



**MUMBAI METROPOLITAN REGION
DEVELOPMENT AUTHORITY**

**MASS RAPID TRANSIT SYSTEM
FOR
VERSOVA-ANDHERI-GHATKOPAR CORRIDOR IN MUMBAI**

VOLUME II of IV

**CONCESSION AGREEMENT
(SCHEDULE A TO SCHEDULE Z)**



RELIANCE Energy
Anil Dhirubhai Ambani Group

 **VEOLIA**
TRANSPORT

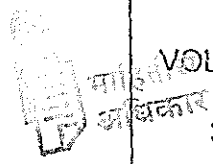
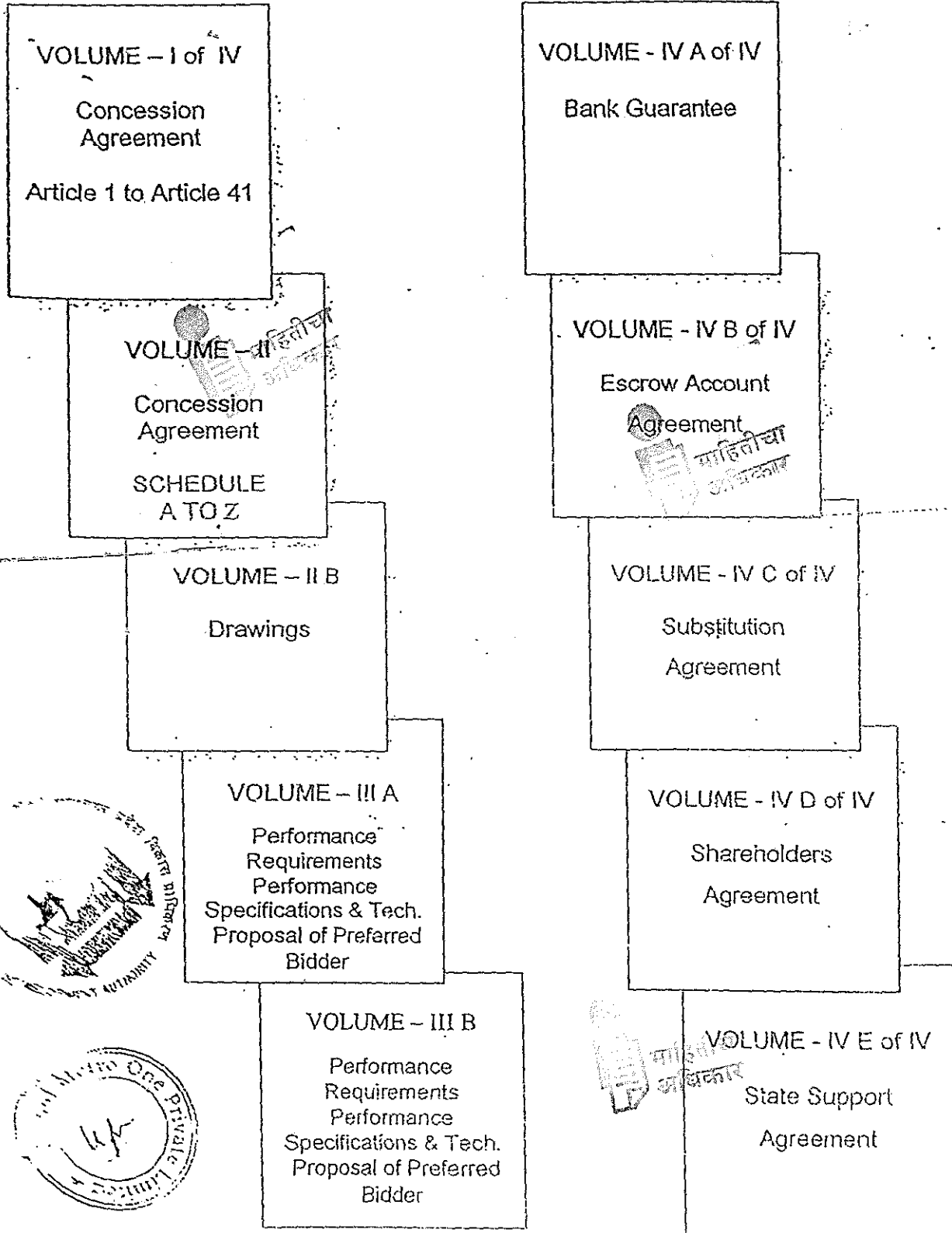


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VERSOVA-ANDHERI-GHATKOPAR CORRIDOR

CONCESSION AGREEMENT

DOCUMENT TREE



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SCHEDULE A

BRIEF DESCRIPTION OF PROJECT

1. Site of the Project

The proposed MRTS project is planned for 11.1 km (approx.) on an elevated structure on Versova-Andheri-Ghatkopar corridor in Mumbai. The Site of the Project ("Project Site") shall include land, MRTS stations and appurtenant works as briefly described in Schedule A1. An inventory of the Project Site including the land, structures, MRTS stations and any other immovable property on or attached to the Project Site shall be prepared by MMRDA and the Concessionaire. It shall also include land, ROW and any work carried out as per approved change in scope.

2. Location

The project is located in the city of Mumbai. An index map and location plan of the MRTS Project is given as Figure A-1. The corridor taken up for construction, operation and maintenance of 11.1 km with 12 stations and car shed is as outlined below:

Table 1

Corridor	Length	Stations
Versova-Andheri-Ghatkopar	11.1 km (approx)	Versova, D N Nagar, Azad Nagar, & Andheri, WEH, Chakala, Airport Road, Marol, Saki Naka, Subhash Nagar, Asalpha, Ghatkopar. (Tentative locations shown in Fig. 1)

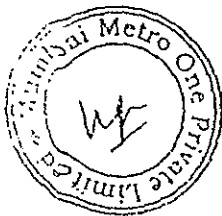
3. Project Elements

The project consists of design, finance, construction, testing and commissioning of the Mass Rapid Transit System for Mumbai City Versova-Andheri-Ghatkopar and its satisfactory operation and maintenance for safe carriage of Commuters till the subsistence of this Contract and or its modifications.

4. Land

Land comprises:

- (i) 13.0 Ha. (approx) at Versova for construction of car depot (see indicative plan forming Part of Schedule A1)



(ii) Right Of Way along existing Versova-Andheri Ghatkopar Corridor including among others Jai Prakash Road, Mathuradas VasANJI Road, corridor from approximately Shiv Sena Bhavan in Asalpa Village to Parsvanath Chowk via Sarvodaya Hospital and the road (Hirachand Desai Road) leading from Parsvanath Chowk to the vicinity of Ghatkopar Station for construction of elevated track ways and MRTS stations. Such Right of way shall be provided to the Concessionaire for the purpose of Construction of MRTS.

a) The land for construction of car depot has been estimated as 13.0 ha approximately. The same will be acquired by MMRDA and will be leased to the Concessionaire against a proper lease agreement, whose terms shall be mutually agreed between the Parties.

b) i) For construction of way structure a portion of the road along median of the road(s) will be made available by MMRDA temporarily during construction period from concerned Government Department for the period provided by the Concessionaire as per the Project Completion Schedule and agreed by MMRDA, and as per approved traffic diversion plan.

ii) Land occupied by the piers, details as per approved design of Concessionaire and as approved by MMRDA including protection to pier for the Concession period against a proper Lease Agreement shall be made available by MMRDA to the Concessionaire.

iii) The land at crossing of WEH and MRTS, will be assessed as per the design of Concessionaire and approved by the MMRDA and made available as per the details provided in Sub-Clause (b)(ii) above by MMRDA.

c) i) For Elevated MRTS stations the land for construction as per the plan submitted by the Concessionaire and approved by the MMRDA will be made available temporarily during construction period from the concerned Government Department by MMRDA

ii) The land occupied by the columns of station will be made available as provided in Sub-Clause b (ii) above.

d) Right of way for construction of way structures at Andheri across Western railway tracks with the permission of Railway authorities. The Special Purpose Vehicle (SPV) will have to enter into a separate agreement with Western railway Authorities for the same.

Note: The minimum strip of roadway between piers / columns if required during construction will be made available by arrangements with concerned authorities. The Concessionaire will indicate his requirement keeping overall site conditions in view.



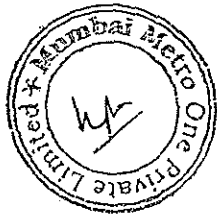
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- e) Land needed for Construction of Andheri MRTS Station and way structures on either side of Western Railway tracks at Andheri as per approved design of Concessionaire and as per the respective changes in scope to be issued to the Concessionaire.
- f) Land required at Versova , Andheri, Ghatkopar MRTS Stations for access facilities and other related amenities.
- g) Way-leave rights from Railways to provide commuter inter-change facilities at Andheri and Ghatkopar Stations

Note:

- i. Reference 4(d) and (g), necessary permission from railway authorities shall be obtained by Concessionaire. MMRDA shall provide necessary assistance.
- ii. Land for Car Depot will also be used for construction of one receiving substation, Operating Control Room and other Operational and Maintenance Facilities for MRTS. Land for second substation along the alignment will be provided as per approved design

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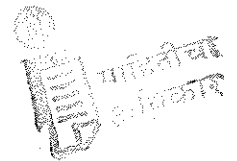
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SCHEDULE A1

SITE OF PROJECT

- The Drawings referred to in Schedule G and forming Volume II B of the Concession Agreement represent the project site. These Drawings are indicative and not to be understood as construction drawings or its equivalent. During actual execution, the same is likely to undergo changes depending on actual site conditions encountered. The Concessionaire shall make its own independent survey and study of the site and acquaint himself to be able to consider all site contingencies.



