



**Emerging Opportunities  
in  
Mass Rapid Transit System (MRTS)  
in  
Uttar Pradesh**

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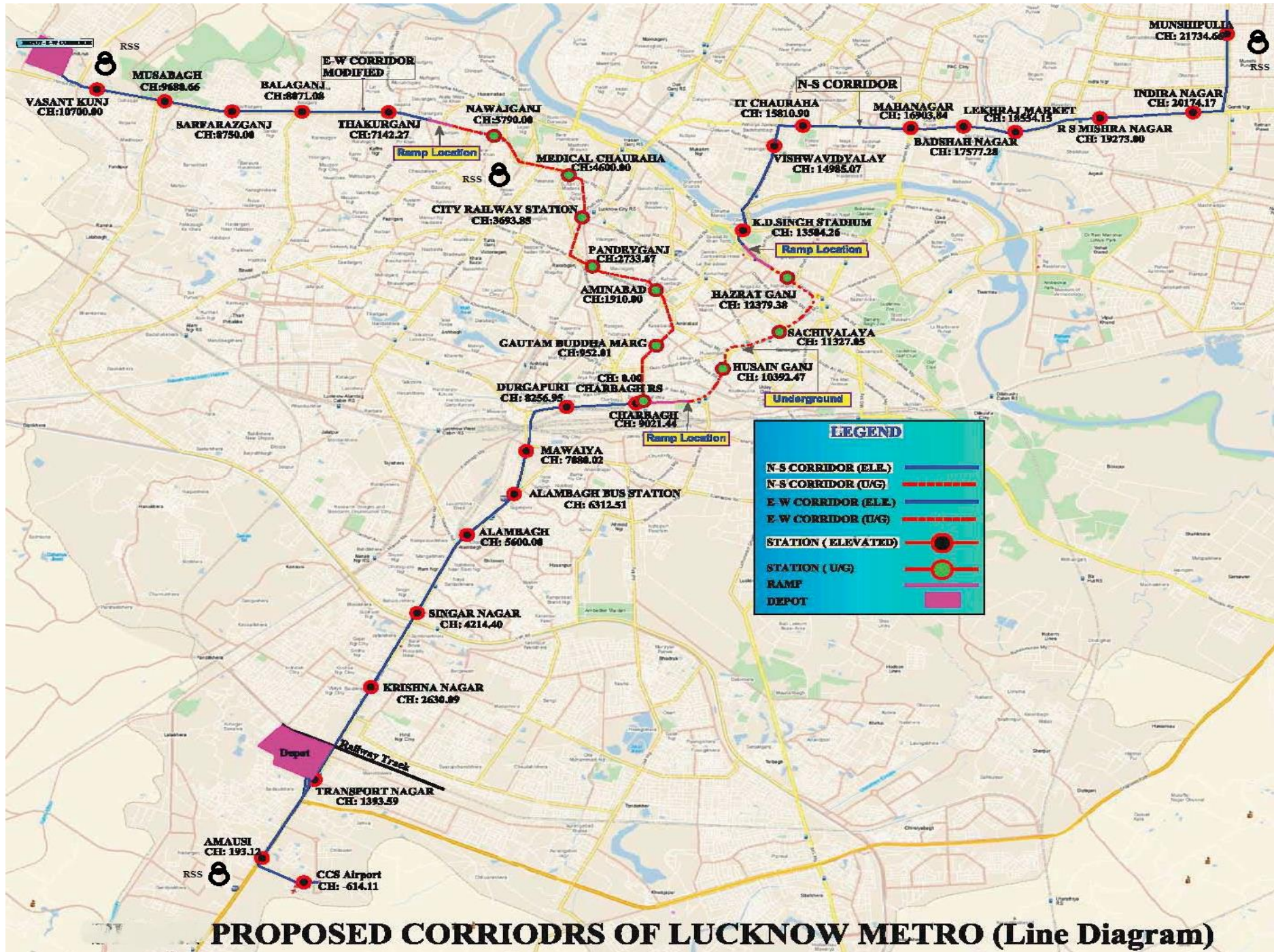
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Technical Presentation on Rolling Stock, Signalling, Electrical and other system infrastructures for LMRC and other upcoming metros.

