- Air-conditioning
- Single axle bogie, two per car, axle load -11 tons
- Running wheel with Rubber tyres
- Stabling and guiding horizontal wheels 3 on each side

#### AUTOMATIC FARE COLLECTION:

- Fare media: Contactless smart token
  - For single journey.
  - or multiple journeys.
- Gates: Computer controlled retractable flap type automatic gates
- Ticket office machine (TOM/EFO): Manned Ticket office machine
- Ticket reader and Portable ticket decoder
- Passenger Operated Machine/Ticket Vending Machine
- Power: UPS (uninterrupted power at stations as well as for OCC).

#### PRESENT STATUS

- Consortium of Larsen & Toubro Ltd. India and Scomi Engineering Bhd. Malaysia appointed as implementing agency.
- M/s. Louis Berger Group, Inc. appointed as Project Management and Proof checking Consultant. Work to be completed by May 2011.
- Work to be completed by May 2011.
- Construction work has been started along Sai Baba road, G .D. Ambekar Marg, Shaikh Misari Road, Wadala TT road, Anik - Wadala road, Anik - Panjarpol Link Road, R.C. Marg and Wadala Depot.
- Trial Run on Anilk – Wadala road flagged by Hon’ble Chief Minister on 26th January, 2010.

**PHASE – 1: (Wadala – Chembur) GUIDEWAY**

Sr. No.	Item	Scope	Total work done
1	Pile	1058	861
2	Pile cap	352	176
3	Pier	352	104
4	Pier Cap	352	74
5	Guideway Beam Cast	676	216
6	Guideway Beam Erected	676	68

**PHASE-1: (Wadala – Chembur) STATION**

Sr. No.	Item	Scope	Total work done
1	Pile	198	194
2	Pile cap/Open foundation	50	14
3	Pier	50	5
4	Pier Cap	50	0

**PHASE – 2: (Sant Gadge Maharaj Chowk – Wadala) GUIDEWAY**

Sr. No.	Item	Scope	Total work done
1	Pile	1370	250
2	Pile cap	427	39
3	Pier	427	1
4	Pier Cap	427	0
5	Guideway Beam Cast	790	0
6	Guideway Beam Erected	790	0

**PHASE – 2: (Sant Gadge Maharaj Chowk – Wadala) STATION**

Sr. No.	Item	Scope	Total work done
1	Pile	381	120
2	Pile cap	60	3
3	Pier	60	2
4	Pier Cap	60	0

**WADALA DEPOT: BUILDING**

Sr. No.	Item	Scope	Total work done
1	Pile	562	562
2	Pile Cap	154	149
3	Stub Column	154	127
4	Ground floor slab	100%	70%

5	Ground floor to First Floor column	185	53
<b>WADALA DEPOT: GUIDEWAY</b>			
<b>Sr. No.</b>	<b>Item</b>	<b>Scope</b>	<b>Total work done</b>
1	Pile	344	304
2	Pile cap	120	9
3	Pier	120	0
4	Pier cap	120	0
5	Guideway Beam	130	0

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## RESEARCH AND OBJECTIVE

### ❖ Study Area

The proposed site is located at Wadala and. It consists of 16 stops during these suburbans.

### ❖ Aim of the project

The aim of the project is to plan and suggest the strategies on the basis of available information.

