The Bangalore Metro Railway (Opening of Public Carriage for Passengers) Rules, 2011

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Rule
THE-BANGALORE-METRO-RAILWAY-OPENING-OF-PUBLIC-CARRIAG of 2011

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The Bangalore Metro Railway (Opening of Public Carriage for Passengers) Rules, 2011Published vide Notification No. G.S.R. 272(E), dated 30th March, 2011Ministry of Urban DevelopmentG.S.R. 272(E). - In exercise of the powers conferred by section 22 of Metro Railway (Operation and Maintenance) Act, 2002 (60 of 2002), the Central Government hereby makes the following rules, namely:-

Chapter I
Preliminary

1. Short title and commencement.

(1)These rules may be called the Bangalore Metro Railway (Opening of Public Carriage for Passengers) Rules, 2011.(2)They shall come in to force on the date of their publication in the Official Gazette.

2. Definitions.

(1)In these rules, unless the context otherwise requires,(a)"absolute block system" means a system of train working wherein a line is divided into sections or blocks and only one train is allowed to enter a block section at a time only after ensuring that the last train ahead has cleared the block section and the movement to the block section is protected by a stop signal;(b)"Act" means the

Metro Railway (Operation and Maintenance) Act, 2002 (No. 60 of 2002);(c)"authorised" means authorised by the Bangalore metro railway administration;(d)"automatic block system" means a system of train working wherein section between two stop signals is divided into several sub-sections or blocks by providing series of signals, the aspect of which is automatically activated by the conditions of the block beyond the signal and the movement in automatic signaling territory is governed by the aspect of signals and train is allowed to enter automatic block section at authorised speed for various aspects of automatic signals;(e)"bridge engineer" means the Chief Engineer or any other engineer responsible for design and construction of bridge, or viaducts or tunnels;(f)"Commissioner" means the Commissioner of the Metro Railway Safety appointed under section 7 of the Act;(g)"Electrical Inspector to Government of India" means a person appointed as such by the Appropriate Government under sub-section (1) of section 162 of the Electricity Act, 2003 (36 of 2003) and includes the Chief Electrical Inspector;(h)"Form" means a Form appended to these rules;(i)"General Rules" means the Bangalore Metro Railway (General) Rules, 2011; published in the Gazette of India. Extraordinary vide notification number G.S.R. 271 (E) of dated the 30th March, 2011;(j)"passenger" means a person travelling on the Bangalore metro railway with a valid ticket or pass;(k)"report" means the report of the Commissioner made under section 15 of the Act;(l)"Schedule" means a Schedule appended to these rules.(2)The words and expressions used in these rules and not defined but defined in the Metro Railway (Operation & Maintenance) Act, 2002 (60 of 2002) shall have the meanings, respectively assigned to them in that Act.

Chapter II
Preparation for Opening of Bangalore Metro Railway

3. Opening of Bangalore Metro railway.

(1)The Bangalore metro railway administration shall ensure that the metro railway in the metropolitan city of Bangalore (hereinafter referred as the Bangalore Metro railway) or a portion thereof to be opened for public carriage of passengers is complete in all respects as per the manuals of practice of the Bangalore Metro Railway and for such opening all the administrative formalities are complete and that the working of the Bangalore metro Railway is regulated by the Bangalore Metro Railway (General) Rules, 2011.(2)Where the Bangalore Metro Railway Administration is of the opinion that the Bangalore metro railway or part thereof is required to be opened for public carriage of passengers, it shall refer the matter to the Commissioner for inspection and report on the safety of that metro railway.

4. Supply of documents to Commissioner.

(1)The Bangalore Metro Railway Administration shall, while making reference to the Commissioner for inspection and report on the safety of the metro railway under sub-rule (2) of rule 3, furnish all relevant documents to the Commissioner from the following list of documents, namely:(a)tabulated details;(b)index plan and sections;(c)drawings of works;(d)certificate;(e)list of infringements of moving and fixed dimensions;(f)working orders to be enforced at the operation control centre and at each station; and(g)administrative note giving salient features of the project.(2)The documents

referred to in sub-rule (1) shall indicate the distances from the same fixed point in kilometers and decimals up to two digits and the fixed point shall be clearly defined in a note on the plan and section sheets of the work documents.(3)The datum adopted shall be mean sea level as fixed by the Survey of India and heights shall be mentioned with reference to the datum in meters and decimals up to two digits.(4)The documents referred to in sub-rule 1 shall be signed by concerned Director-in-charge except the certificate which shall be signed by the Officer-in-charge of the Bangalore Metro Railway Administration himself.(5)The Metro Railway Administration shall furnish such documents to the Commissioner, as far as possible, at least one month in advance of the stipulated date of inspection.

5. Contents of documents.

(1)Tabulated details which shall consist of important characteristics of the Bangalore metro railway or a portion thereof to be opened for public carriage of passengers, and in particular shall include-(a)curve abstract in Form I;(b)gradient abstract in Form II;(c)bridge abstract in Form III,(d)viaduct abstract in Form IV;(e)important bridges abstract in Form V;(f)ballast and permanent way abstract in Form VI;(g)stations and station sites in Form VII;(h)brief particulars of rolling stock in Form VII;(i)brief particulars of traction installations in Form IX;(j)power supply installation abstract in Form X;(k)electrical crossings over metro railway tracks in Form XI;(l)traction maintenance depot abstract in Form XII;(m)ventilation, smoke management, fire safety and other measures in tunnels and stations in Form XIII; and(n)signalling and train control and tele-communication systems in form XIV.(2)The index plan and section sheets, completion drawings, etc., shall include, -(a)index plan and section sheets as specified in the Schedule;(b)completion drawings of bridges or viaducts showing details of structure, loading standards adopted, etc;(c)completion drawings of tunnels, if any;(d)diagrammatic plan of station yards showing layout of tracks and particulars of turn outs, gradients, of any signals and interlocking installed.(3)The comments on the following matters shall be included in the certificate in Form XV, namely:-(a)Moving and fixed dimensions;(b)Strength of bridges or viaducts;(c)Brake and communication;(d)System of working;(e)Electric traction equipment; and(f)Type of rolling stock, proposed along with list of restrictions.(4)The list of infringements of moving and fixed dimensions shall be prepared in Form XVI and shall contain full explanations for the infringements and restrictions or precautions to be adopted because of them and the reference to the authority of the Central Government under which the infringement is permitted or allowed.(5)The working orders to be enforced at each station on the Bangalore metro railway to be opened shall be prepared in accordance with the provisions of the Bangalore Metro Railway (General) Rules, 2011 and shall specify any special conditions that are required to be met with and such orders shall include traction working rules.

