THE SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF TRANSPORT
VIETNAM EXPRESSWAY CORPORATION
SOUTHERN EXPRESSWAY PROJECTS MANAGEMENT UNIT (SEPMU)

HCMC LONG THANH DAU GIAY EXPRESSWAY

Ho Chi Minh City - Long Thanh - Dau Giay Expressway Technical Assistance Project
Loan 2374-VIE
(KM0 - KM4 and RR2 IC)

# Inception Report

## for

## KM0 –KM4 and RR2 Interchange

July 2010

Joint Venture of

Nippon Koei Co., Ltd.
KRI International Corporation
HaFICo Group Holding Co.

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# 1 BACKGROUND

To meet the transport infrastructure demand for the rapid economic development and progress of urbanization in Vietnam, the Government of Vietnam launched various programs for transport development and highway construction in the early years of this decade, as well as in 2004 creating the Vietnam Expressway Corporation (VEC), which is, under the Ministry of Transport, responsible for fund raising, construction, and management of the expressways nationwide.

In the planned expressway network, one of the sections with the highest priority is supposed to be the HCMC-Long Thanh - Dau Giay section of the North-South Axis.

ADB decided to fund a Project Preparation Technical Assistance (PPTA) for the proposed HCMC – Long Thanh – Dau Giay Expressway (HLDE) and confirmed that the expressway had technical, economic, and financial viability by the final report completed in February, 2008.

On 24 July 2008, VEC signed the Technical Assistance contract with the Joint Venture of Nippon Koei, HAFICO, KRI and Mekong Economics for the design of the HLDE from KM4+000 to KM54+983. The design for this section (KM4+000 to KM54+983) was completed in 2009 and the first civil work Package (Package 1A) was commenced for construction on 3 October 2009. The remaining section (KM0-4), at that time, was transferred to the management of Ho Chi Minh City People's Committee (HCMC PC).

Due to fund shortage, HCMC PC could not conduct this additional section. The section (KM0-4) of HLDE connecting from An Phu intersection (KM0+000) to KM4+000 (beginning point of Package 1a) was delayed and considered as a "missing link". Now, thanks to the additional fund from ADB, the implementation of this "missing link" was re-transferred to VEC. VEC quickly engaged the Joint Venture of Nippon Koei and HAFICO to carry out the Technical Assistance Project commenced on 1 July 2010.

# 2 PROJECT OUTLINE

## 2.1 Project Location

The Project, HCMC – Long Thanh – Dau Giay Expressway, was originally configured as a section from the starting point of RR2 HCMC (KM4+000, that is the starting point of viaduct) to the ending point of Dau Giay (KM54+982) with a total length of about 51Km-long expressway. Subsequently, due to demarcation of the component between East-West Highway project and the Project, a section of KM0+000 to KM4+000 is decided to be included into the Project. Furthermore, ramps of interchange to be linked with RR2, which was originally planned in Phase 2 of the Project, were also decided to be included into the Project because of the necessity of the construction of the interchange due to construction progress of RR2 is faster than expected and high demand of the interchange use is expected as

majority of the traffic which comes from the Southwest Vietnam (Mekong Region). The section of the Project with emphasized additional part of the Project (KM0+000 to KM4+000 and interchange at RR2, hereinafter referred to as "the Project (KM0-4 and RR2IC)") are shown in the **Figure 2.1**.

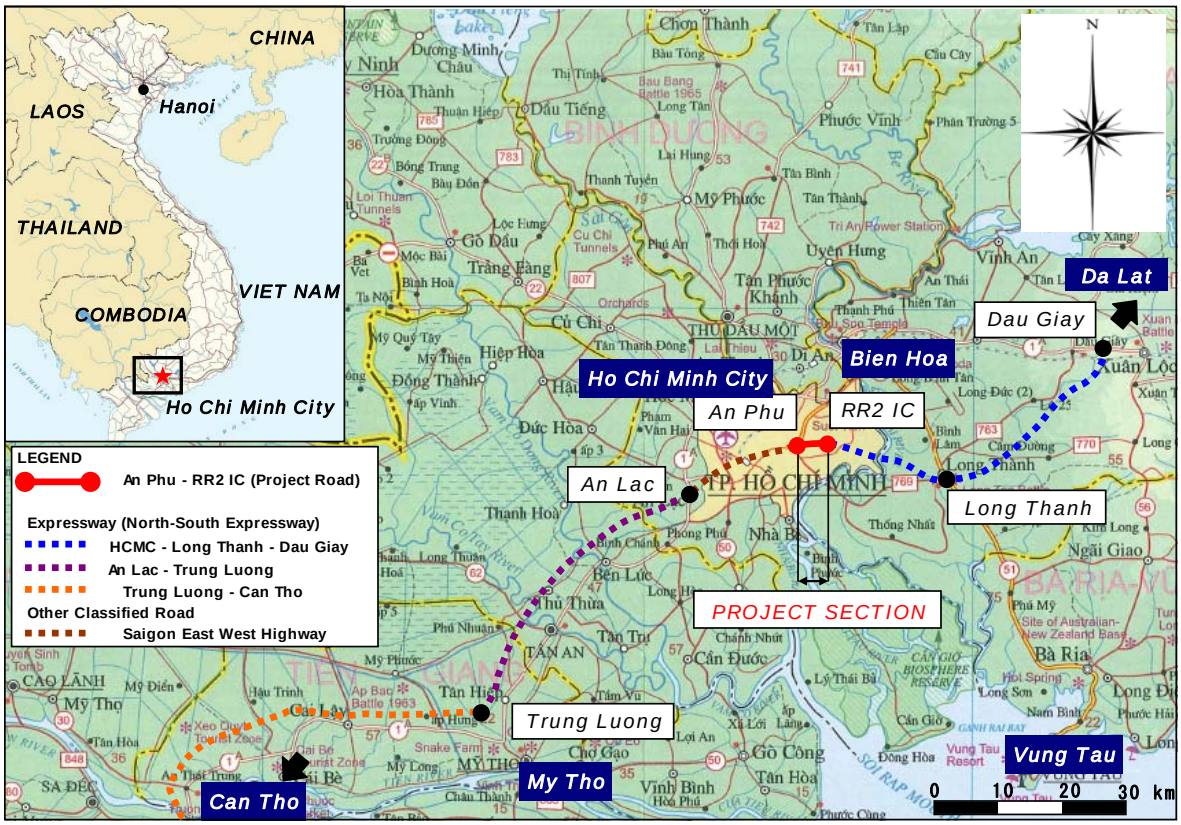



**Figure 2.1 Project Location Map**

## 2.2 Objective of the Project (KM0-4 and RR2IC)

Project objectives for the section KM0+000 to KM4+000 and RR2 interchange is the same as the objectives of the original project such as to construct a part of the new Expressway from HCMC to Dau Giay through Long Thanh by co-financing of JICA and ADB, for strengthening the capacity to keep up the future demand in traffic volume of HCMC area where industrial development has been recently significant through reducing the traffic volume of existing National Highway No.1 (NH1), National Highway No.51 (NH51), and Vung Tau route which already run out its capacity. Also, the route is one of top priority in Expressway Master Plan in Vietnam. The Project (HLD whole section including KM0-4 and RR2IC), thereby, contributes to the improvement of socio-economic situation of Vietnam, by strengthening the traffic capacity.

The main objectives of the Project (KM0-4 and RR2IC) are summarized as the followings;

- To connect HLD expressway to EWHW at An Phu intersection to realize the

activating of traffic flow between HCMC and HDL expressway;

- To construct a section of KM0+000 to KM4+000 is not only provide smooth traffic flow between HLD expressway and EWHW but avoiding traffic congestion on the existing road by traffic such as Nguyen Duy Trinh and Nguyen Thi Dinh, those road don't have enough traffic capacity.
- To connect HLD expressway to RR2 by rampway at RR2 interchange to satisfy the high demand of the interchange use as majority of the traffic which comes from the Southwest Vietnam (Mekong Region) uses RR2 to avoid passing HCMC center and then divert to east wards to Long Thinh direction.

## 2.3 Scopes of the Project (KM0-4 and RR2IC)

The Project (KM0-4 and RR IC) consists of the construction of expressway from An Phu intersection (KM0+000) to KM4+000 and Ring Road 2 I.C. in total length of 4 km with one intersection at An Phu, one interchange at RR2, four (4) small or medium scale bridges. Features of the Project (KM0-4 and RR IC) are as summarized in the following **Table 2.1**.

**Table 2.1 Features of the Project (KM0-4 and RR2 IC)**

| Classification | Item | Quantity | Remarks |
|---|---|---|---|
| Road (Urban Expressway, 4-lane, 4.0km-long) | Embankment<br>Bridges (4nos.) | 2,855m<br>1,145m | 71%<br>29% |
| | Soft Soil Treatment | 2,000m | Estimated from existing data |
| Intersection | | 1 No. | An Phu intersection |
| Interchange | Interchange | 1 No. | Between HLD Expressway and RR2 |
| | Rumpway | @,@@@m | 12 Bridges @@@m (12 nos.) |

Note: Features above are subject to change during the Detailed Design of Consulting Services

Construction of the Project (KM0-4 and RR2 IC) is expected divided into three civil works contract packages as summarized in **Table 2.2** and packages of the whole Project and this Project (KM0-4 and RR2IC) are shown in **Figure 2.2** and **Figure 2.3**. Package 7, 8, and 9 are expected to be constructed by JICA fund.

**Table 2.2 Main Components of Each Package**

| Package | Package 7 and 8<br>KM0+000 - KM4+000 | Package 9<br>Rampway of RR2 I.C. |
|---|---|---|
| **Main Components** | An Phu intersection<br>Embankment of road<br>Soft ground treatment | Widening of expressway<br>Viaduct of rampway (3.8km)<br>Embankment of rampway<br>Soft ground treatment |

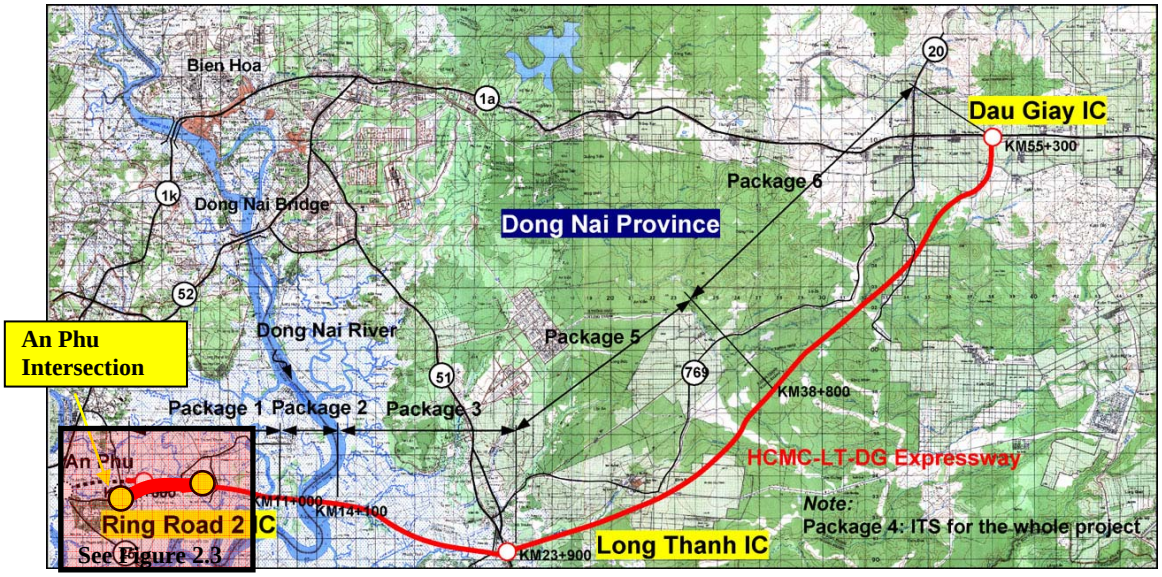



**Figure 2.2 Packaging of the Whole Project**

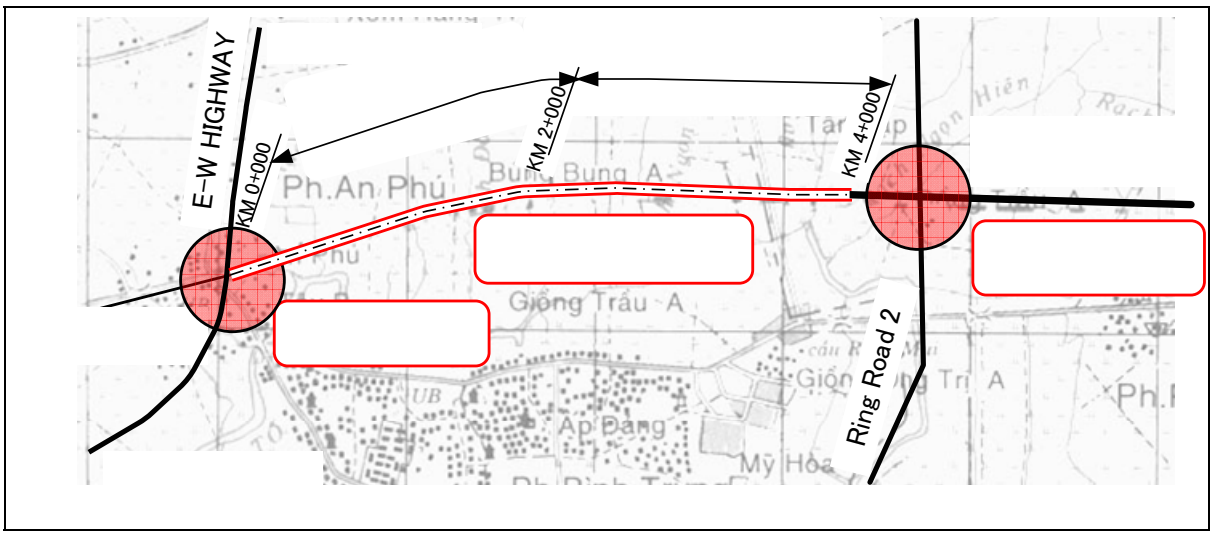



**Figure 2.3 Packaging of the Project (KM0-4 and RR2IC)**

## 2.4 Implementation Program of the Project (KM0-4 and RR2IC)

The detailed design and tender assistance for Package 7, 8 and 9 for the Project (KM0-4 and RR2 IC) are planned to complete by the end of Year 2010.

