CHAPTER 3
RAILWAY TECHNICAL STANDARD

3.1 Purposes of Establishing Railway Technical Standards

Specific rules and standards are necessary for railways to carry out safe, high-speed, punctual, and efficient train operation. Therefore, it is essential for the national government to clearly indicate standards on safety conditions and so forth so that railway operators can satisfy a specific level of social requirements by meeting the standards.

The clarification of the technical standards by the national government will enhance the transparency of national administration. Furthermore, various railway operators with different technological power, past achievements and so forth will become able to observe the standards and secure safety conditions and so forth higher than a specific level.

3.2 Kinds of Railway Technical Standards

Railway technical standards are broadly classified into: compulsory standards which stipulate safety and so forth; design standards which complement the compulsory standards; and optional standards which aim at the enhancement of production efficiency, elimination of trade barriers, and so forth. The details of these standards are as follows.

(1) Compulsory Standards

The governments and national railways of individual countries have established compulsory technical standards on railway construction and operation, for such purposes as ensuring of railway safety and maintaining of railway networks. The titles of some of these standards centering on safety and so forth established in the countries of the world are as follows.

Japan : Regulations on Railway Structure
Germany : Regulations on Railway Construction and Operation
France : Official Administrative Regulations on Safety and Commercial Services on Nationwide and Regional Railway Lines
U.K. : Railway Safety Principles and Guidance
U.S.A. : FRA (Federal Railroad Administration) Regulations (State safety participation regulations, etc.)
EU : EU Directives
(COUNCIL DIRECTIVE 96/48/EC on the interoperability of the trans-European high speed rail system, etc.)

The framework of the compulsory railway technical standards in Japan is as follows.

<table>
<thead>
<tr>
<th>Safety</th>
<th>Safety of passengers, general public, railway employees</th>
<th>Training of railway employees, slack, cant, substations, operation safety devices, interlocking device, brake equipment, car body structure and so forth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policies</td>
<td>Maintenance of network, ensuring of railway characteristics</td>
<td>Gauge, minimum curve radius, steepest gradient, voltage and so forth</td>
</tr>
<tr>
<td>Ensuring of convenience of railway users</td>
<td>Stable transport, enhancement of service quality and comfort</td>
<td>Transition curve, vertical curve, station facilities, remote control device, structure of passenger car and so forth</td>
</tr>
<tr>
<td>Environmental countermeasure</td>
<td>Noise prevention</td>
<td>Prevention of loud noise</td>
</tr>
</tbody>
</table>

In Japan, based on the framework of railway technical standards, concrete items and contents of technical standards have been stipulated.

(2) Voluntary Standards

For industrial products, there are various international, regional, national, and group standards. The main purposes of these standards are to improve the quality of products, enhance production efficiency, rationalize production, reduce production costs, and eliminate trade barriers, by the unification of production methods, work methods, test methods, dimensions, structure, design methods, and so forth.

There are similar standards for railway sectors as well, and each country is making efforts to adjust its regional, national and group standards to the national standards. The voluntary standards for railway sectors are as follows.
By the national standards PS of the Philippines, 57 industrial sectors are covered. However, standards on railway sectors have not yet been established. It is advisable, therefore, to introduce national standards on railway sectors to the Philippines as well.

3.3 Drawing Up of Railway Technical Standards in Metro Manila

As the railways in Metro Manila, PNR lines and LRT Lines 1 and 3 are in operation at present. Furthermore, LRT Lines 2, 4 and 6 are under construction or in the stage of planning, and projects on North Rail and MCX are also in progress. In drawing up the Railway Technical Standards (draft) of this time, compulsory technical standards to be applied to Mass Rapid Transit (MRT) and Light Rail Transit (LRT) systems in Metro Manila have been studied.

In the Japanese railway technical standards, specifications are regulated by concretely stipulating numerical values concerning railway standards, such as track gauge, construction gauge, and standard voltage. However, numerical value regulations can become a factor which hampers development and introduction of new technologies, and also can nullify peculiarities of individual railway organizations or routes, eventually leading to the increase in railway operation costs. Furthermore, there is a possibility that technologies of a specific country (or countries) will become advantageous.

Therefore, in drafting the Technical Standards for the Philippines, the so-called “performance regulations” stipulating performance essential for railways have been adopted, in order to expand the scope of technological freedom of respective railways. As for the contents of the Technical Standards, detailed analysis has been made by conducting surveys on the actual situation of railway operation and construction in the Philippines, and through consultations with the Philippine counterparts as well as through the workshop on technical standards which were held five times. As for the specific difference from the Japanese standards, based on the actual situation of transfer facilities of railways in the Philippines, the two items (smooth transfers between railway lines; and smooth transfers between railway and road-based and other modes of transport) have been added to Chapter 4 concerning station facilities. At the same time, stipulations prohibiting new crossings on the ground level have been excluded, because new construction of level crossings will be inevitable in the future. Furthermore, standards for high speed railways such as those for the Japanese Shinkansen have been excluded. In introducing the performance standards, these ways of thinking would satisfy the demand of the Philippine side that the new standards should be based not only on Japanese railway technologies but also on technologies in the world.
However, since it might be difficult to make technical judgment according to the performance standards alone, such items as “the principles and interpretation of the technical standards” and “the concrete numerical values for reference” are described in Appendix as the interpretation standards (explanation).

