

THAILAND

Mass Rapid Transit Authority of Thailand

State Railway of Thailand

Training Program
For
The Mass Transport System Project in
Bangkok
(Purple Line and Red Line)
Final Report

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Final Report

Training Program for the Mass Transport System Project in Bangkok (Purple Line and Red Line)

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List of Abbreviations

ATO	Automatic Train Operation
ATOS	Autonomous Decentralized Transport Operation System
ATS	Automatic Train Stop
BOT	Build Operation Transfer
BTO	Build Transfer Operation
CBTC	Communication Based Train Control
CTC	Centralized Traffic Control
East-I	Integrated inspection train for Shinkansen electric track
EMU	Electric Multiple Unit
E-Tec	East Japan Technology Co.,Ltd.
JEPS	JR East Personnel Service
JNR	Japanese National Railways
JRC	JR East Consultants Company
JR-East	East Japan Railway Company
MIR	Metropolitan Intercity Railway Company
OCC	Operation Control Center
ORR	Office of Rail Regulation
SPARCS	Simple-structure and high-Performance ATC by Radio Communication System
Tokyo Metro	Tokyo Metro Co. Ltd.
TRAMS	Track Maintenance System

Chapter 1: Outline of the Consulting Services

1.1 Aims of the Services

In Thailand, Mass Rapid Transit Authority of Thailand (MRTA) and State Railway of Thailand (SRT) need to acquire operation and maintenance management capabilities corresponding to new facilities to be introduced. They aim to acquire the capabilities by the commencement of operation for Purple Line and Red Line in 2015 and 2016 respectively. For this time's training, to cope with these issues, in line with Capacity Development strategies of each organization, optimal training program will be planned. Based on the interviews with MRTA and SRT, we will implement the training program smoothly and efficiently.

1.2 Outline of the Services

The services are provided by JR East Consultants Company. Dr. Fumio Kurosaki (Deputy Department Manager), Mr. Michio Ogura (Director) and Mr. Kenshi Miyaoka (Manager) are in charge of the services.

The Services are consisted of 1) domestic preparation work; 2) Interviews with MRTA and SRT; 3) Implementation of training program. Work contents for each phase of the training are as described below.

(1) Domestic Preparation Work

- 1) Based on existing documents, we summarize current status and challenges of MRTA and SRT. In addition, based on requests from MRTA and SRT, we formulate draft training programs for each organization.
- 2) We pull together questionnaires for each training implementation organization in order to understand the current status and challenges of each organization.

(2) Interviews with MRTA and SRT

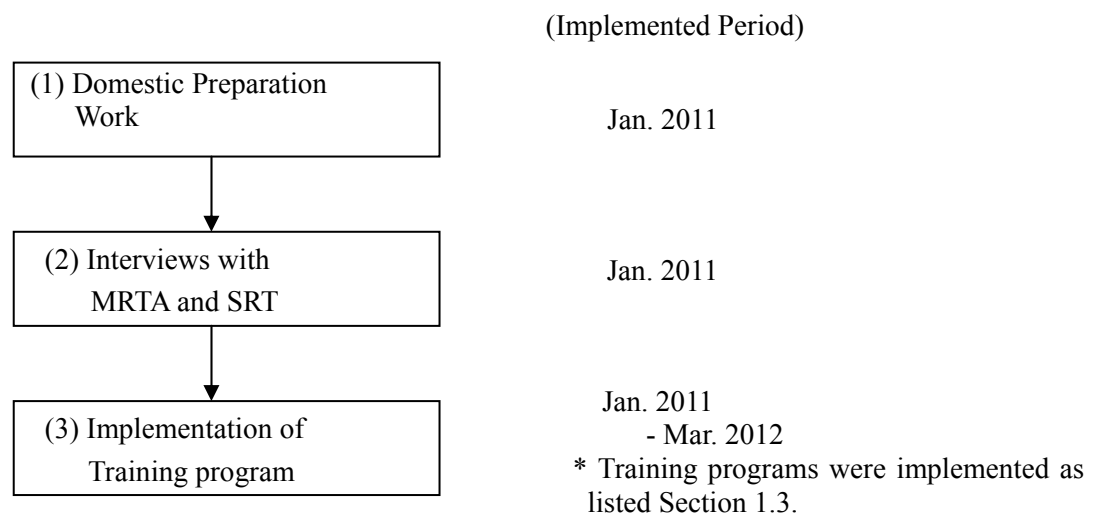
- 1) Based on draft programs and questionnaires, we discuss with MRTA and SRT. Additionally, as for SRT, we discuss their Capacity Development program and positioning of this training.
- 2) With both organizations, we discuss on draft training programs created in the

preparation work (4 courses for MRTA and 3 courses for SRT). Then we agree on courses to be implemented. As for training contents, we have sufficient opinion exchanges with each organization and agree on the contents of the program.

(3) Training Program

- 1) Based on the discussion with MRTA and SRT, we rearrange with JR-East and other organizations in Japan. Then we finalize the training programs. Additionally, we create necessary course materials.
- 2) Training in Japan is implemented to MRTA and SRT.

The training program is implemented as the following flow charts.



The following six tasks are included within the scope of the above program.

- 1) Making training schedule and program (including domestic preparation work)
- 2) Arrangement of the lecturers
- 3) Arrangement of site visits and field works
- 4) Preparation of the textbooks
- 5) Arrangement of the training sites and necessary facilities
- 6) Implementation of lectures, training and site visits

1.3 Outline of the Training Program

(1) Training areas and training frequency

We prepare 4 courses for MRTA and 3 courses for SRT as listed below. Of these courses, total of 3 courses will be implemented: 2 courses to MRTA and 1 course to SRT.

【For MRTA】

- ① Depot designing and management
- ② Track works maintenance and installation
- ③ Railway system maintenance planning and management
- ④ Train operation planning and management

【For SRT】

- ① Track works maintenance
- ② Signaling maintenance
- ③ Train operation management

(2) Trainees

10 trainees for each course are expected.

Trainees are selected from the concerned section within MRTA and SRT

(3) Training period

Approximately 10 days for each course

(4) Training Programs

Total of 3 courses are implemented as followings:

1) Trackworks and Depot Design (MRTA)

First half: from 7th Mar. 2011 to 11th Mar. 2011.

Second half: from 9th Jan. 2012 to 13th Jan. 2012

This course was once interrupted because of the earthquake in 11 Mar. 2011.

2) Train Operation Planning and Management (MRTA):

From 12 Dec. 2011 to 23th Dec. 2011

3) Train Operation Planning and Management (SRT):

From 16 Jan. 2012 to 27th Dec. 2012

Chapter 2: Interviews with MRTA and SRT

2.1 Aims of the Interviews with MRTA and SRT

Major aims of the interviews are to discuss with both organizations, agree with them on courses to be implemented, and to understand their requests on the contents of the programs, based on returned questionnaires and draft training programs (4 courses for MRTA and 3 courses for SRT) created in the Domestic Preparation Work. Additionally, for training contents which will not be implemented for this time's training, we discussed with both organizations. As for SRT, we discussed and confirmed their Capacity Development program and positioning of this training in the interviews.

2.2 Itinerary and Participants of the Interviews

Interviews with MRTA and SRT were conducted following the itinerary below.

Table 2.2-1: Itinerary for the interviews with MRTA and SRT

Schedule		AM	PM
Jan. 17th	Mon.	10:50 Departs Narita Airport (NH953)	16:05 Arrives at Suvarnabhumi International Airport, Bangkok 18:00 Arrives at the hotel
Jan. 18th	Tues.	9:30 The 1st meeting with SRT (Interviewees) Mr. Prasert Attanandana (Deputy Governor) Mr. Vutipong Praepipatmongkol (Signaling and Telecom Dept.) Mr. Sucheep Suksawang (Divisional Engineer, Maintenance Div.)	13:30 The 1st meeting with MRTA (Interviewees) Mr. Peerayudh (Assistant Governor) Mr. Suchin (Director, E & M Dept.) Mr. Kittikorn (Director, Construction Management Division 1) Mr. Tanin (Director, Maintenance Division) Mr. Bordin (Director, Operation Department) Mr. Pattanaphong (Chief, Construction Management Section 3-2)
Jan. 19th	Wed.	Modifications of documents	13:30 The 2nd meeting with SRT (Interviewees) Mr. Jaray Roongthanee (Project Director, Red Line Project) and other staff
Jan. 20th	Thurs.	9:30 The 2nd meeting with MRTA (Interviewees) Mr. Suchin (Director, Electrical and Mechanical Engineering Dept.) and other staff	13:30 The 3rd meeting with SRT (Interviewees) Mr. Udom Opas (Superintendent, Technique and Transportation Development Centre) Mr. Somsak Lamud (Chief, Foreign Conference Section) and other staff (15:00~: Site visit of the Red Line)
Jan. 21st	Fri.	Modifications of documents	13:30 Meeting with JICA
Jan. 22nd	Sat.	5:30 Departs the hotel 8:25 Departs Suvarnabhumi International Airport, Bangkok (NH954)	16:25 Arrives at Narita Airport

The following 3 consultants were participants of the interviews with their fields in charge in ().

- (1) Dr. Fumio Kurosaki (general management)
- (2) Mr. Michio Ogura (tracks)
- (3) Mr. Kenshi Miyaoka (signaling & telecommunication (incl. train operation control))

2.3 Meeting with MRTA

We had meetings with representatives of MRTA in the afternoon on January 18th, 2011 and in the morning on January 20th, 2011. The followings are decisions made and major contents of the discussions.

【Decisions made】

- As for MRTA, it was decided to implement 2 programs. The following 2 courses will be implemented: Trackworks and Depot Design; and Train Operation Planning and Management.

【Major contents of the discussions】

(General items)

- MRTA wishes for issuances of certificates for those who complete the training.
- This is a valuable opportunity for site visits and trainings in modern railways in Japan. MRTA wishes to choose appropriate candidates as trainees.
- MRTA wishes to learn basics in track layouts in the future.

(Trackworks and Depot Design course)

As for training in the field of Rolling Stock Depots, the following are 2 requests from MRTA.

- Examples of inspections and repairs of rolling stock owned by other railway companies
- Contents of rolling stock inspections and repairs and facilities of rolling stock depots

(Train Operation Planning and Management course)

As for training in the field of rolling stock depots, the followings are 6 requests from MRTA.

- (Since many railway projects are currently under way in the Bangkok metropolitan area) Japanese examples of mutual direct through-service with other railway companies in consideration of future introduction in Bangkok.
- Basics of train performance curves

- Basics of train performance in consideration of brake performance
- Management methods for personnel assignment
- Relationships between train operation planning and maintenance sections. (For an example, procedures of Japanese maintenance work)
- Training in management methods for train crews

The following Table 2.3-1 indicates requests from MRTA for the training and the curriculum of the implemented training.

Table 2.3-1 A list of requests from MRTA for the training and curriculum

	Requests from MRTA for the training	Curriculum	
1	Examples of inspections and repairs of rolling stock owned by other railway companies	①3/11 ①*1/12	Site visit to Tokyo General Rolling Stock Center (rolling stock maintenance for Tokyo Waterfront Area Rapid Transit, Rinkai Line)
		②12/12 ②12/20	Through lectures on mutual direct-through operations, explanations of examples are provided for consignment of inspection and repair work.
		②12/13	Site visit to Minatomirai Line
		②12/22	Site visit to Sendai Airport Access Line
2	Contents of rolling stock inspections and repairs and facilities of rolling stock depots	①3/9 ①3/10	Inspection and repair facilities Japanese rolling stock depots and plants
		①3/11 ①*1/12	Tokyo General Rolling Stock Center
		②12/14 ①*1/11	Tsukuba Express
3	Japanese examples of mutual direct through-service with other railway companies in consideration of future introduction in Bangkok	②12/12 ②12/20	Through lectures on mutual direct-through operations, explanations of examples are provided for consignment of inspection and repair work.
		②12/13	Site visit to Minatomirai Line
		②12/22	Site visit to Sendai Airport Access Line
4	Basics of train performance curves	②12/20	Lectures at JR East General Education Center
5	Basics of train performance in consideration of brake performance	②12/19 ②12/20	Lectures at JR East General Education Center
6	Management methods for personnel assignment		Since Japanese case examples including working conditions are largely different from those in Thailand, this was not implemented.
7	Relationships between train operation planning and maintenance sections.	①*1/10	Through site visits to a Track Maintenance Center and to night work, trainees confirmed methods

	(Procedures of Japanese maintenance work)		for commencement of track closures, etc.
8	Training in management methods for train crews	②12/21	Lectures at JR East General Education Center

Numbers in ○: Number of trainings. (①*: The Program after the earthquake)

2.4 Meeting with SRT

2.4.1 Requests for Training Program

We had meetings with representatives of SRT in the morning of January 18th, 2011 and in the afternoon of January 19th and 20th, 2011. The followings are decisions made and major contents of the discussions.

【Decisions made】

- As for SRT, Train Operation Planning and Management course will be implemented.

【Major contents of the discussions】

(General items)

- Since SRT also wishes to consider future station design, SRT wishes to study Japanese station development.
- As trainees, SRT plans to choose excellent persons promising to be future leaders though they may be young.
- (Though training in the field of tracks are decided not to be included in this time's training program), SRT wishes to learn vibration-proof structures, TRAMS (track management system for conventional lines), East-i (automatic track inspection railcars and systems), etc.
- SRT wishes to include site visits of Japanese stations in the programs.

(Train Operation Planning course)

- For the Red Line, trains using traditional and new signaling systems share the same tracks. SRT wishes to learn case examples of Japanese train operations with different signaling systems.
- SRT wishes to learn case examples of mutual direct through-services with other companies. To sort out issues necessary for introduction of mutual direct through-services, SRT wishes to learn Japanese case examples.
- SRT wishes to learn moving block systems.
- SRT wishes for programs to be useful for training of dispatchers, instead of training of drivers.

2.4.2 Training Program of SRT

As for training program for SRT, especially for Capacity Development required by the opening of the Red Line, we conducted interviews with SRT when we visited them in

Thailand. The following is the summary of the outcomes.

(Capacity Development program)

- As for a Capacity Development program required for technical improvement for operations of existing conventional lines, for each technical system at SRT, SRT has its own Capacity Development program. Based on this program, SRT is been conducting long term development of its human resource.
- SRT has a long history as a railway operator and it has its own Capacity Development program for improvement of their technical capability together with required technical manuals.

(Capacity Development by the opening of the Red Line)

- As for Capacity Development methods and schedules for engineers required for the opening of the Red Line (for an example, training of electric train drivers, engineers for ballast-less track maintenance, train dispatchers for electric trains, etc.), SRT is currently waiting for proposals from contractors of the Red Line projects.
- As for train operation methods, they are largely depending on an organizational structure for the operations of the Red Line. Though the organizational structure is still undecided at this point, it is highly likely that SRT (or SRT's 100% subsidiary) operates the Red Line.

(This is because the Red Line operates on the same route as for SRT's traditional conventional lines (including suburb line), to prevent fare adjustment systems from becoming too complex.)

- Bidders (contractors) for the rolling stock and system section will formulate (provide) necessary rules and regulations, manuals for the operations of the electric trains (O&M).
- In the middle of 2012, contractors will be decided. After signing contracts, necessary Capacity Development programs will be conducted by the opening of the line.
- Whether or not to be able to transfer employees currently working for the Airport Link to the Red Line will be a future issue required to be discussed. Specific procedures required for Capacity Development will be conducted after reviewing contents proposed from the bidders.
- The Airport Link is supported by German suppliers and consulting. As for the Red Line, if a German bidder wins the tender, it is very likely that for both lines (Airport Link and the Red Line) human resource and manuals will be diverted.
- On the other hand, if the tender of the Red Line will be won by bidders other than the German companies (suppliers, O&M), there is a possibility that know how with the Airport Link cannot be diverted to the operations of the Red Line.

The following Table 2.4-1 indicates requests from SRT for the training, capacity development programs, and the curriculum of the implemented training.

SRT has its own capacity development programs, but many of them are for non-electrified railway system for the most part.

On the other hand, this present training program deals with the modernized urban railway system. Therefore, it appears that this training program is beneficial for SRT trainees to acquire skills for operational planning and management for electrified railway system before the commencement of operation of Red Line.

