

**STUDY FOR
ITS INTEGRATION PROJECT
IN NORTHERN AREA OF VIETNAM**

APPENDIX 5

- REVIEW COMMENTS TO DRAFT TCVN**
- SPECIFICATIONS FOR SYSTEM CONNECTION/COOPERATION**
- PROPOSED PREQUALIFICATION CRITERIA FOR PACKAGE-1
ON A D&B BASIS**
- RECORDS OF WORKING GROUPS & WORKSHOP**
- RELEVANT LEGAL DOCUMENTS & STANDARDS IN VIETNAM**

NOVEMBER 2015

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS GLOBAL CO., LTD.

METROPOLITAN EXPRESSWAY CO., LTD.

NEXCO EAST ENGINEERING CO., LTD.

TRANSPORTATION RESEARCH INSTITUTE CO., LTD.

ABEAM CONSULTING LTD.

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**PART 1:
REVIEW COMMENTS
TO DRAFT TCVN**

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1. General

The ITS Standards: TCVN is now under development in Vietnam. The Drafts of TCVN are being prepared and discussed in the organization consists of 8 Sub-Groups under DOST/ MOT as shown in the table below.

List of Sub-groups for Developing Draft TCVN

		Item of TCVN	Name of Leader	Draft
Leader			Mr.Nguyen Tuan Anh (MOT/DOST)	--
Sub-group	1	ITS System Architecture	Mr.Nguyen Dinh Khoa (ITST)	N.Y.
	2	Traffic Monitoring & Control on Expressways	Mr.Pham Hong Quang (CadPro)	U.D.
	3	Traffic Database and Message System on Expressways	Mr.Van Van Trung (MOT/ITC)	N.Y.
	4	CCTV Camera System on Expressways	Mr.Chu Quang Trung (MOT/ITC)	N.Y.
	5	VMS on Expressways	Mr.Nguyen Anh Tuan (ITST)	U.D.
	6	Communication System on Expressways	Mr.Le Thanh Tung (MOT/ITC)	N.Y.
	7	ETC System on Expressways	Mr.Pham Duc Long (ITD)	U.D.
	8	Management Office/Center on Expressways	Mr.Ta Tuan Anh (CadPro)	U.D.

Note, N.Y.: Not yet, U.D.: Under drafting.

It is recommended to unify the configuration of table of contents and terminologies

2. Review Comments for SG-2: TCVN on Traffic Monitoring & Management System

Reviewed results of the 2nd Draft TCVN are shown on the table below.

- TCVN is not a national regulation, that's national technical standard.
- Add monitoring in title. (ie Traffic Monitoring and Management)
- In Foreword, QCVN is not correct. That is TCVN. And correct process should be written.

Article Number in TCVN	Classification of Reviewed Result	Comments
1 Application Scope		
2 Reference Materials		<ul style="list-style-type: none"> ● Refer to other SGs and ISO.
3 Terminology and Definition		<ul style="list-style-type: none"> ● Define the function of "Regional Main Center" and "Road Management Office".
		<ul style="list-style-type: none"> ● Integration of 3.1 and 3.10, and add loop detector.
		<ul style="list-style-type: none"> ● 3.8, 3.9, 3.15, 3.16 shall be written on the draft national standard of ETC, SG-7.
	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● "3.12" should be deleted. <ul style="list-style-type: none"> ➢ Already have been made the provision of traffic situation by VOV. ➢ Development of its own FM Radio broadcasting equipment is not a beneficially.
		<ul style="list-style-type: none"> ● "3.13" should be included traffic control system?
		<ul style="list-style-type: none"> ● Definition of traffic information should be added.
4 Abbreviations		
5 Figuration of TMM System		<ul style="list-style-type: none"> ● In 5.2J), "Special Telephone Number System" is much better than "Emergency Telephone System".
		<ul style="list-style-type: none"> ● 5.2m) shall be written on the draft national standard of ETC, SG-7.
	MISMATCH WITH INEXPERIENCED ROAD OPERATOR	<ul style="list-style-type: none"> ● "5.2 n)" should be deleted. <ul style="list-style-type: none"> ➢ In order to perform the inflow control by Ramp Metering, it is necessary to analyze the prediction of traffic situation using rich traffic data. Especially the traffic capacity (and demand) based on the actual traffic data in the target road. (That is not a value based on the design). ➢ There is no relevance to install in present situation.
	COUNTER TO MOD OF MOT-SAPI, MARCH 21, 2014	<ul style="list-style-type: none"> ● Figure 1 shall be written on the draft national standard of Traffic Management Centers for Expressway, SG-8. (Significantly modified figure is going to be provided from us, because Regional Main Center integration in traffic management is most important essential of this TCVN.)

6 System Operation Procedure		
6.1 Procedure of Traffic Monitoring and Management		<ul style="list-style-type: none"> ● a) shall be written on the draft national standard of ETC, SG-7.
		<ul style="list-style-type: none"> ● In 6.1.1 a), Emergency telephone is received at the RMC.
		<ul style="list-style-type: none"> ● In 6.1.1 d), FM Radio should be deleted.
	COUNTER TO MOD OF MOT-SAPI, MARCH 21, 2014	<ul style="list-style-type: none"> ● In 6.1.2, Figure2 should be deleted. (Significantly modified figure is going to be provided from us, because Regional Main Center integration in traffic management is most important essential of this TCVN.)
		<ul style="list-style-type: none"> ● In 6.1.4, Change 30 minutes to 1 hour. <ul style="list-style-type: none"> ➢ From the placement situation of RMO, site arrival difficult in 30 minutes. (Assumed in 1 hour in SAPI)
6.2 Procedure of Automatic Data Collection and Processing	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● In 6.2.2, license plate should be deleted. <ul style="list-style-type: none"> ➢ Enforcement of traffic violations is not included in Road Operator and Traffic Management organization's operations.
		<ul style="list-style-type: none"> ● In 6.2.3, it adds the "in except maintenance time."
6.3 Procedure of Equipments Surveillance and Maintenance		<ul style="list-style-type: none"> ● In 6.3.2, "and power supply" should be deleted from the second line.
		<ul style="list-style-type: none"> ● In 6.3.2, Database Center should be changed to RMC.
		<ul style="list-style-type: none"> ● In 6.3.3, "in accordance..." should be deleted.
7 Technical Requirements on Sub-systems		<ul style="list-style-type: none"> ● For secure the interoperability and interconnectivity, shall add the requirement as follows, <ul style="list-style-type: none"> ➢ The system shall be capable of having following communication interfaces in order to ensure that hardware/software to be communicated or controllable with each hardware/software. <ul style="list-style-type: none"> ◇ 1) The name of implementation software ◇ 2) Transmission data format ◇ 3) Necessary information or specification of hardware/software shall be capable of being disclosed in order to secure the interoperability and interconnectivity of hardware/software. Furthermore, they shall be capable of being disclosed promptly based on the disclosing demand, including the contents that are not described as above.
7.1 Digital Transmission System		<ul style="list-style-type: none"> ● In 7.1.1, "at tollgate", "service office" and "for distance..." should be deleted.

		<ul style="list-style-type: none"> ● In 7.1.3 a), “Backbone” should be changed to “Integration”. <ul style="list-style-type: none"> ➢ Is not a suitable representation.
		<ul style="list-style-type: none"> ● In 7.1.3 a), RMC should be added.
		<ul style="list-style-type: none"> ● In 7.1.3 b), 1000Mbps should be changed to 10Gbps.
		<ul style="list-style-type: none"> ● In 7.1.3 c), 100 Mbps should be changed to 1Gbps.
		<ul style="list-style-type: none"> ● In 7.1.3 b), “Boundary” should be changed to “Road section”.
		<ul style="list-style-type: none"> ● “7.1.4” and “7.1.5” should be modified. <ul style="list-style-type: none"> ➢ Description laying two cables.
7.2 CCTV Camera System for Traffic Monitoring		<ul style="list-style-type: none"> ● The position (duplicates) of the PTZ camera should be considered. <ul style="list-style-type: none"> ➢ Image processing of Recognition is performed at RMC.
		<ul style="list-style-type: none"> ● “7.2.3” should be deleted. <ul style="list-style-type: none"> ➢ Descriptive content is not system architecture. (The camera for traffic conditions and incident detection should be described in another item)
7.3 System for Vehicle Detection		<ul style="list-style-type: none"> ● In 7.3.1 b) and c), those formulas are unnecessary. <ul style="list-style-type: none"> ➢ It is not a regulatory content of TCVN.
	MISMATCH WITH INEXPERIENCED ROAD OPERATOR	<ul style="list-style-type: none"> ● “7.3.2 a)” should be deleted. <ul style="list-style-type: none"> ➢ In order to perform the inflow control by Ramp Metering, it is necessary to analyze the prediction of traffic situation using rich traffic data. Especially the traffic capacity (and demand) based on the actual traffic data in the target road. (That is not a value based on the design). ➢ There is no relevance to install in present situation.
	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● In 7.3.2 d) and E), license plate should be deleted. <ul style="list-style-type: none"> ➢ Enforcement of traffic violations is not included in Road Operator and Traffic Management organization’s operations.
		<ul style="list-style-type: none"> ● “7.3.4” should be deleted. <ul style="list-style-type: none"> ➢ This provision is difficult to observe by aging of equipment. ➢ Speed measurement accuracy of high-speed driving vehicle is difficult. (A matter of time and space resolution on measurement) ➢ For increased accuracy of the high-speed range, it is necessary to improve time and space resolution. (Because the amount of communication data increases, the load on the communication line increases.)

		<ul style="list-style-type: none"> ● “7.3.5 d) including Table-1” Should be deleted. <ul style="list-style-type: none"> ➢ Definition of congestion (condition) should be set by analyzing the actual traffic situation. ➢ It is not a regulatory content of TCVN.
		<ul style="list-style-type: none"> ● In 7.3.6, “Traffic Volume” should be changed to “Traffic Condition”. <ul style="list-style-type: none"> ➢ Original purpose is to display the traffic conditions. (Traffic condition doesn’t know by Traffic volume.) ➢ Traffic volume can be confirmed from the database.
7.4 System for Event Management		<ul style="list-style-type: none"> ● In 7.4.1 d), “Traffic Safety Violation” should be deleted. <ul style="list-style-type: none"> ➢ “Traffic Safety Violation” isn’t an information for driver.
		<ul style="list-style-type: none"> ● In 7.4.2 b), “individuals ...” should be changed to “road user”. <ul style="list-style-type: none"> ➢ In conjunction with the other items, described in the target (organization or person).
		<ul style="list-style-type: none"> ● In 7.4.2 c), the bulleted list should be deleted.. <ul style="list-style-type: none"> ➢ Order to have the flexibility to Subsystems.
		<ul style="list-style-type: none"> ● In 7.4.2 d), the element of "edit" should be added to "only store newly created events." <ul style="list-style-type: none"> ➢ Consideration to realistic operation.
	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● In 7.4.3 a) and b), license plate should be deleted. <ul style="list-style-type: none"> ➢ Enforcement of traffic violations is not included in Road Operator and Traffic Management organization's operations.
7.5 System for Vehicle Axle Load Control	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● In 7.5.1 a), "Vehicle speed and category should be deleted. <ul style="list-style-type: none"> ➢ It is not a necessary data to overload crackdown by Vehicle Axle Load.
	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● In 7.5.2, "velocity" and "The distance between ..." should be deleted. <ul style="list-style-type: none"> ➢ It is not a necessary data to overload crackdown by Vehicle Axle Load.
	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● “7.5.3” should be deleted, including Appendix B. <ul style="list-style-type: none"> ➢ It is not a necessary data to overload crackdown by Vehicle Axle Load.
7.6 System for Traffic Information Provision		<ul style="list-style-type: none"> ● In 7.6.3 a), Management Authorities means RMC?
		<ul style="list-style-type: none"> ● “7.6.3 B)” should be deleted. <ul style="list-style-type: none"> ➢ The description content is unknown. (It might be the problem of English translation.)

		<ul style="list-style-type: none"> ● In 7.6.3 c), “sub-buildings...” should be deleted. <ul style="list-style-type: none"> ➢ The description content is unknown. (It might be the problem of English translation.)
		<ul style="list-style-type: none"> ● In 7.6.3 d), “code” should be deleted. <ul style="list-style-type: none"> ➢ That is not a useful for UI.
		<ul style="list-style-type: none"> ● In 7.6.3 e), “such” should be added front of “as”. <ul style="list-style-type: none"> ➢ This content should not be strictly defined by TCVN.
	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● “7.6.5 b)” should be deleted. <ul style="list-style-type: none"> ➢ Already have been made the provision of traffic situation by VOV. ➢ Development of its own FM Radio broadcasting equipment is not a beneficially.
		<ul style="list-style-type: none"> ● “7.6.5 c)” should be deleted. <ul style="list-style-type: none"> ➢ It is not a device for providing traffic information. ➢ It is not a device to be controlled by RMC.
7.7 System for Traffic Control Notification		<ul style="list-style-type: none"> ● “7.7.1 c)” should be deleted. <ul style="list-style-type: none"> ➢ It is not automatically implemented by TMMS.
		<ul style="list-style-type: none"> ● “7.7.2” should be deleted. <ul style="list-style-type: none"> ➢ In order to avoid confusion the situation, such as a description, required the introduction of an integrated system.
7.8 System for Weather Notification		<ul style="list-style-type: none"> ● For bulleted list in 7.8.1, the set value should be deleted. <ul style="list-style-type: none"> ➢ It should be set as a parameter.
		<ul style="list-style-type: none"> ● In 7.8.2, “slippery ice” should be deleted. <ul style="list-style-type: none"> ➢ Road surface freeze sensor is a high cost. ➢ Require road excavation for equipment installation. ➢ It may not be the target of providing information.
7.9 Communication System		<ul style="list-style-type: none"> ● In 7.9.2 b), “Stations and toll lanes” should be changed to “toll office and toll booth”.
		<ul style="list-style-type: none"> ● In 7.9.3 a), “and event information” should be added to end of sentence. <ul style="list-style-type: none"> ➢ Consideration to reality.
		<ul style="list-style-type: none"> ● In 7.9.4, “TMCC” should be changed to RMO, “stations” should be changed to “toll office”, “except mobile terminal” should be added “terminal equipment”. <ul style="list-style-type: none"> ➢ Consideration to reality.
7.10 System for Emergency Telephone		<ul style="list-style-type: none"> ● “emergency telephone” should be changed to “special telephone number”.

	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● “7.10.1 a)” should be deleted. <ul style="list-style-type: none"> ➢ Expressways are covered as a communication area of the Mobile Telephone Network. ➢ Even if they are not covered in the current, and will in the near future be covered. (Maintenance cost is wasted.)
		<ul style="list-style-type: none"> ● In 7.10.1 b), “TMCC” should be changed to “RMC”. <ul style="list-style-type: none"> ➢ Consideration to reality.
		<ul style="list-style-type: none"> ● “7.10.2” should be deleted. <ul style="list-style-type: none"> ➢ Provisions on Signboard. (To be described in this TCVN?)
		<ul style="list-style-type: none"> ● “7.10.3” should be deleted. <ul style="list-style-type: none"> ➢ Due to the deletion of the 7.10.1 a).
		<ul style="list-style-type: none"> ● In 7.10.4, TMCC should be changed to RMC. <ul style="list-style-type: none"> ➢ Consideration to reality.
7.11 Equipments Surveillance System		<ul style="list-style-type: none"> ● In 7.11.1, “ i), j), k) and l)” should be deleted. <ul style="list-style-type: none"> ➢ Consideration to reality.
7.12 Traffic Operation and Management Center	COUNTER TO MOD OF MOT-SAPI, MARCH 21, 2014	<ul style="list-style-type: none"> ● Description should be changed. <ul style="list-style-type: none"> ➢ Regard to work sharing of RMC and RMO, Consideration to reality.
7.13 Toll Collection System		<ul style="list-style-type: none"> ● This paragraph shall be written on the draft national standard of ETC, SG-7.
7.14 Signal system at Expressway Entry	MISMATCH WITH INEXPERIENCED ROAD OPERATOR	<ul style="list-style-type: none"> ● “7.14” should be deleted. <ul style="list-style-type: none"> ➢ In order to perform the inflow control by Ramp Metering, it is necessary to analyze the prediction of traffic situation using rich traffic data. Especially the traffic capacity (and demand) based on the actual traffic data in the target road. (That is not a value based on the design). ➢ There is no relevance to install in present situation.

3. Review Comments for SG-5: TCVN on Electronic Sign System

Reviewed results of the 2nd Draft TCVN are shown on the table below.

Article Number in TCVN	Classification of Reviewed Result	Comments
1 Application Scope		
2 Reference Materials		
3 Terminology and Definition		
4 Abbreviations		
5 Figuration of TMM System		<ul style="list-style-type: none"> ● Figure 1 A control device is necessary for RMC. Please standardize the name of the center with other TCVN.
5.1 Control device at Center		<ul style="list-style-type: none"> ● "Section Traffic Monitoring and Control Center" in the sentence is revised by "RMO" ● A description of RMC is necessary for all.
5.2 Digital transmission system		<ul style="list-style-type: none"> ● 1. A description of RMC is necessary for all. ● 3. Multiplexer is unnecessary and switch is necessary.
5.3 VMS		<ul style="list-style-type: none"> ● 1. A change is necessary for "RMC and RMO" in "Traffic Monitoring and Control Center".
6 Technical regulation		<ul style="list-style-type: none"> ● For secure the interoperability and interconnectivity, shall add the requirement as follows, <ul style="list-style-type: none"> ➢ The system shall be capable of having following communication interfaces in order to ensure that hardware/software to be communicated or controllable with each hardware/software. <ul style="list-style-type: none"> ◇ 1) The name of implementation software ◇ 2) Transmission data format ◇ 3) Necessary information or specification of hardware/software shall be capable of being disclosed in order to secure the interoperability and interconnectivity of hardware/software. Furthermore, they shall be capable of being disclosed promptly based on the disclosing demand, including the contents that are not described as above.
6.1 General regulation on Electronic Signs on Expressway		<ul style="list-style-type: none"> ● 1. "must not scroll" is necessary. ● 2. "traffic monitoring/ and" is unnecessary. "Center" writes "RMC and RMO" clearly.

		<ul style="list-style-type: none"> 6. It is proper to delete this sentence. Because it cannot use a commercially available LED panel when we introduce this, and cost rises. We recommend the confirmation with the camera as alternative action.
6.2 Components of VMS		<ul style="list-style-type: none"> 6.2.1 2 Visibility may decrease in expression of the circumflex if less than dot pitches 20mm. We recommend 16mm or less in the SAPI.
		<ul style="list-style-type: none"> 6.2.1 4 "Stable average operation time" recommends that you modify in "MTBF". Because MTBF of the general LED is up to around 50,000 hours, MTBF called 100,000 hours is not realistic.
		<ul style="list-style-type: none"> 6.2.2 7 The controller side needs a female connection port.
6.3 Colors		<ul style="list-style-type: none"> 1. We recommend a Yellow not red from the viewpoint of visibility. But you cannot express it in full color when it is this statement.
6.4 Brightness		<ul style="list-style-type: none">
6.5 Size of displayed characters		<ul style="list-style-type: none"> Please add standard TCN 331-05.
		<ul style="list-style-type: none"> 1. Because resolution is low, in the case of dot indication of the LED, we recommend 450 mm.
6.6 Observation capacity		<ul style="list-style-type: none"> 2. The distance of 250m is not realistic. Please refer to Appendix 4 of the SAPI report.
		<ul style="list-style-type: none"> 3. The angle of 30 degrees in not realistic. Please refer to Appendix 4 of the SAPI report.
6.7 Information communication		<ul style="list-style-type: none"> 2. Please delete "through storage code" because it is indicated by dot control.
6.8 Operation environment		<ul style="list-style-type: none"> 2. 98% of humidity is not realistic because 95 % are composed with specifications as for most products.
6.9 Power supply and electricity safety requirement		<ul style="list-style-type: none"> 1. The power supply only in a solar energy is not realistic.
6.10 Requirement of installation		
7 Testing method		These tests are test items at the laboratories. If you state it in TCVN, we recommend that you write only a test item clearly. It is proper to show the detailed contents of the test to Appendix.
8 Labeling		

4. Review Comments for SG-7: TCVN on ETC System

Reviewed results of the 2nd Draft TCVN are shown on the table below.

- In Foreword, QCVN is not correct. That is TCVN. And correct process should be written.
- Unified the terminologies in all paragraphs.

Article Number in TCVN	Classification of Reviewed Result	Comments
1 General Provisions		
1.1 Scope		
1.2 Reference Materials		<ul style="list-style-type: none"> ● To add the standards as follows, <ul style="list-style-type: none"> ➢ GETC-A07200N ETC Roadside Equipment Specification ➢ GETC-A07210N ETC On-Board Unit Specification ➢ GETC-A07220N ETC Application Interface Specification ➢ ISO/IEC 18092:2013 Information technology - Telecommunications and information exchange between systems - Near field communication - Interface and protocol (NFCIP-1) ➢ ISO/IEC 14443-2:2010 Identification cards - Contactless integrated circuit cards - Proximity cards - Part 2: Radio frequency power and signal interface ➢ ISO/IEC 14443-3:2011 Identification cards - Contactless integrated circuit cards - Proximity cards - Part 3: Initialization and anticollision ➢ ISO/IEC 14443-4:2008 Identification cards - Contactless integrated circuit cards - Proximity cards - Part 4: Transmission protocol ➢ ISO/IEC 18000-1:2008 Information technology - Radio frequency identification for item management - Part 1: Reference architecture and definition of parameters to be standardized ➢ ISO/IEC 18000-6:2013 Information technology - Radio frequency identification for item management - Part 6: Parameters for air interface communications at 860 MHz to 960 MHz General
1.3 Terms and Definitions		<ul style="list-style-type: none"> ● About "IC card", IC card is able to stored "account value". According to the current situation, IC card is used by passengers of Bus and will be used by passengers of all public transportation. The IC-card which is used for the public transportation, it is able to store the value. Then, realize interoperability and convenience for user, the IC card shall be used the both toll payment and public transportation. Therefore,

		the value shall be stored in "IC card".
		<ul style="list-style-type: none"> ● Shall add the terms and definition of as follows, <ul style="list-style-type: none"> ➢ "IC card reader/writer": It is the receiver and transmitter to exchange message for proximity card. ➢ "Toll office (as Operation Office)": It is located at the adjacent space of tollgate and equipped with some equipments for toll collection as in paragraph 4.3.3. ➢ "Toll Management Center": It is located in the Sectional Road Management Office (as Road Management Office) which is equipped with Toll Management Center Server to receive, compile and manage the Transaction data, Toll collection data relating to toll collection from Toll Management Server from each Tollgate..
1.4 Abbreviations		
2 Regulations on Toll Counting		
2.1 Defining Type of Vehicle		<ul style="list-style-type: none"> ● IC-Card might be used by another type of vehicle user (driver). In the case, not necessary to record the vehicle type information in IC-Card. Then, in case of IC-Card payment, recognition of vehicle type shall be done by toll collector as same as manual tolling.
2.2 Defining Mileage of Vehicle		<ul style="list-style-type: none"> ● Entry interchange information shall be recorded OBU and IC-Card.
3 Toll Collection Processing		
3.1 General Processing		<ul style="list-style-type: none"> ● About account value, in case of the value is recorded on IC-Card, the value might be used for payment of toll fee, but NOT only. The card might be used for public transportation and so on. For toll collection in open method, the system shall be recorded the new account balance on OBU/IC-Card automatically after deducting toll fee.
3.2 OBU/IC-Card Issuance		<ul style="list-style-type: none"> ● IC-Card might be used by another type of vehicle user (driver). In the case, not necessary to record the vehicle's information in IC-Card. Then, in case of IC-Card payment, recognition of vehicle type shall be done by toll collector as same as manual tolling. ● OBU/IC-Card data sets and data components in 4.5.1 and 4.5.2.
3.3 Account Refilling		
3.4 Toll Collection Processing at Tollgate in open method		
3.4.1 Toll process at Touch & Go lane		<ul style="list-style-type: none"> ● In case of "Cases 2 a)", the vehicle type shall NOT be recorded the IC-Card according to 3.2

in open method		above. Therefore, the vehicle type is NOT the same with the recognized vehicle type by toll collector :
3.4.2 Process at ETC lane in open method		
3.5 Toll Collection Processing at Tollgate in close method		
3.5.1 Toll collection processing at Touch & Go lane in close method		<ul style="list-style-type: none"> ● a) Processing at entry lane, in case of "Cases 2 1)", the vehicle type shall NOT be recorded the IC-Card according to 3.2 above. Therefore, the vehicle type is NOT the same with the recognized vehicle type by toll collector:
3.5.2 Toll collection processing at ETC lane in close method		<ul style="list-style-type: none"> ● b) Processing at exit lane, in case of "Cases 2 2)", the vehicle type shall NOT be recorded the IC-Card according to 3.2 above. Therefore, the vehicle type is NOT the same with the recognized vehicle type by toll collector:
3.6 Clearing Center Processing		
4 Technical Requirements		
4.1 General Requirements		<ul style="list-style-type: none"> ● Reliability and Back-up system, the toll collection system are the most important infrastructure for collecting the toll fee. The reliability shall be high, therefore the system shall be equipped with the countermeasure method for system down.
		<ul style="list-style-type: none"> ● "Toll office" shall be located at adjacent place to tollgate for management and administrate to tollgate staffs. The system ready to connect with toll office, toll management center as RMO, Bank settlement center.
4.2 Tollgate Structure		
4.2.1 Layout of Lane		
4.2.2 Toll Plaza		<ul style="list-style-type: none"> ● For secure the safety of toll booth staff such as toll collectors when they cross the ETC lane, especially, the lane crossing zone and gate shall be located at ETC lane.
4.2.3 Pavement, Deceleration Bar		
4.2.4 Traffic Signs		
4.2.5 Arrangement of Equipment on Touch & Go Toll Lanes		
4.2.6 Arrangement of Equipment on Electronic Toll Collection (ETC) Lanes		<ul style="list-style-type: none"> ● For smooth operation of toll collection, the lane shall be equipped with IC-Card reader/writer which is used when the radio communication failed. In the case, take out the IC-Card from the OBU, and hand out to toll collector. Then, to deduct the toll fee from the account value.