SCHEDULE A2

Site Access Date

Sr. No.	Approximate Chainage		Approximate Length KM	Indicative Date of Handing-Over	Approximate Landmarks-Location
	From	To			
1	0.0	2.956	2.956	D +1 months	Versova Station to Navrang Cinema
2	2.956	3.515	0.559	D+6 months	Navrang Cinema to Andheri (East) Railway Station
3	3.515	4.521	1.006		Andheri Railway Station (East) to Western Express Highway
4	4.521	8.207	3.686	D +1 months	Western Express Highway to Sakinaka
5	8.207	10.184	1.977	D+6 months	Sakinaka to Asalpha Station
6	10.184	11.302	1.118	D+6months	Asalpha station to Ghatkopar Station end

A.) Along the alignment

B.) 13.0 Ha (approx) at Versova for Construction of Car Depot: D+6 months

Note :

D =The Date of Signing of Concession Agreement.
The above dates may be changed by mutual agreement



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SCHEDULE B

BRIEF SCOPE OF THE PROJECT

1. General

The following sections of this schedule briefly highlight the scope of the work of the project under reference and is in no way to be taken as exhaustive and limited to the following elements.

2. The Project

The Concessionaire will carry out detailed engineering survey, investigation, detailed design in respect of different elements/components of the project as required for its implementation. The Concessionaire will arrange for finances and construct/implement the project for its completion and will undertake operation and maintenance required for safe and comfortable carriage of passengers. The Concessionaire will collect the Fare from the passengers as per the rate fixed in accordance with Article 6.

3. Core Requirement

In the design, planning and execution of the works and in connection with operation and maintenance of the system the Concessionaire shall take such actions and do such things as to:

- a) Provide an acceptably safe system of Mass Rapid Transit to carry the projected passenger traffic upto the end of the Concession Period;
- b) Fulfill the statutory and common law obligation; and
- c) ensure safe and comfortable running of trains and safe and comfortable carriage of passengers.

3.1 The Concessionaire shall provide a level of service to the public commensurate with the traffic demand and in accordance with performance specifications;

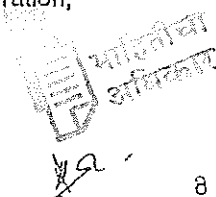
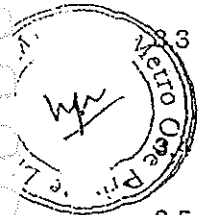
3.2 Enable the police, local authorities, and others with statutory duties or functions in relation to the Project or adjoining roads to fulfill those duties and functions;

3.3 Minimise the occurrence and adverse effects of accidents and ensure that all accidents and emergencies are responded to as quickly as possible;

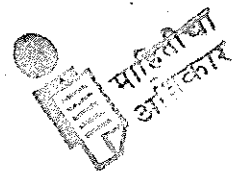
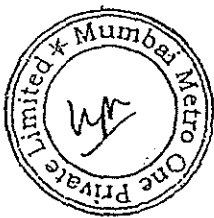
Minimise the risk of damage, destruction or disturbance to third party property;

3.5 Ensure that members of the public are treated with all due courtesy and consideration;

3.6 Provide informative system for guidance of passengers;



- 3.7 Comply with the specified programme requirement including completion of the car depot and other maintenance facilities;
- 3.8 Maintain standards of reliability, durability, accessibility, maintainability, quality control and assurance, and fitness for purpose appropriate to the character of the Project to be achieved throughout the Concession Period;
- 3.9 Achieve a high standard in the appearance and aesthetic quality of the Project and achieve integration of the Project with the character of the surrounding landscape through both appropriate design and sensitive management of all visible elements.



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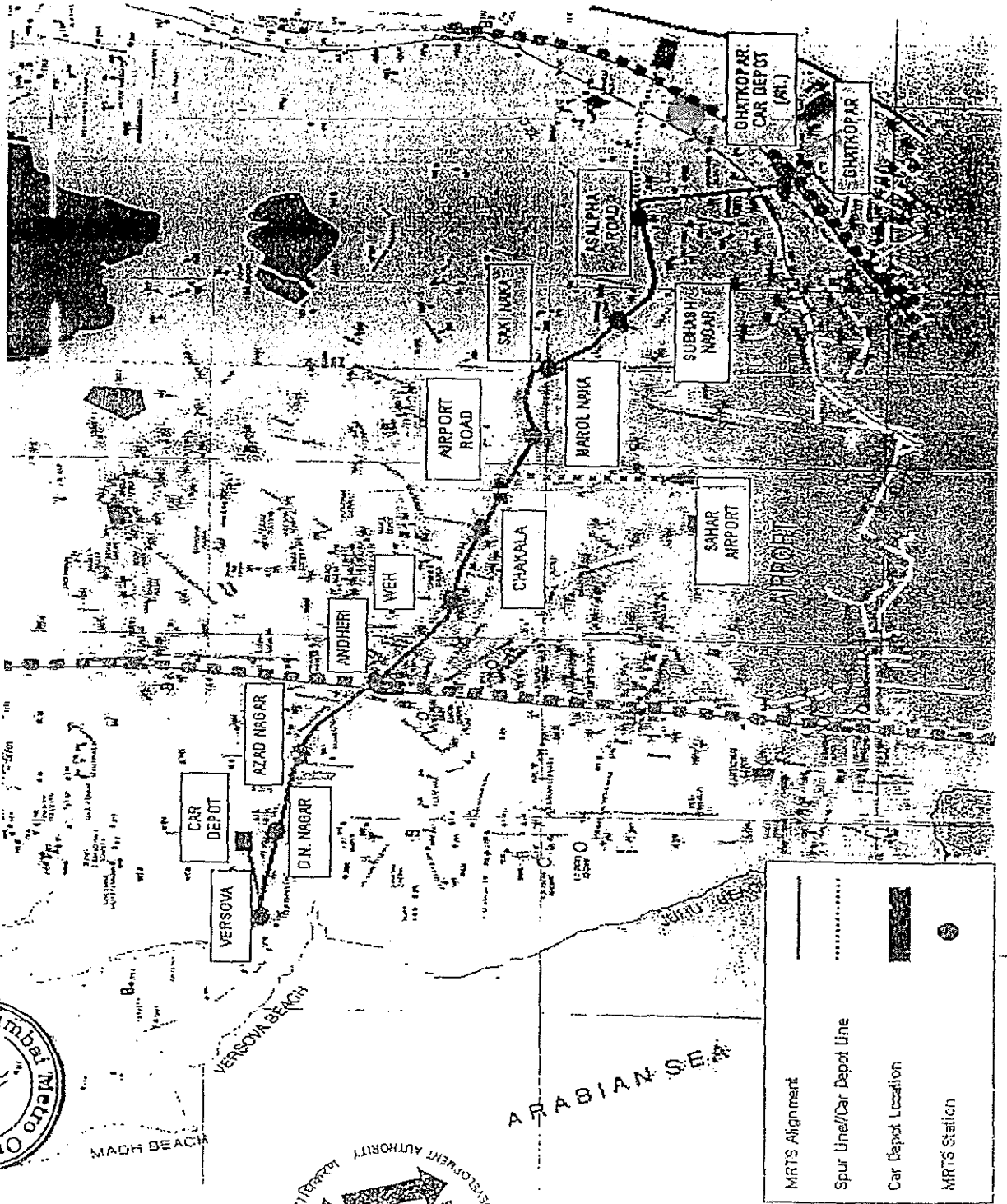
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4. Alignment

The alignment of Versova-Andheri Ghatkopar Corridor is shown in Figure No. 1.



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SCHEDULE C

PROJECT FACILITIES



1. General

The facilities to be provided as a part of the Project for the public/passengers to cater to the envisaged demand till the end of the Concession Period. The Concessionaire shall review the proposed facilities from time to time and add/subtract/modify the facilities as per the revised traffic demand subject to space and other physical constraints. The minimum performance requirements shall however at all times be satisfied.

Adequate number of ticketing counters/booths or automatic vending machines are to be provided to minimise the waiting time of passengers. The requirement should be reviewed from time to time and additional equipment to be provided as required subject to space and other physical constraints.

2. Public Access Telephone

This should be provided in a place easily accessible to public/passengers.

3. Various other Facilities

Other facilities such as public address system, escalators, lifts in stations, clock, and train indication systems etc. should be provided. Certain passenger related amenities, e.g. Tea stall, snacks bar, Newspaper journals, magazines and any other item considered essential by Concessionaire for the convenience of commuters. The requirement should be reviewed from time to time and additional requirement, if any should be provided.



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SCHEDULE D

PERFORMANCE SPECIFICATIONS AND STANDARDS

These documents shall comprise the following

- (1) The Technical & Performance Specifications as given in Volume II of RFP Document as updated in February 2005 along with the updated Technical Proposal as submitted by the Preferred Bidder incorporating all changes, modifications indicated by MMRDA from time to time. And now known as Volume III of IV of the Concession Agreement.
- (2) As per performance specifications, service headway during peak hours should be not more than 4 minutes. Technical proposal of the Preferred Bidder was in conformity. The requirement of coaches accordingly works out to 56 Nos.

The preferred bidder, however, assumed a headway of 3.5 minutes in their Financial Proposal, worked out the coach requirement as 64 Nos. and provided for the same in their cost estimates.

This change is noted. The actual headway in any case shall be as per traffic demand but not exceeding 4 minutes during peak hours as per Performance Specifications.