Table 2.4-1 A list of requests from SRT for the training, capacity development programs and the curriculum

	Requests from SRT for the training and capacity development programs	Curriculum	
1	Future station design Japanese station development	1/25	Site visits of in-station (ekinaka) businesses Explanations of characteristics of station buildings
2	Case examples of Japanese train operations with different signaling systems	1/19	Lectures at JR East General Education Center
		1/24	Site visit to The Nippon Signal Co., Ltd.
		1/26	Site visit to Kyosan Electric Manufacturing Co., Ltd.
3	Case examples of mutual direct through-services with other companies. Issues to be sorted out for introduction of mutual direct through-services	1/24	Site visit to Tokyo Metro
4	Moving block systems	1/24	Site visit to The Nippon Signal Co., Ltd.
		1/26	Site visit to Kyosan Electric Manufacturing Co., Ltd.
5	SRT wishes for programs to be useful for training of dispatchers, instead of training of drivers.	1/20	Lectures at JR East General Education Center and practical training with simulators
6	For the Red Line, trains using traditional and new signaling systems share the same tracks. SRT wishes to learn case examples of Japanese train operations with different signaling systems.	1/24	Site visit to Tokyo Metro
7	SRT wishes to learn case examples of mutual direct through-services with other companies. To sort out issues necessary for introduction of mutual direct through-services, SRT wishes to learn Japanese case examples.	1/24	Site visit to Tokyo Metro
8	SRT wishes to learn moving block systems.	1/17	Site visit of ATACS
		1/24	Site visit to The Nippon Signal Co., Ltd.
		1/26	Site visit to Kyosan Electric Manufacturing Co., Ltd.

9	SRT wishes for programs to be useful for training of dispatchers, instead of training of drivers.	1/20	Dispatcher training
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Chapter 3 Outline and Results of Training Program in Japan

3.1 Outline of the Training Program

In the Training Program, we conducted the following 3 training programs.

- (1) Trackworks and Depot Design course for MRTA
- (2) Train Operation Planning and Management course for MRTA
- (3) Train Operation Planning and Management course for SRT

Aims of the training programs to be implemented this time are as follows.

【Track maintenance and installation】

The following 2 were aims of the training by focusing the acquisition of track structures to minimize future maintenance, methods for efficiency improvement for track-related maintenance and management, planning and execution of maintenance work.

- 1) Understanding track structures (especially, labor-saving tracks)
- 2) Planning track maintenance work, acquisition of execution methods

【Rolling stock depot planning and management】

As basic policies, we chose the following 2 points as our aims.

- 1) Understanding roles of rolling stock depots and rolling stock inspection and repair plants and learning overviews of facilities.
- 2) Acquisition of knowledge required for planning and assessment of rolling stock depots and rolling stock inspection and repair plants.

【Train operation planning and management】

For MRTA, the following are major 3 aims.

- 1) Understanding about the through train operation in Japan
- 2) Learning train diagram setting to accommodate passenger needs and understanding of the basis of train run-curve and driving performance
- 3) Understanding the relationship between operation planning section and maintenance section

For SRT, the following are major 3 aims.

- 1) Understanding about CBTC
- 2) Learning overviews of train operation facilities including dispatcher facilities
- 3) Learning know-how about transport management for safe and accurate train

operations.

Upon execution of the training, since the acquisition of railway technologies is aimed at, though classroom lectures are important, practical training and site visits to various facilities are similarly important. For this reason, for this time's training, we tried not to include too many classroom lectures, but to include abundant of practical training and site visits as much as possible, including those at JR East's railway facilities, rolling stock depots, manufacturers of track materials, etc.

Especially, by utilizing training facilities at JR East General Education Center (Shirakawa city), we conducted training so that trainees can learn by using actual railway facilities. Additionally, as for site visits of various railway facilities, we provided guidance and explanation as needed to the training.

The outline of the training in each field is indicated in Tables 3.1-1 to 3.1-3, with details of programs indicated in Appendices 1 to 3.

The following 3 programs are formulated to fully reflect the contents of the interviews.

Table 3.1-1 (1): Targets to be achieved and outline of classroom lectures for Trackworks and Depot Design (MRTA) (first half)

Schedule	Titles of classroom lectures	Targets to be achieved in classroom lectures	Outline of classroom lectures
March 7th, 2011	JICA guidance	Understanding aims etc. of the training	<ul style="list-style-type: none"> ▪ Greeting by JICA ▪ Things to be noted
	Outline of Japanese Railways (JR East/ Mr. Kobayashi)	Understanding current status of Japanese railways and recognizing differences from its own railway	<ul style="list-style-type: none"> ▪ Outline of railways ▪ History ▪ Introduction of mass, high-speed, safe, and stable railway transport, characteristics of Japanese railways
	Outline of Japanese urban railways (JRC/ Dr. Kurosaki)	Understanding outline of Japanese urban railways and learning ways of urban transport	<ul style="list-style-type: none"> ▪ Privatization (JR, private railways etc.) ▪ Business contents of JR ▪ Safety measures etc.
March 8th, 2011	Track structures (JEPS/ Mr. Kitamura)	Understanding outline of labor-saving tracks to utilize the understanding for improvement of railway management	<ul style="list-style-type: none"> ▪ Rails, turnouts, various track structures (especially slab tracks, directly-fastened tracks etc.) ▪ Rail fastening systems ▪ Rail wear, rail fractures (including practical training)
	Track management (JEPS/ Mr. Kitamura)	Understanding mechanisms and methods of track management for future utilization	<ul style="list-style-type: none"> ▪ Inspections, standard values ▪ Facilities-related machineries, rolling stock inspections ▪ Charts of track inspection cars, EAST-i ▪ Data management (including practical training)
March 9th, 2011	Track maintenance (JEPS/ Mr. Ito)	Understanding maintenance plans, and maintenance work so that the understanding will be utilized for improvement of track management in the future	<ul style="list-style-type: none"> ▪ Flows of track maintenance ▪ Classifications of track-related work ▪ Track improvement
	Rolling stock inspections and repairs (E-Tec/ Mr. Emori)	Understanding rolling stock inspection and repair work which are basics for planning of depots, plants	<ul style="list-style-type: none"> ▪ Maintenance methods ▪ Kinds and cycles of inspections ▪ Inspection work contents
	Inspection and repair facilities	Understanding facilities at depots and plants to acquire necessary knowledge in	<ul style="list-style-type: none"> ▪ Facilities, applications of facilities, structures, functions

	(E-Tec/ Mr. Emori)	planning	<ul style="list-style-type: none"> ▪ Track layouts, compositions of facilities, performance calculation methods etc.
March 10th, 2011	Japanese rolling stock plants and depots (E-Tec/ Mr. Emori)	Understanding examples of actual depots and plants so that it can be utilized for construction and planning of rolling stock plants and depots in the future	<ul style="list-style-type: none"> ▪ Introduction of outlines of depots and plants ▪ Characteristics etc. of facilities for various railcar types, regions, and roles
	Accident History Exhibition Hall (JEPS/ Mr. Arakawa)	Understanding lessons and their countermeasures learned from accidents	<ul style="list-style-type: none"> ▪ Risk involved in railway business and roles played by safety systems
March 11th, 2011	Rolling stock training center (E-TEC/ Mr. Furukawa)	Understanding rolling stock inspection and repair-related facilities so that it can be utilized for planning of rolling stock repairs in the future	<ul style="list-style-type: none"> ▪ Practical training by using mock-up of rolling stock ▪ Real models of platform doors, elevators, escalators
	Site visit to Tokyo General Rolling Stock Center (JR East/ Mr. Miura)	Actually visiting rolling stock plants and rolling stock depots and deepening understanding of contents of inspections and repairs and also outlines of inspection and repair facilities	<ul style="list-style-type: none"> ▪ Contents of organizations, personnel, work ▪ Flows from depot-in to depot-out ▪ Inspections and repairs of rolling stock of other companies ▪ Site visits inside plants (disassembly, cleaning, inspections, cutting of wheels, assembly etc.)

Table 3.1-1 (2): Targets to be achieved and outlines of classroom lectures for Trackworks and Depot Design (MRTA) (latter half)

Schedule	Titles of classroom lectures	Targets to be achieved for classroom lectures	Outline of classroom lectures
January 9 th , 2012	Ride of urban transport (JRC/ Mr. Miyaoka)	Understanding various urban transport modes to reflect to future urban railway improvement plans	<ul style="list-style-type: none"> ▪ Tokyo Monorail ▪ Yurikamome (Tokyo Waterfront New Transit)
January 10 th , 2012	Tokyo Rail Center (JR East/ Mr. Koshikawa)	Understanding flows from transporting from ports, welding at the rail center, and delivery to field sites	<ul style="list-style-type: none"> ▪ Outline of organizations ▪ Welding work at the center ▪ Welding facilities, quality management
	Shinjuku Track Maintenance Center (JR East/ Mr. Kashima)	Understanding work outlines of field organizations in charge of track maintenance as a reference for future maintenance systems	<ul style="list-style-type: none"> ▪ Roles of the Track Maintenance Center ▪ Work contents ▪ Organizations, personnel
	Site visit to night work (Rail replacement inside Shinjuku station premise) (JR East/ Mr. Kashima)	Deepening understanding on methods to secure safety and how to execute work in a short time, to utilize the understanding for construction of future safe and efficiency work systems	<ul style="list-style-type: none"> ▪ Pre-work confirmation (including safety confirmation) ▪ Procedures for track closure ▪ On-site welding work
January 11 th , 2012	Site visit to Tsukuba Express (MIR/ Mr. Kasuya)	Understanding effects of railways connecting urban areas and suburb areas on development of wayside and areas in front of stations. Visiting Japanese rolling stock depots and understanding actual facilities	<ul style="list-style-type: none"> ▪ History of new line planning ▪ Outline of railways ▪ Outline of facilities ▪ Depot facilities ▪ Plant facilities ▪ Plant equipment ▪ Rolling stock
January 12 th , 2012	Inagi-naganuma Site visit to ballast-less tracks (JR East/ Mr. Takibuchi)	Deepening understanding of outline of labor-saving tracks	<ul style="list-style-type: none"> ▪ Visiting an installation site of directly-fastened tracks above an elevated bridge ▪ Site visit of a continuous grade separated crossing
	Site visit to Tokyo General Rolling Stock Center (Revisit since it was interrupted by the	Visiting rolling stock plants, rolling stock depots and deepening understanding of contents of inspections and repairs,	<ul style="list-style-type: none"> ▪ Organizations, personnel, work contents ▪ Flows from depot-in to depot-out

	earthquake) (JR East/ Mr. Iijima)	and outlines of inspection and repair facilities	<ul style="list-style-type: none"> ▪ Inspections and repairs of other companies' rolling stock ▪ Site visits at plants (disassembly, cleaning, inspections, cutting of wheels, assembly etc.)
January 13th, 2012	Site visit to The Railway Museum (JR East Cultural foundation/ Mr. Araki)	By reviewing progresses of railway technologies, deepening understanding of outlines of various railway technologies	<ul style="list-style-type: none"> ▪ History of railways ▪ Transitions of management forms ▪ Transitions in technological development
	Completion ceremony	(Completion ceremony of the training)	<ul style="list-style-type: none"> ▪ Awarding of a completion certificate from JICA ▪ Report

* Due to the Great East Japan Earthquake on March 11th, 2011, MRTA trainees once returned to Thailand.

They came back to Japan in January 2012 and finished the rest of the programs.

Table 3.1-2: Targets to be achieved and outline of classroom lectures for Train Operation Planning and Management (MRTA)

Schedule	Titles of classroom lectures	Targets to be achieved of classroom lectures	Outline of classroom lectures
Dec. 12th, 2011	JICA guidance	Understanding aims etc. of training	<ul style="list-style-type: none"> ▪ JICA greeting ▪ Explanation of programs
	Outline of Japanese Railways (JRC/ Dr. Kurosaki)	Understanding current status of Japanese railways and learning differences from its own railway	<ul style="list-style-type: none"> ▪ Outline of railways ▪ Privatization (JR, private railways etc.) ▪ Introduction of mass, high-speed, safe, and stable railway transport, characteristics of Japanese railways
	Mutual direct through-service and operator classifications (JRC/ Dr. Kurosaki)	Learning basic knowledge of mutual direct-through operations between different railway companies, a characteristic of Japanese urban railway	<ul style="list-style-type: none"> ▪ Business operator classification ▪ Outline of mutual direct-through operations
Dec. 13th, 2011	Site visit to Yokohama Minatomirai Railway Company (Yokohama Minatomirai Railway/ Mr. Oishi)	Deepening understanding of mutual direct-through operations. Learning its uniqueness, though it is the 1st class railway operator, many of its work are commissioned to Tokyu Dentetsu (Tokyu Corporation).	<ul style="list-style-type: none"> ▪ Outline of Yokohama Minatomirai Railway Company ▪ Work consignment ▪ Site visit to station facilities
	Site visit to Kyosan Electric Manufacturing Co., Ltd. (Kyosan/ Mr. Terado)	Learning characteristics and outline of IT-ATP, which is CBTC developed by Kyosan Electric Manufacturing Co., Ltd., and deepening understanding of CBTC	<ul style="list-style-type: none"> ▪ Outline of CBTC ▪ Site visit to plant lines ▪ Platform doors ▪ Interlocking device
Dec. 14th, 2011	Site visit to Tokyo Metro Nakano rolling stock depot (Tokyo Metro/ Mr. Kimura)	Learning improvement of convenience by mutual direct-through operations and effects of network expansion	<ul style="list-style-type: none"> ▪ Corporate outline of Tokyo Metro ▪ Mutual direct-through operations ▪ Site visit to rolling stock inspection & repair facilities
	Site visit to Tsukuba Express (MIR/ Mr. Kasuya)	Tsukuba Express is a newly-opened urban railway with new systems. Learning new line construction processes including background of construction, outline of facilities, transitions after the opening of the line, etc. Additionally, visiting station facilities, plants,	<ul style="list-style-type: none"> ▪ History of new line planning ▪ Site visit of ATO systems, train ride ▪ Site visit of the operation control center

		storage tracks of electric trains, the operation control center etc.	
Dec. 15th, 2011	Site visit to Tokyo Operation Control Center (JR East/ Mr. Ueda)	Understanding functions and roles of JR Tokyo Operation Control Center, which is in charge of train operation control of JR trains in the Tokyo metropolitan area and learning modernized and systemized operation control center	<ul style="list-style-type: none"> ▪ Management area of the operation control center ▪ Outline of ATOS ▪ Mindsets in traffic operation arrangement ▪ Disaster prevention system
	Site visit to The Nippon Signal Co., Ltd. (Nippon Signal/ Mr. Ogihara)	Learning characteristics and outline of SPARCS, which is CBTC developed by The Nippon Signal Co., Ltd. and understanding of CBTC	<ul style="list-style-type: none"> ▪ Outline of SPARCS ▪ Site visit to plant lines
Dec. 16th, 2011	Site visit to The Railway Museum (JR East Cultural foundation/ Mr. Araki)	By reviewing progresses of railway technologies, deepening understanding of outline of various railway technologies	<ul style="list-style-type: none"> ▪ History of railways ▪ Transitions of management forms ▪ Transitions in technological development
Dec. 19th, 2011	Law systems supporting Japanese railway systems (JEPS/ Mr.Ota)	Understanding systems for railway safety	
	Laws and regulations for railways (JEPS/ Mr.Ota)	In Japan, to secure safety in railway operations, handling in train operations etc. are designated by ministerial ordinances. Trainees will learn rules in handling of train operations in this class.	<ul style="list-style-type: none"> ▪ Laws and regulations ▪ In-house rules and regulations
Dec. 20th, 2011	Business operator classification 2 【Vertical separation: separation of infrastructures and operations】 (JRC/ Dr. Kurosaki)	Learning crew and rolling stock management and arrangement for fare adjustment between different operations for mutual direct-through operations	<ul style="list-style-type: none"> ▪ Rules for fare adjustment between different operators ▪ Rules for rolling stock and crew operations ▪ Effects of direct-through operations service (increases in passengers, shortened travel time)
	Roles of persons in charge of facilities (JRC/ Mr. Endo)	Learning basics of train protection facilities which are vital for safe and accurate train operations and observing driving facilities suitable for characteristics of railway sections.	<ul style="list-style-type: none"> ▪ Outline of driving facilities
	Signaling security facilities	Learning basics of facilities to secure safety in train	<ul style="list-style-type: none"> ▪ Mindsets in blocking ▪ Disaster prevention

