

**ROAD DEVELOPMENT AUTHORITY
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**

**PREPARATORY SURVEY
ON THE PROJECT
FOR THE DEVELOPMENT OF
INTELLIGENT TRANSPORT SYSTEM
FOR EXPRESSWAYS
IN SRI LANKA**

FINAL REPORT

APRIL 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

**ORIENTAL CONSULTANTS CO., LTD.
EAST NIPPON EXPRESSWAY COMPANY LIMITED**

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to the consultant (consist of Oriental Consultants Co., Ltd. and East Nippon Expressway Company Limited.).

The survey team held a series of discussions with the officials concerned of the Government of Sri Lanka, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their close cooperation extended to the survey team.

April, 2013

Kazunori Miura
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

SUMMARY

1. Outline of the Country

The Government of the Democratic Socialist Republic of Sri Lanka (hereinafter referred to as “Sri Lanka”) is located on the south side of Palk Strait southeast of the Indian peninsula. Sri Lanka is a republic and had a population of approximately 20.28 million in 2002 and an area of 65.6 thousand km², which is 80 % of the area of Hokkaido in Japan.

The western and southern provinces where the project site is located with over 1,875mm of annual rainfall are categorized as a humid zone. The rainy seasons occur twice a year, from April to May and from October to November and the lightning often causes damage. The average annual temperature is 27-28 degrees Celsius. The low-rainfall season is from November to March due to the North-east Monsoon.

According to the statistic of the International Monetary Fund (IMF), the gross domestic product (GDP) in 2011 was US\$52.5 billion, which is equivalent to the economic scale of Kagoshima prefecture in Japan. GDP per capita is US\$2,558 which is equivalent to 25% of the average GDP per capita of World. According to the data in 2011 by Asian development bank (ADB), 5.66 million people, which is approximately 25 % of the citizens, are living on less than 2 dollars a day.

Agriculture and textile are the country’s main industries. The main agricultural products are rice, tea, coconuts and natural rubber etc. Garments are the top export because the textile industry has recently developed rapidly in connection with industrialization. Sri Lanka is called the Jewellery Island” and is famous for its ruby and sapphire producing districts.

Although the tsunami caused by the Sumatra earthquake in 2004 cost over 30 thousand lives and devastated the economy of the country, Sri Lanka has achieved full recovery in cooperation with foreign support. Furthermore, after the end of the conflict between the government and the Liberation Tigers of Tamil Eelam (LTTE), the number of tourists in 2011 was more than 850 thousand people which are equivalent to twice of the previous year. Sri Lanka’s annual economic growth rate is expected to be more than 8% in 2012 and to continue at a similar rate due to large scale infrastructure development and strong growth of the tourism sector.

2. Background and Outline of the Project

In Sri Lanka, the road transport provides 90% of surface transportation for passengers and cargo, and it functions prominently in the socio economic activities. The number of private vehicles increases 5.7% per year (large-size car 5.6%) backed by the steady economic growth of Sri Lanka in the recent years. In the major urban areas like Colombo, traffic congestion occurs frequently and it is expected to become worse.

Under such condition, the Southern Expressway (hereinafter referred to as “SEW”) was constructed by yen loan as the first expressway in Sri Lanka, and the service of the section between Colombo and Galle (approx. 96km length, 4 lanes) was commenced in November 2011. In addition, capacity building of expressway operation and maintenance such as toll collection, traffic control and maintenance has been enhanced through the project for supporting facilities of yen loan projects. The achievement of the development of the supporting facilities are confirmed for the activities like toll correction, emergency response to traffic accidents, maintenance work and road cleaning works. The Outer Circular Highway (hereinafter referred to as “OCH”) which connects directly to the SEW and the Colombo Katunayake expressway connecting between Colombo and Bandaranaike International Airport (hereinafter referred to as “CKE”) which connects indirectly to the SEW, is currently under construction. It is forecast that traffic volume of SEW will increase rapidly after opening of those expressways. In addition, occurrence of traffic congestion and lane closure or full closure is estimated to increase due to incident clearing activities. Since there is no traffic information disseminating method in the current SEW, worse traffic congestion and secondary accidents due to the original accident are a concern.

In the existing systems of SEW that were installed for handling the rapidly growing traffic demand, there are some systems such as a special telephone number (#1969) or Closed Circuit TV (herein after referred to as “CCTV”) monitoring system that have been introduced. The special calls are routed to the Gelanigama traffic control centre and the operator of the centre is able to collect and confirm the information and respond to it. As for the CCTV monitoring system, the CCTV cameras are installed at the through lane near the interchanges and the toll booths of the interchanges, thereby, the operator in Gelanigama Traffic Control Centre can monitor the traffic condition around the CCTV camera. However even with existing system, due to the impossibility of counting the traffic volume on a real time basis and because there is no way to disseminate traffic information to the drivers on the expressway, it has become an issue for the expressway operation to not be able to provide proper traffic information to the users of the expressway as mentioned above.

In addition, it is impossible to forecast the adverse effects when an incident occurs since real time basis traffic volume is not counted currently. In order to improve the existing conditions, a traffic control system such as precise traffic counting, decision making on traffic control on the basis of traffic information such as traffic volume between interchanges to be obtained when an incident occurs, rapid dissemination of the traffic control to the drivers on the through lane of the expressway and on the major access roads and so on essentially must be developed.

Since there is no traffic control operator now, it is also required to train such expert.

Based on the current conditions mentioned above, JICA has provided a technical cooperation project on expressway operation and management and training in the yen loan project on expressway operation and management in order to comprehensively strengthen the operation and management capability of the expressways. Several trainees were invited to Japan through those projects, and were trained in basic know how on operation, traffic control, and maintenance related

to ITS for the expressways.

Consequently, it is expected that smooth traffic on the expressways will be realized by provision of necessary information for the drivers on the expressways through the introduction of traffic control related equipment to be procured under this Project.

3. Result of Preparatory Survey and Outline of the Project

In response to the request from the Government of Sri Lanka, the Government of Japan made a decision to conduct a preparatory survey for which Japan International Cooperation Agency (hereinafter referred to as JICA) mobilized a study team to Sri Lanka from September 2 to November 2, 2012. The team discussed the Project with the Ministry of Ports and Highways (hereinafter referred to as “MOPH”, the Road Development Authority (hereinafter referred to as “RDA”), and the Ministry of Finance and Planning, and confirmed the components of the request, executed site surveys, and studied the needed equipment and the corresponding operation/maintenance procedures. The results of the preparatory survey conducted in Japan are summarized in the Draft Final Report, and a team for the explanation of the Report was sent to Sri Lanka from December 11 to 22, 2012.

Based on the results of the field survey and discussions, the purpose of the Project is to introduce traffic control system (ITS) technology in the expressways and its access roads so as to provide incident information on the expressways and deliver information to the road users. In addition, after collection of information from the expressway, in order to minimize the influence caused by road closure or congestion due to an incident or event, rapid and precise analysis of the event and the traffic is essentially required for proper traffic information provision. For that purpose, Japan’s Grant Aid will procure a traffic control system which consists of roadside equipment, equipment in the control centre, and a communication system to operate between the roadside equipment and the equipment in the control centre for the SEW and a part of its access roads and a part of the access road of an interchange of OCH.

Major equipment components procured in the Project are summarized in the table below:

Table 1 Major Equipment

Project		Category	Major Equipment	Amount
Scheme of the Project	By Japanese Grant	Traffic control system	Traffic control room: Servers, Workstations, Wall Map	1 set
			Roadside: Rain gauges, traffic counters, VMS	8 Nos., 32 Nos. 16 Nos.
			Service Area: Traffic information board	2 Nos.
			Access road: VMS	8 Nos.
	Prepared by Sri Lankan side	Traffic control room: Web Server	1 set	
		Traffic information provision (from RDA office, Traffic police)	1 set	
		Promotional activities to the general public	1 set	
Operation	Maintenance	Newly installed ITS equipment	1 set	

4. Project Implementation Schedule

The required duration for the implementation of the Project is 3.5 months for detailed design, and 10.5 months for procurement.

5. Project Evaluation

(1) Relevance of the project

1) Beneficiaries of the project

The beneficiaries of the project are the 7,000 cars per day on the section of the road and the persons in the cars. In addition, 5.02 million inhabitants in the western and southern province receive benefit in an indirect sense.

2) Objective of the Project

The objective of the project is to introduce a traffic control system which is capable of gathering information and providing accurate information to users on the expressway and access road in order to minimize the adverse effect of road closure and traffic congestion caused by an incident. This contributes to improve the livelihood of the local residents and community development in addition to reduction of traffic accidents and contribute to ensure smooth traffic on the expressway.

3) Consistency of the government of Sri Lanka's road network development plan

The "Vision for the Future" formulated by the government of Sri Lanka in 2010 says the slow pace of road network development and transportation system development impede the unity of the nation and bring political uncertainty. The "Vision for the Future" plans to improve the road network from 2010 to 2020. This will contribute to improve mobility and access, reduce travel time and maintenance cost, and further economic growth. Therefore, the project is consistent with the government of Sri Lanka's policy.

4) Consistency of Japan's foreign assistance policy

The traffic control system to be procured by the project is based on the advanced technologies of Japan. It coincides with Japanese economic strategies for Asian countries which utilize the excellent technologies and experiences of Japan through assistance for development of infrastructure utilization of the scheme of integrated infrastructure systems.

(2) Project effect

1) Expected quantitative effect

Table 2 Expected quantitative effect

Indicator	Present (Year 2012)	Target time ^{*2} (Year 2017)
Time required for information provision to users after occurrence of an incident	30 minutes ^{*1}	5 minutes

^{*1} Maximum time required for the following actions:

- The Vehicle with VMS at the vehicle standby office goes to the site of an incident(in this case, the site is the place farthest from the vehicle standby office)
- The Vehicle with VMS grasps and reports the situation to the traffic control centre
- The traffic control centre provides information to the users

^{*2} Three years after the project completion

2) Expected qualitative effect

- (i) To promote installation of ITS equipment utilizing Japanese advanced technologies on the expressways under construction.
- (ii) To improve convenience regarding expressways such as choice of optimum route and expectation of arrival time by traffic information provision
- (iii) To improve the safety of driving on the expressways by provision of information about traffic congestion, remaining obstacles, and bad weather.

Consequently it is concluded that implementation of the Project is appropriate and effectiveness of the Project is expected.

Table of Contents

Preface

Summary

Contents

Location Map/Perspective/ Existing Conditions

List of Figures & Tables

Abbreviations

Chapter 1 Background of the Project

1-1	Background of the Project.....	1-1
1-2	Natural Conditions	1-2
1-3	Environmental and Social Conditions.....	1-2

Chapter 2 Outline Design of the Japanese Assistance

2-1	Basic Concept of the Project.....	2-1
2-1-1	Overall Goal and Target of the Project	2-1
2-1-2	Outline of the Project.....	2-1
2-2	Outline Design of the Japanese Assistance	2-2
2-2-1	Design Policy.....	2-2
2-2-1-1	Basic Concept	2-2
2-2-1-2	Natural Condition Policy	2-6
2-2-1-3	Social Policy	2-9
2-2-1-4	Construction and Procurement Policy.....	2-9
2-2-1-5	Local Contractor Policy	2-10
2-2-1-6	Operation & Maintenance Policy.....	2-10
2-2-1-7	Facility Grade Setting Policy	2-12
2-2-1-8	Construction Methodology & Scheduling Policy	2-12
2-2-2	Basic Plan	2-12
2-2-2-1	Overall Plan	2-12
2-2-2-2	Equipment Plan.....	2-21
2-2-3	Outline Design Drawings	2-24
2-2-4	Implementation Plan.....	2-34
2-2-4-1	Implementation Policy	2-34
2-2-4-2	Implementation Conditions.....	2-36
2-2-4-3	Scope of Works	2-36
2-2-4-4	Consultant Supervision	2-37
2-2-4-5	Quality Control Plan	2-38

2-2-4-6	Procurement Plan	2-38
2-2-4-7	Operation Guidance Plan	2-39
2-2-4-8	Implementation Schedule.....	2-41
2-3	Obligations of Recipient Country	2-41
2-4	Project Operation Plan	2-44
2-4-1	Operation & Maintenance Organization.....	2-44
2-4-2	Maintenance of the System	2-46
2-5	Project Cost Estimation.....	2-46
2-5-1	Initial Cost Estimation	2-46
2-5-2	Operation & Maintenance Cost	2-47

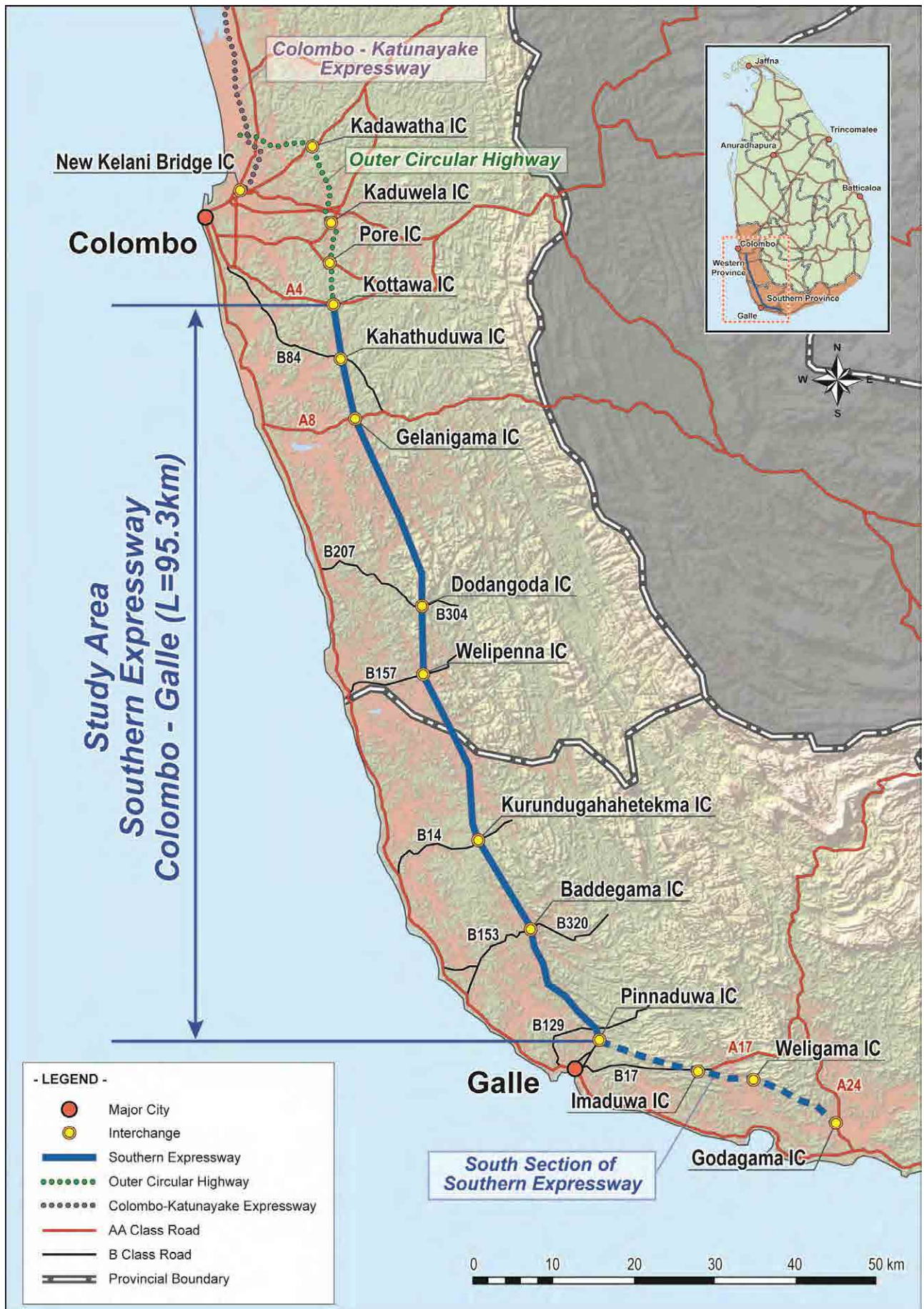
Chapter 3 Project Evaluation

3-1	Preconditions.....	3-1
3-2	Necessary Inputs by Recipient Country	3-1
3-3	Important Assumption.....	3-2
3-4	Project Evaluation	3-2
3-4-1	Relevance	3-2
3-4-2	Effectiveness.....	3-3

Appendix

1.	Member List of the Survey Team	A-1
2.	Study Schedule	A-2
3.	List of Parties Concerned in the Recipient Country	A-4
4.	Minutes of Discussion	A-5
5.	Technical Note	A-32
6.	Traffic Volume.....	A-39
7.	Drawings	A-40

Location Map





PERSPECTIVE / SOUTHERN EXPRESSWAY Variable Message Sign Board

Existing Conditions



Gelanigama Traffic Control Center



Monitors in GelanigamaTraffic Control Room



Existing Servers in Traffic Control Center



Cable Rack for Existing Optical Fiber Cable



Back Side of Monitor Display



Recovery work for Spine out vehicle due to rain fall



Ambulance rushing to incident site



Patrolling Vehicle with VMS



Maintenance work in through lane of Expressway



Existing CCTV Camera



CCTV Monitoring System in Toll Office



Welipenna Toll Office



Back up Engine Generator in Toll Office
(Temporary Equipment)



A4 Road Traffic Condition
(Colombo – Kottawa IC)



A4 Road Traffic Condition
(Colombo – Kottawa IC)

List of Figures & Tables

Chapter 2

Figure 2-2-1	Precipitation Distribution of each season in Sri Lanka	2-7
Figure 2-2-2	Function of Traffic Control System.....	2-13
Figure 2-2-3	Configuration of Traffic Control System.....	2-15
Figure 2-2-4	Typical Roadside Equipment Layout at a Diamond Interchange	2-18
Figure 2-2-5	The layout plan for roadside equipment	2-19
Figure 2-2-6	Road side equipment layout plan (Kottawa IC)	2-24
Figure 2-2-7	Road side equipment layout plan (Kahatuduwa IC).....	2-25
Figure 2-2-8	Road side equipment layout plan (Gelanigama IC).....	2-26
Figure 2-2-9	Road side equipment layout plan (Dodangoda IC).....	2-27
Figure 2-2-10	Road side equipment layout plan (Welipenna IC).....	2-28
Figure 2-2-11	Road side equipment layout plan (Kurundugaahahetekuma IC)	2-29
Figure 2-2-12	Road side equipment layout plan (Baddegama IC)	2-30
Figure 2-2-13	Road side equipment layout plan (Pinnaduwa IC)	2-31
Figure 2-2-14	Road side equipment layout plan (Service Area)	2-32
Figure 2-2-15	Road side equipment layout plan (Kaduwela IC).....	2-33
Figure 2-2-16	Project Implementation Framework	2-34
Figure 2-2-17	Project Implementation Schedule.....	2-41
Figure 2-4-1	Organization Chart of EOM&M.....	2-44
Figure 2-4-2	Organization Chart of EOM&M Traffic Section.....	2-45
Table 2-1-1	Major Equipment.....	2-2
Table 2-2-1	Basic Concept of Traffic Information.....	2-4
Table 2-2-2	Number of Days Lightning Observed in 2011.....	2-8
Table 2-2-3	Configuration of System.....	2-14
Table 2-2-4	Deployment Standards for Roadside Equipment.....	2-16
Table 2-2-5	Equipment for Information Provision.....	2-22
Table 2-2-6	Equipment for Information Collection	2-22
Table 2-2-7	Equipment for Traffic Control Centre	2-23
Table 2-2-8	Equipment for Communication System	2-23
Table 2-2-9	Demarcation of Works.....	2-37
Table 2-2-10	Initial Operation Guidance for the Traffic Control System	2-40
Table 2-4-1	Composition of CCTV Surveillance Team	2-45
Table 2-4-2	Contents of Maintenance Manual (Tentative)	2-46

Chapter 3

Table 3-4-1	Expected quantitative effect	3-3
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[Photos]

Chapter 2

Photo 2-2-1 Land Slide Site at SEW42.5km East side..... 2-7

Abbreviations

A/P	Authorization to Pay
B/A	Banking Arrangements
CCTV (camera)	Closed Circuit Television (camera)
CKE	Colombo Katunayake Expressway
DL	Data logger
E/N	Exchange of Note
EOM & M	Expressway Operation Maintenance & Management Division
ETC	Electronic Toll Collection
FW	Fire Wall
G/A	Grant Agreement
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
HD	Hard Disk
IC	Interchange
IC Card	Integrated Circuit Card
IMF	International Monetary Fund
IP	Internet Protocol
ITS	Intelligent Transport System
JICA	Japan International Cooperation Agency
L2SW	Layer 2 Switch
L3SW	Layer 3 Switch
LED	Light Emitting Diode
LTTE	Liberation Tigers of Tamil Eelam
MC	Media Converter
MOPH	Ministry of Port and Highway
NBT	National Building Tax
NMS	Network Management System
OCH	Outer Circular Highway
OFC	Optical Fiber Cable
PC	Personal Computer
PTZ (camera)	Pan Tilt and Zoom (camera)
RDA	Road Development Authority
RFID (tag)	Radio Frequency IDentification
RG	Rain Gage
SEW	Southern Expressway
SMS	Short Message Service
STEP	Special Terms for Economic Partnership
TC	Traffic Counter
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol (TCP) Internet Protocol (IP)
VAT	Value Added Tax
VMS	Variable Message Sign Board
WS	Workstation

Chapter 1 Background of the Project

1-1 Background of the Project

In Sri Lanka, the road transport provides 90% of surface transportation for passengers and cargo, and it features prominently in the socio economic activities. The number of private vehicle increases 5.7% per year (large-size car 5.6%) backed by the steady economic growth of Sri Lanka in the recent years. In the major urban areas like Colombo, traffic congestion occurs frequently and it is expected to become worse.

Under such condition, the Southern Expressway (hereinafter referred to as “SEW”) was constructed by yen loan as the first expressway in Sri Lanka, and the service of the section between Colombo and Galle (approx. 96km length, 4 lanes) was commenced in November 2011. In addition, capacity building for expressway operation and maintenance such as toll collection, traffic control and maintenance has been enhanced through the project for supporting facilities of yen loan projects. The achievement of the development of the supporting facilities are confirmed for the activities like toll correction, emergency response to traffic accidents, maintenance work and road cleaning works. The Outer Colombo Highway (hereinafter referred to as “OCH”) which connects directly to the SEW and the Colombo Katunayake expressway connecting between Colombo and Bandaranaike International Airport (hereinafter referred to as “CKE”) which connects indirectly to the SEW, is under construction. It is forecast that the traffic volume on SEW will increase rapidly after opening of those expressways. In addition, occurrence of traffic congestion and lane closure or full closure is expected to increase due to incident clearing activities. Since there is no traffic information disseminating method in the current SEW, worse traffic congestion and secondary accidents due to the original accident are a concern.

In the existing system of SEW installed for handling the rapidly growing traffic demand, some systems such as a special telephone number (#1969) or Closed Circuit TV (herein after referred to as “CCTV”) monitoring system have been introduced. The special calls are routed to the Gelanigama traffic control centre and the operator of the centre is able to collect and confirm information, and respond to it. As for the CCTV monitoring system, the CCTV cameras are installed at the through lanes near the interchanges and toll booths of the interchanges, thereby the operator in the Gelanigama Traffic Control Centre can monitor the traffic condition around the CCTV camera. However, even with the existing system, due to the impossibility of counting traffic volume on a real time basis and because there is no way to disseminate traffic information to the drivers on the expressway, it has become an issue for the expressway operation to not be able to provide proper traffic information to the users of the expressway as mentioned above.

In addition, it is impossible to forecast the adverse effects when an incident occurs since real time traffic volume is not counted currently. In order to improve the existing conditions, a traffic control system such as precise traffic counting, decision making on traffic control based on traffic

information obtained when an incident occurs, rapid dissemination of the traffic control and so on must be developed. Since there is no traffic control operator now, it is also required to train such expert.

Based on the current conditions mentioned above, JICA has provided a technical cooperation project on expressway operation and management and training in the yen loan project on expressway operation and management in order to comprehensively strengthen the operation and management capability of the expressways. Several trainees were invited to Japan through those projects, and were trained in basic know how on operation, traffic control, and maintenance related to ITS for the expressways.

Consequently, it is expected that smooth traffic on the expressways will be realized by provision of necessary information for the drivers on the expressways through the introduction of traffic control related equipment to be procured under this Project.

1-2 Natural Conditions

In the objective areas of the Project in the south west area of Sri Lanka, one concern regarding the natural conditions for the expressway users is the adverse effect of precipitation. However, it has very little influence on the installation work for the traffic control related equipment since most of the rainfall stops within a few hours. Other meteorological observation elements such as wind or fog are not so severe for the expressway users, and there is no area that will experience lower than freezing temperatures. Therefore, it is not required to consider the countermeasures for those weather elements.

It is noted that lightning or lightning surge does not directly influence the drivers. However, it may influence the equipment to be installed in the Project. Therefore, necessary counter measures should be considered.

1-3 Environmental and Social Conditions

As for the environmental impact assessment (EIA), it is not required for the Project since the components of the project are related to the installation of equipment, and this is confirmed in the minutes of discussion dated September 10, 2012.

Chapter 2 Outline Design of the Japanese Assistance

2-1 Basic Concept of the Project

2-1-1 Overall Goal and Target of the Project

(1) Overall Goal

The Government of the Democratic Socialist Republic of Sri Lanka (hereinafter referred to as “Sri Lanka”) has considered development of the road network and improvement of the transport system in the “Vision of the Future” established in 2010 as below;

- To enhance the unity of the nation, and
- To enhance governmental stability

The Government of Sri Lanka had set the goals to improve the road network using the latest technology from year 2010 to year 2020, to achieve the serviceability of mobility and access to the objective roads, to reduce travel time and operation cost, and to contribute to the future economic development.

As a link with the foresaid overall goals, the Southern Expressway (herein after referred to as “the SEW”) is planned to reduce the travel time from Colombo to the southern province, to improve the national economy, and to increase the promotion and working opportunity of fishery and agriculture and the expansion of tourism facilities. It was opened on 11 November 2011 between Kottawa and Pinnadiwa interchanges that is close to Colombo and Galle respectively.

In addition, Outer Circular Highway (hereinafter referred to as “OCH”) was planned to reduce the travel time among growth centre close to surrounding areas of Colombo and to encourage development for those areas. OCH is under construction now.

(2) Target of the Project

In order to achieve the above overall goals, the purpose of the Project for Development of an Intelligent Transport System for the Expressway Network in Sri Lanka (hereinafter referred to as “the Project”) is to minimize road closures and traffic congestion on OCH and SEW due to accidents on the expressway, to gather prompt information regarding the expressway and to develop an intelligent transport system (hereinafter referred to as “the ITS”) on the expressway to provide the exact information to the drivers on expressway and to the drivers en route to the expressway. As for OCH, progress on the construction of the through lanes and interchanges is considered and the objective area of this project is limited to a part of the access road of the interchanges.

2-1-2 Outline of the Project

In order to achieve the above mentioned target, the Project aims to procure roadside equipment,

traffic control systems and communication systems as the ITS on the OCH, the SEW and other access roads approaching the OCH and the SEW.

Through this Project, the ITS of the OCH and the SEW is expected to provide exact information regarding the expressway to the drivers on the expressway, drivers en route to the expressway and pre-trip drivers. And furthermore, the ITS is expected to contribute to the serviceability and increase safety on the expressway.

In this context, roadside equipment such as weather monitors, traffic counters, variable message sign boards (hereinafter referred to as “VMS”), traffic control equipment and its software and communication systems will be procured. And furthermore, servers and workstations, and a wall map of the project will be installed at the Gelanigama traffic control centre.

The major equipment in the ITS for the Project is shown in Table 2-1-1.

Table 2-1-1 Major Equipment

Project		Category	Major Equipment	Amount
Scheme of the Project	By Japanese Grant	Traffic control system	Traffic control room: Servers, Workstations, Wall Map	1 set
			Roadside: Rain gauges, traffic counters, VMS	8 Nos., 32 Nos. 16 Nos.
			Service Area: Traffic information board	2 Nos.
			Access road: VMS	8 Nos.
Prepared by Sri Lankan side		Traffic control room: Web Server	1 set	
		Traffic information provision (from RDA office, Traffic police)	1 set	
		Promotional activities to the general public	1 set	
Operation		Maintenance	Newly installed ITS equipment	1 set

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Concept

(1) Scope of Cooperation

The Expressways in Sri Lanka are constructed as high grade roads dedicated only for vehicles and they are equipped with full access controlled conditions and are accessible through interchanges constructed in specific locations. The merit for the users of the expressways is not only reducing travel time but also the safety and convenience for the users. Otherwise, it would be a difficult road to utilize since there is no diversion for the driver when he needs it.