The Technical Standards in the main text have been drawn up, based on the assumption that official standards should be established and put in forth by the Government. The interpretation standards (explanation) have been prepared for the reference of individual railway organizations in making judgment for establishing their technical by-standards.

The composition of the Railway Technical Standards is as follows.

### 3.3.1 Railway Technical Standards for Metro Manila

#### I. Purpose of Technical Standards

Railway traffic must be supported by an integrated system of which the priority concern is to ensure passenger safety while also aiming at ensuring reliable transportation, caring for the disabled as well as the environment and fulfilling its characteristic functions. For this purpose, Technical Standards which are applicable to railway services in general and the currently operating PNR, LRT1 and LRT3 lines as well as planned lines to be opened in the future in particular are established here.

#### II. Main Contents of Railway Technical Standards

Outline of the Contents to be stipulated for Technical Standards is as follows.

1. **General**
   - This Chapter stipulates for Definition of Terminology and Preparation of Implementation Standards
   - It is stipulated that, since the technical standards established by the Government are the minimum performance standards necessary for ensuring safety and so forth, railway operators should decide, based on these standards, their own standards on the structure and maintenance of their specific railway facilities and rolling stock as well as on the handling of train operation.
     Railway operators are also obliged to submit such standards to the Government.

2. **Qualification, Education and Training of Railway Employees**
   - Railway operators are obliged to carry out training of their employees and to enforce train operation by employees with qualifications.
3. Structure and Maintenance of Facilities and Rolling Stock
   - This Provisions describe Functions required for facilities and Rolling Stock in light of Ensuring of Safety, Ensuring of Planned Transportation, Consideration for Disabled Persons and Consideration for Environmental preservation.

(1) Tracks
   - This Chapter stipulates for Gauge and Slack, Curve Radius, Cant, Transition Curve, Grade, Vertical Curve, Construction Gauge, Width of Formation Level, Center-to-Center Distance of Adjacent Tracks, Track and Civil Engineering Structures, Building Construction, Disasters Prevention Devices, Safety Devices and Evacuation Devices.

(2) Station Facilities
   - This Chapter stipulates for Specifications for Station Facilities, Smooth Transfers between Railway Lines, and Smooth Transfers between Railway and Other Modes of Transport.

(3) Power Facilities
   - This Chapter stipulates for Contact Line, Substations and Lighting Facilities.

(4) Operation Safety Devices

(5) Rolling Stock
   - This Chapter stipulates for Size Limits of Rolling Stock, Constrains with respect to Tracks and Structures, Stability of Rolling Stock, Running Gear, Motive Power Apparatuses, Brake Equipment, Structure of Car Body and so forth, Coupling Device, Structure of Rolling Stock for Transport of Special Cargo, Equipment of Driver Section, Automatic Door Control Device, Air Compressor and Accessories, On-Board Devices, Marking on Rolling stock, Fire Prevention and Control Measures for Rolling Stock, and Continued Functioning of Some devices during Power Interruption.
(6) Maintenance of Facilities and Rolling Stock
   • This Chapter stipulates for Maintenance of Railway Facilities and Rolling Stock, Inspection and Trial Operation of New Facilities and Rolling Stock, Patrolling for Natural Disaster, and Regular Inspection of Railway Facilities and Rolling Stock.

4. Train Operation
   • In order to secure safety, train operation handling are stipulated. Specifically, such items as Boundary of station, Train Composition, Emergency Braking Distance of Trains, Train Operation, Shunting of Rolling Stock, Operation Speed, Safety between Trains, Railway Signals and Operation, Train Protection, Track Closure, and Response to Natural Disaster are stipulated.

5. Report on Railway Accidents
   • In order to serve for the identification of the actual situations of railway accidents and incidents as well as for the prevention of accident recurrence, the contents of the report which railway operators should make to the Government on accidents are stipulated.
   Specifically, such items as the scope application, terminology, railway operation accidents, accidents for which railways are responsible, and reporting of railway operation accidents are stipulated.

6. Environment
   • This Chapter stipulates that the measures for alleviating noise pollution due to train operation should be taken.