- System Parameters
- Status of Tenders for LMRC
- Emphasis on Green Building for metro stations, Depot and RSS
- Use of Energy Efficient Technology
- Sustainability is being taken into account





# SECTION DETAILS

- ***North South Corridor (22.878 KM)***

<b>Elevated</b>	<b>Ramp</b>	<b>Underground</b>	<b>Total</b>
19.051 Km	0.774 Km	3.053 Km	22.878 Km

*Priority Section: Transport Nagar- Charbagh  
(Trial Runs to Start by November/December'2016)*



# System Parameters

- Gauge:**
  - Standard Gauge (1435 mm)
- Traction:**
  - 25 KV overhead.
  - Flexible on the Viaduct and ROCS in the tunnel
  - Retractable in Inspection bay
- Rolling Stock:**
  - 2.9 m wide coaches, for all the corridors
  - 4 car train formation in the beginning and can be increased to 6 car in future
- Signalling system – CBTC (GoA 2)**



# The State of Art Technologies



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# Considerations in selection of Technologies

- Functional Requirements.
- Time frame for construction.
- Minimum interruption of existing services (Rail, Road etc.).
- Minimum inconvenience to the citizens.
- Environmental friendly.
- Overall cost.
- System to be fully *Barrier Free* for Physically challenged



- Rolling Stock is including Signalling system – State of the Art Light weight modern stainless steel coaches