In order to secure safety and convenience on the expressway, it is required to provide the relevant traffic information for the expressway users to make a timely decision whether he or she would use the expressway or divert to the national highway from the expressway.

After the opening of the Southern Expressway, the traffic volume has increased, and in the weekends, the traffic congestion occurs at the exit of Kottawa interchange; the current terminal of the Colombo side and at the Pinnaduwa interchange; the current terminal near Galle. Severe traffic congestion with traffic backed up for more than 5km has occurred several times in the past, and Kottawa – Kahatuduwa was required to close due to severe traffic congestion. In addition, there were nose to tail collisions at the end of the queue of the congestion.

In the past one year since the opening of Southern Expressway, there have been 510 traffic accidents and two lanes of the expressway had been closed twice due to severe traffic accidents. In another case, an incidental traffic accident happened at the site of the first accident.

The current and forecast traffic volume of the Southern Expressway is shown in the Appendix. Since it is obvious that there will be an increase in the traffic volume of the Southern Expressway after connection with OCH, it is required to improve the existing condition wherein there is no information provision for the drivers on the expressway regarding accidents or congestion.

On the other hand, the Southern Expressway is constructed in the region with great deal of precipitation in Sri Lanka. During heavy rain fall, serious accidents have occurred. In November 2012, a large-scale landslide occurred due to continuous heavy rain at the 42km point. At that time, two lanes were closed and another side was also affected. The traffic control centre of RDA had received inquiries from drivers or users on the expressway during heavy rain.

In order to improve the existing issues regarding traffic accidents and congestion of the Southern Expressway, and also to minimize the impact of closures or congestion of the expressway, necessary timely information provision for the drivers on the expressway is essential so the drivers can judge by themselves whether to drive on the expressway or exit at the nearest interchange and drive on the highway as a diversion route when some incident or event happens.

For providing proper information to the drivers on the expressway, traffic conditions on the expressway should be collected on a real time basis, and traffic control functions which assist the traffic control officer of RDA to make a decision regarding providing information or regulation properly is required in order to minimize the impact of incidents or congestion on the expressway.

There are the following two types of information to be collected for the different types of roads and that information is to be utilized for the expressway users.

- Information related to the expressway
- Information related to the highway

On the other hand, the recipients of the information are categorized into the following three types;

- Drivers on the expressway
- Drivers en route to the expressway that are driving on the highway
- Pre-trip drivers that intend to use the expressway

The basic concept of the mentioned information collection and provision is summarized in the table shown below;

Table 2-2-1 Basic Concept of Traffic Information

	Information Collection	Information Provision		
		Drivers on Expressway	Drivers en route to the expressway that are still driving on the Highway	Pre-trip drivers that intend to use the expressway
Expressway	<ul style="list-style-type: none"> • Traffic information • Rain Fall 	Traffic information regarding the expressway is provided to driving drivers on the expressway	Traffic information regarding the expressway is provided to drivers on the highway that are heading for the expressway	Traffic information regarding the expressway is provided to drivers before a trip
Highway	<ul style="list-style-type: none"> • Traffic Information 	Traffic information regarding the highway is provided to drivers on the expressway	/	

The scope of the cooperation for the project will be decided upon by taking into account its validity and necessity as a grant aid project.

Now JICA is implementing a study titled “Urban Transport System Development Project for Colombo Metropolitan Region and Suburbs (ComTrans Project; August 2012 – June 2014)”. The current issue of traffic congestion in the Colombo urban area and its countermeasures will be discussed in this study. As for the parts shown in the diagonal line of the Table 2-2-1 (The part of traffic information regarding the highway that is provided to the drivers en route to the expressway and pre-trip drivers), they are highly related to this study. Therefore these parts are excluded from the scope of cooperation of the grant aid project. On the other hand, the highlighted part of table 2-2-1 is valid as a grant aid project since those items can contribute to minimize the impact to smooth traffic flow on the expressway caused by traffic accidents, traffic congestion and natural disasters like landslides along the through lane of the expressway. In addition, by providing proper information on a real time basis, it is possible to contribute to avoid the incidental traffic accidents which happen due to the first accident and also it is possible to prevent casualties and property damage caused by such accidents. Therefore the scope of cooperation of the grant aid project includes the highlighted parts in table 2-2-1. The objective expressway in this project is SEW and a part of the access roads approaching the SEW, a part of the access roads of the interchanges of the OCH, and the traffic control centre in Gelanigama. Necessary equipment is to be procured and installed in the objective areas.

As for the traffic information collection from the highway, it is difficult to justify needs and relevance of the equipment procurement to such sites, since there are many alternative diversion routes and there is no definition of congestion in Sri Lanka. It has been decided to utilize the traffic information from the personnel of RDA and traffic police for the highway which was suggested by the Sri Lankan side.

(2) Policy for selection of sites

Based on the above item (1) Basic Concept (Scope of Cooperation), the sites are selected based on the following criteria.

1) Necessity of Information Provision

As for the expressway section Kottawa – Pinnaduwa, which is now in operation, the information provision is important for the drivers on the expressway so as to judge whether the driver continues to drive on the expressway or diverts to the highway. Therefore the objective sites are the areas surrounding interchanges, but do not cover the entire through lanes in between different interchanges.

The Southern Expressway is accessible only from interchanges. Therefore, information regarding the expressway traffic condition is required to be provided for the drivers on the highway heading for the expressway to judge whether the driver continues to drive on the highway or use the expressway. Hence, the objective sites include required access roads also taking current traffic volume into account.

2) Suitability as equipment location

The clearance between roadside equipment and the vehicle passage should be considered for the expressway and access roads. In addition, the existing facilities of the expressway or highway should not be obstacles for the function of the equipment to be introduced, and there should be enough space for equipment installation.

3) Ease of maintenance

The equipment to be installed will be maintained periodically. Therefore, there should not be any obstruction for the maintenance work.

(3) Policy on basic framework of scope of work of the project

The recipients of the information by using the equipment to be provided by the project are shown as follows as it is mentioned in the above item (1) Basic Concept (Scope of Cooperation).

- i) Drivers on the expressway
- ii) The drivers on the highway heading for the expressway
- iii) Pre-trip drivers that intend to use the expressway

As for the recipients of i), when a traffic accident or other incident/event happens, it is necessary for the drivers on the expressway to be provided with related information. Therefore the required equipment is planned to be introduced.

On the other hand, for the recipients ii) and iii), it is difficult to provide necessary information to all expressway users whenever and wherever it is required for each user. In this project, it is

planned to secure the condition that individual users can select either the expressway or highway at least, and it is considered to utilize existing broadcasting and telecommunication services so that the users can receive necessary information wherever the users are.

In addition, information related to traffic is obtained from the expressway or highway as shown in item (1) Basic Concept (Scope of Cooperation). It is planned to introduce equipment components in necessary locations as well as using existing equipment components and systems.

2-2-1-2 Natural Condition Policy

The natural conditions of the south west area in Sri Lanka between Colombo and Galle are shown as follows; The countermeasure against individual conditions are also shown.

(1) Temperature

The lowest temperature in Colombo and Galle is approx. 23 °C in December; therefore there will be no concern regarding ice on the road. As for introducing the equipment, anti-freezing countermeasures are not required. On the other hand, the highest temperature in Colombo and Galle is approx. 32°C in March. The specification of the equipment will be determined taking this condition into account.

(2) Humidity

According to the observed data in Colombo and Galle, the humidity from 55 to 98 %. The specification of the equipment will be determined taking this condition into account.

(3) Rainfall and Rainfall pattern

The annual precipitation in Colombo and Galle was 1774mm and 2308mm respectively in 2011. The maximum daily precipitation was 81.9mm for Colombo and 99.9mm for Gale in 2011. The objective area of this project is located in the high rainfall area in Sri Lanka based on the following maps;

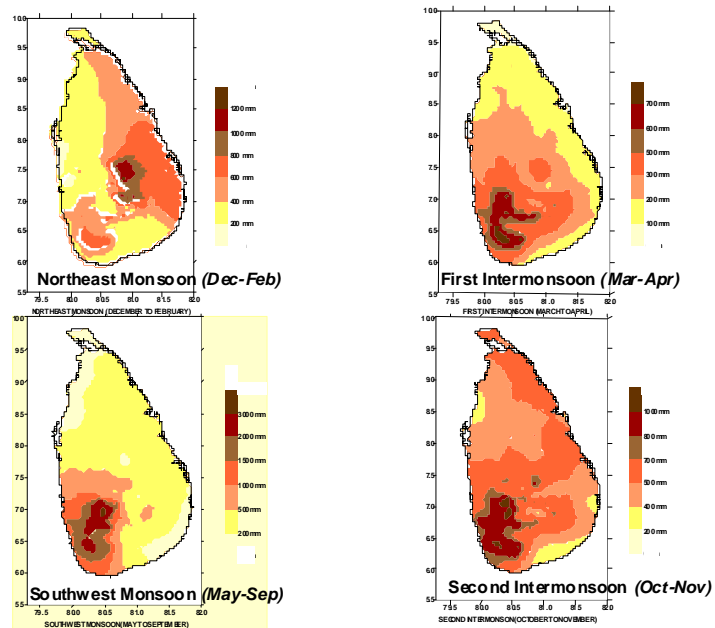


Figure 2-2-1 Precipitation Distribution of each season in Sri Lanka

The rainfall pattern in Sri Lanka is mostly concentrated in a period of around 1 to 2 hours since the rain is generally induced by relatively small scale weather phenomena such as lightning storms, compared with the relatively large scale weather phenomena like typhoons or atmospheric depressions accompanying a rainy front. However, in November 2012, a large scale land slide occurred at around 42.5km point of SEW due to 4 continuous days of heavy rain. Therefore, the equipment to be introduced under this Project must be able to provide proper rainfall information to the users of the expressways. An interruption in the installation work due to the rainfall is considered to be limited. Therefore no interruption is considered for the execution plan of the work.



Photo 2-2-1 Land Slide Site at SEW42.5km East side
 (whole lanes for Galle direction and one lane for Colonbo direction was closed in Nov. 2012)

The reason why there was no vehicle involved in the above landslide is due to entry closure enforced by RDA after the staff of RDA found cracks in the slope through facility inspection made during the heavy rain. Therefore, RDA has enough capability to utilize the equipment to monitor the rainfall.

(4) Lightning

The number of days in which lightning was observed in Colombo and Galle in 2011 is shown below. The frequent lightning period matches the frequent rainfall period.

Table 2-2-2 Number of Days Lightning Observed in 2011

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Colombo	8	4	12	22	10	9	5	3	4	17	12	6	112
Galle	9	7	15	13	4	1	2	1	0	7	15	8	82

(Source: Department of Meteorology)

The RDA reported that existing roadside equipment was damaged due to lightning or lightning surge, and there were power failures after lightning. The power failures usually lasted 1 to 2 hours but sometimes, it lasted half a day. Therefore countermeasures for lightning, lightning surge and power failure are required for the proposed equipment.

(5) Wind Speed

According to the data for maximum wind speed for 3 minutes average from the Department of Meteorology, in 2011 maximum wind speed was observed to be 8.3m/sec in Katunayake and 6.7 m/sec in Colombo. Considering those observed data, the roadside equipment is not required to consider high wind adverse effects in its design.

(6) Fog

There is no observed data in the Department of Meteorology for minimum visibility. According to the information obtained during the site survey, there are foggy or misty days, however, the duration is not long and there are very few cases in which it becomes so dense that creates an adverse effect for drivers. Therefore, it will not be necessary to consider fog or mist for the visibility of the driver

As a whole, the major concern related to the natural conditions for the vehicle drivers who drive on the expressway is rain fall in the objective area of the project in Sri Lanka. Therefore, in this Project, necessary equipment is studied so as to measure precipitation along the expressway and required information on rainfall can be disseminated to the drivers on the expressway.

2-2-1-3 Social Policy

The function of traffic information system for the expressway is to provide precise information related to utilization of the expressway such as road condition, traffic information and weather condition, for expressway users. The proposed system will be designed carefully taking into consideration the social conditions for applying the language and understandable mode of expression of the event.

The official languages of Sri Lanka are Sinhala and Tamil. In addition, English is widely used as a common language. The VMS used in the system must be capable of displaying messages in these three languages, not necessarily simultaneously but alternatively. The Sinhala and Tamil characters are more complex as compared with English characters. The 5 x 7 dot matrix used for English characters is, therefore, not minute enough to express Sinhala and Tamil characters and a dot matrix with more dots per unit area will be used to express the characters. The variable message sign used for the project will be of a type with a finer dot matrix.

Terms such as “accident”, “congestion”, “stalled vehicle”, “fallen object”, and “lane closed” are often displayed on the variable message sign. In the design of the VMS system, correct terms to express the incidents in each of the three languages and their sequence will be studied to convey correctly the details of the incident and intention of the expressway administrator. A similar approach will be taken for the graphic symbols displayed on the VMS.

2-2-1-4 Construction and Procurement Policy

(1) Policy for Procurement

Installation of optical fibre cable and installation of traffic counters, VMS and other equipment, which includes gantries and poles are planned to be executed by local experienced firms. Some specialized works such as installation of software in computers, adjustment and test run of the system, and initial operation training will be made by Japanese engineers of the manufacturers. Regarding materials, concrete will be procured in the local market in Sri Lanka. However, materials such as glass fibre cable and steel poles will be procured from the overseas market in India or Malaysia.

(2) Applicable standards and design conditions

The design, procurement, manufacture and installation of devices, equipment and materials to be procured under this Project shall conform to international and Japanese standards issued by the following organizations:

- International Organization for Standardization (ISO)
- Technical guidelines of International Electrotechnical Commission (IEC)
- Recommendations of Telecommunication Standardization Committee, ITU (ITU-T)
- Institute of Electrical and Electronics Engineers (IEEE)

- Japanese Industrial Standards (JIS)
- The Japan Electrical Manufacturers' Association (JEM)
- Electronic Industries Association of Japan (EIAJ)
- Japanese Electrotechnical Committee of the Institute of Electrical Engineers of Japan
- Japan Cable Standard (JCS)

(3) Laws related to the implementation of the Project

The Project includes small-scale foundation work, electrical work, equipment installation and other works at Project sites. The labour laws of Sri Lanka provide for contract and employment, equality between both sexes, work hours, meal and rest breaks, wages, work rules, labour environment, etc. The law is applied to equipment installation in the Project

2-2-1-5 Local Contractor Policy

As mentioned above (4), all installation works such as unpacking, carrying in and setting of this project will be executed by local firms because they have a great deal of experience related to the construction of communication systems and road equipment.

2-2-1-6 Operation & Maintenance Policy

(1) Operation

The current organizational setup for expressway operation needs to be reviewed in terms of the number of staff, composition of the teams, job description of each position and shift program when the traffic information collection and dissemination system is introduced by this project. Then the organization will be upgraded to efficiently manage the traffic management functions, in particular the traffic information dissemination function, added by the project.

The Expressway Operation Maintenance & Management Division (EOM&M) was created within the Road Development Authority (RDA) to manage the expressway. EOM&M now engages in the expressway surveillance duties through the call centre and CCTV surveillance system on a 24 hour basis.

The EOM&M will be the division that will be in charge of the expressway traffic management system being introduced. Additional staff is required to take on the new tasks. Operation of the traffic information system resembles closely that of the call centre and CCTV surveillance systems. Knowledge of expressways and traffic management is commonly required by both duties. Thus, new personnel will be added to the section in the EOM&M that is currently performing surveillance duties instead of creating a new section. As the traffic management system operates throughout the day, a system operator is required all the time. Considering the 2-shift working arrangement adopted by the current organization, a total of three (3) personnel are required. It is not necessary to separate the operator for traffic management system and that for the existing surveillance system. On the contrary, it would be better for the operators to engage in these works in turn.

It is necessary to prepare operational guidelines to efficiently manage the system and to provide road users with clear messages. The guidelines will cover the following contents:

- Definition of the terms displayed on the VMS
- Selection criteria for VMS messages
- Definition and consistent use of the terms used for Internet, SMS, and radio broadcasting
- Definition of adverse weather conditions
- Countermeasure implementation criteria at the time of adverse weather conditions
- Reporting system and action to be taken in case of system or equipment malfunction

Training must be conducted for the staff on the knowledge and skill of traffic management and traffic information dissemination required for the operation of the system. Training is also required on the basic knowledge as to the equipment comprising the system and actions to be taken at the time of equipment malfunction

As for the preparation of the operational guidelines mentioned above, technical cooperation will be required.

(2) Maintenance

Maintenance is very important for a system to perform its functions continuously. Maintenance standards must be established and followed strictly by the maintenance contractor for the efficient maintenance. It is desirable for the system contractor to engage in the maintenance work under a separate maintenance contract for the same duration as the defect liability period, which will be two years after taking over. The same arrangement is expected to be applied to the tolling system for the Southern Expressway.

Proper maintenance is necessary for any information system including a traffic management system. In general, maintenance work consists of preventive maintenance, corrective maintenance and accident repair. Corrective maintenance covers such works as periodical inspection, cleaning and adjustment. Clean-up, bag fix and garbage collection must also be done for the software and database. These works must be undertaken for the system to continuously perform its functions. They must be done regardless of whether the system is working normally or not.

Corrective maintenance refers to the work that identifies and isolates the faulty part and repair, replacement or adjustment of the part affected. Then the system will be put back into normal operation. Corrective maintenance is required for both hardware and software.

Accident repair will be required when part of the system is damaged by a third party such as a traffic accident or vandalism, for which the employer or contractor are not responsible.

A maintenance manual that describes the procedures for periodic inspection and adjustment, locating and identification of faulty parts, and repair, must be prepared. Preparation of the

maintenance manual must be made by the system contractor and the tender document must set forth such requirement together with the requirement for as-built drawings.

2-2-1-7 Facility Grade Setting Policy

The grade of equipment is similar to the standard equipment operated in Japan and other countries in the world.

2-2-1-8 Construction Methodology & Scheduling Policy

The Project will be tendered in a single package to ensure economy in cost, efficiency and competition among potential tenderers. The procurement schedule will be prepared to ensure that the project will be completed within the duration as called for in the Contract. Special attention will be paid to coordination of the schedule of a series of works such as equipment manufacturing, transportation and installation on site.

2-2-2 Basic Plan

2-2-2-1 Overall Plan

(1) Objective Expressway Section for the Proposed System

The coverage area of the proposed traffic management system will be the section bounded by Kottawa Interchange and Pinnaduwa Interchange having the length of 95.3 km. In addition, the access road of Kaduwela interchange is included in the Project Site, which is prospected to be able to install roadside equipment within the implementation period of this Project. With regard to the Colombo – Katuyanake Expressway (CKE), it will not be considered in this project as the date when CKE is connected with the Outer Circular Highway (OCH) is not known and it will not be in the near future. On the other hand, consideration is given to the points listed below in the system design as to the OCH and the extension of the Southern Expressway to Godagama.

- The Southern Expressway connects with OCH at Kottawa Interchange directly without a mainline barrier. An extension project is being carried out at Pinnaduwa Interchange, the southern end of the Expressway, toward Godagama Interchange for another 28.8 km. In the system design, VMS and other information collection devices will be placed at these interchanges in the same manner as the other interchanges. Considering the progress of these works, installation of these devices at the two interchanges will not pose any scheduling problem.
- Once the OCH and the southern extension are completed in the future, both the Southern Expressway and OCH will be managed as if they are one expressway. The traffic management system to be introduced will have sufficient capacity to process the data and control the equipment to be installed on these expressways.

The system will have the functions that a traffic management system is generally provided with, and be capable of collecting, processing and disseminating traffic information. As some types of surveillance functions are already provided, they are not included in the project to avoid duplication.

(2) System Functions

The expressway traffic management system has the functions of collecting road, traffic and weather conditions, processing them into a useful form and providing information to the road administrator and road users in a suitable form. In addition, countermeasures are implemented if necessary. The basic functional structure is shown in Figure 2-2-4

In the proposed system, traffic volume data and precipitation data are collected. Traffic counters installed at the roadside count the number of vehicles that have passed through the counting area and rain gauges measure the amount rain. Existing CCTV surveillance system and calls to the call centre are also a source of information. Information is also given by road maintenance vehicles and patrol vehicles.

The information thus collected is stored in the event data base as an incident. Depending on the nature of the incident, countermeasures will be implemented and information will be given to road users. All these activities will be recorded in an operation log.

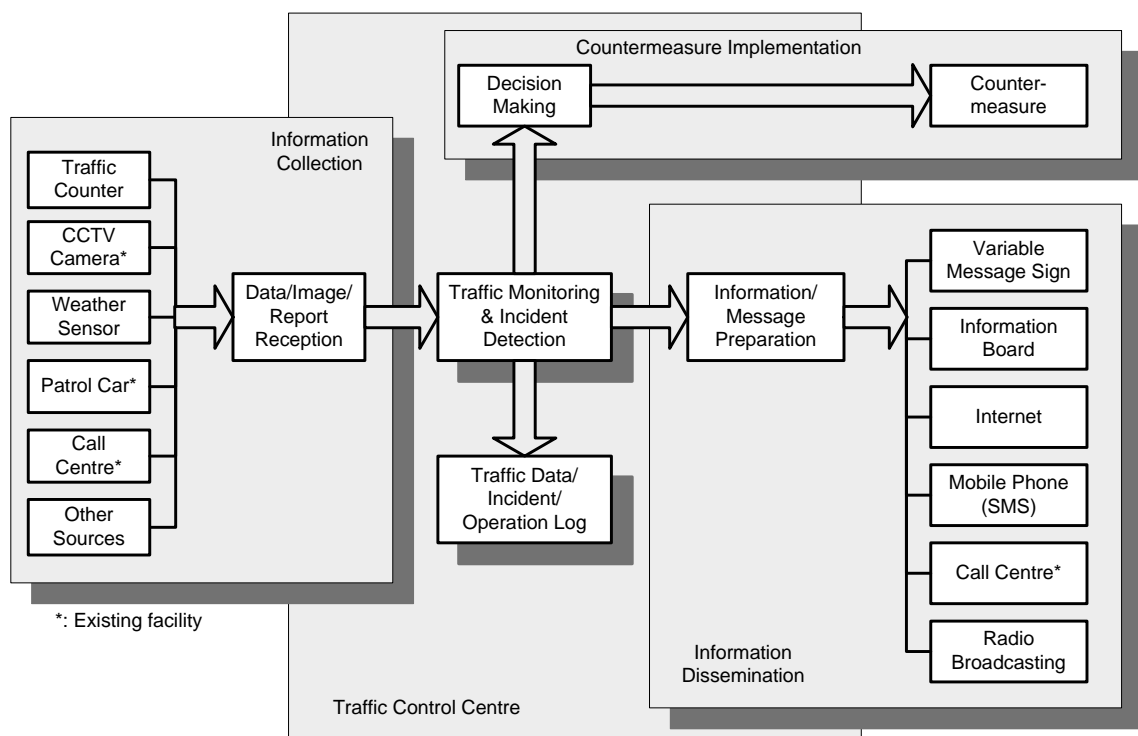


Figure 2-2-2 Function of Traffic Control System

(3) System Configuration

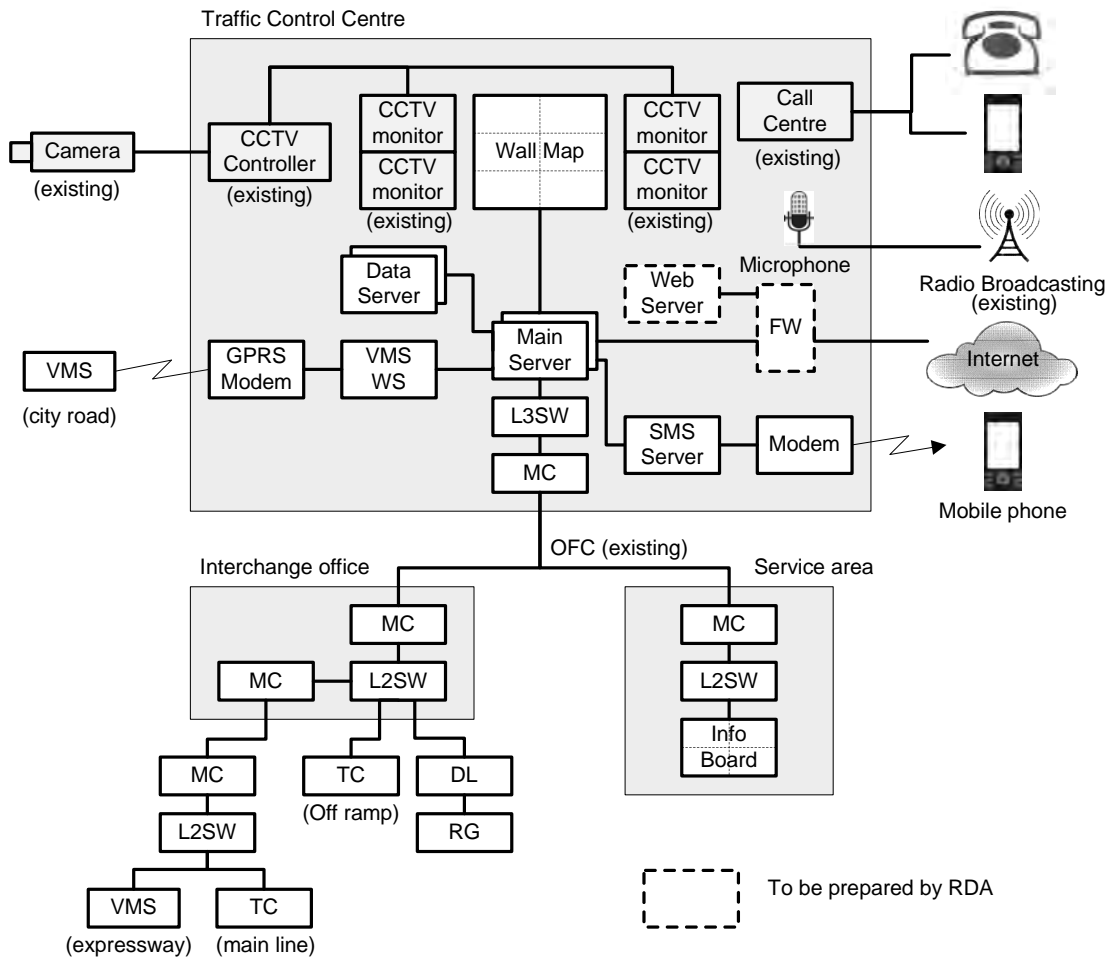
The system to be introduced by this project consists of the equipment listed below.

Table 2-2-3 Configuration of System

Function	Equipment	Remarks
Information collection	Traffic counter	Video camera type
	Rain gauge	Tipping bucket type
Information processing	Servers	Traffic Control Centre
	Wall map	Surveillance and countermeasure implementation by operator
	Operation console	Surveillance, countermeasure implementation, and system operation monitoring by operator
Information dissemination	Variable message sign	Upstream of off-ramp at interchange General road near Kottawa IC and Pinnaduwa IC
	Traffic information board	Service area
	Internet	Traffic information site of Southern Expressway
	SMS	For mobile phone
	Call Centre	Existing
	Radio broadcasting	Traffic information program in commercial radio
Data communication	Ethernet	Existing optical fibre cable will be utilized Network switches to be newly installed

: To be arranged and cost to be borne by Sri Lanka side

The system configuration is shown below.



Acronym

CCTV:	Closed circuit television	DL:	Data logger	TC:	Traffic counter
FW:	Firewall	MC:	Media converter	VMS:	Variable message sign
GPRS:	General packet radio service	OFC:	Optical fiber cable	WS:	Workstation
L2SW:	Layer 2 switch	RG:	Rain gage		
L3SW:	Layer 3 switch	SMS:	Short message service		

Figure 2-2-3 Configuration of Traffic Control System

(4) Roadside Equipment Deployment Standard

The deployment standard of the equipment proposed above is summarized in Table 2-2-4 below.

Table 2-2-4 Deployment Standards for Roadside Equipment

Equipment	Location	Remarks
Variable message sign (mainline)	200 metres upstream of the taper end of the off-ramp	Mounted on gantry
Variable message sign (general road)	200 metres before interchange entrance	At Kottawa and Pinnaduwa IC Mounted on cantilever post
Traffic information board	Service area	One each for up and down directions
Traffic counter (mainline)	Same location as VMS	Mounted on gantry for VMS
Traffic counter (off-ramp)	Straight section of off-ramp	Mounted on dedicated pole
Rain gauge	Open space on interchange premises	Topology, buildings and wiring must be considered

1) Variable Message Sign (mainline)

A VMS will be installed at all interchanges regardless of the number of vehicles using the interchange. The reason is that an incident can occur at any location along the expressway so that it is impossible to predict the section of expressway where lane restriction or even closure could occur. If a VMS is provided at every interchange, guidance to exit at the next interchange will be possible at all interchanges.