The construction and construction supervision are planned to be carried out under JICA loan.

The construction of Package 7, 8 and 9 are scheduled to start from November 2011. However, due to some structures of the components of Package 9 are directly related to the former started Package 1A, it shall be studied to treat Package 9 as a part of Package 1A. In such a case, Package 9 will start earlier than above mentioned plan.

Implementation program of the Project (KM0-4 and RR2 IC) is shown in the **Table 2.3**.

**Table 2.3 Implementation Schedule**

| | 2010 | | | | | | | 2011 | | | | | | | | | | | 2012 | | | | | | | | | | | 2013 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| **Technical Assistance** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Detailed Design | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tender Assistance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Pre-construction and Construction** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Package 7 (Km 0+000 to 2+000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Selection of Contractor | | | | | | | | | | | | | | | | | | | 12 months | | | | | | | | | | | | | | | | | | | | | | |
| Implementation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 20 months |
| Package 8 (Km 2+000 to 4+000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Selection of Contractor | | | | | | | | | | | | | | | | | | | 12 months | | | | | | | | | | | | | | | | | | | | | | |
| Implementation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 20 months |
| Package 9 (RR2 I.C.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Selection of Contractor | | | | | | | | | | | | | | | | | | | 12 months | | | | | | | | | | | | | | | | | | | | | | |
| Implementation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 22 month |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Source: Minutes of Discussion between MOT and JICA dated 16 March 2010

# 3. OUTLINE OF THE CONSULTANT SERVICES

## 3.1 Objectives of the Consultant Services

The Consultant will carry out the required engineering services for the detailed engineering design and tendering assistance which are specified in the Terms of Reference in the Contract. The objectives of the Consultant's services are;

- To undertake detailed engineering design for the missing link and Ring Road 2 Interchange,
- To update resettlement plans and environmental impact assessments to take account of detailed engineering designs,
- To prepare bidding documents for procurement of civil works,
- To assist the Executing Agency (EA) and Implementing Agency (IA) for the Project undertaking procurement of the civil works,
- To set up the pegging out markers and update the land acquisition documents to take account of detailed engineering designs,
- To assist in undertaking land resettlement plans in preparation for commencement of civil works, and
- To complete the resettlement plans for the section from KM4+000 – KM54+983.

## 3.2 Scope of the Consultant Services

The consulting services under the Technical Assistance Project consist of five components as follows:

- Engineering Detailed Designs
  - Data Collection
  - Surveys
  - Detailed Design and Cost Estimates
- Procurement of Construction Contracts
- Environmental Assessments
- Updating and Implementation of Resettlement Plan
- Operation and Maintenance

## 3.4 Consultant Service Contract

The consultant service contract was signed between VEC and the Consultant on 19 July 2010. The summary of the contract is shown in **Table 3.1**.

**Table 3.1 Consulting Service Contract**

| Item | Description |
|---|---|
| Contract Title | Amendment No.4 to Contract for Consultants' Services for Ho Chi Minh City – Long Thanh – Dau Giay Expressway Technical Assistance Project (ADB Loan No.2374-VIE) |
| Employer Name | Vietnam Expressway Corporation under Ministry of Transport |
| Consultant Name | The Joint Venture of Nippon Koei Co., Ltd, KRI International Corporation, HAFICO Group Holding Co and Mekong Economics Ltd. |
| Contracted Date | 19 July 2010 |
| Contract Period | Detailed Engineering Design and Pre-Construction: 6 months |
| Contract Amount | USD 1,617,068<br>JPY 2,072,180<br>(Including all taxes) |
| Notice to Proceed | 23rd June 2010 |
| Commencement of Services | 1st July 2010 |

The commencement of service is before the contract signing because of early commencement was strongly requested by VEC and the Notice to Proceed was issued on 23rd June 2010.

# 4 METHODOLOGY FOR DETAILED ENGINEERING DESIGN

## 4.1 Data Collection

Investigate and collect the following data for cost estimate and general cost estimate.

- Production costs related to local transportation activities
- Depreciation regulations related to traffic vehicles
- Haulage tables for transportation services; charges for travel, bridges and roads, and insurance
- Costs for traffic accidents
- Inflation and exchange rate in the previous years
- Local unit price for calculation of general cost estimate
- Consult unit prices of projects under implementation in the region
- Sources of materials and energies for construction.
- Disposal areas for waste soil and materials (including liquid waste).
- Survey for construction material transportation.
- Planning data related to the project and work with relevant local authorities.
- Planning maps of highways and waterways.
- Plan of industrial and urban zones along the route
- Plan of systems of hydraulic works: irrigation, canals, dykes, and pumping station, etc
- Plan of underground works and system of underground and overhead lines
- Plan of systems of water supply and drainage
- Plan of electricity supply and lighting
- Plan of communication system and other relevant plans along the route, etc ( the plans must be granted with official approval of relevant authorities)
- Designs documents and construction drawings of package 1A, and other relevant projects.

Work with and agree in writing with relevant local agencies and authorities of Ho Chi Minh City, EVN, Ministry of agricultural and rural development, railway department, waterway department, VNPT and other relevant managing agencies about the following contents.

- Alignments.
- Design options of intersections.
- Elevation, detailed plans of urban zones and industrial zones.
- Location, span or width, and elevation of culvert and frontage road.

- Navigational clearance, railway clearance.
- Documents related to irrigation, drainage and water supply sources for urban zones, clearance of large canals and dykes.
- The other relevant documents, etc.

## 4.2 Field Surveys

### 4.2.1 Topographic Survey

Activities of topographical survey include the following items:

- Establishing the plan and work leveling net (based on national coordinate system VN2000- Central Meridian 106˚15').
- Survey of alignment.
- Survey for land acquisition.
- Survey for intersections and cross-road.
- Survey for bridges and constructions.
- Analysis the data of topographical survey by appropriate software for design.
- Providing data by hard copies documents and electronic copies as required.

**Table 4.1 Proposed Survey Work Quantity**

| Item No | Description | Unit | Volume | Note |
|---|---|---|---|---|
| I | Project's Basic data Collection | LS | 1 | |
| II | Topographical survey | | | |
| 1 | Implement control network and leveling network. | | | |
| 1.1 | Control network grade IV | monument | 4 | |
| 1.2 | Leveling network grade IV | km | 8 | |
| 1.3 | Supplemental Secondary Control Point DCC2 | Benchmark | 26 | |
| 1.4 | Technical level network | km | 8 | |
| 2 | Topographical survey | | | |
| | Alignment survey (terrain grade IV) | | | |
| | Plan, scale 1/2000 | ha | 4.8 | |
| | Throughway profile, scale 1/200(V); 1/2000(H) | km | 0.241 | |
| | Throughway cross section, scale 1/200 | km | 14.275 | |
| 3 | Drainage survey | culvert | 5 | |
| | Plan, scale 1/500 | ha | 10 | |
| | Culvert profile, scale 1/200 | km | 1 | |
| 4 | Surveying of intersected project | LS | 1 | |
| 5 | An Phu interchange survey (terrain grade IV) | | | |
| | Plan | Ha | 8 | |

| | | | | |
|---|---|---|---|---|
| | Highway level I Profile measurement | km | 0.4 | |
| | Highway level I Cross section measurement | | 2 | |
| 6 | 2nd Ring Road (terrain grade IV) | | | |
| | Bridge Profile measurement | km | 3.6 | |
| | Highway Profile measurement | km | 10.45 | |
| | Highway Cross section measurement | km | 57.5 | |
| 7 | Bridge survey | each | 4 | |
| | - Plan | ha | 145.58 | |
| | + On land | ha | 123.743 | |
| | + Underwater | ha | 21.837 | |
| | - Profile | km | 2.745 | |
| | + On land | km | 2.333 | |
| | + Underwater | km | 0.412 | |
| | - Control point of Bridge centerline (accuracy in accordance with SCP (DCC2) | pile | 16 | |

Vietnamese standards and specifications shall be applied as follows:

**Table 4.2 Standards and Specifications**

| No | Title | Ref. No |
|---|---|---|
| 1 | Technical survey for piles foundation construction and design | 20TCN 160-87 |
| 2 | Standard for highway survey | 22TCN263-2000 |
| 3 | Standard for topographical mapping | 96TCN 43-90 |

### 4.2.2 Hydrographical Survey

1) Data Collection:

Meteorological documents: purchase the meteorological data: rainfall data for 1, 3, 5, 7 day, wind, temperature, humidity etc.

Hydrographical documents: purchase the hydrographical data: capacity, water level etc at the hydrographical stations along Sai Gon River and on Dong Nai River.

Discuss with appropriate authorities and have agreement about the bridge location, navigation clearance on the alignment in writing.

2) Study Approach

a. Investigate hydrographical for the entire alignment

+ Investigate the water level

- Along the alignment length at the positions of overpass river, ditch and

irrigation channel (equivalence to 1 km), investigate one water level sample each sample includes 3 years of highest flood levels, sample of frequent water level, average water level and the lowest water level, the reason causing the flooding and the time of flooding etc.

- For each of drainage works construction, investigate one water level sample each sample includes 3 years of highest flood levels, sample of frequent water level, average water level and the lowest water level. Investigate the reason and time that flood happened.
- For the culverts crossing the irrigation works, it is necessary to work with the administrative agency and the local government for the agreement of the culverts' location, culverts' size and the required height of bottom culvert.

+ For the open drain construction (cross and longitudinal drains)

- Open drain location and the size of the nearby drainage works should be shown in the layout plan.
- Survey the current drainage work condition, open- drain and irrigation system include: vertical and horizontal open drain system. Indentify the current open- drain's cross section, top width, bottom width, depth, functions, flow direction and vertical slope and show these items next to the open-drain location.
- Survey clearly drainage, purpose of usage, channel and open-drain managing unit.
- For irrigative channels and open-drains in need of re-location, working out with management and local office; at the same time; having agreed document of open-drain re-location, scope of its section and level which open-drain invert requests.

b. Bridge hydrology survey

+ Water level survey

- At each bridge location, survey 3 flow areas for each flow area, it's required to survey 3 year of highest flood level, regular water level, average water level, lowest water level, cause and time of flood...

+ Medium bridge survey

- Survey flow section: At each bridge location, survey one flow section only. Survey area should be 2m higher than historical water level (300m of length per section). Rate is chosen randomly to display topography of section. If flow section was outside bridge layout plan, it is required to

design and survey the distance from flow section to bridge centre line.

- Survey longitudinal section of river invert and water level line: survey area toward upstream and downstream of bridge 150m for each side (300m of length per bridge). Rate is chosen at random to display topography of section.

+ Large bridge survey

- Survey flow section: At each bridge location, survey one flow section only. Survey area should be 2m higher than historical water level (400 m of length per section). Rate is chosen randomly to display topography of section. If flow section were outside bridge layout plan, it is required to design and survey the distance from flow section to bridge centre line.
- Survey longitudinal section of river invert and water level line: survey area toward upstream and downstream of bridge 200 m for each side (400m of length per bridge). Rate is chosen at random to display topography of section.

**Table 4.3 Proposed Survey Work Quantity**

| Item No | Description | Unit | Volume | Note |
|---|---|---|---|---|
| | Hydrological survey and calculation | | | |
| | - Data collection | LS | 1 | |
| | - Alignment hydrologic | Clu. | 4 | |
| | - Drainage culvert | Clu. | 5 | |
| | - Bridge hydrological investigate | | | |
| | + Water level investigate | unit | 12 | |
| | + For Medium bridge | | | |
| | Cross section water capacity survey | m | 600 | |
| | River profile | m | 600 | |
| | + For Large bridge | | | |
| | Cross section water capacity survey | m | 800 | |
| | River profile | m | 800 | |

### 4.2.3 Geological Survey

a. Scope of Work

+ Special geological survey

- The survey of soft ground: Drill one hole at the expressway centerlines per 75 m; the drill of horizontal geological surveys with two holes for two sides of horizontal section will be carried out in Construction stage (if

need).

- For each section, it should be performed at least 2 holes through the soft soil layer, expected 15.0m/ hole.
- Site test: perform the Vane Shear Test with 2.0m interval distance in holes at centre line that intend to make geo-cross section.
- Laboratory test: test with no less than 50% the total sample; besides the normal criteria, it is requested to perform Cv, K, percentage of organic test, triangle compression following UU and CU diagram. Including: test for Cv=10%, Cu=2%, UU=3% of the total undisturbed sample

+ An Phu Intersection geological survey

- The main work includes Anphu Interchange and East – West ramps and Luong Dinh Cua road.
- Proposed work of each ramp set-up 1 borehole on centreline or widen area with depth of 15m/borehole, collecting 7 testing sample.

+ Ring Road 2 geological survey

- All relative work content: survey for ramps and bridges on ramps. The bridges now have not been determining general view, so that the volume shown is proposed. When working, they have to update new design from engineer office.

+ Bridge geological survey

- Project included 2 big bridges (Mương Kênh and Đỗ Xuân Hợp) and 2 medium bridges (Bà Đại and Bà Hiện), all abutment and pier will be drilled with alternate position. Drilling location preliminary based on bridge general view in Investment Project report. (It will be fixed after finishing plan, profile and cross section of bridge).
- Borehole depth (proposed): 70m/borehole
- Testing sample: 2m/1 sample.
- Standard Penetration Test in boreholes with each 2m. SPT based on TCXD 226 – 1999.

b. Applied Standards System of the Survey

Applies Vietnamese current standards and specifications for surveys are the follows :

**Table 4.4 Survey Standard for Soil investigation**

| No | Standards/Specification | Ref. No | Latest |
|---|---|---|---|
| 1 | Technical survey for piles foundation construction and design | 20TCN 160-87 | |
| 2 | Standard for soil exploration in drilling | 22TCN259-2000 | |
| 3 | Standard for soil investigation for waterway projects | 22TCN260-2000 | |
| 4 | Standard for highway survey | 22TCN263-2000 | |
| 5 | Prestressed steel for reinforcing concrete | ASTM A416-85 | |
| 6 | Reinforcing steel bars-spiral bars | TCVN6285-97 | |
| 7 | Procedure of cement concrete testing | 22TCN60-84 | |

Applies Vietnamese current standards and specifications for laboratory testing are the follows :

**Table 4.5 Standard for Laboratory Testing**

| No. | Testing Items | Standards |
|---|---|---|
| 1 | Specific Gravity | ASTM D854 |
| 2 | Natural Water Content | ASTM D2216 |
| 3 | Grain Size Analysis | ASTM D422 |
| 4 | Atterberg Limit | ASTM D4318 |
| 5 | Soil Description and Classification | ASTM D2487 |
| 6 | Unconfined Compression Test (UC) | ASTM D2166-85 |
| 7 | Triaxial Compression Test (UU) | ASTM D2850-90 |
| 8 | Triaxial Compression Test (CU) | ASTM D4767-95 |
| 9 | Consolidation Test | ASTM D2435 |
| 10 | Organic Content | ASTM D2974-00 |
| 11 | Direct Shear Test | ASTM D3080 |
| 12 | Unconfined compressive strength test on rock | ASTM D2938 |
| 13 | Unit Weight | BS 1377-part 2-7 |
| 14 | Water Chemical Analysis | BS 1377-part 3 |

If these standards cannot satisfy completely all of construction requirements, the Consultant proposes to apply other equivalent standards approved by the Ministry of Construction.