III. Railway Technical Standards
   Chapter 1 General
      1.1 Definition of Terminology
      1.2 Preparation of Implementation Standards

   Chapter 2 Qualification, Education and Training of Railway Employees
      2.1 Education and Training of Railway Employees
      2.2 Qualification of Railway Employees (Obtaining of Certificate)
Chapter 3  Tracks

3.1 Gauge and Slack
3.2 Curve Radius
3.3 Cant
3.4 Transition Curve
3.5 Grade
3.6 Vertical Curve
3.7 Construction Gauge
3.8 Width of Formation Level
3.9 Center-to-Center Distance of Adjacent Tracks
3.10 Track and Civil Engineering Structures
3.11 Building Construction
3.12 Disaster Prevention Devices, Safety Devices and Evacuation Devices

Chapter 4  Station Facilities

4.1 Specifications for station
4.2 Smooth transfers between railway lines
4.3 Smooth transfers between railway and road-based and other modes of transport

Chapter 5  Power Facilities

5.1 Contact Line (Overhead trolley wire and third rail)
5.2 Substations
5.3 Lighting Facilities

Chapter 6  Operation Safety Devices

6.1 Installation of Operation Safety Devices
6.2 Devices to Ensure Safety between Trains
6.3 Indicating Device of Railway Signals
6.4 Interlocking Device
6.5 Remote Control Device
6.6 Train Detection Device
6.7 Railway Crossing Safety Facilities
6.8 Communication System for Safety Purposes
6.9 Installation of Communication Cables

Chapter 7  Rolling Stock

7.1 Size Limits of Rolling Stock
7.2 Constrains with respect to Tracks and Structures
7.3 Stability
7.4 Running Gear
7.5 Motive Power Apparatuses
7.6 Brake Equipment
7.7 Car Body Structure
7.8 Structure to Mitigate Excessive Noise
7.9 Structure of Crew Section
7.10 Structure of Passenger Doorway
7.11 Structure of passenger Doorway and Gangway
7.12 Structure of a Passenger Car
7.13 Structure of Emergency Exit
7.14 Coupling Device
7.15 Structure of Rolling Stock for Transport of Special Cargo
7.16 Equipment of Driver Section
7.17 Automatic Door Control Device
7.18 Air Compressor and Accessories
7.19 On-Board Devices
7.20 Marking on Rolling Stock
7.21 Fire Prevention and Control Measures for Rolling Stock
7.22 Continued Functioning of Some Devices during Power Interruption.

Chapter 8  Maintenance of Facilities and Rolling Stock
  8.1 Maintenance of Railway Facilities and Rolling Stock
  8.2 Inspection and Trial Operation of New Facilities and Rolling Stock, etc.
  8.3 Patrolling, etc. when there is threat of disaster
  8.4 Regular Inspection, etc. of Railway Facilities and Rolling Stock

Chapter 9  Train Operation
  9.1 Boundary of Station
  9.2 Train Composition
  9.3 Emergency Braking Distance, etc. of Trains
  9.4 Train Operation
  9.5 Shunting of Rolling Stock
  9.6 Operation Speed
  9.7 Safety between Trains
  9.8 Railway Signals and Operation
  9.9 Train Protection
  9.10 Track Closure
  9.11 Response to Natural Disaster

Chapter 10  Reporting of Railway Accidents
  10.1 Objective
  10.2 Scope of Application
  10.3 Terminology
  10.4 Stipulations Regarding Railway Operation Accidents, etc.
  10.5 Responsible Accidents
  10.6 Reporting of Railway Operation Accidents and Other Matters
3.4 Legislation and Responsible Organization of Railway Technical Standards

3.4.1 Legislation of Railway Technical Standards

(1) Compulsory standards must be adhered to in each railway company. For this reason, it is necessary for these technical standards to be clearly prescribed in the legal system of the Philippine Government.

Confirmation of compliance with standards can either be carried out by the railway companies themselves, or by the public administration sector. As the basic philosophy, the weight applied to the self responsibility of railway companies shall be raised, the degree of freedom of companies including makers shall be expanded, and administrative involvement shall be held to a minimum.

(2) In the Philippines, too, it is necessary for compulsory technical standards to be clearly prescribed in the legal system. Legislation relating to railways in the Philippines at the moment is as follows.

- **Executive Order No. 125**   January, 1987  
  Reorganizing the Ministry of Transportation and Communications defining its powers and functions and for other purposes

- **Executive Order No. 125-A**   April, 1987  
  Amending Executive Order No. 125

- **Executive Order No. 603**   July, 1980  
  Creating a Light Rail Transit Authority, vesting the same with the Authority to construct and operate the Light Railway Transit (LRT) Project and providing funds therefore

- **Presidential Decree No. 741**   July, 1975  
  Amending an Act creating National Philippine Railways
The above legislation lays down prescriptions concerning the mandate, powers, functions, duties, organization and funds of DOTC, LRTA and PNR, but it does not directly state rules concerning railway business management, operating safety and technical standards.