The time required for drivers to obtain information is reduced if VMS is placed at all interchanges. If there is no VMS on the expressway at all, drivers only learn about an incident when they come across the incident site. Considering the total distance of the Southern Expressway of 95.3 km and assuming the average travel speed of 80 km/h, the average time required to learn about an incident (average time to arrive at the incident site) is calculated at 35.7 minutes (95.3 km/2/80 km/h).

On the other hand, if VMS is provided at each interchange, the average interval of VMS is calculated as 13.6 km. Drivers will learn about incidents through VMS and the average time to travel to the VMS is calculated at 5.1 minutes (13.6 km/2/80 km/h). Drivers learn about an incident much earlier if VMS is provided than if no VMS is installed.

Variable message signs on the mainline will be installed 200 meters upstream of the taper end of the off-ramp. The location was selected considering the guide signs for the exit ramps, which are placed at 500 metres and 1000 metres upstream of the off-ramps.

The information provided will be divided into categories such as traffic event/incident, location and traffic regulation. Sample information in each category is assumed as follows and will be confirmed in the detailed design stage;

- a) Traffic Information on Traffic event/incident
 - Traffic Accident/Broken-down Vehicle/Left Obstacle
 - Heavy Rain/Slope failure
 - Congestion
 - Construction Work

- b) Location or Section Information on Traffic event/incident
 - Location of accident occurrence (example; 10km ahead)
 - Section of congestion occurrence (example; Kottawa – Kahatuduwa)

- c) Information on Traffic Regulation
 - Slow Down
 - Lane Closure
 - Closure

Based on the above, a sample message is shown below;

- Accident 10km Ahead Lane Closure
- Slope Failure Dodangoda – Welipena Closure
- Heavy Rain Badegama – Pinnaduwa Slow Down

2) Variable Message Sign (general road)

Variable message signs for the drivers who r planning to take the expressway will be installed at interchanges that have relatively high traffic volume. In the case of the Southern Expressway, two interchanges at both ends, namely, Kottwa and Pinnaduwa interchanges have much larger traffic volume than other interchanges. Variable message signs for general roads will, therefore, be installed along the general roads leading to these interchanges. The location will be 200 metres before the interchange entrance. Actual location of the VMS will be decided based on the site conditions such as road topology, sight distance, intersection, and roadside facilities. VMS on general roads will adopt wireless communication to avoid communication cable installation work.

Although the size of the VMS for general roads is rather large, the VMS will be mounted on a cantilever pole assuming that no median exists on the general road.

The information of the VMS for general roads is similar to the VMS for the main line.

3) Traffic Information Board (service area)

Two service areas are being constructed on the Southern Expressway. They are at the same location but for the traffic in the opposite directions. Traffic information boards will be installed inside the service area buildings. It will provide not only the road and traffic information but also tips for safe travel on the expressway. Showing live images from the CCTV camera will also be considered in addition to the road traffic information. All contents will be sent from the Traffic Control Centre and no interactive feature by the audience will be provided.

4) Traffic Counters

Traffic counters will be installed at every section of expressway between two interchanges and at every off-ramp. This arrangement allows collecting the traffic volume on the mainline, on-ramps and off-ramps in real time in the form of 15-minute volume or 1-hour volume.

Traffic counters installed on main line will be mounted on the gantries for variable message signs. Traffic counters at off-ramps will be mounted on a straight pole dedicated to the traffic counter.

5) Rain Gauges

Only rainfall is considered to be a weather condition that would affect the passage of vehicles on the Southern Expressway. Wind is not expected to be strong along the expressway. Rainfall data will be gathered to remind the drivers to slow down when it rains, and to close the road section if the accumulated total rainfall exceeds the threshold. The rain in the region is very specific to a limited area so that rain gauges will be installed at every interchange. The rain gauges will be installed at places where buildings, tall trees or other structures do not hamper the correct measurement of rainfall. The route and distance of power and signal cables will be also considered in selecting the locations.

Typical layout of roadside equipment at a diamond interchange is shown below.

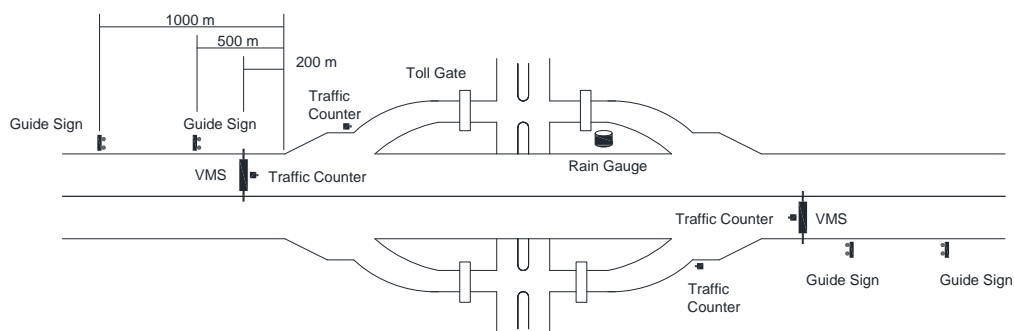


Figure 2-2-4 Typical Roadside Equipment Layout at a Diamond Interchange

The layout plan of roadside equipment shown above is shown in the next page.

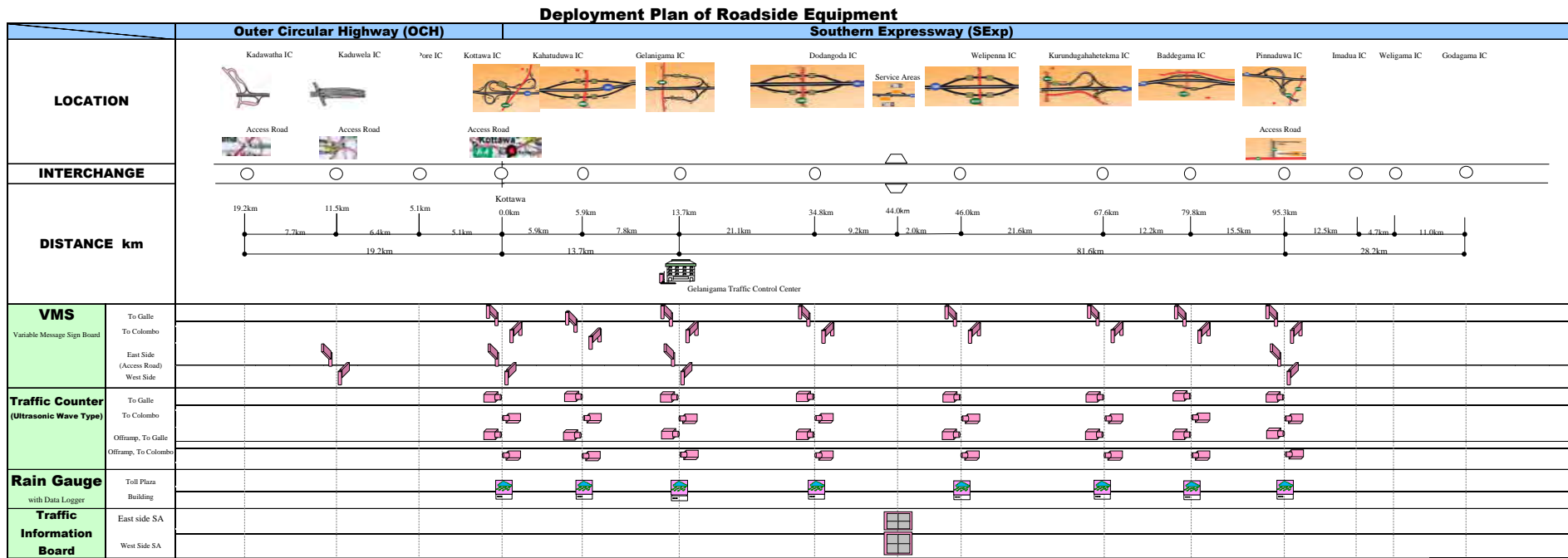


Figure 2-2-5 The layout plan for roadside equipment

(5) Data Communication System

The data communication system to be introduced in this Project is composed of G-Ethernet based equipment components as follows, which is utilized as the communication system of ITS for expressways in Japan. In this plan, there is no plan to utilize existing communication equipment of the CCTV monitoring system along the Southern Expressway, except for the dark fibre cores of the existing 144 cores of optical fibre cable connecting toll offices located at individual interchanges.

1) Layer 3 Switch (L3SW)

This switch is required to route the data from roadside equipment such as traffic counters and data loggers at individual interchanges to the main server to be located in the traffic control centre in Gelanigama, from the servers in Gelanigama to VMS at the roadside, and data routing in between planned servers under this Project. This switch is required to route data based on the IP addresses assigned to the equipment components such as servers, VMS, traffic counters, and data loggers. Therefore L3SW is applied for this switch.

2) Layer 2 Switch (L2SW)

In order to collect data from roadside equipment and transmit it to the main server in Gelanigama, the switch for the toll office located in each interchange is planned for data collection from each interchange's roadside equipment such as rain fall data recorded in the ta logger connected to the rain gauge, and traffic data from the traffic counter. The communication data volume from roadside equipment in an interchange is limited as there are no moving images. The communication data volume from traffic control centre of Gelenigama to the roadside equipment of each interchange is also limited as those are display control data for VMS and control signals to the roadside equipment. Therefore, this switch does not require the functions of L3SW and it is planned to install L2SW for each interchange office.

3) Media Converter (M/C)

The data between the above switches and servers or data loggers are transmitted with electronic signals, but the data between switches located in places that are relatively far apart are transmitted with optical signals. Therefore, a media converter is required which functions to convert electronic signals to optical signals and vice versa.

4) Network Management System (NMS)

In case some failure or fault occurs in the communication equipment or optical fibre cable composing the communication network, it should be detected and notified to the operator in order to recover such failure or fault. The performance of the communication equipment connected to the communication network should be also monitored. Therefore, it is planned to introduce a Network Management System (NMS).

(6) Electric Power Supply Facilities

The planned equipment components of this Project can be categorized into the following in terms of electric power supply;

- (i) Roadside equipment around interchanges (VMS, Traffic Counter, and Rain Gauge)
- (ii) Equipment in toll office at interchanges (Data Logger and L2SW)
- (iii) Equipment in service area (Traffic Information Display and L2SW)
- (iv) Equipment in traffic control centre in Golenigama (Servers, Work Station, Monitor Display and L3SW)

As for the equipment components of (ii) to (iv), the existing electric power supply in each office will be utilized. For the equipment components of (i), the electric power is supplied from the toll office of the interchange so as to back up when power failure happens by using the engine powered generator equipped in each toll office, taking into consideration the conditions that roadside equipment components are installed near the interchanges, and electric power supply conditions in Sri Lanka are not stable.

The electric power supply cable is installed under the ground since the existing aerial optical fibre cable along the Southern Expressway has been stolen several times.

Surge protection is required for all equipment components as many incidents of damage to equipment are reported due to lightning surge.

2-2-2-2 Equipment Plan

Based on section 2-2-2-1, planned major equipment components and those key specifications are summarized in the table below;

(1) Equipment for Information Provision

Table 2-2-5 Equipment for Information Provision

Name of Equipment	Major Specification or Component	Q'ty	Objectives
Variable Message Signboard for Through Lane	Height of displayed letters: min. 400mm/letter Num. of letters possible to display: 15 letters×3 lines, symbols shall be possible to display Language: English, Sinhalese and Tamil Visibility: Driver who drives a vehicle at 120km/h can recognize	16 sets	Information Provision for the drivers on the Expressway
Variable Message Signboard for Access Road	Height of displayed letters: min. 300mm/letter Num. of letters possible to display: 15 letters×3 lines, symbols shall be possible to display Language: English, Sinhalese and Tamil Visibility: Driver who drives a vehicle at 60km/h can recognize	8 sets	Information Provision for the drivers on the highway that are heading for the expressway
Traffic Information Board in Service Area	46 inches x 4 displays for each Service Area (4 units x 2 sets)	8 units	Traffic Information Provision for the Service Area Users

(2) Equipment for Information Collection

Table 2-2-6 Equipment for Information Collection

Name of Equipment	Major Specification or Component	Q'ty	Objectives
Traffic Counter	CCTV Camera: possible to monitor 3 lanes, Resolution: min. 720×480 Outdoor type Image Recognition Processor Output: Num. of vehicles, Average vehicle speed, Occupancy Counting accuracy: not less than 95% Outdoor type	32 sets	To measure number of vehicles and vehicle speed in real time basis
Rain Gauge & Data Logger	Rain Gauge: Tipping-bucket type Sensitivity: 0.5mm Data Logger Memory: min. 1MB Communication Protocol: TCP/IP LCD and Key board shall be equipped	8 sets	Measuring Rainfall and record measured data

(3) Equipment for Traffic Control Centre

Table 2-2-7 Equipment for Traffic Control Centre

Name of Equipment	Major Specification or Component	Q'ty	Objectives
Main Server	Redundancy shall be secured Processor speed: Intel Xeon 2.93GHz or more Memory: 8GB or more, HD:300GB or more	2 units	For Operation of Traffic Control Software
Database Server	Redundancy shall be secured Processor speed: Intel Xeon 2.93GHz or more Memory: 8GB or more, HD:300GB or more	2 units	For management of data collected and generated by Traffic Control Software
Traffic Control Software	<u>Software for Traffic Analysis:</u> Analysis, calculation, compilation and storing of collected traffic data. <u>Software for Traffic Event Data Management:</u> Generation and storing of Traffic Event Data, Prioritization of Traffic Event Data, Provision of guidance for Traffic Control Officer for assisting decision making <u>VMS Control Software:</u> The function is to realize VMS indication prioritized by Traffic Event Data Management software, VMS indication dataset including text and symbols shall be prepared, capable of inputting and editing provided message <u>Software for Weather Data Analysis:</u> Analysis of precipitation, accumulated precipitation and rain fall intensity using collected data, Displaying of processed data in table form and graphic image, Notification function of alert and warning <u>Other Software</u> Multiple display control software, Web information control software, Service area information control software, SMS transmitting software	1 set	Analysis, processing, and guidance for decision making for the Traffic Control Officer, and control of information provision
Main Display	46 inches or more x 4 displays including layout modification of existing monitors (7 unit x 1 set)	7 units	To share information regarding event or incident on expressway among traffic control officer and related personnel

(4) Communication Equipment

Table 2-2-8 Equipment for Communication System

Name of Equipment	Major Specification or Component	Q'ty	Objectives
Network Management System (NMS)	Network monitoring, Detection and notification function of failure and fault of the communication equipment	1 set	Network Monitoring

2-2-3 Outline Design Drawings

Layout plans of the equipment at each interchange and junction are as follows:

(1) Kottawa IC

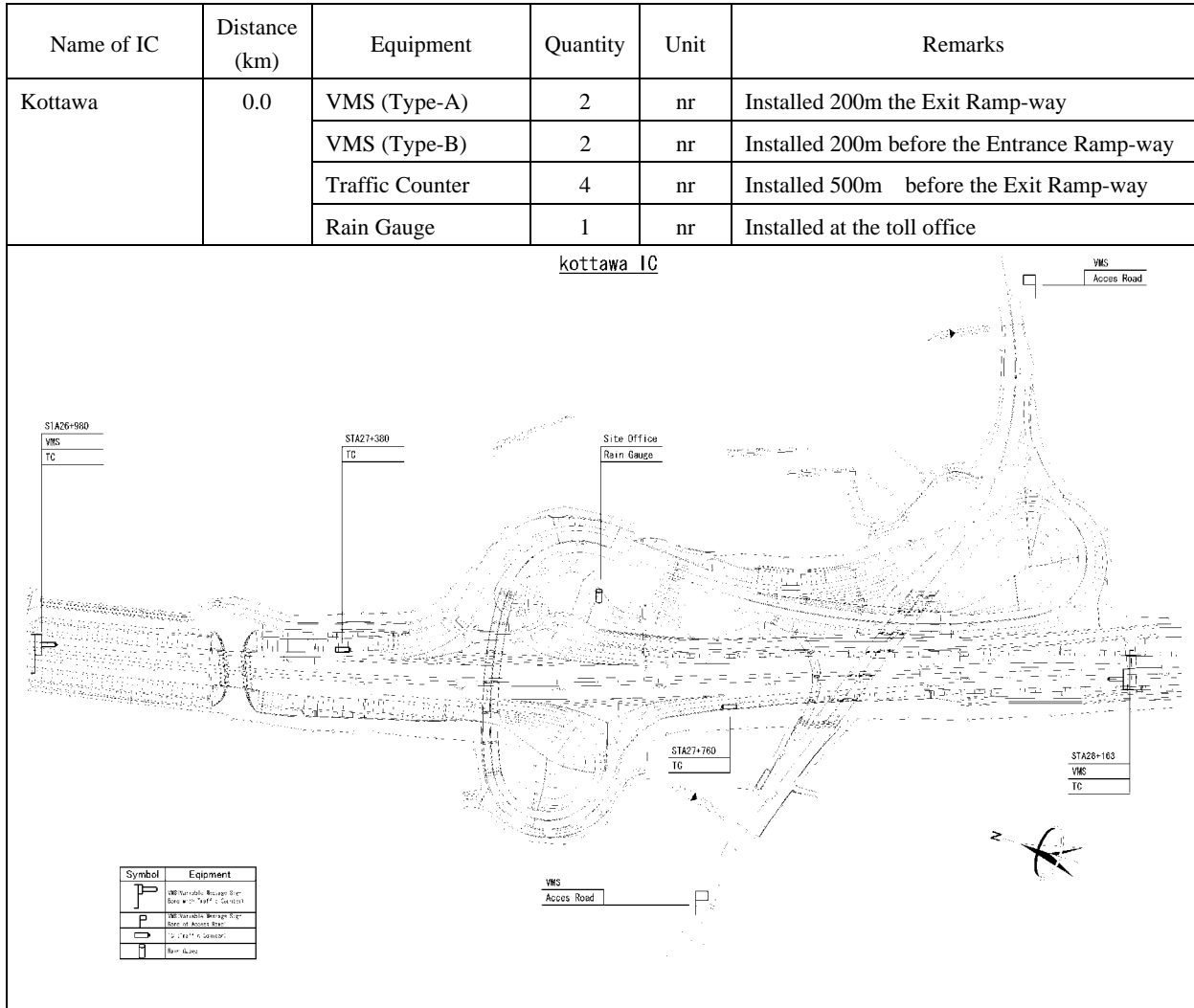


Figure 2-2-6 Road side equipment layout plan (Kottawa IC)

(2) Kahatuduwa IC

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Kahatuduwa	5.9	VMS (Type-A)	2	nr	Installed 200m before the Exit Ramp-way
		Traffic Counter	4	nr	Installed 500m before the Exit Ramp-way
		Rain Gauge	1	nr	Installed at the toll office

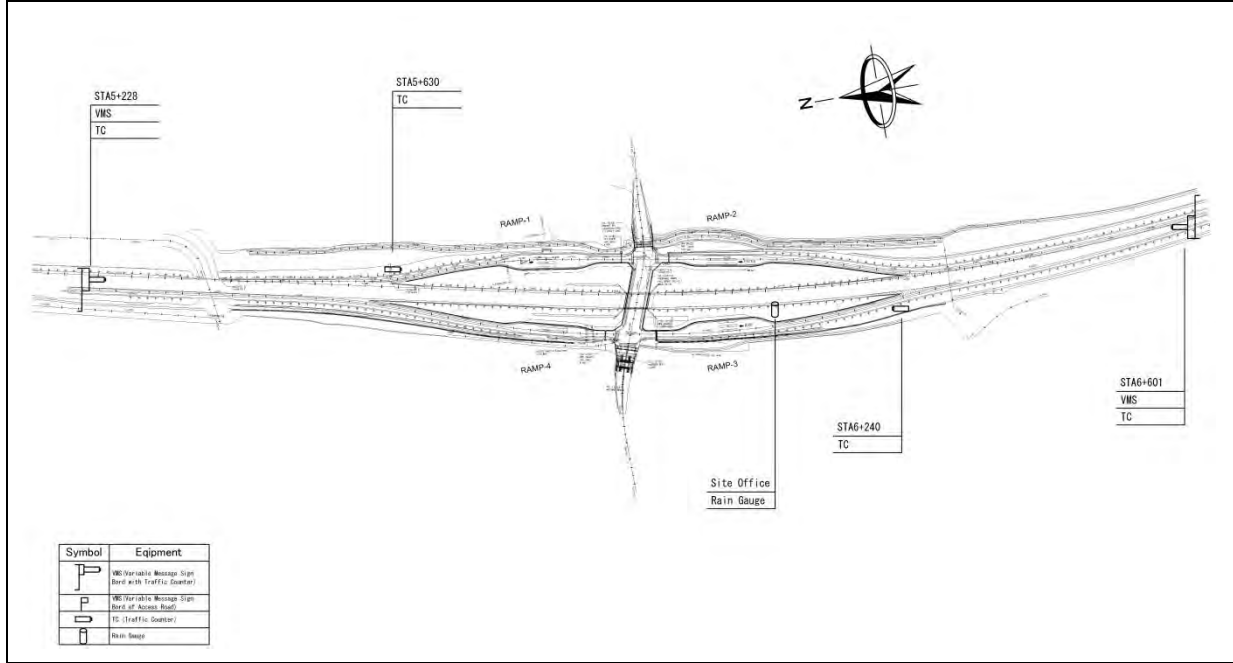


Figure 2-2-7 Road side equipment layout plan (Kahatuduwa IC)

(3) Gelanigama IC

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Gelanigama	13.7	VMS (Type-A)	2	nr	Installed 200m before the Exit Ramp-way
		VMS (Type-B)	2	nr	Installed 200m before the Entrance Ramp-way
		Traffic Counter	4	nr	Installed 500m before the Exit Ramp-way
		Rain Gauge	1	nr	Installed at the toll office

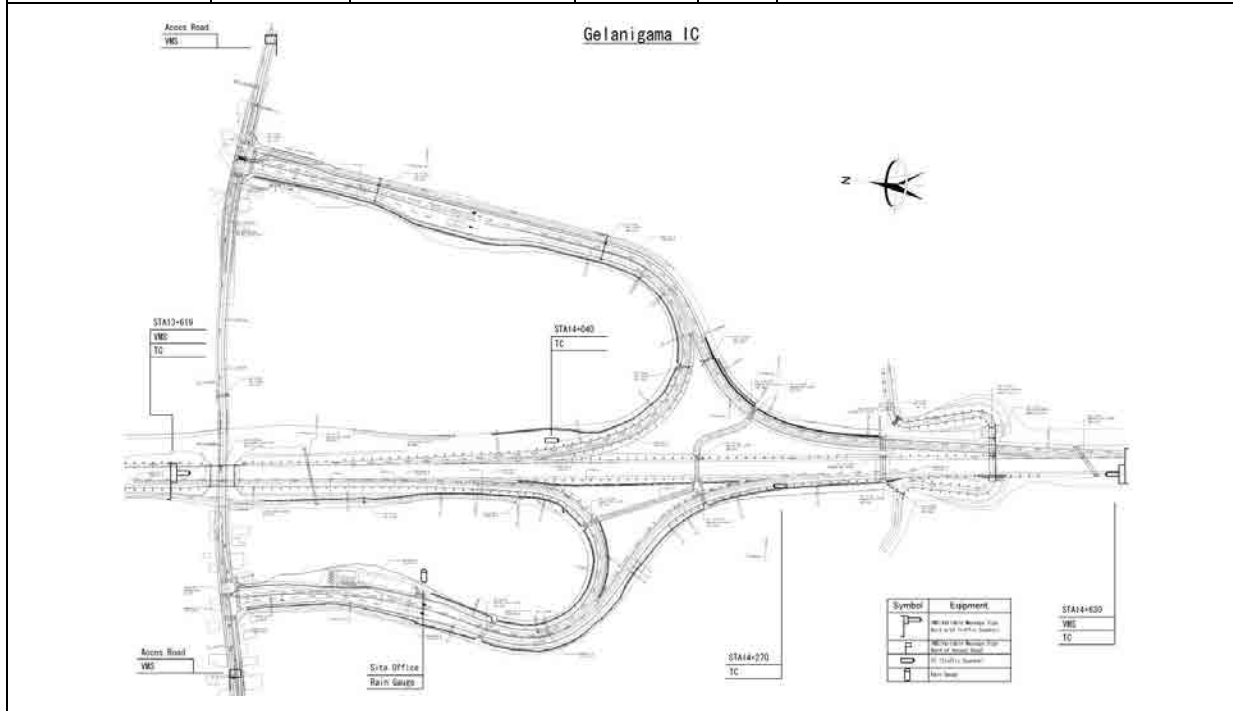


Figure 2-2-8 Road side equipment layout plan (Gelanigama IC)

(4) Dodangoda IC

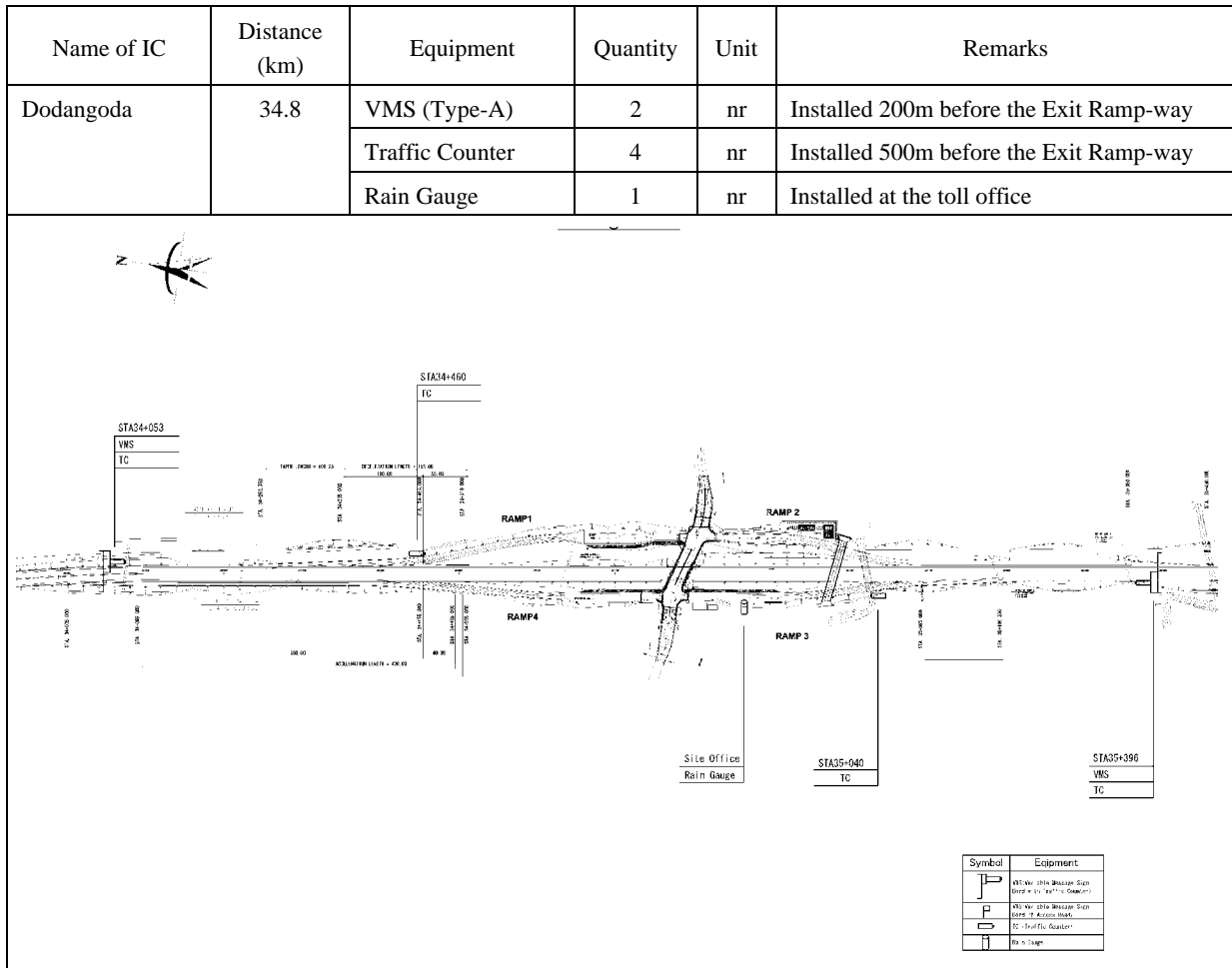


Figure 2-2-9 Road side equipment layout plan (Dodangoda IC)

(5) Welipenna IC

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Welipenna	46.0	VMS (Type-A)	2	nr	Installed 200m before the Exit Ramp-way
		Traffic Counter	4	nr	Installed 500m before the Exit Ramp-way
		Rain Gauge	1	nr	Installed at the toll office