Chapter III
Duties of Bangalore Metro Railway Administration

6. Deviations from manuals of practice to be notified.

(1)The Bangalore Metro Railway Administration shall ensure that Bangalore metro railway or a portion thereof proposed to be opened to be is operationally fit in every respect before inspection.(2)The Bangalore Metro Railway Administration shall, while making reference under sub-rule (2) of rule 3, bring to the notice of the Commissioner any deviation in design, material and construction of the civil works, electrical, signaling, telecommunication and train control installations, rolling stock or appliances of the metro railway, instances in which moving and fixed dimensions have not been observed, or the bridges, viaduct, tunnels that are not capable of carrying the specified or standard loading without exceeding the stresses specified in relevant Indian Codes or, as the case may be, the International Codes.

7. Metro Railway Administration to make special arrangements.

(1)The Bangalore Metro Railway Administration shall make such arrangements which are necessary to facilitate the inspection of the metro railway, which is to be opened by the Commissioner.(2)The Bangalore Metro Railway Administration shall be responsible to make such special arrangements as the Commissioner may require for inspection of civil structures, permanent-way, rolling stock, electrical, signal, telecommunication ad train control installations on the metro railway, which is to be opened.

8. Supply of information to Commissioner.

(1)The Bangalore Metro Railway Administration shall supply all the information and give all the assistance to the Commissioner and supply or provide all instruments and apparatus required for taking measurements, testing of bridges or viaducts, rolling stock, electrical, signal, telecommunication and other installations.

9. Dismantling of any work on request by Commissioner.

(1)The Bangalore Metro Railway Administration shall on receipt of a request made by the Commissioner, make arrangements to dismantle any structure on the metro railway to be opened with a view to make complete examination of the details or workmanship of the structure, as quickly and completely as possible.(2)The commissioner, while requesting the dismantling of the structure, shall be responsible to see that such dismantling does not affect the utility or strength of the structure, unless dismantling is necessary for its proper inspection.

10. Officer in-charge to accompany Commissioner at inspection.

(1)The officer in-charge of the Bangalore Metro Railway Administration shall accompany the Commissioner throughout the inspection.(2)If, for any unavoidable reason, it is not possible for the officer in-charge of the Bangalore Metro Railway Administration to accompany the commissioner, then, concerned Director, authorised by general or special order issued by the officer in-charge of

the Bangalore Metro Railway Administration, shall accompany the Commissioner and shall be present during the entire period of inspection.(3)During such inspection of each portion of the Bangalore metro railway, the engineer or officer who is or was in immediate charge or his representative of that portion of the metro railway during its construction may also be present.

Chapter IV
Duties of Commissioner

11. Commissioner to make full and complete examination.

(1)On receipt of a reference under sub-rule (2) of rule 3 from the Bangalore Metro Railway Administration, the Commissioner shall, with a view to determining whether it is fit to be so opened, inquire into all matters which appear to him relevant for the safety of public carriage of passengers on that metro railway.(2)The Commissioner shall satisfy himself that,-(a)the Bangalore Metro Railway (General) rules, 2011 have been applied to the metro railway or part thereof proposed to be opened;(b)the moving and fixed dimensions have been observed; and(c)the civil works, permanent-way, electrical, signal, telecommunication, rolling stock and other appliances belonging to or working on the metro railway are designed properly or constructed in such a manner so as to guard the system against accident and failure.

12. Provisions for handling traffic at stations.

(1)The Commissioner shall satisfy himself that at every station on the part of Bangalore metro railway proposed to be opened.-(a)adequate provision has been made for handling of passenger traffic;(b)arrangements have been made for easy access by road; and(c)adequate fire-protection and disaster management measures have been taken along with arrangements for safe evacuation of passengers.

13. Inspection of bridges or viaducts.

- The Commissioner shall satisfy himself that the bridges or viaducts and other elevated structures on the Bangalore metro railway proposed to be opened for public carriage of passengers are so designed and constructed to conform to the loading standards as specified in the Bangalore Metro Railway Works Manual and that the stress limits are not exceeded.

14. Procedure for inspection of bridges or viaducts.

(1)For the purpose of rule 13, the Commissioner shall examine at least one bridge or viaduct of each different pattern or type, as the case may be, and satisfy himself about the adequacy with reference to the safety of-(a)the general design of the bridge or viaduct;(b)designs of different parts or portions of the bridge or viaduct;(c)the construction and erection of the whole structure of the bridge or viaduct;(d)steel girder spans and their bedding at all supports; and(e)type and design of

the pre-stressed concrete bridges or viaducts including their bearings.(2)If the Commissioner considers it necessary, in addition to it, certificate of a bridge engineer employed fer the purpose, he may call for load deflection test as specified in Form XVII and other test under the loads for which the bridge is designed.(3)If the Commissioner is satisfied that the girders have been properly designed for the work they are intended to perform, then the open-web and plate-girders shall not require to be tested.(4)The Commissioner may test any number of span and may test a span any number of times and at any speed as he considers desirable up to the maximum permissible speed of the section.

15. Inspection of electrical installation.

(1)The Commissioner shall inspect the following for electrical installations on the Bangalore metro railway proposed to be opened for the public carriage of passengers, keeping in view the essentiality of services and safety of passengers, namely:-(a)protection systems of substation;(b)earthing and bonding of installation;(c)electromagnetic interferences to ensure that these are within limits; and(d)essential services to ensure that these would run in case of major break downs;(e)(i)electrical clearances;(ii)caution and danger notice boards for public;(iii)assurance Registers signed by various metro railway staff of their knowledge of working in electrified area;(iv)maintenance facilities and manpower; and(v)fire fighting measures; and(f)any other item, as he may consider fit for safety of passengers.