4.2.7 Arrangement of Equipment on combination of Touch & Go and Electronic Toll Collection (ETC)		
4.3 System Equipment		<ul style="list-style-type: none"> ● For secure the interoperability and interconnectivity, shall add the requirement as follows, <ul style="list-style-type: none"> ➢ The equipments shall be capable of having following communication interfaces in order to ensure that equipment to be communicated or controllable with each equipments. <ul style="list-style-type: none"> ◇ 1) The name of connector (complied standard) ◇ 2) Transmission data format ◇ 3) Necessary information or specification of equipment shall be capable of being disclosed in order to secure the interoperability and interconnectivity of equipment. Furthermore, they shall be capable of being disclosed promptly based on the disclosing demand, including the contents that are not described as above.
4.3.1 Road Vehicle Communication Equipment		<ul style="list-style-type: none"> ● Type of vehicle information shall be recorded in OBU.
		<ul style="list-style-type: none"> ● In case of the category of vehicle for toll fee is changed, the type of vehicle information shall be changed. Therefore, shall prepare the function as follows, <ul style="list-style-type: none"> ➢ All information of vehicle registration sheet should be input in OBU, however, the memory of OBU is consumed. ➢ Raod Vehicle Communication system or OBU issuing system shall be implemented rewriting function of information in OBU.
4.3.2 Equipment at lane	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● CCTV camera shall be equipped in toll booth for surveillance of activities of the driver and the toll collector. ● The lifetime of LED element shall be more than 50,000 hours (approx. 5.7 years). Add, the meaning of lifetime is that an attenuation of brightness to be 50%.
4.3.3 Equipment in Operation Office		<ul style="list-style-type: none"> ● The storage of servers shall be regulated by record duration of all transaction data.
4.3.4 Auxiliary Equipment System		
4.3.5 Reliability and Backup Equipment		

4.4.6 Network System and Transmission Line		
4.4.7 Power Supply System		
4.4 Software System		
4.4.1 General Requirements		<ul style="list-style-type: none"> ● For secure the interoperability and interconnectivity, shall add the requirement as follows, <ul style="list-style-type: none"> ➢ The software shall be capable of having following communication interfaces in order to ensure that software to be communicated or controllable with each software. <ul style="list-style-type: none"> ◇ 1) The name of implementation software ◇ 2) Transmission data format ◇ 3) Necessary information or specification of software shall be capable of being disclosed in order to secure the interoperability and interconnectivity of software. Furthermore, they shall be capable of being disclosed promptly based on the disclosing demand, including the contents that are not described as above.
4.4.2 Processing Software at Lane	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● Black list (Invalid data set) shall be recorded and renewed periodically. (*the list contain shall be invalidated OBU/IC-Card) ● Invalidation function of OBU/IC-Card which is in Black list at toll gate.
4.4.3 Management Software in Center at Tollgate	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● Black list (Invalid data set) shall be recorded and renewed periodically. (*the list contain shall be invalidated OBU/IC-Card)
4.4.4 Software of Comparing/Settlement	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● Black list (Invalid data set) shall be recorded and renewed periodically. (*the list contain shall be invalidated OBU/IC-Card)
4.5 Transaction Information		
4.6 Model of Inter-Tollgate Connection and Settlement		
4.7 Requirements on Security, transaction security		
5 Requirement on Reports		
6 Related Requirement		

5. Review Comments for SG-8: TCVN on Management Centers/Offices

Reviewed results of the 2nd Draft TCVN are shown on the table below.

- By a statement of Foreword, you revise QCVN in TCVN.

Article Number in TCVN	Classification of Reviewed Result	Comments
1 Application Scope		
2 Reference Materials		Refer to other ISO.
3 Terminology and Definition		<ul style="list-style-type: none"> ● 3.7, 3.11 shall be written on the draft national standard of ETC, SG-7. ● 3.9 You should add "optimum route selection" to the end of a sentence.
4 Abbreviations		
5 General Regulations		
5.1 Road Management Offices	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● 5.1.2 d This description should be included in 5.2. Because you should receive various events in a lump in a Regional Main Center. ● 5.1.3 This system should be utilized to manage the section on own expressway. Because the total information is gathered in Regional Main Center.
5.2 Regional Main Center		
5.3 Integrated system for Traffic Monitoring and Control on Expressways	COUNTER TO MOD OF MOT-SAPI, MARCH 21, 2014	<ul style="list-style-type: none"> ● 5.3.1 Figure 1 You should revise a figure to be different from Minutes of Discussions. ● 5.3.4 You should delete Road Management Office because it is inefficient that Road Management Office exchanges data for other TMC.
6 Requirements on Design and Equipment Development at TMC		
6.1 Design Scope		
6.2 Equipment Room		
6.3 Traffic Operation Room		
6.4 Telephone System		<ul style="list-style-type: none"> ● 6.4.3 a) Confirmation is necessary, because "The number of trunks shall be designed to have redundancy to ensure high availability level for the communication connection to the outside." is contents influencing the carrier side.
6.5 Data Transmission Network	MISMATCH WITH SAPI	<ul style="list-style-type: none"> ● 6.5.1, 6.5.2 It is not necessary to connect Road Management Office and the outside on the Internet.

		<p>The Internet connection is necessary to provide traffic information. Because the access from the several places is non-efficiency, Regional Main Center manages it comprehensively.</p>
6.6 Supporting Device Systems		<ul style="list-style-type: none"> 6.6.3 a) It is unrealistic to keep the humidity of 40~45 %.
6.7 Requirements on Information Safety Security		
7 Exchanged Information and Data among Traffic Management Centers		
7.1 Exchange of Traffic Images Data		<ul style="list-style-type: none"> 7.1.1 It is unnecessary to share data between Road Management Offices. The volume of moving image data is huge, and to suppress the traffic of the network.
		<ul style="list-style-type: none"> 7.1.1 c) "Center" should be changed to "Regional Main Center".
		<ul style="list-style-type: none"> 7.1.6 b) There is not the authority to reject a camera control request of Regional Main Center in Road Management Office.
7.2 Exchange of Traffic Volume Data		<ul style="list-style-type: none"> Confirmation of the consistency with the title is necessary.
7.3 Exchange of Weather Data		<ul style="list-style-type: none"> 7.3.4 "vehicle detector" should be changed "weather sensor".
7.4 Exchange of Vehicle Detection Data	MISMATCH WITH SAPI	<ul style="list-style-type: none"> license plate should be deleted. Enforcement of traffic violations is not included in Road Operator and Traffic Management organization's operations.
7.5 Exchange of Vehicle Axle Load Control Data		
7.6 Exchange of Traffic Event Information		<ul style="list-style-type: none"> 7.6.1 Management and supervised of all event information should be done in Regional Main Center.
7.7 Exchange of Information Displayed on Electronic Traffic Signs	COUNTER TO MOD OF MOT-SAPI, MARCH 21, 2014	<ul style="list-style-type: none"> 7.7.1 Regional Main Center should decide the event information and the VMS display information based on a report from Road Management Office. When there is not traffic information, you are able to decide VMS display information in Road Management Office.
		<ul style="list-style-type: none"> 7.7.2 Data on list of installed electronic traffic signs should be managed in Regional Main Center.
	COUNTER TO MOD OF	<ul style="list-style-type: none"> 7.7.4

	MOT-SAPI, MARCH 21, 2014	A determination and rejection for the traffic information from RMC are not duties of RMO.
7.8 Exchange of Toll Collection Information		
7.9 Requirements on Informatin and Data Exchange Frequency among TMC		<ul style="list-style-type: none"> You should not exchange all data between Road Management Offices. It is not realistic to disclose all information to other operators.
		<ul style="list-style-type: none"> Table 1 We recommend that you consider again in Exchange Frequency to do data management in Regional Main Center.
7.10 Requirements on Communication Standards among Centers		<ul style="list-style-type: none"> 7.10.1 We recommend addition of "such as" in "(SOAP/WSDL/UDDI)". Because the technology innovation of this field is rapidly.
		<ul style="list-style-type: none"> 7.10.2 "among Traffic Management Centers" should modify it in" Regional Main Center". Because the Internet connection assumes only Regional Main Center.
		<ul style="list-style-type: none"> For secure the interoperability and interconnectivity, shall add the requirement as follows, <ul style="list-style-type: none"> ➢ The system shall be capable of having following communication interfaces in order to ensure that hardware/software to be communicated or controllable with each hardware/software. <ul style="list-style-type: none"> ✧ 1)The name of implementation software ✧ 2) Transmission data format ✧ 3) Necessary information or specification of hardware/software shall be capable of being disclosed in order to secure the interoperability and interconnectivity of hardware/software. Furthermore, they shall be capable of being disclosed promptly based on the disclosing demand, including the contents that are not described as above.
8 Requirements on Management Software System		
8.1 Management Software System at Road Management Offices		<ul style="list-style-type: none"> 8.1.1 h) This sentence shall be written on the draft national standard of ETC, SG-7.
8.2 Management Software at Regional Main Center		<ul style="list-style-type: none"> 8.2.1 You should include the VMS data, event information data, weather data and

		information on overload.
		<ul style="list-style-type: none">● 8.2.1 c)● This GIS system is not suitable for display of the traffic information.
8.3 Software for providing traffic information through Internet		<ul style="list-style-type: none">● 8.3.2 This sentence should delete it from the viewpoint of security.

**PART 2:
SPECIFICATIONS FOR SYSTEM
CONNECTION/COOPERATION
(BETWEEN NORTHERN
REGIONAL MAIN CENTER AND
ITS OF ADJOINING SECTION)**

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1. General

The Northern Regional Main Center is to be installed by the ITS Integration Project with its equipment and communication network at roadside. On the other hand, a number of ITS equipment components and communication networks are to be installed by the projects of many expressway sections with their Road Management Offices separately from the ITS Integration Project, in near future. Such separated ITS installation at respective expressway sections can cause the problems that the connectivity of network and the interoperability of data cannot be secured between their systems and the system in the Northern Regional Main Center.

In order to avoid such potential problems, this document provides the Specifications for System Connection/Cooperation, which shall be applied, for securing connection to the system in the Northern Regional Main Center to be installed by the ITS Integration Project, to the connecting networks/interfaces of the systems of ITS to be separately installed in the adjoining expressway sections.

2. Materials for Reference

- Decree No. 32/2014/ND-CP: on Management, Operation and Maintenance of Expressway Works
- Circular No. 90/2014/TT-BGTVT: Guideline some Contents on Management, Operation and Maintenance of Expressway Works
- ITU-T Y. 1541: Network performance objectives for IP-based services
- ITU-T G711: Pulse Code Modulation (PCM) of Voice Frequencies
- ITU-T G165: Echo Cancellers
- ITU-T E161 Arrangements of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network
- ITU-T X.200, ISO/IEC 7498-1: Information Technology – Open Systems Interconnection – Basic Reference Model: The Basic Model (OSI Reference Model)
- IETF RFC 791: Internet Protocol (IP)
- IETF RFC 793: Transmission Control Protocol (TCP)
- IETF RFC 768: User Datagram Protocol (UDP)
- IETF RFC 894: A Standard for the Transmission of IP Datagrams over Ethernet Networks (IP over Ethernet)
- IETF REC 792: Internet Control Message Protocol (ICMP)
- IETF RFC 1157: Simple Network Management Protocol (SNMP)
- IETF, RFC 3261: Session Initiation Protocol (SIP)
- IETF, RFC 3262: Reliability of Provisional Responses in the Session Initiation Protocol (SIP)
- IETF, RFC 3263: Session Initiation Protocol (SIP) – Locating SIP Servers
- IETF, RFC 3264: An Offer/Answer Model with the Session Description Protocol (SDP)
- IETF, RFC 3265: Session Initiation Protocol (SIP) – Specific Event Notification
- IETF, RFC 3550: A Transport Protocol for Real-Time Applications (RTP)
- IETF, RFC 4566: Session Description Protocol (SDP)
- TCVN 8068: 2009: VoIP telephone service – Requirements

- ISO/IEC 14496-2: MPEG4-Part 2
- ITU-T H. 264 and ISO/IEC 14496-10: MPEG4-Part 10
- IEEE 802.3af: Power over Ethernet
- IEEE 802.3at: 10BASE-T/100BASE-TX PoE Plus
- ISO/IEC 14496: Coding of audio-visual objects.

3. Terminology

3.1 Definitions

- **Connectivity:** To be capable of securing connection of the communication network between the different systems (installed in the different road sections).
- **Interoperability:** To be capable of sharing the data among the different systems (operated by the different road operators).
- **Compatibility:** To be capable of sharing the interchangeable devices among the different systems (provided by the different suppliers).
- **Voice Communication:** This is the system function which allows to send an emergency call and a request for help to the Main Centers and road management offices at an incident occurrence using telephones installed at roadsides, rest areas and tunnel sections and by administrative telephones installed at the toll management offices. It also allows instantly sending instructions to the units concerned for clearing incidents and enforcing traffic regulations.
- **CCTV Monitoring:** This is the system function which allows the road operators to capture the current situation of traffic accidents, broken-down vehicles, left obstacles, driving in the reverse direction, vandalism, natural disaster and traffic conditions on the expressways and to monitor the video image at the Main Centers and road management offices by using cameras installed at road sections where traffic can get stuck easily by incidents and at long tunnel sections.
- **Traffic Event Data Management:** This is the system function which allows the road operators to conduct traffic control, regulation and information dissemination on the expressway, in a unified/integrated form, by categorizing the results (acquired through emergency telephones, mobile radio communication, event detection, traffic analysis and weather monitoring) and by organizing them as the data of traffic events specified by the place/ time of occurrence and the priority.
- **VMS Indication:** This is the system function which allows road operators to provide the road users on the expressways with the information organized as traffic events by using VMS (Variable Message Sign) installed at locations short of entrances, exits, tollgates, junctions and tunnels.
- **Integrated Data Management:** This is the system function which allows the road operators to utilize acquired data such as traffic events, traffic volume, large vehicle ratio and measured axle loads of heavy trucks for developing inspection and budget plan of road maintenance and to check validity of toll revenue in comparison with traffic data.

3.2 Abbreviations

- **BOT:** Build Operate Transfer
- **CCTV:** Closed-circuit Television
- **CSS:** Changeable Speed limit Sign
- **CSV:** Comma-separated Values
- **HPC:** Hanoi People's Committee
- **ICMP:** Internet Control Message Protocol
- **IP:** Internet Protocol
- **ITS:** Intelligent Transport Systems
- **L3SW:** Layer 3 Switch
- **NRMC:** Northern Regional Main Center
- **PSTN:** Public Switched Telephone Networks
- **RMO:** Road Management Office
- **RTP:** Real-time Transport Protocol
- **RTSP:** Real Time Streaming Protocol
- **SDP:** Session Description Protocol
- **SFP:** Small Form factor Pluggable
- **SGML:** Standard Generalized Markup Language
- **SIP:** Session Initiation Protocol
- **SNMP:** Simple Network Management Protocol
- **TCP:** Transmission Control Protocol
- **UDP:** User Datagram Protocol
- **UTF:** UCS Transformation Format
- **VEC:** Vietnam Expressway Corporation
- **VMS:** Variable Message Sign
- **VoIP:** Voice over Internet Protocol
- **XML:** EXtensible Markup Language.

4. Target Connecting Interfaces

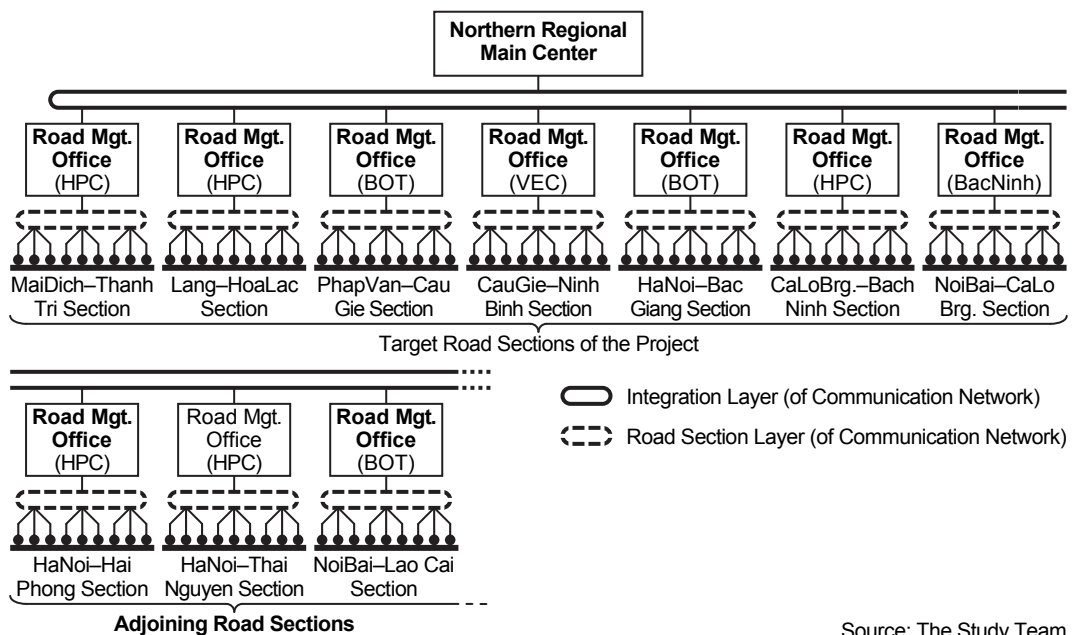
4.1 Target Connecting Interfaces on Communication Network

1) Hierarchical Communication Network Structure

For the integration of traffic information/control, a hierarchical communication network structure is to be established as shown in the figure below. Equipment components at roadside are required to be integrated under a Road Management Office in each road section through the Road Section Layer of communication network. In addition, the Road Management Offices are required to be integrated under the Northern regional Main Center through the Integration Layer of communication network for securing cooperation among the systems installed in the respective road sections.

There are connecting interfaces, on the Integration Layer, on the borders between the respective pairs of adjoining road sections, where systems are to be installed in the different projects. For such connecting interfaces, it is required to secure the connectivity of network and the interoperability of data.

Figure 4.1 Hierarchical Communication Network Structure



Source: The Study Team

2) Target Connecting Interfaces on Optical Fiber Cable Network

ITS equipment components of the adjoining road sections including the following three sections are planned to be installed separately from the ITS Integration Project in near future; because these adjoining sections are not included in the Scope of the Project:

- Ha Noi – Hai Phong
- Ha Noi – Thai Nguyen
- Noi Bai – Lao Cai.

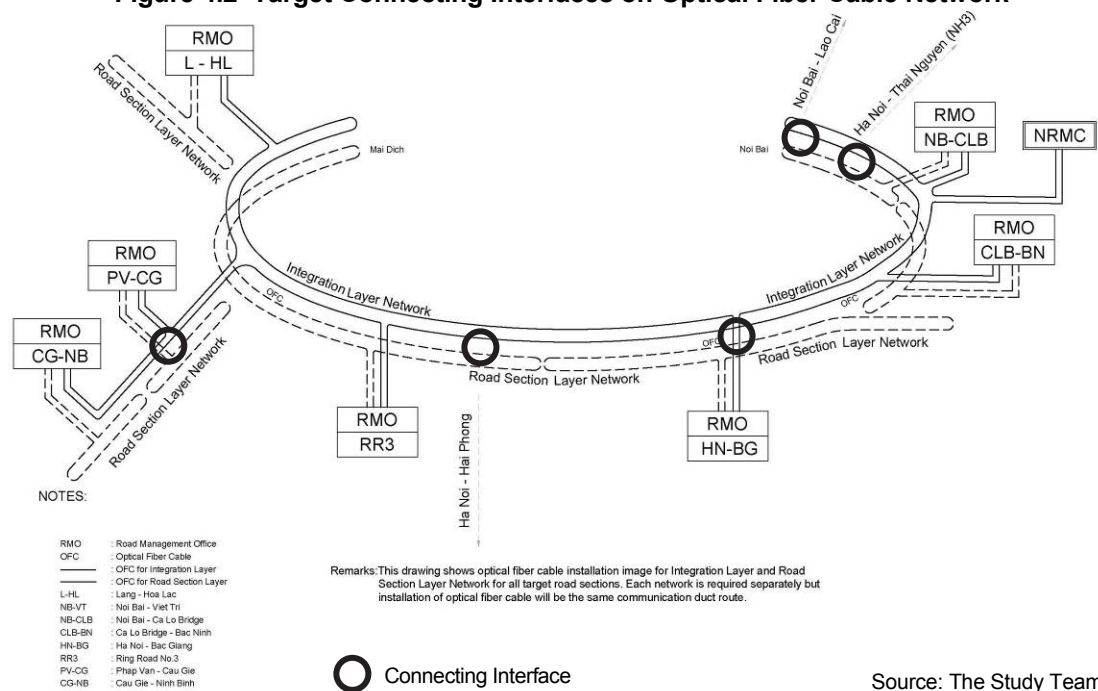
Additionally, some certain parts of ITS equipment components of the following two road sections

are planned to be installed separately from the Project as the investment by BOT companies in near future; although these sections are included in the Scope of the Project:

- Phap Van–Cau Gie
- Ha Noi–Bac Giang.

ITS installation at these road sections separated from the Project can cause the problems that the connectivity of network and the interoperability of data cannot be secured between their systems and the System installed in the Project. In order to avoid such problems, the specifications at the connecting interfaces are to be defined in this document.