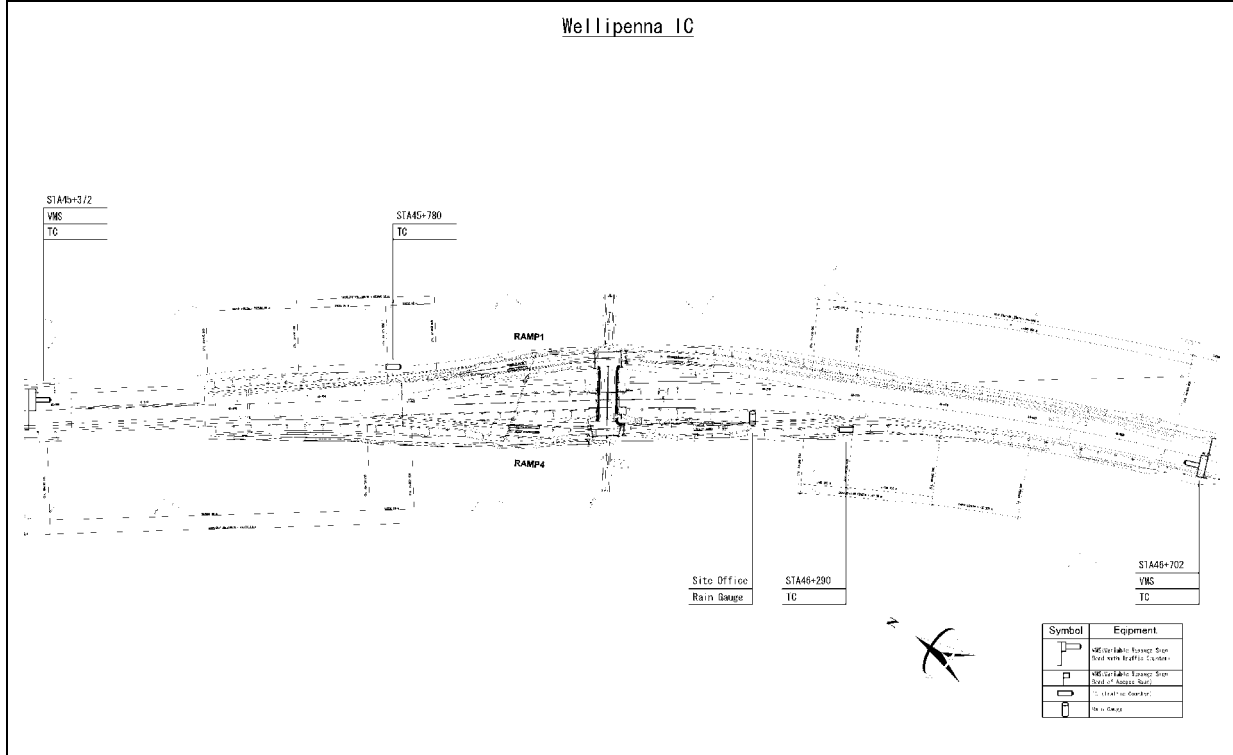


Figure 2-2-10 Road side equipment layout plan (Welipenna IC)

(6) Kurundugahahetekma IC

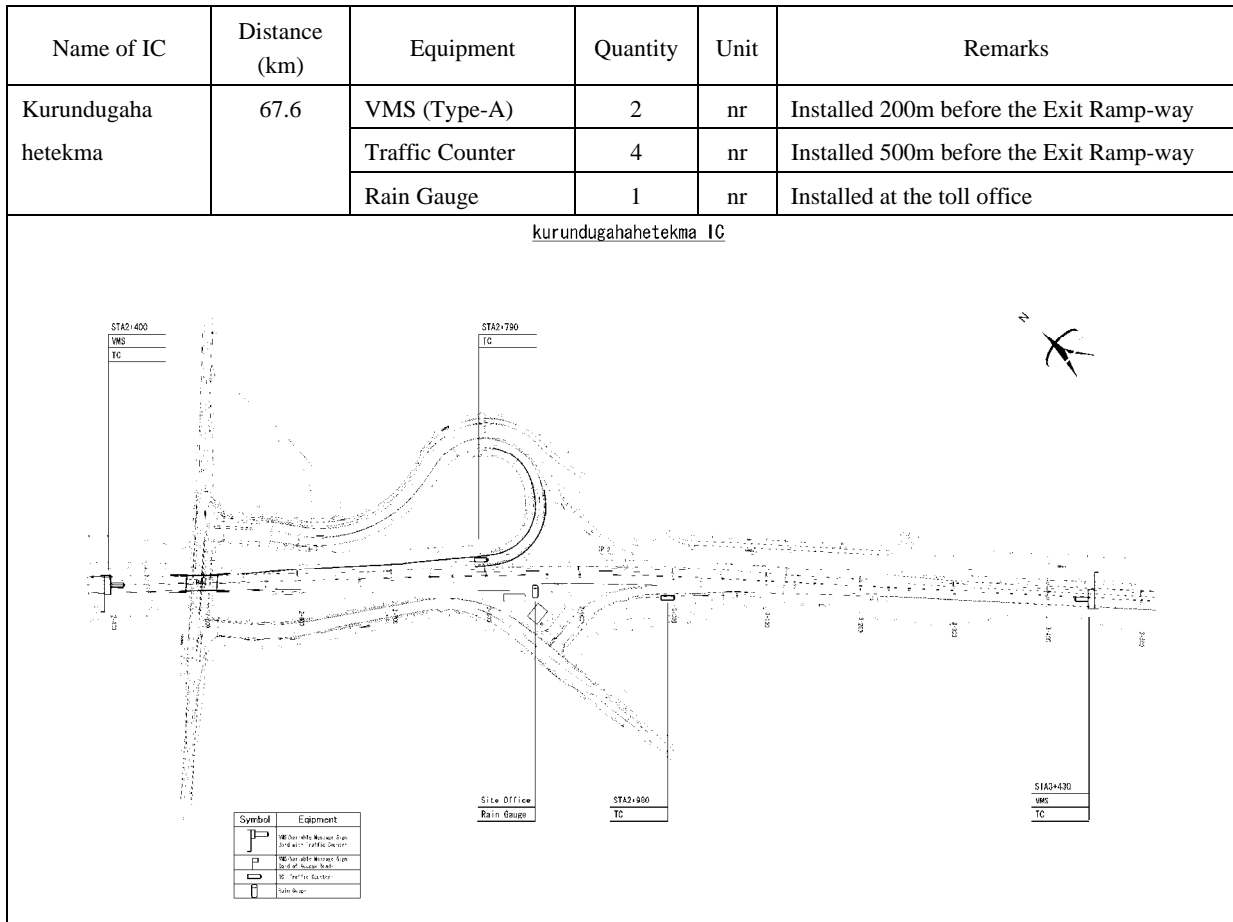


Figure 2-2-11 Road side equipment layout plan (Kurundugahahetekma IC)

(7) Baddegama IC

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Baddegama	79.8	VMS (Type-A)	2	nr	Installed 200m before the Exit Ramp-way
		Traffic Counter	4	nr	Installed 500m before the Exit Ramp-way
		Rain Gauge	1	nr	Installed at the toll office

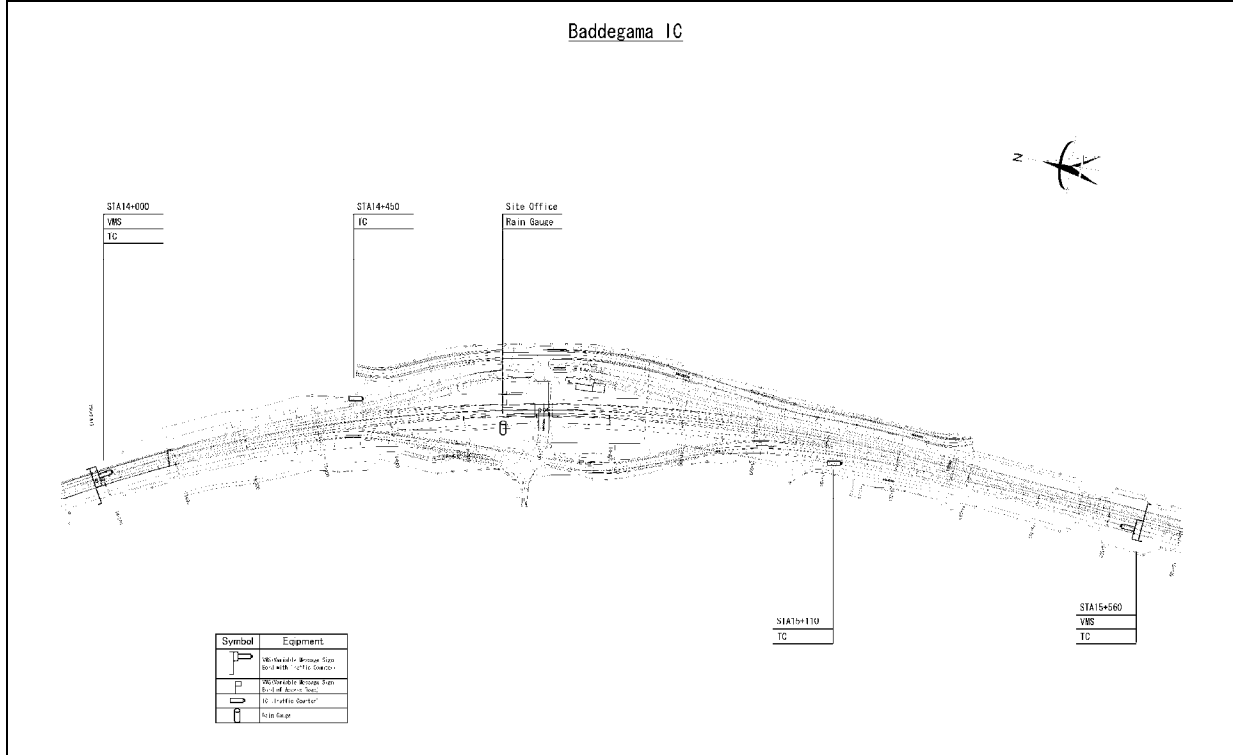


Figure 2-2-12 Road side equipment layout plan (Baddegama IC)

(8) Pinnaduwa IC

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Pinnaduwa	95.3	VMS (Type-A)	2	nr	Installed 200m before the Exit Ramp-way
		VMS (Type-B)	2	nr	Installed 200m before the Entrance Ramp-way
		Traffic Counter	4	nr	Installed 500m before the Exit Ramp-way
		Rain Gauge	1	nr	Installed at the toll office

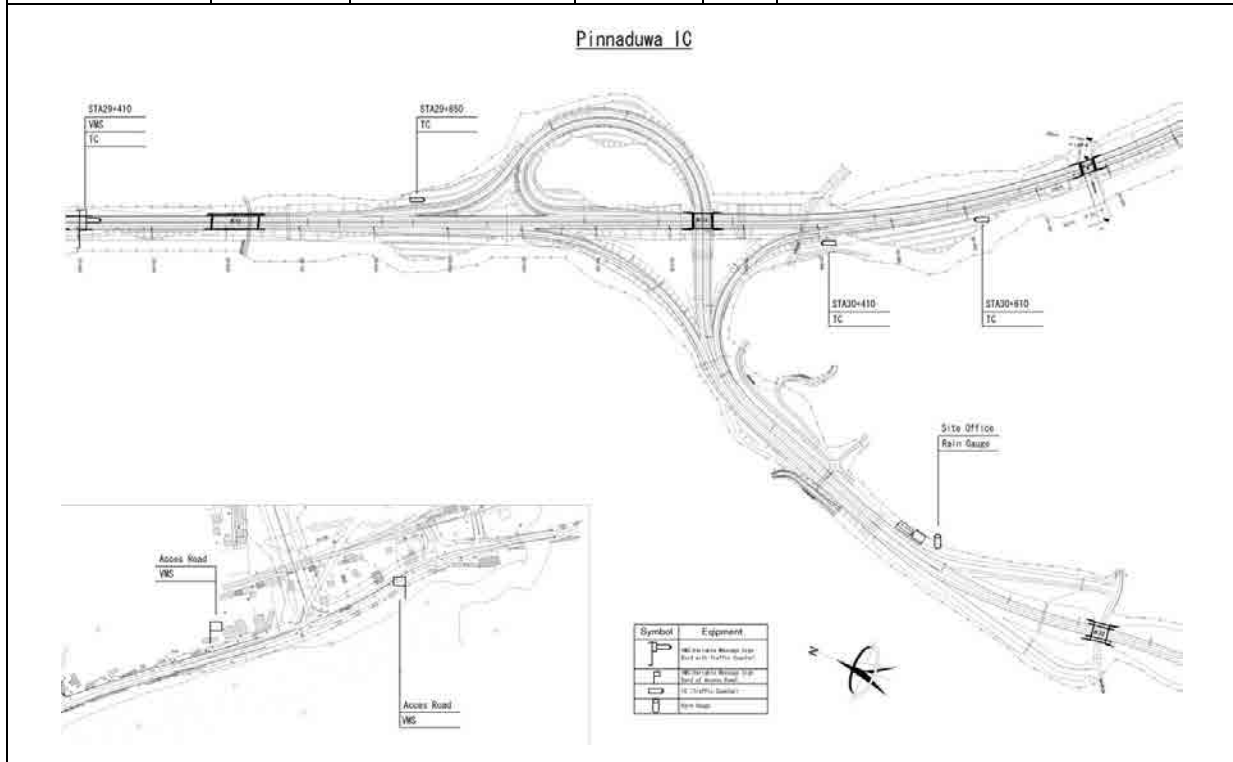


Figure 2-2-13 Road side equipment layout plan (Pinnaduwa IC)

(9) Service Area

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Service Area	44.0	Monitor	4	nr	Installed in the buildings in the service areas

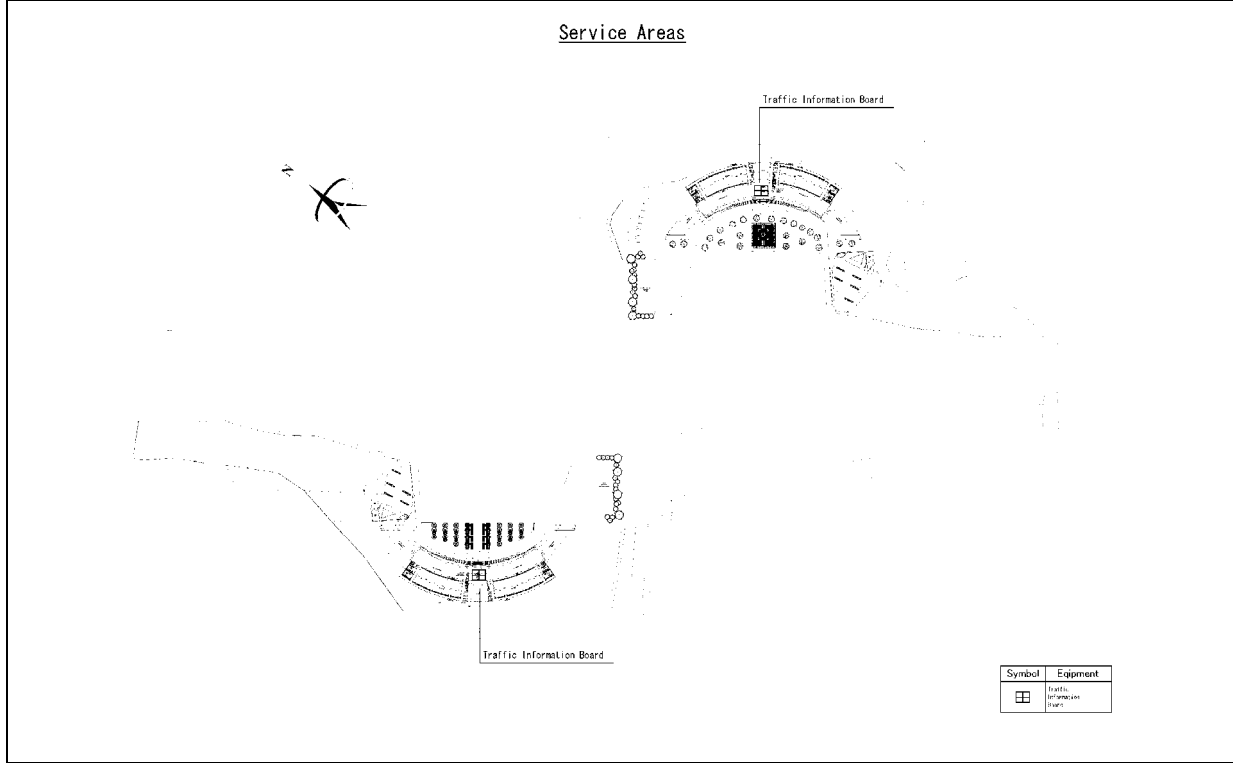


Figure 2-2-14 Road side equipment layout plan (Service Area)

(10)Kaduwela IC (OCH)

Name of IC	Distance (km)	Equipment	Quantity	Unit	Remarks
Kaduwela	18.3	VMS (Type-B)	2	nr	Installed 200m before the Entrance Ramp-way

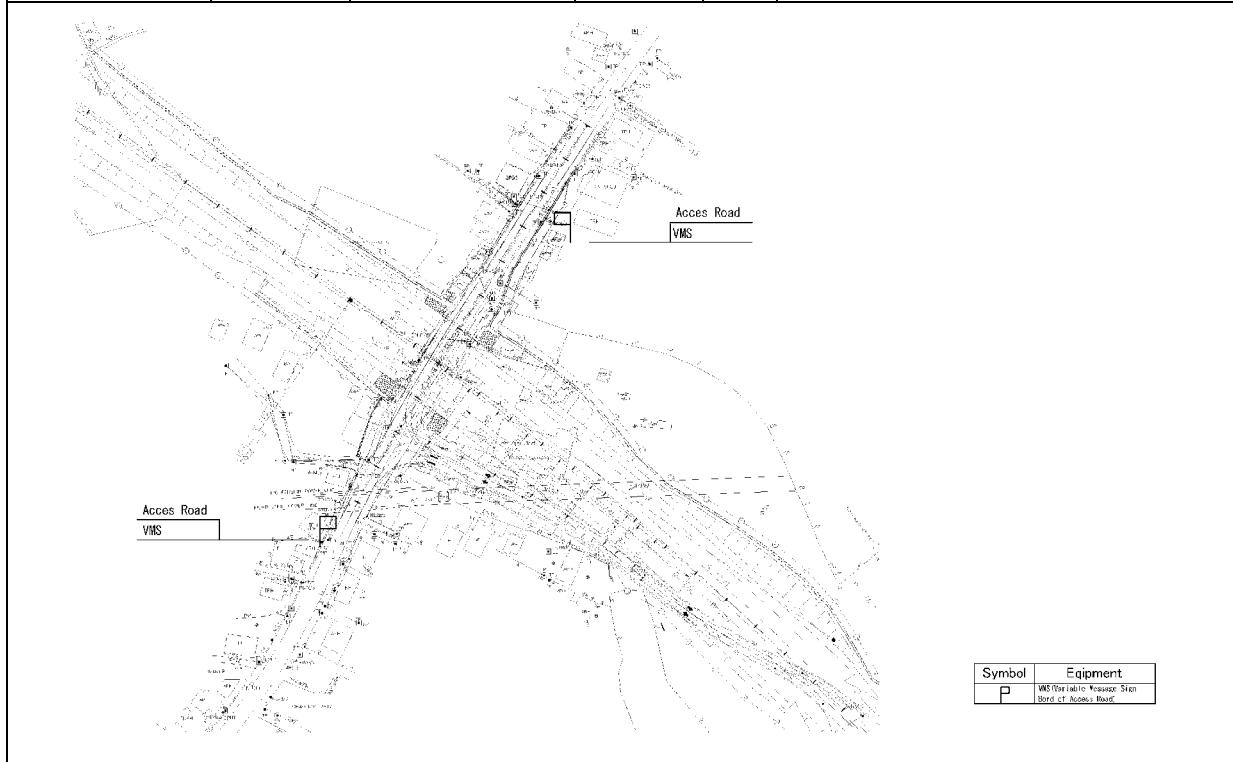


Figure 2-2-15 Road side equipment layout plan (Kaduwela IC)

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic matters

1) Implementation Framework

The Project shall be implemented according to the implementation framework of the organizations concerned as illustrated in Figure 2-2-16 and in accordance with the implementation procedures of the grant aid of Japan.

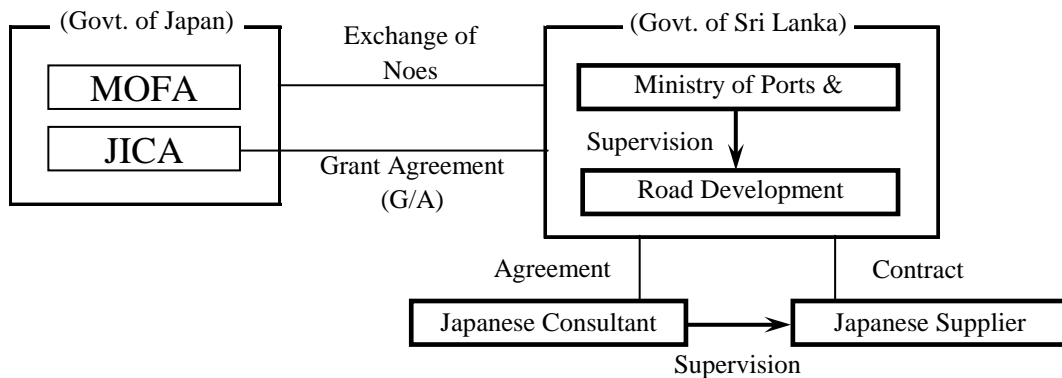


Figure 2-2-16 Project Implementation Framework

- i. The Government of Japan, after its cabinet approval, will sign the exchange of notes (E/N) and Grant Agreement (G/A) with the Government of Sri Lanka concerning the grant aid.
- ii. After the Notes are exchanged by the two governments and signing of the Grant Agreement, a Japanese consultant and the Executing Agency in Sri Lanka will make an agreement on the design and supervision work of the Project. The consultant will commence the work immediately after obtaining the verification of JICA.
- iii. According to the tender guidelines of JICA¹⁾, Japanese procurement firms will be invited for tendering. While the tender administrator is the executing agency of Sri Lanka, the consultant will assist in the tender procedures under the guidance of JICA.
- iv. The awarded successful tenderer will make a procurement contract with the Sri Lankan side and start works immediately after obtaining verification of the contract from JICA.

2) Design and supervision policies of the Japanese consultant

The Japanese consultant implementing the design and supervision work shall fulfil its roles in order to smoothly implement the Project and achieve the purpose of the cooperation under the

¹⁾ http://www.jica.go.jp/activities/schemes/grant_aid/guideline/guideline_01.html

“Guidelines for Consulting Works concerning Grant Aid” issued by JICA. The firm shall conduct all necessary work and make efforts to be trusted by the Project executing agency of Sri Lanka, considering fairness and neutrality for Japanese suppliers.

(2) Procurement Policy

Some equipment components such as communication equipment, large display, printer lightning protection devices etc. are available to procure from the third countries in addition to the products of Japan in Sri Lanka. Those products should have adequate quality and sales records and should have sufficient manufacturers’ support system through local branch offices or agents.

(3) Policy on Installation Work

All equipment procured in this project needs installation. Assumed installations are shown below:

- 1) Installation of gantries for Variable Message Signboards of expressway
- 2) Installation of gantries for Variable Message Signboard of access roads
- 3) Installation of Variable Message Signboards on the gantries
- 4) Installation of rain gauges
- 5) Installation of poles for equipment for measuring traffic volume
- 6) Installation of equipment for measuring traffic volume
- 7) Installation of communication cables
- 8) Installation of equipment for the Traffic Management Centre
- 9) Installation of equipment for the Service Areas

The critical path for the installation works is development of some pieces of software. The Consultant shall consider all risks which impact the equipment and the operation of the system.

(4) Utilization of local consultants

There are those companies in Sri Lanka that can conduct consultant work, such as architectural design and civil engineering design work. However, there are no such consultants that have sufficient knowledge about intelligent transport systems, such as the one to be installed for the Project, and that can conduct consulting work from a neutral position.

In general, it is evaluated that local consultants, including architects and civil engineering design offices, do not have sufficient experience to become a prime contractor to handle a large scale project, such as foreign assistant projects. On the other hand, the objective area of this Project extends over a length of 107km and it would be hard for a foreign consultant to properly supervise the whole area by himself. For this reason, local consultants will be used as the assistants of the Japanese consultant for the Project and transfer of technologies will be provided to them through project implementation.

(5) Utilization of local firms for equipment installation

Roadside ITS equipment such as CCTV Cameras for traffic monitoring or communication cable to be procured under this Project is currently being installed in Sri Lanka in many areas. Therefore, it is deemed that there will be no difficulty to install such equipment by local engineers and technicians. However, as it is required to have extensive and special knowledge for the works such as software installation to the server, configuration of equipment components by the installed software, trial operation, and initial operation guidance, Japanese engineers are required that have adequate capability and experience with the similar equipment.

Therefore a Japanese firm shall be the prime contractor of the Project and supervise the entire installation work including utilization of local subcontractors. It is possible to realize high quality installation work economically by using the mentioned formation.

(6) Utilization of local transportation company

The Project will cover individual interchanges and a part of the SEW access road and a part of the OCH access road. The transportation routes are between Japan and Colombo, and Colombo and these 9 project sites. It would be appropriate to employ a Japanese transportation company for the transportation between Japan and Colombo to provide smooth and reliable equipment shipping procedures to maintain the project schedule. On the other hand, it would be effective to utilize local transportation companies, which are familiar with the local transportation situations, under the supervision of the Japanese transportation company in order to achieve project installation work within the intended installation period and with required quality.

2-2-4-2 Implementation Conditions

The Project will procure the traffic control system which consists of several components.

Not only must each component conform with the specifications but also the whole system is to be composed so as to function as one system.

2-2-4-3 Scope of Works

Works to be borne by the Japanese side include procurement in Japan and Sri Lanka, packing, marine transportation, inland transportation from the port of disembarkation to the site, unpacking, installation, adjustment, testing, and initial training for operation.

Works to be borne by the Sri Lankan side include tax exemption, customs clearance, banking arrangements, provision of storage facilities for the equipment, and supply of electricity and water to the construction site. The table below shows the demarcation of the works for each side.

Table 2-2-9 Demarcation of Works

Works	Japan's Grant Aid	Recipient Side
1. Banking Arrangements (B/A), Authorization to Pay (A/P)		X
2. Tax exemption and custom clearance		X
3. Expense for staff for supervision and inspection		X
4. Provision of temporary stock yard		X
5. Equipment cost	X	
6. Transportation cost	X	
7. Installation, adjustment, and testing cost	X	
8. Permission for construction works		X
9. Temporary stock yard for materials and equipment		X
10. Fee for electricity, water and telephone during construction		X
11. Initial operation training	X	
12. Coordination with relevant organizations for initial training		X

2-2-4-4 Consultant Supervision

The Consultant will perform the services in accordance with the procedures for the Grant Aid Project after conclusion of the agreement for detailed design and procurement supervision with the implementing agency of the recipient country with verification of the Japanese Government of the agreement. The services provided by the Consultant are as mentioned below:

(1) Detailed Design

The Consultant will execute detailed design stipulated in the agreement for the services based on this preliminary survey, Exchange of Notes and Grant Agreement. Project cost estimation will be reviewed and tender documents including drawings and technical specifications will be prepared.

(2) Assistance in Tendering

After coordination with the implementing agency on the tender procedure, the following works will be executed on behalf of the implementing agency.

- Tender notice
- Delivery of tender documents
- Tender opening
- Tender evaluation
- Assistance for negotiation and conclusion of the Contract

(3) Consultancy service on the supervision work

The Consultant will supervise whether the procured equipment conforms with the specifications and whether the equipment is correctly installed. A procurement supervision engineer will stay at the site to supervise installation to hand-over.

Prior to beginning the installation work at the site, the equipment planning engineer will check and review the equipment manufacturer's drawings that must be submitted by the contractor for approval, and witness the inspection of the equipment before shipping at the manufacturer's factory in order to confirm that the equipment to be procured meets the requirements specified in the specifications. The major supervising items of the consultant during procurement are shown below;

- Check, review and approval of the equipment manufacture's drawings
- Witness the Factory Inspection
- Supervising of the progress control and safety control of the contractor
- Supervising of installation work, coordination among related organizations, and witness the trial operation
- Check, review and approval of the acceptance test procedure and inspection plan
- Coordination between the client and the contractor on the initial operation guidance
- Witness the acceptance inspection (completion inspection) and issuing of completion certificate
- Preparation of reports such as monthly and completion reports and submissions of related organizations

2-2-4-5 Quality Control Plan

The quality control of the equipment procurement is shown below;

(1) Quality control during procurement stage

The quality control during the procurement stage is made by confirmation of function and performance that meets the requirements of the technical specifications through the factory inspection, unit test after installation of the equipment at the site, and connection test for all equipment by the consultant. By these confirmation processes it is guaranteed to procure equipment or systems that meet required quality standards

(2) Quality control during tender stage

It is planned to check the organizational quality assurance system of the manufacturer by requiring submission of documents related to quality control qualification at the tendering stage.