- Heavy duty Escalators

- 13 Passenger Heavy Duty Lifts

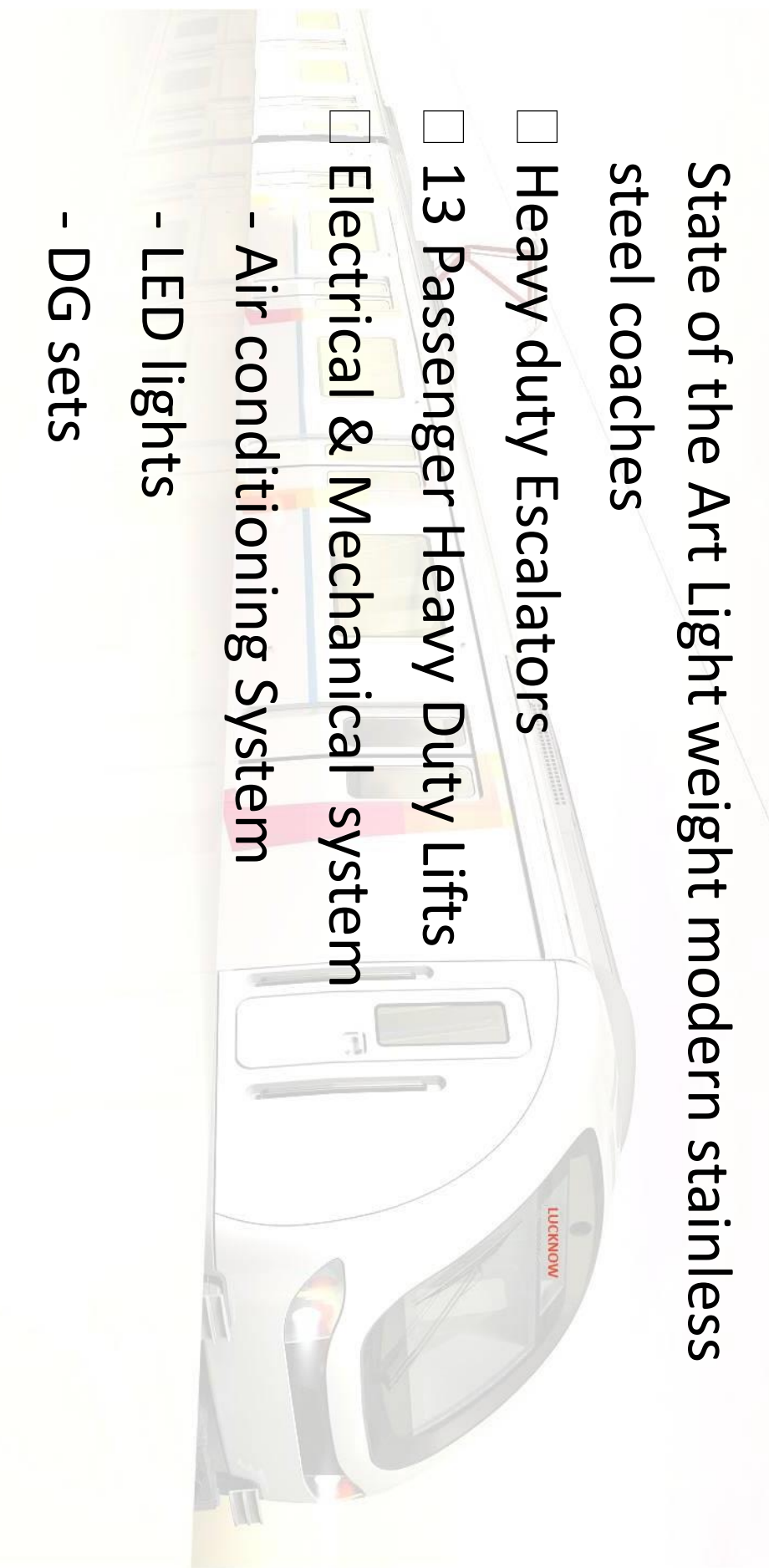
- Electrical & Mechanical system

- Air conditioning System

- LED lights

- DG sets

- Fire detection and protection system







- Contactless AFC system using smart cards/Tokens
- Telecommunication system using the state of the art PA, PIDS , Announcement system, CCTV system
- LTE (4G) system being considered for the telecommunication system for future corridors
- Energy efficient equipments being considered
- Sustainability being given due importance



## Status of the Major System Tenders

- Rolling stock including signalling system has been submitted on 21.4.15 and is under evaluation.
- Traction tender with Design and built which includes RSS cum TSS cum AMS, flexible OHE, ROCS for the underground stations, Cable laying from the grid stations  is already floated and is due for submission on 26<sup>th</sup> May

Contd.



- E&M for Depot, a part of the Civil Depot tender has been awarded
- E&M for Stations a part of the finishing tender has been floated and is due for submission in May, 2015
- Diesel Generating sets and UPS are a part of the E&M tenders.
- Electrical Utility Diversion is awarded and is a part of the civil tender .