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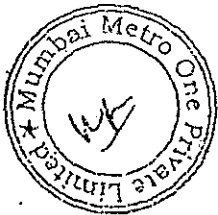
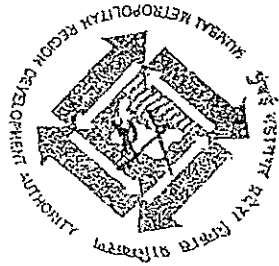
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SCHEDULE E

BANK GUARANTEE FOR PERFORMANCE SECURITY

Executed Bank Guarantee for Performance Security (VOL. IV A) Shall Form Part of the Concesssion Agreement.



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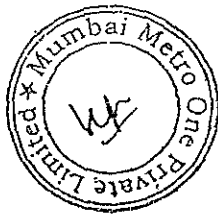
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SCHEDULE F

PROPOSED PROJECT COMPLETION SCHEDULE

The Concessionaire will provide the Project Completion Schedule in terms of time and not necessarily calendar dates, by the time of achieving Financial Close. The COD date shall however be maintained as per this Agreement. Other project milestones may be mutually agreed upon as per site conditions for monitoring the progress of project execution.



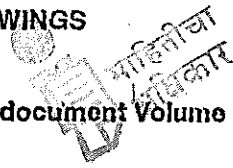
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SCHEDULE G

DRAWINGS

Are included in this document Volume II B



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SCHEDULE H

TESTS AND QUALITY ASSURANCE

1.1 General

The Concessionaire shall be responsible for the establishment and implementation of a quality assurance system structured to ensure that the Works are designed, engineered, manufactured, tested, shipped, and commissioned in accordance with the approved Standards and performance Specifications.

The concessionaire shall acquire and maintain ISO 9000 certification or as may be agreed by Parties within three (3) years of COD

The Concessionaire shall provide MMRDA and the Independent Engineer with copies of the Quality Assurance System documents within four (4) months of the Appointed Date. The Concessionaire shall be responsible for verifying the implementation of the quality assurance system,

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1.2 Quality Assurance Programme

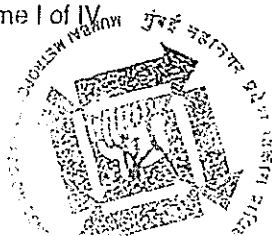
The Q.A programme shall incorporate the following functions:

1. An inspection system for all work operations and including manufacturing and installation to confirm compliance with the relevant standards and specifications
2. A calibration system
3. A record system recording work, testing, defect types and numbers. Records shall be maintained for remedial and close out measures for all non-conformances.
4. Manufacturing control system. Controls shall be implemented for materials, production and fabrication processes, and completed item testing. The programme shall be applied to all suppliers and vendors and for all manufacturing processes. Statistical Quality Control measures shall be used where appropriate and a positive tractability of all inspection and testing results implemented.
5. Installation Control System to ensure installation compliance to the Design and the Contract requirements.



1.3 Independent Engineer Monitoring

The Independent Engineer will monitor and audit the Concessionaire's compliance with the Quality Plan per Clause 14 of Volume I of IV



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1.4 Notification to Independent Engineer and MMRDA

Suitable notification in writing shall be given to MMRDA and the Independent Engineer of the Overall Testing Programme advising all testing plans and venues. The Overall Testing Programme need not advise of routine testing. Notifications of specific tests as may be identified by the Independent Engineer or MMRDA shall be given in sufficient time for the parties to witness the tests.

1.5 Access to the Place of Testing

The Independent Engineer and MMRDA or its delegates shall at reasonable times have access to the Works and to all workshops and places where the Works are being prepared, or from where materials, manufactured articles, machinery, or Equipment are being obtained for the Works.

The Concessionaire shall provide every reasonable facility for, and every assistance in, obtaining the right to such access. The expenses related to the delegation of technical personnel by MMRDA, for witnessing and inspection and tests on the construction site or in the manufacturing plants, shall be borne by MMRDA, unless otherwise provided for in this Contract.



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SCHEDULE I

COMPLETION CERTIFICATE

We, (Name of Consultant) acting as Independent Engineer on the project "Mass Rapid Transit System for Versova-Andheri-Ghatkopar Corridor in City of Mumbai" India on BOOT basis" through the Concessionaire, (Name of Concessionaire) hereby Issue this completion certificate in terms of sub-clause 15.2 of Concession Agreement since the said project has been completed and successfully tested as per Schedule-H. The MRTS project has also been certified by the Safety Commissioner as stipulated in the said Concession Agreement and is ready for commercial operations.

The date of issue of this Completion Certificate shall be the COD as defined in the said Concession Agreement.

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Independent Engineer Signature _____

Name Designation _____

Address _____

Dated _____
(Date of Issue)



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SCHEDULE J

OPERATION AND MAINTENANCE REQUIREMENTS (RAMS)
(Refer to Technical & Performance Specification in Volume-III).

1. General

The Concessionaire is required to design with a high degree of reliability and availability, in order to provide a dependable service that the public will want to use. The optimization of the system with respect to reliability, availability, maintainability, and safety must be planned and must form an integral element of the project from its inception throughout the Concession Period.

The Concessionaire shall submit to MMRDA for approval a management statement for Reliability, Availability, Maintainability and Safety [RAMS] to show how the issues of RAMS will be managed during all phases of the project.

The Concessionaire shall demonstrate to MMRDA that the overall RAMS performance of the MRTS System is equal to that of similar mass transit systems. [Benchmarked]. Any demonstration shall be made in accounting the performance in a continuous period of no less than 15 days.

2. RAMS Management Program

The management of the Reliability, Availability, Maintainability and Safety for the design, procurement, construction, testing and commissioning and life of the Transit System equipment and Operation, until decommissioning shall be based on EN 50126 / IEC 62278 (Railway Applications -The Specification And Demonstration Of Reliability, Availability, Maintainability and Safety (RAMS)).

The RAMS management program shall be compatible with, and take full account of, the requirements of Volume III of the Concession Agreement and the Schedules attached thereto. Any ambiguities or inconsistencies shall be resolved by agreement with MMRDA Areas of risks to be studied shall include but not be limited to:

1. Safety of staff and passengers for the following: Safe refuge, train evacuation, free and safe movement on trains and stations, safe boarding and alighting, safe traction system, safe station evacuation [NFPA 130], communication to passengers.
2. Safety of Operations: Guidance and support for the trains, adequate clearances to trains and fixed structures, train arrest facilities at terminal stations, safe control systems, fire and fume prevention, safe stabling and shunting, signaling, safe on board power systems and equipment, safe controlled operating speeds

The Concessionaire shall develop and submit for approval its RAMS policy and criteria, management plan and deliverables incorporating supplier requirements and System Safety Engineering



3. Safety Engineering

The Concessionaire shall prepare a hazard analysis for the System incorporating:

1. Subsystem hazard analysis
2. Interface hazard analysis
3. Operating hazard analysis
4. Quantitative fault tree analysis
5. Failure modes, effects and criticality analysis

The categories of hazard severity shall be determined ranging from catastrophic to negligible. The Concessionaire shall take actions to resolve hazards by

1. Incorporation of fail safe devices or other features that would reduce the severity of the hazard and
2. Reduction of the probability by increased component reliability or other suitable design measures

The Concessionaire shall maintain a Hazard Log to identify the residual risks and the management of same.

Reliability/availability and Maintainability

The Concessionaire shall develop Reliability/availability and Maintainability goals both for the complete System and for the major elements of the M&E Equipment such that it will provide a high level of dependability and the public will have confidence in the service provided.

- a) Reliability and Maintainability goals shall be developed in terms of mean time between service affecting failures and mean time to repair
- b) Reliability/availability and Maintainability predictions shall be verified by testing of the installed equipment
- c) The systems, subsystems and equipment shall be engineered to maximize reliability/availability and minimize time and cost of maintenance
- d) A reliability model shall be developed consisting of reliability block diagrams and probability of success equations. This model shall show the necessary relationships for a successful system
- e) The Concessionaire shall provide reliability/availability predictions in accordance with established techniques or using verifiable field data for similar equipment.

4.1 Reliability/availability

The measure for reliability shall be the mean time between service affecting failures. The reliability

figures shall be developed in agreement with MMRDA and shall be comparable with international modern metro practice.

The measures for availability shall be the % of actual available equipment compared to planned time. The availability figures shall be developed in agreement with MMRDA and shall be comparable with international modern metro practice.

4.2 Maintainability

The measure for Maintainability shall be the "mean time to restore" The required "mean time to restore" shall apply for all system failures, whether the service is affected or not. The targets for maintainability shall be agreed between the Concessionaire and the MMRDA as part of the RAMS exercise and shall be comparable with international modern metro practice.

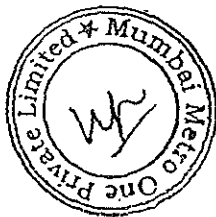
4.3 Demonstration of Maintainability and Reliability/availability

Reliability/availability testing shall be carried out after System commissioning and all equipment shall be fully operational. The Concessionaire shall provide monthly reports incorporating a statement of failures and the status of mean time between failures for each subsystem.

All test plans and testing results for RAMS shall be submitted for acceptance within 30 days of the tests and demonstrations.

5. Benchmarking

Throughout the Concession period the Concessionaire shall arrange to "Benchmark" its RAMS performance against at least three other comparable systems, a minimum of two of which shall be located outside India. The Concessionaire will submit an Annual Report on this matter to MMRDA and must provide contemporary results within 14 days is requested to do so by MMRDA or its authorised agent[s].