Figure 4.2 Target Connecting Interfaces on Optical Fiber Cable Network



4.2 Two Cases of Structuring Connecting Network/Interfaces

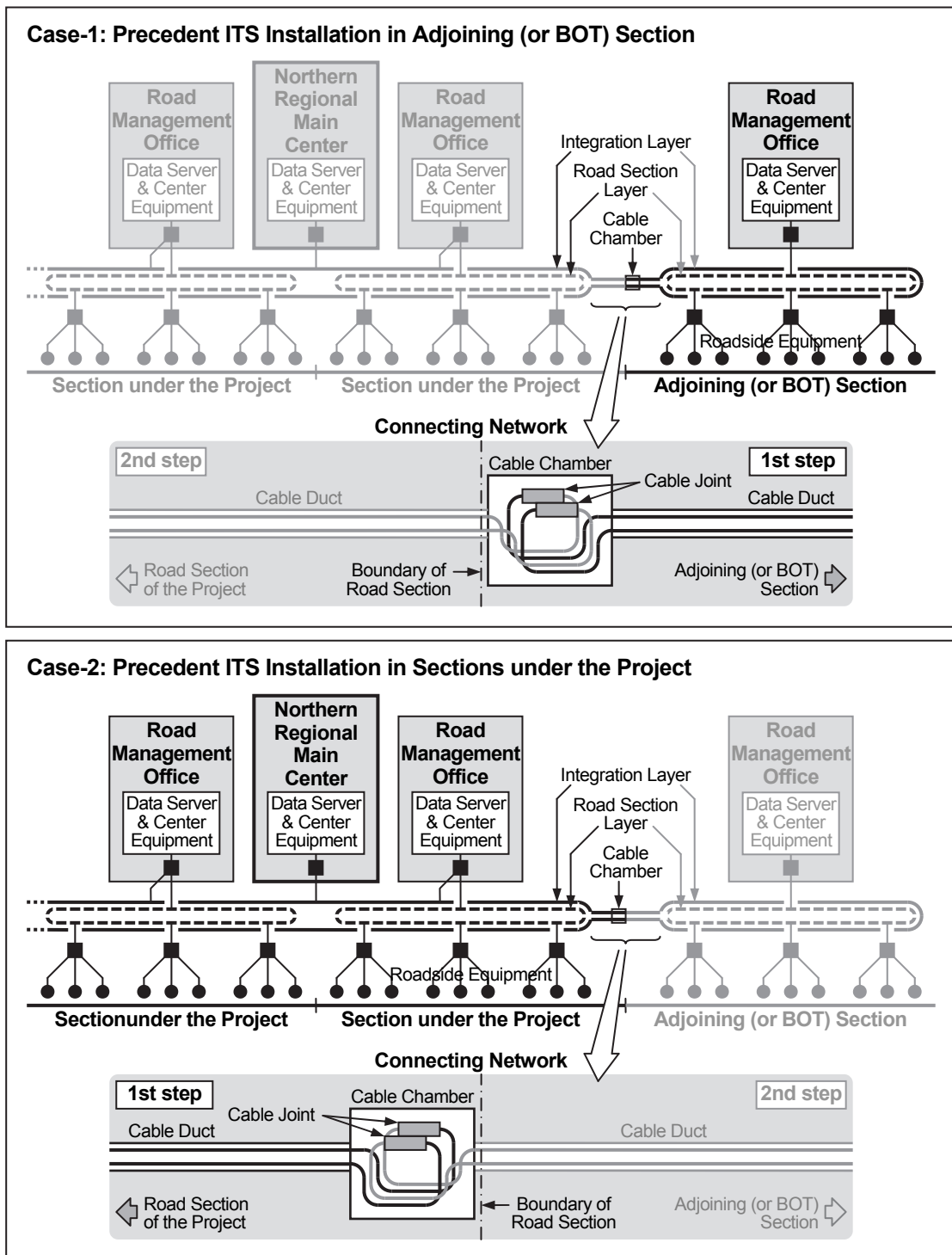
The timing of ITS installation at these road sections discussed above can be different from the timing of implementation of the ITS Integration Project.

There can be the following two cases of structuring the connection between the road sections under the Project and the adjoining road section (or the BOT section) outside the Project:

- Case-1: Precedent ITS Installation in Adjoining (or BOT) Section
- Case-2: Precedent ITS Installation in Sections under the Project.

The outlines of these two cases are shown in the figure below. In both cases, the connecting interface is located between the two ring-shaped optical fiber cable networks prepared for the road sections under the Project and for the Adjoining (or BOT) Section, and the interface is to be formed by the cable joints installed in a cable chamber. In other words, the target connecting interface for system cooperation is established between the Northern Regional Main Center and the Road Management Office of Adjoining Section.

Figure 4.3 Two Cases of Structuring Connecting Network/Interface



Source: The Study Team

3) Demarcation/Requirements on Installation of Connecting Network/Interfaces

The demarcation and requirements on the installation of the connecting network/interfaces are described below.

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- In the ITS implementation of the adjoining road section (or the BOT section), a cable chamber shall be installed in its site close against the border with the neighboring section under the ITS Integration Project, and a cable duct shall be installed for connecting the Road Management Office of the adjoining road section (or the BOT section) and the cable chamber. The optical fiber cables along in the cable duct and the cable joints in the chamber shall be installed at the same time for preparing the connecting network.
- Then, in the ITS Integration Project, another cable duct and the optical fiber cable will be installed for connecting the cable chamber and the Road Management Office of the neighboring section and the connecting network will be established.

Case-2: Precedent ITS Installation in Sections under the Project

- In the ITS Integration Project, a cable chamber is to be installed in its site close against the border with the neighboring adjoining road section (or the BOT section), and a cable duct shall be installed for connecting a Road Management Office under the Project and the cable chamber. The optical fiber cables along in the cable duct and the cable joints in the chamber shall be installed at the same time for preparing the connecting network.
- Then, in the ITS implementation of the adjoining road section (or the BOT section), another cable duct and the optical fiber cable shall be installed for connecting the cable chamber and the Road Management Office of the section and the connecting network shall be established.

4.3 Physical Specifications of Target Connecting Interface

1) Optical Fiber Cable

- The optical fiber cable to be installed shall be compatible to the ITU-T Recommendation G.652.D.
- As for the fiber core connection method, any type connection is acceptable provided that the end to end loss of the optical fiber core shall be the acceptable quality of connecting SFP transceiver module.
- Although the communication traffic from one road management office to the regional main center is small compared to its transmittable capacity of one optical fiber core, 4 cores are recommended to connect between the Regional Main Center and the Road Management Office taking necessary construction years of the expressway into consideration.
- The breakdown of 4 cores is active 2 cores for upstream and downstream respectively, and another 2 cores for redundancy of the active cores. In addition to the above 4 cores, additional 4 cores are reserved for future necessity. The number of these cores is the capacity that is enough when a section of the one which is not adjoining becomes the addition. Therefore in total 8 cores are recommended to install and connect between the Regional Main Center and the Road Management Office.

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the optical fiber cable to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of communication network.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the technical specifications of the optical fiber cable shown in the detailed design of the ITS Integration Project and shall establish the connection of communication network.

2) L3SW

Following Interface should be supported:

- 1000Base-T Interface (RJ-45 connector)
- Interface for Gigabit SFP Transceiver Module for single mode optical fiber cable that is compatible for ITU-T G652.D.

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of L3SW to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of communication network.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the technical specifications of L3SW shown in the detailed design of the ITS Integration Project and shall establish the connection of communication network.

3) Transceiver

- As for the transceiver called SFP (small form-factor pluggable) transceiver module to be necessary between Layer 3 Switch (L3SW) and end of optical fiber cable to be connected to the L3SW for electric-optic conversion of transmitting data and vice versa, there is no international standard in fact. Therefore, if the L3SW to be installed in Target Road Management Office is not compatible to the one installed in Regional Main Center, the responsible organization of Regional Main Center shall install the compatible L3SW at the Target Road Management Office.
- The responsible organization of Regional Main Center shall connect with the L3SW installed in Target Road Management Office through minimum 1000Base-T or equivalent cable.

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the transceiver to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of communication network.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the technical specifications of the transceiver shown in the detailed design of the ITS Integration Project and shall establish

the connection of communication network.

4.4 Target Connecting Interfaces on System Architecture

The target connecting interface between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section aforementioned are shown as the interfaces [1] to [5] on the system architecture in the following pages.

These connecting interfaces are requisite for actualizing respectively the following functions:

- [1] for Voice Communication:
which is needed for the operator in the Road Management Office to report the results of traffic information/control to the Regional Main Center and for the operator in the Regional Main Center to manage and supervise the traffic information/control in the events of serious incidents/accidents/disasters in accordance with the Circular No. 90/2014/TT-BGTVT and the Decree No.32/2014/ND-CP,
- [2] for CCTV Monitoring:
which is needed for the operator in the Regional Main Center to monitor the situation of the traffic information/control executed by the respective Road Management Offices both in the normal state and in the events of serious incidents/accidents/disasters in accordance with the Circular No. 90/2014/TT-BGTVT and the Decree No.32/2014/ND-CP,
- [3] for Traffic Event Data Management:
which is needed for the operator in the Road Management Office to send data of the results of traffic information/control to the Regional Main Center and for the operator in the Regional Main Center to deliver the compiled data over the expressway network to the Road Management Office in accordance with the Circular No. 90/2014/TT-BGTVT and the Decree No.32/2014/ND-CP,
- [4] for VMS Indication:
which is needed for the operator in the Regional Main Center to send the guidance of traffic information in the events of serious incidents/accidents/disasters in accordance with the Circular No. 90/2014/TT-BGTVT and the Decree No.32/2014/ND-CP,
- [5] for Integrated Data Management:
which is needed for the operator in the Road Management Office to send data of the results of axle load measurement to the Regional Main Center in accordance with the Circular No. 90/2014/TT-BGTVT and the Decree No.32/2014/ND-CP.

These functions will constitute the traffic information/control and the heavy truck control based on the cooperation among the System in the Northern Regional Main Center and the systems of the Adjoining (or BOT) Sections.

Figure 4.4 Target Connecting Interfaces for Traffic Information/Control

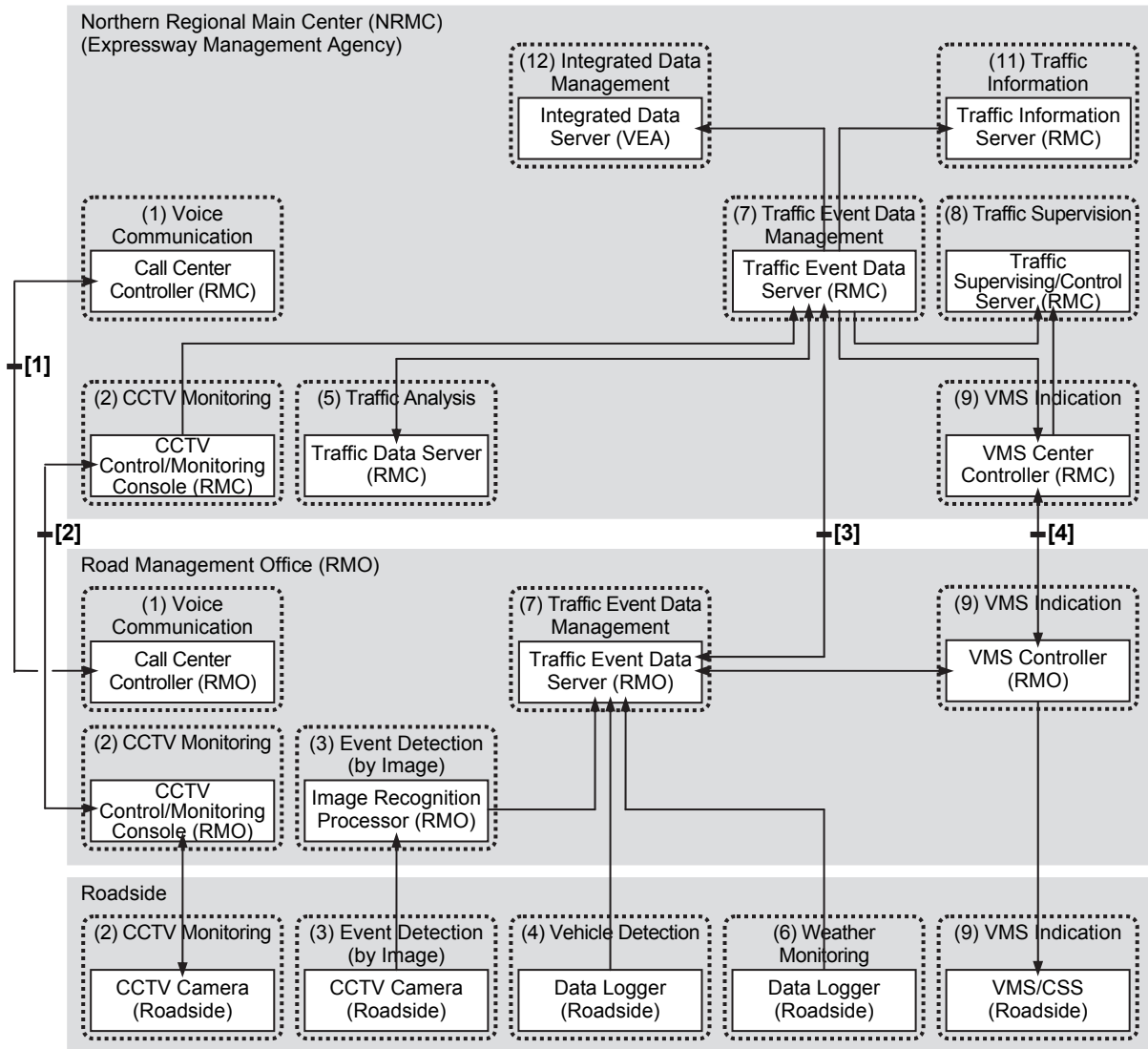
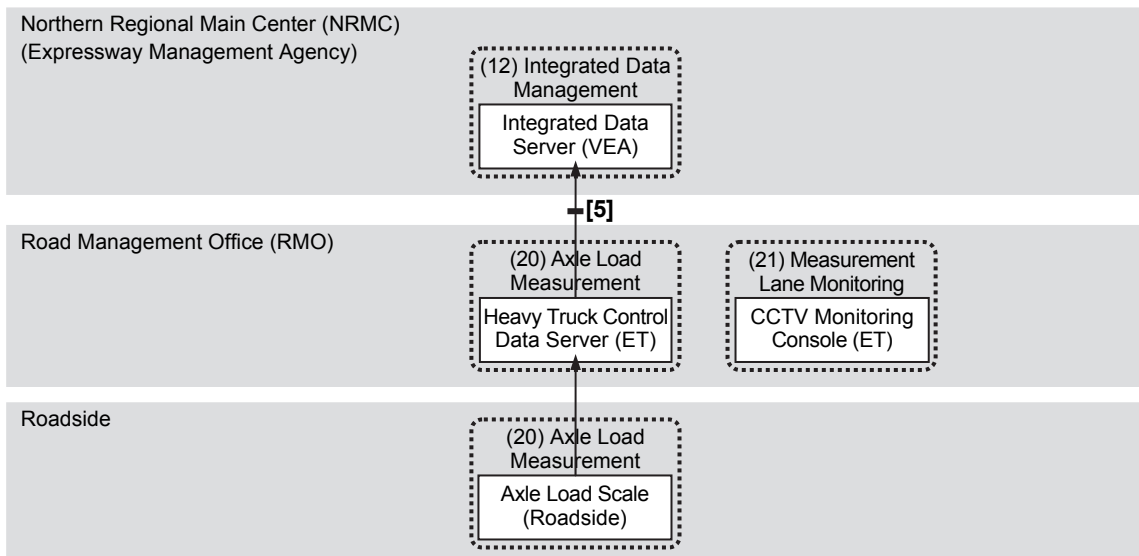


Figure 4.5 Target Connecting Interfaces for Integrated Data Management



5. Specifications for Voice Communication

5.1 Requirements on System Functions

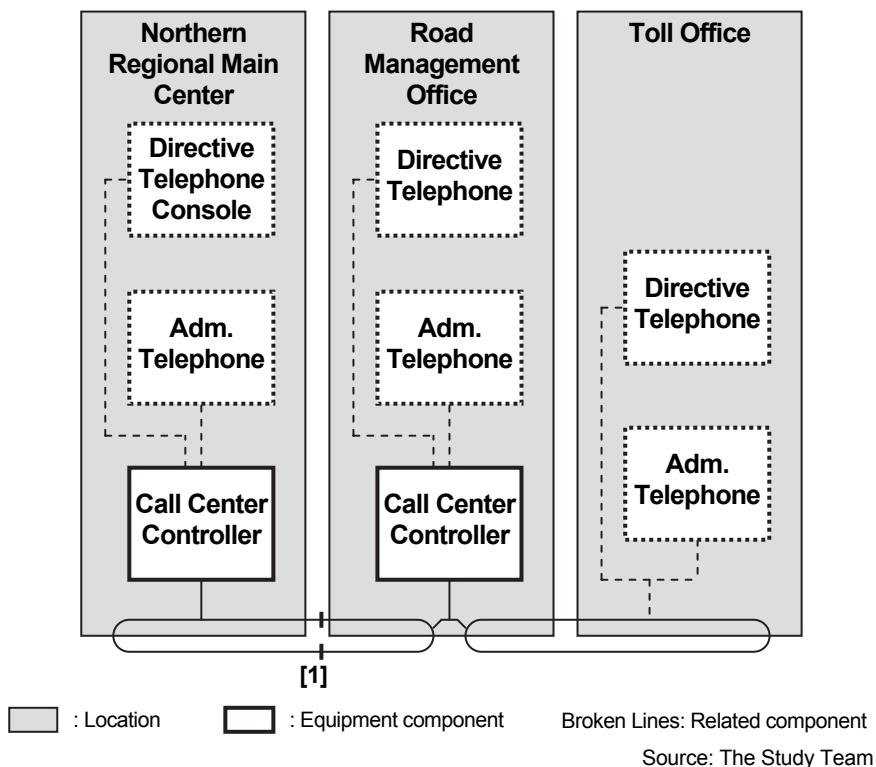
The System for Voice Communication shall meet the following requirements:

- The System shall be capable of sending directives simultaneously from the operator in the Northern Regional Main Center to the Road Management Offices of the Adjoining (or BOT) Sections concerned with top-priority at any time for clearing incidents and enforcing traffic regulations.
- The System shall be capable of receiving report of current traffic conditions and of incident occurrence promptly in the Northern Regional Main Center from the operators from the Adjoining (or BOT) Sections.
- The System shall be capable of switching and connect the interactive voice and emergency directives among the Regional Main Center, the Road Management Offices and the Toll Offices.
- The SIP Server of the System shall be capable of controlling Quality of Service on voice communication within ITS related communication network.
- The SIP Server of the System shall be capable of connecting directive communication from directive communication console 100% without any calling loss within ITS related communication network.
- The SIP Server of the System shall be capable of functioning as proxy server which transmits connection request to another Server for Call Control when such request receives.
- The SIP Server of the System shall be capable of securing one to many communications.
- The SIP Server of the System shall be capable of functioning as registrar which manages users, IP addresses and telephone numbers.
- The VoIP Gateway of the System shall be capable of originating call from administrative telephone in the ITS communication network to PSTN and capable of receiving incoming call from PSTN to the administrative telephone in ITS communication network.
- The VoIP Gateway of the System shall be capable of resolving telephone number and IP address, and capable of connecting to the proper telephone terminal.
- The VoIP Gateway of the System shall be capable of converting call control signal in PSTN into call control signal in IP network, and vice versa, and it shall be capable of interconnecting between administrative telephone in ITS network and telephone in PSTN.

5.2 Detailed System Architecture and Target Connecting Interface

For actualizing the function of voice communication, the target connecting interface [1] shall be established between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section as shown in the system architecture below.

Figure 5.1 Target Connecting Interface [1] for Voice Communication



5.3 Protocol/Message Specifications

1) Protocol Specifications

For securing the connectivity of network and the interoperability of data required for the voice communication, the following protocols shall be established at the Target Interface [1] between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section on the integration layer of communication network.

Table 5.1 Protocol Specifications at [1] for Voice Communication

	Protocol Specifications & Remarks
Physical Layer	Optical Fiber Cable: 8 core (at least) Optical fiber standard: Generic cabling for customer premises (ISO/IEC 11801) Characteristics of single-mode optical fiber cable (ITU-T G.652) Characteristics of a non-zero dispersion shifted single-mode optical fiber cable (ITU-T G.655) Ethernet (IEEE 802.3) Power over Ethernet (IEEE 802.3af) 10BASE-T/100BASE-TX PoE Plus (IEEE 802.3at)
Data Link Layer Network Layer Transport Layer Session Layer	IP: Internet Protocol version 4 and 6 (IETF RFC 791) TCP: Transmission Control Protocol (IETF RFC 793) UDP: User Datagram Protocol (IETF RFC 768) ICMP: Internet Control Message Protocol (IETF RFC 894)
Presentation Layer Application Layer	SNMP: Simple Network Management Protocol (IETF RFC 1157) SIP: Session Initiation Protocol (IETF RFC 3261) SDP: Session Description Protocol (IETF RFC 4566) RTP: A Transport Protocol for Real-Time Applications (IETF RFC 3550) Character code: 8-bit single-byte coded graphic character sets (ISO/IEC 8859, with securing upward compatibility) UTF-8 (ISO/IEC 10646) Speech codec: Pulse Code Modulation (PCM ITU-T G.711) Conjugate Structure Algebraic Code Excited Linear Prediction (CS-ACELP ITU-T G.729)

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the Target Interface [1] to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of interface.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the protocol specifications of the Target Interface [1] shown in the detailed design of the ITS Integration Project and shall establish the connection of interface.

2) Message Specifications

For securing the interoperability of data for Voice Communication between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, the message to be exchanged through the Target Interface [1] shall comply with the protocol specifications prescribed in SIP (IETF RFC3261).

6. Specifications for CCTV Monitoring

6.1 Requirements on System Functions

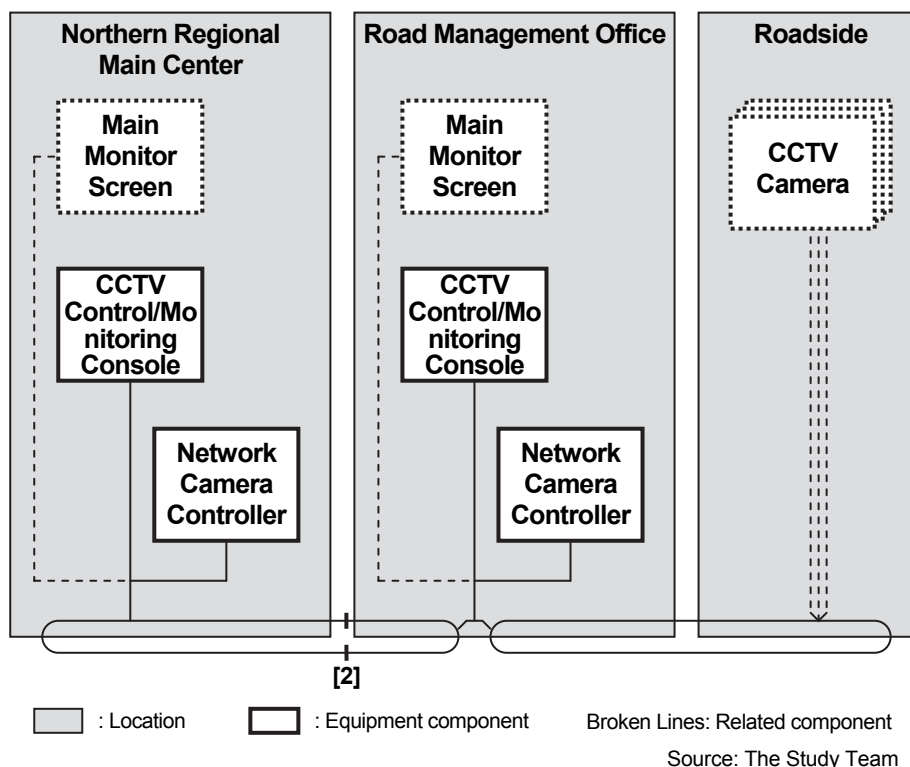
The System for CCTV Monitoring shall meet the following requirements:

- The System shall be capable of recognizing incident occurrences on the road and their type by using cameras located at every 2km or less along the through lanes of expressways and controlled/monitored remotely from the Regional Main Center and the Road Management Office; the incidents shall include traffic accidents, breakdown vehicles, left obstacles, reverse driving, vandalism, flood, natural disaster, fire, road damage, and traffic congestion.
- The System shall be capable of sending live video image of the existing conditions of traffic and events on the Adjoining (or BOT) Section both to the competent Road Management Office and to the Northern Regional Main Center, as the needs arises, respectively under the control of the operators in the Office and in the Center.
- The System shall be capable of recognizing the severity of incidents through identifying types of vehicles involved (such as trucks, buses and sedans) and identifying smoke or fire by appearance.
- The System shall be capable of installing roadside equipment for the monitoring to through lanes of Expressway in continuity.
- The System shall be capable of installing roadside equipment at the bottleneck spots on Expressway where traffic flow can easily be stuck by incidents.
- The System shall be capable of controlling roadside equipment remotely from the Regional Main Center in real time and from the Road Management Office at an occurrence of incident.
- The System shall be capable of storing the needed video images, such as the video image of traffic accident occurrence.
- The camera of the System shall be capable of making images of road traffic by using black/white or colour image continuously 24 hours a day, 365 days a year excluding time for regular maintenance.
- The camera of the System shall have auto-focus function to be controlled from "CCTV Monitor Console"
- The camera of the System shall be capable of correcting brightness of captured image automatically. (This is called the iris function.)
- The network camera controller of the System shall be capable of controlling CCTV cameras functions such as zooming, panning and tilting.
- The network camera controller of the System shall be capable of recording simultaneously and give remote access of live video streams from CCTV cameras.