16. Inspection of rolling stock.

- The Commissioner shall inspect the following items of the rolling stock proposed to be used on the Bangalore metro railway keeping in view the safety of travelling public on metro railway system proposed to be opened, namely:-(a)important systems like traction, braking, etc;(b)safety items like deadman handle door operation, etc;(c)facilities for evacuation of passengers in case of emergencies;(d)system of operation;(e)fire prevention measures; and(f)any other item, as he may consider fit for safety of passengers.

17. Inspection of signaling and telecom facilities.

- The Commissioner shall inspect the following items of the signaling and telecom facilities keeping in view the safety of travelling public, proposed to be used on Bangalore metro railway system proposed to be opened, namely:-(a)fail-safe features of the signaling system;(b)communication between train operator and passengers; and(c)any other item, as he may consider fit for the safety of the passengers.

18. Inspection of facilities for relief of passengers in emergencies.

- The Commissioner shall check the following facilities for relief of passengers in case of emergency, namely;-(a)(i)in-house facilities and preparedness to combat emergencies;(ii)communication and arrangements with outside relief agencies;(iii)any other item, as he may consider fit for safety of

passengers; and(b)competency of metro railway official connected with train working.

Chapter V
The Inspection Report

19. Contents of report.

(1)The Commissioner, in his report, shall specify that-(a)he has made a careful inspection of the metro railway and the rolling stock that may be used there on;(b)the moving and fixed dimensions as laid down have not been infringed;(c)the track structure, strength of bridges or viaducts, tunnels, general structural character of the civil works, signal and train control system, telecommunication, traction installations and the size of, and maximum gross load upon the axles of any rolling stock, comply with the requirements laid down; and(d)in his opinion, the metro railway can be opened for the public carriage of passengers without any danger to the public using it.(2)The reports shall be clear and concise and shall deal with all matters which are required to be considered, particularly whether the metro railway line is designed for the specified loading and the instances of deviation or infringement of moving and fixed dimensions.

20. Documents accompanying inspection report.

- The report referred to in rule 19 shall be accompanied by the following documents, namely:-(a)index plan and sections of the metro railway;(b)results of the bridge test, when asked for by the Commissioner;(c)documents required for initiation of eclectic traction;(d)tabulated details in Forms I to XIV;(e)certificate by the Officer in-charge of the Bangalore Metro Railway Administration in Form XV; and(f)list of infringements of moving and fixed dimension in Form XVI.

21. Submission of report to Central Government.

- In respect of every reference made to him under sub-rule (2) of rule 3, the Commissioner shall submit his report to the Central Government.

Chapter VI
Sanction to Open Metro Railway for Public Carriage of Passengers

22. Sanction to open metro railway.

(1)The central Government may, after considering the report of the Commissioner submitted under rule 21, sanction the opening of the Bangalore metro railway or a portion thereof, as the case may be, under section 14 of the Act as such or subject to such conditions as may be considered necessary

by it for the safety of the public.(2)The Bangalore Metro Railway Administration shall publish the date of opening of Bangalore metro railway or a portion thereof for public carriage of passengers in the leading local newspapers in Hindi, English and Kannada languages.

23. Opening of a metro railway by Commissioner.

(1)The Commissioner may sanction the opening of the Bangalore metro railway for public carriage of passengers, subject to such conditions as he may impose in the interest of the passengers.(2)The Commissioner shall, while giving sanction to the opening of a metro railway, forward his inspection report to the Central Government.(3)On receipt of the inspection report of the Commissioner, the Central Government may confirm, modify or cancel the sanction given under sub-rule (1) subject to such conditions, alternations or relaxation as may be considered necessary.

Chapter VII
Introduction of New Type of Rolling Stock

24. Use of new type of rolling stock.

(1)The Bangalore metro railway administration when it desires to use rolling stock of new type different from those already running on a section of the Bangalore metro railway, shall apply for sanction for the same to the Central Government through the Commissioner.(2)Any modification in the design of car which alters the system of operation and control on the rolling stock like change in the braking system, or change in the principle of traction, shall be considered as a material modification and shall constitute a change in the type and design of the rolling stock.(3)Any modification in the car or rolling stock affecting the salient dimensions or suspension system or running gears and any other modification which affect the riding quality of the rolling stock, shall also constitute a change in the type and design of the rolling stock.(4)The rolling stock of new type different from those already running on a section or increasing the speed of existing rolling stock by making improvements, shall require oscillation and other trials to be conducted as specified by the Central Government from time to time to determine safe speed potential and stability or rolling stock.(5)The application under sub-rule (1) shall be accompanied by -(a)such diagrams as necessary to give full particulars of the axle loads, wheel spacing, length over buffers or couplers and other principal dimensions of the rolling stock as specified in form VIII for which sanction is required;(b)such calculations and stress sheets showing-(i)the external forces on which the stress calculations are based;(ii)the stresses which will be produced in the various bridges or viaducts on which the proposed rolling stock will run;(iii)the effects which the said rolling stock will have on various structures and track as compared with those caused by the rolling stock already in use, or allowed by the existing orders; and(iv)the conclusions arrived at;(c)the calculations stress sheets showing, as to what allowance has been made for any secondary or deformative stresses in addition to the primary stresses caused by the external forces and what relief of stress, if any, has been included and the necessary tests carried out on bridges as referred to in sub-rule (2) of rule 14;(d)the modification, telecommunication if any, installation necessary to ensure to signal and electromagnetic compatibility or electromagnetic interference compatibility with rolling stock and a

certificate that the same have been carried out;(e)actual test report of electromagnetic compatibility or electromagnetic interference measurements with rolling stock and a confirmation that the results are within specified limits and standards;(f)report of checks on rolling stock to ensure that it withstands the electromagnetic interference from external sources;(g)speed certificate base on oscillation trail results; and(h)a safety certificate jointly signed by the concerned Directors of the metro railway in the Form XVIII.(6)The Commissioner shall scrutinize the proposal and make recommendations to the Central Government for orders.(7)No new type of rolling stock which causes change in the electromagnetic compatibility or electromagnetic interference behavior or stresses exceeding the design criteria specified and approved by the Central Government for existing structures or excessive stresses in track shall be planned unless the prior sanction of the Central Government to the specification of new Rolling stock has been obtained.