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SCHEDULE K

ANNUAL REVENUE STATEMENT

1. Name of Work:: Versova-Andheri-Ghatkopar MRTS
2. Date of commencement of fare collection(D/M/Y)
3. Report for year ending.....
4. Fare rates (in Rs.)
5. Collection during year under report (Amount in Rs. Lacs)
6. Collection from Additional Concessions granted by MMRDA with a break up of activities:

Travel Distance	Fare rates on commencement	Rates during year before last year w.e.f.....(date)	Rates during previous year applied w.e.f.....(Date)	Present rates applied w.e.f.....(Date)
Upto __ kms				
Above __ kms				

Travel Distance	Previous Year		Current YEAR	
	Nos.	Amount	Nos.	Amount
Upto __ kms				
Above __ kms				

Advertising Revenues -Rs. _____

Commercial Activity (xxx) – Rs. _____

Commercial Activity (xxx) – Rs. _____



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SCHEDULE L

FARE SCHEDULE

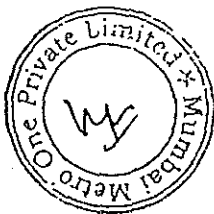


"Fare Schedule" means the Resolution No MUT-- 1004/1671/158/2004/UD-10 dated 19 August 2004 Issued by GOM in exercise of the powers conferred by the Indian Tramways Act, 1886 (Bombay Amendment Act 1948) in respect of the levy and collection of the Fare from Commuters and a copy of which is given in this Schedule L and includes any such subsequent notifications issued from time to time to give effect to the provisions of this Agreement.

Fare to be charged to the users of the MRTS Project will be set and revised as under:

1. Maximum Fares to be charged to the Commuters of MRTS Project (2003-04 level)
 - i) Rs. 6 upto 3 km ii) Rs. 8 between 3 km to 8 km iii) Rs. 10 beyond 8 km
2. Fare Revision shall be indexed]@ 11% every fourth year (rounded off to the nearest Rupee).

The Fare Notification based on the above principles for entire Concession Period is under issue by Government of Maharashtra. This will form part of the Concession Agreement.



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SCHEDULE M

ESCROW ACCOUNT AGREEMENT

Executed Escrow Account Agreement (VOL. IV B) shall form part of the Concession Agreement.



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SCHEDULE N

OPERATIONAL AND SAFETY REQUIREMENTS

Introduction

These Sections of the Agreement set out the basic requirements that the Concessionaire is to meet when operating and maintaining the system. These requirements are in outline only; the Concessionaire is expected to adjust this outline and develop its own operating procedures during project implementation, which are to be in accordance with recognised International practices and standards. These Operational Requirements, and the included Safety Plan are to be read in conjunction with the RAMS requirements as notified in Schedule J. The text below is separated into N1-Safety requirements related to design and construction and N2-Safety for Operations and Maintenance.

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SCHEDULE N.1

SAFETY REQUIREMENTS RELATED TO DESIGN AND CONSTRUCTION

4 - Safety Criteria for Design

Passenger and public safety shall be the paramount design requirements. All structural components, electrical and mechanical equipment, alarm systems, circuitry, control methods, operating procedures, security procedures and emergency procedures shall be designed to minimise the risks to persons and property. Whenever any failure or hazardous condition results in a conflicting concern for personnel and passenger safety versus equipment safety, the design or procedure shall resolve the conflict in favour of personnel and passenger safety.

There are two principles of safety that shall be used in the design of all safety critical subsystems, including but not limited to the traction power supply system, the automatic train protection (ATP) system, the vehicle brake system, automatic doors and signal interlocking. These principles are the Fail-Safe Principle and the Checked-Redundancy Principle. Additional system safety elements to be covered include the component/equipment failure list and the operational safety criteria.

The Fail-Safe Principle applies to hardware configurations and is defined as a characteristic of a system which ensures that any malfunction affecting safety will cause the system to revert to a state that is known to be safe.

The Checked-Redundancy Principle refers to either hardware or software configurations. It assesses the probability of failure or combinations of failures that can result in an unsafe condition and controls these by adjusting the design to produce a risk comparable to that associated with traditional fail-safe design.

The checked-redundant control configuration, whether it comprises hardware or software elements, incorporates at least two parallel controls and a means of comparing the output of the control units. The following characteristics must be incorporated into a checked-redundancy design: -

The checking process must, in itself, be fail-safe or checked-redundant. 'Agreement' must not be indicated unless the control unit outputs agree. Unless 'agreement' occurs, timely action must result which assures safety.

The checking shall cover the comparison of all control units related to safety. Any failure in one of the redundant channels, which could affect the safety of the system, shall be detected. The parallel control units must be completely independent from each other so that no common environmental condition, power fluctuations, errors, faults etc. can cause related errors in the output of the control units.

The checking process must be sufficiently frequent and comprehensive to ensure that during any one year of operation, the probability of occurrence of a combination or sequence of



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neutralising errors causing agreement between comparisons will be controlled to produce a risk comparable to that of traditional fail-safe design.

In this regard 'failure' for a software element is understood to include programming errors.

2 Component/Equipment Failures

In designing for a fail-safe configuration, components shall be selected so that the occurrence of any failure or combination of the failures listed in the Component/Equipment Failure List shall not result in an unsafe condition.

In a checked-redundant configuration involving software applied to a computer, the probability of an error in the software programme shall be considered to determine the probability of an unsafe condition occurring in the configuration.

The Component/Equipment Failure List shall be composed of items normally used in metro-type command and control systems. The list shall itemize "frequent failure modes", that is, failure modes that are likely to occur more than once in 1 million years. Not listed for each item are certain failure modes that occur so rarely (less than once in 1 million years) that they can be neglected in circuit design. If components with other modes of failure are used, these must be identified and the appropriate failure modes documented.

The system design must minimise the dependence of system safety during normal operations upon correctness of actions taken or not taken by operating or maintenance personnel.

During service disruptions or other abnormal conditions, particular wayside elements or vehicle control elements will be relied upon for safety. The fact that these elements are seldom used must not be used to justify unsafe design.

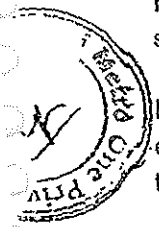
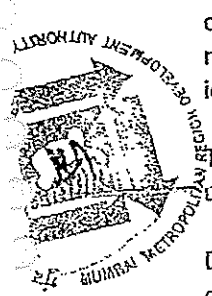
3 Fire Safety

Passenger stations shall be equipped with fire detection and prevention equipment and will conform to fire-resistive construction standards, generally national regulations and NFPA. Fire detection systems shall transmit an alarm to the Station Control if any and to the Control Center at any case.

Vehicle bodies shall be provided with thermal insulation, seats shall be constructed of fire retardant materials and electrical wiring and equipment shall comply with applicable codes and standards. Passengers within the train shall be protected from any fire in under floor equipment.

In the event of a station fire, the Station Master or the Control Centre shall be able to order evacuation of the station, disconnect electrical power, dispatch trains from the station, and block the entry of other trains or direct them to run through without stopping if it is safe to do so.

In the event of fire on board a train, the Control Centre shall be able to direct the vehicle to the next station for evacuation or in extreme cases shall be able to order the immediate evacuation of the train with all necessary actions required for a safe evacuation.



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Among other, the Control Centre shall be able to de-energize any one traction power substation or all, or portions of the traction power distribution system.

The maintenance facility, the Control Centre and all miscellaneous facilities shall be constructed with fire protection or retardation systems and an electrical fire alarm system shall be provided. In addition to providing a local alarm also transmitted to the Control Centre, the system shall also comprise gas drench/flooding systems and systems for the automatic shutdown of electrical systems except emergency lights or equipment and the closing of fire doors and dampers.

4 Electrical Safety

Traction power substations shall be provided with an earthing system to insure safety of passengers, O&M staff and equipment. In addition, earthing and bonding system shall be provided for overhead catenary equipment laid on concrete viaducts to limit touch and step voltages to safe limits. Track rails and/or other traction return current/earth conductors shall form part of the main earthing system. Details of the earthing and bonding system will be in accordance with the relevant standards.

Protective relays shall be provided in the traction power system and in the utility supply system for electrical fault and overload protection at traction power substations. The detection of a fault shall produce an alarm at the Control Centre and shall also trigger local alarms. Traction power circuit breakers shall be capable of being manually tripped by means of emergency trip buttons.

Vehicle electrical wiring and components shall comply with applicable safety codes and standards. Compartments containing high-voltage equipment shall be secured and clearly marked with warning signs. A backup battery system shall be provided to supply emergency power for ventilation, lighting, communications and other vital services in the event of traction power supply failure or shutdown.

Sensing and fault clearing devices shall be provided on the vehicle to protect propulsion and auxiliary system components from faults or over current damage

Electrical installations in the maintenance facility shall be provided with manual and automatic controls, power cut-offs and insulating floors for the protection of maintenance personnel.

5 Vehicle Operation Safety

The emergency braking system shall be designed to provide a braking rate of not less than 1.2 m/s/s. The system shall be monitored by a fail-alarm checking system, with visible and audible warnings in the event of failure. The emergency brake capability shall also respond to train-lined commands.

Passenger Doors will be opened either by the ATO/ATP system or by the driver. The Train driver shall initiate their closure and they shall be detected positively in the closed position before a train can move. Interlocking shall be provided to prevent a door from being unlocked or



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opened when the vehicle is in motion and to prevent the vehicle from moving when a door is open. Manual door releases, which shall operate only when the vehicle is stopped, shall be provided for emergency use by passengers or crew.