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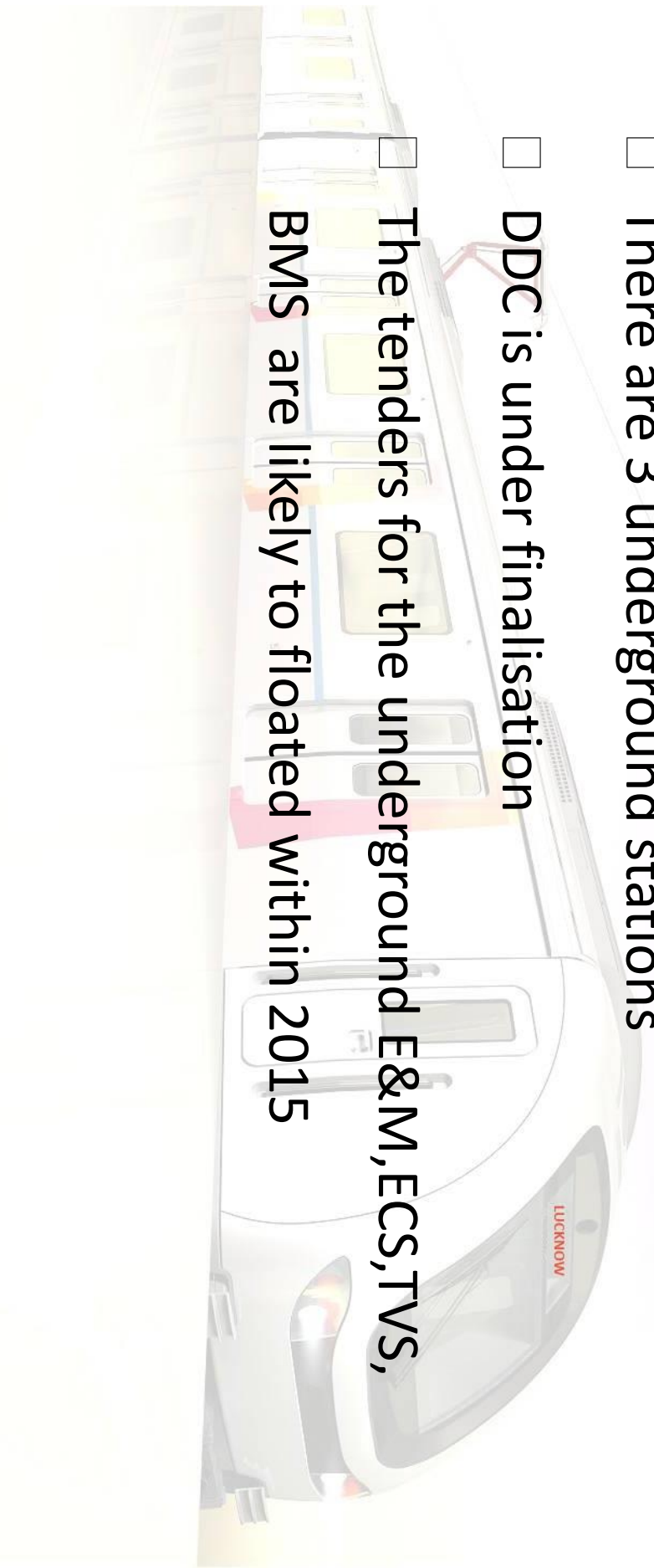
- **Specifications of the following Tenders are in finalisation and shall be floated shortly;**
- ❖ Telecommunication tender includes following
  - Fiber Optics Transmission System
  - Train Radio TETRA System
  - Telephone System
  - Coordinated PA/PIDS System
  - Master Clock System
  - CCTV System
- ❖ Automatic Fare Collection system
- ❖ Lifts and Escalators
- ❖ PV roof mounted Solar cells on Depot roof is being planned under the RESCO model





# Status of the Underground Stations

- There are 3 underground stations
- DDC is under finalisation
- The tenders for the underground E&M,ECS,TVS, BMS are likely to floated within 2015





# STAGES INVOLVED IN TENDERING

1. Pre – qualification / Technical Evaluation
2. Financial Evaluation.
3. Approval of Competent Authority at different stages as required
4. Issue of Letter of Acceptance also implies NTP.
5. Signing of Contract.  
(A fully Transparent system)



## Tender Conditions – Some Aspects

- No contractor or supplier allowed to engage agents as middleman.
- Help taken from FIDIC / International Funding Agencies/DMRC conditions to suitably update the International Competitive Bidding
- Completion time is sacrosanct.
- Important items of interface with other Contractors clearly identified & given in tabular form contract wise.
- For Interface management “Access dates” & “Key dates” are listed.