	(JRC/ Mr. Endo)	operations or mindsets in “blocking” to secure safety between trains	facilities
Dec. 21st, 2011	Driver education (crew education) (JEPS/ Mr. Inoue)	Understanding education methods and training programs for crews etc., and employees in charge of driving trains. Additionally, through requested practical training with driving simulators, deepening understanding in handling at a time of accidents or irregularities, and also Japanese training methods.	<ul style="list-style-type: none"> ▪ Laws and regulations related to crews ▪ Crew training programs ▪ Training using driving simulation (practical training)
	Accident History Exhibition Hall (JEPS/ Mr. Arakawa)	Understanding lessons learned from accidents and countermeasures	<ul style="list-style-type: none"> ▪ Risk involved in railway operations and roles played by safety systems
	Site visit to train coupling and uncoupling site at Fukushima station (JRC/ Mr. Miyaoka)	Through site visits of operations with coupling and uncoupling of Shinkansen, understanding efficient rolling stock and crew operations.	<ul style="list-style-type: none"> ▪ Site visit to train coupling and uncoupling site
Dec. 22nd, 2011	Moving block (ATACS) (JR East/ Mr. Umezu & Mr. Uchiyama)	Learning the new type train protection system (ATACS) with moving block systems using digital radio communication between onboard and ground facilities, shifting to on-board train detection from traditional train detection with track circuits.	<ul style="list-style-type: none"> ▪ Outline of ATACS, the latest signaling method
	Site visit to Sendai Airport Access Line (Sendai Airport Access Line/ Mr. Ogawa)	In general, in mutual direct-through operations, only rolling stock drives into other companies’ lines. However, in this program, trainees can learn and understand special case examples of crews driving in together. Trainees can also learn rules related to fare adjustment involved to eliminate the need for fare adjustment in mutual direct-through operations.	<ul style="list-style-type: none"> ▪ Explanation of outline of Sendai Airport access line ▪ Restoration status from tsunami damage
Dec. 23rd, 2011	Completion ceremony	Completion ceremony of the training	<ul style="list-style-type: none"> ▪ Awarding of a completion certificate from JICA ▪ Report

**Table 3.1-3: Targets to be achieved and outline of classroom lectures for Train Operation
Planning and Management (SRT)**

Schedule	Titles of classroom lectures	Targets to be achieved for classroom lectures	Outline of classroom lectures
January 16th, 2012	JICA guidance	Understanding aims etc. of training	<ul style="list-style-type: none"> ▪ JICA greeting ▪ Explanation of programs
	Outline of Japanese Railways (JRC/ Dr. Kurosaki)	Understanding current status of Japanese railways and learning differences from its own railway	<ul style="list-style-type: none"> ▪ Outline of railway history ▪ Introduction of mass, high-speed, safe, and stable railway transport, characteristics of Japanese railways
	Outline of Japanese urban railways (JR East/ Mr. Ezawa)	Understanding outline of Japanese urban railways and its development history	<ul style="list-style-type: none"> ▪ Privatization (JR, private railways etc.) ▪ Businesses contents of JR ▪ Safety measures etc.
January 17th, 2012	Site visit to Miyagino CTC Center (JR East/ Mr. Umezu & Mr. Uchiyama)	Understanding outline of ATACS (CBTC), a new train operation control technology. Miyagino CTC is a small control center managing only 1 railway section, Senseki Line. Understanding facilities at the control center to suit its small scale.	<ul style="list-style-type: none"> ▪ Ride of Senseki Line with ATACS ▪ Site visit of signaling equipment room, ground and on-board facilities ▪ Site visit to Miyagino CTC
	Site visit to Shinkansen General Rolling Stock Center (JR East/ Mr. Oizumi)	The center conducts maintenance of JR East's Shinkansen. It is the largest and is the only signal cabin which is conducting manual signaling. Trainees will learn basics of handling in train operation work such as confirmation methods etc., in shunting work.	<ul style="list-style-type: none"> ▪ Roles of Shinkansen General Rolling Stock Center ▪ Planning methods for yard work ▪ Handling of signaling for shunting in yard premise ▪ Observations of inspection and repair lines
January 18th, 2012	Site visit to coupling and uncoupling site at Fukushima station (JRC/ Mr. Miyaoka)	Through site visit of coupling and uncoupling operations of Shinkansen, trainees will understand efficient rolling stock and crew operations.	<ul style="list-style-type: none"> ▪ Site visit to coupling and uncoupling site ▪ Site visit of station facilities related to coupling and uncoupling

	Transport plans for high-density and highly congested railway sections (JEPS/ Mr. Ota)	Understanding rules related to handling in train operations and utilizing them for future work.	<ul style="list-style-type: none"> ▪ Learning basic actions to act based on priority for safety.
January 19th, 2012	Transport plans (JRC/ Mr. Miyaoka)	Understanding characteristics of railway transport and understanding ways of thinking to formulate diagrams in line with demand forecast and passenger needs. Especially, trainees will learn ways of thinking for transport plans for peak hours such as commuting hours etc.	<ul style="list-style-type: none"> ▪ Work flows of transport planning ▪ Transport capacity (setting of congestion rate)
	Selections of transport volume and train control methods (JRC/ Mr. Yoshida)	Among vital train protection facilities for safe and accurate train operations, trainees will especially learn basics for ways of thinking for “blocking” to secure safety between trains and facilities to secure safety in train operations.	<ul style="list-style-type: none"> ▪ Blocking, interlocking ▪ Signaling security facilities ▪ Train operation control system ▪ Electronic interlocking device
January 20th, 2012	Accident History Exhibition Hall (JEPS/ Mr. Arakawa)	Understanding lessons learned from accidents and their counter measures.	<ul style="list-style-type: none"> ▪ Risk involved in railway business and roles played by safety systems
	Driver education (dispatcher education) (JEPS/ Mr. Ota)	Learning education methods to secure safety which is of the utmost importance for railway operators.	<ul style="list-style-type: none"> ▪ Site visit of training drills for new crews ▪ Site visit of joint training for dispatchers and crews ▪ Drills utilizing simulators (practical training)

January 23rd, 2012	Site visit to Tokyo Operation Control Center (JR East/ Mr. Takada)	Understanding functions and roles of JR Tokyo Operation Control Center in charge of JR's train operation control in the Tokyo metropolitan area and learning modernized and systemized operation control center.	<ul style="list-style-type: none"> ▪ Management area of the operation control center ▪ Outline of ATOS ▪ Mindsets in traffic operation arrangement ▪ Disaster prevention system
	Site visit to Tsukuba Express (MIR/ Mr. Kasuya)	Tsukuba Express is a newly opened urban railway with new systems. This is to learn construction processes of the new line including backgrounds of the construction, outlines of facilities, transitions after the opening etc. Additionally, this includes site visits of facilities including station facilities, plants, electric train storage tracks, operation control centers etc.	<ul style="list-style-type: none"> ▪ History of new line planning ▪ Site visit of ATO systems, train ride ▪ Site visit of the operation control center
January 24th, 2012	Site visit to Tokyo Metro (Tokyo Metro/ Mr. Sato)	Deepening understanding of mutual direct-through operations, which is a characteristic of Japanese railways, and learning facilities of the operation control center for high-density operations.	<ul style="list-style-type: none"> ▪ Corporate outline of Tokyo Metro ▪ Outline of Tokyo Metro ▪ Mutual direct-through operations
	Site visit to The Nippon Signal Co., Ltd. (Nippon Signal/ Mr. Ogihara)	Learning characteristics and outline of SPARCS, which is CBTC developed by The Nippon Signal Co., Ltd. and deepening understanding of CBTC.	<ul style="list-style-type: none"> ▪ Outline of SPARCS ▪ Site visit to plant lines
January 25th, 2012	Site visit to Shinkansen Operation Control Center (JR East/ Mr. Akamine)	Deepening understanding of train operation control methods for highly systemized Shinkansen.	<ul style="list-style-type: none"> ▪ Outline of JR East's Shinkansen (Network extending to 5 directions) (Direct-through service with mini Shinkansen) ▪ Outline of train operation control systems

	Site visit to Research and Development Center of JR East Group (JR East/ Mr.Saito)	Deepening understanding of contents of research and development by a railway operator and its structure, facilities.	<ul style="list-style-type: none"> Site visit of experiment facilities at the center Outline of research and development themes
January 26th, 2012	Urban transport ride experience (JRC/ Mr. Miyaoka)	Understanding various urban transport modes and reflecting them to future urban railway improvement plans.	<ul style="list-style-type: none"> Yurikamome (Tokyo Waterfront New Transit)
	Site visit to Kyosan Electric Manufacturing Co., Ltd. (Kyosan/ Mr. Terado)	Learning characteristics and outline of IT-ATP, which is CBTC developed by Kyosan Electric Manufacturing Co., Ltd. and deepening understanding of CBTC.	<ul style="list-style-type: none"> Outline of CBTC Site visit to plant lines Platform doors Interlocking device
January 27th, 2012	Site visit to The Railway Museum (JR East Cultural foundation/ Mr. Araki)	By reviewing progresses of railway technologies, deepening understanding of outline of various railway technologies	Visually learning the followings: <ul style="list-style-type: none"> History of railways Transitions of management forms Transitions in technological development
	Completion ceremony	Completion ceremony of the training	<ul style="list-style-type: none"> Awarding of a completion certificate from JICA Report

* Though SRT possesses abundant experiences as a railway operator, SRT only has experiences of the Airport Link as operation experiences in urban electric train operations. For this reason, this training program focuses on learning differences in methodologies in transport planning and train operation controls for intercity transport and metropolitan transport.

* In this training program, trainees visit 5 different operation control centers with different scales and functions.

3.2 Results of the Training Program

3.2.1 MRTA

① Results of the 1st training program

Due to the Great East Japan Earthquake, trainees had to return to their country after finishing the first half of the training, leaving the latter half unfinished. However, in January 2012, trainees were able to come back to Japan and were able to finish the rest of the planned training.

After finishing these programs, the followings are examples of trainees' opinions on the program: "as for track and rolling stock maintenance, we were able to understand track and rolling stock maintenance through both classroom lectures, site visits

theoretically and practically.”; “through observing actual night work at actual sites, we were able to understand how to secure safety and also work procedures etc. as our own experience.”

Additionally, in returned questionnaires, trainees also wrote: “through classroom lectures, site visits, we were able to learn our future challenges not only in technological fields of our own specialty, but also in a wide range of fields related to railway operations.” This indicates that the Training Program was effective for trainees to learn in a wide range of fields.

② Results of the 2nd training program

Since MRTA is a consigner of railway operations with separation of infrastructures and operations, the 2nd training program focuses on relationships between driving facilities and transport conditions and forms of railway businesses. Specifically, we included lectures on Mutual Direct-through Operations, which is the largest characteristic of Japanese railway operations, conducting site visits to Tokyo Metro Co. Ltd. (Tokyo Metro), Yokohama Minatomirai Railway Company (Minatomirai Line), and Sendai Airport Access Line.

Additionally, through site visits to manufacturers of ATACS and signaling introduced to the Senseki Line, we conducted introductions of the latest technologies of CBTC.

3.2.2 SRT

The contents of training program for SRT took the fact into consideration that SRT is a railway operator operating both infrastructures and railways. Especially, on safety which is the foundation for railway operations, trainees learned on safety for both software and hardware.

Specifically, at the JR East General Education Center, by visiting train protection drills for crew training and also visiting the Accident History Exhibition Hall, trainees learned JR East’s measures for securing safety.

As for train protection facilities, history of train protection systems developed through failures in the past, mechanism to achieve high-density operations, trainees learned Japanese technologies widely including CBTC (Communication Based Train Control) etc., the latest technology for ATACS for signaling manufacturers, which was introduced to Senseki Line.

3.3 Accomplishment of the Training Program

3.3.1 MRTA

① Accomplishment of the 1st training program

Since MRTA is a consigner of their railway transport business, their work environment includes less opportunity to be directly involved in field works. However, through site

visits to night work, etc., trainees replied in their questionnaires that they learned not only track welding technologies but also importance of accident prevention and methods to establish security systems.

Especially, through rail replacement work during night work, it was beneficial that trainees could experience a meeting before commencement of the work, execution of the work, methods to secure safety during the replacement work. It was a good opportunity for trainees who are not required to operate railways to expand their perspectives to those outside of their specialty, to realize necessity to take maintenance into consideration in designing in railway business.

In addition, the trainees could deepen the understandings of the track structure including maintenance-less track.

② Accomplishment of the 2nd training program

The 2nd training program focuses on Mutual Direct-through Operations, which can be said the largest characteristic of Japanese railway operations. As a result of the questionnaires, it is indicated that site visits to Yokohama Minatomirai Railway Company (Minatomirai Line), Tokyo Metro Co. Ltd. (Tokyo Metro), Sendai Airport Access Line, etc., which conduct mutual direct-through operations were very meaningful.

Trainees learned the following advantages can be obtained by mutual direct-through operations.

- 1) Improved convenience for passengers
- 2) Standardization of specifications of gauges and current collection methods etc.
- 3) Low-cost expansion of railway network
(Sharing of rolling stock depots and business consignment of maintenance work)

Advantages described above were innovative ways of thinking for trainees and were evaluated as very meaningful by trainees.

Additionally, upon visiting Accident History Exhibition Hall in the JR East General Education Center, trainees gained opportunities to re-acknowledge the importance of safety by learning mindsets in accident prevention, history of development of security systems, backgrounds in formulating work rules etc. Moreover, trainees replied in their questionnaires that they acknowledged importance of steadily conducting accident investigations and making records of accidents.

In addition, they could deepen the understandings about the relationship between operation planning department and maintenance department through night works, etc. They have also learned basis of operation planning and management including train diagram planning. It is expected that this program contributed to commence some measures to improve train operation from the status to contract out the train operation services.

3.3.2 SRT

Though SRT possesses abundant experiences in railway operations, since SRT has less experience in urban railway operations, the program focused on acquisition of knowledge and technologies required for operations of high-density railway sections. Especially, the program emphasized that securement of safety is inevitable for train operation management in high-density railway sections and trainees deepened understanding of safety measures taken by Japanese railway operators.

Specifically, trainees visited training drills for crews at the JR East General Education Center. By observing crew training sites to thoroughly learn basic safety actions, trainees replied in their questionnaires that they re-acknowledged that securement of safety is of the utmost importance in railway operations.

Moreover, at SRT, safety is secured by attentiveness of train drivers. However, in Japan, trainees learned that train protection systems are used for prevention of major accidents resulting from human errors. Trainees seemed to have strongly felt that modernized driving facilities are indispensable in train operation management in high-density railway sections and the training was effective.

Additionally, through site visits to 5 operation control centers of different sizes, the trainees replied in their questionnaires that they could learn importance of designing systems and facilities depending on transport volumes and characteristics of the railway sections. The followings are the 5 operation control centers they visited and their characteristics.

Table 3.3-1 The 5 Operation Centers for Site Visits

	Operation control center	Characteristics
①	JR East's Tokyo Operation Control Center	Large-scale operation control centers which manage multiple railway sections in the Tokyo metropolitan area with a wide management area and with a great number of train operations
②	Tokyo Metro Co. Ltd. (Tokyo Metro) operation control center	
③	Metropolitan Intercity Railway Company, MIR (Tsukuba Express)	Operation control center controlling a single railway section connecting Tokyo metropolitan area and suburb
④	JR East's Miyagino CTC	Operation control center controlling a single railway section for a local city (Senseki Line)
⑤	JR East's Shinkansen Operation Control Center	Operation control center controlling Shinkansen lines (intercity railways)

These operation control centers are different in conditions of railway sections (commuter and long distance transports) and in scale so that the contents of the site visits were useful as references for trainees to plan their operation control centers in the future.

Trainees learned methods in train operation arrangement for urban railway operations and also deepened understanding of modernized driving facilities and systems.

They have learned CBTC as well, and many of the programs appear to be beneficial for the members of SRT, which faces the commencement of the services of modernized urban railways. It is expected that the experiences of this training course will be beneficial for SRT trainees to prepare manuals in the future.

Chapter 4: Future Challenges

4.1 Program Plan which is not implemented

The followings are training programs which are not implemented in this time's training but are considered to be necessary in maintenance management of urban railways in the future.

① MRTA

As for Track course and Rolling Stock Depot course, since they were combined and shortened for this time's training, there are many training programs which cannot be implemented in this time's programs. These programs which were not implemented this time are indicated in Table 4.1-1 (track course), Table 4.1-2 (Rolling Stock Depot course) based on discussions with MRTA.

As for railway system maintenance management course, it was decided not to be included in this time's training. In this training field, based on requests from MRTA, followings can be considered to be provided as training programs.

- Since MRTA is highly interested in signaling systems with moving blocks), system site visits of ATACS which JR East introduces to its Senseki Line.
- Contents related to signaling systems, train security systems. Possibly classroom lectures on differences between European and Japanese signaling systems.

Based on these requests, Table 4.1-3 (system course) describes outline and aims of the classroom lectures.

② SRT

Though Track Repair and Signaling Repair are not included in this time's training, based on discussions with SRT, the following training subjects can be considered.