Should traction power be lost, emergency lighting, public address facilities, passenger to driver communication links and ventilation shall be provided powered from the vehicle storage battery for an accepted time duration.

The propulsion mode shall be inhibited by an emergency brake application, parking brake application, low air supply pressure, friction brake fault, doors open, or other action of protective devices.

Surfaces exposed to passengers, crew or maintenance staff shall be smooth and free from burrs, fins and sharp projections.

The ATO/ATP system shall control interlocking, avoid collisions, enforce safety and oversee vehicle door operation. The system shall provide route security interlocking switches and complete protection against collisions and over speed conditions.

6 Public Address Announcements

The following types of Public address announcements shall be made:-

- Line Controller to train passengers via the train radio system ;;
- Control Centre pre-recorded messages to train passengers via the train radio system
- Train driver to passengers via the train PA system
- Line Controller to selected platform(s) and/or concourse via the station PA system
- Control Centre pre-recorded messages to selected platform(s) and/or concourse via the station PA system
- Station staff to selected platform(s) and/or concourse via the local PA system
- Local pre-recorded messages to selected platform(s) and/or concourse via the local PA system
- automatically generated visual messages on platforms
- Automatically generated visual messages on trains
- Pre recorded visual messages on platforms
- Pre recorded visual messages on trains



Schedule N.2

SAFETY-REQUIREMENTS RELATED TO OPERATION AND MAINTENANCE

1. Operating Plans (operations, maintenance and safety of the O&M)

As a minimum, the Concessionaire shall produce a detailed Operations Plan which is to be submitted to MMRDA for approval. To ensure that the Documents take full cognizance of the equipment to be supplied, the detailed Operations Plan will have to be developed by or in conjunction with the selected Suppliers. The Plan will ensure that the correct methodology for the complete functioning of the system under service conditions is followed under all circumstances. The following topics cover the areas, which must be included in the planning for the system. These topics shall be refined during the design and construction stages of the Project, taking account of the testing and commissioning and the empty trial run stages, to form the final Operations Plan. The plan will then be used to form the Rule Book for the system. An auditable recording system shall be included in the plan for all operations and maintenance activities.

1.1 Safety Plan for operations and maintenance

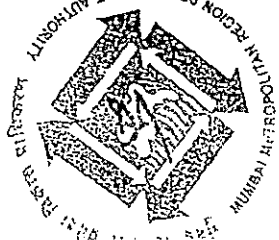
1.1.1 General

A Safety Plan must be provided to cover the operation and maintenance of the System, the protection of passengers and staff and the safety of the public at large. The plan will include:-

- The safety criteria for the designs of equipment to be used on the metro
- The normal and emergency operating procedures for the metro
- Procedures for the protection of staff working on the metro
- Protection against electric shock
- Protection from moving vehicles
- Protection against collisions
- Emergency isolation of traction power;
- Emergency stopping of trains;
- First aid equipment requirements throughout the system;
- Fire alarms
- Fire fighting equipment.
- Security the Safety Plan will be enforced through the Rule Book (see below).

1.1.2 Safety Criteria for Operations and Maintenance

The system safety design shall recognise that during emergencies and disruptions, vehicle control systems normally display their most restrictive indications. In events where the safety of an action depends upon a human response, such response will be governed by Operating Rules and Procedures and shall be confirmed by the Control Centre before initiation of any action.



In cases where the safety of the system may be degraded by environmental extremes or excessive stresses on equipment, procedures shall be provided to prevent the operation of the system until safe operation is ensured.

1.1.3 Emergency Evacuation from Metro Premises

Emergency evacuation required by conditions which pose an immediate threat to passengers or employees, such as fire, toxic fumes or flooding, shall be accomplished under the supervision of the staff of the Central Control and staff on site and, when available, with assistance from emergency services.

The design of the system shall include provisions to enable the timely evacuation of passengers and staff from all fixed structures and facilities. It shall also be possible in an emergency to evacuate passengers from vehicles between stations.

2.2 Rule Book

2.2.1 Introduction

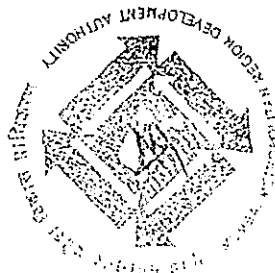
The requirements of the Safety Plan shall be enforced for all levels of operation through the provisions contained in the Rule Book. The Rule Book shall contain all rules pertaining to the conduct of staff, the safety of passengers and staff and the obligations to third parties. This coverage shall be extended as necessary to include general rules and guidelines on train service operation, revenue collection, customer service, staff supervision, staff discipline, organisation hierarchy, command and control, passenger handling.

The Rule Book shall cover all aspects of operational safety associated with the operation of the metro. The Rule Book may be divided into separate sections in order to permit easy access by the relevant staff.

All staff shall be issued with a copy of the Rule Book upon joining the metro and are expected to be fully conversant with the Rule Book and the procedures, safety warning and authorisation levels contained therein. To ensure that all new staff understand the importance of the Rule Book, training on all subjects covered in the Rule Book related to their job position and scope shall be mandatory. This training shall be specifically designed for each post and, for the drivers, the control room supervisors and other key safety-related staff, shall culminate with written, practical and verbal tests, which the trainee must pass before being allowed to work on the metro.

Any Subcontractors, companies or company's staffs working on the metro who may come in contact with potentially hazardous situations shall have to attend a safety training course and shall be issued with the safety rules that apply to him. If need be in certain cases such persons working in potentially hazardous locations shall be under the supervision of a metro employee of appropriate qualification.

2.2.2 Outline of the Rule Book



The Rule Book shall cover the following subjects:

- General Rules
- Legal Requirements:
- Corporate and individual responsibilities
- Adherence to Rules and Orders:
- Standards expected of staff, supervisory authority

2.2.3 Training and Examination

The Rule Book shall set out Training and Examination requirements. All staff shall receive induction training and specific metro training as appropriate.

2.2.4 Health and Fitness

The Rule Book shall set out the medical requirements, for posts, medical examinations required, sickness, accidents at work, accidents off duty, maternity leave, age limits, medical retirement, normal hearing and eyesight requirements, substance abuse, mental illness etc.

2.2.5 Reporting for Duty

The Rule Book shall set out the general guidelines for working times. The supervisory procedures for overall limitations on hours of duty. Detailed rules for times and booking shall be set in a separate document known as the "working agreement".

2.2.6 Property

The care of the property shall be covered together with the duties and responsibilities of employees with regard to the loss or damage of property or equipment, including intellectual property.

2.2.7 Incident Reporting

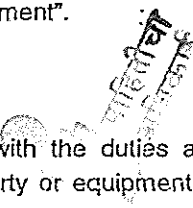
The Rule Book shall cover the general methods of reporting incidents, including the appropriate level at which the report is to be made.

2.2.8 Public Relations

The Rule Book shall describe the various information and communication systems available and shall set out requirements as to the security and confidentiality of information. It shall clearly indicate who has authority to release information to external organisations, the public or the media.

2.2.9 Uniforms and Equipment

The Rule Book shall cover the various Grades of uniformed staff and the rules governing the wearing of uniforms both on and off duty as well as the general policies covering the use of operating or office equipment on and off duty



2.2.10 Lost Property

- Rules for dealing with lost property shall be covered, including security alerts, labeling, reporting, and dispatch to head office.

2.2.11 Operating Rules

Normal Operations:

The Rule Book shall cover the way the operations are to be prepared and decided. As a principle this is made by using traffic estimates, setting of service levels, timetable preparation and the provision of rolling stock. It shall also include basic requirements for staffing trains, stations and the control centre. Maintenance, day-to-day service adjustments, control strategies, terminal operations, recording of performance, reporting procedures, station management, train dispatching from stations and automatic fare collection shall also be covered.

Degraded Operations:

The section of the Rule Book dealing with Degraded Operations shall contain the operations philosophy to be adopted under abnormal operating conditions, these shall include: -

- Train equipment failures
- Station equipment failures
- Service delays due to additional traffic
- Signaling failures
- Communications failures

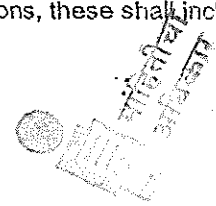
This section shall include procedures and strategies to be adopted in order to maintain the best possible service for unaffected sections of the system and to recover from the degraded service level in the shortest possible time.

Emergency Operations:

This section of the Rule Book shall deal with the procedures to be taken in the event of a life threatening incident, or one, which could result in serious equipment damage. Included shall be procedures for dealing with loss of power supplies, derailment or obstructed tracks, fire in the depot, fire in stations, fire on viaduct, severe weather, passenger action and external threats. In particular, it shall cover evacuation procedures from stations and trains.

Depot Operations:

The section of the Rule Book shall cover the movement of trains in and out of service, restrictions on stabling locations, use of washing facilities, methods for recording locations and movement of trains within depot limits. It shall also cover the preparation of trains for service, the movement of trains ready for service, procedures for communications with train staff



supervisors and Central Control and the return of trains to the depot. The movement of heavy maintenance vehicles, normal and emergency maintenance on trains, recording of maintenance work and use of materials, supervision of staff and principles of recording of work performance shall also be covered here. The supervision and control of any Maintenance staff (including subcontractors) shall also be included for the appropriate period.

Workshop Operations:

The Rule Book shall cover the movement of trains in and out of shops, power supplies for trains in shops, recording of work done and materials used, supervision of staff, train lifting and inspection of equipment.

Track Maintenance Operations:

This important section of the Rule Book shall cover track possessions, limits of possessions or isolations, co-ordination within engineering departments and the use and movement of equipment.