6.2 Detailed System Architecture and Target Connecting Interface

For actualizing the function of CCTV monitoring, the target connecting interface [2] shall be established between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section as shown in the system architecture below.

Figure 6.1 Target Connecting Interface [2] for CCTV Monitoring



6.3 Protocol/Message Specifications

1) Protocol Specifications

For securing the connectivity of network and the interoperability of data required for the CCTV monitoring, the following protocols shall be provided at the Target Interface [2], between the systems of the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, on the integration layer of communication network.

Table 6.1 Protocol Specifications at [2] for CCTV Monitoring

	Protocol Specifications & Remarks
Physical Layer	Optical Fiber Cable: 8 core (at least) Optical fiber standard: Generic cabling for customer premises (ISO/IEC 11801) Characteristics of single-mode optical fiber cable (ITU-T G.652) Characteristics of a non-zero dispersion shifted single-mode optical fiber cable (ITU-T G.655) Ethernet (IEEE 802.3) Power over Ethernet (IEEE 802.3af) 10BASE-T/100BASE-TX PoE Plus (IEEE 802.3at)
Data Link Layer Network Layer Transport Layer Session Layer	IP: Internet Protocol version 4 and 6 (IETF RFC 791) TCP: Transmission Control Protocol (IETF RFC 793) UDP: User Datagram Protocol (IETF RFC 768) ICMP: Internet Control Message Protocol (IETF RFC 894)
Presentation Layer Application Layer	SNMP: Simple Network Management Protocol (IETF RFC 1157) RTP: A Transport Protocol for Real-Time Applications (IETF RFC 3550) RTSP: Real Time Streaming Protocol (IETF RFC 2326) SDP: Session Description Protocol (IETF RFC 4566) Character code: 8-bit single-byte coded graphic character sets (ISO/IEC 8859, with securing upward compatibility) UTF-8 (ISO/IEC 10646) Video Image data: Coding of audio-visual objects (ISO/IEC 14496) MPEG4-Part2 (ISO/IEC 14496-2) MPEG4-Part10 (ISO/IEC 14496-10) H.264 (ITU-T)

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the Target Interface [2] to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of interface.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the protocol specifications of the Target Interface [2] shown in the detailed design of the ITS Integration Project and shall establish the connection of interface.

2) Message Specifications

For securing the interoperability of data between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, the following messages to be exchanged through the Target Interface [2] shall be generated complying with the Data Dictionary defined in Chapter 10.

Table 6.2 List of Messages to be exchanged through [2] for CCTV Monitoring

Name of Message	A Pair of Equipment Components on Both Side of Interface through Which Message is Exchanged		Name of Included Data Sets
Image Data Message	CCTV Control/Monitoring Console (NMRC)	Network Camera Controller (RMO)	Event Image Data Set

Note, NMRC: Northern Regional Main Center, RMO: Road Management Office (of Adjoining (or BOT) Section).

7. Specifications for Traffic Event Data Management

7.1 Requirements on System Functions

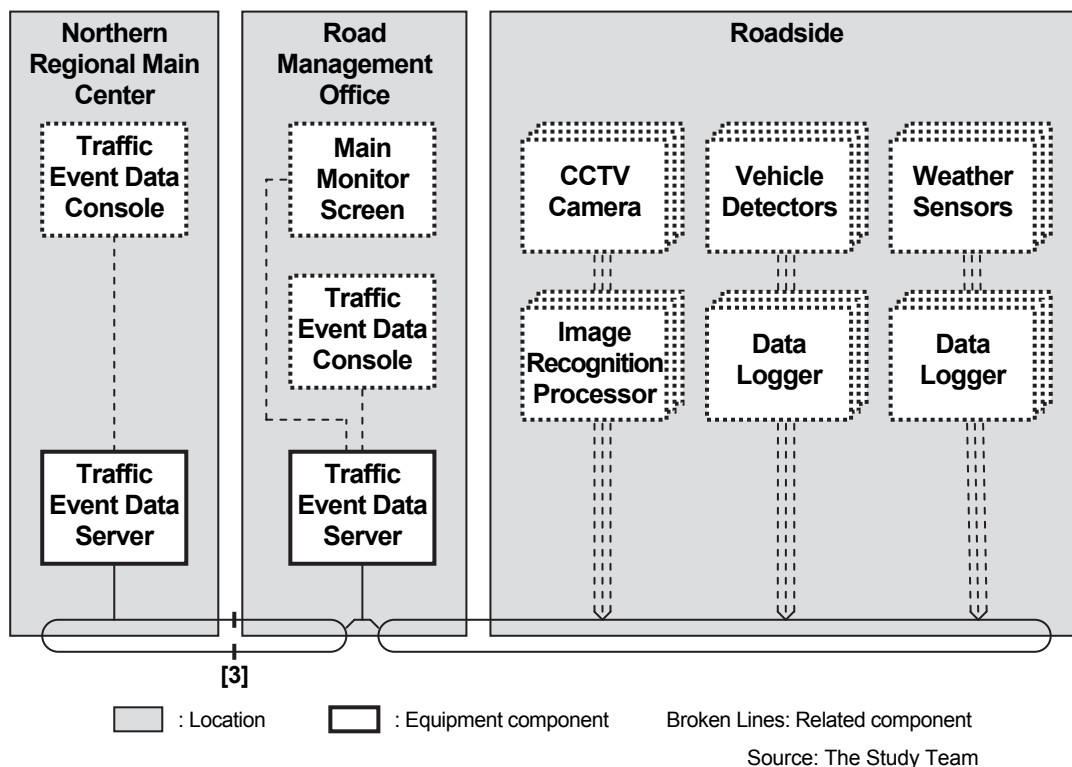
The System for Traffic Event Data Management shall meet the following requirements:

- The System shall be capable of measuring number of vehicles and vehicle speed at the midway point between a pair of adjacent interchanges and at the other specific point on the expressway network.
- The System shall be capable of providing the function for sharing the traffic event data between the Road Management Office of Adjoining (or BOT) Section and the Northern Regional Main Center.
- The System shall be capable of generating information in the form of traffic event from the results of CCTV monitoring, event detection, traffic analysis, and weather monitoring.
- The System shall be capable of generating the traffic event including traffic accidents, reverse driving, broken-down vehicle, left obstacle, natural disaster, vandalism, construction work, bad weather, and congestion.
- The System shall be capable of generating the traffic event including traffic restriction such as closure and speed limitation.
- The System shall be capable of identifying the generated events by kilo-meter post of the road sections and date/time.
- The System shall be capable of correlating a traffic event to its causal traffic event.
- The System shall be capable of indicating the categorized events in Vietnamese and English.
- The System shall be capable of storing the categorized events as the data for every 1 minute in a database.
- The System shall be capable of storing the transmitted traffic event data and message data from the Regional Main Center.
- The System shall be capable of registering and deleting and editing plural traffic event data.
- The System shall be capable of receiving, compiling and manage the Traffic Event Data.
- The System shall be capable of dividing Bad Weather event than three phases automatically.
- The System shall be capable of dividing Traffic Congestion event than three phases automatically.
- The System shall be capable of dividing Speed Limitation event than two phases automatically.

7.2 Detailed System Architecture and Target Connecting Interface

For actualizing the function of traffic event data management, the target connecting interface [3] shall be established between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section as shown in the system architecture below.

Figure 7.1 Target Connecting Interface [3] for Traffic Event Data Management



7.3 Protocol/Message Specifications

1) Protocol Specifications

For securing the connectivity of network and the interoperability of data required for the traffic event data management, the following protocols shall be provided at the Target Interface [3], between the systems of the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, on the integration layer of communication network.

Table 7.1 Protocol Specifications at [3] for Traffic Event Data Management

	Protocol Specifications & Remarks
Physical Layer	Optical Fiber Cable: 8 core (at least) Optical fiber standard: Generic cabling for customer premises (ISO/IEC 11801) Characteristics of single-mode optical fiber cable (ITU-T G.652) Characteristics of a non-zero dispersion shifted single-mode optical fiber cable (ITU-T G.655) Ethernet (IEEE 802.3) Power over Ethernet (IEEE 802.3af) 10BASE-T/100BASE-TX PoE Plus (IEEE 802.3at)
Data Link Layer Network Layer Transport Layer Session Layer	IP: Internet Protocol version 4 and 6 (IETF RFC 791) TCP: Transmission Control Protocol (IETF RFC 793) UDP: User Datagram Protocol (IETF RFC 768) ICMP: Internet Control Message Protocol (IETF RFC 894)
Presentation Layer Application Layer	SNMP: Simple Network Management Protocol (IETF RFC 1157) RTP: A Transport Protocol for Real-Time Applications (IETF RFC 3550) SDP: Session Description Protocol (IETF RFC 4566) Character code: 8-bit single-byte coded graphic character sets (ISO/IEC 8859, with securing upward compatibility) UTF-8 (ISO/IEC 10646) Text Data: Plain text CSV (IETF RFC4180) SGML (ISO 8879) XML (W3C XML 1.1)

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the Target Interface [3] to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of interface.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the protocol specifications of the Target Interface [3] shown in the detailed design of the ITS Integration Project and shall establish the connection of interface.

2) Message Specifications

For securing the interoperability of data between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, the following messages to be exchanged through the Target Interface [3] shall be generated complying with the Data Dictionary defined in Chapter 10.

Table 7.2 List of Messages to be exchanged through [3] for Traffic Event Data Management

Name of Message	A Pair of Equipment Components on Both Side of Interface through Which Message is Exchanged		Name of Included Data Sets
Incident Input Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Incident Data Set
Vehicle Detection Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Vehicle Detection Data Set; Traffic Volume Data Set
Traffic Congestion Input Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Traffic Congestion Data Set
Weather Observation Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Weather Monitoring Data Set
Bad Weather Input Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Bad Weather Data Set
Construction Work Input Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Construction Work Data Set
Traffic Restriction Input Message	Traffic Event Data Server (RMO)	Traffic Event Data Server (NRMC)	Traffic Restriction Data Set
Traffic Event Message	Traffic Event Data Server (NRMC)	Traffic Event Data Server (RMO)	Traffic Event Data Set

Note, NRMC: Northern Regional Main Center, RMO: Road Management Office (of Adjoining (or BOT) Section).

8. Specifications for VMS Indication

8.1 Requirements on System Functions

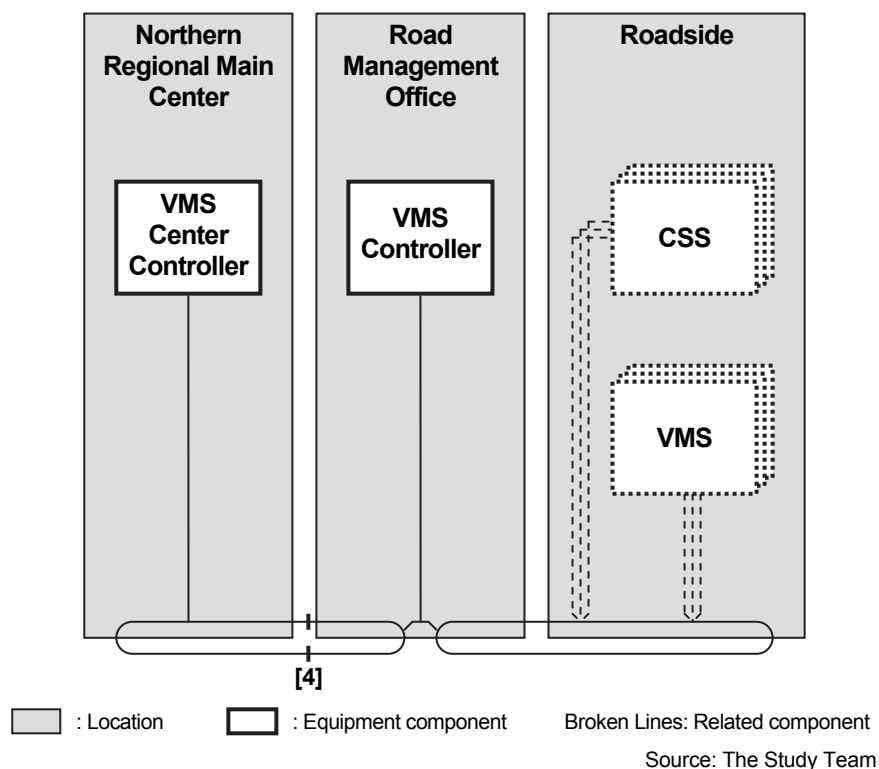
The System for VMS Indication shall meet the following requirements:

- System shall be capable of disseminating information in the form of traffic events by using VMSs located in front of entrance gates, exit gates, junctions and other places; the traffic events shall include traffic accidents, breakdown vehicles, left obstacles, reverse driving, vandalism, bad weather, flood, natural disaster, fire, construction works, traffic congestion, and traffic restrictions.
- The System shall be capable of sending guidance of the information to be indicated on the VMSs on Adjoining (or BOT) Section to the competent Road Management Office from the Northern Regional Main Center and of controlling the VMSs directly from the Northern Regional Main Center in case of serious incidents.
- The System shall be capable of indicating information on VMSs, under the control of the competent Road Management Office, in the form of traffic events which includes traffic accidents, reverse driving, breakdown vehicles, left obstacle, natural disaster, vandalism, construction work, bad weather, flood, fire, traffic congestion, and traffic restriction.
- The VMS of the System shall be capable of indicating information in Vietnamese and English.
- The VMS of the System shall be capable of indicating textual information to the drivers to read in their vehicles at the maximum speed 120 km/h.
- The VMS of the System shall be capable of installing roadside equipment in front of entrances, exits, junctions, and tunnels on the expressways.
- The System shall be capable of receiving the guidance from the Regional Main Center to the Road Management Office, irrespective of traffic event.
- The System shall be capable of minimizing load caused by data transmission, including video image on the communication system.

8.2 Detailed System Architecture and Target Connecting Interface

For actualizing the function of VMS indication, the target connecting interface [4] shall be established between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section as shown in the system architecture below.

Figure 8.1 Target Connecting Interface [4] for VMS Indication



8.3 Protocol/Message Specifications

1) Protocol Specifications

For securing the connectivity of network and the interoperability of data required for the VMS Indication, the following protocols shall be provided at the Target Interface [4], between the systems of the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, on the integration layer of communication network.

Table 8.1 Protocol Specifications at [4] for VMS Indication

	Protocol Specifications & Remarks
Physical Layer	Optical Fiber Cable: 8 core (at least) Optical fiber standard: Generic cabling for customer premises (ISO/IEC 11801) Characteristics of single-mode optical fiber cable (ITU-T G.652) Characteristics of a non-zero dispersion shifted single-mode optical fiber cable (ITU-T G.655) Ethernet (IEEE 802.3) Power over Ethernet (IEEE 802.3af) 10BASE-T/100BASE-TX PoE Plus (IEEE 802.3at)
Data Link Layer Network Layer Transport Layer Session Layer	IP: Internet Protocol version 4 and 6 (IETF RFC 791) TCP: Transmission Control Protocol (IETF RFC 793) UDP: User Datagram Protocol (IETF RFC 768) ICMP: Internet Control Message Protocol (IETF RFC 894)
Presentation Layer Application Layer	SNMP: Simple Network Management Protocol (IETF RFC 1157) RTP: A Transport Protocol for Real-Time Applications (IETF RFC 3550) SDP: Session Description Protocol (IETF RFC 4566) Character code: 8-bit single-byte coded graphic character sets (ISO/IEC 8859, with securing upward compatibility) UTF-8 (ISO/IEC 10646) Text Data: Plane text CSV (IETF RFC4180) SGML (ISO 8879) XML (W3C XML 1.1) Image Data: Binary

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the Target Interface [4] to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of interface.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the protocol specifications of the Target Interface [4] shown in the detailed design of the ITS Integration Project and shall establish the connection of interface.

2) Message Specifications

For securing the interoperability of data between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, the following messages to be exchanged through the Target Interface [4] shall be generated complying with the Data Dictionary defined in Chapter 10.

Table 8.2 List of Messages to be exchanged through [4] for VMS Indication

Name of Message	A Pair of Equipment Components on Both Side of Interface through Which Message is Exchanged		Name of Included Data Sets
VMS Indication Message	VMS Center Controller (NRMC)	VMS Center Controller (RMO)	VMS Indication Data Set
VMS Control Input Message	VMS Center Controller (RMO)	VMS Center Controller (NRMC)	VMS Control Input Data Set
CSS Indication message	VMS Center Controller (NRMC)	VMS Center Controller (RMO)	CSS Indication Data Set

Note, NRMC: Northern Regional Main Center, RMO: Road Management Office (of Adjoining (or BOT) Section).

9. Specifications for Integrated Data Management

9.1 Requirements on System Functions

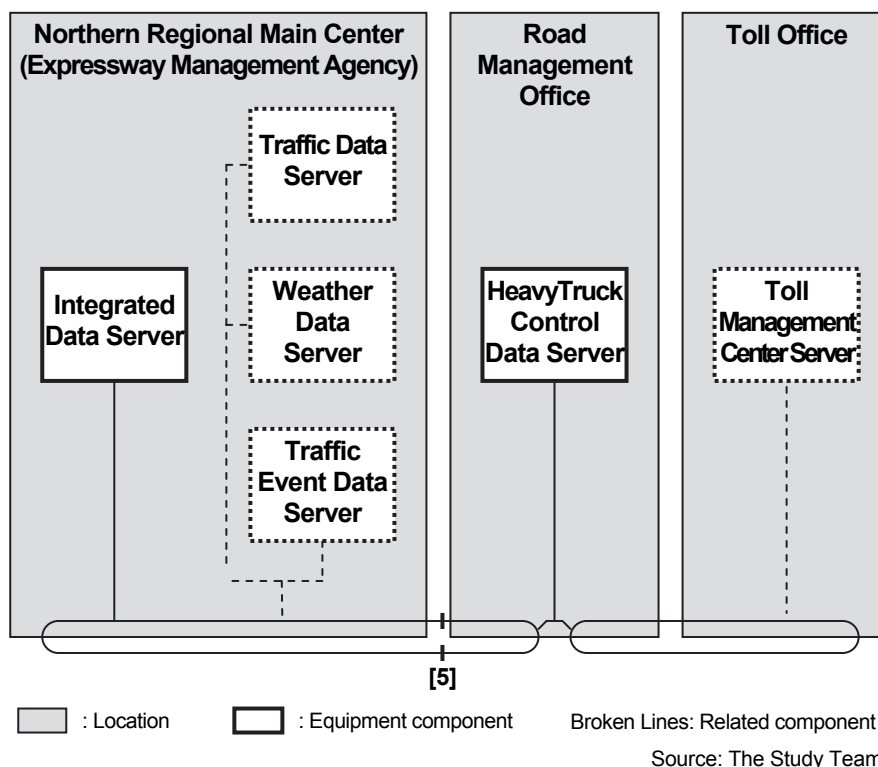
The System for Integrated Data Management shall meet the following requirements:

- The System shall be capable of providing the function for integrating the data, which are generated in the Road Management Offices of the Adjoining (or BOT) Section for traffic information/control, toll collection and vehicle weighing, and the function for storing the integrated data in the Northern Regional Main Center.
- The System shall be capable of integrating the data sets of incident, traffic volume, traffic congestion, bad weather, construction work, traffic restriction, hourly toll collection and axle load management into a form of historical data records.
- The System shall be capable of compiling the recorded data corresponding to date/time and kilo-meter post of a road section.
- The System shall be capable of searching/calculating values required for checking validity of toll revenue in comparison with traffic data.

9.2 Detailed System Architecture and Target Connecting Interface

For actualizing the function of integrated data management, the target connecting interface [5] shall be established between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section as shown in the system architecture below.

Figure 9.1 Target Connecting Interface [5] for Integrated Data Management



9.3 Protocol/Message Specifications

1) Protocol Specifications

For securing the connectivity of network and the interoperability of data required for the integrated data management, the following protocols shall be provided at the Target Interface [5], between the systems of the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, on the integration layer of communication network.

Table 9.1 Protocol Specifications at [5] for Integrated Data Management

	Protocol Specifications & Remarks
Physical Layer	Optical Fiber Cable: 8 core (at least) Optical fiber standard: Generic cabling for customer premises (ISO/IEC 11801) Characteristics of single-mode optical fiber cable (ITU-T G.652) Characteristics of a non-zero dispersion shifted single-mode optical fiber cable (ITU-T G.655) Ethernet (IEEE 802.3) Power over Ethernet (IEEE 802.3af) 10BASE-T/100BASE-TX PoE Plus (IEEE 802.3at)
Data Link Layer Network Layer Transport Layer Session Layer	IP: Internet Protocol version 4 and 6 (IETF RFC 791) TCP: Transmission Control Protocol (IETF RFC 793) UDP: User Datagram Protocol (IETF RFC 768) ICMP: Internet Control Message Protocol (IETF RFC 894)
Presentation Layer Application Layer	SNMP: Simple Network Management Protocol (IETF RFC 1157) RTP: A Transport Protocol for Real-Time Applications (IETF RFC 3550) SDP: Session Description Protocol (IETF RFC 4566) Character code: 8-bit single-byte coded graphic character sets (ISO/IEC 8859, with securing upward compatibility) UTF-8 (ISO/IEC 10646) Text Data: Plane text CSV (IETF RFC4180) SGML (ISO 8879) XML (W3C XML 1.1)

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the Target Interface [5] to the ITS Integration Project, when the specifications are requested by the Project for securing the connection of interface.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the protocol specifications of the Target Interface [5] shown in the detailed design of the ITS Integration Project and shall establish the connection of interface.

2) Message Specifications

For securing the interoperability of data between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, the following messages to be exchanged through the Target Interface [5] shall be generated complying with the Data Dictionary defined in Chapter 10.

Table 9.2 List of Messages to be exchanged through [5] for Integrated Data Management

Name of Message	A Pair of Equipment Components on Both Side of Interface through Which Message is Exchanged		Name of Included Data Sets
Over Loading Message	Heavy Truck Control Data Server (RMO)	Integrated Data Server (NRMC)	Axle Load Measurement Data Set; Axle Load Management Data Set

Note, NMRC: Northern Regional Main Center, RMO: Road Management Office (of Adjoining (or BOT) Section).

10. Data Dictionary

The data sets included in the messages aforementioned, which are to be exchanged through the target connecting interface between the Northern Regional Main Center and the Road Management Office of Adjoining (or BOT) Section, shall comprise the data elements and their attributes defined in the data dictionary below.