- Track Repair

- Track inspection by East-i
 - Vibration-proof track structures
 - Rail grinding
- Signaling Repair
- (Since SRT is highly interested in signaling systems with moving blocks), system site visits of ATACS which JR East introduces to its Senseki Line.
 - Classroom lectures on basics of signaling systems, train security systems
 - Classroom lectures related to development of signaling security systems
 - Classroom lectures to learn introduction of Japanese case examples for co-existence of different signaling systems, specific methods for co-existence

Based on the above requests, outlines and aims of classroom lectures for future execution are summarized in Table 4.1-4 (track repair), Table 4.1-5 (signaling repair).

In each table, from Table 4.1-1 to Table 4.1.5, the priority subjects that MRTA and SRT should be trained first are shown in *Italic and Underlined Style*.

Table 4.1-1: Track course (Outline and aims of classroom lectures which are not implemented this time): MRTA

Possible venue	Titles of classroom lectures	Targets to be achieved by classroom lectures	Outline of classroom lectures
Thailand	Track structures	Understanding ways of thinking in classes of tracks etc. and grades for maintenance	<ul style="list-style-type: none"> ▪ <u>Ways of thinking for transport conditions and classes for tracks etc.</u> ▪ <u>Inspection cycles, and differences in repair costs</u> ▪ <u>Relationships among speeds and curve radius, cant slacks, transition curves</u> ▪ <u>Details of track materials (rails, sleepers, rail fastening systems etc.)</u> ▪ <u>Long rails, expansion joints</u> ▪ <u>Relationships with track circuits</u>

	Vibration-proof, sound insulation measures	Understanding measures to reduce noise and vibrations of trains.	<ul style="list-style-type: none"> ▪ Understanding noise and vibrations of trains. ▪ Regulation values for noise and vibrations ▪ Countermeasure work
	Civil engineering structures and inspections	Characteristics of civil engineering structures and kinds of inspections	<ul style="list-style-type: none"> ▪ Tunnels, bridges, civil engineering work, depot facilities ▪ Disaster prevention measures (wind, rain)
Thailand	Safety measures	Understanding safety measures for maintenance work	<ul style="list-style-type: none"> ▪ <u>Safety for track maintenance work</u> ▪ Security facilities ▪ Measures etc. for approaching trains
	Site visit to rail, sleeper plants	Understanding manufacturing processes of track materials	<ul style="list-style-type: none"> ▪ Site visit of rail manufacturing site ▪ A series of related work including installation of plant manufactured sleeper mold forms, processing of reinforcing bars, tension of PC steel wires, casting of concrete, product delivery etc.
Thailand	Site visit to a turnout plant	Understanding manufacturing processes of turnouts	<ul style="list-style-type: none"> ▪ Site visit of a turnout manufacturing plant
	Track structures	Ways of thinking for classes of tracks etc. and grades for maintenance	<ul style="list-style-type: none"> ▪ Ways of thinking for transport conditions and classes for tracks etc. ▪ Inspection cycles, and differences in repair costs ▪ Relationships among speeds and curve radius, cant slacks, transition curves ▪ Details of track materials (rails, sleepers, rail fastening systems etc.) ▪ Long rails, expansion joints ▪ Relationships with track circuits

Table 4.1-2: Rolling Stock Depot course (Outline and aims of classroom lectures which are not implemented this time): MRTA

Possible venue	Titles of classroom lectures 【Expected receiving organizations】	Targets to be achieved by classroom lectures	Outline of classroom lectures
Thailand	Systems for rolling stock inspections and repairs	Contents of each inspection and facilities in charge	<ul style="list-style-type: none"> ▪ Processes for rolling stock inspections and repairs, contents of inspections and repairs for each part ▪ <u>Technological development (flat detection, wheel profile measuring device etc.)</u> ▪ <u>Management of inspection plans, and processes</u> ▪ Comparison of preventative maintenance and breakdown maintenance
Thailand	Quality management of rolling stock	Basics and applications of quality management	<ul style="list-style-type: none"> ▪ International standards (ISO etc.) ▪ <u>Data management</u>
Thailand	Structures of rolling stock	Understanding of structures	<ul style="list-style-type: none"> ▪ Structures of wheelsets, motion performance of wheelsets, hunting, axle box suspension ▪ <u>Mechanisms for derailment</u> ▪ Brake equipment ▪ Train protection systems (ATS)
Thailand	Technological development	Trends of latest technological development	<ul style="list-style-type: none"> ▪ Measures against exterior noise ▪ Zero emissions ▪ Improvement of exterior and interior images
	Case examples of depot designs	Case example study with specific examples	<ul style="list-style-type: none"> ▪ <u>Case example study of both domestic and overseas cases</u> ▪ Design specifications etc.
Japan	Site visit of Shinkansen General Rolling Stock Center 【JR East】	Shinkansen rolling stock center is a plant with capacity to inspect and repair 7 kinds of Shinkansen rolling stock. Through this site visit, trainees will learn work lines to cope with various kinds of rolling stock, management methods etc. for parts inventory.	<ul style="list-style-type: none"> ▪ Structures of inspections and repairs for Shinkansen rolling stock ▪ <u>Outlines of the plant and facilities</u> ▪ Organizations, personnel, work contents

Table 4.1-3: System maintenance management (Outline and aims of classroom lectures which are not implemented this time): MRTA

Possible venue	Titles of classroom lectures 【Expected receiving organizations】	Targets to be achieved by classroom lectures	Outline of classroom lectures
Thailand	Basics of signaling security facilities	Understanding facilities to secure safety of train operations	<ul style="list-style-type: none"> ▪ <u>History of development of signaling security facilities and technological backgrounds</u> ▪ Safety measures against failures of facilities ▪ Basics of signaling security facilities ▪ Theory of fail-safe designs
Thailand	Blocking equipment, signaling equipment	Understanding blocking Facilities to secure safety of train operations	<ul style="list-style-type: none"> ▪ Ways of thinking in blocking ▪ <u>Blocking equipment and signaling equipment</u>
Thailand	Switch and lock equipment, interlocking device	Understanding switch and lock equipment, interlocking device	<ul style="list-style-type: none"> ▪ Structures of switch and lock equipment and roles of each equipment (including practical training) ▪ Interlocking device for blocking equipment and signaling equipment, signaling equipment and switch and lock equipment etc.
Thailand	Items for inspections and cycles	Methods for efficient facilities management	<ul style="list-style-type: none"> ▪ Management of facilities distributed in a wide area along railway lines ▪ Remote centralized monitoring ▪ <u>Efficient facilities maintenance methods</u>
Japan	Site visits of signaling and communication technology center, night work 【JR East】	Learning outline of field organizations in charge of maintenance work as reference for future maintenance systems	<ul style="list-style-type: none"> ▪ Maintenance and management methods for of signaling equipment, communication equipment etc., preventative maintenance methods based on data
Japan	Site visit of night work 【JR East 】	Deepening understanding on methods to secure safety and how to execute maintenance work in a short time, and utilizing the knowledge for construction of safe and efficient work systems in the future.	<ul style="list-style-type: none"> ▪ Pre-work confirmation ▪ Track closure ▪ Actual work ▪ Arrangement after the work ▪ Lifting of track closures

Table 4.1-4: Track Repair (Outline and aims of classroom lectures which are not implemented this time): SRT

Possible venue	Titles of classroom lectures 【Expected receiving organizations】	Targets to be achieved by classroom lectures	Outline of classroom lectures
Thailand	Outline of Japanese Railways	Understanding current status of Japanese railways and learning differences from its own railway	<ul style="list-style-type: none"> ▪ Outline of railways ▪ History ▪ <u>Introduction of mass, high-speed, safe, and stable railway transport, characteristics of Japanese railways</u>
Thailand	Outline of Japanese urban railways	Understanding outline of Japanese urban railways and learning ways of urban transport.	<ul style="list-style-type: none"> ▪ Privatization (JR, private railways etc.) ▪ Business contents of JR ▪ <u>Safety measures etc.</u>
Thailand	Track structures	Understanding outline of labor-saving tracks to utilize the understanding for management of railways to be improved.	<ul style="list-style-type: none"> ▪ <u>Rails, turnouts, various track structures (especially slab tracks, directly-fastened tracks etc.)</u> ▪ <u>Rail fastening systems</u> ▪ <u>Rail wear, rail fractures (including practical training)</u>
Japan	Track management 【JR East】	Understanding mechanisms and methods of track management for future utilization.	<ul style="list-style-type: none"> ▪ <u>Inspections, standard values</u> ▪ Facilities-related machineries, rolling stock inspections ▪ Charts of track inspection cars, EAST-i, TRAMS ▪ Data management
Japan	Track maintenance 【JR East】	Understanding maintenance plans, and maintenance work so that the understanding will be utilized for track management to be improved in the future.	<ul style="list-style-type: none"> ▪ Flows of track maintenance ▪ <u>Classifications of track-related work</u> ▪ <u>Track improvement</u>
Japan	Corporate outline of Tsukuba Express 【Metropolitan Intercity Railway Company, MIR】	Understanding effects of railways connecting urban areas and suburb areas on development of wayside and areas in front of stations.	<ul style="list-style-type: none"> ▪ History of new line planning ▪ Outline of railways ▪ Outline of facilities

Japan	Site visit to Tsukuba Express 【Metropolitan Intercity Railway Company, MIR】	Visiting Japanese rolling stock depots and understanding actual facilities.	<ul style="list-style-type: none"> ▪ Depot facilities ▪ Plant facilities ▪ Plant equipment ▪ Rolling stock
Japan	Site visit to ballast-less tracks 【JR East】	Deepening understanding outline of labor-saving tracks	<ul style="list-style-type: none"> ▪ <u>Visiting an installation site of directly-fastened tracks above an elevated bridge</u> ▪ Site visits of continuous grade separated crossing business
Japan	Track Maintenance Center 【JR East】	Understanding work outline of field organizations in charge of track maintenance as a reference for future maintenance systems	<ul style="list-style-type: none"> ▪ <u>Roles of the Track Maintenance Center</u> ▪ Work contents ▪ Understanding organizations, personnel
Japan	Site visit of night work 【JR East】	Deepening understanding on methods to secure safety and how to execute maintenance work in a short time, and utilizing the knowledge for construction of safe and efficient work systems in the future.	<ul style="list-style-type: none"> ▪ Pre-work confirmation ▪ Track closure ▪ Actual work ▪ Arrangement after the work ▪ Lifting of track closures
Japan	Safety measures for track work 【JR East】	Understanding safety measures for maintenance work	<ul style="list-style-type: none"> ▪ <u>Safety for track maintenance work</u> ▪ Security facilities ▪ Measures etc. for approaching trains
Japan	Site visit to rail, sleeper plants 【JR East】	Understanding manufacturing processes of track materials	<ul style="list-style-type: none"> ▪ Site visit of rail manufacturing site ▪ A series of related work including installation of plant manufactured sleeper mold forms, processing of reinforcing bars, tension of PC steel wires, casting of concrete, product delivery etc.
Japan	Site visit to The Railway Museum 【JR East】	By reviewing progresses of railway technologies, deepening understanding of outline of various railway technologies	<ul style="list-style-type: none"> ▪ History of railways ▪ Transitions of management forms ▪ Transitions in technological development

Table 4.1-5: Signaling Repair (Outline and aims of classroom lectures which are not implemented this time): SRT

Possible venue	Titles of classroom lectures 【Expected receiving organizations】	Targets to be achieved by classroom lectures	Outline of classroom lectures
Thailand	Signaling facilities security	Understanding facilities to secure safety of train operations of urban railways	<ul style="list-style-type: none"> ▪ <u>History of development of signaling security facilities and technological backgrounds</u> (especially, learning outline of security facilities for urban railways) ▪ Case examples of safety measures against failures of facilities ▪ Examples of signaling security facilities
Japan	Blocking equipment, signaling equipment 【JR East】	Understanding characteristics of Japanese blocking methods Understanding security facilities of urban railways	<ul style="list-style-type: none"> ▪ <u>Outline and case examples of security facilities of urban railways</u>
Thailand	Security systems of urban railways	By comparing and studying outlines of various security systems for intercity and urban railways which SRT has been traditionally operating to date, understanding characteristics of security systems for urban railways	<ul style="list-style-type: none"> ▪ Various security systems for urban railways ▪ <u>Outlines of security systems for intercity and urban railways and comparison</u>
Thailand	Inspection items and cycles	Learning management methods for facilities of urban railways	<ul style="list-style-type: none"> ▪ Management of security facilities for urban railways ▪ <u>Case examples of safe and efficient facilities maintenance</u>
Japan	Site visits of signaling and communication technology center, night work 【JR East】	To establish efficient maintenance systems for urban railway systems, understanding work of field organizations in charge of facilities maintenance	<ul style="list-style-type: none"> ▪ Execution of maintenance management of signaling equipment, communication equipment for urban railways ▪ <u>Execution of maintenance work by securing safety</u>

Japan	Site visit of night work 【JR East】	Deepening understanding on methods to secure safety and how to execute maintenance work in a short time in highly frequent and high-density train operations	<ul style="list-style-type: none"> ▪ <u>Methods to execute safe maintenance work by track closures</u> ▪ Execution of appropriate train watch including those for adjacent lines, and safe work structures
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* Since SRT already possesses abundant of experiences as a railway operator for a long time, the program aims to learn safety of Japanese railway systems through comparisons with Japanese railway systems and explanations of case examples.

Additionally, since SRT does not have enough operation experiences in urban railways, the program aims to learn especially characteristics of security systems for urban railways.

4.2 Suggestions for the Future Program

As for this time’s capacity development training for MRTA and SRT, based on requests from both organizations from interviews with them, we provided planned and effective training programs within the limited time length.

Though the length of the training program for each organization was limited to 2 weeks, we formulated training programs while paying attention to accommodate capacity development strategies and requests of both organizations. (Consistencies and differences of the programs to MRTA and SRT from their requests are indicated in Table 2.3-1 and Table 2.4-1. Additionally, programs which are not included in this time’s training are discussed in a prior chapter.)

Moreover, from the results of questionnaires from the trainees, the contents of the training programs were highly evaluated. Trainees also highly evaluated instructors for responding to questions from them. For these reasons, we consider that the initial aims of the training programs were fully achieved.

Based on this time’s training outcomes, the followings are Suggestions for the Future Program.

① Enhancement of practical training

In this time’s training, to further enhance the training, we planned to include not only classroom lectures but also site visits and practical training. Especially, in the 1st training for MRTA (Tracks and Rolling Stock Depots course), we included not only utilizing training with practical training facilities at JR East General Education Center but also included site visits of night work into the program. In the Train Operation Planning course for MRTA and SRT, we aimed to enhance site visits of train operation control center facilities etc., being evaluated as meaningful from trainees.

Though there is time constraint, education training such as practical training and site

visits are effective to more efficient acquisition of contents of classroom lectures. It is important to include efficient practical training drills and site visits utilizing limited training time periods effectively in planning meaningful Training Programs.

② Prior confirmation of English proficiency of trainees

In this time's training, based on interviews with MRTA and SRT, we decided to utilize English interpreters. However, since contents of classroom lectures are highly technical, etc., to fully understand explanations, trainees are required to have high English proficiency.

During site visits, we could find that some trainees with good English proficiency were sometimes explaining to other trainees in Thai even in case some trainees had difficulties to understand English technical explanations fully.

For training programs in the future, we consider that it is necessary to either choose trainees with enough English proficiency or to include engineers with enough English proficiency and technical capability to explain to other trainees as in this time's training.

③ Education of railway operational methods

For efficient operation of railways, not only engineering but also operation methods are extremely important. For an example, Japan has many case examples and abundant experiences in mutual direct through-services methods by clarifying each responsible field between different operators for direct-through operations of each train. Additionally, the mutual direct through-services methods have potential to be able to be utilized fully in railway networks outside Japan which are to be developed in the future.

Not only education and training in engineering fields, but also training in operation and maintenance management (O&M) related management methods are also considered to be effective in improving operational efficiency of railways outside Japan.

④ A ride of airport access line

In Training Programs for railway fields, we consider that a ride of airport access lines from the Narita Airport to the Tokyo metropolitan area is of reference to plan and improve one's own airport access line.

Between the Narita Airport and the Tokyo metropolitan area, two airport access lines are operating: JR lines and Keisei lines. For this reason, we consider that riding different lines with different tracks and trains for one way and the other is a meaningful training menu.

⑤ Use of IC cards

For newly constructed railway lines outside Japan, it is expected that automatic ticket gate systems with IC card methods will become more common. Japanese railway operators are leading the trend of the introduction of IC cards. For this reason, it is considered to be meaningful for trainees to actually use contactless IC cards and

understand convenience of the IC card system. (However, use of IC cards in the Training Program has a disadvantage of consuming time in fare adjustment.)