### ❖ Importance for Mono in Mumbai

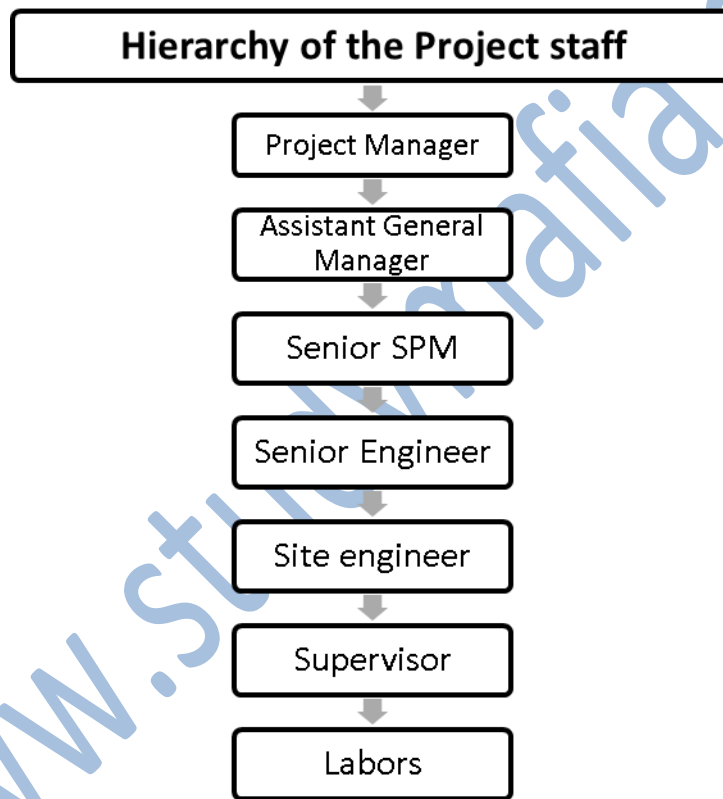
- Mumbai is a satellite township on the west coast of the Indian state of Maharashtra. It was developed in 1972 as a new urban township of Mumbai, and is the largest planned city in the world.
- Mumbai has a population of more than 2.6 million with main transport modes being taxis, auto rickshaws, buses operated and parts of the Mumbai Suburban Railway network.
- The Mono for Mumbai was conceived as early as 1992 to improve the railway connectivity within the city and meet the fast-growing residential and commercial demands.
- Existing suburban systems under extreme pressure.
- Existing bus system's role limited to providing feeder services to railways.
- Bus system and Local Network cannot meet the future demand.
- Environmental deterioration due to growth in road traffic.

### ❖ Our location site

**Wadala to Chembur**

- Total distances = 8.26 Km
- Total Stations= 7
- Project started on: 1-07-2011.

❖ **Hierarchy of the project staff**



❖ **Owner and financer of the project = MMRDA**

- MMRDA gave the contract to = NACC (Nagarjuna construction Company)
- Total Project cost= 4100 Cr. Approx.
- Payment is made to NACC on completion of every stage of work.
- EG. After columns Stand = 20 %
- Slab on columns = More 20%



- Every stages of contract are being allocated to different Contractors.

❖ **Material**

- Cement: ACC and Ultratech: Contract is made with the company for supplying CEMENT BULKER instead of cement bags. (As the demand is very high) which saves minimum 10-15% cost of cement to NACC. (\*\*Rates of cement are confidential as they are part of tender\*\*)
- Steel: JSW, TATA, SAIL, And and TISCO: mm used 10mm, 12mm, 20mm, 25mm, 32mm.  
32 mm is used largely as it is heavy work which needs heavy duty steel.
- Machinery: Machinery belongs to NACC as well as MAHAVIR Constructions.

❖ **Construction Type**

- All the construction is done by **Segmentary Box Type**.
- Pile system is used to build the columns..
- Slab system is avoided due to high risk.
- Metro rail (Bridge) will be having min 6.5 meter ground clearance at every stage.

❖ **Labour**

- 350 Labours are appointed between belapur to Sec 14 Kharghar which consists of Skilled as well as non skilled labours.
- Wages : 200 – 250 per day (Approx)
- The 3.9m high and 2.9m wide coach will have longitudinal seating arrangement for maximizing the capacity. The trains will run on standard gauge of 1,435mm with speeds ranging between 35-85km/h.
- The planned communication systems include Close Circuit TV, public information display systems, radio systems, telephones and public announcements.
- A continuous automatic train control system is also planned. It will provide automatic supervision, protection and operation of the trains.

## LIMITATIONS

### ❖ CONSTRAINTS FACED DURING SITE VISIT –

- They didn't provide the details of other project which is ongoing or completed.
- They didn't provide the details of Capital structure.
- Rates of Raw Materials are confidential as they are the part of tender.

## CONCLUSION

- We found that the work was going slow as compared to what MMRDA estimated.
- The completion date was 30<sup>th</sup> June 2012 but NCC was unable to complete it within a given time.
- Therefore the work timings have been increased, Now there is 24 hrs work instead of 16-18 hrs.
- Metro will have only 4 coaches which we think are not sufficient for the crowd of Navi Mumbai.
- So we came to a conclusion that, as this is the first metro rail project in Navi Mumbai, we can hope for the best and expect people to support and cooperate with metro rail. So that if the project is successful here, it can shortly be started in big cities of rest of the country.

## REFERENCES

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- [www.studymafia.org](http://www.studymafia.org)

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