The drilling is in accordance with TCN 259-2000 (TCVN). The Laboratory testing in accordance with ASTM standard and with accepted good practice for geotechnical work.

### 4.2.4 Material Source Survey

Material quarries survey will be carried out with reference to the DD of KM4-KM54+983 for updating the information on rock quarries and borrowed areas for fills. The data required will include:

a. Updating on the Existing Rock Quarries and Borrowed Areas:

- Map the location, plan of the rock quarries to determine the hauling distance and means of transportation to the project area, kind and grade of Road (river) for transportation.
- Gather material properties, available quantity and reserve, transportation capability, and expected costs, time of exploitation.
- Collect names of Suppliers, ownerships, contact person, address and phone number.

b. Exploration of New Rock Quarry and Borrowed Areas:

- Map the location, plan of the rock quarries to determine the hauling distance and means of transportation to the project area, kind and grade of Road (river) for transportation.
- Gather material properties, available quantity and reserve, transportation capability, and expected costs.
- Collect names of Suppliers, ownerships, contact person, address and phone number.
- Explore licensing and permit issues with related local authorities.

c. Survey Quantities

The Consultant will carry out the material survey for quarry sites and borrow areas as follows:

- Laterite : 3 – 4 locations
- Fill sand : 4 locations
- Sand for concrete : 2 locations
- Rock : 4 quarries
- Sand for ground improvement : 2 locations

Since the proposed ground improvement may require the use of significant amount of coarse SAND which had faced shortage in the past, therefore it may be a need to import the sand from Cambodia. The names of potential suppliers (or importers), the availability (time, capacity of supply per day) transportation condition, distance and means of transportation to the project area as well as the expected cost will be gathered.

c. Laboratory Tests:

The types of laboratory tests required for each type of material are listed below:

**Table 4.6 Testing for Materials Quarries Survey**

| No. | Type of testing | Laterite soil | Fill Sand | Sand for soil improvement | Sand for concrete | Rock |
|---|---|---|---|---|---|---|
| 1 | Particles Size Analysis | YES | YES | YES | YES | YES |
| 2 | Proctor Compaction | YES | YES | NA | NA | NA |
| 3 | CBR Test | YES | YES | NA | NA | YES |
| 4 | Physical Properties Test | YES | YES | YES | YES | NA |
| 5 | Permeability Test | NA | YES | YES | NA | NA |
| 6 | Sulphate, sulphite and chloride content test | NA | NA | NA | YES | NA |
| 7 | Specific Gravity | YES | NA | NA | NA | YES |
| 8 | Strength Test | NA | NA | NA | NA | YES |
| 9 | Los Angeles abrasion | NA | NA | NA | NA | YES |
| 10 | Clay and dust content | NA | NA | NA | NA | YES |
| 11 | Elongation and flakiness index test | NA | NA | NA | NA | YES |

**Table 4.7 Specification of the survey**

| No | Standards/Specification | Ref. No |
|---|---|---|
| 1 | Specifications of aggregates for Road | 22TCN 334-06 |
| 2 | Specifications of aggregates for concrete and mortar | TCVN 7570:2006 |
| 3 | Test methods for aggregates for concrete and mortar | TCVN 7572-1:2006 to TCVN 7572-20:2006 |
| 4 | Method for determination of physical-mechanical properties of rock | 22 TCN 57-84 |
| 5 | Method for constructing and checking laterite material | 22 TCN 11-77 |
| 6 | Los Angeles Abrasion | 22 TCN 318-04 |
| 7 | California Bearing Ratio | 22 TCN 332-06 |
| 8 | Graded Aggregate Material for Bases or Sub-bases for Highways | ASTM D2940 |
| 9 | Sizes of Aggregate for Road and Bridge Construction | ASTMD448 orAASHTO M43 |
| 10 | Sieve Analysis of Fine and Coarse Aggregates | ASTM C136 or AASHTO T27 |
| 11 | Flat and Elongated Particles in Coarse Aggregates | ASTM D4791 |

| | | |
|---|---|---|
| 12 | Standard and Modified compaction tests | AASHTO – T99, T180 |
| 13 | Permeability | ASTM D2434 /AASHTO T215 |
| 14 | Liquid limit and plastic limit | AASHTO – T89, T90 |
| 15 | Determination of silt, clay content (grain <0.075mm) | AASHTO-T11 |
| 16 | Clay Lumps and Friable Particles in Aggregate | AASHTO-T112 |

## 4.3 Detailed Design

### 4.3.1 Highway Design

a. General

Highway design shall be carried out for the urban expressway, so called missing link of HLD-Expressway, section from KM0+000 to KM4+000 based on the findings from data collection and survey results to be given in the detailed design period. Following conditions shall also be considered into the design;

- Highway design shall be carried out for Phase I development as 4-lane urban expressway for thruway section from KM0+000 to KM4+000.
- Design shall basically follow the approved Feasibility Study report (FS2007) and consider the results of the surveys and investigations to be carried out during the detailed design.
- Neither a toll system nor ITS system is included in the scope of work.

An Phu intersection (KM0+000) and Ring Road 2 interchange including rampways (KM4+514) shall be mentioned in Clause 4.3.2 and 4.3.3.

b. Design Standard

The principal geometric design standards to be applied for highway design are Vietnamese Design Standard: TCXDVN104-2007, TCVN4054-2005 and TCVN5029-1997. Where no provisions exist in these Vietnams standards, the Consultant refers to the relevant standards of AASHTO (A Policy on Geometric Design of Highway and Streets, 2004), JRSO (Japanese Road Structure Ordinance, 2004) and Japanese Standard for Expressway (Standard of NEXCO).

c. Road Classification

The FS2007 report described that An Phu – Ring Road 2 section is urban road – Main Road Grade I, design speed 100km/h, and agreed by MOT.

In TCXDVN104-2007, road classification and hierarchy have been further developed and specified. Considering the expected function and the location, in accordance with Article 6 of TCXDVN104-2007, it is categorized that section between An Phu intersection and RR2 as “Urban Expressway”, with full access control, without interruption by traffic signal, connecting the HCMC - Long Thanh - Dau Giay Expressway (HLD Expressway) which would carry the largest traffic in the country.

d. Design Speed

The design speed to be applied in the Project (KM0-4 and RR2IC) is shown in **Table 4.8**.

**Table 4.8 Design Speed**

| Section | | Design Speed | Remarks |
|---|---|---|---|
| Thruway | | | |
| | KM0+000 ~ KM4+514 | 100 km/h | Urban Expressway |
| | KM4+514 ~ | 120 km/h | Expressway |
| Rampway | | 40 km/h | |

e. Traffic Volume

Traffic volume for the Project shall be based on the latest relevant study that is The Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2) (JICA, 2010). The result of traffic volume forecast for the years 2020 and 2030 are shown in **Table 4.9**.

**Table 4.9 Forecasted Traffic Volume**

| Year | Traffic Volume (PCUs/day) |
|---|---|
| 2020 | 58,200 |
| 2030 | 80,700 |

Source: VITRANS2 Study Team

e. Geometric Design Criteria for Thruway

Summary of geometric design criteria to be applied for the Project (KM0-4 and RR2IC) with design speed of 100 km/h is given in **Table 4.10**.

**Table 4.10 Geometric Design Criteria for Thruway**

| Design Elements | | Type/Value | Remarks | Reference |
|---|---|---|---|---|
| 1 | Road Classification | Urban Expressway | | TCXDVN104-2007 |
| 2 | Terrain | Plain | | TCXDVN104-2007 |
| 3 | Classification of Construction Condition | Class I | | TCXDVN104-2007 |
| 4 | Design Speed (km/h) | 100 | | F/S, TCXDVN104-2007 |
| 5 | Cross Sectional Elements | | | |
| | Number of Travelled Way | 4 | | F/S |
| | Formation Width (m) | 26.5 | | F/S |
| | Travelled Way Width(m) | 2 x 7.5 | @3.75 | TCXDVN104-2007 |
| | Outer Shoulder Paved Width (m) | 3.0 | | F/S |
| | Outer Shoulder Earthen Width (m) | 0.5 | | TCXDVN104-2007 |
| | Median Width (m) | 3.0 | | TCXDVN104-2007 |
| | Median Marginal Strip (m) | 0.75 | | TCXDVN104-2007 |
| 6 | Crossfall of Roadway (%) | 2.0 | | TCXDVN104-2007 |

| Design Elements | | Type/Value | Remarks | Reference |
|---|---|---|---|---|
| 7 | Slope of Earthworks | V : H = 1:2.0 | Fill | TCXDVN104-2008 |
| 8 | Radius of Horizontal Curve (m) | | | |
| | Desirable Minimum (m) | 600 | | TCXDVN104-2007 |
| | Absolute Minimum (m) | 400 | | TCXDVN104-2007 |
| 9 | Minimum Radius to omit Superelevation (m) | 4,000 | | TCXDVN104-2007 |
| 10 | Crossfall (%) | 1.5-2.5 | | TCXDVN104-2007 |
| 11 | Maximum Grade (%) | | | |
| | Up | 4.0 | | TCXDVN104-2007 |
| | Down | 6.0 | | TCXDVN104-2007 |
| 12 | Maximum slope length(m) | | | |
| | For 4% | 800 | | TCXDVN104-2007 |
| | For 3% | 1000 | | TCXDVN104-2007 |
| 13 | Minimum Grade (%) | | | |
| | Desirable Minimum | 0.5 | | TCVN4054 |
| | Absolute Minimum | 0.3 | | TCVN4054 |
| 14 | Minimum slope length(m) | | | |
| | Standardized urban road | 200 | | TCXDVN104-2007 |
| | Improved urban road | 150 | | TCXDVN104-2007 |
| 15 | Minimum Vertical Curve Radius (m) | | | |
| | Desirable Crest (m) | 10,000 | | TCXDVN104-2007 |
| | Desirable Sag (m) | 4,500 | | TCXDVN104-2007 |
| | Standardized Crest(m) | 6,500 | | TCXDVN104-2007 |
| | Standardized Crest(m) | 3,000 | | TCXDVN104-2007 |
| | Minimum Vertical Curve length(m) | 85 | | TCXDVN104-2007 |

f. Typical Cross Section

Typical Cross Section of Urban Expressway of Phase I (4-lane in both ways) and Phase II (8-lane in both ways) are shown in **Figure 4.1** and **4.2** respectively.

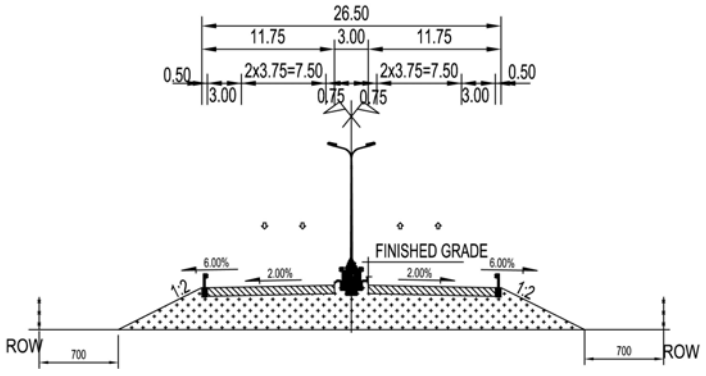



**Figure 4.1 Typical Cross Section of Urban Expressway of Phase I**

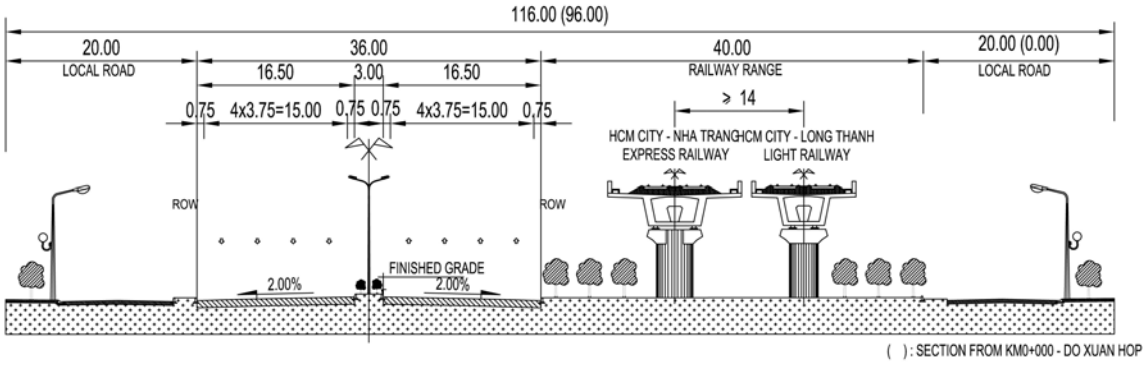



**Figure 4.2 Typical Cross Section of Urban Expressway of Phase II**

g. Horizontal Alignment of Urban Expressway

The Consultant was given updated horizontal alignment data in the initial stage of this Project. After reviewing the data it was found that horizontal alignment of the urban expressway has been slightly modified comparing to the FS2007 report due to in consideration of planned high speed railway project and future development of the adjacent area. The horizontal alignment of FS2007 and updated data to be adopted for the section from KM0+000 to KM4+000 are shown in **Table 4.11** and **4.12** respectively.