4.3 Suggestions and Direction of Capacity Development of MRTA and SRT

Implementation of this training program is considered to be effective for capacity improvement of engineers for both MRTA and SRT. In this chapter, while taking differences in characteristics of both organizations into consideration, we will discuss Suggestions and Direction of Capacity Development of MRTA and SRT separately for each organization.

① MRTA

About direction of capacity development MRTA should implement, it is outlined in SAPI conducted in 2010 by JICA.

For this reason, in this chapter, we provide suggestions based on information gained in interviews with MRTA (January 2011) and training provided to MRTA (Dec. 2011 and January 2012).

<Characteristics and necessary capacity for organization of MRTA>

- Though MRTA is playing a role to construct railway facilities, in railway operations, MRTA consigns operations to concessionaires.
- For this reason, MRTA is required to have capability to correctly manage concessionaires and sometimes MRTA employees are required to possess different capability in addition to those required for engineers of railway operators.
- For an example, MRTA are required to have following capabilities. (These are confirmed at the time of interviews with MRTA.)
 - ① Capacity to assess different proposals from concessionaires (for an example, railcar types, signaling specifications, etc.)
 - ② Assessment index related to train operations of multiple concessionaires

< Suggestions and Direction of Capacity Development >

- In Japan, since case examples of railway operations with concessions (business right method) do not exist, basically there is no organization with capability and experience for concessions.

For this reason, one possibility is that MRTA conducts the training in Europe etc. with abundant railway operation experience with this concession method. (For an example, ORR etc. which grants the business rights in UK.) However, some European public organizations conduct assessment of concessionaires by hiring consultants etc. with knowledge of railway technologies. We consider that MRTA could consider conducting assessment with similar methods. Additionally, MRTA

conducts construction work of railway systems. It is surely important that MRTA employees have necessary technical capabilities required for execution of construction work. It might be also effective to fully utilize energy and capacity of private sectors as methods for efficient work execution. For an example, by introducing either BOT or BTO methods, we consider that it might be possible to introduce methods to utilize excellent capacity of private sectors from outside the organization, while utilizing competition principles.

- Though MRTA engineers do not directly maintain, manage, operate railway systems, there is a concern that acquisition of capabilities in technologies, maintenance, and operations similar to those for engineers of railway operators requires tremendous efforts and long time. Additionally, MRTA employees are frequently required to possess capacity different from those required for engineers of railway operators. As a consigner of railway transport service, we consider that reconfirmation of truly required capacity would be of reference in planning of effective training programs focused on acquisition of necessary capacity for execution of the consigned work.
- As methods for Capacity Development, in addition to education and training in Japan and in Thailand, we consider that technological and personnel exchanges etc. with concessionaires would also be effective. (Since there is no concessionaire in Japan, technological and personnel exchanges with BMCL appears to be effective.)

② SRT

<Technological levels of SRT and current issues>

- SRT possesses a long history as a railway operator. Especially in the field of traditional railway technologies, SRT already possesses necessary technological manuals and Capacity Development programs for enhancement of technological capacity.
- We were able to confirm via interviews with SRT and via Training Programs in the past that SRT's engineers already possess necessary basic technological capacity in traditional technologies required for operations of railway systems.
- On the other hand, as for experiences in the field of operation and maintenance management of modern electrified railways, SRT's experiences are limited to those for the Airport Link and it cannot be said that as a whole SRT, technological capacity in the field is fully accumulated.
- SRT is currently required to formulate (provide) necessary rules, regulations and manuals required for operation and maintenance management (O&M) of EMU and at the same time to train engineers required for operations of the Red Line to be opened in the future (for an example, dispatchers and drivers for high-speed and highly frequent electric train operations, ballast-less track maintenance engineers).

<Suggestions and Direction of Capacity Development>

- As for training of necessary engineers for the opening of the Red Line, it is assumed

to be efficient to utilize experiences accumulated in operation and maintenance management of the Airport Link. However, it is one of future issues for consideration if it is possible to utilize its employees in this manner. If it is difficult to utilize employees of the Airport Link to operations of the Red Line, it is required to newly educate engineers for operations of the Red Line. In this case, it is necessary to decide contractors well in advance for education and training, to formulate necessary manuals, and to implement education and training of employees.

- For enhancement of necessary technological capacity required for operations of existing conventional lines, it is desired that SRT continues its long term capacity development programs for its employees based on its plans for each technological field.
- It is assumed that the reasons why SRT's operations are not modernized are largely because that SRT is facing a large difficulty financially and is short of funds for facility investment and for maintenance management costs due to its organizational structure, not because SRT employees lack sufficient technological capacity. For this reason, for modernization of SRT, we consider that in addition to technological education and training, the necessity for transformation of fundamental operational forms such as the reform of the Japanese National Railways (JNR) would be heightened. To this end, we consider that training in railway business management would also be effective.

Appendix 1 : Training Schedule

Appendix 1-1: The 1st training program for MRTA (Trackworks and Depot Design)

The 1st Training Program for the Mass Transport System Project in Bangkok (MRTA)
 【Trackworks and Depot Design】

Date	7 March 2011	8 March 2011	9 March 2011	10 March 2011	11 March 2011	21 January 2012
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Place	JICA Tokyo	JR East General Education Center (Sendai to Shin-Shirakawa)	JR East General Education Center	JR East General Education Center	E-TEC/JR East	JICA Tokyo
9:30 (9:00~)	JICA Guidance	In Transit Introduction	3.Track Maintenance Work (incl. Practical Training)	3.Track Maintenance Work (incl. Practical Training)	Site Visit to "E-TEC" "Tokyo Education Center"	
10:00	Lunch	Lunch	Lunch	Lunch	Lunch	
11:00	JRC Guidance	1.Track Structures (incl. Practical Training)	4. Rolling Stock Inspection and Repair (Lecture)	Learning from Train Accidents	Site Visit to "JR East" Tokyo General Rolling Stock Center	
12:00	a. Outline of Japanese Railways (Lecture)	2.Track Maintenance Management (incl. Practical Training)	5. Insepection and Repair Facilities (Lecture)	In Transit (Shin-Shirakawa to Tokyo)	suspended by earthquake	
13:00	b. Outline of JR East (Lecture)					
14:00						
15:00						
16:00						
17:00-						
Stay	JICA Tokyo	JR East General Education Center	JR East General Education Center	JICA Tokyo	JICA Tokyo	JICA Tokyo
Date	9 January 2012	10 January 2012	11 January 2012	12 January 2012	13 January 2012	14 January 2012
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Place	JICA Tokyo	JR East Tokyo Rail Center	T sukuba Express	JR East	JICA Tokyo	JICA Tokyo
9:30 (9:00~)	JICA Guidance	In Transit Site Visit to "JR East" Tokyo Rail Center	In Transit "Tsukuba Express" (OGG)	In Transit Site Visit to "JR East" Installation of Ballastless Track (Inaginagumama station)	In Transit Site Visit to "The Railway Museum"	
10:00	Lunch	Lunch	In Transit	Lunch	Lunch	
11:00	Urban Trains Yurikamome Tokyo Monorail	In Transit Site Visit to "JR East" Shinjuku Track Maintenance Center	Site Visit to "Tsukuba Express" (OGG)	In Transit Site Visit to Tokyo General Rolling Stock Center	In Transit Summary Report of Program Farewell	
12:00	Lunch	Lunch	In Transit	Lunch	Lunch	
13:00		In Transit	In Transit	In Transit	In Transit	
14:00		Preparation for night program	In Transit	In Transit		
15:00		Site Visit to Track Maintenance Works (23:30~4:00)				
16:00						
17:00-						
Stay	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku

Class at JR East General Education Center
 Site Visit

Appendix 1-2: The 2nd training program for MRTA (Train Operation Planning and Management)

The 2nd Training Program for the Mass Transport System Project in Bangkok (MRTA)

【Train Operation Planning and Management】

Ver.2011/12/09

Date	12 December 2011	13 December 2011	14 December 2011	15 December 2011	16 December 2011	17 December 2011	18 December 2011
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Place	JICA Tokyo	Yokohama MM Line and Kyosan In Transit	Tokyo Metro, Tsukuba Express In Transit	JR East and The Nippon Signal In Transit	Railway Museum In Transit		
9:30	(9:00~)						
10:00	JICA Guidance	Sight Visit to "Yokohama Minatomirai Railway Company"	Sight Visit to "Tokyo Metro Co.,Ltd." (Nakano Depot)	Sight Visit to "JR East" (Tokyo OCC)	Site Visit to "Railway Museum"		
12:00	Lunch	Lunch	Lunch (In Transit)	Lunch	Lunch		
13:00	JRC Guidance	In Transit		In Transit			
14:00	a. Outline of Japanese Railways (Lecture)	Sight Visit to "Kyosan Electric Manufacturing Co.,Ltd."	Site Visit to "Tsukuba Express" (OCC)	Sight Visit to "The Nippon Signal Co.,Ltd."	In Transit		
15:00	b. Outline of Japanese Urban Railways (Lecture)	In Transit	In Transit	In Transit	In Transit		
16:00							
17:00-							
Stay	JICA Tokyo	JICA Tokyo	JICA Tokyo	JICA Tokyo	JICA Tokyo	JICA Tokyo	JICA Tokyo

Date	19 December 2011	20 December 2011	21 December 2011	22 December 2011	23 December 2011	24 December 2011	25 December 2011
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Place	JR East General Education Center (Tokyo to Shin-Shirakawa)	JR East General Education Center	JR East General Education Center	JR East and Sendai Airport	JICA Tokyo		
9:30	In Transit						
10:00	Introduction	2. Structure of Japanese Railways 【Vertical Separation】	5. Train Simulator	Site Visit to "JR East" "Miyagino CTC Center" [New-Train Control System: ATACS]	Summary Report of Program Farewell		
12:00	Lunch	Lunch	Lunch	Lunch	Lunch		
13:00	1. Laws and Regulations for Railways	3. Facilities for Train Operation	6. Learning from Train Accidents	Site Visit to "Sendai-Airport Access Line"	Urban Trains Monorail and Automated Guideway Transit		
14:00				In Transit (Sendai to Tokyo)			
15:00		4. Signaling Systems	In Transit (Shin-Shirakawa to Sendai)				
16:00							
17:00-							
Stay	JR East General Education Center	JR East General Education Center	Sendai	JICA Tokyo	JICA Tokyo	JICA Tokyo	JICA Tokyo

Class at JR East General Education Center

Sight Visit

Appendix 1-3: The Training program for SRT (Train Operation Planning and Management)

Training Program for the Mass Transport System Project in Bangkok (SRT)

【Train Operation Planning and Management】

Ver.2012.1/16

Date	16 January 2012	17 January 2012	18 January 2012	19 January 2012	20 January 2012	21 January 2012
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Place	JICA Tokyo	JR East In Transit	JR East General Education Center (Sendai to Shin-Shirakawa)	JR East General Education Center	JR East General Education Center	
9:30	(9:00~)					
10:00	JICA Guidance	Site Visit to "JR East" (Miyazino CTC Center) <small>(Note: Train Control System: ATACS)</small>	In Transit	Train Operation Planning	Learning from Train Accidents	
11:00			Introduction			
12:00	Lunch	Lunch	Lunch	Lunch	Lunch	
13:00		In Transit	Laws and Regulations for Railways	Facilities for Train Operation	Training Method for Dispatcher	
14:00	JRC Guidance					
15:00	a. Outline of Japanese Railways (Lecture)	Site Visit to "Shinkansen Depot"		Signaling Systems	In Transit (Shin-Shirakawa to Tokyo)	
16:00	b. Outline of JR East (Lecture)	In Transit				
17:00						
Stay	Hotel Sunroute Plaza Shinjuku	Sendai	JR East General Education Center	JR East General Education Center	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku

Date	23 January 2012	24 January 2012	25 January 2012	26 January 2012	27 January 2012	28 January 2012
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Place	JR East, Tsukuba Express In Transit	Tokyo Metro, The Nippon Signal In Transit	JR East In Transit	Kyosan In Transit	JICA Tokyo In Transit	
9:30						
10:00	Site Visit to "JR East" (Tokyo OCC)	Site Visit to "Tokyo Metro Co.,Ltd." (OCC)	Site Visit to "JR East" (Shinkansen OCC)	Urban Trains Yurikamome	Site Visit to "The Railway Museum"	
11:00						
12:00	Lunch (In Transit)	Lunch	Lunch	Lunch	Lunch	
13:00		In Transit	In Transit	In Transit	In Transit	
14:00	Site Visit to "Tsukuba Express" (OCC)	Site Visit to "The Nippon Signal Co.,Ltd."	Site Visit to "JR East" (Research and Development Center)	Site Visit to "Kyosan Electric Manufacturing Co.,Ltd."	Summary Report of Program Farewell	
15:00						
16:00	In Transit	In Transit	In Transit	In Transit		
17:00						
Stay	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku	Hotel Sunroute Plaza Shinjuku

Class at JR East General Education Center
Site Visit

Appendix 2 : Questionnaire

First Training – Responses to Questionnaires (MRTA Rolling Stock Depot Management and Tracks) 【Training Periods: March 7-11, 2011 and January 9-13, 2012】

1. Achievements of training, opinions
a) Are objectives fully accomplished?
<ul style="list-style-type: none"> • We could understand approach to capacity evaluation of depot and track structure • We could learn about railways, which was useful.
b) Curriculum and degree of satisfaction
<ul style="list-style-type: none"> • Composition of training program was well balanced. • The curriculum content was adequate. (Majority opinion) • The curriculum could not cover details due to short training period. (Minority opinion) • Achievements of training were satisfactory. (Unanimous opinion)
c) Opinions about this training
<ul style="list-style-type: none"> • Visits to the following sites were useful. <ol style="list-style-type: none"> 1. Nighttime work at Shinjuku Maintenance of Way Office 2. Tokyo Rail Center 3. Tokyo General Rolling Stock Center
2. For the advancement of Thai urban railways • • •
a) What needs to be improved in the operation and maintenance of Thai urban railways?
<ul style="list-style-type: none"> • Building of appropriate relationships with concessionaires • Improvement of design issues • Optimization of maintenance cost • Turnout technology, inspection technology, construction, importation of maintenance materials • Introduction of common tickets • Grade separation of crossing • Improvement of railway networks
b) What is needed for solving the problems?
<ul style="list-style-type: none"> • Design that takes easier maintenance into account • Establishment of appropriate maintenance standards • Review of specifications and rolling stock inspection processes • Construction of plants for manufacturing Thai made products • Description on TOR at the bidding for common tickets • Transfer of railway technology to Thailand • Continued use of common workshops, through-service operation, and common tickets.
c) What kind of personnel development programs are necessary for MRTA?
<ul style="list-style-type: none"> • General programs, including technology, marketing, regulations, etc. • Safety, business development • Development and design of stations for more profits • Management, track management, rolling stock inspection • Operation plan, rolling stock maintenance • Project management • Rolling stock inspection and track repair
d) Others
<ul style="list-style-type: none"> • We could identify a wider range of issues, in addition to those of our specialty, as well as realize the needs to improve our capability further in the fields other than our specialty. • We want to take training on the railway management, if any, to broaden our view.

Report on Training Program for the Mass Transport System Project in Bangkok (1-1)

1. Regarding your engineering abilities:

Please declare your current level of engineering abilities.

- (*****) I am civil engineer who works with MRTA for 13 years. I have been work in MRT Blue Line Project (Track work Contract). For the time being my Position is Director of Construction Management Division in charge of MRT Purple line Project (Contract1).
- (*****) According to my educational background, I had received B.Eng. (Civil Engineering) and M.Eng (Construction Engineering and Management). I have been working for MRTA since 1997 in a mass rapid transit project.
- (*****) I am in charge of maintenance , management for facilities. I do not enough ability to review the specification, contractor works for supervising the maintenance of Track work maintenance.
- (*****) I deal with construction & contract management and supervision of the MRT Purple Line project.
- (*****) According to Council of Engineers, COE (Thailand), My current level of engineering abilities is Professional Engineer. In charge for Construction supervision and Project Management for Contract 3 (Depot and Park&Ride) of the MRT Purple Line Project.
- (*****) Design , construction and maintenance of railway system projects
- (*****) According to Council of Architect, COE (Thailand), My current level of Architecture abilities is Professional Architect.
- (*****) According to Council of Engineers, COE (Thailand), My current level of engineering abilities is Associate Engineer.
My current duty is planning, preparing scope of work, selected, management, supervision and monitoring of civil construction and architecture construction for MRT projects and other project both the consultants and contractors. (trackworks)
- (*****) Design, construction of Infrastructure Projects such as underground drainage tunnel, Water Works Plants.
- (*****) Professional level in electrical engineering. My current job is responsible for planning, design, specification and standard works for M&E systems. Operation and Maintenance planning, and monitor consultant works.