Table 10.1 Dictionary of Data to be exchanged through Target Connecting Interface

Major Data Set <Origin>	Data Elements	Type	Digit	Set	Update Cycle	Storage Period for Origin	Definition
[3] Incident Data Set <- Server>	Road Management Office ID	INT*	4	1	When an event occurs	1 year	An unique identifier of a road management office
	Road Section ID	INT*	4	1			An unique identifier of the road section where an incident occurred (Jurisdiction of a Road Management Office)
	Lane ID	INT*	2	1			An unique identifier of the lane where an incident occurred (Numbered from the median)
	Place ID	INT*	4	1			An unique identifier of the place where an incident occurred (For information dissemination)
	Beginning Kilometer Post	TXT	6	1			The beginning kilometer post of the place where an incident occurred
	Ending Kilometer Post	TXT	6	1			The ending kilometer post of the place where an incident occurred
	Roadside Equipment ID	INT*	4	1			An unique identifier of a CCTV camera
	Incident Status	INT*	2	1			Class of incident input referring to the video image: - 1: Traffic Accident - 2: Incident in Tunnel - 3: Reverse Driving - 4: Broken-down Vehicle - 5: Left Obstacle - 6: Natural Disaster - 7: Vandalism
Date/Time	Datetime	≥14	1		Year/month/day /hour/minutes/second of generating data set		
[3] Vehicle Detection Data Set <G - Vehicle Detector>	Road Management Office ID	INT*	4	1	Every 5 minutes	Latest	An unique identifier of a road management office
	Roadside Equipment ID	INT*	4	1			An unique identifier of a CCTV camera
	Cumulative Number of Vehicles	INT*	4	1			Cumulative number of vehicles detected by vehicle detector
	Vehicle Speed	FLOAT	5	N			Vehicle speed detected by vehicle detector (unit: km/h)
	Vehicle Length	FLOAT	4	1			Vehicle length detected by vehicle detector (unit: m)
	Date/Time	Datetime	≥14	1			Year/month/day /hour/minutes/second of generating data set
[3] Traffic Volume Data Set <G - Traffic Analysis Processor>	Road Management Office ID	INT*	4	1	Every 5 minutes	1 year	An unique identifier of a road management office
	Roadside Equipment ID	INT*	4	1			An unique identifier of a CCTV camera
	Total Traffic Volume per Day	INT	5	1			Total traffic volume per day
	Large Vehicle Ratio	FLOAT	5	1			Percentage of large vehicles to the total number of vehicles
	Traffic Volume per Day of vehicle class 1	INT	5	1			Traffic volume per day vehicle class 1: Ordinary vehicle
	Traffic Volume per Day of vehicle class 2	INT	5	1			Traffic volume per day vehicle class 2: Large vehicle
	Traffic Volume per Day of vehicle class 3	INT	5	1			Traffic volume per day vehicle class 3: Trailer vehicle
	Traffic Volume per Day of vehicle class 4	INT	5	1			Traffic volume per day vehicle class 4: Reserved
	Traffic Volume per Day of vehicle class 5	INT	5	1			Traffic volume per day vehicle class 5: Reserved
	Total Traffic Volume per Hour	INT*	4	1			Total traffic volume in the latest one hour
	Large Vehicle Ratio	FLOAT	5	1			Percentage of large vehicles to the total number of vehicles
	Traffic Volume per Hour of vehicle class 1	INT*	4	1			Traffic volume in the latest one hour of vehicle class 1: Ordinary vehicle
	Traffic Volume per Hour of vehicle class 2	INT*	4	1			Traffic volume in the latest one hour of vehicle class 2: Large vehicle
	Traffic Volume per Hour of vehicle class 3	INT*	4	1			Traffic volume in the latest one hour of vehicle class 3: Trailer vehicle
	Traffic Volume per Hour of vehicle class 4	INT*	4	1			Traffic volume in the latest one hour of vehicle class 4: Reserved
	Traffic Volume per Hour of vehicle class 5	INT*	4	1			Traffic volume in the latest one hour of vehicle class 5: Reserved
	Total Traffic Volume per 15 minutes	INT*	3	1			Total traffic volume in the latest 3 sets of 5 minutes
	Traffic Volume per 15 minutes of vehicle class 1	INT*	3	1			Traffic volume in the latest 3 sets of 5 minutes of vehicle class 1: Ordinary vehicle
	Traffic Volume per 15 minutes of vehicle class 2	INT*	3	1			Traffic volume in the latest 3 sets of 5 minutes of vehicle class 2: Large vehicle
	Traffic Volume per 15 minutes of vehicle class 3	INT*	3	1			Traffic volume in the latest 3 sets of 5 minutes of vehicle class 3: Trailer vehicle
	Traffic Volume per 15 minutes of vehicle class 4	INT*	3	1			Traffic volume in the latest 3 sets of 5 minutes of vehicle class 4: Reserved
	Traffic Volume per 15 minutes of vehicle class 5	INT*	3	1			Traffic volume in the latest 3 sets of 5 minutes of vehicle class 5: Reserved
Date/Time	Datetime	≥14	1	Year/month/day /hour/minutes/second of generating data set			

[3]	Traffic Congestion Data Set <G - Traffic Analysis Processor>	Road Management Office ID	INT*	4	1	Every 5 minutes	1 year	An unique identifier of a road management office			
		Roadside Equipment ID	INT*	4	1			An unique identifier of a CCTV camera			
		Cumulative Number of Vehicles	INT*	4	1			Cumulative number of vehicles detected by vehicle detector in the latest 3 sets of 5 minutes			
		Average Vehicle Speed	INT*	4	1			Average value of detected vehicle speed in the latest 3 sets of 5 minutes			
		Traffic Congestion Status	INT*	2	1			Class of traffic congestion generated referring to the results - 1: Congestion on Trough Lanes 1 - 2: Congestion on Trough Lanes 2 - 3: Congestion on Trough Lanes 3 - 4: Crowdedness on Trough Lanes - 5: Congestion at Exit 1 - 6: Congestion at Exit 2 - 7: Congestion at Exit 3			
		Beginning Kilometer Post	TXT	6	1			The beginning kilometer post of vehicle queuing			
		Ending Kilometer Post	TXT	6	1			The ending kilometer post of vehicle queuing			
		Date/Time	Datetime	≥14	1			Year/month/day/hour/minutes/second of generating data set			
		Road Management Office ID	INT*	4	1			An unique identifier of a road management office			
		Roadside Equipment ID	INT*	4	1			An unique identifier of a weather monitoring device			
[3]	Weather Monitoring Data Set <G - Weather Sensor>	Precipitation	FLOAT	2	1	Every 5 minutes	Latest	Accumulated precipitation during specific 5 minutes (unit: mm)			
		Wind Speed	FLOAT	2	1			Average, minimum, and maximum observed wind speed during specific 5 minutes (unit: m/s)			
		Visibility	FLOAT	2	1			Average, minimum, and maximum observed visibility during specific 5 minutes (unit: m)			
		Temperature	FLOAT	2	1			Average, minimum, and maximum observed temperature during specific 5 minutes (unit: Celsius degree)			
		Alarm Status of Precipitation	INT*	2	1			Alarm to be issued when specific level of precipitation aforementioned is detected			
		Alarm Status of Wind Speed	INT*	2	1			Alarm to be issued when specific level of wind speed aforementioned is detected			
		Alarm Status of Visibility	INT*	2	1			Alarm to be issued when specific level of visibility aforementioned is detected			
		Alarm Status of Temperature	INT*	2	1			Alarm to be issued when specific level of temperature aforementioned is detected			
		Date/Time	Datetime	≥14	1			Year/month/day/hour/minutes/second of generating data set			
		Road Management Office ID	INT*	4	1			An unique identifier of a road management office			
[3]	Bad Weather Data Set <G - Weather Server>	Roadside Equipment ID	INT*	4	1	When a bad weather occurs	1 year	An unique identifier of a weather monitoring device			
		Precipitation	FLOAT	2	1			Precipitation (converted from 10 min. data) measured by rain gauge. (unit: mm/h)			
		Wind Speed	FLOAT	2	1			Wind speed (10 min. average) measured by wind sensor (unit: m/s)			
		Visibility	FLOAT	2	1			Visibility (10 min. average) measured by visibility sensor (unit: m)			
		Temperature	FLOAT	2	1			Temperature (10 min. average) measured by thermometer (unit: Celsius degree)			
		Heavy Rain Status	INT*	2	1			Specifying bad weather in traffic event category and corresponding class of heavy rain in traffic event class: - 1: Heavy Rain 1 - 2: Heavy Rain 2 - 3: Heavy Rain 3			
		High Wind Status	INT*	2	1			Specifying bad weather in traffic event category and corresponding class of high wind in traffic event class: - 1: High Wind 1 - 2: High Wind 2 - 3: High Wind 3			
		Low Visibility Status	INT*	2	1			Specifying bad weather in traffic event category and corresponding class of lowering of visibility in traffic event class: - 1: Dense Fog 1 - 2: Dense Fog 2 - 3: Dense Fog 3			
		High Temperature Status	INT*	2	1			Specifying bad weather in traffic event category and corresponding class of high temperature in traffic event class: - 1: High Temperature			
		Date/Time	Datetime	≥14	1			Year/month/day/hour/minutes/second of generating data set			
[3]	Construction Work Data Set <I - Server>	Road Management Office ID	INT*	4	1	When a construction work is scheduled	1 year after end of construction	An unique identifier of a road management office			
		Road Section ID	INT*	4	1			An unique identifier of the road section where a construction work applied (Jurisdiction of a Road Management Office)			
		Lane ID	INT*	2	1			An unique identifier of the lane where a construction work applied (Numbered from the median)			
		Place ID	INT*	4	1			An unique identifier of the place where a construction work applied (For information dissemination)			
		Beginning Kilometer Post	TXT	6	1			The beginning kilometer post of the place where a construction work applied			
		Ending Kilometer Post	TXT	6	1			The ending kilometer post of the place where a construction work applied			
		Construction Work Status	INT*	2	1			Status of construction work: - 1: Scheduled - 2: Under construction - 3: Finished			
		Number of document	TXT	20	1			Official number of permission document			
		Permission Date	TXT	8	1			The date (Day/month/year) of permission of construction work			
		Date/Time Begin	TXT	≥14	1			The begin time (Day/month/year/hour/minutes/second) of construction work			
		Date/Time End	TXT	≥14	1			The end time (Day/month/year/hour/minutes/second) of construction work			
		Date/Time	Datetime	≥14	1			Year/month/day/hour/minutes/second of generating data set			

[3]	Traffic Restriction Data Set <- Server>	Road Management Office ID	INT*	4	1	When an event occurs	1 year after end of restriction	An unique identifier of a road management office				
		Road Section ID	INT*	4	1			An unique identifier of the road section where a construction work applied (Jurisdiction of a Road Management Office)				
		Lane ID	INT*	2	1			An unique identifier of the lane where a construction work applied (Numbered from the median)				
		Place ID	INT*	4	1			An unique identifier of the place where a construction work applied (For information dissemination)				
		Beginning Kilometer Post	TXT	6	1			The beginning kilometer post of the place where a traffic restriction applied				
		Ending Kilometer Post	TXT	6	1			The ending kilometer post of the place where a traffic restriction applied				
		Construction Work Status	INT*	2	1			Status of construction work: - 1: Scheduled - 2: Under construction - 3: Finished				
		Permission Date	TXT	8	1			The date (Day/month/year) of permission of traffic restriction				
		Date/Time Begin	TXT	≥14	1			The begin time (Day/month/year/hour/minutes/second) of traffic restriction				
		Date/Time End	TXT	≥14	1			The end time (Day/month/year/hour/minutes/second) of traffic restriction				
		Date/Time	Datetime	≥14	1			Year/month/day /hour/minutes/second of generating data set				
		[3]	Traffic Event Data Set <G/C - Server>	Traffic Event Data ID	INT			8	1	When an event occurs	1 year	An unique identifier of the traffic event data
				Road Management Office ID	INT*			4	1			An unique identifier of a road management office
Road Section ID	INT*			4	1	An unique identifier of the road section where a traffic event occurred (Jurisdiction of a Road Management Office)						
Road Link ID	INT*			4	1	An unique identifier of a segmentation of road network divided by diverging/merging points at interchanges/junctions or barrier tollgates						
Lane ID	INT*			2	1	An unique identifier of the lane where a traffic event occurred (Numbered from the median)						
Place ID	INT*			4	1	An unique identifier of the place where a traffic event occurred (For information dissemination)						
Traffic Event Category ID	INT*			4	1	An unique identifier of traffic event data category: - 1: Special Event - 2: Incident - 3: Construction Work - 4: Bad Weather - 5: Traffic Congestion - 6: Traffic - 7: Restriction						
Traffic Event Class ID	INT*			4	1	An unique identifier of traffic event data class 01: Special Event 19: High Temperature 02: Traffic Accident 20: Congestion on Trough Lanes 1 03: Incident in Tunnel 21: Congestion on Trough Lanes 2 04: Reverse Driving 22: Congestion on Trough Lanes 3 05: Broken-down Vehicle 23: Crowdedness on Trough Lanes 06: Left Obstacle 24: Congestion at Exit 1 07: Natural Disaster 25: Congestion at Exit 2 08: Vandalism 26: Congestion at Exit 3 09: Construction Work 27: Entry Closure 10: Heavy Rain 1 28: Closure 11: Heavy Rain 2 29: Exit Closure 12: Heavy Rain 3 30: Lane Closure 13: High Wind 1 31: Speed Limitation 1 14: High Wind 2 32: Speed Limitation 2 15: High Wind 3 16: Dense Fog 1 17: Dense Fog 2 18: Dense Fog 3						
Causal Traffic Event Data ID	INT			8	1	An unique identifier of the causal traffic event data						
Beginning Kilometer Post	TXT			6	1	The beginning kilometer post of the place where a traffic event occurred						
Ending Kilometer Post	TXT			6	1	The ending kilometer post of the place where a traffic event occurred						
Input Person	TXT			32	1	Name of the person who input traffic event data set						
Event Status	TXT			4	1	Status of traffic event						
Video Image address	TXT			60	1	The network address of where the Video image file is stored						
Main Center Check Status	INT*			4	1	Approval status by the main center: - 0: Not yet approved - 1: Approved						
Road Management Office Check Status	INT*			4	1	Approval status by the road management office: - 0: Not yet approved - 1: Approved						
Status of Traffic Event	INT*			2	1	Status of traffic event: - 1: Occurred and existing - 2: Removed						
Date/Time End	TXT	≥14	1	Day/month/year/hour/minutes/second of the traffic event input by operator								
Date/Time	Datetime	≥14	1	Year/month/day /hour/minutes/second of generating data set								
[2]	Event Image Data Set <G - Server>	Road Management Office ID	INT*	4	1	When an event is checked	1 year	An unique identifier of a road management office				
		Roadside Equipment ID	INT*	4	1			An unique identifier of a CCTV camera				
		Place ID	INT*	4	1			An unique identifier of the place where the traffic event occurred (For information dissemination)				
		Video Image ID	INT	8	1			An unique identifier of the video image				
		Event Video Image	IMG	var	1			Video image data during time interval from 5 min before incident to 10 min after incident				
		Traffic Event Data ID	INT	8	1			An unique identifier of the traffic event data				
		Date/Time	Datetime	≥14	1			Year/month/day /hour/minutes/second of generating data set				
[4]	VMS Indication	Road Management Office ID	INT*	4	1	When	1 month	An unique identifier of a road management office				

	Data Set <G/C - Server>	Roadside Equipment ID	INT*	4	1	an event occurs		An unique identifier of a VMS
		Traffic Event Class ID	INT*	4	1			An unique identifier of the traffic event class
		Place ID	INT*	4	1			An unique identifier of the place where a traffic event occurred (For information dissemination)
		Place Name	TXT	28	1			Name of the place where a traffic event occurred
		Traffic Event ID	INT	8	1			An unique identifier of the traffic event (including indication of "Under Repair")
		Traffic Event Name	TXT	20	1			Name of the traffic event occurred
		Causal Place ID	INT*	4	1			An unique identifier of the place where the causal traffic event occurred (For information dissemination)
		Causal Place Name	TXT	28	1			Name of the place where the causal traffic event occurred
		Date/Time	Datetime	≥14	1			Year/month/day/hour/minutes/second of generating data set
[4]	VMS Control Input Data Set <- Server>	Road Management Office ID	INT*	4	1	When an event occurs	1 month	An unique identifier of a road management office
		Roadside Equipment ID	INT*	4	1			An unique identifier of a VMS
		Traffic Event Class ID	INT*	4	1			An unique identifier of the traffic event class
		Place ID	INT*	4	1			An unique identifier of the place where a traffic event occurred (For information dissemination)
		Place Name	TXT	28	1			Name of the place where a traffic event occurred
		Traffic Event ID	INT	8	1			An unique identifier of the traffic event (including indication of "Under Repair")
		Traffic Event Name	TXT	20	1			Name of the traffic event occurred
		Causal Place ID	INT*	4	1			An unique identifier of the place where the causal traffic event occurred (For information dissemination)
		Causal Place Name	TXT	28	1			Name of the place where the causal traffic event occurred
		Free Text	TXT	var	1			The characters input using data input device
Date/Time	Datetime	≥14	1	Year/month/day/hour/minutes/second of generating data set				
[4]	CSS Indication Data Set <G/C - Server>	Road Management Office ID	INT*	4	1	When an event occurs	1 month	An unique identifier of a road management office
		Roadside Equipment ID	INT*	4	1			An unique identifier of a CSS
		Speed Limit	INT*	3	1			The limit speed input using data input device
		Date/Time	Datetime	≥14	1			Year/month/day/hour/minutes/second of generating data set
[5]	Axle Load Measurement Data Set <G -Axle Load Scale>	Road Section ID	INT*	4	1	When overloading data detected	6 months	An unique identifier of the road section where the axle load scale installed
		Axle Load Scale Location ID	INT*	4	1			An unique identifier of install location of axle load scale
		Lane ID	INT*	2	1			An unique identifier of the lane of axle load scale (Numbered from the median)
		Number of Axles	INT*	2	1			Number of axles (less than or equal to 10)
		Axle Load	INT*	2	10			Measurement data of load of an axle (unit: Ton)
		Maximum Axle Load	INT*	2	1			Maximum value of measured axle loads of a vehicle (unit: Ton)
		Axle Load Status	INT*	2	1			Status of the axle load scale: - 0: Normal - 1: Suspicious at overloading - 2: Overloaded
		Serial Number of Vehicle	INT	5	1			Daily serial number for a vehicle passing through the axle load scale. (For reference to other data set)
		Date/Time	Datetime	≥14	1			Year/ month/day/hour/minutes/second of generating data set
		[5]	Axle Load Management Data Set <G/C-Server>	Road Owner ID	INT*			4
Road Section ID	INT*			4	1	An unique identifier of the road section where the axle load scale installed		
Axle Load Scale Location ID	INT*			4	1	An unique identifier of install location of axle load scale		
Lane ID	INT*			2	1	An unique identifier of the lane of axle load scale (Numbered from the median)		
Date/Hour of Record	TXT			10	1	Day/month/year/hour of the record		
Number of Heavy Trucks	INT			5	1	Number of heavy trucks measured		
Number of Suspicious Trucks	INT			5	1	Number of heavy trucks suspicious at overloading		
Number of Overloaded Trucks	INT			5	1	Number of heavy trucks overloaded		
Axle Load Measurement Data Set	Set			var		Axle load measurement data set of vehicle passing through axle load scale		
Axle Load Status	INT*			2	N	Status of the axle load scale: - 0: Normal - 1: Suspicious at overloading - 2: Overloaded		
Serial Number of Vehicle	INT	5		Daily serial number for a vehicle passing through the axle load scale. (For reference to other data set)				
Date/Time	Datetime	≥14	1	Year/ month/day/hour/minutes/second of generating data set				

Note: IMG: Image, TXT: Text, FLOAT: Floating-point complex number, INT: Integer, INT*: Short integer, I: Input, G: Generated, C: Checked, R: Recorded.
 Source: The Study Team

Case-1: Precedent ITS Installation in Adjoining (or BOT) Section

- VEA shall instruct the road operator of Adjoining (or BOT) Section to disclose the detailed design specifications of the messages, the data set and the data dictionary to be exchanged through the Target Interface [1] to [5] to the ITS Integration Project, when the specifications are requested by the Project for securing the inter-operability of data and the cooperation of systems.

Case-2: Precedent ITS Installation in Sections under the Project

- The road operator of Adjoining (or BOT) Section shall confirm the specifications of the messages

and the data dictionary to be exchanged through the Target Interface [1] to [5] shown in the detailed design of the ITS Integration Project and shall establish the inter-operability of data and the cooperation of systems.

PART 3 :
PROPOSED PREQUALIFICATION
CRITERIA FOR PACKAGE-1
ON A D&B BASIS

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1. General

The proposed prequalification criteria for Package-1 of the Project for implementation on a design and build basis are presented below for consideration at the beginning of the procurement process of the Project.

2. Concept of Standard Prequalification Criteria

1) Composition of Prequalification Documents

The Prequalification Documents should follow the JICA Standard Prequalification Documents of the latest edition (Version 1.1 of October 2012) comprising the following Sections (refer to the following JICA website:

http://www.jica.go.jp/english/our_work/types_of_assistance/oda_loans/oda_op_info/guide/tender/index.html):

- 1) Section I: Instructions to Applicants (ITA), which shall be used without any alteration or modification.
- 2) Section II: Prequalification Data Sheet (PDS), which supplements the ITA and shall specify particulars of the Project, the Packages and the Prequalification process in a standard manner.
- 3) **Section III: Qualification Criteria and Requirements**, which sets out the qualification criteria and the requirements for the Applicants to meet to become a bidder. This Section III must be tailored to suite the respective project.
- 4) Section IV: Application Forms, which shall be filled in by the Applicants. Standard forms are available in the JICA Standard Prequalification Documents.
- 5) Section V: Eligible Source Countries of Japanese ODA Loans (at present, all countries and areas are eligible source countries).

As such, the proposed qualification criteria for Package-1 of the Project, Section III in particular, are discussed hereunder.

2) Discussions on Section III: Qualification Criteria and Requirements

The standard qualification criteria set out in the JICA Standard Prequalification Documents comprise the following 4 Factors:

Factor 1. Eligibility

This criterion comprises the following 3 Sub-Factors:

Sub-Factor 1.1: Nationality,

Sub-Factor 1.2: Conflict of Interest, and

Sub-Factor 1.3: JICA Ineligibility.

As such, this criterion is quite simple and standardized for all projects. No undue changes will be allowed for this Project.

It should be noted that the qualification criteria for the eligibility (the nationality in particular) of the prime contractors for STEP projects are different from those for non-STEP projects. When the Project becomes a STEP project, the proposed criteria must be modified accordingly. For more details, refer to the following website:

http://www.jica.go.jp/english/our_work/types_of_assistance/oda_loans/step/c8h0vm000053zae9-att/c8h0vm000056jr3z.pdf

Factor 2. Historical Contract Non-Performance

This Factor comprises the following 3 Sub-Factors:

Sub-Factor 2.1: History of Non-Performing Contract,

Sub-Factor 2.2: Pending Litigation, and

Sub-Factor 2.3: Litigation History.

This Factor is also standardized for all projects. Only the number of years (1 or 2 years) in Sub-Factor 2.1 and the % ratio of pending litigation to the net worth (50 to 100%) in Sub-Factor 2.2 may be adjusted for each project as appropriate.

Factor 3. Financial Situation

This Factor comprises the following 2 Sub-Factors:

Sub-Factor 3.1: Financial Performance, and

Sub-Factor 3.2: Average Annual Construction Turnover.

In this criterion, there are standard concepts of judging the financial situation of the Applicants and no deviation from these standard concepts will be allowed.