## Tender Conditions – Some Aspects.

Technical specifications clearly and elaborately spelt out specially by :

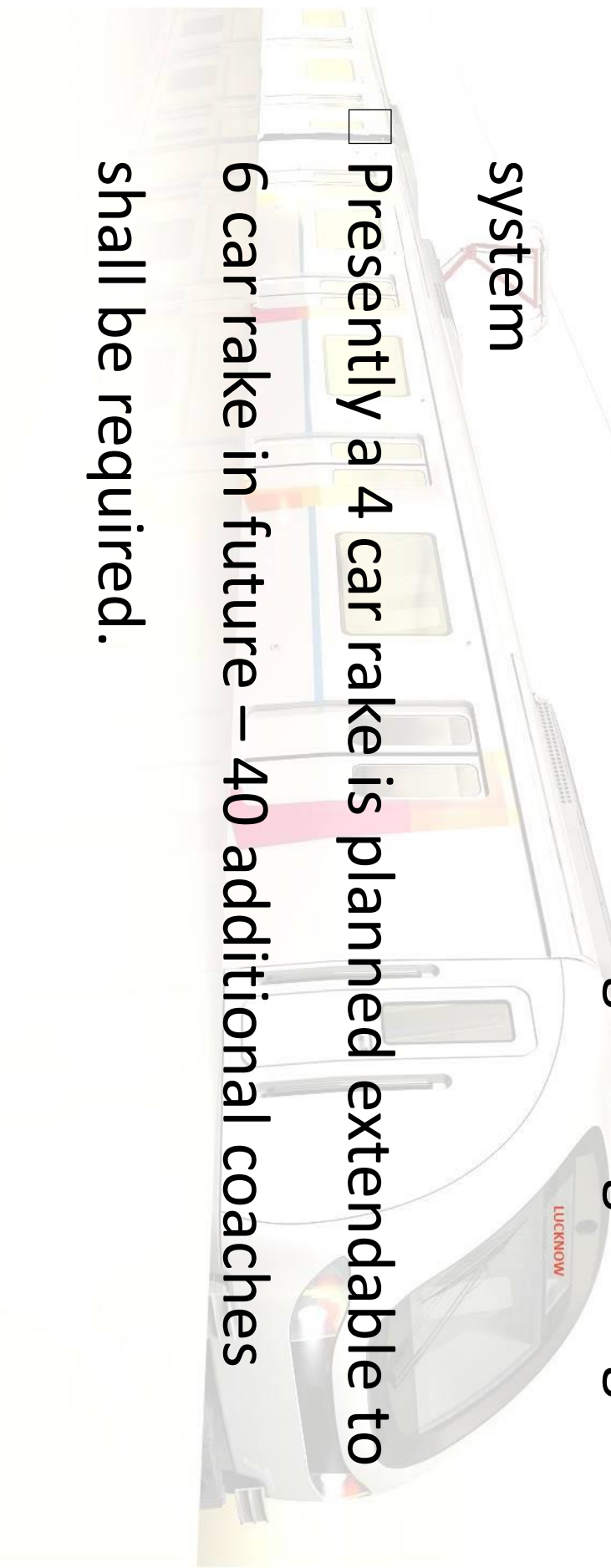
- Giving list of relevant code numbers of specifications, Standards etc.
- Modifying the international codal provisions to suit Indian conditions
- Prescribing the precedence of code in case of contradiction.
- Above all General Philosophy – success of the Contract/Project depends upon the success of the contractors