2. Regarding your objectives for this course

Please describe what you most wished to study in this training course.

- (*****) The concept and alignment design for Trackwork.
- (*****) Experience and best practice in design and operation of depot and

workshop.

- (*****) I wish to know the techniques for maintenance & inspection and I wish to study the new technology of track signal, turnout ,switch and fastening system.
- (*****) I'd like to learn about design criteria of depot design & management and system of trackwork maintenance & installation in order to apply and improve our Projects.
- (*****) I wish to study how to design Depot with a major concern of optimization land use.
- (*****) Study the factors to be considered in MRT's Depot Design, including its details, which it can be adopted in the future MRT Project of MRTA.
Study Track Works Design and Maintenance for MRT Systems (Heavy Rail, Light Rail, Monorail, etc.) which it can be applied in the future MRTA's Project.
- (*****) I wish to study how to design Depot with a major concern of optimization land use.
- (*****) MORE KNOWLEDGE OF TRACKWORKS :
- TRACKWORKS MAINTENANCE & INSTALLATION & PLANNING.
- TRACKWORKS STRUCTURE AND FIXATION FACILITIES.
- CAUSE OF RAIL DAMAGED.
MORE KNOWLEDGE OF DEPOT.
- DEPOT DESIGN & MANAGEMENT.
- MAINTENANCE ACTIVITIES.
- ALLOCATION OF DEPOT FACILITIES AND EQUIPMENTS RELETE TO MAINTENANCE ACTIVITIES.
- (*****) -Study the factors to be considered in MRT's Depot Design, including its details, which it can be adopted in the future MRT Project of MRTA.
-Study Track Works Design and Maintenance for MRT Systems (Heavy Rail, Light Rail, Monorail, etc.) which it can be applied in the future MRTA's Project.
- (*****) -Depot and Workshop design concept. Capacity estimation and arrangements of areas and equipments relate to maintenance activities.
-Track works design concept.

3. Regarding your results of this course

a) Have you studied what you mentioned above satisfactorily?

- (*****) The training course has not included this topic.
- (*****) Even through most of a site visit for depot, workshop trackwork and OCC could not be conducted due to a certain reason, it is considered for a lecture part, be satisfied.

(*****) Techniques for maintenance and inspection that similar our defect case.

(*****) Yes, I did.

(*****) Yes, I have.

(*****) Yes, I studied about depots & workshops in Japan and about trackworks. But I missed almost all site visit program.

(*****) Yes, I have.

(*****) Yes ,I have

(*****) This training course is partially fulfilling my expected objectives.

(*****) Yes. I've got basic concept how to estimate capacity of depot and workshop and arrangement of main equipments. I also got knowledge of track structure.

• **If “no”, please describe the reasons.**

(*****) The training course has not included this topic.

(*****) Based on the actual training durations of 1-week, we had finished only half of the program. We missed almost all Site Visit Program (Rail Center, Depot Installation of Ballastless Track and Track Maintenance Works).

(*****) —

b) Which programs/site visits/issues did you feel helpful and effective to improve the operation and maintenance of your Railways?

(*****) Track Maintenance work.

(*****) Depot and Workshops in Japan

(*****) Only one site that we have a chance to visit.

(*****) The part of lecture at JR EAST General Education Center, the whole courses were helpful and effective to improve the depot design & management and trackwork maintenance & installation.

(*****) In particular of lecture at JR EAST General Education Center, all of courses were helpful and effective to improve the operation and maintenance work.

(*****) I think every training program are helpful and effective to improve the operation and maintenance of my Railways.

(*****) In part of lecture at JR EAST General Education Center, all of courses were helpful and effective to improve the operation and maintenance work

(*****) This course improves the operation and maintenance. The Content is interesting and improved my Knowledge and skills but the situation at that time during the site visit Could not visit until the end. This is deplorable because it is very interesting for Railway Technology in Japan.

(*****) We had attended 7 Topics during Tuesday to Thursday and took a Site Visit at Tokyo Depot and Workshop on Friday. Therefore, I think it helps us to have a wide framework on Track Maintenance.

- (*****) Program:
 -Rolling Stock Inspection
 -Inspection and Repair Facilities
 -Depot and Workshops in Japan
 -Track Structure
 Site Visit: N/A (program had been terminated due to earthquake)

4. Regarding your opinion about this course

a) Which issues do you want to study more in detail among the offered course?

- (*****) Track work Design.
 (*****) Design and Operation of Depot
 (*****) I want to study more in the Track Design.
 (*****) Depot and trackwork design for resistance seismic wave.
 (*****) Depot Layout Design. (Including some criteria of parameters for using in design.)
 (*****) Inspection an Repair Facilities
 (*****) Depot Layout Design. (Including some criteria of parameters for using in design.)
 (*****) I wish to study know to install a special track and any type of the special track.
 (*****) Rail / Structure Interaction Analysis for Ballastless Track.
 (*****) Rolling Stock Maintenance and Depot Design.

b) Please describe your suggestions/recommendations to improve the program

- (*****) The small group in specific issues would be more efficient for Training Program.
 (*****) Basically, the program has both a lecture and a site visit, which considered appropriate to the participants.
 (*****) If possible please prepare all text in English.
 (*****) After the earthquake had occurred in your country, almost depot and track work structure was still stability, apparently those structures were designed for resistance seismic wave from earthquake. So this is the reason why I am very interested to learn more about it .
 (*****) This program shall include more practical training of Rolling stock inspection and Depot Layout Design. They would helpful to make skills for participants.
 (*****) None.
 (*****) This program shall include more practical training of Rolling stock inspection and Depot Layout Design. They would helpful to make skills for participants.

- (*****) They have a proper subject in this training program already.
I think it's the best if Training is completed.
- (*****) None
- (*****) The program duration should be longer especially for lecture program to get more detail in each study issues.

5. Regarding challenges and your activities to improve Urban Railways in Thailand

a) What kind of issues and problems should be solved by the organization or by participants to improve the operation and maintenance system in Urban Railways in Thailand?

- (*****) In order to improve the operation and maintenance system in BKK. We have to study how to incorporate the system from different operators to provide a good service for the customers and minimize the maintenance cost.
- (*****) Appropriate project requirements, in a context of Thailand and MRTA, could be developed.
- (*****) To adapt the technologies of development of next generation turnouts to our project.
- (*****) It is Land Acquisition, a major problem is land use optimization.
- (*****) With regard Land acquisition, a major problem is concerned of optimization land use.
- (*****) Understanding the problems and solve them in the direct way.
- (*****) With regard Land acquisition, a major problem is concerned of optimization land use.
- (*****) With regard Land acquisition, a major problem is concerned of optimization land use.
- (*****) A clear and consistent plan for the urban railway development shall be directed by the Government.
Nowaday, the PPP scheme for the urban railway operation is promoting in Thailand. Therefore, the organization who responsible for operating the railway route may have a need to consider their appropriate organization structure to suit with their responsibility.
- (*****) As the existing Chaloevrachamongkon Line is responsible by the concessionaire, we could not much involve in his operation and maintenance activities. But the information that we got from the concessionaire and this training program would be useful for us to apply to our upcoming new projects.

b) What kind of human resource development program do you think your organization needs to improve the operation and maintenance system in Urban Railways in

Thailand?

- (*****) The program should be focus on the technical and management study.
- (*****) Through Operations, in all aspects including technical, commercial, rules and regulations.
- (*****) I think that “How to use Track Maintenance Machines to improve the Track work.”
- (*****) Rolling stock inspection and Repair and Trackwork maintenance program.
- (*****) Rolling stock inspection and Repair and Track work maintenance programs.
- (*****) I think the practical training program is needs for my organization. Because we will have the knowledge while we training that program.
- (*****) Rolling stock inspection and Repair and Track work maintenance programmes.
- (*****) Rolling stock inspection and Repair and Track work maintenance programmes.
- (*****) The development program shall be implemented from design phase of the project, operation phase and maintenance period. Therefore, MRTA shall set up a master plan for human resource development program to all departments that involves the project, from design phase to operation/maintenance phase.
- (*****) Training program for:
-Railway System Design, Installation, Commissioning Planning and Management
-System Integration
-O&M Planning
-Each Railway system (eg. Signalling, Telecommunication, Rolling Stock etc.)

c) How do you intend to make good use of the experience of this training program after returning to Thailand?

- (*****) I hope to adapt the knowledge that I have got from the experience of this program to my works in the future.
- (*****) As MRTA’s personal, I will consider adopting the experience, as applicable and appropriate, for the next MRTA’s projects, in particular the project requirements which more fit with a context of Thailand and MRTA.
- (*****) I can choose the suitable solution to correct a defect.
I can adapt the knowledge of Track Maintenance to improve the Planning and Job Procedures
- (*****) Apart from knowledge and experience obtained from Depot Design & Management and Track work Maintenance & Installation course, which can be applied in our Projects at either the design or the operation and

maintenance state, I think the most significant things for everyone in my Country to take attention to are being order-linens and responsibility to any events occurred.

(*****) Even though, MRTA have 1 Project is operating and 2 Project is constructing such as the MRT Purple line and MRT Blue line Extension. After open these operations, they are needed a long term to maintenance of Track work and Rolling stock. In this training, it gave effectively increase technical capabilities of track work and Rolling stock maintenance. However, the regular of inspections in Thailand may a little difference from Japan due to workload during operation. So this experience may apply to our inspection work with based on Japan's Railway regulation.

(*****) I intend to use my experiences in new MRT projects in Thailand (Purple line (south) , Orange line , Pink line , etc.)

(*****) Even though, MRTA have 1 Project is operating and 2 Project is constructing such as the MRT Purple line and MRT Blue line Extension. After open these operations, they are needed to maintenance of Track work and Rolling stock. In this training, it gave effectively increase technical capabilities for track work and Rolling stock maintenance. However, the sequence of inspections

(*****) Even though, MRTA have 1 Project is operating and 2 Project is constructing. After open these operations, they are needed a long term to maintenance of Track work and Rolling stock. In this training, it gave effectively increase technical capabilities of track work and Rolling stock maintenance. However, the regular of inspections in Thailand may a little difference from Japan due to workload during operation. So this experience may apply to our inspection work with based on Japan's Railway regulation.

(*****) I will use my experiences, from this program, to the development of the new MRT Project in Thailand, e.g., Purple Line (South) / Orange Line / Pink Line etc.

(*****)
- Share these experiences and knowledge to my colleague.
- Apply the useful experience and knowledge to our new projects.

Report on Training Program for the Mass Transport System Project in Bangkok (1-2)

Instructions: Please fill out this Report below as an output of the training course and submit it to JRC at the end of the course, 13 January 2012.

1. Regarding your objectives for this course

Please describe what you most wished to study in this training course.

- (*****) Track work Maintenance.
- (*****) Depot design and maintenance.
- (*****) The design construction and maintenance of Track work & Depot from theory and site visit.
- (*****) Site visit at Tokyo Rail Center at Toyochou, I saw methodology for flash butt, and it has developed my knowledge. Good experience for me.
- (*****) Site Visit night program, of Track maintenance work at Shinjuku. This is my first time to know that how to replace the rail and thermit welding the rail on site.
- (*****) I wish to know the techniques for Track work inspection.
- (*****) Depot Design
- (*****)
 - Learning about Track work & Depot Components to be a basic of design of Track work & Depot.
 - Track work Maintenance, both preventive and corrective maintenance measures.
- (*****) Depot Design and station Design in Japan.
- (*****) Depot design and planning. I would like to understand how to manage workshop areas and maintenance equipments location. From this program, I've got the idea and concept that they should be in line with maintenance schedule and management. (frequency, sequence, duration of each maintenance activities.)

2. Comments to the program

Please describe your comments to the program freely.

- (*****)
 - This program was very good to bring me understand more how they operate the Train systems in Japan.
 - It's would be great it. We have more time to stay.
- (*****) The program has both technical class and site visit, which is, in my opinion, appropriate for all participants. The program has also both depot work and track works. This could give all participants both how important issue in railway or MRT system. Due to a

short period, we could not get in details. But this could acceptable.

(*****) This program is already knowledge and real situation from lecturer and construction site.

(*****) - This program give me a good experience in my job and I will used this experience for my company.

- This Program is all clear. Thank you very much.

(*****) The program is an appropriate of only in the part of lecture last year, but also in the part of site visit, is proper to fulfill participant's knowledge.

All staffs, including lecturers are warmly welcome to us.

(*****) I have improved the knowledge and technologies of dept design a track-work maintenance.

(*****) - The program gave me some idea to improve my working in my organization.

- Thank you very much.

(*****) The program provides both theory and field experiences about Track work & Depot including track work maintenance.

(*****) This Program was very good to bring me know about track work and Rolling Stock maintenance.

(*****) This program is very useful to us, however some documents are in Japanese only.

3. Regarding your results of this course

a) Have you studied what you mentioned above satisfactorily?

(*****) Yes.

(*****) Basically, I have been

(*****) Yes, I have.

(*****) Yes.

(*****) Yes, I have.

(*****) Yes.

(*****) Yes.

(*****) Yes, I have.

(*****) Yes, I have.

(*****) Yes.

b) Which programs/site visits/issues did you feel helpful and effective to improve the operation of your Railways?

(*****) Site visit.

- (*****) Deport design and maintenance.
- (*****) Programs and site visit are a lot of knowledge and experience to improve the design construction and operation of our Mass Rapid Transit System.
- (*****) Site visit to Tokyo Rail Center and Tokyo Depot and workshop.
- (*****) Track Structures and Depot Design programs which I had studied at JR East General Education Center for last year.
- (*****) Site Visit to Tokyo Depot and Work shop.
- (*****) Depot Design at JR East Education Center.
- (*****) - Track work & Depot Components, to improve the participant understanding on its main components, to be a fundamental or basic of its design concept.
- (*****) - Site visit on track maintenance; provide a valuable experiences to the participant.
- (*****) Depot design programs at JR East education center are a lot of knowledge to improve the architectural design.
- (*****) Depot Design which held at JR East Education Center.

4. Regarding challenges and your activities to improve Urban Railways in Thailand

a) What kind of issues and problems should be solved to improve the operation and maintenance system in Urban Railways in Thailand? (Please describe in detail)

- (*****) Design Issues.
- (*****) I have recognized that maintenance is a major part of operation even it may need the expenditure. This is for safety of the system. For concessionaire approach, an Authority, must establish a code of conduct or regulation, to be ensure that a proper maintenance is received.
- (*****) We have to import a lot of parts from oversea for construction and maintenance.
- (*****) The manufacture can improve the maintenance system in Thailand.
- (*****) The common ticket issue. Currently, we have 2 existing lines which are operated by BTS on BMCL. That is 2-difference operation systems which the passenger can not use a ticket for the said 2-difference operation systems.
- (*****) - To adapt the technologies of turnouts in our project.
- (*****) - To adapt the Inspection and Repair Procedure in our project.

- (*****) The ticket system because in Thailand doesn't have the common ticket system.
- (*****) - For DMU of State Railway of Thailand (SRT) upgrading of traction unit & improvement of level crossing are required to improve the effectiveness of train operation.
- (*****) - For EMU, the expansions of train network are necessary to provide more convenient to people which will increase the ridership and revenue from train operation.
- (*****) The ticket systems between other lines are not unity. In Thailand blue line use coin but BTS line use card.
- (*****) At present we have 3 MRT operators under 3 separate government authorities, so it very difficult to conduct and control those 3 operators in the same direction.

b) How the above issues and problems can be solved? (Please describe your opinion in detail.)

- (*****) The design concept should be concerning about the maintenance.
- (*****) As described above, as the Authority, a code of conduct or regulation for MRT proper maintenance should be developed.
- (*****) We have to construction the factory of parts of Railways to produce its for substitute import from oversea.
- (*****) Because in Thailand cannot manufacturing the facility of the Rail.
- (*****) During bidding of operation Contract phase, TOR would be stipulated that the operation system shall be opened to co-operate with common ticket.
- (*****) - To review the specification for next project.
- (*****) - To review the Inspection Procedure.
- (*****) Every train operator should be solved the problem together.
- (*****) - Appropriate funding for project s to solve the aforementioned problem.
- (*****) - Railway technology transfer to Thai's engineer & technician, Participations of Japanese & Thai on railway technology transfer are required.
- (*****) Improve the ticket system to can use same ticket.
- (*****) Our government authority for all MRT project in Bangkok should be settled to make possibility to control the operations to improve their services and model to apply the concept of facilities sharing. (Common Depot, through operation, common fare ticket, etc.)

c) What kind of human resource development program do you think your

organization needs to improve the operation in Urban Railways in Thailand?