**Table 4.11 Horizontal Alignment in FS2007**

| No. | | Station | Coordinate | | Beginning Radius | Clothoid Parameter | Ending Radius |
|---|---|---|---|---|---|---|---|
| | | | X | Y | | | |
| 1 | BP | 0+000 | 1193542.445 | 554668.187 | 0.000 | 0.000 | 0.000 |
| 2 | TS | 0+474.645 | 1193691.486 | 555118.825 | 0.000 | 1341.641 | 4000.000 |
| 3 | SC | 0+924.645 | 1193824.735 | 555548.578 | 4000.000 | 0.000 | 4000.000 |
| 4 | CS | 1+674.236 | 1193950.969 | 556286.352 | 4000.000 | 1341.641 | 0.000 |
| 5 | ST | 2+124.236 | 1193968.180 | 556735.959 | 0.000 | 0.000 | 0.000 |
| 6 | TS | 3+632.512 | 1193997.607 | 558243.948 | 0.000 | 1341.641 | 4000.000 |
| 7 | SC | 4+082.512 | 1193997.950 | 558693.885 | 4000.000 | 0.000 | 4000.000 |
| 8 | CS | 4+383.714 | 1193975.570 | 558994.182 | 4000.000 | 1341..641 | 0.000 |

**Table 4.12 Horizontal Alignment for the Project**

| No. | | Station | Coordinate | | Beginning Radius | Clothoid Parameter | Ending Radius |
|---|---|---|---|---|---|---|---|
| | | | X | Y | | | |
| 1 | BP | 0+000 | 1193538.237 | 554664.067 | 0.000 | 0.000 | 0.000 |
| 2 | TS | 0+427.63 | 1193668.220. | 555076.704 | 0.000 | 1549.193 | 4000.000 |
| 3 | SC | 1+032.63 | 1193834.089 | 555653.165 | 4000.000 | 0.000 | 4000.000 |
| 4 | CS | 1+533.35 | 1193917.552 | 556146.555 | 4000.000 | 1549.193 | 0.000 |
| 5 | ST | 2+133.35 | 1193950.517 | 556745.498 | 0.000 | 0.000 | 0.000 |
| 6 | TS | 3+591.51 | 1193994.234 | 558203.005 | 0.000 | 1341.641 | 4000.000 |
| 7 | SC | 4+041.51 | 1193999.246 | 558652.910 | 4000.000 | 0.000 | 4000.000 |
| 8 | C | 4+383.714 | 1193975.570 | 558994.182 | 4000.000 | 1341..641 | 0.000 |

As the result of the modification of the alignment, the length of the horizontal curve of 4000m-radius (between KM4+041.51 and KM4+383.714) extended slightly than the FS2007 design.

The difference of the alignment, mentioned above, shall not effect at the abutment of viaduct bridge (KM4+231) in Package 1a.

h. Vertical Alignment of Urban Expressway

For the vertical alignment of the section from KM0+000 to KM4+000, following control points shall be taken account into the design; 1) the road formation of East-West Highway, 2) food water level for road embankment, 3) navigation clearance for bridge, 4) vertical clearance for undercrossing road, 5) minimum vertical gradient, 6) required earth covering for underground structures, and 7) vertical alignment of section after KM4+000.

### 4.3.2 An Phu Intersection

a. General

An Phu Intersection is expected to be a large-scale intersection located at the beginning point of Urban Expressway which connects East-West Highway, Luong Dinh Cua Street, and Nguyen Thi Dinh Street. At-grade intersection type with traffic signal control was selected for Phase I development in order to speedy opening of the traffic in accordance with the Prime Minister Decision No. 334/QD-TTg dated 13 February 2007.

It is expected that traffic volume (all directions) in which An Phu Intersection is forecasted 96,700 PCU/day in 2020 and 118,500 PCU/day in 2030, and it is planned grade separated (interchange) development in the future.

In Phase I development, the improvement of Luong Dinh Cua Street shall not be considered.

b. Design condition

<u>Road class of connecting road</u>

+ East-West Highway

Road Class: Main Urban Road, Primary
Design Speed: 80km/h
Typical Cross Section: as shown in **Figure 4.3** and **4.4**

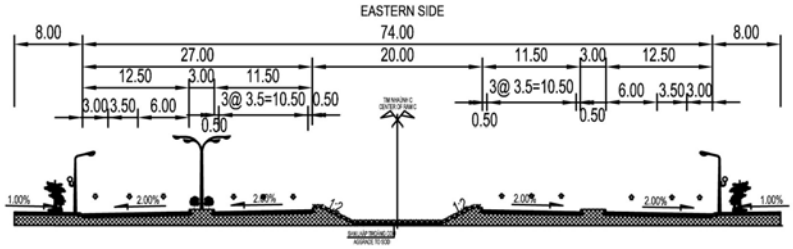



**Figure 4.3 East – West Highway (Eastern Side)**

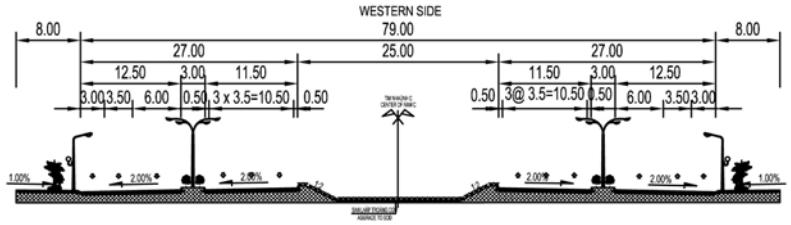



**Figure 4.4 East – West Highway (Western Side)**

+ Luong Dinh Cua Street

Road Class: Access urban road

Design Speed: 60km/h

Typical Cross Section: as shown in **Figure 4.5**

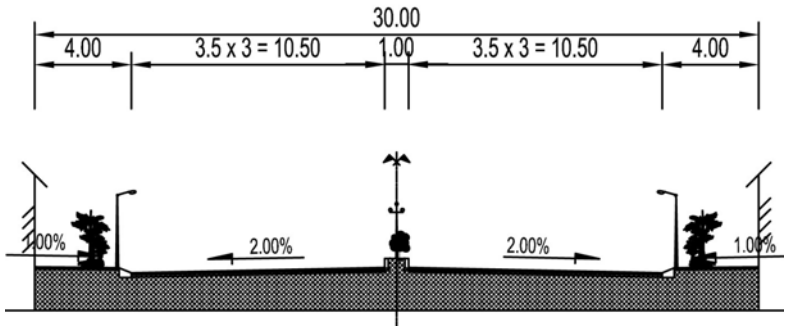
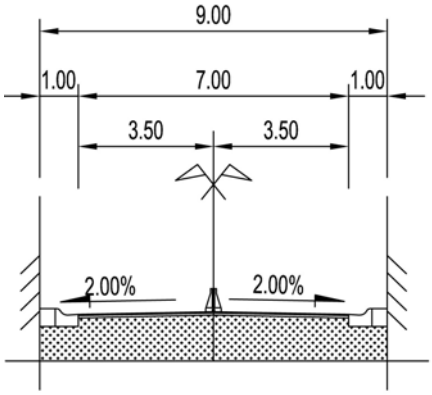



**Figure 4.5 Luong Dinh Cua Street**

+ Nguyen Thi Dinh Street

Typical Cross Section: as shown in **Figure 4.6**




note: dimensions are scaled up from topo survey result

**Figure 4.6 Nguyen Thi Dinh Street**

Forecast of traffic volume

The directional traffic volume of An Phu intersection in 2020 which is forecasted in VITRANSS2 report as shown in **Table 4.13**.

**Table 4.13 Directional Traffic volume at An Phu Intersection (2020)**

| Direction | | TTB ↓ LTB | TTT ↓ LTB | HNR ↓ LTB | LTB ↓ TTB | LTB ↓ TTT | LTB ↓ HNR | TTB ↓ HNR | TTB ↓ TTT | TTT ↓ HNR | TTT ↓ TTB | HNR ↓ TTT | HNR ↓ TTB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NAN | | 10,000 | 10,000 | 7,100 | 13,500 | 12,700 | 5,000 | 2,000 | 4,900 | 11,900 | 1,500 | 13,000 | 5,100 |
| NYC(1) | 0.12 | 1,200 | 1,200 | 852 | 1,620 | 1,524 | 600 | 240 | 588 | 1,428 | 180 | 1,560 | 612 |
| NYC(2) | 0.14 | 1,400 | 1,400 | 994 | 1,890 | 1,778 | 700 | 280 | 686 | 1,666 | 210 | 1,820 | 714 |

TTB: Thu Thiem Bridge, LTB: Long Thanh Bridge, TTT: Thu Thiem Tunnel, HNR: Hanoi Road,
NAN: Design Annual Daily Traffic Volume (PCU/day), NYC: Design Hourly Traffic Volume (PCU/hr)

Source: VITRANSS2 Study Report

The total traffic volume going through An Phu intersection will be 96,700 PCU/day (11,604 PCU/hr in case of NYC(1)).

c. Other Conditions to be Considered

Location of Ba Dai Bridge

Ba Dai Bridge is planned to be located over Ong To River in distance from 350m from An Phu Intersection. In FS2007, it was planned that An Phu intersection was at-grade intersection and connecting thruway directly to EW Highway, and the thruway shall be flyover in Phase II. In this plan, once constructed Ba Dai Bridge in Phase I shall be demolished and to construct new flyover bridge in Phase II. To avoid this situation, it should be studied to find most rational plan in detailed design stage.

Connection of Nguyen Thi Dinh Street

Nguyen Thi Dinh Street is located aside of existing An Phu intersection. It is obvious that heavy traffic congestion must be occurred if Nguyen Thi Dinh Street connects to the intersection when Urban Expressway developed. It should be studied to find better solution for this matter.

### 4.3.3 Ring Road 2 Interchange

RR2 Interchange is to be located along the east gate of Ho Chi Minh City, and connects HLD Expressway and Ring Road 2.

a. Previous Studies

FS2007

In the feasibility study report in 2007 (FS2007) "Modified Trumpet Type" was selected as interchange type in order to avoid land development of the surrounding areas. The interchange layout in FS2007 and the development plan of surrounding area are shown in **Figure 4.7** and **Figure 4.8**.

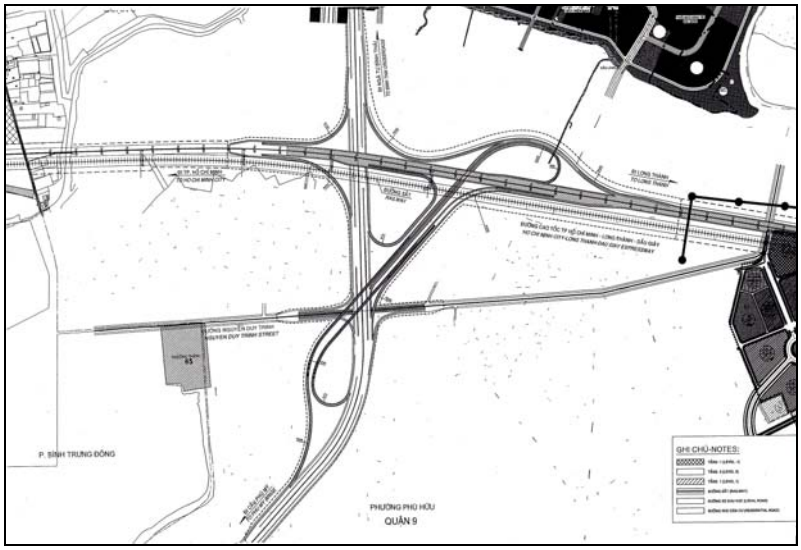



**Figure 4.7 Interchange Layout in FS2007**

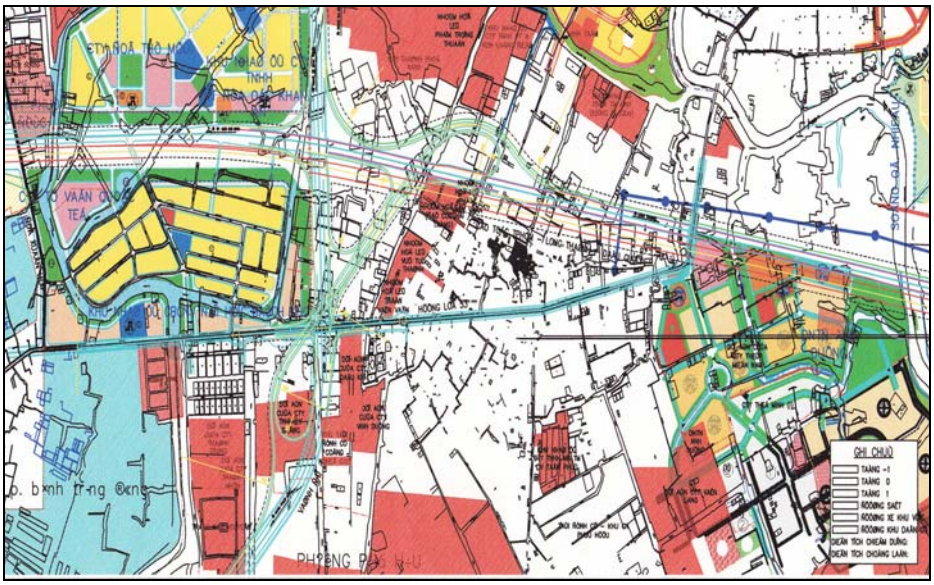


**Figure 4.8 Development Plan at Surrounding Areas**

Basic design in TA

By the technical assistance project (2009 – 2009), design of interchange was reviewed and recommendations for modifications were provided. For instance, horizontal and vertical alignment and type of speed change lane for some rampways had been revised due to considering traffic safety. Updated interchange layout in the TA project is shown in **Figure4.9**.

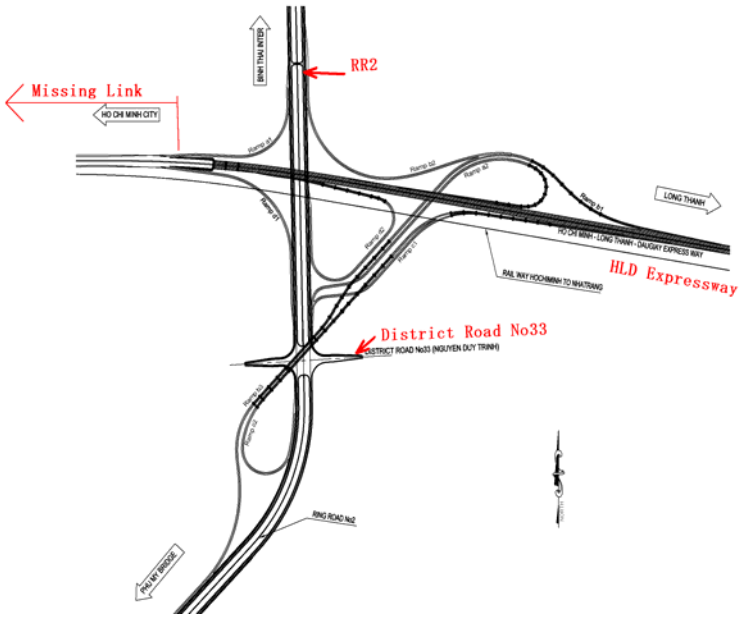



**Figure 4.9 Revised Interchange Layout**

b. Preliminary Design of RR2 Interchange

Based on reviewing previous studies, preliminary design has been prepared by the Project (KM0-4 and RR2IC). Focuses of modification under the preliminary design are as mentioned below;

1) Preferable functionability of Rampway a2 and simplification of interchange (**Figure 4.10**)

There are five (5) rampways at the section "A-A" section in the previous plan. However, it is possible to reduce the number (length) of ramp way when the rampway a2 is arranged as shown in the figure. This modification will not only economize the construction cost but also simplify the interchange provide safety operation. The point is marked in **Figure 4.10**.