# ROLLING STOCK AND SIGNALLING SYSTEM

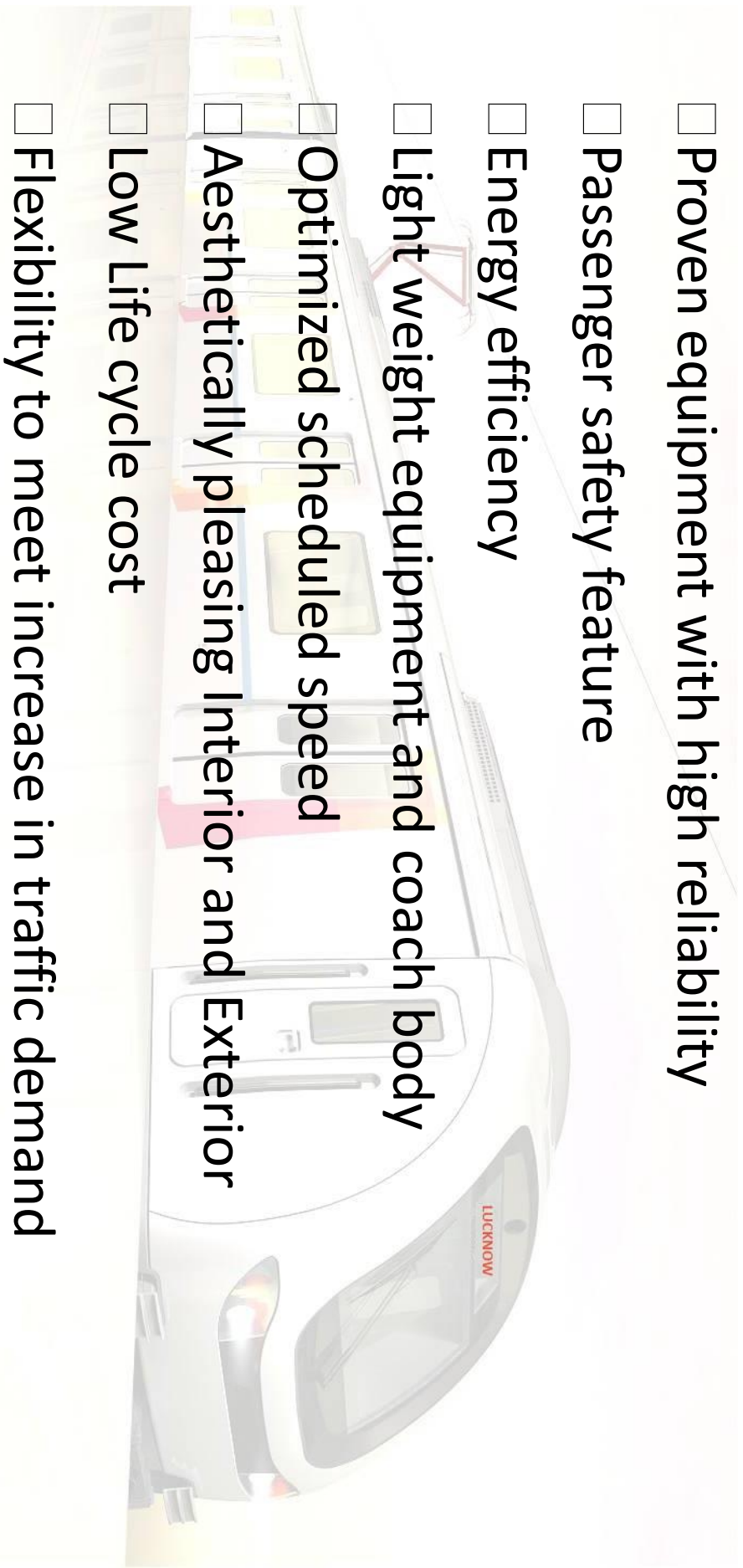
- We need 80 coaches including the signalling system
- Presently a 4 car rake is planned extendable to 6 car rake in future – 40 additional coaches shall be required.