- (*****) Security and Business Development.
- (*****) A design of railway and MRTA infrastructure, such as station, will on integrated commercial development. This could generate more income to the project.
- (*****) Training from basic knowledge of railway to advance for real situation.
- (*****) Rolling stock program because I think in Thailand not have a lot of engineer for Rolling stock.
- (*****)
 - Track Maintenance program.
 - Rolling stock Inspection on Repair program.
- (*****) Management of Rail Systems.
- (*****) The Ticket System.
- (*****) Since, nowadays, MRTA give a concessionaire to private company to operate the system, but if shall be changed to PPP scheme in the ongoing project, ie, Purple Line, Blue Line, extension etc. There force, programs for resources developments on train operation / maintenance are necessary.
- (*****) Station Design program.
- (*****)
 - Project control for civil construction and M&E Systems purchasing, installation and integration.
 - Operation and Maintenance.

**Second Training – Results of Questionnaire
(MRTA Operation Planning and Management)
【Training Period: December 12 - 23, 2011】**

1. Achievements of training
a) Are objectives fully accomplished?
<ul style="list-style-type: none"> • We could gain useful knowledge about railways.
b) Which programs were effective for improving the railway operation and maintenance of your country ?
<ul style="list-style-type: none"> • We had deeper understanding of the through-service operation, a feature of Japan's railways. • Among visit sites, the following sites were very informative. <ul style="list-style-type: none"> ➤ JR East General Education Center ➤ JR East Tokyo General Operation Center ➤ Tsukuba Express
2. Comments on training
a) What issues do you want to study more?
<ul style="list-style-type: none"> • We want to take lectures on practical work and operations, including the following lectures in particular: <ul style="list-style-type: none"> ➤ Details of through-service operation (work at border stations, fare reconciliation, etc.) ➤ Procedures to be taken in emergencies, such as natural disaster and power outage. ➤ Organization and system of Japan's railways ➤ ATACS (Moving block) ➤ Station design, facilities (for disabled)
b) Suggestions and points to be improved concerning the training
<ul style="list-style-type: none"> • Materials on lectures and site visits were unavailable because of confidentiality, and no photographing was allowed in certain locations. (After return, we cannot share the information with colleagues and use it in the training for the employees of next generation personnel.) • A lecture covering more details about Japan's railways system desirable.
3. For the advancement of Thai urban railways . . .
c) What needs to be improved in the operation and maintenance of Thai urban railways?
<ul style="list-style-type: none"> • As all facilities are built for each project rather than sharing facilities such as rolling stock depot, more constrequired. • As there are not many engineers with sufficient knowledge on railways technology, the employment of foreign engineers is indispensable.
d) What is needed for solving the problems?
<ul style="list-style-type: none"> • Specifications for each line, such as signal system and gauge, should be standardized. • It is necessary to standardize the specifications of ticket vending machines and automatic fare validation for allowing passengers go through multiple lines with the same ticket. • It is important to establish an education center to provide next generation personnel with training.
e) What kinds of personnel development programs are necessary for MRTA?
<ul style="list-style-type: none"> • Those which we can learn practical works of railways operation (operation control, signals, rolling stock maintenance, etc.) • Establishment of education facilities, such as an education center, which can provide training in all fields of work.

Report on Training Program for the Mass Transport System Project in Bangkok (2)

Instructions: Please fill out this Report below as an output of the training course and submit it to JICA at the end of the course, 23 December 2011.

1. Regarding your engineering abilities:

Please declare your current level of engineering abilities.

(*****) I am a Civil Engineer with years of Technical experience on several Mega projects regarding the infrastructure industries. My work experience expands for projects in both USA and Thailand. Later, I exposed myself to management aspect especially on managing point of view and successfully implemented the Thailand's 1st underground subway project. Currently, I'm managing the Contract 1 for MRT Purple Line project and Contract 1 and 2 for Blue Line Extension project.

(*****) From my engineering background is not to deepen in core engineering but to use a basic knowledge of engineering and information and communication technology (ICT) for applied to a job such as when I worked at the Provincial Authority of Thailand (PEA), my responsibility was to survey data of electricity power distribution system and to transform such surveying data into electronic information by using Geographic Information System (GIS) software. Such GIS data is used for input of Supervisory Control and Data Acquisition (SCADA) and planning of electricity power distribution network. And for current job, a scope of work is about supervising a contract and checking bidding documents prepared by consultants whether their documents are according to MRTA's requirements. So my engineering ability is to use a basic knowledge of engineering for applied to a job.

(*****) In the first 4 years at MRTA, my duty is planning, monitoring and supervising MRT services of the concessionaire (BMCL) work for MRT Initial Blue Line project. And now, my current duty is monitoring and supervision M&E works of the project consultant for MRT Purple Line project and MRT Blue Line Extension project.

(*****) I am Mechanical Engineer. Before I am working at MRTA, I worked about design air-conditioning of vehicle so I have knowledge about air-conditioning system (Vehicle). Implementation of MRTA, My job responsible M&E system but knowledge is basic of M&E system.

(*****) I'm an electrical engineer in mechanical and electrical system engineering division. Scopes of works are monitoring consultant works including supervision purple line project consultant for M&E and E&M systems.

- (*****) Chief of MRT System Operation Mass Rapid Transit Authority of Thailand To monitoring the Concessionaire to provide for the Design, Manufacture, Supply, Installation, Test, Operate and full support activities for Equipment are set out below and are in accordance with the MRTA's Requirements.
- (*****) I am work in MRTA for 6 year in Engineering Position , Operation Department my job descriptions were to monitoring Concessionaire (BMCL) To operated train operations as performance of the contract.
- (*****) As previous experience in BMCL as station controller: SC. I have been studied in transfer technology program of Operation and maintenance management for 1 year then on duty as SC for 2 years after that on duty as operation officer for 4 years to monitoring BMCL on Operation Department : MRTA that involve with Mechanical Engineering Electrical Engineering and Civil Engineering so I'm got basic of them on railway business.
- (*****) Experience in the past, I have a duty to audit monitoring regulated train services, repair, maintenance and operate system of Chaloem Ratchamongkhon Line Project and also always study in training service and maintenance system. And now I have a duty to supervise, inspection, and repair and maintenance system of the public service which has continued service without interruption and unsafe condition in accordance with standard.
- (*****) Responsible for design, specification and standard works for architectural. Operation and maintenance planning and monitor consultant works

2. Regarding your objectives for this course

Please describe what you most wished to study in this training course.

- (*****) My previous experience is to implement civil work within time and cost as stipulated in the Contracts. I always take information from MRTA operation department as for granted. This is a great opportunity for me to learn know the train operator think? I am quite confident that this knowledge will help me toward my career in the near future.
- (*****) I would like to understand a comprehensive knowledge of train operation planning and management to apply to examine proposal of bidders whether proposed operation plan is suitable for MRTA's requirement.
- (*****) My objective for this course is to know the Japan Train Operation and Management and new technology of Japan Railway System.
- (*****) Even though MRTA have one project in operation, MRTA is still at initial stage for a development of MRT system. An experience and practice of Japan, who is considered one of the most developed countries in a railway and MRT system so I would like to increase MRT technical capability and operation system.

- (*****) Due to MRTA have to develop the mass rapid transit system. Experience and practice of Japan can be used for a railway and MRT system in our country including increase MRT technical capability, practicality in design and operation for MRT system.
- (*****) To know about Train operation and management And modern system of the operation & signalling with provided that allows for the safe operation of a high-density metro train service /the effective operation of a modern rail network. /the various ticket vending and processing equipments as well as entry and exit barriers that travel can only be taken by those in possession of a valid ticket. /operate equipment booking office and data on travel trends and passenger flows.
- (*****) To learning JR organization and how to operated multiple train lines in Japan and how each of company manage train individual.
- (*****) My previous experience is station Controller in BMCL after that I'm monitoring BMCL as regulator on station operation, train operation and Central Control Room follow contract agreement on behalf of Operation Department MRTA and my present job is monitoring reporting, coordinating and controlling of Maintenance concessionaire on Operation Department MRTA so. I need to get acknowledge or new idea to apply for my current job to meet the contract agreement.
- (*****) I expect that the training knowledge can be applied to operation and maintenance system of MRT, useful know-how will be practical work in MRT current line project, and will be improved the functioning system of the new extension line project. (see issue 4 and 5.)
- (*****) Obtain the concept and knowledge of Train Operation Planning & Management [Operation System, Train's Technology, and Professional Management]

3. Regarding your results of this course

a) Have you studied what you mentioned above satisfactorily?

- (*****) Yes
- (*****) Yes
- (*****) Yes
- (*****) Yes
- (*****) Yes
- (*****) Yes ,I have satisfy this course.
- (*****) Yes. the course have many site and many to visited and get the lectures by railway experts.
- (*****) Yes
- (*****) Yes

(*****) Yes

• If “no”, please describe the reasons.

b) Which programs/site visits/issues did you feel helpful and effective to improve the operation of your Railways?

(*****) JR East General Education Center

(*****) All sight visits. Because Japanese urban systems is more advance than in Thailand and I can learn by using facilities in a station and riding trains. So such sight visits are to make me more understanding what is not available in Thailand but what we want to be happen such as common ticket system, through operation, depot sharing, Shinkansen , train simulator, comfortable network, facilities for disabled passengers, commercial development around a station ,etc.

(*****) Site visit at JR East OCC because it's possible combine many OCCs of Bangkok to only one OCC in the future.
JR East General Education Center.

(*****) All site visits.

(*****) All training program in JR East General Education Center.

(*****) Tokyo Metro Co.,Ltd. / site visit to Tsukuba Express (Station ,Depot,OCC)
Tokyo OCC which helpful and effective to improve the operation of my Railways.

(*****) Site visit to Tsukuba Express (Station, Depot OCC) it program show me how Tsukuba Express manage operation train and how to manage in maintenance section that very different method in Thailand because we gave Siemens for maintenance not maintenance by ourselves.

(*****) - JR-E General Education Center program such as vertical separation of railways, through operation service railway equipment, and railway's characteristics and its safety management are very helpful to MRTA to understand new alternative to operate our Railways.

- Site visit on every program on this trip can help to understand the whole picture of JR railway operation such as flow of passenger,

(*****) The training course is very useful and can be actually applied to the work.

(*****) As an architect. All programs have very useful and improve the comprehension of the operation system for me. In addition, I receive the indirect profit from my observation when I use the Japan Railways that is great experience.

4. Regarding your opinion about this course

a) Which issues do you want to study more in detail among the offered course?

- (*****) As in a middle management level, I would like to obtain more discussion with Japan government officers about the overall picture of Japanese railway business especially its business model.
- (*****) - How to manage through operation among operators in all of facets such as revenue sharing, maintenance cost sharing, power utility cost sharing, investment cost sharing, cost sharing of interchange station, cooperation at interchange station etc.
- Structure, responsibility, authorization of a railway regulator.
 - Process, criteria and methodology of bidding to obtain a competent railway operator.
 - Clearing house system of fare revenue
- (*****) Management of the emergency accidents such as disaster prevention, power failure, flood prevention etc.
- Train Operation and Management of Shin kansen.
- (*****) As all structure of Japan Railway system and management model.
- (*****) I would like JICA to explained more details about operation cost and investment cost
- (*****) Tokyo Metro Co.,Ltd. (Station ,Depot,OCC).
- (*****) Miyagino CTC center new-train control system : ATACS
- (*****) - station, train operation and maintenance management controlling on regulator view (follow my present section's job description)
- (*****) I have found that the conceptual methods and maintenance techniques of the Japan railway difference form MRT project such as MRT has only one project and comply with one specify standard, lack of any ideas, concepts and processes in maintenance systems. But from the training I found the simple and effective ways to maintenance systems, so this training course will be useful and actually applied to my job. I would like to propose the interesting issues as follows:
- The maintenance system of the Japan's railway.
 - The maintenance technical such as maintenance plan, quality control.
 - The incident management in case of the system failure, repair procedure, maintenance technique, and the usage of newly repair equipments etc.
- (*****) Station design [Architecture, Concept, Function, Safety, Facility etc.]

b) Please describe your suggestions/recommendations to improve the program.

- (*****) Everything is great so far.
- (*****) The training program is suitable in a short time frame.
- (*****) If JICA can support the document file of all programs/site visits/issues such as company profile and information of the product or the system, it will be better.
- (*****) Train Operation system management get more detail (Overview of Japan

Railway system).

- (*****) I'm appreciated for your training program.
- (*****) The program is excellence to study in this training course but it is too tight the time to see all program and some course could be can take a photo to be knowledge with next generation.
- (*****) This outline of program appropriate for this training and It should be added in the book appear in a program such as the book "Japanese Railway Technology Today" and "the history of train in japan" that I've seen in JR east education center.
- (*****) Everything is very good.
- (*****) The training knowledge from this course is very useful and can be actually applied to the work. However, I recommended JICA to improve in giving more details information in each topic, provide supporting document related to each topic and video presentations. Furthermore in prohibit taking photos area should preparation the document instead because some information will be further to study and technology transfer to the MRTA staff. However I hope that JICA will support and provide training course and technology transfer in other topics to MRT team in the future.
- (*****) Everything is Great.

5. Regarding challenges and your activities to improve Urban Railways in Thailand

a) What kind of issues and problems should be solved to improve the operation and maintenance system in Urban Railways in Thailand? (Please describe in detail)

- (*****) I would like to address Thai's politician mentality toward Railway business. They understand that Railway infrastructure and Roadway infrastructure are alike. That is why they allow us to start civil work construction without knowing how the trains to be operated. Secondly, I also would like to address about Thai's government officer's attitude. They are always afraid to support Private Sector in order to avoid public criticism. However, they seemed to forget that this kind of attitude will discourage private sectors from doing business in Thailand.
- (*****) For the Purple Line Project, the concession scheme is the first PPP Gross Cost in Thailand, this scheme MRTA have to repay all investment cost of Rolling Stock and Railway equipment to the concessionaire according to the concessionaire's proposal. And after opening MRTA have to pay Operation and Maintenance Cost (O&M) to the concessionaire based on performance criteria of the contract agreement.
- But, from the ADB consultant study, operation and maintenance cost of railway companies in Thailand is higher than other countries such as Hong-Kong,

Singapore, China etc.

What things have we to do for reducing the O&M Cost?

(*****) We have no enough knowledge to establish the Railway System factory in Thailand such as Rolling Stock factory, Signaling System factory because the supplier in Japan and Europe do not transfer knowledge enough. If Thailand have own factory, the cost of investment for Railway System will decrease and Thailand can improve the operation and maintenance in Railway System.

(*****) The investment cost of Rolling Stock in Thailand is expensive than other countries.

(*****) In urban railways system, MRTA have to hire the specialist from other country because Thai Engineers have not enough knowledge in these systems.

(*****) Politics that have complicated/ have many department to take responsibility. The system now have 2-3 operators and have not the good feeder to sent passengers to the system.

(*****) Urban Railways in Bangkok of Bangkok is now operated 1 line by concessionaire (BMCL) To operated train operations and ongoing under construction 2 lines that will auction the operator separately that not share with same utility such as depot and not share signaling and track to run in same route.

(*****) Thais don't have acknowledge about railway system much. that mean Thais can't use all function of infrastructure in railway system usefully and Thailand government need to support mass transit business much more than nowadays such as allow to create new line project and support budget like Japan did to their railway system.

(*****) From this training course I have seen the complex railway systems network ,management of railway systems such as the provision of facilities to the passengers, preparation of the train driving simulator, Joint collecting fares, signal management system, how to driver, more than one operators management, organization planning which accommodate to new line project, So I expect that I have a perspective new ideas and experience which will be apply to project under the construction and future project (about 10 lines).

(*****) For MRT that have the large station and entrance, cause very maintenance cost and construction cost including the people's effect from expropriation also.

b) How the above issues and problems can be solved? (Please describe your opinion in detail.)

(*****) Changing the attitude is quite difficult and time consuming work. I always plan to inject the idea of "Doing the right thing" to young generation. When I am in the position that can make policy, I will try to move MRTA to other level

and I hope that I will get full support from them.

(*****) Each railway company should reduce operation and maintenance cost (O&M) by improving a management, enhancing abilities of employees and less depending on foreigner specialists. Furthermore the government should design a concession scheme that is suitable for monitoring a concessionaire in order to the government knows the approximate O&M cost. So when the government has good records of O&M cost, it can reduce burden of financial budget by reasonable payment money to the concessionaire according to the concessionaire's performance, not be cheated by the concessionaire.

(*****) We should setting the condition in the contract that supplier should transfer all technology of the Railway System to Thailand or join with Thailand to establish the Railway System factory.

(*****) Bidding process should be opened to more suppliers to competition for lowering the cost.

(*****) The Supplier should be have technology transfer about rolling stock system to MRTA. However MRTA should be support and promote employees in our organization to concern with urban railways system too.