Chapter VIII
Alterations or Changes in the Existing Metro Railway

25. Notice of alterations or changes.

(1)Where it is proposed on the Bangalore metro railway or a portion there of which had been opened after inspection, to construct any deviation line, stations, or to make an addition, alternation or reconstruction materially affecting the character of any work and such work forms part of, or is directly connected with the working of the metro railway, the Bangalore metro railway administration shall give notice to that effect to the Commissioner.(2)The Bangalore Metro Railway Administration shall before carrying out any work, which may affect the running of trains carrying passengers, furnish to the Commissioner for his approval drawings or particulars of work and any temporary arrangements necessary for carrying it out.

26. Opening of new or strengthening bridges or viaducts.

(1)No bridge or viaduct shall be reopened to traffic, after strengthening without the approval of the Commissioner even though it is able to carry the load without exceeding the maximum permissible stresses as specified in the relevant Indian codes and the International Codes.(2)No load shall be imposed on the Bangalore metro railway bridge or viaduct which would cause in any member thereof stresses greater than those specified in sub-rule (1) without the prior sanction of the Commissioner.(3)Closure of an existing bridge shall require the sanction of the Commissioner.

27. Use of new type of signalling equipment.

(1)The Bangalore metro railway administration shall, in case where it desires to use a new type of signaling equipment which is not of approved type, apply for sanction to the Commissioner.(2)The application under sub-rule (1) shall be accompanied by-(a)a list of the requirements which the equipment fulfil together with the results of the tests conducted;(b)a certificate from the Director-in-charge of signal and telecommunication in the Form XIX;(c)a statement giving details of the tests, trails and verification conducted by suppliers, metro railway, etc. on the performance of

the equipment;(d)safety assessment report from an independent safety assessor, where applicable;(e)certificate, if any, from the other metro railway where equipment is in use for passenger carrying services;(f)the relevant system details as many be necessary to give full particulars of the principle of operations and safety feature, incorporated;(g)a copy of the instructions jointly approved by Director-in-charge of Operation and Director-in-charge of Signal and Telecommunication, to be issued for operation of the equipment by the Operating Staff, including those instructions for working under abnormal or failure conditions;(h)any changes in the station working order.

28. Alteration or changes in electric traction equipment and use of new traction equipment.

(1)The Bangalore Metro Railway Administration shall, in the case where it desires to alter or make changes in electric traction equipments when it materially affects its design characteristics and is directly connected the train operation, such metro railway administration, apply for such alternation or change in electric traction equipment to the Commissioner.(2)The application under sub-rule (1) shall be accompanied by-(a)a list of the requirements which the equipment fulfils;(b)a statement whether the equipment complies with the relevant Indian specification or International specifications;(c)a statement giving details of the tests, trails and verification conducted by suppliers, metro railway, on the performance of the equipment;(d)certificate, if any, from the other metro railway where equipment is in use for passenger carrying services; and(e)the relevant system details as many be necessary to give full particulars of the principle of operation and safety features incorporated.

Chapter IX
Signaling and Train Control Installations

29. Signals.

(1)The signals to be provided for controlling the movements of trains on the Bangalore metro railway shall be, -(a)Cab Signals;(b)Fixed Signals (where provided);(c)Hand signals.(2)The signaling and train control systems shall permit different modes of train operation depending upon its design, namely:-(a)automatic mode;(b)cooled manual mode;(c)run on sight mode;(d)restricted manual mode; and(e)cut-out mode.(3)The train services on Bangalore metro railway may, under special circumstances or during initial stages, be run in accordance with the Approved Special Instruction by any of the following systems of working; namely:-(a)automatic block system;(b)absolute block system.(4)the requirements of the various modes of train operations referred in sub-rule (3) shall be in accordance with provisions laid down in the Bangalore Metro Railway (General) Rules, 2011 and the Bangalore Metro Signal Engineering Manual.(5)The signaling and train control systems provided on the section shall be optimum for the planned level of safety and requirement of traffic.(6)The design of signaling and train control system shall be such as to enable the driver to easily distinguish between various modes of train operation.(7)The locations of trains running on the section and aspects of the signals where provided and in use shall be displayed in the operation

control center and station control rooms.(8)The cab signal and fixed signals where provided but not in use shall have specific indication to that effect.(9)The standard of safety of signaling and train control system provided shall generally be in accordance with the recommendations of the European Committee for Electro technical Standardisation or its equivalent national standards or international standards.

30. Points.

(1)All points on passenger lines shall be power operated.(2)The point operating mechanism on passenger lines shall be of non-trailable designs.(3)Spring points shall not be used.(4)Moveable crossings and moveable diamond crossings on passenger lines shall be provided with complete facing point equipment of approved type.(5)The requirements of points as stipulated in the Bangalore Metro Signals Engineering Manual shall be followed.

31. Interlocking.

(1)The operation of signaling gears shall be from a panel or Video Display Unit or key board or any other approved means enabling operation of routes and also individual operation of points and signals.(2)The apparatus provided for operation of points and signals shall be interlocked for all passenger running lines.(3)The standard and requirements of interlocking shall be as per Bangalore Metro Signal Engineering Manual.

32. Track Circuits.

(1)All passenger running lines shall be equipped with means of continuous detection like track Circuit, axle counters, to detect the presence or absence of a vehicle.

33. Sidings.

- Sidings shall be arranged in such a manner that shunting operations upon them shall involve the least possible use of, obstruction to, running lines.

34. Provision of isolation at stations.

(1)All passenger line shall be isolated from all sidings connected thereto.(2)The isolation referred to in sub-rule (1) may be accomplished by-(a)connection to a long line or siding; or(b)provision of a short dead end siding; or(c)provision of trap; or(d)any other authorised means:Provided that when a trap is provided, the trap switch shall be located with the heel of the switch in rear of the fouling mark and preferably on the straight and the switch be in the rail away from the line to be protected.