The number of years (normally 3 to 5 years) in Sub-Factors 3.1 and 3.2 as well as the amount of the average annual construction turnover (normally 1.5 to 2 times the annual turnover of this Project) in Sub-Factor 3.2 can be adjusted to suit this Project. In case of a JV Applicants, the % ratio of the average annual construction turnover in Sub-Factor 3.2 for the leading and non-leading JV members can also be adjusted slightly to suit this Project.

Factor 4. Experience

This Factor comprises the following 2 Sub-Factors:

Sub-Factor 4.1: General Construction (Installation) Experience, and

Sub-Factor 4.2: Specific Construction (Installation) Experience.

This criterion must be tailored to suit the respective projects, considering the scope of the works involved, the technologies applied and other particulars of the specific project.

Sub-Factor 4.1

Sub-Factor 4.1 is to check the Applicant's experience as a construction (installation) contractor. In this Sub-Factor 4.1, the number of years (not less than 3 years, normally 5 years or more) may be adjusted to suit this Project. Considering the necessity of a fully experienced contractor for proper implementation of this important Project, a period of experience of system construction/installation of 10 years is proposed.

Sub-Factor 4.2 including Sub-Factors 4.2 (a) and 4.2(b)

Sub-Factor 4.2 is to check the Applicant's experience in contracts/projects similar to this Project.

In Sub-Factor 4.2(a), the number of similar contracts (normally 1 to 3 contracts), and the minimum size (contract amount) of the contracts/projects when needed to specify, may be

adjusted to suit this Project, and the number of years (normally 5 to 10 years) may also be adjusted to suit this Project. Experience of 2 or more similar contracts in the last 10 years is proposed, to make sure that the contractor has been continuously successful in this field. Considering that the number of similar projects undertaken in the world and the size of this Project are very limited, it is proposed that one of these contracts is US\$ 18 million or more in the contract amount.

In Sub-Factor 4.2(b), requirements for experience in specific key activities involved in this Project may be included where appropriate.

By setting the Sub-Factors 4.2(a) and 4.2(b) in a proper manner, and requiring submission of appropriate evidences of the contracts satisfactorily completed, only those contractors or manufacturers that are fully capable and adequately experienced for undertaking and completing this Project in a successful manner will pass the prequalification evaluation. The evidences may be the detailed design documents of the relevant contracts bearing the Employer's signature/seal and/or the certificates of completion of the relevant contracts (to be submitted as attachments to the Application Forms EXP-4.2(a) and EXP-4.2(b))

Sub-Factor 4.2 (a)

It should be noted that, in Sub-Factor 4.2(a), definition of the "similar contracts" will be very important for proper judgement of the Applicants' qualification. In this Package-1 of the Project, the following definition is proposed considering the critically important aspect of integration of the systems operated by multiple road operators:

"Eligible similar construction/installation" is the construction/installation of a part or the whole of "Center System for Two-way Integrated Traffic Information/Control actualized by Integrated/Prioritized Information Dissemination (using Traffic Event Data)." The Center System must meet the following parameters, as of the Application submission deadline:

- The center system covers 10 or more expressway sections and shares data with 2 or more other center systems operated by different road operators;
- Total length of the expressway sections under control by the 3 or more center systems above is 2,000 km at least;
- The numbers of interchanges and junctions located in the expressway sections under control by the 3 center systems above, to allow wide selection of alternative routes on the expressway network, are 120 and 40 at least respectively;
- The maximum average traffic volume for the expressway sections under control by the 3 center systems above is 4,000,000 vehicle-km/day/100 km at least; and
- The center system is connected with the roadside equipment including CCTV cameras, detectors and variable message signs (VMSs), which are installed along the expressway sections, for performing data acquisition and information dissemination.

"Integrated/Prioritized Information Dissemination" is defined as shown on the Attachment hereto (Section 7.5 of the Basic Design Report).

"Traffic Event Data" are defined as the data on the following events (including the correlations between specific pairs of events actually occurred):

- Incidents/Accidents;

- Bad weather;
- Construction work;
- Traffic congestion;
- Traffic restriction; and
- Special events.”

Sub-Factor 4.2 (b)

For Sub-Factor 4.2(b), the following requirement regarding continuous improvements of the system for “Integrated/Prioritized Information Dissemination (using traffic event data)” is proposed:

“A minimum of **three (3)** contracts awarded to the Applicant in a series to make empirical-based continuous improvements, spread over a period of **ten (10)** years or more, of the system for “Integrated/Prioritized Information Dissemination” (including improvements of the functions of its Center System) that was installed by the Applicant as a prime contractor (single entity or JV member). The period of 10 years or more may be from the commencement of the first contract to the completion of the last contract in the series.”

Necessity of the continuous improvements for empirical-based prioritization is discussed below (details are shown in Section 7.5 of the Basic Design Report).

The integrated traffic information/control system using traffic event data must be continuously improved after installation, over a sufficiently long period (say, more than 10 years), for the empirical-based prioritization of the traffic information/control. For the continuous improvements, the road operators must properly estimate and define the coefficient configuration based on the track records of the integrated/prioritized information dissemination accumulated until the time of the subject improvement.

Only through these improvements, properly prioritized traffic information and traffic control plans can be generated promptly and efficiently after occurrence of each traffic event, and the optimal traffic information can be disseminated to the respective VDSs and the optimal traffic control plans implemented by the responsible parties accordingly throughout the expressway network without delay at a minimum cost.

It is recommendable that the Contractor who installed the original system is hired for the said continuous improvements on an ad hoc basis as and when needed for the improvement services so that the Contractor’s responsibility under the original design and build/installation contract will remain intact without involvement of other contractors. Therefore, this Sub-Factor 4.2(b) is recommended as part of the qualification criteria.

3. Proposed Prequalification Criteria for Package-1

A draft of the proposed qualification criteria and requirements for the Package-1 developed in consideration of the above discussions is shown below in the form of Section III of the JICA Standard Prequalification Documents.

Eligibility and Qualification Criteria				Compliance Requirements			Documentation
No.	Factor	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
1. Eligibility							
1.1	Nationality	Nationality in accordance with ITA Sub-Clause 4.3	Must meet requirement	N/A	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.2	Conflict of Interest	No conflicts of interest, as described in ITA Sub-Clauses 4.4, 4.5 and 4.6	Must meet requirement	N/A	Must meet requirement	N/A	Application Submission Form
1.3	JICA Ineligibility	Not having been declared ineligible by JICA, as described in ITA Sub-Clause 4.7	Must meet requirement	N/A	Must meet requirement	N/A	Application Submission Form Form ACK
2. Historical Contract Non-Performance							
2.1	History of Non-Performing Contracts	Non-performance of a contract ⁽ⁱ⁾ did not occur as a result of contractor's default since 1 st January 2014.	Must meet requirement ⁽ⁱⁱ⁾	N/A	Must meet requirement ⁽ⁱⁱ⁾	N/A	Form CON – 2
2.2	Pending Litigation	All pending litigation shall in total not represent more than 50 % of the Applicant's net worth of the last year and shall be treated as resolved against the Applicant.	Must meet requirement ⁽ⁱⁱ⁾	N/A	Must meet requirement ⁽ⁱ⁾	N/A	Form CON – 2
2.3	Litigation History	No consistent history of court/arbitral award decisions against the Applicant ⁽ⁱⁱⁱ⁾ since 1 st January 2011.	Must meet requirement ⁽ⁱⁱ⁾	N/A	Must meet requirement ⁽ⁱ⁾	N/A	Form CON – 2
<p><u>Notes for the Applicant</u></p> <p>(i) Non-performance, as decided by the Employer, shall include all contracts</p> <p>(a) where non-performance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and</p> <p>(b) that were so challenged but fully settled against the contractor.</p> <p>Non-performance shall not include contracts where Employer's decision was overruled by the dispute resolution mechanism. Non-performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Applicant have been exhausted.</p>							

- (ii) This requirement also applies to contracts executed by the Applicant as a JV member.
- (iii) The Applicant shall provide accurate information on the related Application Form about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last five (5) years. A consistent history of awards against the Applicant or any member of a joint venture may result in failure of the Application.

3. Financial Situation

3.1	Financial Performance	The audited balance sheets or, if not required by the laws of the Applicant's country, other financial statements acceptable to the Employer, for the last three (3) years (financial years 2012 to 2014, or financial years 2013 to 2015 in case the Applicant have completed the financial statement of Independent Auditor's report for financial year 2015) shall be submitted and must demonstrate the current soundness of the Applicant's financial position and indicate its prospective long-term profitability. As the minimum requirement, an Applicant's net worth calculated as the difference between total assets and total liabilities should be positive.	Must meet requirement	N/A	Must meet requirement	N/A	Form FIN – 3.1 with attachments
3.2	Average Annual Construction Turnover	Minimum average annual turnover of US\$ 28 million (Twenty Eight million US\$) , calculated as total certified payments received for system construction/ installation contracts in progress and/or completed, within the last three (3) years (financial years 2012 to 2014, or for financial years 2013 to 2015 in case the Applicant have completed the financial statement of Independent Auditor's report for financial year 2014), divided by three (3) years.	Must meet requirement	Must meet requirement	Must meet 25 % (twenty five percent) of the requirement	Must meet 40 % (forty percent) of the requirement	Form FIN – 3.2

4. Experience							
4.1	General Construction Experience	Experience under system construction/installation contracts in the role of prime contractor (single entity or JV member), subcontractor, or management contractor ⁽ⁱ⁾ for at least the last ten (10) years, starting 1 st January 2006.	Must meet requirement	N/A	Must meet requirement	N/A	Form EXP – 4.1
4.2 (a)	Specific Installation Experience	A minimum number of two (2) similar ⁽ⁱⁱ⁾ contracts for construction/installation of Intelligent Transport System (ITS) (including a Center System) for expressways that have been satisfactorily designed, supplied, installed and completed with the contract amounts of US\$ 18 million ⁽ⁱⁱⁱ⁾ at least for one of them, by the Applicant as a prime contractor (single entity or JV member) ⁽ⁱⁱⁱ⁾ between 1st January 2006 and the Application submission deadline.	Must meet requirement	Must meet requirement ^(iv)	N/A	N/A	Form EXP – 4.2 (a)
4.2 (b)	Specific Key Activity Experience	A minimum of three (3) contracts awarded to the Applicant in a series to make empirical-based continuous improvements, spread over a period of ten (10) years or more ^(v) , of the system for “Integrated/Prioritized Information Dissemination” (including improvements of the functions of its Center System) that was installed by the Applicant as a prime contractor (single entity or JV member).	Must meet requirement	Must meet requirement	N/A	N/A	Form EXP – 4.2 (b)
<p><u>Notes for the Applicant</u></p> <p>(i) A management contractor is a firm which takes on the role of contract management as a “general” contractor of sort could do. It does not normally perform directly the construction work(s) associated with the contract. Rather, it manages the work of other (sub) contractors while bearing full responsibility and risk for price, quality, and timely performance of the work contract.</p> <p>(ii) Eligible “similar” construction/installation is the construction/installation of a part or the whole of Center System for “Two-way Integrated Traffic Information/Control actualized by Integrated/Prioritized Information Dissemination (using traffic event data).” The Center System must meet the following</p>							

parameters, as of the Application submission deadline:

- The center system covers 10 or more expressway sections and shares data with 2 or more other center systems operated by different road operators;
- Total length of the expressway sections under control by the 3 or more center systems above is 2,000 km at least;
- The numbers of interchanges and junctions located in the expressway sections under control by the 3 center systems above, to allow wide selection of alternative routes on the expressway network, are 120 and 40 at least respectively;
- The maximum average traffic volume for the expressway sections under control by the 3 center systems above is 4,000,000 vehicle-km/day/100 km at least; and
- The center system is connected with the roadside equipment including CCTV cameras, detectors and variable message signs (VMSs), which are installed along the expressway sections, for performing data acquisition and information dissemination.

“Integrated/Prioritized Information Dissemination” is defined as shown on the Attachment hereto (Section 7.5 of the Basic Design Report).

“Traffic Event Data” are defined as the data on the following events (including their seriousness/locations and the correlated traffic-restrictions/events):

- Incident/Accident;
- Bad weather;
- Construction work;
- Traffic congestion;
- Traffic restriction; and
- Special event.

- (iii) For contracts under which the Applicant participated as a JV member, only the Applicant’s share, by value, shall be considered to meet this requirement.
- (iv) In case of a JV, the value of contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single contract has been met. Instead, each contract performed by each member shall satisfy the minimum value of a single contract as required for single entity. In determining whether the JV meets the requirement of total number of contracts, only the number of contracts completed by all members, each of value equal or more than the minimum value required, shall be aggregated.
- (v) The period of 10 years or more may be from the commencement of the first contract to the completion of the last contract in the series.

PART 4 :
RECORDS OF WORKING GROUPS
& WORKSHOP

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1. General

Twice of the Technical Review Working Group, twice of the Toll Settlement System Review Working Group and a Workshop were held for implementing the Study.

2. Technical Review WG

2.1 Minutes of Technical Review WG (1)

Date: Feb 3rd, 2015

Time: 13h30 to 15h30

Place: Meeting Room in VEA.

JICA Study Team (JST) presents brief results of the Study.

Q&A:

Mr. Long_ITD:

1. Vietnam urban expressways are complicated and different from expressways in other countries with regular traffic jams. Do you have some advices for us?
2. Currently, ETC is provided in Vietnam with 3 technologies. It's not so easy to integrate these 3 technologies. How should we do?
3. Could you consult us about heavy truck enforcement? Now, we haven't got regulations for it. Weighing scales are installed but just for statistic.

JST Ans (main content):

Firstly, we focus on handling incidents, then, we provide communication system (collection, VMS indication)

We are on preparation of proposing our ideas for heavy truck enforcement in Vietnam.

Mr. Tung_Director of VEA:

According to the ideas from Deputy Minister Truong in the meeting with DRVN, overloaded truck, once detected, will be convoyed back to the loaded place for unloading.

Mr. Quy_VietinBank:

In the presentations of JST, there is not enough information on ETC, it's very important.

For the distribution of OBU, only bank-relating organizations can dealt with settlement contracts, according to the Circular 23, 2014.

Banks are useful in information security, wide distribution network (branches), up to remote hamlets. Banks can assist for setting up vehicle registration centers. Banks can assist for topup by sms, ibanking,...Banks can implement toll collection by the similar scheme with salary payment.

Could you share the management scheme in Japan?

Mr. Nam_BOT Hanoi – Bac Giang:

1. Hanoi – Bac Giang section is upgraded from NH to Expressway. There are many non-motorized vehicles travelling on this section. So, in many cases, events to affect vehicles are not only “big” event, but also such event as: normal rain that is big problem for motorbike.
2. Technical vehicles, ambulance, etc need land acquisition on roadside, but, its not easy to acquire land on our section.

JST Ans (main content):

There are two ways for information: VMS/Internet. Not so many VMSs located in too long interval is not useful for them. Internet, smartphone, radio, ... are much more useful.

Mr. Tien_Director of ITC-DRVN:

In my idea, 3 priority serices mentioned are the same with 3 processes as in the slide presentation.

VITRANSS 2 Master Plan mentioned information is collected from both expressway and ramp at interchange. I think information for the ramp at the connection with expressway is much more important for drivers to decide their routs.

The RMC and the Center of Hanoi City need the connection.

JST Ans (main content): We propose information for Access road in short distance.

Mr. Tuan Anh_DOST:

Operation Scheme is very important. It decides the whole system in future. So, it need to be clear and accurate. Investor is possibly be BOT in future. Expressway management agency is VEA.

Other contents from JST presence are basicly logic. ITS standards/Regulations also structured in similar way. We hope for the update and discussion from WG members.

Roles of expressway management agency should be reviewd according to Decree 32. Also, JST shoudnt mentioned learly as “Traffic Inspector”.

JST Ans (main content):

We will revise to make it clear and detailed.

Mr. Thang_PMU3

In my opinion, Decree 32 is still quite general. 02 articles regulating roles of 02 center (RMC and RMO as defined by JST) are too short.

We should arrange a meeting among all road operators of all targeted sections.

JST Ans (main content):

Other members of our team are preparing design. We may presence in next WG. We need small meeting on each issue.

Mr. Tung_Director of VEA:

ITS is still new and difficult for us. We need more advices and more comments. Other comments should be sent via email.

2.2 Minutes of Technical Review WG (2)

Date: June 25th, 2015

Time: 9:00 to 11:30

Place: Meeting Room in VEA.

Participants:

VEA: Mr. Nguyen Xuan Hung, Mr. Nguyen Viet Tuan, Ms. Tran Thuy Linh, Ms. Thu;

PMU3: Mr. Nguyen Nang The (Deputy Director), Mr. Dam Ngoc Linh, Mr. Ho Sy Son;

TEDI: Mr. Nguyen Minh Thang (Deputy Director), Mr. Nguyen Tien Luc, Mr. Huy.

JICA Study Team: Mr. Ishiguro, Mr. Ito, Ms. Hoi, Ms. Tam.

Contents:

Study Team explained the contents to be discussed in the meeting, including 3 hand-outs to be discussed in the Workshop, 2 hand-outs to be discussed internally.

Hand-out 1: Integrated Traffic Information/Control using Traffic Event Data

The event of serious incident is to be considered.

For management and supervision, integration of traffic information/control over expressway network is necessary.

Two types (two methods) of integration on traffic information/control: 1-way, 2-way

1-way: monitoring only: communicating among RMOs and RMC or integration is only by telephone or in some case by email. Roadside equipment sets send information to RMOs, RMOs process by their own ways. RMC just receives and keep the monitoring data in its database. It's enough for usual conditions.

2-way: guidance provided to RMO from RMC, with prioritization, harmonization.

Only few qualified staffs can control many VMSs.

This policy is consistent with basic stance: both Decision No.140/QD-TTg and the ITS Master Plan.

Hand-out 2: Important FWs for Expressway Operation using ITS

The issue has been discussed between VN side and F/F Mission already, so, we just summarize them.

Essential point: total FW of expressway operation.

Figure 3.3 page 5 shows 2 cases of Service Level Control: by PRO (Public Road Owner) or Inv (Road Investor), F/F Mission discussed this already.

In FW for incident notification to RO (Road Operator): Special number is used but we need cooperation with 113 and 115 emergency numbers.

FW for integrated data management: Not included toll collection as in figure.

Mr. Ishiguro would like to hear comments from VEA side.

He insisted that revisions have been added already in the hand-out today after F/F Mission.

Q&A

TEDI:

Mr. Hung recommends TEDI to comment and share policies, regulations, actual conditions in Vietnam.

Mr. Thang, TEDI:

Can u make clear (provide details) about the important points of integrating traffic information/control? That's the first thing to consider before considering other issues, I think.

For presenting it in the WS, you should make much clear, advantages and disadvantages of it.

Different between last and current models, after you revised your results?

You should explain more the revisions.

And how much money is different (cost difference)? What's included in the 2-way integration, or the developments following it: infrastructure, facilities... Those things should be made clear.

JST Ans:

Ms. Hoi explains unclear items.

Mr. Ishiguro explains:

Detail information shown in page 4.

In Vietnam, currently, VMSs are mostly for commercial ads or else rather than for traffic control.

We followed the draft standards to revised our results.

We may adopt Vietnamese products for VMS.

The control of the equipment is done by human.

RMC's roles are reduced. VMSs are planned to be controlled by RMC but currently, after the Decree No. 32 and Circular No. 90 were issued in 2014, we amended the roles of RMC that RMC does not take control VMS but just issue guidelines, with prioritization to the RMOs. Not big roles any more.

Maybe there is no difference, facilities is same. Software/programs will be used, then we estimate that qualified staffs are required. In case of section by section control: complicated programs, analysts need to be provided for each RMO. In the other case, only 1 integrated software is needed in RMC, no need telephone exchange. So, it's even cheaper in case of 2-way rather than 1-way. That's the difference in operation cost, facilities are almost the same.

Mr. The, PMU 3

We agree with the 2-way method.

You should not explain technically only, economically also.

Simple, stepwise implementation is suitable for Viet Nam now, in the situation of young out-of-date expressways.

10-20 years later expressways will develop, will change a lot.

He mentions an experience in Vietnam in a project name "HDM4" which was costly and provided wrong information.

JST Ans:

2-way method, mainly operated by programs/software, needs less staffs. Software will be designed in advance in the beginning of expressway operation.

Integration can be achieved.

Road Operators have different software, which causes more cost, makes it not easy to integrate. That case actually happened in Japan already. They paid much for replacing each system/facility.

Mr. Linh, PMU 3

You should add domestic consultants together with foreign consultants for optimizing the schedule; make a flexible M/M schedule.

We need to keep some backup budget in case of arising issues that need paying.

You may know that it's very difficult to prolong consultant service in Vietnam.

We need to arrange it soon to have a total picture on cost.

Positions of each M/M is not mentioned.

JST Ans:

Ms. Hoi:

In the stage of procuring, we are able to adjust the cost break-down for backup budget.

Study Team has shown each M/M in a table.

Mr. Hung:

He provides the information on the Letter from JICA to MOT on asking MOT's confirmations on: integration ITS equipment, not installing ITS equipment until the detail design of the Project, 6 targeted sections in the Project's Scope according to Report No. 247,...

He mentioned in his internal talking that Deputy Minister approved for PV-CG another project on ITS, so, there are two duplicated projects.

The by-Hanel project under MOPS standards is somewhat another project on this section.

We understand that JICA side requires the initial preparation on all sections need to follow this Project.

Next Monday, a meeting on appraising all loan projects is to be held, this Project will be mentioned.

Study Team and TEDI need to work together to make it two cost estimation results similar.

JST Ans:

Study Team discusses some understanding on the situation and think that 2 sides should work together to assist answering that Letter quickly and properly. We understand there are some discussion in Vietnam side on BOT sections (PV-CG and HN-BG), they consider that it's difficult for Government to invest one more time on those sections. It's not easy to persuade MOF.

Study Team side want the equipment for integration to be included in the Project.

Study Team reminds themselves the understandings that:

We should make clear that we already revise proposal from VN side, no more directly involvements in RMC's roles, etc.

We should compare the cost to justify that our recommend is good, make a specific figure/table on the cost.

2.3 Minutes of Technical Review WG (3)

Time: 14:30 – 18:30

Date: July 8, 2015

Place: Meeting Room in VEA.

Attendance:

VEA: Mr Nguyen Xuan Hung, Mr Nguyen Viet Tuan, Ms Tran Thuy Linh;

JICA Study Team: Mr Ishiguro, Mr Ikeda, Mr Ito, 2 translators (Ms. Tam, Ms Dung).

Contents:

1. Draft Letter (Feedback to JICA)

JICA STUDY TEAM: we would like to ask DRVN to attend the meeting with JICA tomorrow, to recommend F/F Mission 2 about the next actions and JICA would like to get more information about the current situation.

VEA: MOT has assigned DOST to chair and to answer all questions from JICA. And now, DPI has been reviewing the DFR. Basically, DOST has got draft feedback, but not released the official one yet. DRVN assigned Mr Tuan – Expert and also the person in charge for this ITS Project, to attend the meeting tomorrow, only listen, receive plan and orientation of JICA, without commenting or giving out any opinion. DRVN will get the point and report MOT, because this is not an official meeting. If JICA STUDY TEAM have any questions, we will answer immediately.

DRVN has prepared a draft (not final) letter to MOT, because DRVN is trying to consult MOT, the contents in the letter, as below, may be changed:

- On the Project scope: Currently the scope is remain, no change
- On the ensuring the integration between Northern Regional Main Center and Road Management Offices (Sectional Centers): it's necessary to continuously study, give out solution to integrate ITS system by regarding of utilizing the equipment installed on sections, in order to reduce the investment cost of Project.

JICA STUDY TEAM: When will DRVN submit this letter to MOT?

VEA: On July 06th, DRVN submitted to DOST and DPI to exchange idea and comment. VEA also assigned some staffs to join the discussion with them in order to get comments and complete the letter. Maybe end of this week, DRVN can submit the letter to Vice Minister, then next week we can have feedback to JICA. Now, Mr Tuan is representative of DRVN to solve all issues related to ITS.