2.2.12 Safety Rules

General Safety

This section shall cover the rules for personal responsibility for safety and the corporate philosophy for safety. Legal requirements as they apply to the metro and means for dealing with breaches of safety rules shall also be covered. Appropriate rules shall cover the training and certification of staff, the protection of the public and procedures for dealing with medical emergencies and first aid, including procedures for dealing with injury or death of passengers or staff.

Main Line and Depot Safety

Rules shall be included covering access to the track during traffic and non-traffic hours, isolations authorised walkways, observation of moving vehicles, hand signals and portable signals. Emergency access to tracks, protection of staff working on trains, protection of staff working on the track, the role of the Control Centre in providing protection, the provision of emergency protection shall also be covered.

Workshop Safety

Rules shall be included covering the safety of staff in workshops, including the provision and upkeep of emergency exits, safety of electrical and compressed air supplies, protection against moving vehicles, traction current isolation equipment, emergency current discharge.

Equipment Safety

Rules shall be included for the training of staff in the use of equipment, limits of areas where equipment can be used, inspection and maintenance of equipment, repairs to equipment,



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reporting of defects, movement of equipment in workshops and on the metro, protection of the public.

Tool Safety

Rules shall be included covering the training of staff in the use of tools, limits of areas where tools can be used, inspection and maintenance of tools, repairs, reporting of defects, movement of tools in workshops and on the metro, protection of the public.

Hazardous Materials Safety

Rules shall be included covering the use and storage of hazardous materials, reordering procedures, prohibited substances, environmental risks, disposal of hazardous materials and procedures in the event of accidental spillage or injury.

Electrical Safety

The Rules shall cover electrical safety including regulations dealing specifically with the authorisation levels, access levels and safety procedures associated with the traction power supply. Levels of responsibility for all activities associated with the traction power supply shall also be included.

2.2.13 Fire Safety

Rules shall be included covering the prevention of fire on the metro, including rules for the storage of refuse and materials and the cleaning of stations, trains, premises and equipment. The rules shall also cover the response to fire alarms or to the discovery of fire, emergency communications procedures, evacuation procedures, fire fighting equipment and methods.

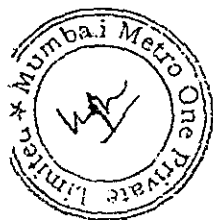
2.2.14 Protective Clothing

Rules shall cover the use and provision of protective clothing in workshops, depot areas, washing areas and on tracks and stations as well as the use of special clothing for use with hazardous materials.

2.3 Normal Operations Plan

A Normal Operations Plan shall be developed and shall cover all aspects of normal train operations including:

- Traffic levels
- Frequency of service
- Quantity and use of rolling stock
- Timetable concept
- Dispatching of trains
- Station operations
- Automatic fare collection



- Passenger information and communications
- Security of stations
- Station operation procedures

Aspects such as customer service, staff supervision, staffing and duty rosters and organization hierarchy shall be an integral part of this plan.

2.3.1 Traffic Levels

The traffic levels for the system shall be determined and the equipment and operational plans shall be designed to meet these requirements.

2.3.2 Frequency of Service

Specified Levels

The required levels of service are set out in the Concession Agreement.

Calculated Levels

Within the requirements of the Concession Agreement, the frequency of service may be adjusted having regard to the levels of demand.

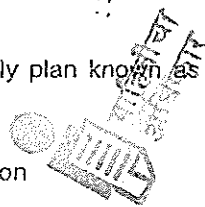
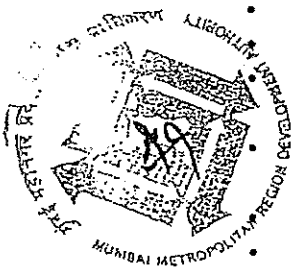
2.3.3 Timetable Concept

The provision of the train service shall be based on a daily plan known as a timetable. The timetable will contain the following information:

- A reference number for each train trip in each direction
- A reference number for each train consist
- The scheduled departure and arrival times for each train trip into or out of the depot or other stabling point
- The scheduled times of arrival and/or departure for each train trip at each station or other specified control point
- A crew reference number for each train trip
- Inter station distances
- Rolling stock requirements
- Rolling stock utilisation summary
- Train mileage summary for each consist
- Depot and stabling summary

A train trip shall be defined as a journey between two points where the direction of the train changes.

Within the requirements of the Concession Agreement, the timetable shall be written according to the traffic levels expected for each day, in particular separate weekday, Saturday, Sunday and Public Holiday schedules shall be prepared. Additional timetables shall be compiled for



special events as required.

2.3.4 Special Occasions

Timetables shall be drawn up so as to provide the service frequency and transport capacity required for particular periods of the day.

Sensitivity analyses of the proposed timetable shall be carried out to determine its robustness and capacity to recover from late running. Intervention from the Control Centre in the case of unscheduled operation should be restricted to cases of severe service disruption. In normal circumstances the Automatic Train Regulation (ATR) system will perform this function. In the event of severe perturbation the aim shall be to restore the planned operating frequency, rather than to recover the timetable.

It is envisaged that the timetable shall be written using a computer based programme and will be capable of being loaded into the Automatic Train Supervisory system (ATS) at the Control Centre.

It is not intended that timetables should be published. Instead the public will be informed of the operating hours and the expected frequency of trains. Services for special events shall be advertised in advance. ~~Passengers shall be informed of the expected waiting time to the next train.~~

2.3.5 Dispatching of Trains

Automatic Dispatch

Trains shall be dispatched from stations in accordance with the working timetable. Under normal operations, the train operator will be given the time to depart by the ATS system. The closing of the doors should be initiated by pressing a single button.

2.3.6 Station Operations Operating Plan

The Normal Operating Plan shall set out the requirements for station operations including the following:

- Opening for service in the morning
- Inspection of public premises
- Checking of staff premises
- Checking of equipment
- Logging onto Central Control
- Maintenance
- Utilities
- Tickets and revenue
- Staffing requirements and booking on
- Fare collection status
- Dispatch of trains
- Platform attendance, if any



- Fire control systems
- Rental property
- Passenger relations
- Correspondence
- Overcrowding
- Emergencies
- Closing of station
- Engineering works on or near station
- Stores
- Refuse disposal
- First aid equipment
- Police post, if appropriate

2.3.7 Passenger Information

Equipment

Passenger information shall be provided from a number of different sources. Apart from advertising in accordance with the commercial need to encourage or suppress traffic, the public will need to be informed about the levels of services offered, opening and closing times, does and don't of traveling on the line (luggage, prohibited articles, etc.), lost property, maps, ticket prices and availability.

More immediate information shall be available in the form of posters, fixed notices and public address announcements. Information shall also be given to passengers on board the train via the PA system and alphanumeric displays. Information provided shall include the identity of the next station and on which side the doors will open.

2.3.9 Security of Stations

General

During traffic hours, stations shall be staffed as appropriate by operating personnel who shall be responsible for safety, security, ticketing, cash handling, light maintenance and cleaning, assistance with train dispatch during busy periods and passenger assistance when required.

CCTVs located at strategic locations will assist with security.

During non-traffic hours, the stations shall be closed against public access. Stations shall be monitored by Central Control including during non-traffic hours.

2.3.10 Fare Collection

The Normal Operations Plan shall contain a description of the Automatic Fare Collection System and rules and regulations for interfacing with it.



As a minimum, the following items shall be covered:

Types of tickets and/or Tokens used.

- Recirculating Tokens
- Dealing with corrupted Tickets or Tokens.
- Ticket Sales Area Security
- The Station Cash and Ticket Room
- The audit of TVM Cash Box and Drop Vaults
- Cash handling procedures at Stations
- Provision of Change
- Collection of Cash.

2.4 Degraded Operations Plan

2.4.1 Introduction

The need to operate in Degraded Operations mode result from the failure of one of the system components, from the effects of extreme meteorological conditions, or from the effects of external influences. By definition Degraded Operations do not involve life threatening situations or situations where serious injuries or serious property damage could result. These are dealt with under Emergency Operations.

As the name implies, in Degraded Operations the system is unable to operate as designed and instead operates at reduced capacity or with some of its functions impaired. Degraded Operations can occur in parallel with Emergency Operations and commonly follow a period of Emergency Operations.

The system and its separate sub-systems shall be designed to minimise the effects of failures so as to avoid the need for Degraded Operations or to permit Degraded Operations with a relatively high quality of service.

Normally a single failure should not result in a need for Degraded Operations but the combination of more than one failure can significantly reduce the quality of services.

2.4.2 Items to be Included

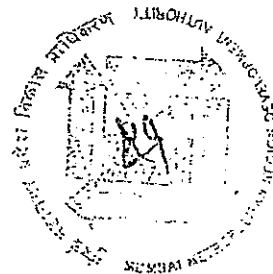
A Degraded Operations Plan is unique to the System it pertains to, but the following items shall be addressed as a minimum.