2-2-4-6 Procurement Plan

(1) Materials

As mentioned above in chapter 2.1, concrete will be procured in the local market in Sri Lanka. However materials such as glass fibre cable and steel poles will be procured from the overseas market in India or Malaysia.

(2) Construction Machinery & Equipment

Equipment installed in the Project consists of products procured in Japan and Sri Lanka. Most of the products procured in Sri Lanka are manufactured in countries other than Sri Lanka or Japan. Those products should have adequate quality and sales records and should have sufficient manufacturers' support system through branch offices and agents.

Some products such as communication equipment are to be procured from third countries other than Japan since the products of the recipient country are not available and the products of Japan are expensive due to transportation cost. Official request by the recipient country and prescribed formalities are required in the implementation stage for procurement of the products of the third countries.

2-2-4-7 Operation Guidance Plan

The traffic control system to be procured in this Project will be the first one for the personnel of RDA. Therefore initial operation guidance is planned for the operation staff of RDA. As for the communication equipment, since RDA made the maintenance contract with a telecommunications carrier for the existing equipment, it is recommended to make another maintenance contract for the equipment to be procured in this project. Therefore the initial operation guidance for the communication equipment is limited to the necessary components except for the maintenance contract.

(1) Items, contents and method of guidance

The initial operation guidance for the personnel of RDA related to the traffic control system will be conducted using the contents and methods shown in the Table 2-2-10 by the engineer of the manufacturer for this Project.

Table 2-2-10 Initial Operation Guidance for the Traffic Control System

Objective equipment	Contents of guidance	Method of guidance
<ul style="list-style-type: none"> • VMS • Traffic Counter • Rain Gauge 	<ul style="list-style-type: none"> • Confirmation of equipment connection and instruction of proper handling method • Instruction regarding the test of the equipment for communication between the traffic control centre and roadside equipment • Instruction on proper response when fault is detected • Instruction on the periodical check-out • Instruction on cleaning • Instruction on maintenance parts and consumable items • Instruction on maintenance records 	<p>[Target of Guidance] RDA operation and maintenance personnel who works in each toll office of the SEW</p> <p>[Method] By using instruction manual and forms, confirmation method of connection, test, handling, operation etc. is instructed, and level of mastering is checked</p>
<ul style="list-style-type: none"> • Main Server • Database Server • Processing Software • Main Display • Traffic Information Board at Service Area 	<ul style="list-style-type: none"> • Confirmation of equipment connection and instruction of proper handling method • Instruction on function of software, screen element, and operation menu • Operation instruction on data input method and generating data • Explanation of processing condition of software and instruction on operation • Instruction on the test of the equipment for communication between the traffic control centre and roadside equipment • Instruction on proper response when fault is detected • Instruction on data back-up methods • Instruction on log analysis and checking 	<p>[Target of Guidance] RDA operation and maintenance personnel in Gelanigama Traffic Control Centre</p> <p>[Method] By using instruction manual and forms, confirmation method of connection, test, handling, operation etc. is instructed, and level of mastering is checked</p>
<ul style="list-style-type: none"> • Network Management System (NMS) • Communication Equipment 	<ul style="list-style-type: none"> • Confirmation of equipment connection and instruction on proper handling method • Instruction on function of NMS, screen element, and operation menu • Instruction on proper response when fault is detected and clarification method to identify the faulty equipment • Confirmation of requesting items for maintenance support • Instruction on log analysis and checking 	<p>[Target of Guidance] RDA operation and maintenance personnel in Gelanigama Traffic Control Centre</p> <p>[Method] By using instruction manual and forms, function of NMS and proper response when fault is detected is instructed and level of mastering is checked</p>

(2) Implementation Plan

The initial operation guidance for the personnel of expressway operation and maintenance of RDA will be presented over 2 days regarding individual roadside equipment such as VMS, traffic counters and rain gauges by one Japanese engineer from the manufacturer of the equipment. In addition, at least two guidance sessions are required taking shift working of the personnel into account. Therefore, 12 man days are required (1 engineer x 2 days x 3 types of equipment x 2 times).

On the other hand, the initial operation guidance for the RDA personnel of Gelanigama Traffic Control Centre will be presented over 5 days by one Japanese engineer from the software development manufacturer. In addition, at least two guidance sessions are required taking shift working of the personnel into account. Therefore, 10 man days are required (1 engineer x 5 days x 2 times).

As for the initial operation guidance for the NMS, the engineer from the NMS provider will offer 2 days guidance. In addition, at least two guidance sessions are required taking shift working of the personnel into account. Therefore, 4 man days are required (1 engineer x 2 days x 2 times).

2-2-4-8 Implementation Schedule

The project implementation schedule is shown in Figure 2-2-17.

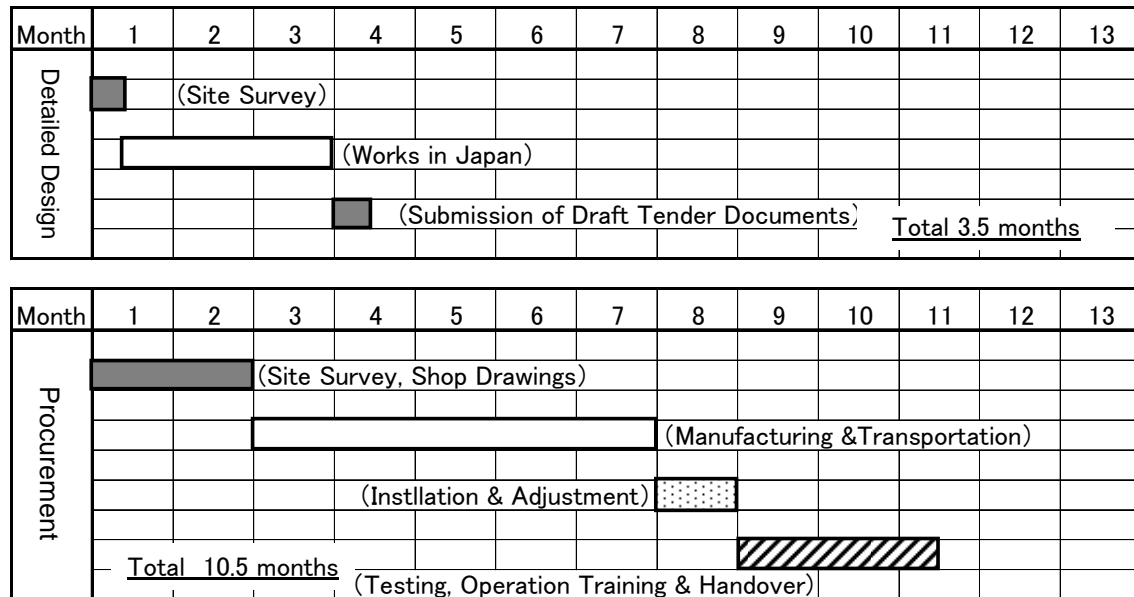


Figure 2-2-17 Project Implementation Schedule

2-3 Obligations of Recipient Country

Upon the implementation of this Project as a grant aid from Japan, the Sri Lanka side shall be responsible for those items indicated in Section 2-4-3 “Scope of works”. According to that demarcation, the following measures are required.

(1) Undertakings to be borne by the Sri Lanka side

1) Digging/Work Permission

In this Project, procured equipment and materials will be installed at the sites shown below;

- Beside the through lane of the Southern Expressway : VMS, Traffic Counter and Gantry for that equipment
- Off ramp: Traffic Counter and its supporting pole
- Around interchanges and Toll Office: Communication and power supply cables and ducts for those cables, rain gauge and its foundation
- Access Road of Kottawa and Pinnaduwa: VMS and its supporting pole

The contractor of this Project is required to obtain digging permission and construction work permission from RDA, since those construction sites are under RDA's administration. Therefore, smooth issuing action is required for those permissions prior to installation work.

2) Contracts with communications carrier

In this Project, the following data communication services need to utilize communication carrier's service under contract with RDA.

- Radio communication service contract for transmitting data to the VMS to be installed at access roads
- Short Messaging Service (SMS) contract for all cell phone carrier's users

Since RDA entered into a contract for an internet connection to its web server, this type of contract is not required additionally for the web server related scope of work for this Project. However, the above services are newly introducing ones for RDA. Therefore, a contract must be concluded on or before commencement of the connection test of the equipment (by the end of July 2014).

In this Project, the existing dark fibre cores of the optical fibre cable between toll offices will be utilized. It is recommended that a maintenance contract between RDA and Sri Lanka Telecom for this optical fibre cable be finalized prior to commencement of installation work of the communication equipment of this Project (by the end of June 2014) so as to repair it immediately when failure or a fault is detected in the cable.

3) Contract with Broadcasting Company

In this Project, it is planned that traffic conditions of the Southern Expressway will be broadcast through the existing radio broadcasting program provided by the existing radio broadcasting company. It is required to enter into a contract for this service with the radio broadcasting company before the commencement of the operation of the traffic control system (by the end of September 2014).

4) Tax exemption

Sri Lanka will exempt customs duties, domestic taxes and other charges for Japanese nationals entering the country to procure equipment and materials based on the procurement contract of the Project and to implement various activities. The country will also facilitate customs clearance of procured equipment and materials, and exempt taxes for them.

There are two methods to handle the tax exemption. The one is tax exemption prior to the payment, and it is requested by RDA through the Ministry of Ports and Highways to the Ministry of Finance and Planning in writing, and an approval in writing is granted to RDA. This takes around 3 months from the request of RDA to the approval of the Ministry of Finance and Planning in writing.

The other one is a refund claim after payment of the tax. In this method the exemption is applied for Value Added Tax (VAT), Nation Building Tax (NBT), Customs Import Duty, Construction Industry Guarantee Fund Levy and etc. The most appropriate tax exemption method depends on the timing, whether the exemption is needed before RDA would have time to receive the approval letter or if it is possible to wait. If the tax payment is not due until after it is expected that RDA would receive the approval letter, such as customs import duty, it can be exempted by the approval letter prior to the tax payment, however, for tax payments which are due before it is expected that RDA would receive the approval letter the tax must be paid and refunded after payment.

As for the exemption of customs import duty, RDA must issue a request letter through the Ministry of Ports and Highways to the Department of Trade, Tariff and Investment Policy, and the Department will issue approval letters on a case by case basis.

5) Convenience provision

To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contract, such conveniences as may be necessary for their entry into Sri Lanka and stay therein for the performance of their work.

6) Banking arrangements (B/A), Authorization to pay (A/P)

Sri Lanka will open a bank account in its name at a Japanese bank and issue Authorization to pay (A/P) to the bank. Based on the Banking Arrangements (B/A), the Sri Lankan side should bear an advising commission of an Authorization to Pay and payment of commission to the Bank.

(2) Works by Sri Lanka side

1) Promotional Activities

The traffic control system to be introduced under this Grant Aid Project make it possible for the drivers on the expressway or the drivers en route to the expressway to obtain the traffic information through the VMS, internet, SMS and radio broadcasting program. However, since the general public is not aware of this matter, promotional activities are necessary through media such as TV, radio and others. It is recommended to begin the promotional activities from the timing of trial operation for three months (from September 2014), and it is also recommended to repeat it periodically.

2) Preparation of primary side indoor electric wiring

At Gelanigama Traffic Control Room and each toll office, required power supply capacity is confirmed to be secured and unnecessary to improve the existing supplying capacity for the equipment to be installed in this project. However, if the power supplied is inadequate the Sri Lankan side should provide the required amount In addition, necessary equipment inside of the distribution board or wiring in the offices shall be the Sri Lankan side responsibility.

3) Maintenance Contract

As for the computer or communication system to be introduced under this Project, it is important to keep it in the best performable condition by proper maintenance. The maintenance contract is different form guarantee against defect, and the maintenance contract is required to make with the maintenance service provider. The maintenance contract includes periodic checks and adjustment of the equipment.

The maintenance work is recommended to be made by the manufacturer based on the maintenance contract, as the manufacturer understands the delivered system deeply. The expenditure of the maintenance cost belongs to the recipient side.

2-4 Project Operation Plan

2-4-1 Operation & Maintenance Organization

A proper operation and management organization must be setup to operate the traffic management system efficiently. The Road Development Authority (RDA) has already created the Expressway Operation Maintenance & Management Division (EOM&M) to operate and maintain the Southern Expressway. EOM&M now engages in the operation of the call centre and expressway surveillance system using CCTV cameras. The organization chart of EOM&M is presented below.

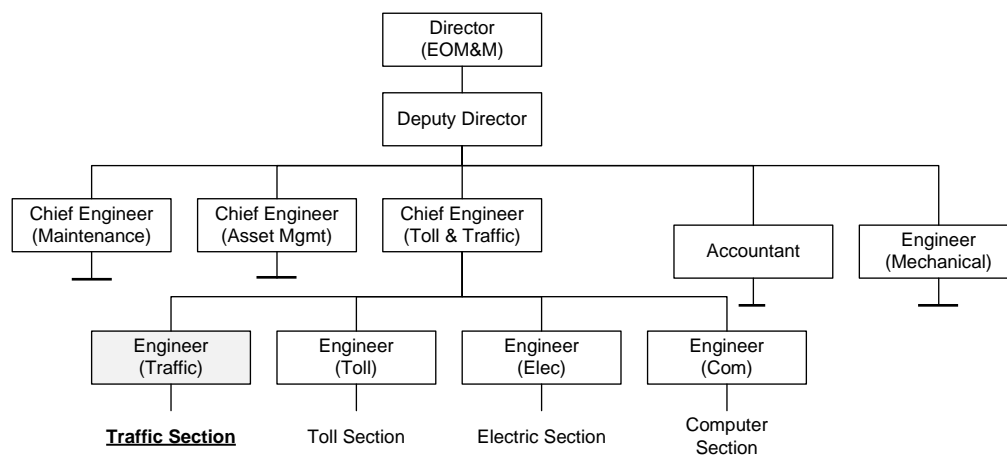


Figure 2-4-1 Organization Chart of EOM&M

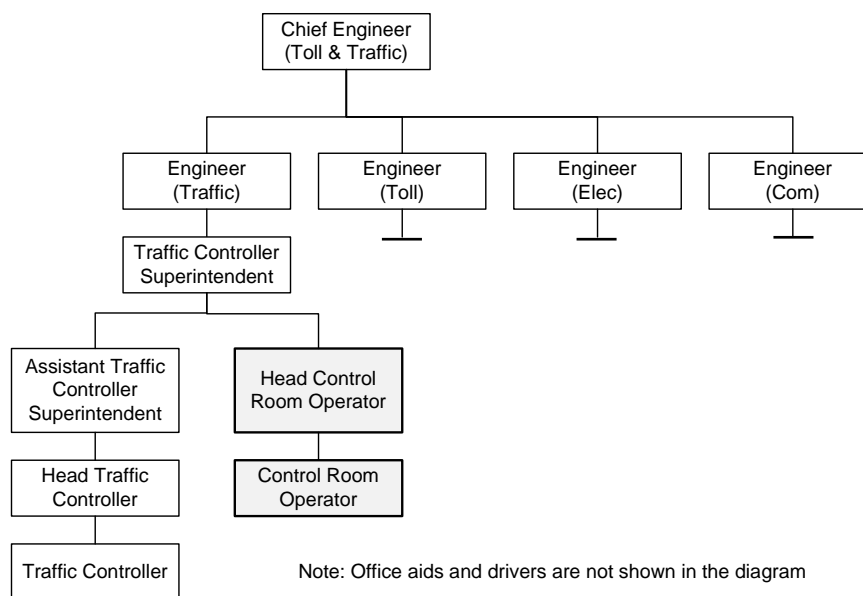


Figure 2-4-2 Organization Chart of EOM&M Traffic Section

The Traffic Section has a total of 107 staff members, at Head Office there are 2 persons, at Gelanigama Traffic Control Centre 62 persons and at Badegam Office 43 persons. The number includes office aides and drivers.

Additional staff is planned for the CCTV monitoring team and there will be 9 persons in one team as listed below. A total of 27 persons in three teams will engage in the surveillance operation.

Table 2-4-1 Composition of CCTV Surveillance Team

Position	Number of persons
CCTV Operation Supervisor	1
CCTV Operator	2
Call Operation Supervisor	1
Call Operator for 1969 (Special Number)	3
Technical staff for server	1
Technical staff for Electrics	1
Total	9

Currently the position of CCTV operator is vacant so that a total of seven persons are working at the centre. When the traffic management system is introduced by this project, another staff member needs to be added to each team

The Traffic Control System to be introduced in Gelanigama under this Project is the first of its kind and it will not be a familiar system for the person who operates it as the expressway traffic control operator. Therefore, it is required to provide training by an experienced traffic control expert as technical cooperation from Japan in addition to the initial operation guidance provided by the contractor or manufacturer.

2-4-2 Maintenance of the System

Maintenance work consists of the following tasks:

- Preventive maintenance
- Corrective maintenance/Accident repair
- System modification
- Spare parts inventory management

A maintenance specification will be prepared to set forth the requirements for the maintenance work to be provided by the maintenance contract. The maintenance specifications will have the following contents:

Table 2-4-2 Contents of Maintenance Manual (Tentative)

1.	General	3.4	Maintenance office
1.1	General requirements	4.	Preventive maintenance
1.2	Scope of works	4.1	Inspection items for preventive maintenance
1.3	Type of maintenance work	4.2	Schedule for preventive maintenance
2.	Maintenance personnel	4.3	Check list
2.1	Maintenance organization	4.5	Software preventive maintenance
2.2	Chief maintenance engineer	5.	Corrective maintenance and accident repair
2.3	Other maintenance engineer	5.1	Response time and resolution time
3.	Maintenance facilities	5.2	Inspection of faulty parts
3.1	Maintenance equipment and tools	5.3	Work order and fault/accident report
3.2	Maintenance equipment owned by the Employer	6.	System Modification
3.3	Maintenance vehicles	7.	Spare parts and consumables

Because of the initial operation guidance specified in item 2-2-4-7 to be provided by the supplier of the equipment for the personnel of EOM&M, it is considered that there will be no issue on the operation and maintenance on the equipment after hand over of the all equipment components.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Cost Estimate

The tentative cost for the Project was estimated by the JICA Preparatory Survey Team. The contents of the Project cost to be borne by Japan are shown separately from the Sri Lankan side by the Survey Team. This cost estimate is provisional and will be further examined by the Government of Japan for approval of the Grant.

(2) Premises of Estimation

- (i) Time of estimate : October 2012
- (ii) Exchange rate : 1US\$ = JPY 80.40 1LKR= 0.62JPY
- (iii) Implementation period : Tendering process and construction period are shown in the Implementation Schedule
- (iv) Others : Assuming that the Project will be implemented under the Japan's Grant Aid Scheme. The above-mentioned exchange rate will be reviewed by the Government of Japan.

(3) Cost Borne by Sri Lankan Government

The estimated cost to be provided by the Government of Sri Lanka is shown below. This cost was estimated for advertisement charges with TV and radio spots, advertisement goods. This advertisement is required for the potential drivers to use expressways and to understand the traffic control system to be introduced under the project. **Approximate Project Costs: 8.1 Million Sri Lankan Rupee**

2-5-2 Operation & Maintenance Cost

Annual operation and maintenance cost of the equipment which is procured by the Project is estimated at about Japanese Yen 11 mil (LKR 17.1 Mil) which includes the cost required for periodical replacement of parts and repair works for trouble. The cost is required separately from the guarantee against defects. Breakdown of the cost is as follows:

- 1) Periodical inspection:
Yen 1.5 Mil (LKR 2.4 Mil); for 2 weeks work by 1 engineer in Sri Lanka
- 2) Periodical replacement of consumables:
Yen 0.5 Mil (LKR 0.8 Mil); for 2 units LED per year
- 3) Trouble shooting:
Yen 1.0 Mil (LKR 1.6 Mil); for printed circuit board and power unit
- 4) Employment cost for operation:
Yen 0.7 Mil (LKR 1.2 Mil); for Additional 3 Traffic Controllers
- 5) Communication charge:
Yen 6.9 Mil (LKR 11.1 Mil)

This amount is equivalent to approximately 0.6 % of the annual supply and employee cost, which suggests that the operation/maintenance cost of the Project may not significantly affect the finances of RDA.

Chapter 3 Project Evaluation

3-1 Preconditions

For the implementation of the project without any delay, the Recipient shall be responsible for the following items:

(1) Obtaining of construction permits

To obtain the construction permits and required procedures from RDA in relation to OCH and SEW which are the sections of the roads in the project.

(2) Tax exemption

To arrange for tax exemptions regarding equipment and materials from Japan such as import tax, domestic taxes and other charges.

(3) Social and environmental considerations

To get the approval in compliance with any environmental impact assessment and other regulations in Sri Lanka, if required.

3-2 Necessary Inputs by Recipient Country

In order that the equipment to be installed by the project will be effectively and continuously utilized, the Recipient is required to;

(1) Traffic control operator

To organize three teams, 2 shift system 24 hours a day for traffic control management work and manage traffic control equipment to be installed by the skilled traffic control operators.

(2) Electricity supply

To supply electricity for equipment to be installed by the project on the roads and at the traffic control centre.

(3) Space for equipment to be installed by the project

To provide the space for equipment to be installed by the project at the Gelanigama traffic control centre.

(4) Operation and maintenance for equipment to be installed by the project

To allocate the required budget for continuous operation and maintenance of equipment installed by the project.

(5) Contract with telecommunication and broadcasting companies

To provide information to users through contracted telecommunication and broadcasting companies.

(6) Effective utilization of mass media

To publicize ITS through mass media in an early stage of the project in order to promote the necessity of the expressway and produce the effect expected from the project.

3-3 Important Assumptions

The external factors required to produce and sustain the effect expected for the project are as follows:

(1) Capacity building of traffic control operators

The traffic control operators will be trained for a certain period by a Japanese traffic control expert who will provide technical training utilizing the equipment to be installed by the project. This will improve the traffic control service and accurate information provision to the users.

(2) Provision of standardized traffic control service

With respect to roads planned or under construction, it is important to provide standardized traffic information to avoid confusion. Therefore, it is recommended that traffic control equipment for other sections of roads are selected to maintain the service level of traffic information provision in the nationwide expressway network.

(3) Expansion of the traffic control system

If the traffic volume and/or number of objects to monitor increase on the roads under the project, additional surveillance cameras and roadside equipment must be installed for appropriate monitoring.

3-4 Project Evaluation

3-4-1 Relevance

(1) Beneficiaries of the project

The beneficiaries of the project are 7,000 cars per day on the section of the road and the persons in the cars. In addition, 5.02 million inhabitants in the western and southern provinces will receive indirect benefits.

(2) Objective of the Project

The objective of the project is to introduce a traffic control system which is capable of gathering information and providing accurate information to the users on the expressways and access roads

in order to minimize the adverse effects of road closure and traffic congestion caused by incidents. This will contribute to improve the livelihood of local residents and foster community development in addition to reduction of traffic accidents and will contribute to ensure smooth traffic on the expressways

(3) Consistency of the government of Sri Lanka’s road network development plan

The “Vision for the Future” formulated by the government of Sri Lanka in 2010 says the slow pace of road network development and transportation system development impede the unity of the nation and bring political uncertainty. The “Vision for the Future” plans to improve the road network from 2010 to 2020. This will contribute to improve mobility and access, reduce travel time and maintenance cost, and further economic growth. Therefore, the project is consistent with the government of Sri Lanka’s policy.

(4) Consistency of Japan’s foreign assistance policy

The traffic control system to be procured by the project is based on the advanced technologies of Japan. It coincides with Japanese economic strategies for Asian countries which utilize the excellent technologies and experiences of Japan through assistance for development of infrastructure utilization of the scheme for integrated infrastructure systems.

3-4-2 Effectiveness

(1) Expected quantitative effect

The expected quantitative effect from the project is shown in Table 3-4-1

Table 3-4-1 Expected quantitative effect

Indicator	Present (Year 2012)	Target time* ² (Year 2017)
Time required for information provision to users after occurrence of an incident	30 minutes* ¹	5 minutes

*¹ Maximum time required for the following actions:
 - The Vehicle with VMS at the vehicle standby office goes to the site of an incident (in this case, the site is the place farthest from the vehicle standby office)
 - The Vehicle with VMS grasps and reports the situation to the traffic control centre
 - The traffic control centre provides information to the users

*² Three years after project completion

(2) Expected qualitative effect

- (i) To promote installation of ITS equipment utilizing Japanese advanced technologies on the expressway under construction.
- (ii) To improve convenience regarding the expressways such as choice of optimum route and expectation of arrival time by traffic information provision
- (iii) To improve the safety of driving on the expressways by provision of information about traffic congestion, remaining obstacles, and bad weather.

Consequently, it is concluded that implementation of the Project is appropriate, and effectiveness of the Project is expected.

Appendix

1. Member List of the Study Team

1) Field Survey

No.	Name	Position	Organization
1	Mr. Yoshihiro Kakishita	Leader	JICA
2	Mr. Daisuke Fukuzawa	Expressway ITS	JICA
3	Mr. Kei Mamiya	Project Coordinator	JICA
4	Mr. Keigo Konno	Chief Consultant / Transport Planning	Oriental Consultants Co., Ltd.
5	Mr. Seiya Matsuoka	ITS System Design	Oriental Consultants Co., Ltd.
6	Mr. Takayoshi Ito	ITS Equipment Design	Oriental Consultants Co., Ltd.
7	Mr. Hiroaki Kurita	Communication Network Design	Oriental Consultants Co., Ltd.
8	Mr. Junji Yamada	Electric Power Supply Facility Design	Oriental Consultants Co., Ltd.
9	Mr. Michiya Kitayama	Roadside Facilities and Construction Planning	East Nippon Expressway Co., Ltd.
10	Mr. Toshinori Kanazawa	Procurement Condition and Cost Estimate	Oriental Consultants Co., Ltd.
11	Mr. Kazuto Matsuzawa	Coordinator	East Nippon Expressway Co., Ltd.

2) Outline Explanation of the Preparatory Survey

No.	Name	Position	Organization
1	Mr. Yoshihiro Kakishita	Leader	JICA
2	Mr. Daisuke Fukuzawa	Project Coordinator	JICA
3	Mr. Keigo Konno	Chief Consultant / Transport Planning	Oriental Consultants Co., Ltd.
4	Mr. Seiya Matsuoka	ITS System Design	Oriental Consultants Co., Ltd.