35. Emergency communication.

- Necessary means of communication, as mobile radio communication shall be provided to enable the drivers to contact operation control centre and station control room in case of emergency.

36. General.

- Necessary measures as protective devices or design features shall be adopted to safeguard the signaling, train control and telecommunication installations against the harmful effect of electromagnetic inference, stray currents and earth leakage currents, from the traction system as adopted on the section.

Chapter X
Design and Inspection of Equipment for Electric Traction

37. Design of Electric Installations.

(1)The design of all electric installations, namely, transmission and distribution network, substations and third rail Dc traction system shall be according to international standards or approved standards laid down by the Central Government and the Indian Electricity Rules, 1956, or any other law for the time being in force and wherever any departure from accepted norms becomes necessary, prior approval of the Central Government shall be obtained.(2)Adequate protective arrangement shall be made to ensure that the public cannot come in contact with tile electric equipment on line within the metro railway premises.(3)Suitable protective screens or shroud shall be provided over the third rail.(4)The structures supporting third rail equipment shall be designed in accordance with the relevant international and Indian standards for the viaduct and the tunnel.(5)When the distribution system involves third rail carried on pedestals and return circuit via running rails or earth, all such structures and associated tracks shall be effectively earthed and bonded or other precautions taken to ensure that contact with any part of the structure will not be dangerous to the public and the metro railway staff.(6)In the electric traction system, bonding and earthing shall be as per the approved code for bonding and earthing in respective areas and in case of elevated and tunnel concrete structures, continuous earth bonding shall be provided by earthing the reinforcement of structures and connecting the same to structure earth cable.(7)The earthing arrangements at power supply installations shall strictly conform to the international standards or the Indian Electricity Rules, 1956 and accepted codes of practices for bonding and earthing for traction.(8)Adequate stray current control system shall be provided under DC traction System to avoid corrosion to steel reinforcement and other metallic parts of the tunnels and nearby structures.(9)All precautions shall be taken to avoid Electro-magnetic effect in the environment as per relevant standards.(10)The earthing system for DC traction, shall conform to requirements of 1S-3043 and EN-50122 Part - 1 and the maximum rail potential shall not exceed 120V for main lines and 60V for depot area in accordance with EN-50122 Part-I.(11)No earth wire shall cross any track and where structures to be connected to an earth-wire are located on opposite sides of a track, separate wire runs shall be used for connecting the structures and in complicated areas, structures

may be connected to individual earthing stations.(12)When overhead lines transmitting electric power (other than lines forming part of the railway traction equipment) have to be carried across metro railway track, the details of the equipment provided in connection with such lines shall be designed with the object of minimising danger in the event of breakage and in accordance with Regulations for Electrical Crossings, 1997.(13)lightening arrestors of standard or approved types shall be provided wherever they are necessary.(14)All parts of the equipment which carry live conductors shall be provided with devices approved by the Electrical Inspector to the Government of India to prevent unauthorised persons climbing them.(15)On both sides of the road-under-bridges, height gauges of suitable design shall be provided to ensure that no part of any road vehicle or its load shall come in contact with the road-under-bridge girders.(16)Warning notices shall be erected in conspicuous position indicating the existence of live electrical equipment.(17)The details under this rule shall be approved by the Electrical Inspector to the Government of India.(18)The Central Government may direct that the Chief Electrical Engineer of Bangalore Metro Rail Corporation shall, for the purpose of works under the Bangalore Metro Rail Corporation, function as the Electrical Inspector to the Government of India.(19)The Central Government may also direct that an officer with Electrical Engineering background and Senior to Chief Electrical Engineer of Bangalore Metro Rail Corporation shall, for the purpose of works under the Bangalore Metro Rail Corporation, function as the Chief Electrical Inspector to the Government of India.

38. Display of caution boards and notices.

- The following caution Beards and notices of standard size written in Kannada, English and Hindi shall be displayed at the various locations indicated below, namely:-(a)treatment for electric shock boards giving instructions for treatment of electric shock at all station control rooms, metro train depots, substations, offices of maintenance engineers for works, signals, electrical traction equipment and rolling stock;(b)general "caution notices" regarding danger of high voltage traction for public at metro railway stations and for staff at prominent places;(c)"750 V Caution Boards" shall be affixed on foot over and road over bridges, sub-stations.

39. Protection of private property against corrosion effects of DC traction.

- Under DC traction, there is a possibility of corrosion due to stray currents on the metallic structures and conductors in the vicinity of viaduct and tunnel and even though, the stray current protection measures have been taken by the Bangalore metro railway, yet wide publicity may be given so that special precautions may be taken by parties concerned against the possibility of corrosion effect of stray current.

40. Approval of energization of high tension lines.

(1)The Bangalore Metro Rail Corporation, shall submit the application at least fifteen days before energization of high tension lines to the Electrical Inspector of the Government for the following purpose, namely:-(a)formal approval to the design and layout of all high voltage equipment including sub-stations, transmission line, power distribution system, DC feeders and third rail equipment;(b)approval for energization of high tension installations mentioned above including

third rail equipment for DC traction;(2)The application referred to in sub-rule (1) shall be accompanied with documents specified in traction manual of the Bangalore Metro Railway;(3)On receipt of an application under sub-rule (1), the Electrical Inspector shall scrutinize and inspect the design and installations in respect of the following, namely:-(a)the layout and design for receiving sub-stations, traction sub stations auxiliary sub stations, 750 V DC third rail equipment and other installations for compliance with the Indian Electricity rules, 1956 and the relevant Indian standards or International standards; and(b)inspection of completed installations, either personally or by deputing his officers for compliance with the safety requirements.The Electrical Inspector shall after conducting the inspection under sub-rule (3), convey his approval for the energization of receiving sub-stations, traction sub-stations, auxiliary sub-stations, 750 V DC third rail system and others associated high tension equipments subject to such conditions as he may consider necessary.