Power Supply Failures

- Catenary Failures
- Traction Power Failures
- Electrical (Non Traction) Failures

2.4.3 Control Centre Failures

- SCADA Failure



2.4.4 Signalling Failures

- Workstation Failure
- TMS Failure or Transmission Failure
- Failure of a Local Interlocking
- Failure of the ATP System

2.4.5 Telecommunications Failures

- Radio
- Telephones
- PA System

2.4.6 Rolling Stock Failures

- ATP Failure
- Door Failures
 - Failure to open or close doors.
 - Failure to lock doors.
 - Failure to indicate the status of doors.
- Communication Failures
 - On-board PA System
 - Train Radio
- Brakes
- Train Lights
 - Failure of headlights.
 - Failure of taillights.
 - Failure of saloon lighting.
 - Failure of instrument lights.
- Passenger Air-conditioning
- Driver's Air-conditioning
- Bogie Failures
 - Wheel flats.
 - Hot boxes.
 - Brake rigging defect.
 - Broken axles, bogie frames, springs, hangers, etc.
- Traction Failures

Track Failures

- Cracked or Broken Rail
- Turnout Failure
- Point Motor Failure

2.4.8 Recovery Actions



The task of recovering trains and more importantly, passengers, from the track

- Diminished capability a train may be able to proceed with diminished capability under its own power as a result of:
 - Loss of on board ATP.
 - Loss of one or more traction motors.
 - Partial loss of braking.
 - Loss of auxiliaries e.g. air-conditioning, PA, radio etc.
- Train Can Be Pushed
- Train Cannot Be Pushed

2.4.9 Blocked Line

Possible Routes

2.4.10 Station Related Failures

Failures that have to be considered include: -

- Loss of electric power.
- Failures of the Automatic Fare Collection (AFC) equipment.
- Failure of escalators and elevators.
- Loss of PA system.
- Loss of Passenger Information Displays.
- Fire within or adjacent to the station.

2.4.11 Trespassers on Track

2.5 Emergency Operating Plans

2.5.1 Introduction

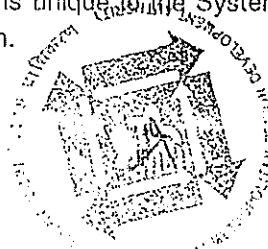
Emergencies are defined as incidents that could result in death, severe injury or major property damage. They can result from accidental failures, external factors, sabotage or other deliberate acts.

Information as to the existence or possible existence of an emergency can come from members of staff, members of the public, external agencies or automatic reporting systems.

All such reports must be channeled to the Operation Supervisor as a matter of urgency. The Operation Supervisor, in conjunction with the Operation Control Centre (OCC) Staff, is responsible for initiating and monitoring the necessary reaction.

2.5.2 Items to be Included

An Emergency Operations Plan is unique to the System it pertains to, but the following items shall be addressed as a minimum.



2.5.3 Passenger Safety

At all times the safety of passengers and the general public is of paramount importance. In many cases the first reaction to reports of a serious incident is the immediate blocking of both tracks until the extent of the problem can be established.

2.5.4 Liaison

The Internal and if necessary, the External Emergency Response are normally organised by the Operation Supervisor, who calls on internal emergency services and external emergency services as necessary.

2.5.5 Incident Manager

The position of Incident Manager is normally held by various members of the senior staff in accordance with a roster. The Incident Manager controls internal operations at the site of the incident and is also responsible for on site liaison with the external emergency services. Until his arrival, the most senior staff member on site assumes his duties. The Incident Manager must ensure that the Operation Supervisor, the Public Relations Department and senior management are regularly informed of the current situation.

2.5.6 Blockage of Line

Single Track Blocked
Both Tracks Blocked

2.5.7 Controlled Evacuation onto the Line

Handicapped Passengers

2.5.8 Non-Controlled Evacuation

2.5.9 Passenger Declared Emergency

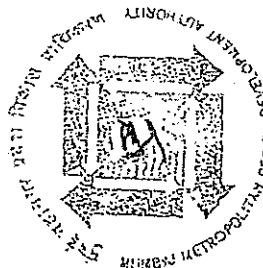
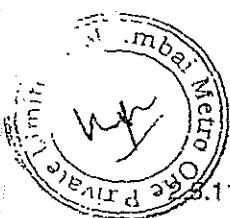
2.5.10 Fire on a Train

Amongst the equipment under the train floor
Inside the train
In the Driver's cab
Amongst the roof equipment

2.5.11 Bomb and Terrorists Threats

2.5.12 Evacuation from Stations and Platforms

Fire Exits Fire Fighting Equipment Stations Fire plans must be prepared for each of the intermediate stations. Terminal Stations



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3. Organisation and Staffing.

3.1 Introduction

The organisation and staffing of the metro shall be developed in parallel with the development of the system and shall have regard to the technical specification of the metro and the requirements of the various Operating Plans.

3.2 Organisation and Manpower Planning

The Concessionaire shall devise and submit to MMRDA for information an Organizational Structure encompassing the Operations activity of the metro. This shall include a chart of all proposed positions showing laterally equivalence of responsibility and vertically lines of reporting responsibility.

Responsibility for all safety related issues shall be vested in a single person whose position in the Organisational Structure shall be clearly shown.

3.2.1 Job Descriptions

The Concessionaire shall prepare and submit to the MMRDA for information Job Descriptions for each position identified in the Organisation Structure that will include but not be limited to the following:

- Job Title
- Job Function
- Position to which the holder is responsible
- Positions responsible to the holder
- Responsibility of holder for care of assets
- Responsibility of holder for expenditure
- Responsibility of holder for safety

3.2.2 Personnel Specification

The Concessionaire shall prepare and submit to the MMRDA for information Personnel Specifications for each position identified in the Organisational Structure that will include but not be limited to the following:

- Educational Qualification requirements
- Experience Requirements
- Physical and medical requirements (if necessary)

3.3 Recruitment

The recruitment and selection criteria are the responsibility of the Concessionaire. However the criteria will require MMRDA's prior approval.

3.4 Training Planning



3.4.1 Training Philosophy

The Concessionaire will prepare and submit to the MMRDA for information a statement of Training Philosophy, Objectives and Methodology for the Operations staff such that staff on completion of training will have the knowledge and/or skills required by their respective job descriptions.

3.4.2 Plans of Instruction

The Concessionaire will prepare and submit to the MMRDA for information Plans of Instruction (POI) for each grade in the Organisation Structure detailing course modules, the objectives, content and duration of each and the standards to be achieved.

3.5 Training Implementation

3.5.1 Accommodation

The Concessionaire shall provide all necessary accommodation for training.

3.5.2 Equipment

The Concessionaire shall provide all special equipment necessary to carry out the approved training course modules.

3.5.3 Training Staff

The Concessionaire shall provide suitably qualified and competent training staff.

3.6 Qualification and Certification

The qualification and certification are the responsibility of the Concessionaire.

3.7 Staff Discipline and Dismissal

The staff discipline and dismissal are the responsibility of the Concessionaire.

3.7.1 Disciplinary Procedures

Procedures for investigating any breach of the Rule Book or other operating regulation or procedure shall be prepared carefully with appropriate responses. Care shall be taken to distinguish between breaches caused willfully and those resulting from inadequate training or supervision in determining the response and the imposition of disciplinary measures or the selection of retraining requirements.

3.7.2 Dismissal

All actions or circumstances which may result in the dismissal of any member of staff shall be clearly defined and procedures for ensuring that these are known to all staff shall be specified.



SCHEDULE O

CRITERIA FOR LIST OF CHARTERED ACCOUNTANTS

Selection of Chartered Accountants for a mutually agreed list shall be as follows:

1. Pursuant to the provisions of Article 26, Concessionaire shall provide a list of 10 (ten) reputable firms of Chartered Accountants having their registered office in India.
2. MMRDA shall shortlist a list of 5 (five) reputable firms of Chartered Accountants (the "List of Chartered Accountants") from the above-mentioned list.
3. The Concessionaire shall appoint Statutory Auditors from the List of Chartered Accountants.
4. After completion of every five years from the date of preparing the mutually agreed List of Chartered Accountants, or such earlier period as may be agreed between MMRDA and the Concessionaire, a new list shall be prepared in accordance with the provisions of this



SCHEDULE P

SUBSTITUTION AGREEMENT

Executed Substitution Agreement (VOL. IV-C) shall form part of the Concession Agreement.

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SCHEDULE Q

VESTING CERTIFICATE

Mumbai Metropolitan Region Development Authority (MMRDA) hereby acknowledges:

1. Compliant and fulfillment by the Concessionaire of the Divestment Requirements set forth in Clause 31.2 of the Concession Agreement in respect of the Versova-Andheri-Ghatkopar MRTS Project;
2. Receipt of actual possession of the MRTS Project from the Concessionaire; and
3. Receipt from the Concessionaire of a certificate confirming that there are no liens or encumbrances whatsoever on the Versova-Andheri-Ghatkopar MRTS Project including Project Assets;

on the basis that upon the issue of this Vesting Certificate, MMRDA shall be deemed to have acquired, and all title and interest of the Concessionaire in or about the MRTS Project shall be deemed to have vested, unto MMRDA free from all encumbrances, charges and liens whatsoever.

Notwithstanding anything to the contrary contained hereinabove it shall be a condition of this Vesting Certificate that in the event of any defect or deficiency in any of the Divestment Requirements set forth in Clause 31.2 of the Concession Agreement being found or discovered within 3 months of handing over at any time hereafter, nothing contained in this Vesting Certificate shall be construed or interpreted as waiving the obligation of the Concessionaire to rectify and remedy the same and/or relieving the Concessionaire in any manner of the same.

Agreed and accepted
For the Concessionaire

For MMRDA

By:.....

By:.....

Name:

Name:

Title:

Title:

Dated:

Dated:



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SCHEDULE R

REPORTING AND RECORD MAINTENANCE

1. Submission of Returns

The Concessionaire should submit the following returns monthly/yearly to the MMRDA.

- a) Passenger Statement
- b) Train Running Statement –directionwise
- c) Punctuality of trains and analysis of loss of punctuality -causewise.
- d) Annual earning statement
 - (i) Passenger Earning
 - (ii) Other Earnings
- e) Accident statement with causes
- f) Monthly train failure statement with causes.
- g) Major incidents involving passengers.