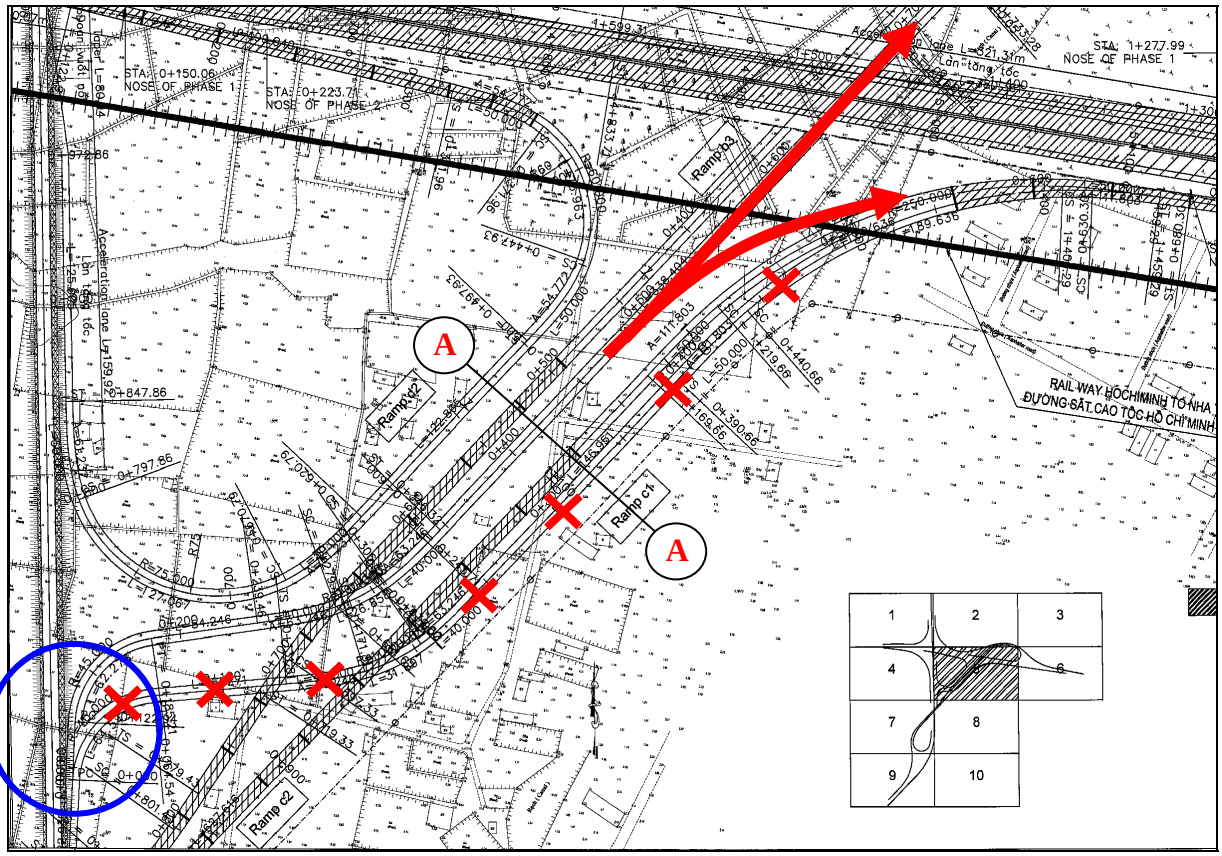



**Figure 4.10 Plan of Interchange (1)**

2) Economization of Ramp b3 and c2

At the rampway b3 and c2, five (5) meter of median space was designed in the previous design as shown in **Figure 4.11**, **4.12** and **4.13**. However, it is possible to minimize the median space as shown in **Figure 4.14**, it will reduce the construction cost economically.

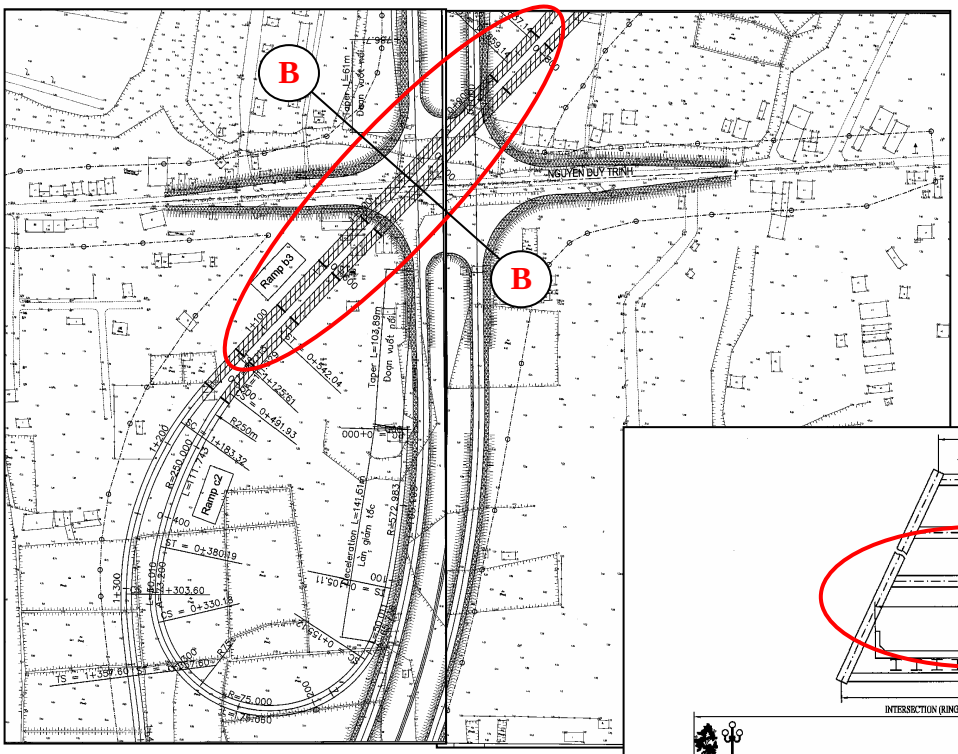



**Figure 4.11 Plan of Interchange (2)**

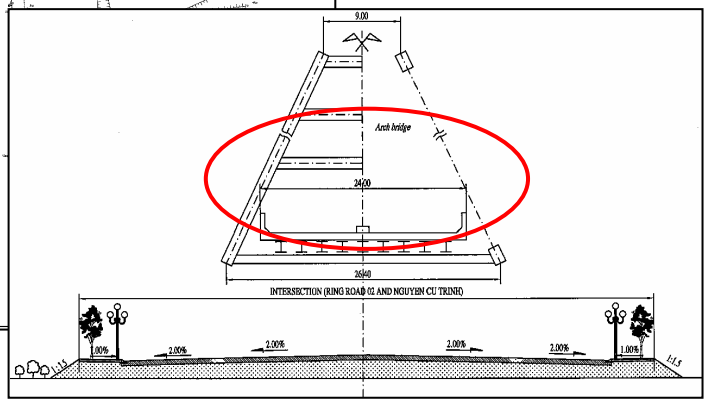



**Figure 4.12 Section B-B (Previous Design)**

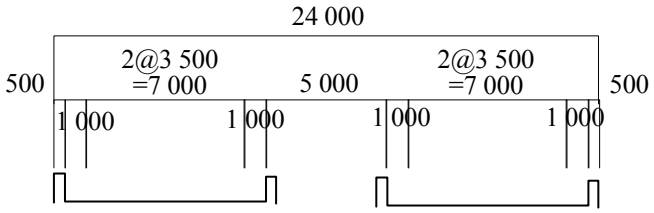



**Figure 4.13 Detail of Section B-B (Previous Design)**

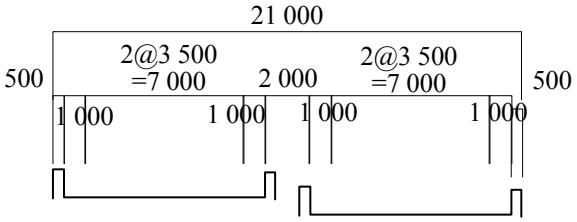



**Figure 4.14 Detail of Section B-B (Revised Design)**

In order to improve the points mentioned above, modification for interchange alignments has been considered as shown in **Figure 4.15**.

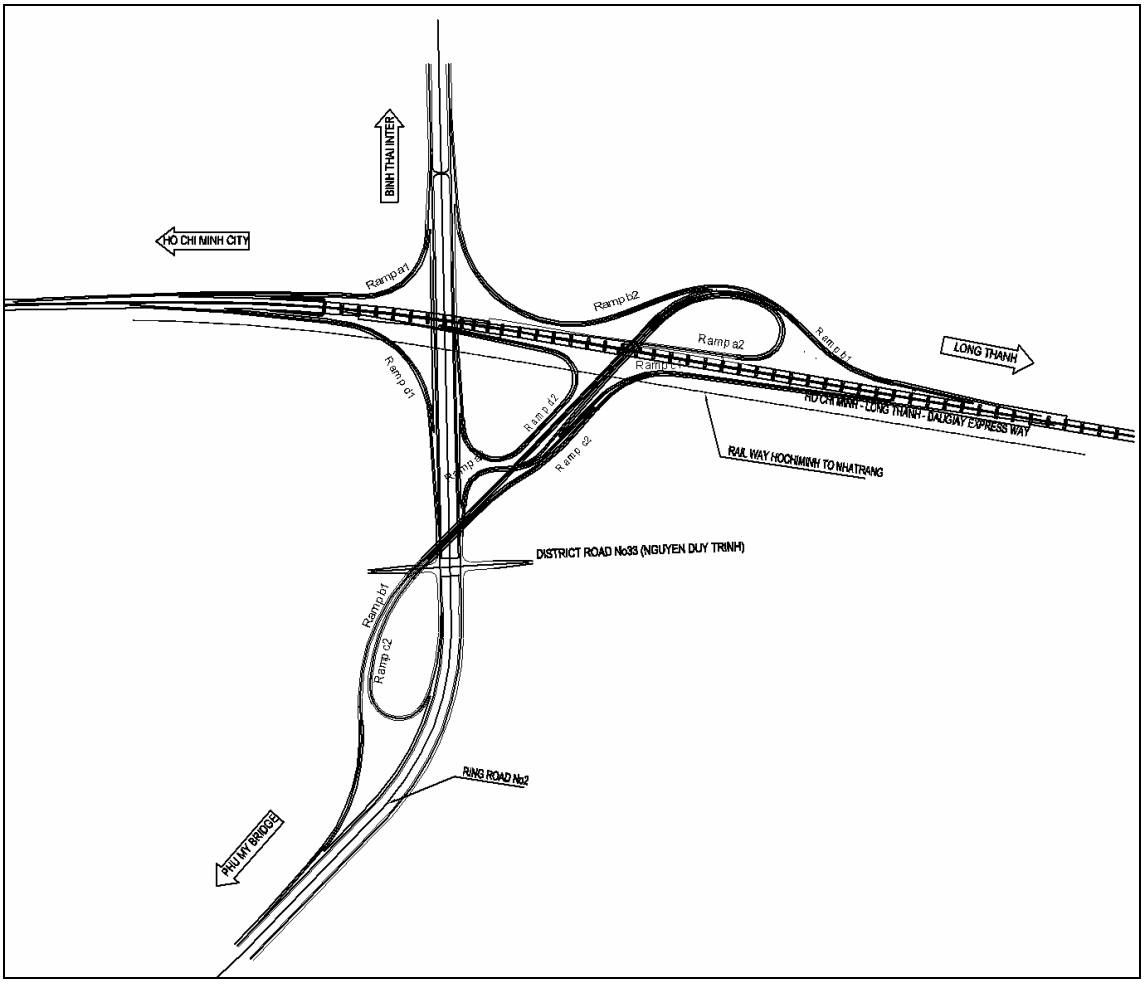



**Figure 4.15 Modification Plan of Interchange (2)**

c. Detailed Design

Detailed design of RR2 Interchange shall be carried out based on the result of topographic survey, hydrological investigation, geotechnical investigation, and the latest data of RR2, etc.

The bridge type and the location of merging and diverging noses which will be effected by the bridge structure shall be reviewed. In addition, the connection method between each rampway and RR2 shall be studied from the viewpoint of traffic operation, etc.

The optimum type of rampway bridges crossing over the intersection of RR2 and Nguyen Duy Trinh Street shall be decided by comparison study during the detailed design.

Design traffic volume:

Traffic volume for each direction at RR2 Interchange had been forecasted in

VITRANSS2 Study. The traffic volume to be applied to the detailed design is shown in **Table 4.14**.

**Table 4.14 Major Traffic Direction at RR2 IC (2030)**

| Direction | | LTB ↓ TTB | HNR ↓ TTB | PMB ↓ TTB | TTB ↓ LTB | HNR ↓ LTB | PMB ↓ LTB | HNR ↓ PMB | TTB ↓ PMB | LTB ↓ PMB | PMB ↓ HNR | TTB ↓ HNR | LTB ↓ PMB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Ramp Name) | | Thruway | (a1) | (a2) | Thruway | (b1) | (b2) | Thruway | (c1) | (c2) | Thruway | (d1) | (d2) |
| NAN | | 35,700 | 1,000 | 5,200 | 32,000 | 5,100 | 9,500 | 9,100 | 5,800 | 10,500 | 8,400 | 1,000 | 4,700 |
| NYC(1) | 0.12 | 4,284 | 120 | 624 | 3,840 | 612 | 1,140 | 1,092 | 696 | 1,260 | 1,008 | 120 | 564 |
| NYC(2) | 0.14 | 4,998 | 140 | 728 | 4,480 | 714 | 1,330 | 1,274 | 812 | 1,470 | 1,176 | 140 | 658 |

*Note:TTB: Thu Thiem Bridge (Luong Dinh Cua Street), TTT: Thu Thiem Tunnel (EW Highway-South), HNR: Ha Noi Road (EW Highway-North) LTB: Long Thanh Bridge (HLD Expressway), HLD: Luong Dinh Cua Street – HLD Expressway,EWH: East-West Highway

**Source: VITRANSS2 Study

Design standards

"TCVN5729-1997: Expressway specifications for design" shall be applied as a principal design standard for RR2 Interchange and rampway. Additionally, Japanese Standard for Expressway (Standard of NEXCO) shall also be applied when there are no criteria in TCVN5729.