41. Procedure for energization of traction installations.

(1)(a)after obtaining the sanction of the Electrical Inspector to the Government of India for energization under rule 40, the sub stations should be commissioned sufficiently in advance for the energization of third rail equipment;(b)before energization of the sub-stations, full communication facilities should be available and power supply authorities should be ready to give power supply;(c)on the date on which energization of third rail equipments take place, necessary clearance certificate should be obtained from all the Construction Officers of Electrical, Civil, Signaling and Telecommunication and others who had been hitherto working in the substation premises and on the section to the effect that their staff had been withdrawn and the sub-station including the section could be energized;(d)after final measuring of the whole installation and check on the satisfactory operation of all equipments including protective relays, the traction sub-stations and other installations may be energized.(e)energization of electrical equipments and third rail system shall be progressively undertaken starting with High Tension equipments at the receiving sub-stations, 33 KV feeders from the receiving sub-stations to the traction and auxiliary sub-stations and 750V DC feeders from the traction sub-station to the third rail followed by one sub-sector after another; and(f)before running electric rolling stock, a confirmatory fel test to check the proper operation of the protective relays in the traction substation shall be conducted.(2)The station manager shall, in addition to giving wide publicity through newspapers and other media, warn all passengers about the danger of 750V DC third rail equipment on the section.(3)All relevant documents and certificates as mentioned in, and notifications issued under, the Traction manual along with the approval of Electrical Inspector for energisation shall form a part of complete documents to the Commissioner while making reference to the Commissioner under sub-rule (2) of rule 3 for opening of the Bangalore metro railway or a part there of for public carriage of passengers.(4)(a)The Commissioner shall carry out the inspection of the entire section;(b)the Director-in-charge of Electrical Department nominated by the Officer in-charge of the Bangalore Metro Railway Administration shall accompany the Commissioner throughout the inspection;(c)the engineer-in-charge of the section during the construction shall also be present;(d)during the inspection particular attention shall be paid to the safety and operational aspects of the train movements and to see that staff are in possession of statutory rule books; instruction books, registers, forms, and the transportation, electrical, permanent-way and signal and telecommunication staff are fully acquainted with the duties to be carried out after electric traction

is introduced.(5)The signalling and train control and telecommunication requirements in electrified section shall be in accordance with international standards or approved standards laid down by the Central Government.(6)Subject to inspection being satisfactory, an 'all concerned message' may be issued by the Commissioner, communicating his authorisation for the introduction of commercial services under electric traction.(7)A catechism dealing with the requirement of signal and telecommunication installations for 750V DC electrified section shall be in accordance with Appendix A and Appendix B to these rules.

Schedule

[See rule 5(2) (a)]Index Plan and Section Sheets

1. A set of plans and sections for Bangalore Metro Rail Project should consist of:-

(i)Index Plan and sections;(ii)Detailed Plans and Sections;(iii)Plans of Station yards; and(iv)Detailed drawings of structures.

2. The index plan and section should be drawn to a scale of 0.5 km to a cm horizontal and 10 meters to a cm vertical, the plan being drawn above the section on the same sheet.

3. The index plan should be traced from topographic survey sheets. The centre line of the proposed metro line should be indicated by a full red line with position of each station by a red block and name of the station also in red. The radius and degree of all curves should be figured.

4. The index section should show the formation level/deck level of elevated structures by a red line; the gradients should be figured and the height of the formation / deck level above mean sea level entered at each change of the gradient. The position, of each station with its name and distance from the fixed point, position and size of the bridge/viaduct spans should be indicated.

5. Throughout each set of plans and sections, the kilometrage shall be reckoned from the same "fixed point" and datum should be mean sea level. Each sheet should be plotted in the direction of the through kilometrage so that the kilometrage may be read from left to right.

6. On each sheet should be noted the name i.e. Bangalore Metro Railway, gauge and scale along with direction of the magnetic North.

7. The index plan and section and the first and the last sheets if the set of detailed plans and sections should be signed by the engineer in charge.

8. Plans of station yards having yard lines other than Up/Down lines only may be submitted.

9. Drawing of structures to be submitted should be the completion drawings.

Form I[See rule 5(1) (a)]Curve Abstract

Section : Bangalore MetroRailway

Length : Gauge : 1435mm

Degreeof curvature and radius	Numberof each	Lengthin kms of primary curve
(1)	(2)	(3)

Total

Ratio of curve length to total length of line ..... .Form II[See rule 5(1) (b)]Gradient Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Gradient(compensated)	Numberof each	Lengthin km	Percentageto total length of line
(1)	(2)	(3)	(4)

Total

Longest continuous length of Steepest Gradient For a length of.....Km Followed byForm III[See rule 5(1) (c)]Bridge Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Type of Bridge	Clear span in meters	Total no of spans	Waterway in lineal meters	Loading standard for which designed	Remarks
(1)	(2)	(3)	(4)	(5)	(6)

Form IV[See rule 5(1) (d)]Viaduct Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Type of Viaduct	Clear span in meters	Total no of spans	Opening in lineal meters	Loading standard for	Remarks

				which designed	
(1)	(2)	(3)	(4)	(5)	(6)

Form V[See rule 5(1) (e)]Important Bridges Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Type of Bridge	Clear span in meters	Total no of spans	Waterway in lineal meters	Loading standard for which designed	Remarks
(1)	(2)	(3)	(4)	(5)	(6)

Form VI[See rule 5(1) (f)]Ballast and Permanent Way Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

1. The permanent way consists of UIC _ Kg, _ grade, head hardened rails to specification, of make meters long, _____ welded and laid on sleepers with the density of sleepers per km on main lines at grade. The track in tunnels and on elevated section (viaducts) is laid on type _____ track with rails supported on at spacing of ___ mm C/C on curves of radius less than 400m and __ _ mm C/C on straight and curves of radius equal to or greater than 400m with fastening system from. The track in yards/depots at grade is laid with UIC _ Kg., _ grade to specification, of make, _m long, welded, using fastening system of _____ make laid on sleepers to a density of _____'sleepers per Km. on mm graded stone ballast with minimum cushion of __ mm under the sleepers. Ballast cushion on main lines is mm.

2. The turnouts to be negotiated are and consist of switches and ____ crossings.

3. Certified that tested and approved new permanent way materials have been used in this section and comply with the accepted specifications.