JICA STUDY TEAM: We heard that Vice Minister shall retire early, shalln't he? Because he has no schedule to attend our workshop and he seems not to care this Project anymore.

VEA: We have no idea of this information.

2. Discussion on 7 Handouts:

VEA: Has JICA STUDY TEAM updated all comments on DFR of this Project which DRVN sent on July 02nd?

JICA STUDY TEAM: We just updated a half. Actually in DFR, we mentioned all issues in details already. About the content No. 2, we did clarify the functions, duties, responsibilities of RMC and RMO clearly based on Circular No. 90/2014/TT-BGTVT.

VEA: Please explain the equipment control level of RMC and RMO? In case of some problems related to national security, how to solve?

DOST requests to:

- Clarify the roles between RMC and RMO in controlling equipments.
- Why does the Project pay more attention to install equipments on Hanoi – Bac Giang and Cau Gie – Ninh Binh sections? (ex. Axle load scale, lane control)

JICA STUDY TEAM: According to Vietnamese side's opinion, to measure axle load of vehicle, it's required to install scale in front of tollgate; however, there is no tollgate on some sections, resulting in difficulties in stopping and checking vehicles. Otherwise, it's possible to remove the items which were installed on some sections already.

VEA: At first, JICA STUDY TEAM proposed to installed equipments entirely on 7 sections, but now, JICA STUDY TEAM removed some items. So, JICA STUDY TEAM should explain in details the reason why so as to secure the target of Project.

VEA would like to know why the cost of Project increases. VEA notice that due to higher exchange rate; however, in the recent discussion between DPI and JICA on June 29th, we still got information of old cost (around 6.5 billion Yen). Please explain.

JICA STUDY TEAM: Actually, Vietnamese side has to request ODA loan in advance, so that JICA STUDY TEAM can give out the exactly estimated cost.

VEA: However, Vietnamese side has not finished the estimation, so we cannot issue the request. Depend on the revised estimation and content of explaining the reason for increased cost by JICA STUDY TEAM, we will make our own estimation, then report and issue request.

MOT has to explain the imbalance cost of around 2 billion Yen to MOF, so DRVN has responsibility of making clear. However, DRVN is confused of why:

- Increasing cost while ETC has been removed?
- Increasing cost while integration between RMC and RMO?

JICA STUDY TEAM: Some BOT sections need to be integrated. There is a request to install new equipments and remain existing equipments. However, BOT companies do not provide JICA STUDY TEAM any documents of items installation, so JICA STUDY TEAM has to keep and estimate full number of equipments for those sections. Anyway, we can revise and reduce the total cost of Project.

VEA: DRVN will provide JICA STUDY TEAM some detailed drawings and Technical Requirement for BOT sections. After reviewing, JICA STUDY TEAM can revise and submit report to MOT. Moreover, Mr Dũng – Vice director of DRVN has some underlines with comments from DPI (under DRVN) on DFR:

- Based on responsibilities of Regional Main Center and Road Management Offices defined in Circular No. 90/2014/TT-BGTVT, it is necessary to clarify the responsibility of Regional Main Center to expressway sections under DRVN and sections under BOT companies.

- Table 11.2 “Functional packages and other Items” to implement Project: it is required to consider toll collection/management, because Government does not apply toll collection to some expressway sections built with state budget.

· HANDOUT 1:

Article 10.7: There can be two methods for the integrated system implementation of ITS.

- In case of using Stepwise Method (1), it's necessary to have calculation software in each RMO, causing much additional cost of installation and maintenance. Otherwise, this method was invented by experts, so it cost much if any upgrading or changing. NEXCO has experienced in applying this method around 20 to 30 years ago due to low memory of computer.

- In case of using Immediate Method (2), it's only necessary to invest an expensive calculation software in RMC, and simple calculation software in RMO, therefore, it costs much lower than Method 1. It's recommended to install Method 2, but BOT sections should be prepared with one-way integration to integrate in later stage.

- In comparison between 2 methods, we can find 3 losses if using Method 1 (see in Attachment).

· HANDOUT 2:

Article 9.6.3: It's possible to remove the duplicating equipments with BOT companies, so we can revise and change the cost estimation later.

From page 5 to 7, figures changed. Some equipment, illustrated in broken lines, are installed at roadside or in the RMO and managed by RMO.

VEA: How to backup the data and how long? Traditionally by CD, hardware, tape or by cloud calculation? In case of enormous volume of data, can it keep forever? JICA STUDY TEAM should refer national storage regulations to define the important level and classification of information.

JICA STUDY TEAM: Traditional backup.

VEA: we have some comments:

- In figure 9.22, it's required that firewall has strong security function to secure information. And to make clear the note “***”, JICA STUDY TEAM should add more detail “installed on roadside or in RMO decided by the owner”.

- In section 4 Toll Office: The number of equipments on roadside can be removed or changed. In the period of Detailed Design, we can require to change.

Article 9.6.5, JICA STUDY TEAM would like to get confirmation with Vietnamese side that which organization installs and operates the equipments on those target 7 sections?

VEA: The equipment installation and operation shall be decided by the owner (based on the results of bidding and selection).

- HANDOUT 3: Proposed Consultant Selection

JICA STUDY TEAM: We present some important contents of consultation selection (see attachment)

- TOR for this Project was established in 2012 with clear contents (see attachment 3-2)
- We need to implement consultant selection before loan agreement 4 or 5 months in advance.
- Look at attachment 3-1, we can see JICA's assistance (defined by broken line) since the beginning of construction period.

VEA: Vietnamese side basically agrees with proposal, we will take consideration of which beneficial opinions for the Project.

Attachment 3-3: JICA STUDY TEAM explains the cost and gives details of M/M for consulting service (exclude Training Assistance) by the color table.

- HANDOUT 4: Project Implementation Plan

JICA STUDY TEAM recommends VEA to pay much attention to the underlined sections in the handout, referring to the attached schedule for each period.

- HANDOUT 5: Estimated Results of Project Costs

JICA STUDY TEAM: The values have been changed due to recalculating the estimation complying with existing condition of equipments.

- HANDOUT 6: Institutional Arrangement

JICA STUDY TEAM: In case of getting approval for loan agreement in March 2016, MOT and MOF will be the direct borrower. DRVN and PMU3 will be implementing organizations (as the chart in attachment). Is this right?

VEA: The chart is wrong. DRVN has no responsibility of signing the contract, PMU3 will. Because DRVN is the Employer, PMU3 is the representative of DRVN to implement the Project, so PMU3 will sign the contract and be in charge of all duties.

Article 6.5, VEA comments that the Existing Owner is wrong, because MOT is Governmental organization and also the general owner of all sections, including VEC's section. MOT has right to transfer and assign other organizations to own, manage and operate sections by specific contracts.

- HANDOUT 7: JICA STUDY TEAM recommends proposed bidding packages, contracts and bidding methods (see attachment).

3. Toll Settlement System Review WG

3.1 Minutes of Toll Settlement System Review WG (1)

Date: Feb 3rd, 2015

Time: 15h30 to 18h30

Place: Meeting Room in VEA.

Attendance:

VEA: Mr. Nguyen Quoc Tung, Mr. Nguyen Xuan Hung and other experts;

Related departments from MOT and other related organizations;

JICA Study Team: Mr. Ishiguro and other members.

Content:

JST presents brief contents such as: if balance is kept at bank, in near future, when vehicle number increases, many problems will occur.

JST proposes to combine use ETC and T&G to reduce the initial investment cost.

Q&A

Mr. Long_ITD:

1. QCVN 75 & 76, 2013 define some articles on the frequency of 5.8 (1 piece and 2 piece). I think that it still does not comply with standard. I propose JST to cooperate with ITD to confirm about it. ITD met with realistic difficulties. Or else, those 1 piece and 2 piece cannot be imported into Vietnam.

2. How is the speed of vehicle moving through tollgate? Japan requires designed 40km/h for Vietnam. Whether it is possible or not? In Vietnam now it's only 20 km/h. Driving attitude is different.

3. The comparison table of Method - 0 is not updated.

If the operators follow one standard, we can use 1 OBU/IC, if they don't, we need many.

If we use bank card, vehicle can pass through many sections, if the IC-card is issued by 1 road operator, it can be used limitedly in one section.

JST Ans (main content):

Vietnamese drivers may not have much experience on driving on real expressways, for long distance.

40km/h is design speed to process by equipment. Speed limit is also 20km/h.

Mr. Quy_Vietinbank

I agree that the balance should be stored in IC-Card. If it's saved in bank account the process is very slow, at least 10 seconds. I propose to clarify more about the balance on IC-Card. I recommend the reference of ISO 14443 A/B.

Mr. Hung_BOT Phap Van – Cau Gie

We closed the contractor providing technology and equipment. They provided for Cau Gie – Ninh Binh. However, all ETC lanes in Cau Gie – Ninh Binh were closed. We signed the principle contract with them. Some categories have been installed: gantry, equipment...

We are sharing the Dai Xuyen tollgate with VEC, it's very difficult to separate technology.

We are wondering that equipment components from different projects are still not compatible.

We'd like to know your experience in using RFID?

In near future, if we change the method, is it complicated?

JST Ans (main content):

Its very costly. You need to pay twice because they are quite different systems.

Mr. Long_ITD

ITD has the experience in toll collection for more than 15 years. We studied about RFID. We know that USA and Taiwan are two different management models. In Vietnam we insist on payment before allowing vehicle to pass through tollgate of DSRC, even we used IR.

BOT Phap Van – Cau Gie should utilize available things. However, the tollgate of Dai Xuyen is not easy case, it requires more study.

Vietinbank should strongly launch marketing OBU for the customer to use.

Mr. Tuan Anh_DOST

ITS Standard on ETC had been sent to State Bank for commenting. They replied, I will send JST for reference.

3 technologies are applying in Vietnam for ETC

+ For RFID, it hasn't been integratedly operated, without the role of bank. BIDV and Viettel are implementing.

+ DSRC Passive has been implementing since 2010 until now by Vietinbank.

In Draft Standards/Regulations, we mentioned general requirement for 3 technologies.

The users tend to use 1 OBU, 1 card.

Before, DSRC Passive 5.8 was proved to comply with MOIC requirements.

+ For DSRC Active, if necessary, we can send a letter to MOIC to confirm about the frequency.

3.2 Minutes of Toll Settlement System Review WG (2)

Date: February 05, 2015
Time: 10:00 AM – 11:00 AM
Place: VietinBank Hanoi Office

Participants:

Vietinbank: Mr. Nguyen Ngoc Quy (Manager/Business Developer), Mr. Nguyen Ba Tuan (System Administrator)
JICA Study Team: Mr. Ishiguro, Mr. Honda, Ms. Dung

Contents:

1. Toll Settlement Processes
2. Card Invalidation Processes
3. Data Dictionary for Toll Settlement

Following are the information provided by Vietinbank:

1. Toll Settlement Processes

The settlement processes were explained by Honda in order to confirm the division of duties between road operators (or assigned units) and banks. Mr. Quy pointed out that the settlement must be handled by bank(s) due to local regulation governed by SBV. Therefore, the revenue data process must be revised as per SBV Decision 20.

2. Card Invalidation Processes

The following processes were explained by Honda in order to confirm the division of duties between road operators (or assigned units) and banks.

- IC Card Issuing
- IC Card Re-charging (Top-Up)
- IC Card Passage (Transactions)
- IC Card Invalidation
- OBU Registration
- OBU Invalidation

Mr. Tuan provided his comment on the “invalidation” process. As per stipulated the SBV Decision 20, banks must be wholly liable for any loss and shall compensate for any loss caused by the illegal use of the card. Therefore, in order to minimize the time to transmit the invalidation list to the roadside, the invalidation list should be sent directly to the toll offices, not via head-office of road operators, or it can be sent to lane servers directly.

Mr. Tuan also explained that the current their ETC can be recharged via ATM, POS, Internet and SMS. It provides convenience to the users.

3. Data Dictionary for Toll Settlement

Mr. Tuan agreed the study team explanation except for the update cycle of invalidation list. It must be daily and upon-demand basis in order to inactivate the cards immediately.

Mr Tuan also declared that currently they use only card ID for the invalidation, however, for the ETC, they may need more information as the study team suggested.

4. Others

Mr. Tuan invited the study team to their data center used for their current ETC.

4. Workshop

1) Agenda

Workshop is held on August 20th 2015.

Registration (8:00 – 8:30)

1. Participant Introduction (DRVN/VEA, 8:30 – 8:40)
2. Speech by MOT (Vice Minister, 8:40 – 8:55)
3. Necessity & Structured Image of ITS Integration;
Recommended Method of Integration;
Specifications for System Connection/Cooperation with Adjoining Road Section
(Study Team 9:00 – 9:40)
4. Q&A (9:40 – 10:10)
5. Coffee Break (10:10 – 10:30)
6. Outline of Basic Design Results of ITS Integration Project (Study Team, 10:30 – 11:10)
7. Q&A (11:10 – 11:50)
8. Closing Speech (DRVN/VEA, 11:50 – 12:00)

2) Attendances

**WORKSHOP
ON
Presentation on Outline & Important Points of “ITS INTEGRATION PROJECT IN NORTHERN AREA OF VIETNAM”
August 20th, 2015
Attendant list (attended guests)**

No.	Name	Position & organizations	Ad/tel/Note
1. MOT			
1.1.1 Dept. of Science and Technology (DOST)			
1	Ms. Bui Cam Tu	Expert_DOST	
1.1.2 Planning and Investment Dept. (DPI)			
2	Mr. Nguyễn Ngọc Hải	Expert_DPI	
1.1.2 Transport Infrastructure Dept. (DTI)			
3	Mr. Nguyen Quang Huy	Expert_DTI	
1.1.3 Information Technology Center (ITC)			
4	Mr. Dang Chien Cong	ITC	
5	Mr. Thang	ITC	

1.2 Directorate for Road of Vietnam (DRVN)		
1.2.1 Vietnam Expressway Administration (VEA) under DRVN		
6	Mr. Nguyễn Quốc Tùng	Director_VEA
7	Mr. Vũ Anh Tuấn	Deputy Director_VEA
8	Mr. Nguyễn Xuân Hưng	Deputy Director_VEA
9	Ms. Trần Thị Thùy Linh	Expert_VEA
10	Ms. Trần Minh Thu	Expert_VEA
11	Mr. Nguyễn Việt Tuấn	Expert_VEA
1.2.2 Department of Science, Technology, and Environment (DOST&E) under DRVN		
12	Mr. Tuan	Deputy Director of DOST&E_DRVN
1.2.3 Department of Planning and Investment (DPI) under DRVN		
13	Mr. Hieu	Deputy Director of DPI_DRVN
1.3 ITST		
14	Mr. Nguyễn Quang Tuấn	Deputy Director General_ITST
15	Mr. Nguyen Anh Tuan	ITST
1.4 Vietnam Register (VR)		
16	Mr. Nguyen Quang Dat	Director of Informic Center_VR
1.5 PMU 3 under DRVN		
17	Mr. Lê Như Hiệp	Manager of PID 1_PMU 3
18	Mr. Nguyễn Văn Giang	Expert, PID 1_PMU 3
19	Mr. Hồ Sỹ Sơn	Expert, PID 1_PMU 3

1.6 Vietnam Expressway Cooperation (VEC)			
20	Mr. Nguyễn Như Bình	Apprasing Dept._VEC	
2. Ministry of Information and Communication (MOIC)			
2.1 Radio Frequency Directorate (RFD)_MOIC			
21	Mr. Nguyễn Đình Tuấn	Official of Policy & Frequency Planning Division, RFD_MOIC	
3. Ministry of Science and Technology			
3.1 Vietnam Standard and Quality Institute _VSQI, Directorate for Standards, Metrology and Quality (STAMEQ)			
22	Mr. Lý Văn Hùng	VSQI	
3.2 Nacentech			
23	Mr. Trần Vũ Tuấn Phan	Director_NAC BIC_Nacentech	
24	Mr. Nguyen Quoc Dat	NAC BIC_Nacentech	
25	Mr. Lê Hồng Minh	Manager of Software Technology Dept, IMET, Nacentech	
26	Mr. Quang	Software Technology Dept, IMET, Nacentech	
4. Transport Engineering Design Incorporated (TEDI)			
27	Mr. Nguyễn Tiến Lực	TEDI	
28	Mr. Nguyễn Mạnh Hà	Director of a center, TEDI	
5. University of Transport and communication (UTC)			
29	Mr. Nguyễn Đình Thọ replace = Mr. Phạm Quang Sơn	Professor, Highway and Airfield Engineering Laboratory, Civil Engineering Faculty_ UTC	0973.34.3529

6. National University of Civil Engineering (NUCE)			
30	Mr. Đinh Văn Hiệp	Director of Institute of Planning and Transportation Engineering (IPTE)_ NUCE	
7. Post & Telecommunications Institute of Technology (PTIT)			
31	Mr. Đặng Hoài Bắc replaced by Mr. Vu Huu Tien	Vice Principal of PCIT Mr. Tien: Professor of Department of Media Design & Invention (VN: Khoa Thiet ke & Sang tao Da phuong tien)	
8. Hanoi University of Technology			
32	Mr. Hoàng Quang Huy	Professor, HUT	
9. ITD Corporation			
33	Mr. Phạm Đức Long	Director_ITD	
34	Mr. Ngô Phương Thanh	Manager of Marketing Dept., representative for Northern Area_ITD	
10. VNPT Group			
35	Phạm Minh Đức	Deputy Director of PMU I, Network Infrastructure Corp.,_VNPT Group (Tong Cong ty Ha tang mang)	0911.98.8999
36	Mr. Cuong	Deputy Director of PMU I, Network Infrastructure Corp.,_VNPT Group	0914.98.9789
37	Mr. Minh	Deputy Director of PMU I, Network Infrastructure Corp.,_VNPT Group	0904.18.8199
11. FPT			
38	Mr. Hoàng Minh Hưng	Principal Solution Consultant, Director Solution & Presales Consultant Center_FPT FTU Information Sytem Company Limited_FPT & Mitsubishi Heavy	

12. Japan International Cooperation Agency (JICA)			
39	Mr. KOBAYASHI Ryutaro	Deputy Director, Southeast Asia Division 3, JICA Southeast Asia and pacific Dept., _JICA Head Quarter	
40	Mr. TAKAHASHI Kunihiro	Office for Design and Cost Examination, Financial Cooperation Implementation Dept., Senior Engineering Officer (Road), _JICA Head Quarter	
41	Ms. Tran Thi Minh Anh	Senior Program Officer_JICA Vietnam Office (Can bo Chuong trinh Cao cap)	
13. NEXCO Central Co., Ltd (C-NEXCO)			
42	Mr. Hideyasu UNO	Chief Representative, NEXCO - Central, Vietnam Office	
14. Metropolitan Expressway Co., Ltd (Metropolitan Ex)			
43	Mr. Hiroshi WARITA	Deputy Manager, International Affairs Division, Technical Consulting Dept._Metropolitan Ex	
15. NEC			
44	Mr. Yoshitaka Fujita	Product Architect, Transportation and City Infrastructure Division_ NEC Corp, Tokyo	
45	Mr. Kogusu Atsushi	Management Division, Business Development Manager, NEC Vietnam Co., Ltd.	12F, 52 Le Dai Hanh, Le Dai hanh Ward, HBT Dst., HN
46	Mr. x y	NEC	

16. TOSHIBA			
47	Mr. Takashi Yuhara	Specialist, Road Solution Dept., Solution Center_Toshiba Solution Corp., Tokyo	
48	Mr. Tomohiko Amira	Senior Manager, Toshiba Software Development (Vietnam) Co., Ltd._Hanoi	16F, 519 Kim Ma, VIT Tower
17. Panasonic Vietnam Co., Ltd			
49	Mr. Eiji Ochidai	General Manager_ Infrastructure Business System Solutions Division, Panasonic Sales Vietnam_Panasonic Vietnam Co., Ltd.	14F, 117 Tran Duy Hung, Cau Giay Dst., Hn; Chamvit Tower
18. Mitsubishi Heavy Industries, Ltd (Mitsu-Heavy)			
50	Ms. Trinh Hong Dung	Hanoi Liason Office_Mitsu-Heavy	Ly Thuong Kiet
51	Ms. My	Hanoi Liason Office_Mitsu-Heavy	0904.76.8685
19. Omron Asia Pacific PTE Ltd (Omron-AP)			
52	Mr. Kokumai Seiji	Sales Manager, Social Solutions Business_Omron AP Singapore	
53	Mr. Sin Zee Kean	Assistant Manager, Social Solutions Business_Omron AP Singapore	
20. Hitachi			
54	Mr. Atachi Nao	Sale Executive, Hitachi Asia (Vietnam) Co., Ltd_Hitachi	5F, 23 Phan Chu Chinh, Sun Red River Bld
21. Oriental Consultants Global Co., Ltd			
55	Mr. Hitoshi Yahagi	Chief Representative, Hanoi Office, OCG Co., Ltd.	
56	Ms. Chu Minh Hoi	Hanoi Office, OCG Co., Ltd.	