However, in DOTC (E. O. No. 125) Section 5 (Powers and Functions), the following is stated: “Administer all laws, rules and regulations in the field of transportation and communications”, and since authority to establish railway-related standards is given, it is possible to establish Department Orders concerning railway technical standards.

For this reason, it is appropriate for technical standards to be established and advertised by DOTC Department Order.

In this connection, since the Interpretation Guidelines are reference standards, it is advisable to make the Guidelines sufficiently known to the personnel concerned as a notification by the Director of Transport Planning Service, Department of Transport and Communication.

Furthermore, in order to confirm that the contents of technical standards are satisfied during the construction and operation of railways, it is desirable to establish legislation concerning the business management and running of the railway utility and state prescriptions in that (for example, establishment of a rail transportation law).

Currently in the Philippines, since there is no comprehensive legislation concerning railway business management and operation (permission of railway operations, authorization of works, etc.), it is worth examining the establishment of a new law, however, this should be examined from a viewpoint that is separate from that of technical standards.

Also, from the viewpoint of minimizing administrative involvement, it is realistic to establish a system whereby railway companies themselves confirm compliance with technical standards.

### 3.4.2 Organization in Charge of Railway Technical Standards

1. Railway technical standards state regulations which are necessary for securing railway safety, maintaining networks, displaying railway characteristics, securing convenience for users, and taking environmental countermeasures; however, in order to newly
establish or revise standards, it is necessary to assign experts in technical standards who are well versed in railway work affairs.

Moreover, because technical standards are applied to all railway companies in the country, it is appropriate that the said experts belong to the administrative departments of national agencies or their equivalent bodies.

(2) In the Philippines, too, it is necessary to establish a department in charge of railway technical standards.

Government agencies currently in charge of railways in the Philippines are as follows.

1) Department of Transportation and Communications (DOTC)

   Secretary
   
   Transportation Planning Service
   
   Railway Transport Planning Division

   Within the DOTC there is a division responsible for railway transport planning, and around 10 personnel are assigned to this.

   Moreover, within the ministry, EDSA MRT 3 Executive Office which is responsible for operation on Line 3 has been established.

2) Light Rail Transit Authority (LRTA)

   Administrator
   
   Administrative Department
   Finance Department
   Planning Department
   Operations Department

   In terms of administrative machinery, LRTA is an independent authority under control of the DOTC. This authority manages and operates LRT, however, operation and maintenance of Line 1 is consigned to Metro Transit Organization, Inc.
(METRO). However, the contract on the entrustment has been void since August 2000.
The number of staff is around 50 in LRTA and 1,250 in METRO.

3) Philippine National Railways (PNR)

In terms of administrative machinery, PNR is a nationalized railway company under the management of the DOTC, and it manages, operates and maintains 446 km of line.

PNR has a work force of approximately 1,200 employees.

(3) As was pointed out previously, it is appropriate for railway technical standards to be established by DOTC Department Order, so for this reason it is thought rational to establish a department within the DOTC responsible for establishing and revising technical standards. DOTC departments currently in charge of railways are the Railway Transport Planning Division (policy department) and the EDSA MRT3 Executive Office (implementing department).

The Railway Transport Planning Division belongs to the Planning Service Department and, similar to the Road Transport Division, Air Transport Division, and Water Transport Division it is jointly established with, it is responsible for planning and controlling projects. If possible it is desirable to expand the Railway Transport Planning Division so that it can also take charge of technical standards, however, it is thought that difficulty would arise in expanding just this division (also in terms of comparison with other sections).

Meanwhile, the EDSA MRT3 Executive Office is in charge of operation on Line 3, however, it is thought that establishment of such a field department within the DOTC is temporary, and anyway this is not a department for dealing with policy matters such as establishment of standards, etc.
For the organizations in charge of the railway technical standards, it is necessary to have a good administrative sense and also to be familiar with the railway technologies. Therefore, the following organizations are considered as recommendable organizations responsible for the establishment and revision of the railway technical standards in the Philippines.

1) Railway Transport Planning Division is recommended as the organization in charge of the establishment and revision of the railway technical standards.

2) However, the number of personnel in Railway Planning Division is small, and the Division is not sufficient as the organization for studying the details of the railway technical standards. Therefore, it is advisable to establish a "Council for Railway Technical Standards" within Railway Transport Planning Division as an organization which consists of government officials, railway personnel and so forth and is responsible for substantial deliberations for the establishment and revision of the railway technical standards (including the Implementation Guidelines). The members (draft plan) of the Council for Railway Technical Standards are as follows.

- DOTC (Railway Transport Planning Division)
- DOTC (EDSA MRT3 Executive Office)
- LRTA (Planning Department)
- LRTA (Operations Department)
- LRTA (Line 2 Project Office)
- PNR (Operations Department)
- PNR (Maintenance Department)
- MRTC (Metro Railway Transit Corporation)