Note:(a) A brief description to be given of the rails, fastenings, sleepers and ballast provided. Details of dimensions of rails, fittings etc should not be given in the case of standard section.(b)In the case of new rails and fish plates manufactured in India, the name of producer should be given. If they are imported, the name of the country of origin should be indicated.(c)A certificate should be submitted by the Director-in-charge of Civil that the materials are of tested and approved quality and comply with the accepted specification.Form VII[See rule 5(1) (g)]Station and Station Sites

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Name of station	Kilometrage from fixed point	Inter station distance	Remarks
(1)	(2)	(3)	(4)

Form VIII[See rule 5(1) (h)]Brief Particulars of Rolling Stock

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

S.No.	Description	Details	Remarks
(1)	(2)	(3)	(4)
1.	Rolling Stock features		
	(a) Composition		
	(b) TrainControl System		
	(c) MaxmDesign Speed		
	(d) MaximOperational speed		
	(e) Jerk rate		
	(f) MaximumTractive Effort		
2.	Physical Dimensions		
	(a) Car Weight		
	(b) Length over Body		
	(c) Maximum width over body		
	(d) Height of floor from TOR		
	(e) Total Height		
3.	Bogie Details		
	(a) Bogie wheel base		
	(b) Distance between Bogie Centres		
	(c) Wheel Diameter		
	(d) Type of Suspension		
4.	Braking Details		
	(a) Type of Braking System		
	(b) Max. Braking effort		
	(c) Service braking effort**From maximum operational speed to stand still, for fully loadedtrain on level tangent track.		
	(d) Parking Brake		
5.	Electro Magnetic effect on Environment		

(a) Electro Magnetic interfernce

6. Safety features

(a) Communication between trainOperator and passengers

(b) Provision of Dead Man Handle

(c) Fire Prevention, detection andsuppression system

(d) Other Safety Features

Certified that the design has been checked for being within the Kinematic Envelope (KE) at all conditions.Form IX[See rule 5(1) (i)]Brief Particulars of Traction Installation

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Third Rail Equipment:

1. Salient Features of the Design specially covering following aspects;

(a)Current carrying capacity of the system(b)Boundaries like Temperature range(c)Speed potential(d)Protection arrangements(e)Power supply from Grid sub-station (GSS) to Receiving sub-station (RSS)(f)Power distribution from Receiving sub-station (RSS) to Traction substation (TSS)(g)DC power feed from Traction sub-station (TSS) to conductor rail(h)Power distribution system from Receiving sub-section (RSS) to Auxiliary sub-station (ASS)(i)Traction SCADA system(j)Earthing and Bonding system

2. Certificate that all warning boards and notices as per statutory requirements have been provided at specified locations.

Form X[See rule 5(1) (j)]Power Supply Installation Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

S.No.	Type of sub stations	Total Nos.	Location and nearest station	Remarks
(1)	(2)	(3)	(4)	(5)
1.	Receiving sub stations			
2.	Traction sub stations			
3.	Auxiliary sub stations			

Form XI[See rule 5(1) (k)]Electrical Crossing Over Metro Railway Tracks Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

S.No.	Location	Brief technical particulars including voltage	Whether with guards or w/o guards	Owned by	Whether clearance as per the regulations forelectrical Xings available	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Form XII[See rule 5(1) (I)]Traction Maintenance Depot Abstract

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

S.No.	Location	Name of nearest metro station	Remarks
(1)	(2)	(3)	(4)

Form XIII[See rule 5(1) (m)]Ventilation, Smoke management, Fire safety and other measures in tunnels and Stations

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

1. Salient features of the design specially covering following aspects:-

(a)Emergency ventilation and smoke management system in tunnels and stations;(b)Emergency Evacuation procedure from tunnels or stations;(c)Fire detection/suppression system in tunnels or stations;(d)Fire alarm and Public address system in emergencies;(e)Emergency lighting and Power supply; and(f)Access routes for firefighting personnel.(g)Any other protective measures against flooding

2. Certified that all test certificates from equipment suppliers and commissioning authorities are in order and clearances from statutory authorities have been obtained.

Form XIV[See rule 5(1) (n)]Brief Particulars of Signalling/train Control and Telecommunication Systems

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

Signaling and Train Control systems

1. Continuous Automatic Train Control system has been provided on _____ section for movements of trains between stations and between the depot and running lines.

2. The continuous automatic Train control system works on the principle of target speed with cab signals by means of continuous transmission from track to train through coded Audio Frequency Track Circuit, ensuring safe movement of trains by continuously generating a safe operating envelope defined by the Limit of Movement Authority and the Maximum Safe speed.

3. The Continuous Automatic Train Control system provides the following modes of train operation.

(i)Automatic mode(ii)Coded Manual mode(iii)Run on sight mode(iv)Restricted Manual mode(v)Cut-Out mode

4. Train operation on main lines is controlled from Operation Control Centre which normally operates under Automatic Train Control system with routes being set and trains interval regulated by computer control. Facility for manual setting of routes and individual operation of point if required has also been provided. Automatic Train Supervision system at Operations Control Centre monitors and controls train operation.

5. A local Control by means of Video Display Unit workstation has been provided in the station control room to enable the Traffic Controller to hand over control of the signals at specific station if required.

6. _____stations on the section have been provided with Computer based interlocking system.

7. A digital Mobile Train Radio Communication System based on Terrestrial Trunked Radio specifications has been provided on the section to provide radio communication between traffic controller, dept controller and the train operator.