2. Commissioning Requirement -Schedule

3. Record of Maintenance

As per Technical and Performance Specifications in Volume- III of IV
Concessionaire shall maintain record of Maintenance as detailed in respective manuals.

Note:-

Upon request Concessionaire shall promptly and within seven days of receipt of such request, provide any such document to MMRDA concerning the project as may be reasonably required.



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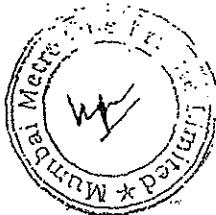
SCHEDULE R1

Submission of Documents for Handing Over of System

On expiry of the Concession period, which will be 35 years (or as specified), the Concessionaire will hand over the entire system along with all the assets to the MMRDA as per the Concession Agreement in good working condition at least for succeeding 5 years, so that the system when taken over is still fit for carriage of commuters.

For the purpose of handing over of the system, the Concessionaire will furnish the following details at least "one year" in advance to the MMRDA.

1. Detail statement of Civil Engineering structures with drawings
2. Detail statement of building with drawings
3. Details of power supply installation with drawings
4. Details of overhead equipment with drawing
5. Details of signalling systems with drawings
6. Details of different communication systems with drawings
7. Details of ticketing system with layout drawings of different types of equipment
8. Details of rolling stock and special stocks
9. Details of maintenance facilities with plans and equipments provided therein for different disciplines/systems.
10. List of available spares for different system.
11. Statement of replacement of equipment carried out during the Concession Period with dates of such replacements.
12. Schedule of maintenance of different equipment.
13. List of equipment required to be replaced during the next three years and proposed plan for replacement.
14. Expected life of equipment of different disciplines working in the system.
15. List of different category of staff employed with their pay scales and total emolument for different disciplines of operation and maintenance.
16. Any other document required by MMRDA

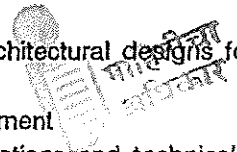
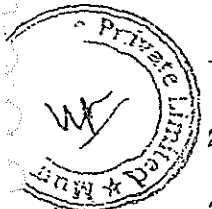
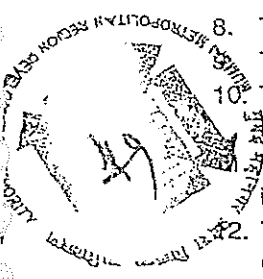


SCHEDULE S

INDEPENDENT ENGINEER'S DUTIES & RESPONSIBILITIES

Duties and Responsibilities

1. To always act fairly and independently in the overall interest of the Project
2. To review and finalise various standards for the Standard Gauge metro system as proposed by the Concessionaire's Consultants for implementation of the MRTS
3. To review and finalise the list of various Codes of Practice – national and/or international which will form the basis of system Design
4. To approve the Conceptual Designs and Layouts including Architectural designs for the MRT Stations
5. To approve the horizontal and vertical designs for the entire alignment
6. To review and approve preliminary designs, drawings, specifications and technical aspects of Tender documents for various sub-systems prepared by Concessionaire.
7. For "design and Construct" modules review the design and drawings as prepared by the Contractors and approved by Concessionaire.
8. To review the working drawings submitted by the Contractors during implementation
9. To review Quality Assurance Programme prepared by the Concessionaire's Consultants
10. To monitor the progress and quality of the works through periodic inspections and submit report to the Concessionaire and MMRDA
11. To witness all tests and pre commissioning trials as needed for the successful project implementation including commissioning
12. To approve safety and Operations Plan for the MRTS as proposed by the Concessionaire's Consultants.
13. To approve O & M manuals covering all disciplines, prepared by Concessionaire's Consultants
14. To review the adequacy of Training modules finalized by Concessionaire's Consultants/Operator for O & M Staff
15. To assist Commissioner of safety in his inspection of the integrated system prior to safety Certification by him
16. To issue Completion Certificate/Provisional Completion Certificate as the case may be.
17. For any change in scope order, advise and assist MMRDA and Concessionaire regarding cost and time element for its implementation and certify reasonableness of payment etc.
18. In the event of delays not attributed to the Concessionaire, but likely to affect COD recommend suitable extension of COD and Concession Period.
19. To review all project documents especially works and procurements Contracts and detailed technical specifications etc.
20. To verify occurrence and effect of Force Majeure, Exceptional events caused by technical issues, if any and certify payable Compensation/Time Extension as required.
21. To carry out inspection of assets to assess their serviceability and to ensure compliance of all divestment requirements as per provision of Concession Agreement.
22. Any other duty not specifically listed above but necessary for successful project implementation or as may be construed from the concession Agreement.



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SCHEDULE S1

SELECTION/APPOINTMENT OF INDEPENDENT ENGINEER

For selection and appointment of Independent Engineer, the procedure as under will be followed:

1. MMRDA will invite Expression of Interest (EOI) from competent Consultants of International Repute having similar experience and prepare a shortlist of potential bidders.
2. Technical and financial proposals will be invited only from such short listed pre-qualified Consultants. The terms of Reference (TOR) will be finalized by MMRDA in consultation with Concessionaire/Preferred Bidder.
3. The Technical bids/Proposals will be evaluated first as per evaluation criteria given in the Request for proposal (RFP). The Financial proposals of only the technically qualified bidder will be opened.
4. The consultants will be selected finally on the basis of Least Cost considerations as per the World bank's guidelines for Selection of Consultants. A representative of the Preferred Bidder will be associated with the Bid Evaluation process.
5. The Least Cost Bidder may be called for further negotiations if felt necessary. Final negotiated offer will be accepted by MMRDA and the Independent Engineer appointed.
6. The duration for the Consultancy will initially be for a period of four years extendable for one year with mutual agreement.
7. MMRDA shall make all payments to the Independent Engineer as per Contract Agreement. The concessionaire shall reimburse one-half of all such payments within 15 days of the demand being made by MMRDA.
8. For any reasons whatsoever, if it becomes essential to terminate the services of the Independent Engineer, MMRDA will do so in consultation with the Concessionaire.
9. The fresh appointment of the Independent Engineer will be done by MMRDA following a mutually agreed procedure.

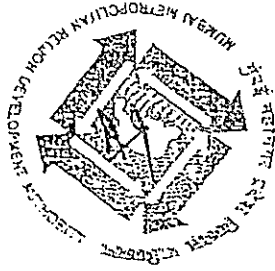


SCHEDULE T

SHAREHOLDERS AGREEMENT



Executed Shareholders Agreement (VOL- IV-D) shall form part of the Concession Agreement.



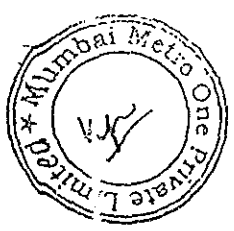
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SCHEDULE U

STATE SUPPORT AGREEMENT

Executed State Support Agreement (VOL. IV-E) shall form part of the Concession Agreement.

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SCHEDULE V

PERMITTED COMMERCIAL ACTIVITIES

The Concessionaire shall be permitted to undertake the following Commercial Activities on the concourse area at stations subject to a maximum of 100 square metres per station.

1. Stalls for sale of pre-cooked food items. Microwave oven and other non-flame heating equipments can be used.
2. Vending machines
3. Stalls for sale of newspaper, magazines etc
4. General retail outlets
5. Bank ATM's
6. Tourist information services and travel agencies
7. May undertake any other activity which in normal course is undertaken at such transit station in the country or outside India,



SCHEDULE W

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SCHEDULE X

EVENTS CONSTITUTING AN O & M FAILURE AND RESULTING IN TERMINATION

1. RAMS standards

Refer to Schedule J

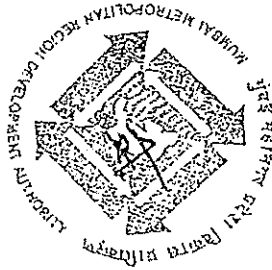
2. O&M Failure

If the Concessionaire fails to meet the agreed RAMS requirements for a consecutive period of more than 3 months and fails to take suitable corrective action, which, in the opinion of the Independent Engineer will rectify the defects, then such event[s] shall constitute grounds for the MMRDA to terminate the Concession Agreement

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1. RAMS standards

Refer to Schedule J



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SCHEDULE Y

PARAMETERS TO ASSESS THE SERVICEABILITY OF ASSETS TO BE TRANSFERRED AT THE EXPIRY OF THE CONCESSION

1. RAMS standards

Refer to Schedule J

2. Serviceability Parameters

For a period of 3 years before handing over of the System the Concessionaire shall meet the RAMS requirements in all respects and shall have sufficient spare parts available at handover to continue operation for a minimum of 2 years.



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SCHEDULE Z

Schedule Z

Formula for determining extension of Concession Period

If there is partial disruption of the MRTS system due to the occurrence of an Indirect Political Event and Non Political Event in Article 27.2 (iii), as the result of which the Concessionaire is unable to collect the Fares at any station then the Concession Period shall be extended in accordance with the formula set out below.

$X = Y * Z / 100$ where

Z = no. of days of occurrence of a Indirect Political Event or Non Political Event in Article 27.2 (iii), provided that such an event has occurred for a continuous period of 7 or more days in an Accounting Year.

X = Total No. of days of extension of the Concession Period

Y = % percentage of revenue received from such station in a day which shall be the average percentage of 30 days immediately preceding the occurrence of the said event.

The number of days of the extension of the Concession Period thus arrived shall be cumulated over the Concession and rounded off to the nearest number at the end of the Concession.