TCXDVN104-2007 shall be applied for the rampways connecting with Urban Expressway (section before KM4+514).

Geometric design criteria for rampway

Geometric design criteria for rampway and ramp terminals are shown in **Table 4.15** and **4.16** respectively and following conditions shall also be considered into the design;

- In FS2007, it was not described about design speed of rampway, however, it shall be applied 40km/h based on the design speed of connecting roads, expressway: 120km/h, urban expressway: 100km/h and RR2: 80km/h, in accordance with TCVN5729.
- Number of lanes of rampway is adopted 2-lane for 1-way and 7m-wide as following FS2007.
- Direct connection type for speed change lane is adopted for both of acceleration lane and deceleration lane in accordance with Japanese Expressway Standard, which is proposed based on the tendency of the driver to run directly in the straight line between the nose point and outer lane of expressway in case of 2-lane rampway.

**Table 4.15 Geometric Design Criteria for Ramp way**

| Design Elements | | | Type/Value | Remarks | Reference |
|---|---|---|---|---|---|
| 1 | Design Speed of Ramp way (km/h) | | 40 | | TCVN5729 |
| 2 | Cross-Sectional Elements | Number of Traveled Way | 2 | | F/S |
| | | Formation Width (m) | 10.0 | | |
| | | Traveled Way Width(m) | 7.0 | @3.5 | TCVN5729 |
| | | Shoulder Paved Width (m) | 1.0 | | Japan Expressway Standard |
| | | Shoulder Earthen Width (m) | 0.5 | | TCVN4054 |
| | | Cross fall of Roadway (%) | 2.0 | | TCVN5729 |
| | | Slope of Earthworks | | | TCVN5729 |
| | | Fill | V : H = 1:2.0 | | TCVN5729 |
| | | Cut | V : H = 1:1.5 | | TCVN5729 |
| 3 | Sight Dist. | Driver's Eye Height (m) | 1.20 | | TCVN4054 |
| | | Height of Object for Stopping Distance (m) | 0.10 | | TCVN4054 |
| | | Stopping Sight Distance (m) | 45 | | TCVN5729-2007 |
| 4 | Horizontal Alignment | Horizontal Curve | | | |
| | | Desirable Minimum Radii of Horizontal | 60 | Se=8% | TCVN5729-2007 |
| | | Absolute Minimum Radii of Horizontal | 45 | Se=8% | TCVN5729-2007 |
| | | Super elevation (Se) | | | |
| | | Maximum Se for Absolute Min. Radius (%) | 8.0 | | TCVN5729-2007 |
| | | Minimum Radii w/o Super elevation (m) | 600 | Se-2% | TCVN5729-2007 |
| | | Maximum Slope of Super elevation | 1/150 | One-way double | TCVN5729-2007 |
| | | Transition Curve | | | |
| | | Minimum Parameter(m) | 35 | | TCVN5729-2007 |
| 5 | Vertical Alignment | Maximum Grade (%) | 6.0 | | TCVN5729-2007 |
| | | Vertical Curve | | | |
| | | Minimum Length of Vertical Curve (m) | | | |
| | | Normal | 40 | | TCVN5729-2007 |
| | | Absolute | 35 | | TCVN5729-2007 |
| | | Minimum Radius of Crest Curve (m) | | | |
| | | Desirable Minimum Radius (m) | 900 | | TCVN5729-2007 |
| | | Absolute Minimum Radius (m) | 450 | | TCVN5729-2007 |
| | | Minimum Radius of Sag Curve (m) | | | |
| | | Desirable Minimum Radius (m) | 900 | | TCVN5729-2007 |
| | | Absolute Minimum Radius (m) | 450 | | TCVN5729-2007 |
| 6 | Control for Formation Height, Higher of the Outer edge of shoulder 0.5m higher than Design | | | | TCVN4054 |
| | Pavement bottom higher than Design Stagnant | | | | TCVN4054 |
| 7 | Lateral Clearance (m) | | Traveled width | | TCVN5729 |
| | Vertical Clearance (m) | | 5.0 | | TCVN5729-2007 |
| 8 | Widening (m) | | 0 | In case of Radius is ≧47m | TCVN5729-2007 |

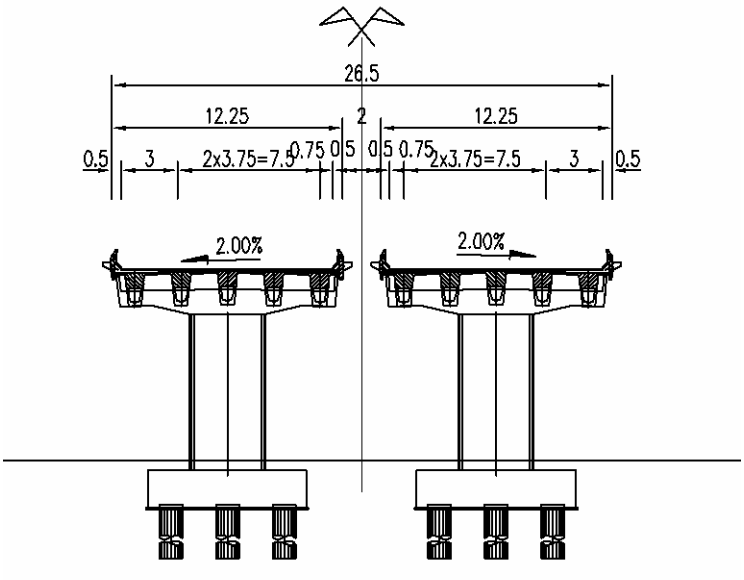
**Table 4.16 Geometric Design Criteria for Ramp Terminal of Expressway**

| | Design Elements | | Type/Value | Remarks | Reference |
|---|---|---|---|---|---|
| 1 | Design Speed (km/h) ( ):Urban Expressway | | 120(100) | | TCVN5729 |
| 2 | Horizontal Alignment | Horizontal Curve | | | |
| | | Desirable Minimum Radii of Horizontal Curve (m) | 2000( ) | | TCVN5729 |
| | | Absolute Minimum Radii of Horizontal Curve (m) | 1500( ) | | TCVN5729 |
| 3 | Vertical Alignment | Maximum Grade (%) | | | |
| | | Desirable | 2..0( ) | | TCVN5729 |
| | | Absolute | 2..0( ) | | TCVN5729 |
| | | Vertical Curve | | | |
| | | Minimum Radius of Crest Curve (m) | | | |
| | | Desirable Minimum Radius (m) | 45000 ( ) *25000*( ) | | TCVN5729 |
| | | Absolute Minimum Radius (m) | 23000 ( ) *(15000)( ) | | TCVN5729 |
| | | Minimum Radius of Sag Curve (m) | | | |
| | | Desirable Minimum Radius (m) | 16000() (12000) | | TCVN5729 |
| | | Absolute Minimum Radius (m) | 12000 (8000) | | TCVN5729 |
| 4 | Speed Change Lane(in case of 2-lane rampway of Expressway) | Minimum Length of Deceleration Lane (m) (except the portion of taper) | 120( ) | 100X1.2 | Japanese Expressway Standard |
| | | Minimum Length of Acceleration Lane (m) (except the portion of taper) | 240( ) | 200X1.2 | |
| | | Maximum divergence angle for the tapered design | 1/25( ) | | |
| | | Minimum convergence angle for the tapered design | 1/40( ) | | |

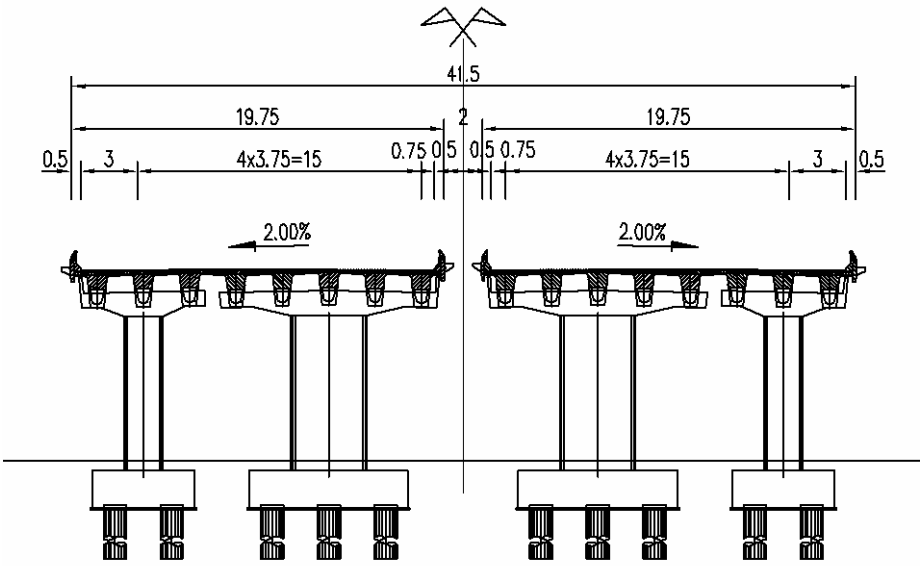
Typical cross sections of connecting roads and rampways with "stage constructions" at the interchange are shown as following figures.

**HLD Expressway**

Phase I (4-lane)

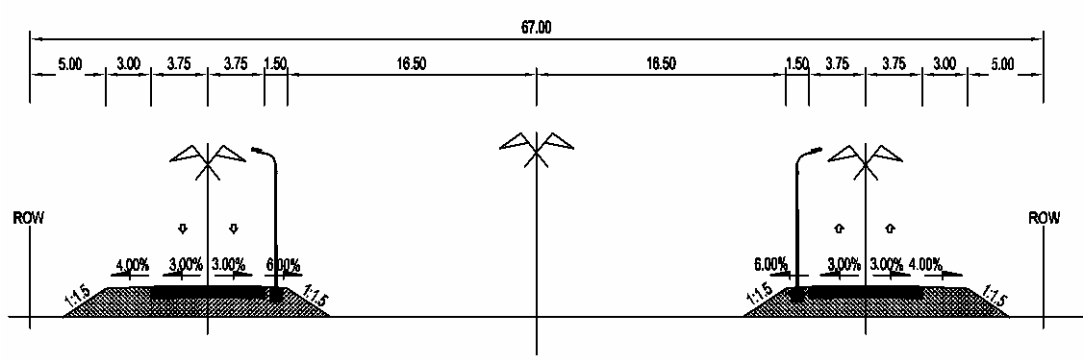


Phase II (8-lane)

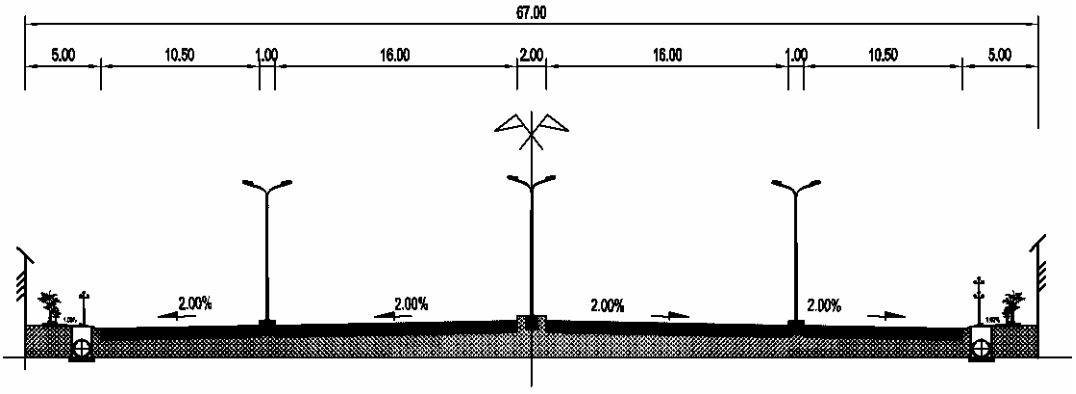



**Ring Road 2**

Phase I (4-lane for both ways)




Phase II (12-lane for both ways)

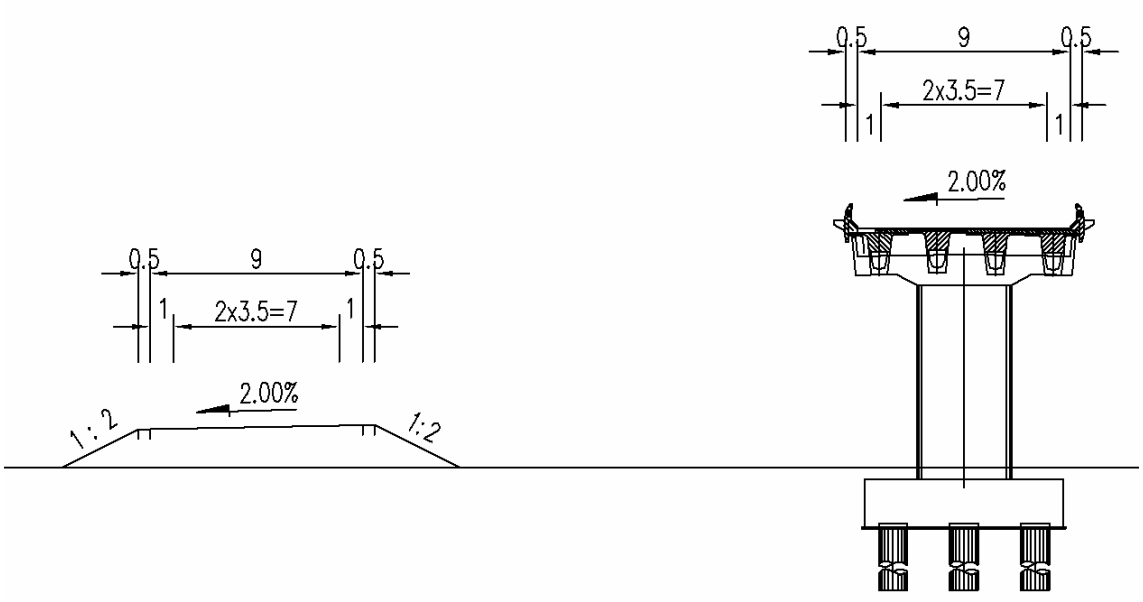


**Rampway**

(2-lane for 1way)