## **Criteria for selection of rolling stock :**

- Proven equipment with high reliability
- Passenger safety feature
- Energy efficiency
- Light weight equipment and coach body
- Optimized scheduled speed
- Aesthetically pleasing Interior and Exterior
- Low Life cycle cost
- Flexibility to meet increase in traffic demand
- Anti-telescopic





## Special Provisions :

- Uttar Pradesh govt. has plans to start E-W corridor of Lko Metro very early, which will need □ additional coaches. In addition there are proposals to construct Metros in Varanasi, Kanpur, Agra and Meerut. These cities also will have Metro coaches of similar specifications. In view of this and to have **Transfer of Technology / Indigenisation**, the Rolling Stock Supplier if they do not have the facility of manufacturing in India, they should set up a factory for manufacture of cars in the State of Uttar Pradesh. UP Government shall facilitate acquisition of the required land for setting up the factory. The tenderers should keep this in mind and indicate in the tender the specific proposals and commitment.
- The employer reserves the right to enter into a supplementary contract for E-W corridor for supply of eleven no trains (44 Nos of cars) at the same rates of the original contract . Such supplementary order shall be placed before the ROD of the N-S corridor.



# E-W CORRIDOR

- E-W corridor is 12 kms long from Vasant Kunj to Charbagh railway Station
- 25 kV ac traction system
- Signalling System we may consider GOA 3 or GOA 4
- Other systems likely to remain same



- Requirement of Rolling Stocks for the four upcoming Metros is as below:
- ❖ Considering an average of 25 kms for four metros viz. Varanasi, Meerut, Agra and Kanpur with 6 car rake and 4-5 minutes headway requirement is likely to be 450.
- ❖ Specifications are likely to be the same as that of LMRC except for the Grade of Automation for Signalling system
- ❖ In case of GOA 3/GOA 4 PSDs shall be provided



# Traction System

- Design and Built Tender
- 220/132 kV GIS has been envisaged for the RSS
- 25 kV GIS has been planned
- Power evacuation has been planned through cables from the Grid Substations of UPPCL
- 33 kV ring main with duplicate feeders for auxiliary supply
- 33 kV GIS for UG portion for the breakers and for elevated it could be either GIS/AIS
- Sub-station automation has been planned with the latest IEC 61850 protocol



- Operational Control centre being planned near Sahkarita Bhawan
- Back up control centre being planned at DCC in the depot. The BCC shall be without mimic panels and it has been planned to make it operational alongwith the Priority section.
- Integrated SCADA is being considered.

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# Telecommunications

- State of the art backbone transmission system
- IP based telephones along with traditional telephones for equipments room
- Coordinated PA/PIDS as per train schedule
- Centrally synchronized Clock system for passengers and staff
- Trunk Radio systems for Group calls
- IP based CCTV systems





# Electrical & Mechanical System

- LED lights have been planned at all the stations and Depot
- For detection and prevention of fire, detectors and automatic pumps with standby arrangements and jockey pumps shall be provided.
- For reliability of power supply DG sets have provided at all the stations and the Depot.
- Air conditioning shall be provided for some of the technical rooms and the SM's room



## GREEN INITIATIVES

- All the stations are in the process for getting the certifications (Gold/Platinum) as per IGBC Green Mass Rapid Transit System (MRTS) Rating
- Attempt is there for the Depot and the RSS also to obtain the certifications.
- Planned to go in for Solar in a big way



# Operation and Maintenance

- The philosophy for the O & M is being drawn out
- Attempt is to have a mix of both outsource and in house so that the cost and required manpower are within the limits.
- The major contracts have a 24 months Defect liability period and in addition some contracts will have AMC also.
- ERP system is also being planned

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- The train depot shall be equipped with all the M & P required like Pit wheel lathe, Mobile and stationary jacks, re-railing equipments etc.
- Auto Wash Plant has been planned at the entry line of the Depot where all the trains shall be washed before entering the depot.
- Workshop has been planned for the maintenance schedules of the trains.
- One of the Inspection lines shall be with retractable catenary system.
- CMV/Tower wagon has been planned for the maintenance of the catenary system



- A world class Training school has been planned with all the latest training modules including the Simulator for the train.
- Training classes shall have the modern facilities for imparting training to LMRC employees as well as to the engineers and staff of other metros also
- A library which shall house all the maintenance manuals apart from the other books has been planned.



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