22. Belden			
57	Ms. Nguyen Thi Van Dung	Industrial Account Manager_Belden	
23. BNP			
58	Mr. Nguyen Hai Bang	Director, BNP JSC Vietnam	0904.88.89.36
24. Agency/Company in charge of targeted sections			
24.1 Hanoi People Committee, Hanoi Department of Transport (in charge of the sections: RR3, Lang – Hoa Lac, and Noi Bai – Ca Lo Bridge)			
59	Mr. Vuong Minh Hoan	HPC	
25. Newspapers & TV			
25.1 Vietnam News Agency (TTXVN)			
60	Ms. Thuy Dung	Journalist,_Vietnam News Agency (TTXVN)	
61	Mr. Ta Quang Toan	Journalist, Economic News Dept.,_Vietnam News Agency (TTXVN)	
26. Study Team (ST)			
62	Mr. Hitoshi Ishiguro	Study Team Leader_ST	
63	Mr. Takayoshi Ito	Member_ST	
64	Ms. Giang Thi Minh Tam	Member_ST	
65	Ms. Do Thuy Dung	Member_ST	
27. Others			
66++	some not registered guests		

**PART 5:
RELEVANT LEGAL DOCUMENTS
& STANDARDS IN VIETNAM**

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- 1. List of Relevant Legal Documents 1
- 2. List of Relevant Standards 3

1. List of Relevant Legal Documents in Vietnam

- (1) Law No. 68/2006/QH11 dated 29 June 2004 (Law on Standards) (V);
- (2) Circular No. 21/2007/TT-BKHCHN dated 28 September, 2007;
- (3) Document No. 3233/MOT-KHDT dated 20 May, 2008 (to PrimeMinister_CG-NB) (V);
- (4) Document No. 899/TTg-KTN dated 12 June, 2008 (from Prime Minister to MOT, MOF, MOPI, VEC_CG-NB) (V);
- (5) Decision No. 1734/QD-TTg dated 01 December 2008 (Master.Plan.of.Exp.) (V);
- (6) Notice No. 41.TB-BGTVT dated 10 February, 2009 (DSRC5.8GHz);
- (7) Decree No. 12-2009-ND-CP dated 12 February, 2009 (on FS Study) (V);
- (8) Notice No. 347.TB-BGTVT dated 23 July, 2009 (ETC-2pieceOBU) ;
- (9) Notice No. 480/TB-BGTVT dated 27 October, 2009 (JICA StudyStd);
- (10) Circular No. 07/2010/TT-BGTVT dated 11 February, 2010 (Legal regulation for measurement of overloaded heavy truck) (V);
- (11) Decree No. 11/2010/ND-CP dated 24 February, 2010 (road infrastructure management and protection) (V);
- (12) Decree No. 34/2010/ND-CP dated 02 April, 2010 (Processing for measured overload heavy truck) (V);
- (13) Decision No. 997/QD-BGTVT dated 15 April, 2010 (regarding the assignment of ITS development for Vietnam Road System);
- (14) Appraisal Report No. 412/KHDT dated 31 May, 2010 (package 4:HCM-LT-DG);
- (15) Circular No. 30/2010/TT-BGTVT dated 01 October, 2010 (prevention and recovery after flodd and storm in road section) (V);
- (16) Circular No. 03_2011_TT-BGTVT dated 22 February, 2011 (amending and supplementing the Circular no. 07/2010/tt-bgtvt of february 11, 2010) (V);
- (17) Letter No. 1178/BGTVT-KHDT dated 4 March, 2011 (from MOT to MPI_register long list FY 2011-2013);
- (18) Notice No. 67/TB-BGTVT dated 18, March, 2011 (Conclusions by VM NgoThink Duc_RFID etc.);
- (19) Document No. 2503/BGTVT-KHCHN dated 14 May, 2011 (by VM Duc) (V);
- (20) Circular No. 39/2011-TT-BGTVT dated 18 May, 2011 (Guideline for Decree No. 11/2010/ND-CP dated February 24, 2010) (V);
- (21) Notice No. 207/TB-BGTVT dated 7 July, 2011_(Conclusions by VM Ngo Think Duc at the meeting with Chief Representative of JICA about some JICA fund projects);
- (22) Letter No. 440/BGTVT-KHCHN dated 19 January, 2012 (from MOT to HCM PC on ETC of Saigon) (V);
- (23) Document No. 1040/BGTVT-KHDT dated 21, February, 2012 (V);
- (24) Circular No. 03/TT-BTTTT dated 20 March, 2012 (providing the list of radio devices exempt from radio frequency use licensing and accompanying technical and operation conditions) (V);
- (25) Letter No. 6205/BGTVT-KHDT dated 31 July 2012;
- (26) Letter No. 6500/BGTVT-KHDT dated 08 August, 2012 (by MOT on SAPI);
- (27) Decision No. 1502/QD-TTg dated 11 October, 2012 (Weighing Station) (V);
- (28) Letter No. 9745/BGTVT-KHDT dated 16th November, 2012 (MOT Letter on Scope);

- (29) Notice No. 03/TB-BGTVT by MOT dated 03 January 2013;
- (30) MOT request No. 918/BGTVT-KHDT dated 29 January, 2013 (for support of Finalizing FS) (V);
- (31) Letter No. xx/BGTVT-KHDT (Request for support of Finalizing Vietnam's FS);
- (32) Notice No. 420/TB-BGTVT dated 5 July, 2013 (by MOT_on ITS);
- (33) Proposal No. 3981/TCDBVN-KHCN-MT-HTQT dated 06 September, 2013 (DRVN Proposal _ Meeting to JICA Hanoi);
- (34) Letter No. 4456/ TCDBVN-VPQLDCT dated 04 October, 2013 (DRVN to JICA_ ITS project);
- (35) Letter No. 4725/TCDBVN-VPQLDCT dated 21 October, 2013 (to JICA);
- (36) Circular No.15/2014/TT-BCA dated 14 April, 2014 (regulating the vehicle registration) (V);
- (37) Decree No. 32/2014/ND-CP dated 22/4/2014 (management, O&M of expressway facilities) (V);
- (38) Circular No. 90/2014/TT-BGTVT dated 31/12/2014 (guidance on management, O&M of expressway facilities) (V);
- (39) Notice No. 831/TB-BGTVT dated 11 September, 2015 (Conclusions by VM Truong) (V);
- (40) Document No. 12653-BGTVT-KHDT dated 22 September, 2015 (MOT to HPC) (V);
- (41) Document No. 12706-BGTVT- DTCT dated 22 September, 2015 (MOT to BOTs) (V);

2. List of Relevant Standards in Vietnam

OBJECTIVE:

Related Standards on Variable Message Sign
Description method of information sign on Expressway

TT	CODE	STANDARD NAME		Collection		Link	
		Vietnamese (V)	English (E)	V	E	V	E
1	22TCN331-05	Biển chỉ dẫn trên đường cao tốc	Signs of Expressway	✓		VN\22 TCN 331-05 Dieu le BHDB tren Duong Cao Toc.pdf	
2	QCVN41 : 2012/BGTVT	Quy chuẩn kỹ thuật Quốc gia về báo hiệu đường bộ	National technical regulations on Road signs	✓		VN\QCVN_41_2012.pdf	
3	TCVN 5729:2012	Đường ô tô cao tốc - Yêu cầu thiết kế	Eexpressway - Specifications for design	✓		Related Expressway STANDARDS\TCVN5729_2012.pdf	

OBJECTIVE:

Related Standards on toll collection system

TT	CODE	STANDARD NAME		Collection		Link	
		Vietnamese	English	V	E	V	E
4	TCCS 01:2008/VRA	Trạm thu phí đường bộ, thu phí một dừng sử dụng ấn chỉ mã vạch	Signs of Expressway	✓	✓	VN\TCCS_01_2008_VRA.pdf	

OBJECTIVE:

Related Standards on weight checking system

TT	CODE	STANDARD NAME		Collection		Link	
		Vietnamese	English	V	E	V	E
5	QCVN 66:2013/BGTVT	Quy chuẩn kỹ thuật Quốc gia về trạm kiểm tra tải trọng xe	National Technical Regulation on Highway Weigh Station	✓		VN\QCVN 66-2013-BGTVT Quy chuan KTQG ve Tram KTTTX ngay 12_6.pdf	
6	DLVN 225:2010	Cân kiểm tra quá tải xe – Quy trình thử nghiệm	Scales for checking load of vehicles - Testing procedure	✓		VN\DLVN 225-2010 Can kiem tra qua tai xe - QTTN.pdf	
7	DLVN 48:2009	Cân kiểm tra quá tải xe – Quy trình kiểm định	Scales for checking load of vehicles - Verification procedures	✓		VN\DLVN 48-2009 Can kiem tra qua tai xe - QTDKD.PDF	
8	DLVN 122:2013	Cân kiểm tra quá tải xách tay - Quy trình thử nghiệm	Portable wheel load scales – Testing procedures	✓		VN\DLVN+122-2013.pdf	
9	DLVN 26:2012	Cân kiểm tra quá tải xe xách tay - Quy trình kiểm định	Portable wheel load scales – Verification procedures	✓		VN\DLVN 26 - 2012 Can kt gtai xtay-QTKD_2.pdf	EN\DLVN 146_2004_E.docx
10	DLVN 146:2004	Cân ô tô động – Quy trình thử nghiệm	Automatic instruments for weighing road vehicles in motion - Testing procedures	✓	✓	VN\dlvn 146_2004_791_2.pdf	EN\DLVN 145_2004_E.docx
11	DLVN 145:2004	Cân ô tô động – Quy trình kiểm định	Automatic instruments for weighing road vehicles in motion - Verification procedures	✓	✓	VN\dlvn 145_2004_8437.pdf	

OBJECTIVE:

Related Standards on information communication system

TT	CODE	STANDARD NAME		Collection		Link	
		Vietnamese	English	V	E	V	
12	TCVN 8068:2009	Dịch vụ điện thoại voip – các yêu cầu	VoIP telephone service - Requirements	✓		VN\8068_2009.pdf	
13	TCVN 8078:2009	Thiết bị cổng thoại IP dùng cho mạng điện thoại công cộng (IP Gateway) - Yêu cầu kỹ thuật	Internet Protocol Gateway (IP Gateway) - Technical requirements	✓		VN\TCVN 8078-2009 Internet Protocol Gateway - Technical Requirements.pdf	
14	TCVN 8700:2011	Cống, bể, hầm, hố, rãnh kỹ thuật và tủ đầu cáp viễn thông - Yêu cầu kỹ thuật	Duct, jointing chamber, manhole, handhole, technical gutter and cable connected box – Technical Requirements	✓		VN\Vi_TCVN8700-2011.doc	
15	TCVN 9250:2012	Trung tâm dữ liệu - Yêu cầu về hạ tầng kỹ thuật viễn thông	Data centers - Telecommunications technical infrastructure requirement	✓		VN\Vi_TCVN9250-2012.doc	
16	TCN 68-254:2006	Công trình ngoại vi Viễn thông - Quy định kỹ thuật	Telecommunication outside plants - Technical regulations	✓		VN\TCN 68-254-2006 (Công trình ngoại vi viễn thông) - Unicode.doc	
17	TCVN 8238:2009	Mạng viễn thông – Cáp thông tin kim loại dùng trong mạng điện thoại nội hạt	Telecommunication network - Metallic cables for local telephone networks	✓		VN\TCVN8238_2009_902417.pdf	

18	TCVN 8665:2011	Sợi quang dùng cho mạng viễn thông – Yêu cầu kỹ thuật chung	Optical fibre for telecommunication network – General technical requirements	✓		<u>VN\Vi_TCVN8665-2011.doc</u>	
19	TCVN 8698:2011	Mạng viễn thông – Cấp sợi đồng thông tin CAT.5, CAT.5E – Yêu cầu kỹ thuật	Telecommunication network - Cat.5 and Cat.5e communication copper cable - Technical requirements	✓		<u>VN\TCVN 8698-2011.pdf</u>	
20	TCVN 8699:2011	Mạng viễn thông - Ống nhựa dùng cho tuyến cáp ngầm - Yêu cầu kỹ thuật	Telecommunication network – Plastic ducting use for underground cable lines – Technical requirements	✓		<u>VN\Vi_TCVN8699-2011.doc</u>	
21	QCVN 9:2010/BTTTT	Quy chuẩn kỹ thuật quốc gia về tiếp đất cho các trạm viễn thông và mạng cáp ngoại vi viễn thông	National technical regulation on earthing of telecommunication stations	✓		<u>VN\qcvn_9_2010_926.pdf</u>	
22	QCVN 32:2011/BTTTT	Quy chuẩn kỹ thuật quốc gia về chống sét cho các trạm viễn thông và mạng cáp ngoại vi viễn thông	National technical regulation on lightning protection for telecommunication stations and outside cable network	✓		<u>VN\qcvn32_2011_btttt_901479_9226.pdf</u>	
23	QCVN 33:2011/BTTTT	Quy chuẩn kỹ thuật quốc gia về lắp đặt mạng cáp ngoại vi viễn thông	National technical regulation on installation of outside telecommunication cable network	✓		<u>VN\QCVN 33_2011_BTTTT.pdf</u>	

9

OBJECTIVE:

Related Standards on electro-mechanic system

TT	CODE	STANDARD NAME		Collection		Link	
		Vietnamese	English	V	E	V	
24	11 TCN-18-2006 *	Quy phạm trang bị điện (Phần I)	Electrical equipment norm (Part I)	✓		VN\11 TCN-18-2006 Quy phạm trang bị dien 1-PKTPCTH.pdf	
25	11 TCN-19-2006 *	Quy phạm trang bị điện (Phần II - Hệ thống đường dẫn điện)	Electrical equipment norm (Part II – Electrical path system)	✓		VN\11 TCN-19-2006 Quy phạm trang bị dien 2-PKTPCTH.pdf	
26	11 TCN-20-2006 *	Quy phạm trang bị điện (Phần III - Trang bị phân phối và trạm biến áp)	Electrical equipment norm (Part III - Distribution facilities and substation)	✓		VN\11 TCN-20-2006 Quy phạm trang bị dien 3-PKTPCTH.pdf	
27	11 TCN-21-2006 *	Quy phạm trang bị điện (Phần IV - Bảo vệ và tự động)	Electrical equipment norm (Part IV – Protection and Automatic)	✓		VN\11 TCN-21-2006 Quy phạm TBD 4-PKTPCTH.pdf	
28	TCVN 4756:1989	Quy phạm nối đất, nối không các thiết bị điện	Code of Practice of ground connection, “0” connection of electrical equipments	✓		VN\TCVN 4756-1989 Quy phạm noi dat va noi khong thiet bi dien.pdf	
29	TCVN 5678:2012	Thông gió - Điều hòa không khí - Tiêu chuẩn thiết kế	Ventilating – Air conditioning – Design Standard	✓		VN\TCVN 5678 2010 - Thông gió & -HKK.pdf	
30	TCVN 3254-89	Phòng cháy chữa cháy, các yêu cầu an toàn chung	Fire protection - General requirements	✓		VN\Vi_TCVN3254-1989.doc	

31	TCVN 3890:2009	Phương tiện phòng cháy và chữa cháy cho nhà và công trình – Trang bị, bố trí, kiểm tra, bảo dưỡng	Fire protection equipment for building and construction – Providing, Installation, Inspection and Maintenance	✓		VN\32TCVN3890-2009PhuongtienPCCCchonha vacongtrinh.pdf	
32	TCVN 5738-2000	Hệ thống cảnh báo và phát hiện cháy - Yêu cầu kỹ thuật	Automatic fire alarm system - Technical regulations	✓		VN\TCVN 5738 - 2000 - He thong bao chay tu dong.pdf	
33	TCVN 5739-1993	Thiết bị chữa cháy - Đầu nối	Fire fighting equipment - Coupling heads	✓		VN\TCVN5739 1993 908004.doc	
34	TCVN 6379-1998	Thiết bị chữa cháy - Trụ nước chữa cháy - Yêu cầu kỹ thuật	Fire protection equipment - Fire hydrant - Technical requirements	✓		VN\TCVN 6379-1998 Tieu chuan Tru nuoc chua chay - yeu cau ky thuat.pdf	
35	TCVN 5760-1993	Hệ thống chữa cháy. Yêu cầu chung về thiết kế, lắp đặt và sử dụng	Fire extinguishing system - General requirements for design, installation and use	✓		VN\TCVN 5760-1993 HTBC-CC.doc	
36	TCVN 7435:2004	Phòng cháy, chữa cháy. Bình chữa cháy xách tay và xe đẩy chữa cháy. Phần 1: Lựa chọn và bố trí	Fire protection. Portable and wheeled fire extinguishers. Part 1: Selection and Installation	✓		VN\TCVN 7435.pdf	
37	TCVN 7278-1:2003	Chất chữa cháy - Chất tạo bọt chữa cháy - Phần 1: Yêu cầu kỹ thuật với chất tạo bọt chữa cháy độ nở thấp dùng phun lên bề mặt chất lỏng cháy không hòa tan được với nước	Fire extinguishing media – Foam concentrates – Part 1: Specifications for low expansion foam concentrates for top application to water – immiscible liquids	✓		VN\[xaydung360.vn]TCVN 7278 - 1 - 2003 - Chat chua chay bot yeu cau thiet ke.pdf	

38	TCVN 5040:1990 (ISO 6790:1986)	Thiết bị phòng cháy chữa cháy - Ký hiệu hình vẽ dùng trên sơ đồ phòng cháy - Yêu cầu kỹ thuật	Fire prevention and protection equipments – Graphical symbols used for protection schemes - Specifications	✓		VN\TCVN 5040-1990.pdf	
39	QCVN 06:2010/BXD	Quy chuẩn kỹ thuật quốc gia về an toàn cháy cho nhà và công trình	National technical regulation on Fire safety of Buildings	✓		VN\QCVN 06 2010_BXD_29920.pdf	
40	TCXDVN 259:2001	Tiêu chuẩn thiết kế chiếu sáng nhân tạo đường, quảng trường đô thị	Design standard on Artificial lighting for urban road, street and square	✓		VN\Vi TCXDVN259-2001.pdf	
41	TCXDVN 333:2005	Tiêu chuẩn thiết kế chiếu sáng nhân tạo bên ngoài các công trình công cộng và kỹ thuật hạ tầng đô thị	Design standard on Artificial outdoor lighting for public buildings and urban infrastructure	✓		VN\TCXDVN 333-2005.pdf	
42	TCVN 8095- 845-2009	Tiêu chuẩn Việt Nam - Từ vựng kỹ thuật điện quốc tế, Phần 845: Chiếu sáng	National regulation – International electrotechnical vocabulary, Chapter 845: Lighting	✓		VN\Vi TCVN8095-845- 2009.doc	
43	QCVN 01:2008/ BCT	Quy chuẩn kỹ thuật quốc gia về an toàn điện	National technical regulation on Electrical safety	✓		VN\QCVN 01_2008_BCT.doc	
44	QCVN QTD-5: 2009/BCT	Quy chuẩn kỹ thuật quốc gia về kỹ thuật điện. Tập 5: Kiểm định trạng thiết bị hệ thống điện	National technical regulation on Electrical techniques Set 5: Testing, Acceptance test for Power facility	✓		VN\QCVN QTD_05-2009_BCT Ky thuat dien.pdf	

45	QCVN QTĐ-7: 2008/BCT	Quy chuẩn kỹ thuật quốc gia về kỹ thuật điện. Tập 7: Thi công các công trình điện	National technical regulation on Electrical techniques Set 7: Power network Installation	✓		<u>VN\QCVN QTĐ-7 2008BCT 85619 QD54BC T4.DOC</u>	
46	TCVN 9206:2012	Đặt thiết bị điện trong nhà ở và công trình công cộng - Tiêu chuẩn thiết kế	Installation of electric equipments in dwellings and public building – design standard	✓		<u>VN\TCVN 9206 2012 dat-thiet-bi-dien-trong-nha-va-cong-trinh-cong-cong-tieu-chuan-thiet-ke.pdf</u>	
47	TCVN 9207:2012	Đặt đường dẫn điện trong nhà ở và công trình công cộng - Tiêu chuẩn thiết kế	Installation of electrical wiring in dwellings and public building – Design standard	✓		<u>VN\TCVN 9207 2012 dat-duong-dan-dien-trong-nha-o-va-cong-trinh-cong-cong-tieu-chuan-thiet-ke.pdf</u>	
48	TCVN 9208:2012	Lắp đặt cáp và dây dẫn điện trong các công trình công nghiệp	Installation of electrical cables and wires for industrial projects	✓		<u>VN\TCVN 9208 2012 lap-dat-cap-va-day-dan-dien-trong-cac-cong-trinh-cong-nghiep.pdf</u>	
49	TCVN 9358:2012	Lắp đặt hệ thống nối đất thiết bị cho các công trình công nghiệp	Installation of equipment earthing system for industrial projects	✓		<u>VN\TCVN 9358 2012 lap-dat-he-thong-noi-dat-thiet-bi-cho-cac-cong-trinh-cong-nghiep-yeu-cau-chung.pdf</u>	
50	TCVN 9631-1:2013	Uninterruptible Power Sysstem (UPS) – Part 1: General and safety requirements for UPS	Hệ thống điện không gián đoạn (UPS) - Phần 1: Yêu cầu chung và yêu cầu an toàn với UPS	✓		<u>VN\Vi_TCVN9631-1-2013.doc</u>	
51	TCVN 9631-2:2013	Uninterruptible Power Sysstem (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements	Hệ thống điện không gián đoạn (UPS) - Phần 2: Yêu cầu về tương thích điện tử EMC	✓		<u>VN\Vi_TCVN9631-2-2013.doc</u>	

52	TCVN 9631-3:2013	Uninterruptible Power System (UPS) – Part 3: Method of specifying the performance and test requirements	Hệ thống điện không gián đoạn (UPS) - Phần 3: Phương pháp xác định các yêu cầu tính năng thử nghiệm	✓		VN\Vi TCVN9631-3-2013.doc	
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OBJECTIVE:

Related Standards on Expressway design and construction of management center

TT	CODE	STANDARD NAME		Collection		Link	
		Vietnamese	English	V	E	V	
53	TCVN4054 : 2005	Đường ô tô - Yêu cầu thiết kế (tái bản lần 3)	Highway – Specifications for Design (3rd edition)	✓		VN\TCVN 4054 2005 Duong o to 07-02-2006.doc	
54	TCVN2737 : 1995	Tải trọng và tác động - Tiêu chuẩn thiết kế	Loads and Effects – Design standard	✓		VN\TCVN-2737-1995.pdf	
55	22TCN272-05	Bài giảng Kết cấu thép theo Tiêu chuẩn 22 TCN 272-05 và AASHTO LRFD		✓		VN\272_05_Full.pdf	
56	TCVN 9362 : 2012	Thiết kế nền nhà và công trình	Specifications for design of foundation for buildings and structures	✓		VN\Vi TCVN9362-2012.doc	
57	TCVN 5574 : 2012	Kết cấu bê tông và bê tông cốt thép - Tiêu chuẩn thiết kế	Concrete and reinforced concrete structures - Design standard	✓		VN\TCVN5574 2012 907349.doc	
58	TCVN 5575 : 2012	Kết cấu thép - Tiêu chuẩn thiết kế	Steel structures - Design standard	✓		VN\TCVN 5575 2012.doc	

59	TCVN 4474 : 1987	Thoát nước bên trong. Tiêu chuẩn thiết kế	Internal drainage – Design standard	✓		<u>VN\tcvn 4474-1987 thoat nuoc ben trong.doc</u>	
60	TCVN 4513 : 1988	Cấp nước bên trong. Tiêu chuẩn thiết kế	Internal water supply – Design standard	✓		<u>VN\tcvn 4513 1988 tke cap nuoc ben trong nha o.doc</u>	
61	TCVN 7957 : 2008	Thoát nước - mạng lưới và công trình bên ngoài. Tiêu chuẩn thiết kế	Drainage and sewerage – External networks and facilities - Design standard	✓		<u>VN\Vi_TCVN7957-2008.doc</u>	
62	TCXDVN 33:2006	Cấp nước - Mạng lưới đường ống và công trình - Tiêu chuẩn thiết kế	Water supply – Distribution system and facilities - Design standard	✓		<u>VN\33_2006.doc</u>	
63	TCVN 25 : 1991	Đặt đường dẫn điện trong nhà ở và công trình công cộng. Tiêu chuẩn thiết kế	Installation of electric wire in dwellings and public buildings. Design standard	✓		<u>VN\tcxd 25-1991 tk dien nha o va ct cong cong.doc</u>	
64	TCVN 27 : 1991	Đặt thiết bị điện trong nhà ở và công trình công cộng. Tiêu chuẩn thiết kế	Electric distribution network in dwellings and public buildings. Design standard	✓		<u>VN\TCXD 27-1991-Dat thiet bi dien trong nha o va CT cong cong-TC thiet ke.pdf</u>	
65	TCVN 2622 : 1995	Phòng cháy, chống cháy cho nhà và công trình. Yêu cầu thiết kế	Fire prevention and protection for buildings and structures. Design standard	✓		<u>VN\tcvn 2622 1995 tk pccc cho nha o.doc</u>	
66	TCVN 232 : 1999	Hệ thống thông gió, điều hòa không khí và cấp lạnh	Ventilating, air-conditioning and cooling system	✓		<u>VN\Vi_TCXD232-1999.doc</u>	
67	TCVN 9385 : 2012	Chống sét cho công trình xây dựng - Hướng dẫn thiết kế, kiểm tra và bảo trì hệ thống	Protection of structures against lightning - Guide for design, inspection and maintenance	✓		<u>VN\TCVN 9385-2012.doc</u>	

68	QCVN 01/2008/BXD	Quy chuẩn kỹ thuật quốc gia về Quy hoạch xây dựng	National technical regulation on Construction Planning	✓		<u>VN\QCXDVN 01 2008BXD_4bxd2008.doc</u>	
69	QCVN 07:2012/BXD	Quy chuẩn kỹ thuật quốc gia các công trình hạ tầng kỹ thuật đô thị	National technical regulation on Urban technical infrastructures	✓		<u>VN\QCVN 07 2010 BXD.pdf</u>	
70	TCXDVN 362:2005	Quy hoạch cây xanh sử dụng công cộng trong các đô thị - Tiêu chuẩn thiết kế	Planning on using public greenery in urban areas - Design Standard	✓		<u>VN\tcxdvn 362 2005.doc</u>	
71	TCVN 4601:2012	Công sở cơ quan hành chính nhà nước - Yêu cầu thiết kế	State Administrative Agencies - Design requirements	✓		<u>VN\TCVN 4601-2012.pdf</u>	
72	TCVN 4319:2012	Nhà và công trình công cộng - Nguyên tắc cơ bản để thiết kế	Public buildings – Basic rules for design	✓		<u>VN\Vi_TCVN4319-2012.doc</u>	
73	TCVN 9379:2012	Kết cấu xây dựng và nền - Nguyên tắc cơ bản về tính toán	Building structures and Foundations – Basic rules for calculations	✓		<u>VN\Vi_TCVN9379-2012.doc</u>	