2. Study Schedule

1) Field Survey

Order	Date	Day	JICA		Leader/ Transport Planning	Designing for System of ITS	Designing for Communication Network	Designing for Equipment and Material of ITS	Designing for Electric System	Designing Roadside Facilities/ Construction Planning	Procurement Condition/ Cost Estimate
			Mr. Yoshihiro KAKISHITA Mr. Daisuke FUKUZAWA Mr. Kei MAMIYA	Mr. Keigo KONNO							
-	2-Sep	Sun	Movement to Colombo								
-	3-Sep	Mon	Discussion with JICA, Site Survey								
-	4-Sep	Tue	Discussion with MoPH and RDA, Data Arrangement								
-	5-Sep	Wed	Minutes of Discussion with MoPH and RDA								
-	6-Sep	Thu	Discussion with MoPH and RDA, Data Arrangement								
-	7-Sep	Fri	Ditto								
-	8-Sep	Sat	Data Arrangement, Site Survey								
-	9-Sep	Sun	Ditto								
-	10-Sep	Mon	Minutes of Discussion/ Sign of MD with MoPH and RDA								
-	11-Sep	Tue	Movement to Narita								
-	12-Sep	Wed									
-	13-Sep	Thu									
-	14-Sep	Fri									
-	15-Sep	Sat									
-	16-Sep	Sun									
-	17-Sep	Mon									
-	18-Sep	Tue									
-	19-Sep	Wed									
1	20-Sep	Thu			Movement to Colombo				Movement to Colombo		
2	21-Sep	Fri			Courtesy Visit on MoPH, RDA and JICA office				Courtesy Visit on MoPH, RDA and JICA office		
3	22-Sep	Sat			Data Arrangement/Meeting in Study Team/Site Survey				Data Arrangement/Meeting in Study Team/Site Survey		
4	23-Sep	Sun			Data Arrangement				Data Arrangement		
5	24-Sep	Mon			Discussion with MoPH and RDA on Inception Report and Minutes of Discussion				Discussion with MoPH and RDA on Inception Report and Minutes of Discussion		
6	25-Sep	Tue			Verification of Adequacy and Need of Introduction of the Provision System for Road Traffic Information				Verification of Adequacy and Need of Introduction of the Provision System for Road Traffic Information		
7	26-Sep	Wed			Ditto				Ditto		
8	27-Sep	Thu			Ditto				Ditto		
9	28-Sep	Fri			Site Survey				Site Survey		
10	29-Sep	Sat			Data Arrangement/Meeting in Study Team/Site Survey				same as on the left	Movement to Narita	Data Arrangement/Meeting in Study Team/Site Survey
11	30-Sep	Sun			Data Arrangement				same as on the left	Movement to Narita	Data Arrangement
12	1-Oct	Mon			Site Survey		Movement to Colombo	Site Survey			Site Survey
13	2-Oct	Tue			Discussion/Confirmation about Project Commitment		Site Survey				Survey related to Construction and Installation
14	3-Oct	Wed			Data Collection in MoPH		Ditto				Ditto
15	4-Oct	Thu			Ditto		Ditto				Ditto
16	5-Oct	Fri			Ditto		Ditto				Ditto
17	6-Oct	Sat			Data Arrangement/Meeting in Study Team/Site Survey						Data Arrangement/Meeting in Study Team/Site Survey
18	7-Oct	Sun			Data Arrangement						Data Arrangement
19	8-Oct	Mon			Discussion for System Architecture						Procurement Condition Survey
20	9-Oct	Tue			Ditto						Ditto
21	10-Oct	Wed			Ditto						Ditto
22	11-Oct	Thu			Ditto						Ditto
23	12-Oct	Fri			Ditto						Ditto
24	13-Oct	Sat			Data Arrangement/Meeting in Study Team/Site Survey						Data Arrangement/Meeting in Study Team/Site Survey
25	14-Oct	Sun			Data Arrangement						Data Arrangement
26	15-Oct	Mon			Discussion for System Architecture						Supplement Investigation of Procurement Condition/Construction and Installation
27	16-Oct	Tue			Supplement Investigation						Ditto
28	17-Oct	Wed			Data Analysis						Ditto
29	18-Oct	Thu			Ditto						Ditto
30	19-Oct	Fri			Discussion with MoPH Report to JICA office		Movement to Narita	Discussion with MoPH Report to JICA office			Discussion with MoPH Report to JICA office
31	20-Oct	Sat			Data Arrangement/Meeting in Study Team/Site Survey			Data Arrangement/Meeting in Study Team/Site Survey			Data Arrangement/Meeting in Study Team/Site Survey
32	21-Oct	Sun			Data Arrangement			Data Arrangement			Data Arrangement
33	22-Oct	Mon			Movement to Narita			Site Survey	Movement to Narita		Movement to Narita
34	23-Oct	Tue						Ditto			
35	24-Oct	Wed						Ditto			
36	25-Oct	Thu						Data Analysis			
37	26-Oct	Fri						Ditto			
38	27-Oct	Sat						Data Arrangement			
39	28-Oct	Sun						Ditto			
40	29-Oct	Mon						Data Analysis			
41	30-Oct	Tue						Ditto			
42	31-Oct	Wed						supplement investigation			
43	1-Nov	Thu						Ditto			
44	2-Nov	Fri						Movement to Narita			

2) Outline Explanation of the Preparatory Survey

Month	Date	Day	JICA	JICA	Leader/ Transport Planning	Designing for System of ITS
			Mr. Yoshihiro KAKISHITA	Mr. Daisuke FUKUZAWA	Mr. Keigo KONNO	Mr. Seiya MATSUOKA
Dec	11th	Tue			Arrival at Colombo	
Dec	12th	Wed			Meeting with JICA SL office, Pre-Kick-off Meeting with RDA	
Dec	13th	Thu			Explanation of Draft Final Report to RDA	
Dec	14th	Fri			Ditto	
Dec	15th	Sat		Departure from NRT, Arrival at Male	Road Survey on STDP	Departure from NRT, Arrival at Colombo
Dec	16th	Sun	Departure from NRT, Arrival at Colombo, Progress Meeting	Departure from Male, Arrival at Colombo	Progress Meeting	Progress Meeting
Dec	17th	Mon	Meeting with JICA SL office, Courtesy call to MoPH, Courtesy call to ERD	Meeting with JICA SL office, Courtesy call to MoPH, Courtesy call to ERD	Meeting with JICA SL office, Courtesy call to MoPH, Courtesy call to ERD	Meeting with JICA SL office, Courtesy call to MoPH, Courtesy call to ERD
Dec	18th	Tue	Kick off Meeting With RDA, Meeting with ADB (Hearing of A4 Access Road Plan)	Kick off Meeting With RDA, Meeting with ADB (Hearing of A4 Access Road Plan)	Kick off Meeting With RDA, Meeting with ADB (Hearing of A4 Access Road Plan)	Kick off Meeting With RDA, Meeting with ADB (Hearing of A4 Access Road Plan)
Dec	19th	Wed	Meeting with RDA	Meeting with RDA	Meeting with RDA	Meeting with RDA
Dec	20th	Thu	Meeting with RDA (Finalization of M/D), Signing of M/D (DG/RDA)	Meeting with RDA (Finalization of M/D), Signing of M/D (DG/RDA)	Meeting with RDA (Finalization of M/D), Signing of M/D (DG/RDA)	Meeting with RDA (Finalization of M/D), Signing of M/D (DG/RDA)
Dec	21st	Fri	Report to JICA SL office, Departure from Colombo	Report to JICA SL office, Departure from Colombo	Report to JICA SL office, Departure from Colombo	Arrival at NRT
Dec	22nd	Sat	Arrival at NRT	Arrival at NRT	Arrival at NRT	

3. List of Parties Concerned in the Recipient Country

Ministry of Ports and Highways of Sri Lanka

Mr. R.W. Ranjith Pemasiri Secretary

Ministry of Finance and Planning

Mr. Mapa Pathirana Director General, Department of External Resources

Ms. D. L. U. Peiris Director, Department of External Resources

Ms. Menaka Programme Officer, Department of External Resources

Road Development Authority

Mr. W. A. S. Weerasinghe Director General

Mr H. M. K. G. G. Bandara Director, Planning Division

Mr. B. V. D. N. Chandrasiri Project Director (Southern Transport Development Project)

Ms. Fernando Namalie Deputy Director, Planning Division

Mr. R. A. Sndath Deputy Director, Planning Division

Mr. D. N. Siyambalapitiya Deputy Director, Planning Division

Mr T. K. Ranatunge Director of EOM&M (Expressway Operation, Maintenance & Management Division)

Mr. R. A. D. Kahatapitiya Act. Dy. Director, EOM&M

Mr. Udila Shalitha Officer

Mr. M. P. K. L. Ceunereli Project Director, CKE

Mr. Hasintha Dhanapala Tolling (User Fee) Engineer

Mr. L. K. N. Lilinikumar Electric Engineer

Asian Development Bank

Mr. Chen Chen Transport Specialist, Transport and Communication Division, South Asia Department

Ms. Sharon Zhao Social Development Specialist, Transport and Communication Division, South Asia Department

Mr. Aruna Nanayakkara Transport Specialist, Sri Lanka Resident Mission

Department of Meteorology

Mr. S. H. Kaliyawasam Director General

Mr. D. A. Jayasinghearachchi Deputy Director

JICA Sri Lanka Office

Mr. Hiroyuki Abe Senior Representative

Mr. Hiroaki Adachi Representative

Ms. Namal Ralapanalue Project Specialist

4. Minutes of Discussion

1) Minutes of Discussions: September 10, 2012

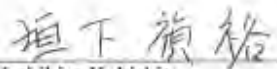

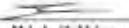
**Minutes of Discussions
on the Preparatory Survey
on the Project for the Installation of Intelligent Transport System
for Expressway Network
in the Democratic Socialist Republic of Sri Lanka**

In response to the request from the Government of the Democratic Socialist Republic of Sri Lanka (hereinafter referred to as "Sri Lanka"), the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with the Government of Japan, decided to conduct a Preparatory Survey on the Project for the Installation of Intelligent Transport System for Expressway Network (hereinafter referred to as "the Project").

JICA sent to Sri Lanka the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Yoshihiro Kakishita, Senior Advisor to the Director General of Economic Infrastructure Department, JICA. The Team is scheduled to stay in the country from 2nd September to 22nd October, 2012.

The Team held a series of discussions with the officials concerned of the Government of Sri Lanka (hereinafter referred to as "the Sri Lankan side") and conducted site surveys in the study area. In the course of the discussions, both sides have confirmed the main items described in the sheets attached hereto. The Team will proceed to further works and prepare Preparatory Survey Report.

Colombo, 10th September, 2012

 Yoshihiro Kakishita Leader, Preparatory Survey Team, Japan International Cooperation Agency	 M P H U K Mapa Pathirana Director General, External Resources Department	 W A S Weerasinghe Director General, Road Development Authority
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ATTACHMENT

1. Objective of the Project

The objective of the Project is to provide necessary road traffic information to road users with a view to realizing smooth and safe transportation in Southern Expressway and related expressways including connecting roads (hereinafter referred to as "the Expressways") through the installation of information provision system.

2. Project Site

The Project site is located on the Expressways as shown in Annex-1.

3. Responsible and Implementing Organization

(1) The responsible organization is the Ministry of Ports and Highways (MOPH).

(2) The implementing organization is the Road Development Authority (RDA).

The Organization Structure of RDA is shown in Annex-2.

4. Items requested by the Government of Sri Lanka

(1) After the discussions with the Team, the items described in Annex-3 were requested by the Sri Lankan side. Details of the items will be further discussed between both sides.

(2) The Team explained that the number and location of Variable Message Signs (VMSs) as well as other equipment would be decided through further studies by the Team. Both sides confirmed that VMSs would be installed at a few interchanges including Kottawa and Pinnaduwa Interchanges and other relevant interchanges would be decided through the further studies. The Sri Lankan side strongly requested VMSs to be installed at minimum 4 interchanges on Southern Expressway and Outer Circular Highway (OCH).

(3) Both sides confirmed that Information Processing Unit would be installed at existing Gelanigama traffic control center.

(4) Both sides agreed that the system to be installed in the Project should be compatible with other intelligent transport system (ITS) which is and to be installed in Southern Expressway and that the system should be expandable for the future development. In this regard, RDA will further discuss details with the Team. In case that other ITS installation plans arise regardless of their status, RDA will notify JICA.

(5) JICA will assess the appropriateness of the request through the Preparatory Survey and will report the findings to the Government of Japan. Implementation and components of the Project will be decided by the Government of Japan.

5. Japan's Grant Aid Scheme

(1) The Sri Lankan side has understood the Japan's Grant Aid scheme explained by the Team as described in Annex-4 and 5.

(2) The Sri Lankan side will take the necessary measures, as described in Annex-6, for smooth implementation of the Project as prerequisites for the Japan's Grant Aid to be implemented.

6. Further schedule of the Study

(1) The Team is scheduled to continue further surveys in Sri Lanka until 22nd October, 2012.

(2) JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Sri Lanka in order to explain its contents around December 2012.

(3) If the contents of the report are accepted in principle by the Sri Lankan side, JICA will complete the final report in English and send it to Sri Lanka around May 2013.

7. Environmental and Social Consideration

(1) The Sri Lankan side explained to the Team that environmental impact assessment is not required for the Project because the component of the Project is mainly an installation of

equipment.

- (2) The Sri Lankan side confirmed that RDA shall conduct land acquisition and necessary arrangements (if necessary) before Project implementation.

8. Other Relevant Issues

- (1) The Team explained to the Sri Lankan side that the Project should be defined as a pioneer project for the future expansion of ITS. The Sri Lankan side understood the idea and showed their intention for the expansion.
- (2) The Sri Lankan side confirmed that the related expressway network is as follows and observed that as the expressway network expanded, the importance of ITS would be vastly increased.
- a) Colombo - Katunayake Expressway Project will be finished in August 2013
 - b) Outer Circular Highway Project (southern part) will be finished in December 2013
 - c) Outer Circular Highway Project (northern part) will be finished in December 2015
- (3) The Team requested the Sri Lankan side that the necessary number of counterpart personnel shall be assigned to the Team during the Survey in Sri Lanka. The Sri Lankan side agreed to support the Team based on the request.
- (4) The Team requested the Sri Lankan side to make necessary arrangements with related organizations during the Survey in Sri Lanka. The Sri Lankan side agreed to support the Team based on the request.
- (5) The Team requested the Sri Lankan side that the answers to the questionnaires which the Team will submit to the Sri Lankan side shall be given to the Team in a timely manner.
- (6) The Team requested following arrangements for the Team.
- a) project office provided by RDA with power supply, AC, internet access and office furniture
 - b) authority to enter into proposed project area
- (7) Both sides confirmed that the Sri Lankan side will be responsible for power supply to Project sites and data communication facilities to each piece of Project equipment.
- (8) Both sides confirmed that the system installed in the Project shall be utilized effectively and properly on Southern Expressway operation with appropriate budget and staff.
- (9) Both sides confirmed that necessary instructions of the equipment procured under the Project would be included in the Project. In this context, the Sri Lankan side strongly requested training for expressway operation utilizing the system installed in the Project for selected numbers of RDA officers.
- (10) Both sides confirmed that the equipment procured under the Project must be maintained and used properly for the implementation of the Project under the responsibility of the Sri Lankan side. In this regard, maintenance contract between the Sri Lankan side and the equipment supplier is recommended to be concluded prior to the expiration of equipment warranty against defects.

(End)

P.F.



- Annex-1 Project Site (map)
- Annex-2 Organization Chart of RDA
- Annex-3 Items requested by the Sri Lankan side
- Annex-4 Japan's Grant Aid Scheme
- Annex-5 Flow Chart of Japan's Grant Aid Procedures
- Annex-6 Major Undertakings to be taken by Each Government

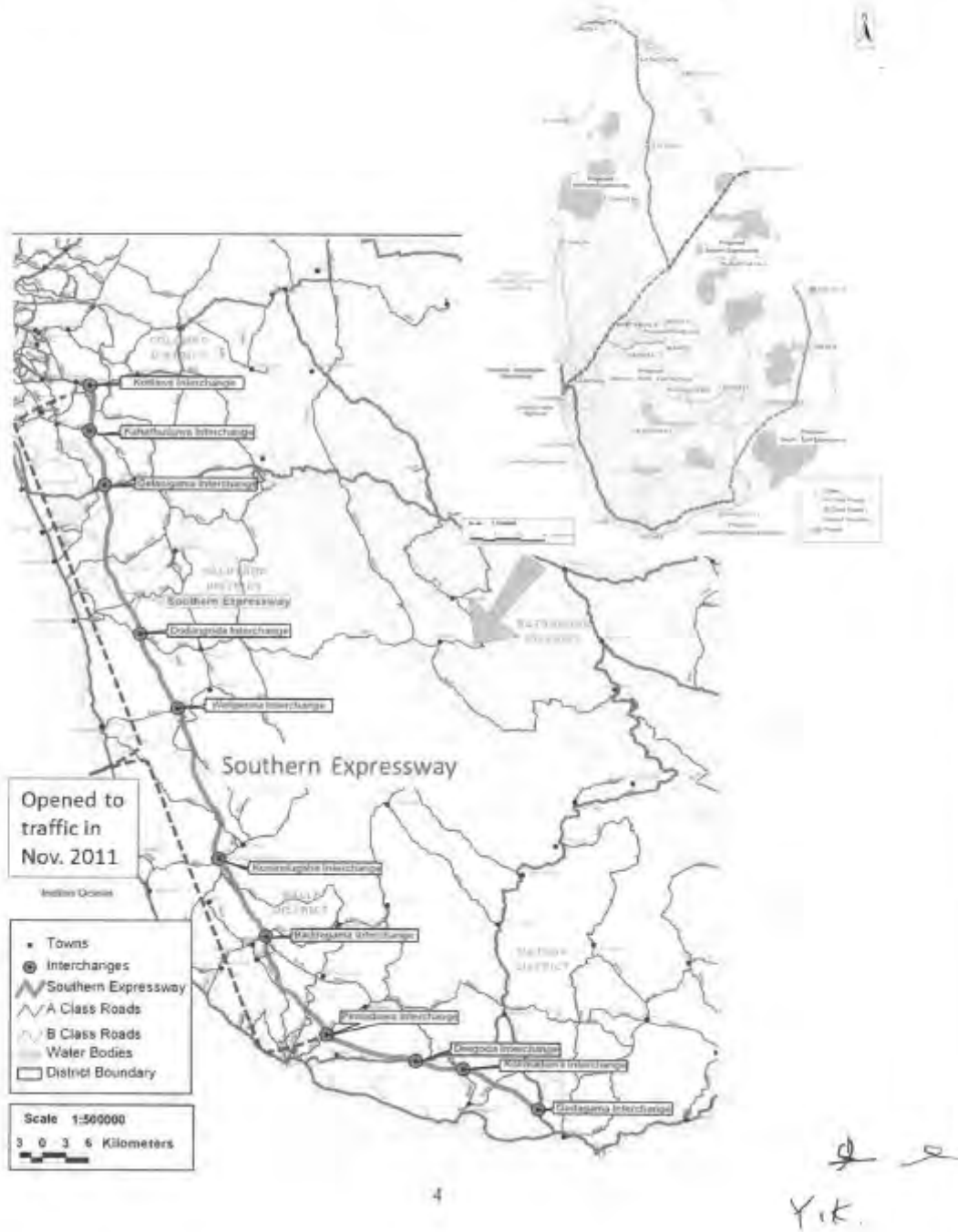
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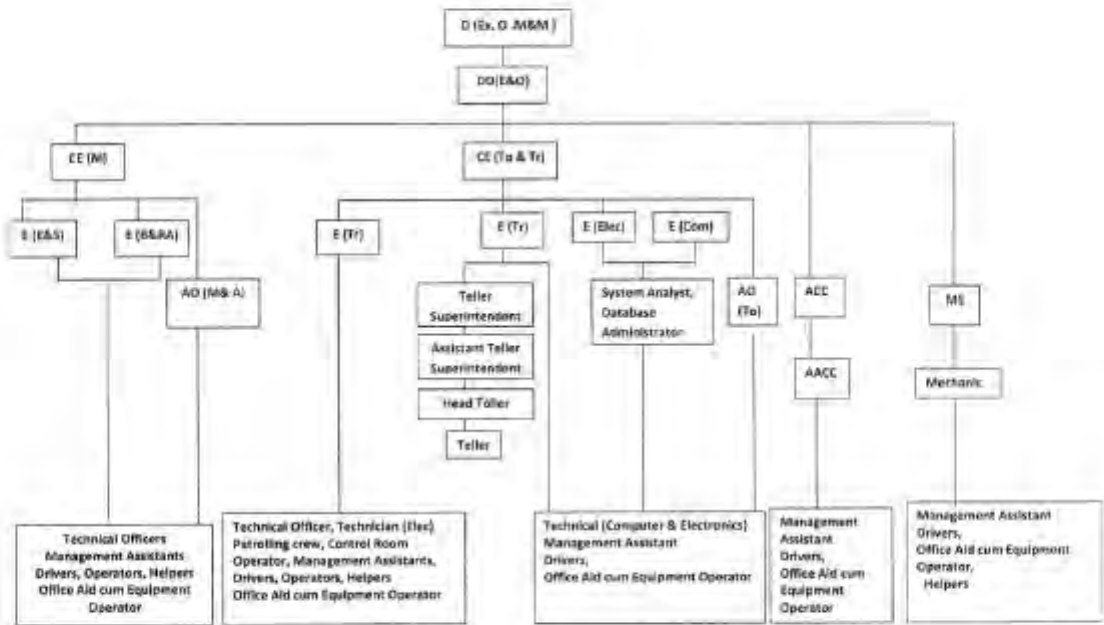
Annex-1

The Project Site

Sri Lanka



Organization Chart of EOM&M (Expressway Operation, Maintenance and Management), RDA



- D (Ex.O.M&M)-Director(Expressway Operation, Maintenance & Management)
- DD (EAO)-Deputy Director (Engineering & Operation)
- CE (M)-Chief Engineer (Maintenance)
- CE (To & Tr)- Chief Engineer(Tolling & Traffic)
- E(E&S)- Engineer(Expressway& Structures)
- E(B&RA)-Engineer(Building& Road Area)
- E(Tr)-Engineer(Traffic)
- E(To)-Engineer(Tolling)
- E(Com)-Engineer(Computer)
- E(Elec)-Engineer(Electrical& Electronic)
- AO(M&A)-Administrative Officer(Maintenance & Administration)
- AO(To)- Administrative Officer(Tolling)
- ACC-Accountant
- MS-Mechanical Superintendent
- AACC-Accounts Assistant

S.K.

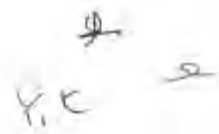
Annex-3

Requested Items

No.	Item	Amount	Remarks
1. Information Collection Unit			
1-1	Closed Circuit Television Camera (CCTV)	15	
1-2	Traffic Counter	14	
1-3	Meteorological Observation System	8	
2. Information Processing Unit			
2-1	System Server	1 set	
2-2	System Software	1 set	including recovery media
2-3	Operation Instruments (PC)	1 set	
2-4	Console Monitor	1 set	
3. Information Supply Unit			
3-1	Variable Message Sign (VMS)	15	
4. Others			
4-1	Spare Parts	1 set	LED unit etc.

Note:

- 1) Items will be further discussed between both sides.
- 2) Installation work will be included in the Project.
- 3) Each equipment component includes necessary auxiliaries such as communication cable, power supply cable, UPS, lightning protection system, earthing system and others required to complete it.



Annex-4

Japan's Grant Aid

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on the law and the decision of the GoJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey (hereinafter referred to as "the Survey")
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by The GOJ and JICA, and Approval by the Japanese Cabinet
- Authorities for Determining, Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(i) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures are necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey, and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and the G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex-6.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an

account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

- b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of a Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

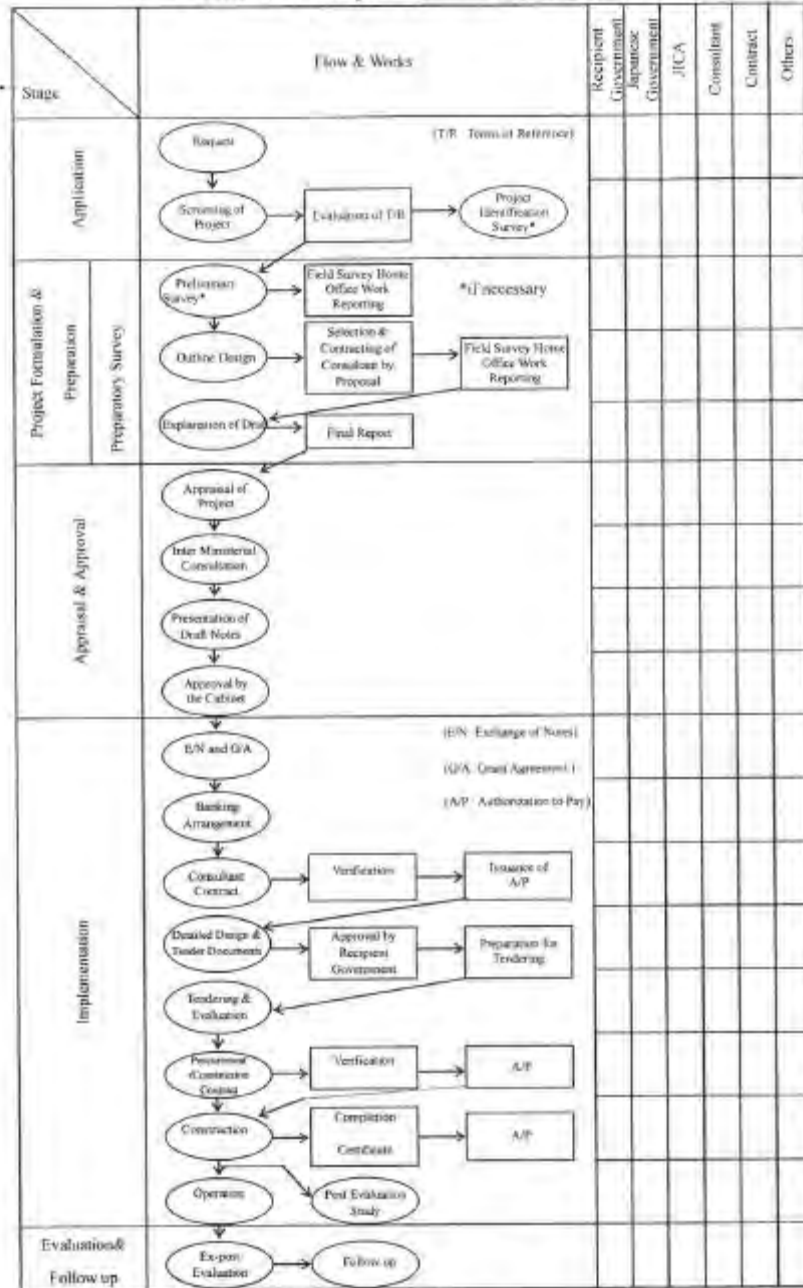
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

(End)

Y. K.  

Annex-5

Flow Chart of Japan's Grant Aid Procedures



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Annex-6

Major undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
2	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be borne by the Authority without using the Grant.		●
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		●
4	To ensure that the products be maintained and used properly and effectively for the implementation of the Project.		●
5	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project.		●
6	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
7	To give due environmental and social consideration in the implementation of the Project.		●

*1 B/A: Banking Arrangement, A/P: Authorization to pay. *2 If the environmental screening category is C, No. 7 is unnecessary

Y.K.  

2) Minutes of Discussions: December 21, 2012

**Minutes of Discussions
on the Preparatory Survey
on the Project for Development of Intelligent Transport System for Expressways
in the Democratic Socialist Republic of Sri Lanka
(Explanation on Draft Final Report)**


In September 2012, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team on the Project for the Installation of Intelligent Transport System for Expressway Network to the Democratic Socialist Republic of Sri Lanka (hereinafter referred to as "Sri Lanka"), which through discussions, field surveys and technical examination of the results in Japan, prepared a Draft Final Report of the study.


In order to explain and to consult with the officials of concerned authorities in Sri Lanka (hereinafter referred to as "the Sri Lankan side") on the contents of the Draft Final Report, JICA dispatched to Sri Lanka the Preparatory Survey Team for Draft Final Report Explanation (hereinafter referred to as "the Team"), which is headed by Mr. Yoshihiro KAKISHITA, Senior Advisor to Director General, JICA Economic Infrastructure Department. The Team is scheduled to stay in Sri Lanka from December 11 to 21, 2012.

The Team held discussions with the Sri Lankan side. In the course of the discussions, both sides have confirmed the main items described in the sheets attached hereto.

Colombo, December 21, 2012


Yoshihiro Kakishita
Leader,
Preparatory Survey Team
Japan International
Cooperation Agency


M.P.D. U.K. Mapa Pathirana
Director General,
External Resources Department
Ministry of Finance and
Planning


W.A.S. Weerasinghe
Director General,
Road Development Authority

b/c e

ATTACHMENT

1. Project Title

Both sides agreed that the Project Title is "the Project for Development of Intelligent Transport System for Expressways" (hereinafter referred to as "the Project").

2. Objective of the Project

The objective of the Project is to provide necessary road traffic information to road users with a view to realizing smooth and safe transportation in Southern Expressway (hereinafter referred to as "SEW"), Outer Circular Highway (hereinafter referred to as "OCH") and related roads through the installation of information provision system.

3. Project Site

The Project site is located on SEW, OCH and related roads as shown in Annex-1.

4. Responsible and Implementing Organization

- (1) The responsible organization is the Ministry of Ports and Highways (MOPH).
- (2) The implementing organization is the Road Development Authority (RDA).
The Organization Structure of RDA and Expressway Operation Maintenance and Management Division (EOM&M) is shown in Annex-2.

5. Validity of the Previous Minutes of Discussion

Both sides confirmed that all the agreements in the Minutes of Discussion of the preceding Preparatory Survey signed on September 10th, 2012 continue to be valid unless information is updated by the Draft Final Report.

6. Contents of the Draft Final Report

The Sri Lankan side agreed and accepted in principle the contents of the Draft Final Report and the Draft Technical Specifications of the Survey explained by the Team.

7. Components of the Project

The following are selected as the Project components. The layout plan of roadside equipment is shown in Annex-3

- (1) 16 units of gantry typed VMS for main line of expressway, 8 units of cantilever typed VMS for access road on B263, A4, A8 and A2.
- (2) 2 units of Traffic Information Board in both service areas.
- (3) 16 units of Traffic Counter at the same place of gantry typed VMS.
- (4) 16 units of Traffic Counter at every off-ramp of SEW.
- (5) 8 units of Rain Gauge at every interchange of SEW.
- (6) 10 units of Uninterruptible Power Supply (UPS) at every interchange and both service areas of SEW.
- (7) 1 set of Electric Power Supply Facility including Surge Protection at every interchange and both service areas of SEW.
- (8) 1 set of Server System in Gelanigama Traffic Control Center.
- (9) 1 set of Network Equipment, and
- (10) Installation work for the equipment.

8. Expandability

- (1) The Team explained that the components of the Project are designed to be compatible and expandable for the future development of ITS system.