(*****) The above issues and problems can be solve by to combine or incorporate the department with take responsibility for the Mass Transit as only one department.

(*****) MRTA should be use global spec of signaling or system that can apply or share with the other lines or extension line in the nearest future.

- (*****)
- Promote railway business in Thailand to support social development
 - Design infrastructure and equipment in railway system of MRTA to suitable for Thailand social (easy to use as much as possible) such as ticket vending machine :TVM which passenger can buy the ticket for two or three or more person in one time like Japan TVM , joint together on difference operator in one station or one track that make passenger convenience to travel follow Japanese style
 - Use common ticket and set fare price to motivate passenger to use railway system
 - set up new line of railway to support community or for develop new community
 - set up Education Center like JR East Education Center to develop railway people

(*****) This knowledge and experience is useful for our projects which expected to solve MRT project problems as follows.

- Apply to operation management, systems service, operation control, maintenance solution.
- To build and develop drive simulator in the future, which MRT will start the

installation drive simulator room in year 2015.

- Suggestion the advantages of using depot together and sharing track in case of more operations in order to saving cost.
- Study the possibility of using signaling system in the same track and I will propose to the extension project.
- To suggest and provide the central or federal agency for train staff, provide training standard.
- I will bring this knowledge corporate to the design, improve the construction and installation of facilities in station and train, (preparation of map for the blind, preparation of the information for the deaf, installing the display of information in stations and trains) ,how to design a CCR in case of more than one operation, provide information chart for passengers, design the Ticket vending machines to support multiple lines.

(*****) The design concept is important for this. Because the suitable function and space is effective from the design analysis.

c) What kind of human resource development program do you think your organization needs to improve the operation in Urban Railways in Thailand?

(*****) Since MRTA is not an operator, we are quite lacking of field practice. Without knowing how to actually operate, MRTA can be easily disguised by our operator such as BMCL. In my opinion, learning by doing is the best solution.

(*****) There are rare Thai specialists in this field, especially in M&E equipments and rolling stock. MRTA should establish an education center for training in urban railway system so that urban railway development is sustainable and less depending on foreigner specialists.

(*****) MRTA should set up the knowledge center like JR East General Education Center to improve all of the operation and maintenance in Railway system.

(*****) MRTA should support employees to study in Rolling Stock by practical learning for comprehensive understanding and establish Railway system technical center.

(*****) MRTA should be found the education center for learning and practice which relate with urban railways system in the future.

(*****) The organization needs to improve the operation person in the detail of operation and management: The control centre facility /the Depot /all operating functions with the signaling, communications and SCADA central equipments. A system which provides an overview of the status of all train movements on the network to all operating staff in the control centre. and operating staff.

(*****) Signaling system in detail, that Thailand don't have own knowledge and experience.

- (*****)
- on the job training for new employee on every position
 - joint technology transfer program with concessionaire as much as possible on every position who concern with O&M
 - get training program from developed country like Japan's JICA course we did at least can help to change attitude and point of view then MRTA can use this experience adapt to design for new line , give comment to consultant for design equipment and for monitoring , controlling on concessionaire
- (*****)
- I think the maintenance department staffs should receive more training to perform their duties in the maintenance MRT systems, because MRT had problem in non-staff who has direct experiences in maintenance system and now Chaloem Ratchamongkhon Line has been open for about 8 years the system or structure has a many problem or malfunction more. The solution is made by trial and error as a result of the maintenance of the system delay, system error occur and might has impact to the passenger .Furthermore, I hope JICA will cooperation and organize technology transfer to MRTA in the near future.
- (*****)
- Details in the networks operation. Because in the near future, Thailand have more railway line that some line is overlap as Japan's railway.

Third Training – Responses to the Questionnaires
(SRT : Operation planning and management)
【Training period : January 16-27, 2012】

1. Achievements of training
a) Are objectives fully accomplished?
<ul style="list-style-type: none"> • We could gain useful knowledge about railways
b) Which programs were effective for improving the railway operation and maintenance of your country?
<ul style="list-style-type: none"> • The curriculum focusing on signal maintenance equipment was useful for gaining deeper understanding. • Among visit sites, the following sites were very informative and useful. <ul style="list-style-type: none"> ➤ Tokyo Metro Operation Center ➤ JR East Miyagino Transport District (ATACS) ➤ Tsukuba Express ➤ Research & Development Center
2. Opinions on the training
a) What issues do you want to study more?
<ul style="list-style-type: none"> • We want to take the training on the following issues, which we face as a railway operator, <ul style="list-style-type: none"> ➤ Actions to be taken in the event of accidents (contacts between dispatcher and driver, station safety equipment, dispatch equipment) ➤ Laws and regulations on train operation ➤ National railways reform
b) Suggestions and improvements concerning this training
<ul style="list-style-type: none"> • We want to take the trainings covering more details by lengthening the training period. • The curriculum of the training was satisfactory, for 2 weeks. • The training on the following themes is requested: <ul style="list-style-type: none"> ➤ Lecture on passenger services during peak hours ➤ Track maintenance <p>(*The theme of this training was “operation planning and management”. Above request was from a trainee whose specialty was rail track.)</p>
3. For the advancement of Thai urban railways . . .
a) What needs to be improved in the operation and maintenance of Thai urban railways?
<ul style="list-style-type: none"> • Frequent train delays due to troubles of locomotives • In urban areas with congested roads, some automobiles enter the crossing areas, forcing the trains to stop before the crossing and preventing it from increasing the speed. • Because of poor transport planning, customers choose other modes of transportation. • Aging signal systems
b) What is needed for solving the problems?
<ul style="list-style-type: none"> • Safety education • Change of employees’ consciousness • Laws and regulations concerning train operation, Choice of E&M system • Education on international standards • Introduction of operation safety system such as ATS and ATC
c) What kinds of personnel development program are necessary for SRT ?
<ul style="list-style-type: none"> • High-density train operation technology • Knowledge about natural disasters and the ways how to deal with them

Report on Training Program for the Mass Transport System Project in Bangkok

1. Regarding your engineering abilities:

Please declare your current level of engineering abilities.

- (*****) Budget Planning and Human Resource Development section.
- (*****) My position is traffic controller. I am responsible for controlling and monitoring train operation complying with the safety protocols and punctuality for transportation. In the case of abnormal situation, I have to decide, command and communicate with staff concerned to solve the situation as quickly as possible.
- (*****) I am responsible for traffic inspection, Planning and management with in responsible area in order to achieve the smooth train Operation.
- (*****) I am responsible for controlling and monitoring the trains operated with safety and punctuality.
- (*****) I am an Engineer that operating, controlling and coordinating about the Electrical and Mechanical works (E&M) of the Mass Transit Project (Red Line).
- (*****) I am civil engineer, my current position is Engineer 7 that engineering abilities about prepare document, coordinator, civil engineering work check and other assign by Divisional Engineer.
- (*****) Educated Telecommunication engineering.
Signaling engineering knowledge was transferred by SRT senior signaling.
Design Optic fiber Telecommunication network in SRT for CTC system.
Test and commissioning first CTC in SRT.
Test and commissioning Computer based interlocking more than 50 CBIs.
Training of CBI, CTC, Telecommunication from manufacture.
- (*****) Educated Civil engineering.
Civil engineering knowledge was supervised and manage the track maintenance, bridge and civil work plan in order to solve about railway engineering problems.
- (*****)
- 1) Inspect and supervise the maintenance of railway track, bridge and building infrastructure.
 - 2) Supervise the construction on over - track by contractor and by SRT.
 - 3) Prepare the project schedule and request the annual budget for track, bridge and building works.
 - 4) Manage the activities relate to schedule maintenance of railway track, bridge and building so that the work program as planned.

5) Manage the work force, assist work, supervise and check the quality of the work evaluate the performance of subordinates and perform other duties as assigned by the management.

(*****) I am an Engineer that response in the Electrical and Mechanical works (E&M) of “The Mass Transit System Project in Bangkok (Red Line) Project.”

2. Regarding your objectives for this course

Please describe what you most wished to study in this training course.

(*****) I am mostly interested in operation control center of both railway and subway.

(*****) In the field of traffic control, train safety is firstly important. I wish to study technologies or equipments applied in Japanese Railway network to prevent train accidents effectively.

(*****) My objective is to study the train operation management of Japanese Railway to improve the operation of SRT.

(*****) I wish to study train operation and traffic control in the mass transport system in Japan.

(*****) Studying the successful mass transit system from the original field in order to apply and install them complying with SRT’s new mass transit system.

(*****) State Railway of Thailand (SRT) operates passenger and freight trains every day. Now, SRT has new project “the Mass Transit System in Bangkok (Red Line) project. ” I would like to apply all training course to operate and service for Red Line project.

(*****) Training safety signaling system such as ATS, ATP, ATO, OCC.

Training new CBTC by radio.

Training Hi-speed train.

(*****) Japan is one of the most developed countries where the railway technology is of high standard and this kind of training has proved that it is one the most beneficial training for previous SRT trainees. Therefore I hope that the knowledge and experience gained from this training will be beneficial to myself as well as to SRT.

The topics that I would like to study on this program are...

- Modern technique of Train Operation Management
- Application of high technology equipments for Train Operation Management

(*****) To be trained in this training course will give me a chance to update my knowledge and hopefully seek challenging ideas/concepts of Train Operation Management in order to improve SRT upon return to

Thailand.

(*****) Applying to operate for “The Mass Transit System Project in Bangkok (Red Line) Project”.

3. Regarding your results of this course

a) Have you studied what you mentioned above satisfactorily?

(*****) Yes.,

(*****) Yes, I have.

(*****) Yes.

(*****) Yes.

(*****) Yes, it was a quite perfected program.

(*****) Yes, I am satisfied.

(*****) Yes I have satisfied.

(*****) Yes, I have satisfied because new experience gained from this training will be beneficial to myself as well as to SRT.

(*****) Yes, I very satisfied in the training program. I can get many Knowledge, many new experiences, new friends and know more Japanese traditions.

(*****) Yes.

• If “no”, please describe the reasons.

b) Which programs/site visits/issues did you feel helpful and effective to improve the operation of your Railways?

(*****) The knowledge on Signaling System acquiring through the program will benefit for SRT. especially safety equipment.

(*****) The issue on safety equipment is greatly beneficial for SRT. At present, accidents occur more frequently throughout SRT’s network. It always cause from driver’s inattentiveness by violating the stop signal leading to serious accidents. Moreover, drivers may exceed the speed limits at turnouts, curves or down slope resulting in derailment. The installation of safety device, ATS, STC for example, will effectively prevent the driver from taking the above mentioned action.

(*****) Learning from Train Accident will be helpful and effective to improve the operation of SRT.

(*****) JR East (Tokyo OCC)

(*****) The JR East (Miyagino CTC Center) site visited was the helpful and effective programs that I would like to install this system complying with the conventional line of SRT.

- (*****) I would like to apply sites visit to “Tokyo Metro Co., Ltd.”(OCC) for Red Line project.
- (*****) 1) All OCC that visited have difference idea that can adjust to SRT.
2) The most helpful visited was MIR Co, (Tsukuba Express) this line nearly same scale as SRT project.
- (*****) 1) All site that visited have new technology for high density train safety system.
2) In my job, the most helpful visited was research & development center of JR East Group because the duties of this place nearly same my job.
- (*****) Site visit to “Tokyo Metro Co., Ltd.” That introduct the evolution of the train operation from the past to now. That I get the idea now to choose the suitable gauge of track between standard gauge and meter gauge for the railway in Thailand and I know the system which can help train operation to safety and according on time.
- (*****) Site visit to Tokyo Metro Co., Ltd. (OCC)

4. Regarding your opinion about this course

- a) Which issues do you want to study more in detail among the offered course?
- (*****) I want to study more in detail Control Operation Center (OCC) especially in case of abnormal situation.
- (*****) I would like to study more in the issue of safety devices at station. Because of high-volume passenger at platform, safety equipments to prevent passenger from falling onto the tracks or emergency alarm must be installed.
- (*****) Safety equipment.
- (*****) The operation between train crews and dispatcher in case of emergency is the issue that I want to study more detail.
- (*****) About the railways networking management course that I want to study in more detail.
- (*****) Train operation planning and site visit to “Tokyo Metro Co., Ltd.” (OCC)
- (*****) Law and Regulation of hi speed train.
- (*****) Research & Development about railway track of hi-speed train.
- (*****) Restructuring of the Japanese National Railway.
- (*****) Integrating each Railways System all together.

- b) Please describe your suggestions/recommendations to improve the program.

- (*****) Passenger service at rush how should be contained in the program.
- (*****) An additional topic of train information should be included in the program.
- (*****) Site visit and issues as well as duration of the Program is appropriate.
- (*****) Passenger Service should be also contained in the program.
- (*****) The Railways networking program above I suggested.
- (*****) I am suggesting adding site visit to track maintenance one or two hours.
- (*****) Program was set in the most effective during 10 days.
- (*****) Program was set in the most effective during 10 days.
- (*****) If we have more time to training is better and hope will chosen to training again next time especially on track maintenance training program.
- (*****) Additional the detail of Integrated each Railways System.

5. Regarding challenges and your activities to improve Urban Railways in Thailand

- a) What kind of issues and problems should be solved to improve the operation and maintenance system in Urban Railways in Thailand? (Please describe in detail)
- (*****) Locomotive malfunction occur frequently on the way resulting in train delay.
- (*****) As widely known, traffic jam on road is heavy on peak hour in Bangkok metropolitan area and there are many ground-level railroad crossings throughout Bangkok. Which are a major cause of accidents and delays. Most of trains running in urban area have to stop before approaching level railroad crossings because there are many motorcars still on the railroad crossings. Until level crossing barrier functions, trains can proceed with lower speed permission resulting in train delay.
- (*****) Construction of infrastructure to commute passenger in urban area is not supported continuously by government.
- (*****) Traffic in urban area is mostly operated by staff manual resulting in the higher risk of accidents.
- (*****) The low quality services such as timetables, fares, service, etc. could not reflect to the local condition.
- (*****) SRT has not been integrated control center system such as rolling stock management, facilities and equipment management, traffic control and so on. The capacity is not fully well that I would like to issue integrated control center system.
- (*****) 1) Law and Regulation
2) Selection of E&M system

3) Training

- (*****) 1) Law and Regulation
- (*****) 2) Technology, Machine and Tools
- (*****) Signaling system that used now in Thailand very old and must usually have the problem by human error that cause train delay and use much costs to maintenance.
- (*****) Now, Railway in Thailand quite delays because traffic planning is not good. Affect to people choose another public transportation.

b) How the above issues and problems can be solved? (Please describe your opinion in detail.)

- (*****) Thai Government supports the huge budget to purchase new Locomotives or to carry out Locomotive refurbishment.
- (*****) Ground-level railroad crossings throughout urban area should be completely eliminated by employing tunnels, overpasses, and bridges along the entire line.
- (*****) Thai government should be more focus on urban railway transportation in order to relieve road traffic jam.
- (*****) Safety equipments should be installed completely to prevent accidents caused by human error.
- (*****) The safety and punctuality were the first priority must be improved. After that high frequency, high speed and high capacity maybe considered later.
- (*****) In my opinion, I would like to integrated control center system for Red Line project first, and after that implementation to other railway line.
- (*****) All 3 items can be controlled with international standard.
- (*****) All of them can be controlled with international standard.
- (*****) We can use the systems such as ATC and ATS to help train operation system can set a safe distance between trains in optimistic headway and according on time on lower costs for maintenance works.
- (*****) Improving traffic planning that now, SRT expanding double track. If All over the country has double track, railway transportation will be better.

c) What kind of human resource development program do you think your organization needs to improve the operation in Urban Railways in Thailand?

- (*****) In my opinion, rolling stock management is required.
- (*****) The topic of Railway “Passenger service” is needed to improve the

operation of SRT in urban area. To meet passenger satisfaction, the following improvements should be carry out : seat reservation system, barrier-free access, railway information, automatic fare collection system and etc.

- (*****) “Rolling Stock Management” is needed to improve the operation of SRT.
- (*****) The theme of service quality improvement is required for SRT’s Operation.
- (*****) The program that integrated and combined either the equipments or the systems all together to be a network railways system complying and reflecting to the local condition.
- (*****) Integrated control center system program.
- (*****) Training program for High-density train operation.
- (*****) Training program for High-density train operation.
- (*****) Natural Disaster Prevention program such as heavy rain and flood that make me we can operate the train when Natural Disaster occurs. Because at now we do not have a plan to prevent the when natural Disaster occur we can not operate the train.
- (*****) The program that integrated and combined either the equipments or the system all together to be a network railways system complying and reflecting to the local condition.