8. A telephone system interconnecting stations, Operation Control Centre and depots has been provided

Form XV[See rule 5(3)]CertificateI do hereby certify:(a)that the moving and fixed dimensions for Bangalore Metro Railway have in every case been worked to. Also that these dimensions will be observed in future and that no work or structure infringing the dimensions will hereafter be permitted without the sanction of the Central Government.(b)that each bridge or viaduct conforms to the approved standard of loading without exceeding the maximum permissible stress on the available material in any member or portion of the structure.(c)that every coaching vehicle constructed or procured for the use of the metro railway has been provided with electro-pneumatic regenerative/air brake and effective means of communication between passengers and the train operator.(d)that the metro railway shall be worked as per the system specified in the Bangalore Metro Railway General Rules, 2011.(e)that the 750v DC electric traction equipment can be used for the public carriage of passengers without danger to the public and that the Rules for the design and inspection of equipment for electric traction as per Chapter X of the rules for opening of metro

railway for public carriage of passengers, 2011 have been complied with.(f)that the signaling and telecommunication equipment have been installed in accordance with the approved instructions and they are safe for passing traffic.(g)that adequate facilities for handicapped passengers have been made available at the stations and in the trains.(h)that_____ has been delegated to accompany the Commissioner for metro railway safety on his inspection and all information supplied or engagements entered into by him shall bear my authoritySignature with seal of Officer in-charge of Bangalore Metro Railway AdministrationForm XVI[See rule 5(4)]Infringement of Moving and Fixed Dimensions

Section : Bangalore Metro Railway

Length : Gauge : 1435mm

S.No.	Location	Name of structure which infringes	Prescribed dimensions with Chapter and item No.	Existing actual dimension	Amount of infringement	Reasons of infringement	Authority under which infringement permitted	Restrictions/ precautions to be adopted
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Form XVII[See rule 14(2)]Deflection Test of Bridges

Section: Date of Test..... Bangalore Metro Railway

Length: Description of Test Load..... Gauge : 1435mm

Bridge No	Kilometerage	Material of griders	Clear spa between bearing plates	Overall depth of griders	Speed of train	Test Load EUDL	Deflection in M.M	Design load EUDL for B.M.	Ration of Design load B.M. To test load B.M.	Reduced Deflection under design load (for slowspeed tests) = (8x10)	Theore (calcul deflect (appro design load
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

Form XVIII[See rule 24(5)(h)]Safety CertificateBased on the reports of "oscillation" trials (Copy enclosed) it is certified that it is safe to run (particulars of EMU / rolling stock proposed to run) not exceeding units (in case of EMUs) coupled together on the section (station) to (Station) from (km) to _____ (km) of metro railway at a maximum speed of (km /h) subject to the following speed restrictions and conditions.

S.No.	From Km To Km	Nature of Speed restriction	Brief reason of restriction
(1)	(2)	(3)	(4)

Special Conditions

To be signed by

Director-in-charge of Civil	Director-in-charge of Electrical
Director-in-charge of Signal and Telecom	Director-in-charge of Operations

Form XIX[See rule 27(2)(b)]CertificateCertified that it is safe to use (particulars of the equipment) at the station / on the section of the metro railway with the following precautions.

1. _____

2. _____

3. _____ etc.

Director-in-charge of Signal and TelecommunicationNote: The application should be scrutinized by the Commissioner who, if satisfied, will communicate his sanction to the metro railway administration, in case he is not fully satisfied, he will give his comments and recommendation for suitable further action.Appendix A[See rule 41 (7)]Catechism for Signaling and Interlocking Installations Signaling and Train ControlHave the requirements and recommendations for signaling and train control systems vide Chapter IX these rules and appendix thereto pertaining to Signaling and Train Control systems installed on the section being complied with?A. Signal

1. Do the signals comply with the requirements as laid down in Bangalore Metro Railway General Rules, 20ll.

2. Have the signal posts been placed on the left side of the track of the approaching train to which they refer? If otherwise, for what reason?

3. Are all running signals controlling placed in such a position and at such a height above rail level so they can be clearly seen by the drivers in sufficient time and be readily distinguished by night or by day from subsidiary signals?

4. In case of slotted or controlled signals, can the signals be freely returned to danger by either of the controlling agencies?

5. Are signals not commissioned have their aspects covered and the cover displaying two crossed white bars on a black background, the bars not being less than 30 cms x 10cms?

B. Points

1. Are the locking of facing points such that the points cannot be or become unlocked while a train is passing over them i.e electrically controlled by track circuits or alternative devices?

2. Are detectors (internal/external) fitted to all facing points and do they Efficiently detect with switches the signals controlling the movement of train over them?

3. Are switches adjusted to come tight against stock rails? Does the insertion of 5mm obstruction piece between the switch and stock rails 150mm from the toe of the switch prevent the points being locked and prevent the relevant signal being taken 'off', the giving of which is preceded by the locking of the points?

C. Station Control Room

1. Are all signals, points and track circuits electrically/ electronically repeated on the Station Control Panel/Work Station as & where provided?

2. Is the station controller provided with necessary means of stopping the train at his station?

3. Have instructions for working been issued to all staff and included in Metro Railway Working Instructions and are they correct and efficient?

D. Test in Station Control RoomIt is essential that the interlocking of all signals with points must be so effected as to ensure the following conditions, which may be tested from the Station Control panel or Work station

1. Is it possible to take off conflicting signals at the same time?

2. Is it possible to take off a signal until

(a)All points on the running line including overlap are correctly set and the point locked where required?(b)All points, giving access to the running line from sidings are set against the running line?E. Operation Control CentreAre all signals, points and track circuits electrically/electronically repeated on the Operation Control or Work station as and where provided?F. Cab Signal

1. Are the various modes of train control clearly distinguishable on the Driver's Man machine Interface (MMI).

2. Under Cab Signaling System of working, is Automatic Train Protection system able to bring the train to a stop before an obstruction?

Appendix B[See rule 41 (7)]A. Additional Catechism for Signaling and Telecommunication

1. Have the requirements and recommendations for signaling and telecommunication installation in accordance with the instructions issued for the installation of Signaling and Telecommunication equipment in 750V DC traction systems as adopted on the section, been complied with?

If not, in what respect the arrangements provided fall short of them?Statement of Deviation-Signaling and Telecom Systems

Items	Existing parameters	Prescribed Parameters	Deviation / Infringement	Remarks	Approval / Sanction
(1)	(2)	(3)	(4)	(5)	(6)
SIGNAL					
POINTS					
TRACK CIRCUITS					
CABLES					
ELECT SIGNALING EQUIPMENT					
BATTERIES					
EARTING					
MOBILE TRAIN RADIO COMMUNICATIONS					
GENERAL SAFETY					