- (2) Both sides confirmed that in order to realize smooth and safe transportation in expressway networks in Sri Lanka, ITS system installed in the Project should be expanded by the Sri Lankan side to other expressway networks such as the Colombo – Katunayake Expressway and the expanded section of SEW and OCH in the near future. The Sri Lankan side expressed their intention for the expansion of the system.

9. Confidentiality of the Project

(1) Project Cost

The Team explained the estimated cost of the Project as described in Annex-4. The Sri Lankan side agreed that the cost for the Project contains procurement cost of equipment, construction cost of facility, transportation cost up to the Project site, installation cost and the Consultant fees.

The Sri Lankan side agreed that the cost for the Project should not exceed the amount agreed on the Exchange of Notes (E/N) to be signed between the Governments. The Sri Lankan side understood that the estimated cost for the Project attached as Annex-4 is not the final and is subject to change as a result of the detailed design to be implemented after the E/N. Both sides agreed that the estimated cost for the Project should not be duplicated or disclosed to any outside parties (i.e. outside of JICA and the Sri Lankan side) before tender for the Project.

(2) Detailed specifications of the Facilities and Equipment

Both sides agreed that all the information related to the Project including detailed drawings, specifications of the facilities, equipment and other technical information shall not be disclosed to any outside parties (i.e. outside of JICA and the Sri Lankan side) before the conclusion of all contract(s) for the Project.

10. Japan's Grant Aid Scheme

- (1) The Sri Lankan side has understood Japan's Grant Aid Scheme explained by the Team as described in Annex-5 and 6.
- (2) The Sri Lankan side will take necessary measures, as described in Annex-7, for smooth implementation of the Project as prerequisites for the Japan's Grant Aid to be implemented.
- (3) The Sri Lankan side has also understood that the Team is not in the position to guarantee implementation of the Project, this position is the responsibility of the Government of Japan.

11. Schedule of the Study

JICA will complete the final report in accordance with the signed Minutes of Discussions and send it to the Sri Lankan side around March, 2013.

12. Other Relevant Issues

- (1) Both sides confirmed that the following undertakings should be taken by the Sri Lankan side at the Sri Lankan expenses in addition to the items mentioned in Annex-7.
- 1) Necessary assistance on issuance of licenses, permission (digging and construction) and other necessary procedures for the commencement of the installation work.
 - 2) Exemption of taxes and customs duties for project related equipment, materials and facilities.
 - 3) Necessary traffic control at the time of installation work.
 - 4) Necessary contracts with communications carrier, broadcasting companies for the utilization of the equipment.
 - 5) Power supply to the Project sites.
 - 6) Promotional activities through TV or radio media from the early stage of the Project.
- (2) Operation and Maintenance
- 1) The Team emphasized it is essential that the Sri Lankan side ensures to constantly secure the necessary budget for operation and maintenance (both periodical maintenance and accident

repair), of equipment to be procured under the Project, to ensure continuous provision of road traffic information. The Sri Lankan side has fully understood and shared the same view.

2) The Team explained such maintenance work is different from the warranty against defects which will be the responsibility of the contractor(s) and that the maintenance work should be done continuously from the commencement of the operation. In this regard, maintenance contract(s) with the supplier of the equipment or other competent agents is advisable to be concluded. The Sri Lankan side understood the importance of proper maintenance and confirmed to maintain.

3) The Team emphasized that the allocation of appropriate number of engineers for operating and maintaining the new equipment is a prerequisite to implement the Project. The Sri Lankan side understood and agreed to allocate three (3) operation teams under Chief Engineer of traffic control for 24 hours service with two (2) operation shifts for the operation.

(3) Counterpart Personnel

The Team requested the Sri Lankan side that the necessary number of counterpart personnel shall be assigned for the Project and the necessary arrangements with related organizations be made during the Project period. The Sri Lankan side agreed to assign necessary counterpart personnel.

(4) Environmental and Social Considerations

The Sri Lankan side confirmed that the Project will comply with related environmental and social laws and regulations in Sri Lanka which are or to be applied to the Project.

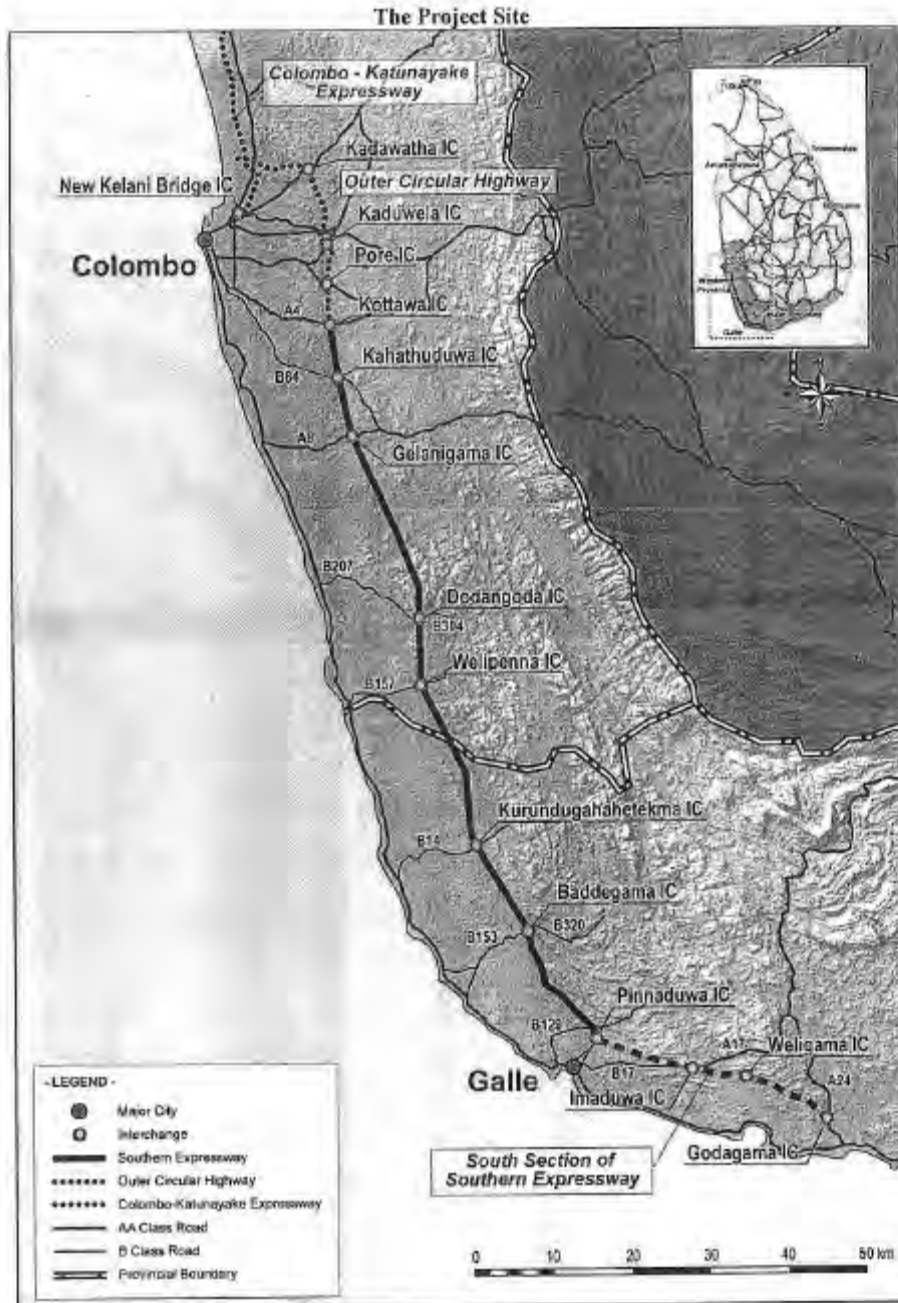
(5) The Sri Lankan side explained that southern section of OCH (Kottawa – Kaduwela) is scheduled to be opened before the commencement of operation of the equipment installed by the Project.

(6) Both sides confirmed that necessary instructions on the operation of the equipment procured under the Project are included in the Project. However, in order to operate not only the equipment in the Project but ITS of the expressway, the Sri Lankan side needs to enhance its capacity of expressway operation. Under these circumstances, the Sri Lankan side requested training by Japanese expert for expressway ITS operation.

(End)

Annex-1	Project Sites (map)
Annex-2	Organization Chart of RDA and EOM&M
Annex-3	Layout plan of roadside equipment
Annex-4	Estimated Project Cost (Confidential)
Annex-5	Japan's Grant Aid Scheme
Annex-6	Flow Chart of Japan's Grant Aid Procedures
Annex-7	Major Undertakings to be taken by Each Government

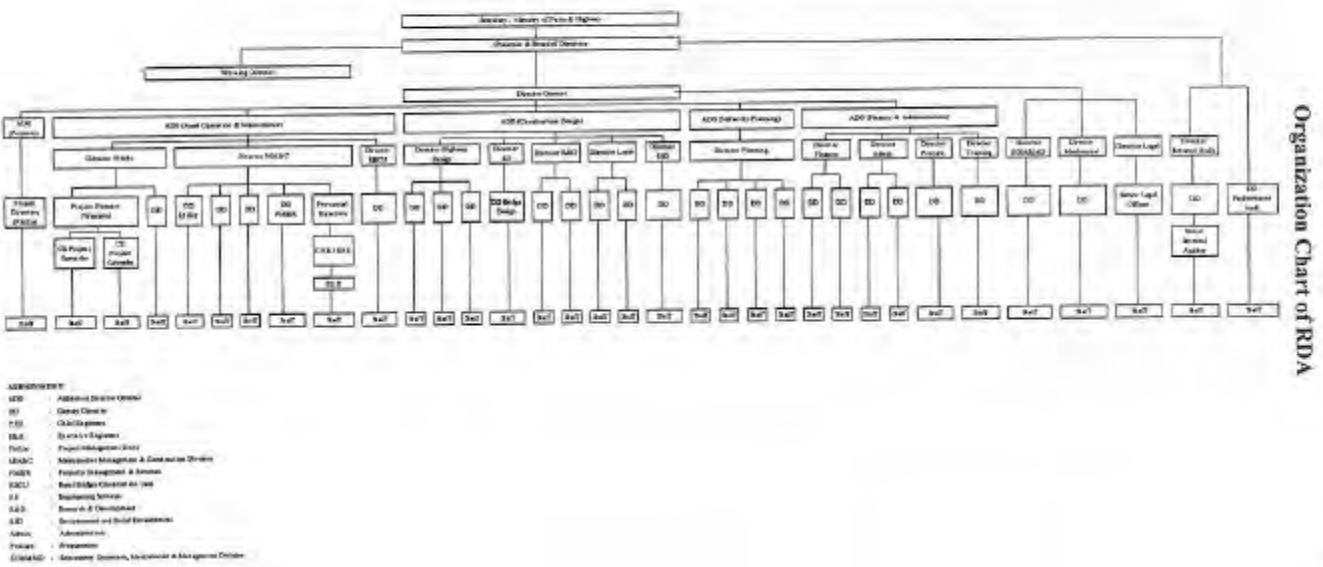
Annex-1



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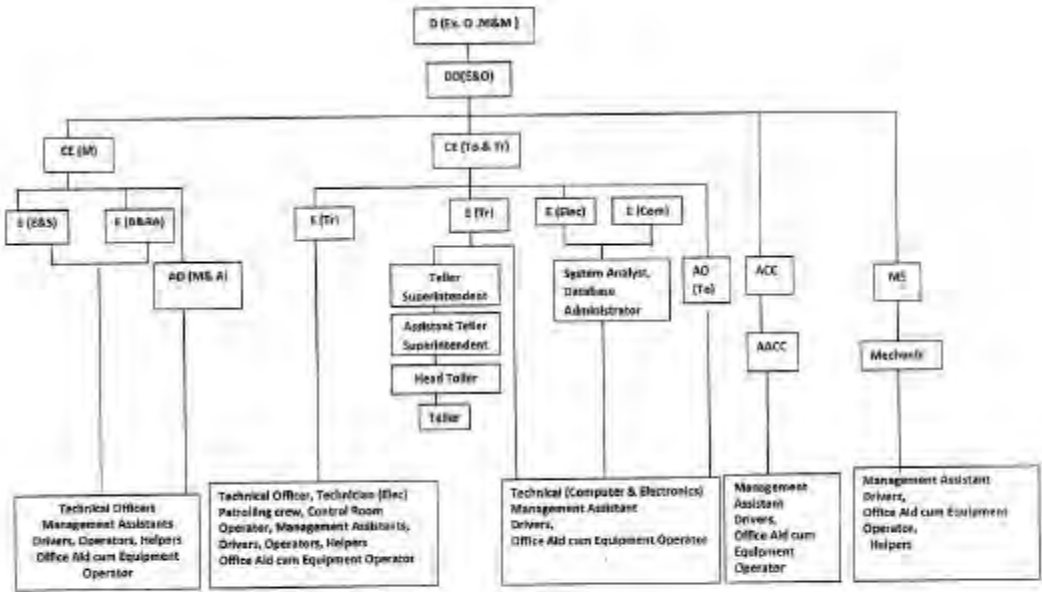
Annex-2



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T.K. *[Signature]*

Organization Chart of EOM&M (Expressway Operation, Maintenance and Management), RDA



D (Ex. O.M&M)-Director (Expressway Operation, Maintenance & Management)

DO (SBO)-Deputy Director (Engineering & Operation)

CE (M)-Chief Engineer (Maintenance)

CE (To & Tr)- Chief Engineer (Tolling & Traffic)

E (ES)-Engineer (Expressway & Structures)

E (B&RA)-Engineer (Building & Res. Area)

E (Tr)-Engineer (Traffic)

E (Inz)-Engineer (Inz)

E (Comp)-Engineer (Computer)

E (Elec)-Engineer (Electrical & Electronic)

AD (MSA)- Administrative Officer (Maintenance & Administration)

AO (Tel)- Administrative Officer (Tolling)

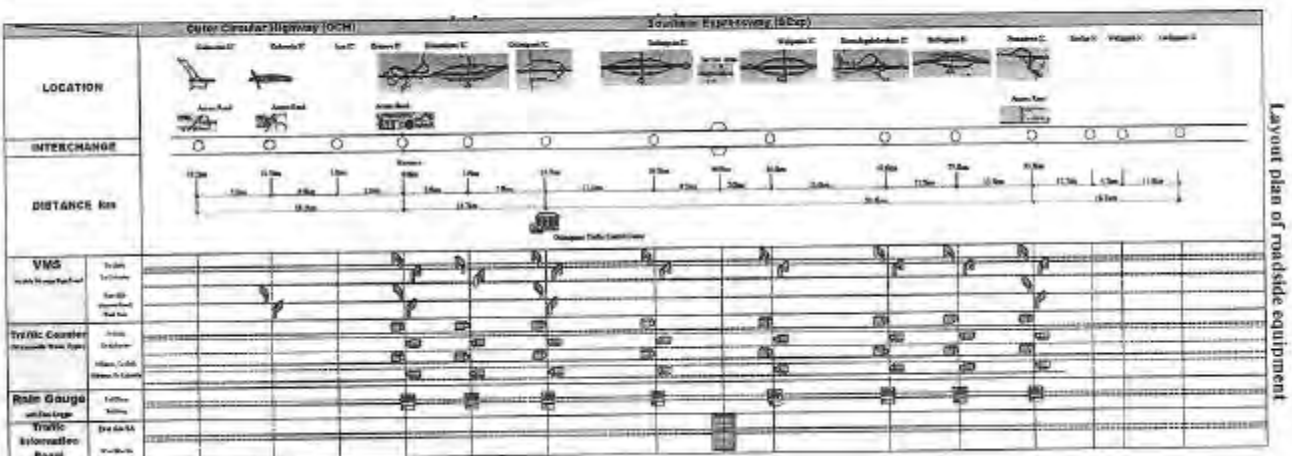
ACC-Accountant

MS-Mechanical Superintendent

AACC-Accounts Assistant

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Annex-3



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Annex 4

Project Cost Estimation (Confidential)

The Project cost will be _____ in total. The contents of the Project cost are shown separately for the Japanese borne portion and the Sri Lankan side borne portion in accordance with the condition in item 3. (3).

This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

1. Cost to be borne by the Japanese side:

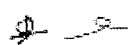
Item	Amount (Million Japanese Yen)
1) Equipment Procurement and Installation	
2) Detailed Design & Consult's Supervision	
3) Total (1+2)	

2. Cost to be borne by the Sri Lankan side : LKR 37 million (JPY 23 million)

- (1) A/P commission and Payment commission of bank: LKR 2 million (JPY 1 million)
- (2) Advertisement charge with TV and radio spot, advertisement goods : LKR 8 million (JPY 5 million)
- (3) Budget for the reimbursement for internal tax : LKR 27 million (JPY 17 million)

3. Condition for estimation

- (1) Time of estimation : October 2012
- (2) Foreign exchange rate : 1 USD\$ = JPY 78.41, 1 LKR = 0.62 JPY
- (3) Others:
The above estimation was carried out in accordance with relevant rules and the guideline of the Japanese Grant aid.


Y. H.

Annex-5

Japan's Grant Aid

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet.
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project
- Preparation of a basic design of the Project.

- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

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(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex-7.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

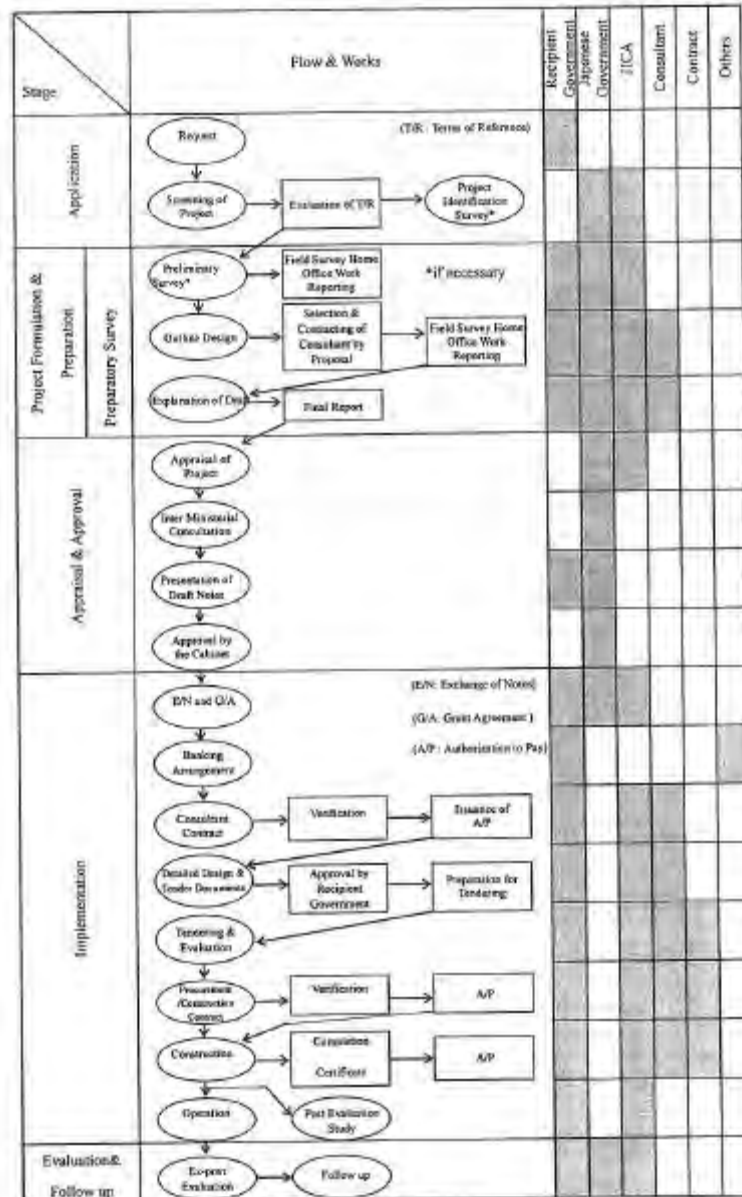
(10) Social and Environmental Considerations


A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

(End)

Annex-6

Flow Chart of Japan's Grant Aid Procedures



V.T. 

Annex-7

Major undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	•	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		•
	3) Internal transportation from the port of disembarkation to the project site	•	
2	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted.		•
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		•
4	To ensure that the products be maintained and used properly and effectively for the implementation of the Project		•
5	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		•
6	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		•
	2) Payment commission		•
7	To give due environmental and social consideration in the implementation of the Project		•

*1 B/A : Banking Arrangement, A/P : Authorization to pay.

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5. Technical Note: October 18, 2012

TECHNICAL NOTES ON THE PREPARATORY SURVEY ON THE PROJECT FOR INTELLIGENT TRANSPORTATION SYSTEM FOR THE EXPRESSWAY NETWORK OF SRI LANKA

The JICA Preparatory Survey Team on the Preparatory Survey (hereinafter referred to as "the Team") on the Project for Intelligent Transportation System for the Expressway Network of Sri Lanka (hereinafter referred to as "the Project") and Road Development Authority (hereinafter referred to as "RDA") which is the responsible and implementing organization for the aforementioned Project have confirmed on the items described in the attached Technical Notes. Based on these Technical Notes, the Team will finalize the draft report for the outline design of the Project including the Project cost estimate through analysis of the field survey and discussions with concerned authorities in Japan.

The draft report including the results of the analysis and the outline design will be presented and explained around the middle of December 2012.

October 18, 2012
Colombo



Mr. Keigo KONNO

Chief Consultant,
JICA Preparatory Survey Team



Mr. W. A. S. Weerasinghe

Director General,
Road Development Authority

ATTACHMENT

1. Exact Name of Each Interchange

The Team had requested RDA the exact name of Interchange on Southern Expressway. RDA answered the exact name to the Team as Annex-1.

2. Design Concept of Traffic Information System for Southern Expressway (SExp) and OCH

The Team had drawn up the concept of traffic information system for SExp and OCH as Annex-2, and explained it to RDA. RDA understood the concept and agreed to the design concept of the proposed system to be introduced to the expressways.

1. It was agreed to include the possibility of connect a Local Radio Frequency.
2. It was decided to accommodate the system collect the information from local police and RDA staff on National Roads and use the information to be given to Expressway users.

3. Basic Configuration of System

The Team showed and explained the basic configuration of the system consisting of the equipment to be installed at Gelanigama traffic control centre, at two service areas, at each toll plaza building and along the expressway, which is connected by the existing fibre cable at necessary points as shown in Annex-3. RDA confirmed and agreed to the basic configuration of the system proposed subject to the followings;

- I. It is necessary to establish redundancy mechanism in place for the use of an emergency such as discontinuation of the communication system using existing optical fibre cable.
- II. It was highlighted to look into the possibility of installing traffic counters capable of identifying vehicle classification presently used at RDA.

4. Deployment Plan of Roadside Equipment

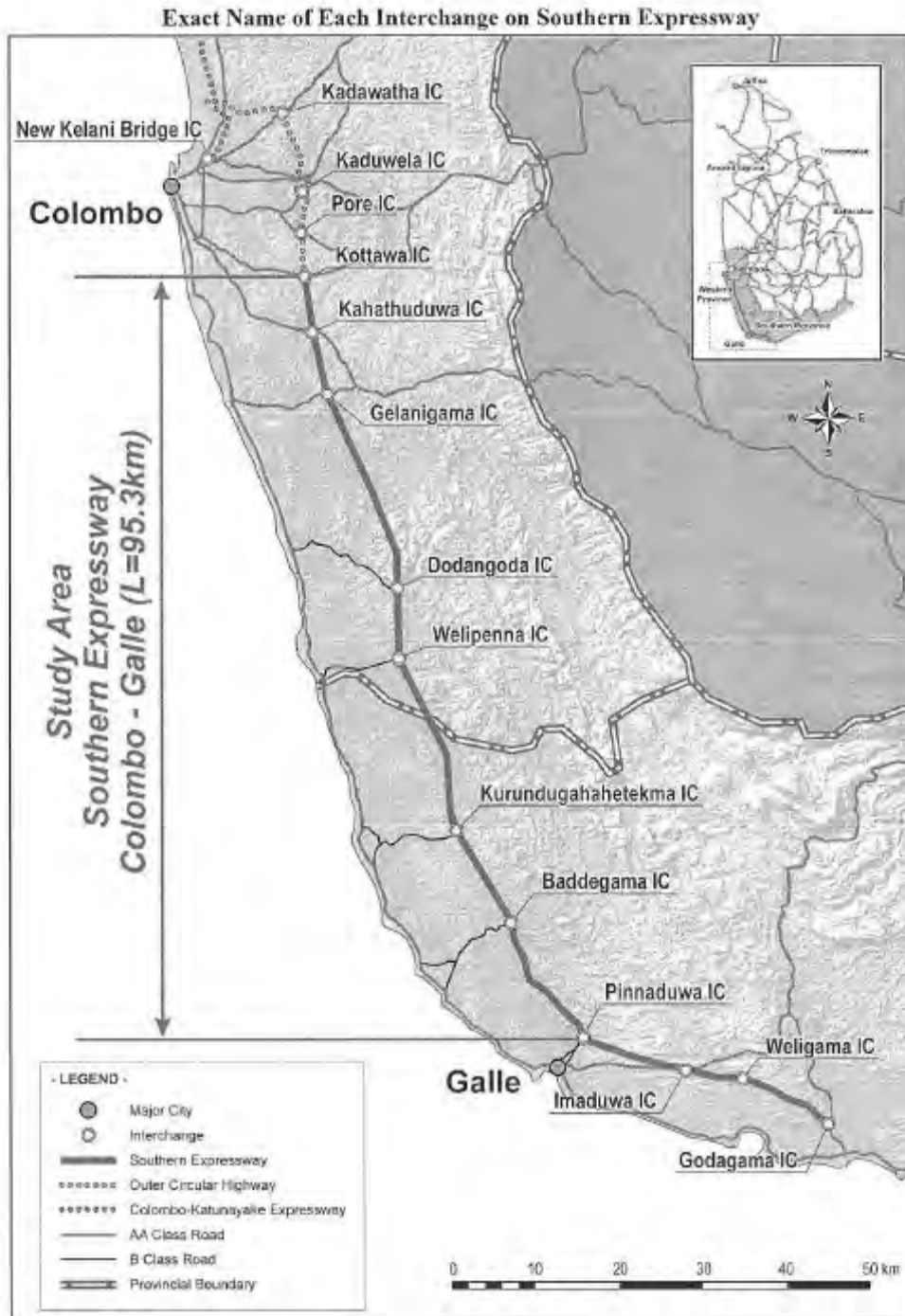
The Team explained the deployment plan of roadside equipment along the expressway as Annex-4. RDA suggested as stated in 3-ii. (Annex 4 – Traffic Counters)

5. Implementation Schedule

The Team showed the tentative implementation schedule as Annex-5 to RDA. RDA requested to see the possibility of reducing the time duration required to complete preparation work, manufacturing, installation and test of equipment.

(End)





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Design Concept of Traffic Information System

Traffic information system is a system that gathers road, traffic and weather information, processes them and disseminates to road users. There are two types of information to be gathered:

- Information about expressway
- Information about highway connected to expressway interchange.