Embankment

Bridge

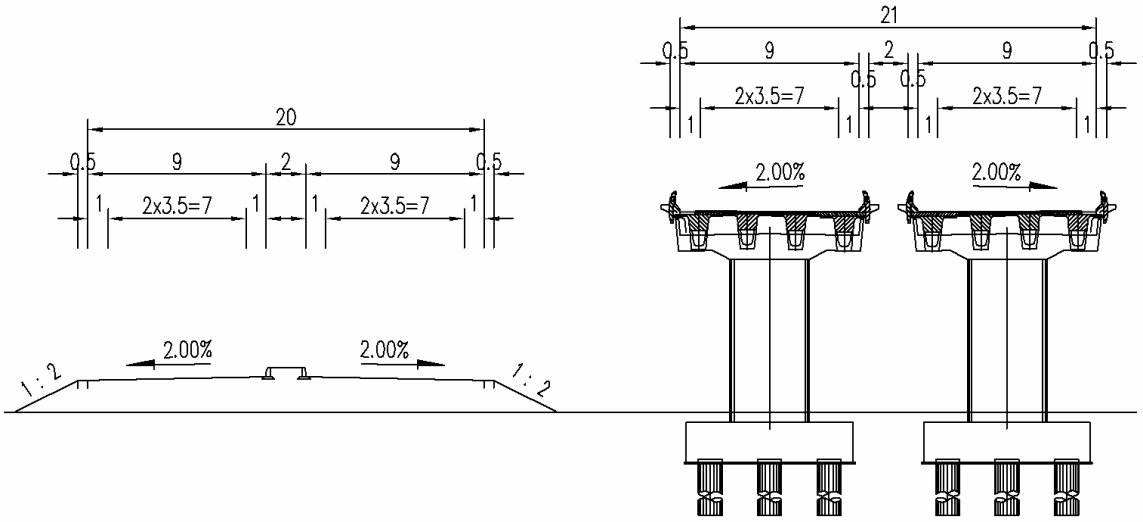



**Rampway**

(2-lane for 2 ways)

Embankment

Bridge

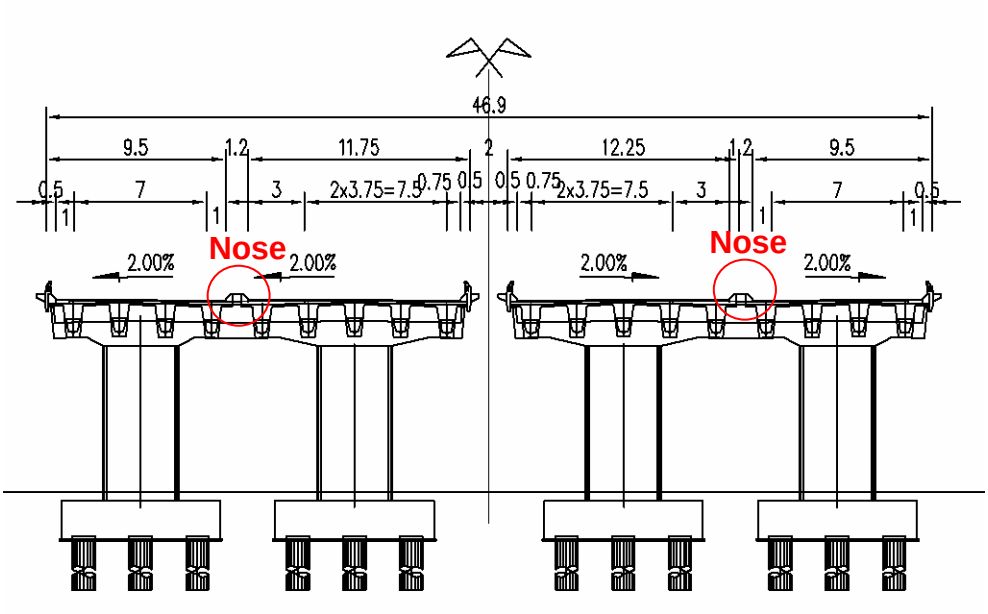



Alignment of rampways connecting to expressway

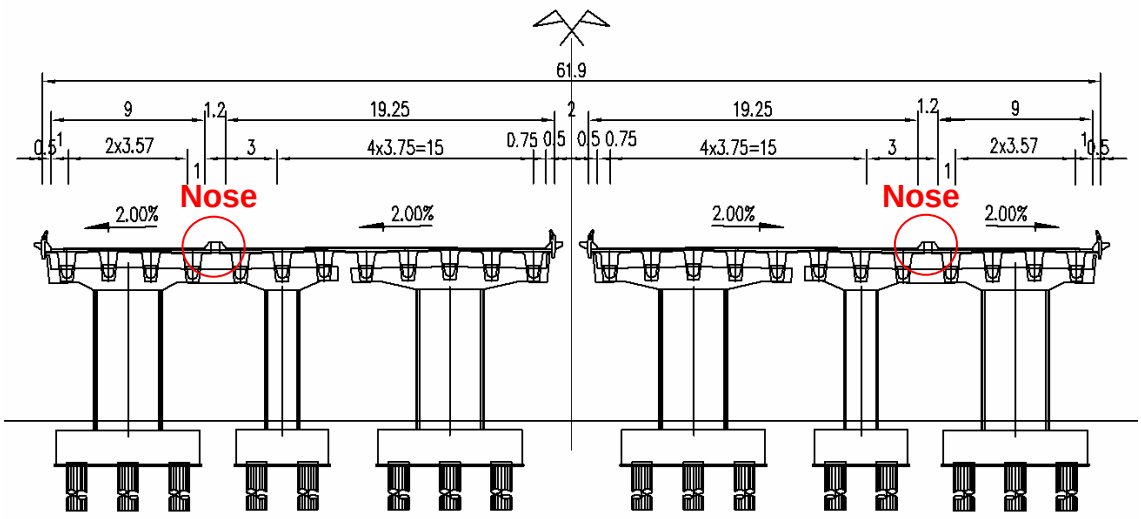
Alignment of rampways connecting to expressways should be avoided of future modification in alignment in Phase II for nose and rampway connecting point between nose for Phase II and rampways connecting to RR2 in Phase II. In other words, it should be designed only be required to widen the speed change lane between nose and taper-end in Phase II. Location of noses in Phase I and Phase II are shown in the following figures.

Location of Nose on Expressway

Phase I




Phase II




Changing lanes on rampway

Design of speed changing lane and the cross sections are to be designed with consideration of followings.

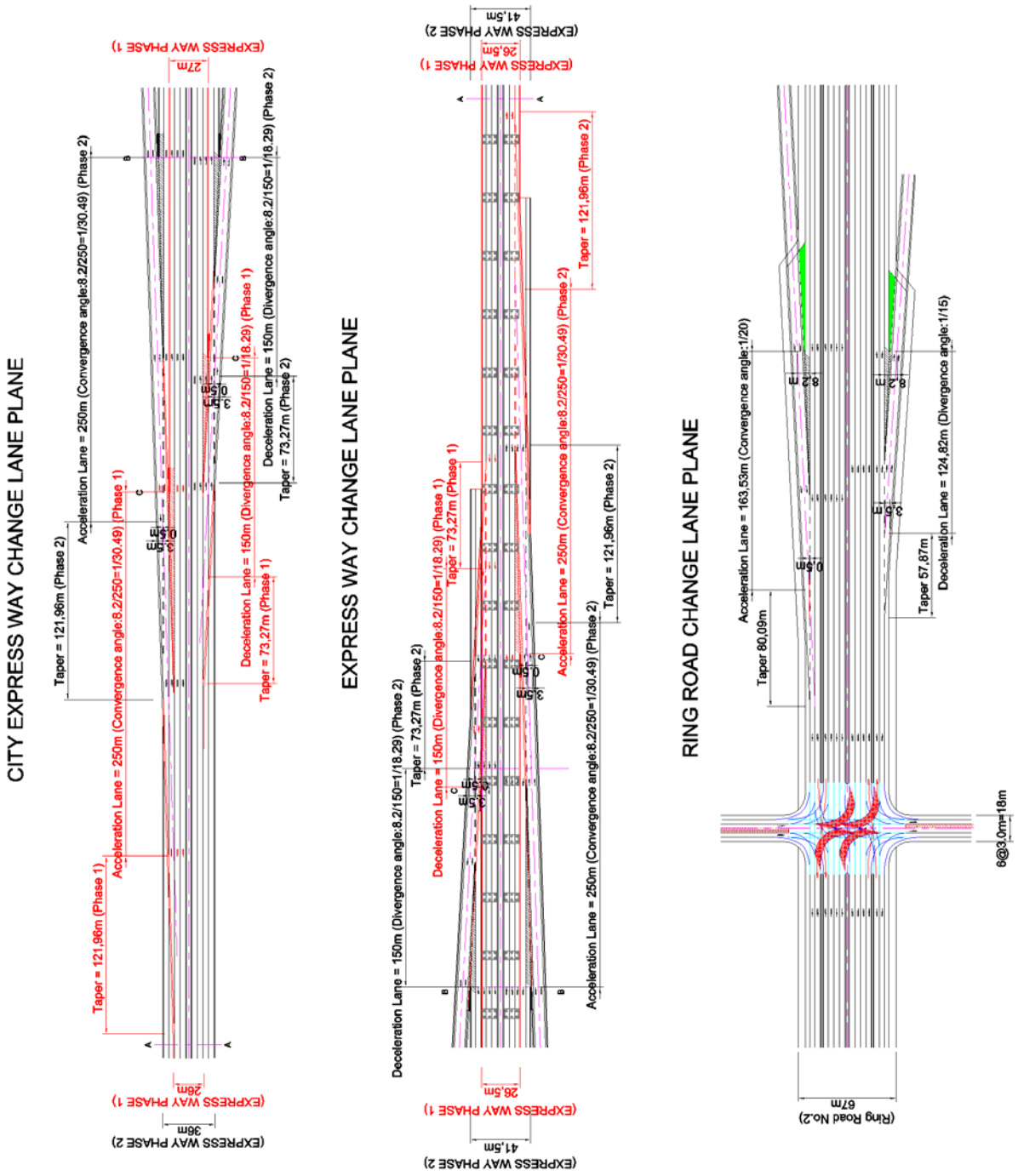
- Design of speed changing lane on HLD Expressway
  - Acceleration lane length: 250 m. --- It is constant value.
  - Acceleration angle: 1/30.49 < 1/30 --- OK.
  - 1-lane and margin: 0.5 m kept at acceleration lane end.

- Deceleration lane length: 150 m. --- It is constant value.
- Deceleration angle: 1/18.29 < 1/15 --- OK.

➢ Design of speed changing lane on RR2

- Design speed of rampway and outer lane of RR2 where rampway connects: both are 40km/h. --- There is no speed changing.
- At design speed is 40km/h, acceleration and deceleration lanes length are not mentioned in the standard.
- Acceleration and deceleration lane angle at rampway when the design speed is 40km/h are 1/20 and 1/15 respectively. However, it should be considered to apply constant value for the section.
- Intersection between RR2 and Nguyen Duy Trinh Street shall be considered for the design of speed changing lane.

Plans of speed changing lane are shown in following figures.



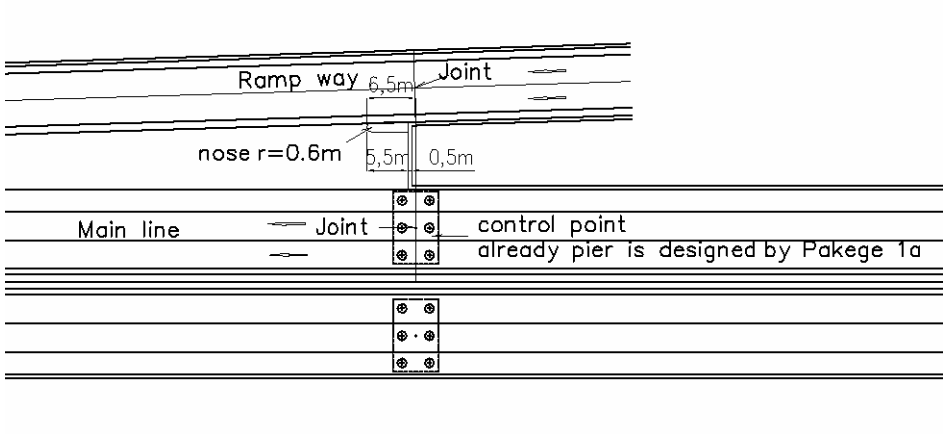

Nose position on the bridge

Structures of nose position on the bridge are to be referred to the standard of NEXCO (Nippon Expressway Company Limited) in Japan.

Nose position on the bridge is as shown in following figures with consideration of followings;

- Control point shall be pier positions of Package 1a which is already under implementation.

- Nose position setting shall be 6.5 m from joint on the bridge.




Sight distance of rampway

Needed width of sight distance is shown as following figure.

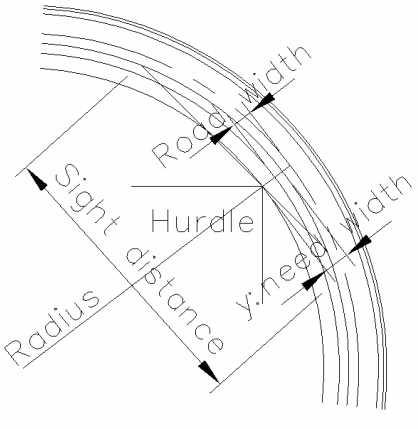
y = S2/8R

y: need width

R: radius

S: Sight distance

S=45m at design speed is 40km/h




Example

R: radius=60m

S=45m at design speed is 40km/h

y=452/8*60=4.219m

Standard width is 3.5/2+1.0 =2.75m

4.219 – 2.75 = 1.469m need over width

4.3.4 Pavement Design

Following design conditions shall be considered for the pavement design.

i) Pavement design for throughway shall be carried out by referring Vietnamese standard TCN211-06.

ii) Traffic volume for pavement design shall be based on the forecasted results from the latest relevant study: VITRANSS 2.

iii) Flexible pavement will be applied for the throughway and rampway based on the F/S report.

iv) The pavement design shall be done with total elastic modulus Eyc≥2000daN/cm$^2$ for throughway based on the government decision.

v) Pavement structure of rampway shall be designed same as the thruway, which is a common practice from operation viewpoint. Farther more, this design

policy is same as the other interchanges on HLD Expressway.

vi) As the Project will be implemented by staged construction approach to reduce the initial investment cost, most appropriate design will be considered from economic viewpoint yet sufficient enough to carry the traffic load till the Phase II.