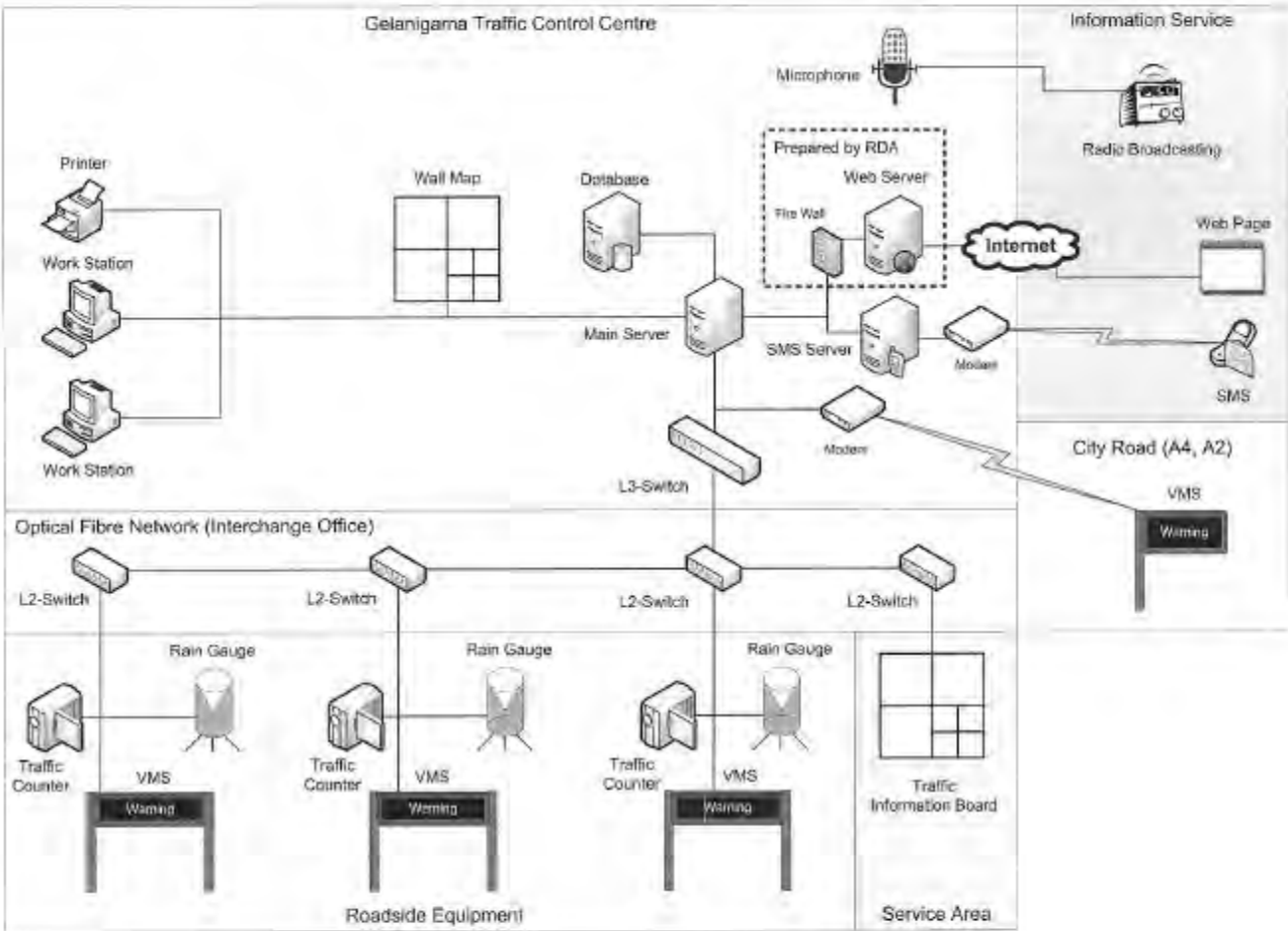
The information gathered will be provided to three types of road users to help them select the route;

- Drivers on the expressway
- Drivers on the highway heading for expressway
- Pre-trip drivers

The proposed system will have the functions shown in shaded areas below.

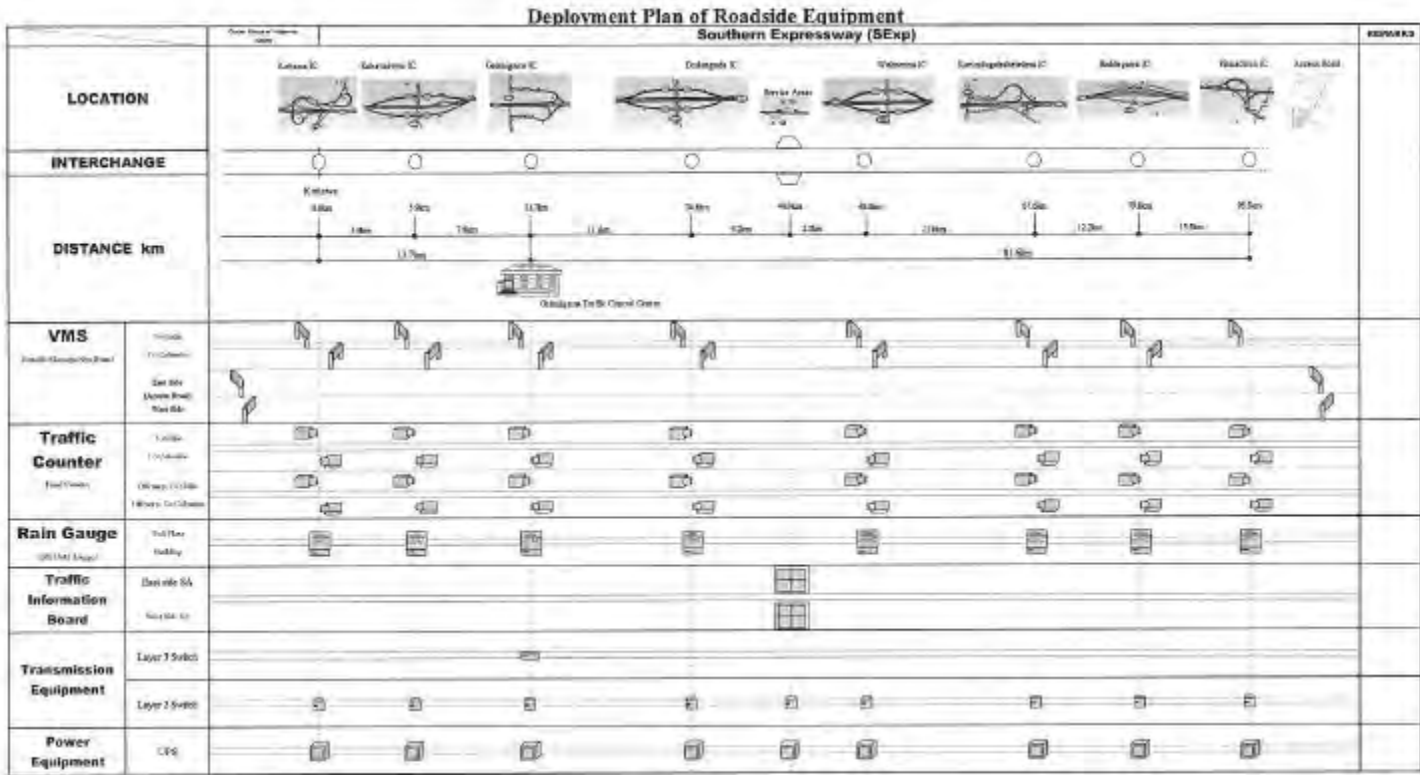
	Information collection	Information provision		
		Drivers on expressway	Drivers en route to expressway	Pre-trip drivers
Expressway	<ul style="list-style-type: none"> • Traffic counter • Rain gage • Video surveillance* • Call centre* • Patrol car* (* existing)	Expressway information is provided to drivers on expressway <ul style="list-style-type: none"> • Variable message sign on expressway • Information board at service area • Radio broadcasting 	Expressway information is provided to drivers on highway heading for expressway <ul style="list-style-type: none"> • Variable message sign on highway • SMS • Call centre • Radio broadcasting 	Expressway information is provided to drivers before a trip. <ul style="list-style-type: none"> • Internet • SMS • Call centre • Radio broadcasting
Highway	Information is gathered from RDA office, Traffic Police and other sources. No information collection facilities will be installed on highway by the system.	Highway information is provided to drivers on expressway. <ul style="list-style-type: none"> • Variable message sign on expressway • Information board at service area • Radio broadcasting 	Out of scope of the system	Out of scope of the system

Basic Configuration of System



Annex-3

Annex-4



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Implementation Schedule for the Project (Tentative)

	Year Month	2012												2013												2014												2015											
		11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Expalation and Confirmation of Draft Final Report		█																																															
Exchange of Notes (E/N)				▼																																													
Grant Agreement (G/A)				▼																																													
Consultant Agreement & Preparation of Tender						█																																											
Tendering Process & Contract Signing of the Contractor								█																																									
Preparatory work, Manufacturing, Installation and Test										█		█																																					
Management Guidance												█		█				█						█																									
Task by RDA	Preparation of the Budget							█																																									
	Contract with Communication Service Provider											█																																					
	Promotional Activities													█		-																																	

6

6. Traffic Volume

Existing and Forecasted Traffic Volume of OCH and Southern Expressway (Daily Traffic Volume)

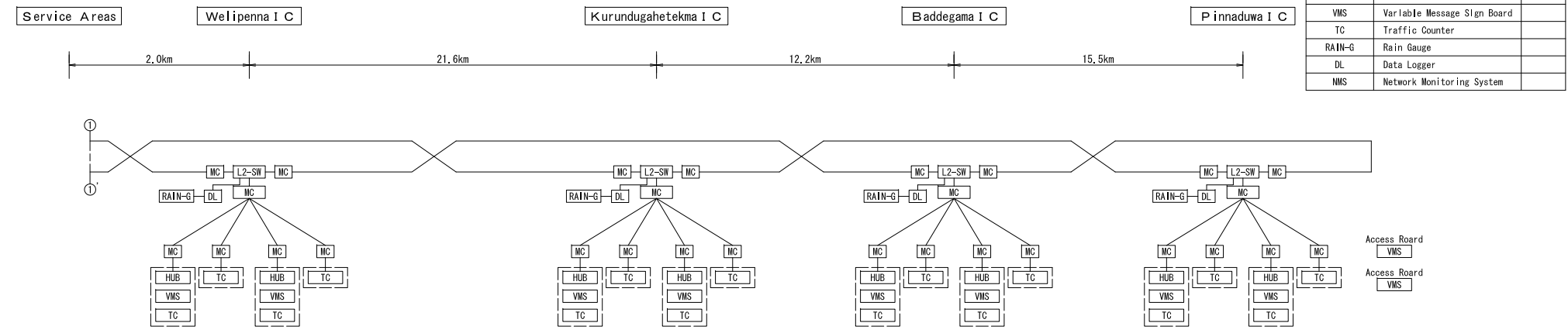
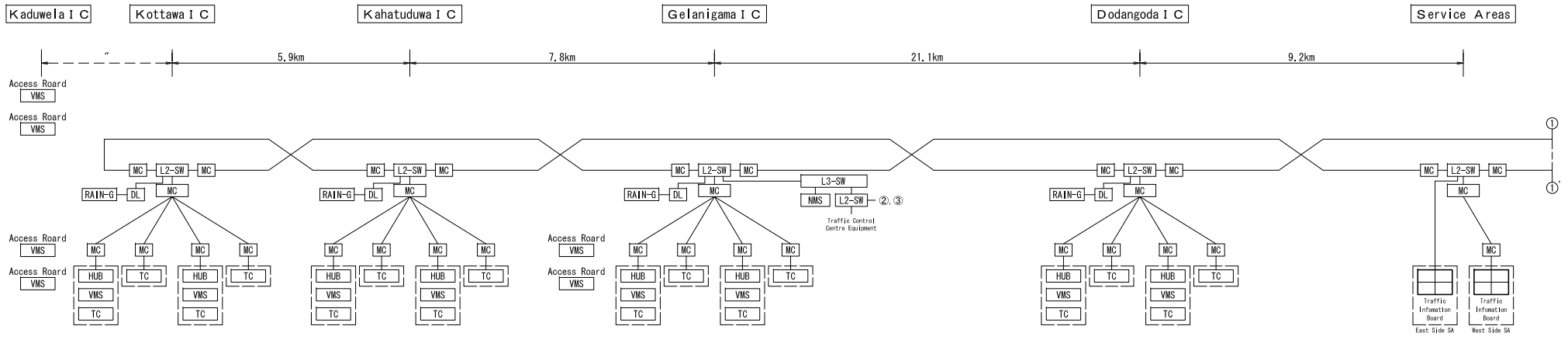
Expressway Section or IC	Category	2012 (Existing Condition)			2020	2025(2027)
		South Direction	North Direction	2-way	2-way	2-way
Kadawatha	IN				8,600	11,400
	OUT				15,700	21,200
Kadawatha - Kaduwela North	Total				28,500	33,800
Kaduwela North	IN				100	100
	OUT				2,500	3,700
Kaduwela North - Kaduwela South	Total				48,400	53,800
Kaduwela South	IN				2,100	2,400
	OUT				2,300	3,000
Kaduwela South - Kottawa	Total				48,400	53,800
Kottawa	IN	3,031	—		3,200	11,000
	OUT	—	3,047		8,600	20,500
Kottawa - Kahatuduwa	Total	3,031	3,047	6,078	33,521	39,580
Kahatuduwa	IN	327	120			
	OUT	123	296			
Kahatuduwa - Gelanigama	Total	3,235	3,223	6,458	37,815	44,616
Gelanigama	IN	521	537			
	OUT	519	480			
Gelanigama - Dodangoda	Total	3,236	3,166	6,402	26,430	31,202
Dodangoda	IN	160	504			
	OUT	476	161			
Dodangoda - Welipena	Total	2,920	2,822	5,742	12,245	14,427
Welipenna	IN	107	298			
	OUT	333	113			
Welipena - Kurundughahetekuma	Total	2,694	2,637	5,331	10,386	12,246
Kurundughahetekma	IN	166	495			
	OUT	480	164			
Kurundughahetekma - Baddegama	Total	2,380	2,306	4,686	Not available	Not available
Baddegama	IN	31	254			
	OUT	267	40			
Baddegama - Pinnaduwa	Total	2,145	2,091	4,236	Not available	Not available
Pinnaduwa	IN	—	2,091			
	OUT	2,145	—			

Note: The forecasted traffic volume for OCH is 2020 and 2027, and for Southern Expressway is 2020 and 2025 respectively.

7. References - Drawings

Preparatory Survey on the Project for
Development of Intelligent Transport System
for Expressways in SriLanka

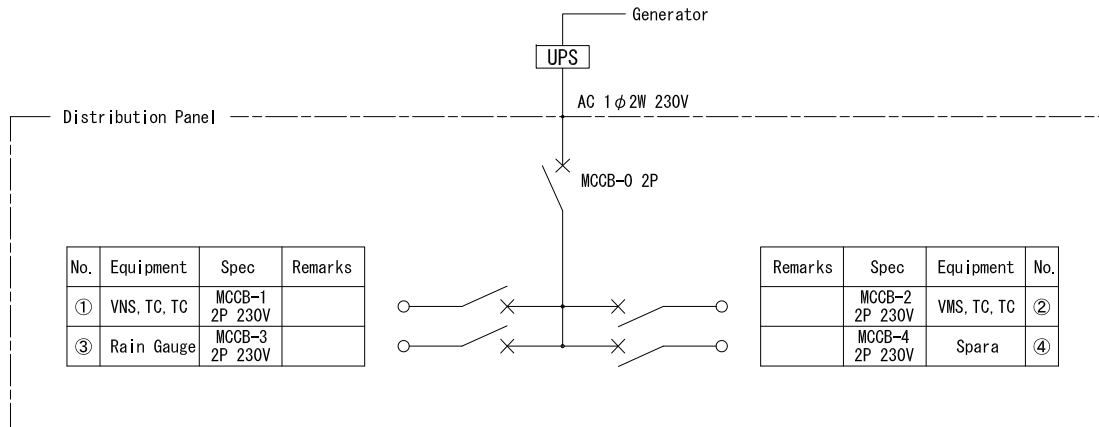
COMMUNICATION SYSTEM NETWORK



EQUIPMENT		
ABBREVIATION	EQUIPMENT	REMARKS
L3-SW	Layer3-Switch	
L2-SW	Layer2-Switch	
HUB	Hub-Switch	
MC	Media Converter	
VMS	Variable Message Sign Board	
TC	Traffic Counter	
RAIN-G	Rain Gauge	
DL	Data Logger	
NMS	Network Monitoring System	

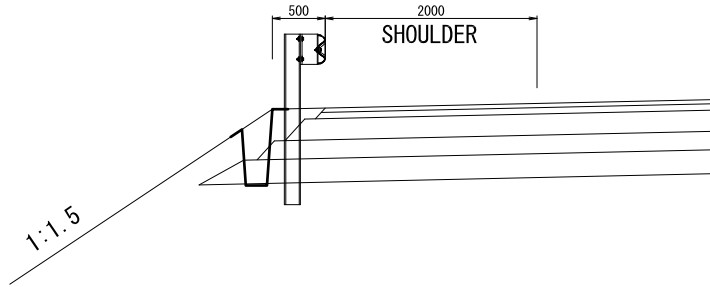
	Supervision Consultants	Contractor	
			Contractor: _____ Engineer: _____ Date: _____ DWG. No. _____

POWER SUPPLY DIAGRAM

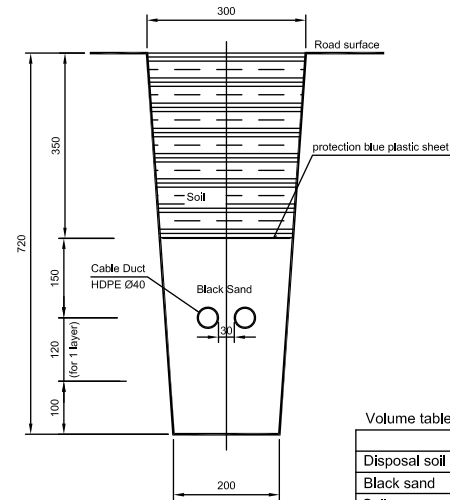


	Supervision Consultants	Contractor	
			Contractor: Engineer: Date: DWG. No.

LOCATION OF COMMUNICATION DUCT



DETAIL scale:1/10



Volume table of Duct (for 1 kilometer in length)

	Volume
Disposal soil	180 m ³
Black sand	83 m ³
Soil	97 m ³
Protection blue plastic sheet	240 m ²

PROTECTION BLUE PLASTIC SHEET scale:1/10

Supervision Consultants

Contractor

Contractor:

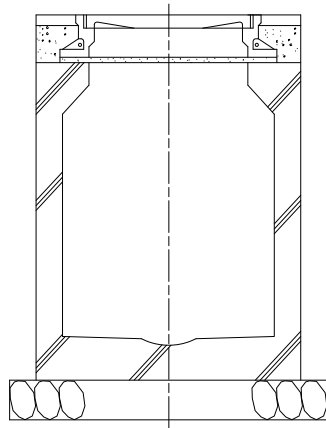
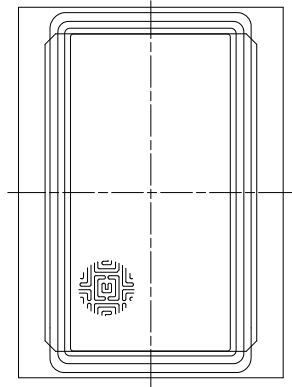
Engineer:

Date:

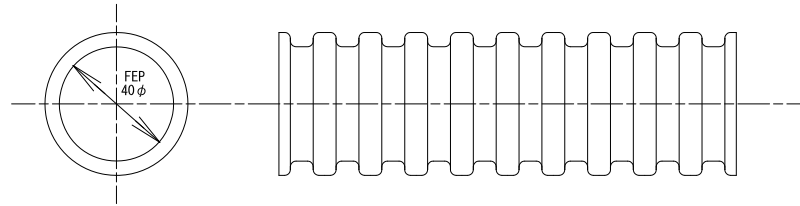
DWG. No.

COMMUNICATION DUCT • HANDHALL

HANDHOLE for Communication



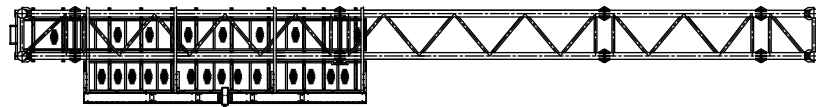
COMMUNICATION DUCT



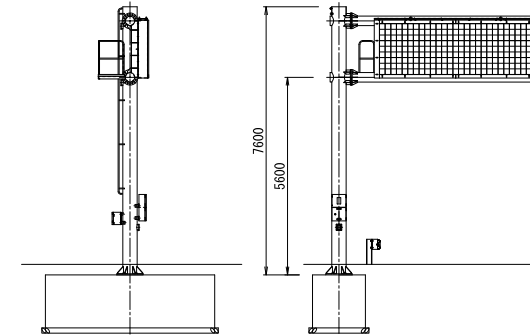
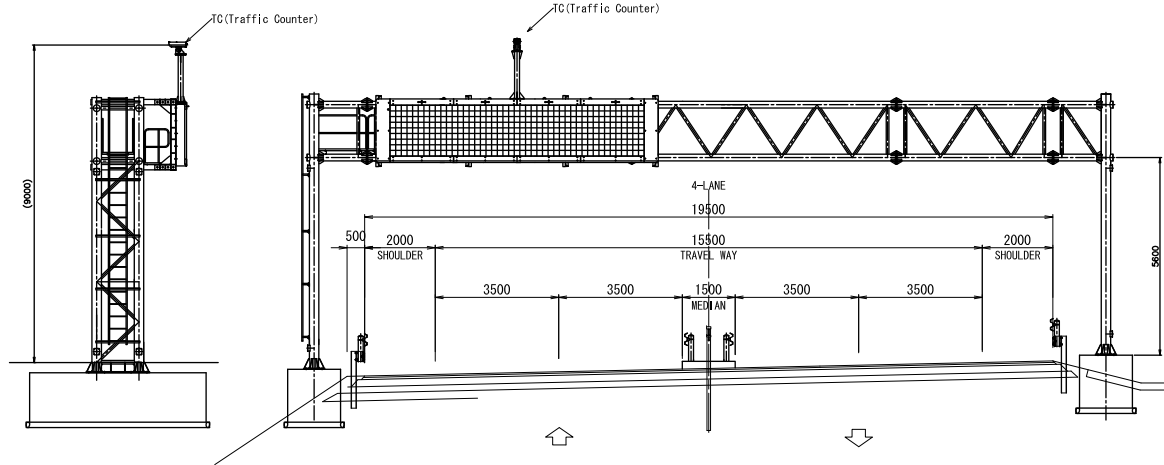
	Supervision Consultants	Contractor			Contractor:	
					Engineer:	
					Date:	
					DWG. No.	D-4

VMS (Variable Message Sign Board)

VMS (Expressway)



VMS (Access Road)

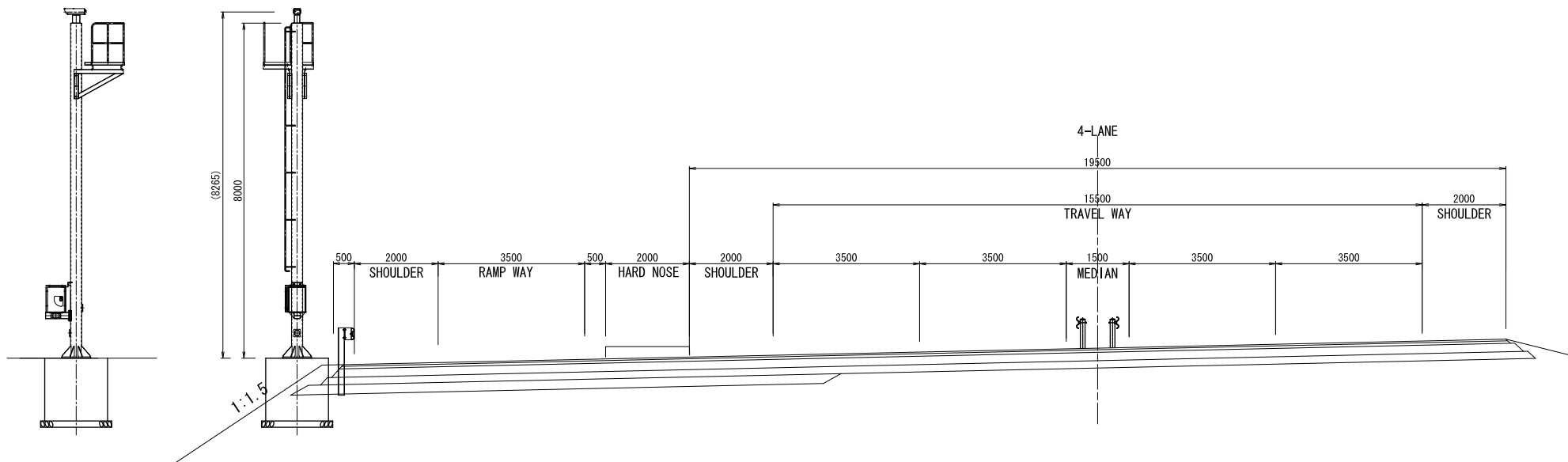


Rain Gauge



	Supervision Consultants	Contractor									
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Contractor:</td> <td></td> </tr> <tr> <td>Engineer:</td> <td></td> </tr> <tr> <td>Date:</td> <td></td> </tr> <tr> <td>DWG. No.</td> <td></td> </tr> </table>	Contractor:		Engineer:		Date:		DWG. No.	
Contractor:											
Engineer:											
Date:											
DWG. No.											

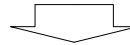
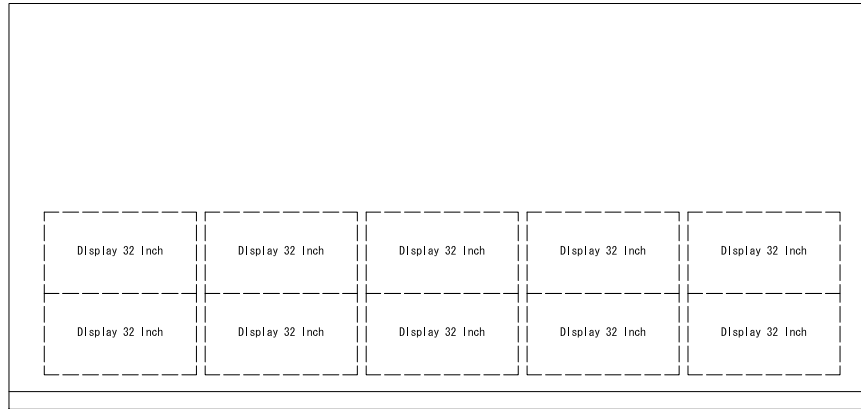
T C (Traffic Counter)



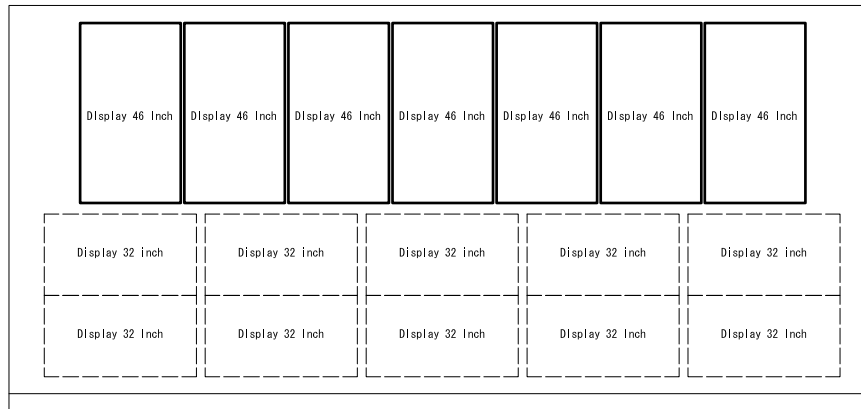
	Supervision Consultants	Contractor		Contractor:	
				Engineer:	
				Date:	
				DWG. No.	D-6

TCC MONITOR DISPLAY

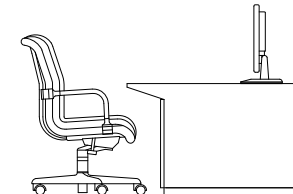
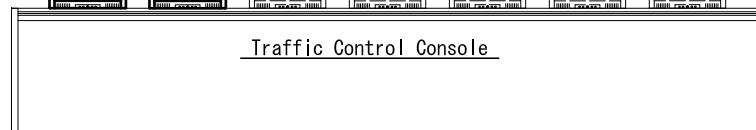
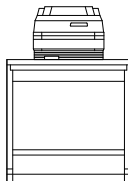
Existing Control Center



Arrangement image of display panel

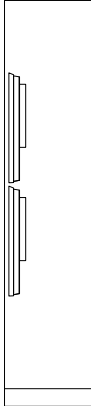
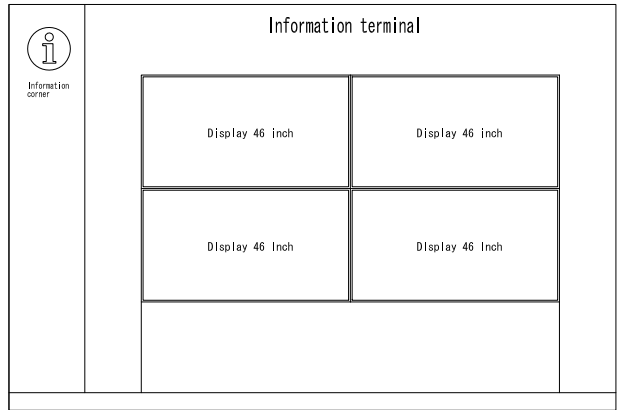


Printer



	Supervision Consultants	Contractor		
				Contractor:
				Engineer:
				Date:
				DWG. No.
				D-7

SERVICE AREAS MONITOR DISPLAY



	Supervision Consultants	Contractor										
				<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Contractor:</td> <td></td> </tr> <tr> <td>Engineer:</td> <td></td> </tr> <tr> <td>Date:</td> <td></td> </tr> <tr> <td>DWG. No.</td> <td style="text-align: right;">D-8</td> </tr> </table>	Contractor:		Engineer:		Date:		DWG. No.	D-8
Contractor:												
Engineer:												
Date:												
DWG. No.	D-8											