### 4.3.5 Bridge/Structural Design

There are 15 bridges (2 bridges, 1 flyover, 12 rampways) in the Project (KM0-4 and RR2IC) as shown in **Table 4.17** and **4.18** respectively.

**Table 4.17 List of Bridges on Feasibility Study 2009**

| PK | Name of Bridge | Chainage | Length | Span Arrangement or Unified Type | Type of Structure |
|---|---|---|---|---|---|
| 7 | Ba Dai Bridge | From KM0+208.45 to KM0+286.55 | 78.1 | 3@40 | Super-T Girder |
| 7 | Muong Kenh Bridge | from KM1+250 to KM1+750 | 478.0 | 5@40+42+63+42+5@40 | Box Girder |
| 8 | Do Xuan Hop Flyover | From KM3+000 to KM3+450 | 466.0 | 11@40 | Super-T Girder |

**Table 4.18 List of Bridges on Rampway Proposed**

| Ramp | | Bridge type | Span Arrangement | Width (m) | L(m) | Connection Structure with Main line | Radius of Horizontal Curve |
|---|---|---|---|---|---|---|---|
| a2 | Sec-1 | Slab girder | ≒11@25m=275m | 10 | | | R=60 |
| | Sec-2 | Super-T | 9@40m=360m | 7.5-18.3 | | Acceleration | |
| | Sec-3 | Super-T | 5@40m=200m | 7.5 | 835 | Acceleration | |
| b1 | Sec-1 | Super-T | ≒10@40=385m | 10 | | | R=300 |
| | Sec-2 | Super-T | 5@40=200m | 7.5-18.0 | | Deceleration | |
| | Sec-3 | Super-T | 4@40=160m | 7.5 | 745 | Deceleration | |
| b3 | Sec-1 | Super-T | ≒10@40 | 10 | | | Straight |
| | Sec-2 | Box-girder | 30+51+30=111m (under studying) | 10 | | | |
| | Sec-3 | Super-T | ≒4@40 | 10 | 670 | | R=430m |
| c1 | Sec-1 | Super-T | 6@40=240m | 7.5 | | Acceleration | |
| | Sec-2 | Super-T | 8@40=320m | 7.5-18.3 | | Acceleration | |
| | Sec-3 | Super-T | ≒3@40 | 7.5 | 680 | | Straight |
| c2 | Sec-1 | Super-T | ≒4@40 | 10 | | | R=400m |
| | (Sec-2) | Box-girder | 30+51+30=111m (under studying) | 10 | | | |
| | Sec-3 | Super-T | ≒4@40 | 10 | 351 | | R=400m |
| d2 | Sec-1 | Super-T | 4@40=160m | 7.5 | | Deceleration | |
| | Sec-2 | Super-T | 5@40=200m | 7.5-18.2 | | Deceleration | |
| | Sec-3 | Slab (or T) | ≒6@25 (or 4@40) | 10 | 510 | | R=60+straight |

Note:

The data of Bao Nai Bridge is based on Feasibility Study 2007.
The design of Feasibility Study shall be reviewed and general plan and elevation of each bridge shall be prepared for the approval of the client. After approval of the general design, the detailed design of each bridge shall be carried out.

a. Applied Design Standards and Specifications

The following Vietnamese standards and specifications shall be applied for the bridge design.

| | |
|---|---|
| 22 TCN-272-05 | Specification for Bridge Design |
| TCXDVN 375:2006 | Design of structures for earthquake resistance |
| TCVN 5729-97 | Expressways – design specifications |
| TCVN 4054-2005 | Highways – design specifications (applied for connections, collector roads) |

The following international standards and specifications shall be applied as a reference.

| |
|---|
| AASHTO LRFD Bridge Design Specifications |
| AASHTO LRFD Bridge Construction Specifications |
| ASTM A 416-85 Prestressed steel for reinforcing concrete |
| Standard Specifications for Highway Bridges (Japan Road Association, 2002) |

b. Design Criteria

Dead load

Applied dead load for design calculation is summarized as the following table.

**Table 4.19 Unit Weight**

| Material | | Density [kN/m3 (kg/m3)] |
|---|---|---|
| Bituminous Wearing Surfaces | | 22.1 (2250) |
| Compacted Sand, Silt or Clay | | 18.9 (1925) |
| Concrete | Plain | 23.5 (2400) |
| | Reinforced | 24.5 (2500) |
| Loose Sand, Silt or Gravel | | 15.7 (1600) |
| Soft Clay | | 15.7 (1600) |
| Steel | | 77.0 (7850) |
| Water | | 9.8 (1000) |

(Source: 22 TCN-272-05)

Live load

HL-93 shall be applied as live load for the design of the bridge.

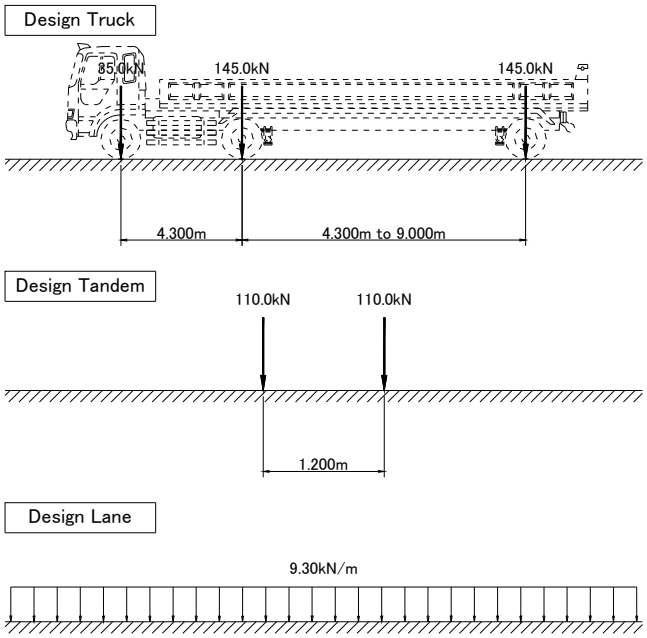



**Figure 4.7 Design Vehicular Live Load HL-93**

Other loads are applied in accordance with 22 TCN-272-05.

Vertical clearance

The vertical clearance of overpass and underpass will be decided based on the road category and discussion with the local authority.

**Table 4.20 Vertical Clearance for Roads and Railways**

| Category | Vertical Clearance [m] | Remark |
|---|---|---|
| Other | 3.20 | |
| National and Provincial Highway | 4.50 | |
| Expressway | 5.00 | Main Line |
| Railway | 6.00 | |

(Source: TCVN5729:97)

Navigation clearance

The navigation clearance will be decided based on the grade of the river and discussion with the local authority.

**Table 4.21 Clearance over Navigable Waterways**

| Class of Waterway | Minimum Clearance Above 20Year High Water Level [m] | | |
|---|---|---|---|
| | Horizontal | | Vertical (over full width) |
| | Across River | Across Canal | |
| I | 80 | 50 | 10 |
| II | 60 | 40 | 9 |
| III | 40 | 30 | 7 |
| IV | 40 | 25 | 6 (desirable)<br>5 (minimum) |
| V | 25 | 20 | 3.5 |
| VI | 15 | 10 | 2.5 |

(Source: 22 TCN-272-05)

The navigation clearance of Khu Duong Song is applied 6m height and 40m width in the Feasibility Study 2009 and we will confirm the navigation clearance with the local authority.

Seismic design

Seismic effect will be considered for the bridge design and applied acceleration coefficient in this project is accordance with 22 TCN-272-05 and TCXDVN 375:2006.

Zone of Maximum Seismic Intensity: Imax ≦ 6 (MSK-64)
Seismic Zone 1
Acceleration Coefficient: A ≦ 0.09

**Table 4.22 Acceleration Coefficient for each Package**

| Package | Acceleration Coefficient | Location |
|---|---|---|
| 7 | 0.0856 | District 2, HCMC |
| 8 | 0.0856, 0.0747 | District 2, District 9, HCMC |
| 9 | 0.0747 | District 9, HCMC |

(Source: TCXDVN 375:2006)

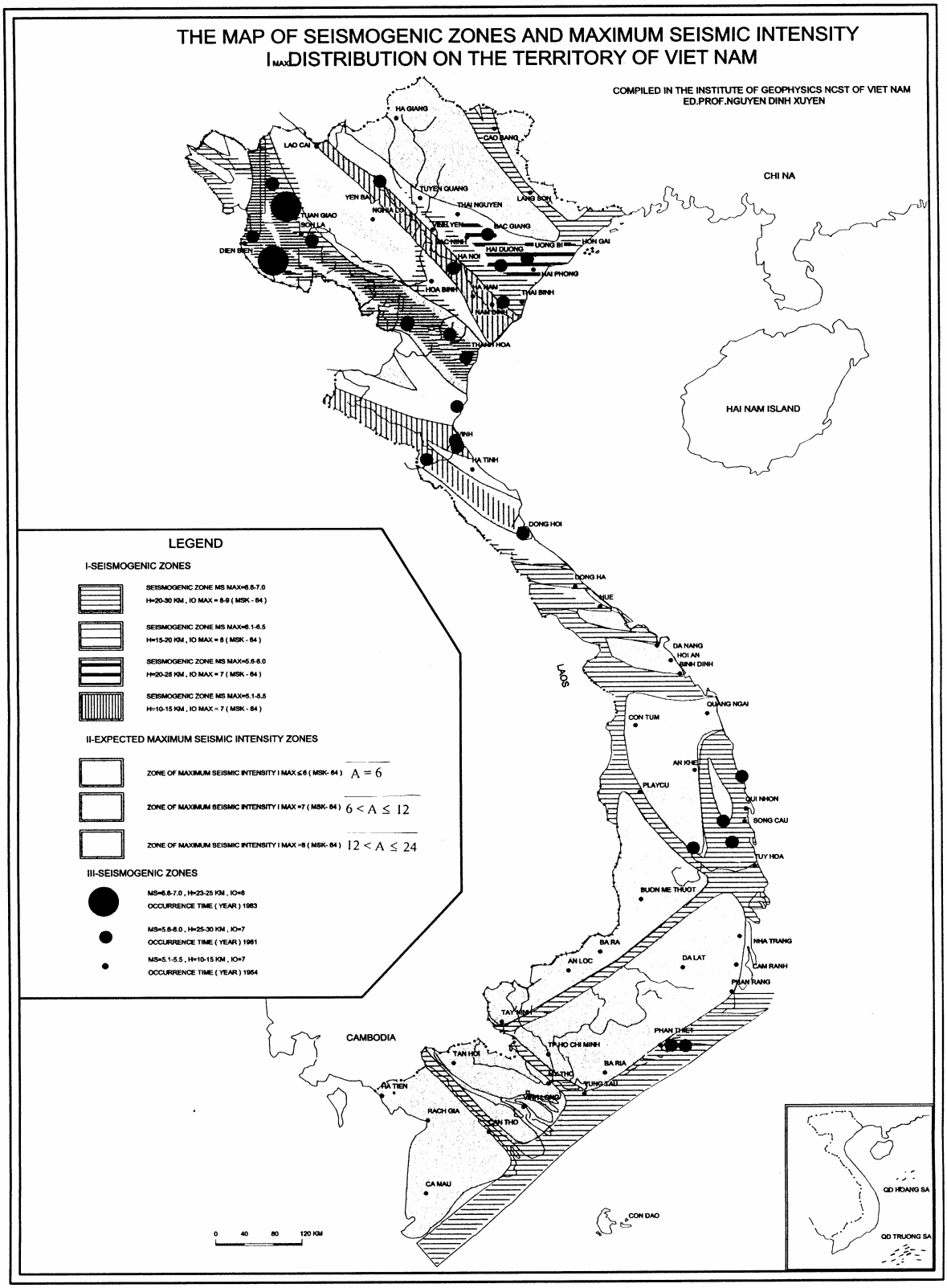



**Figure 4.16 Seismic Zone Map**

## Materials

### 1) Reinforcing bar

| | | |
|---|---|---|
| Round bar CI | Yield strength | 240MPa |
| | Tensile strength | 380MPa |
| | Elastic modulus | 200,000MPa |
| Deformation bar CIII | Yield strength | 400MPa |
| | Tensile strength | 600MPa |
| | Elastic modulus | 200,000MPa |

Source : TCVN 1651 – 85

### 2) Concrete

The following concrete classes and modulus are used.

| Class | Strength | Modulus | Structure |
|---|---|---|---|
| C50 | 50MPa | 38,007MPa | Precast girder (Super T) |
| C40 | 40MPa | 33,994MPa | Box girder |
| C35 | 35MPa | 31,799MPa | CIP deck slab inc. link slab, Crossbeam of Super T |
| C30 | 30MPa | 29,440MPa | Abutment, Piers Bored pile, Precast concrete plank for super T |
| C25 | 25MPa | 26,875MPa | Parapet, Pedestal of lamp-post, Approach slab |
| C20 | 20MPa | - | Sealing concrete |
| C10 | 10MPa | - | Blinding cocrete |

Notes, Strength is based on cylinder strength (MPa)

### 3) Prestressing strands

For precast girder

| | Super T |
|---|---|
| Diameter | 15.2*1strand |
| Tensile strength | 1860MPa |
| Yield strength | 1670MPa |
| Elastic modulus | 200,000MPa |

For Box girder (Song Tac Bridge)

| | | |
|---|---|---|
| Diameter | 12.7*12 strand | 12.7*19 strand |
| | ASTM A416 | |
| Location to be used | Deck slab | Bottom slab |
| Tensile strength | 1860MPa | |
| Yield strength | 1670MPa | |
| Elastic modulus | 200,000MPa | |

## Control point

The control point of profile of bridge is the height on the upper surface of pavement at the position of 1.5m from centre line as shown below.

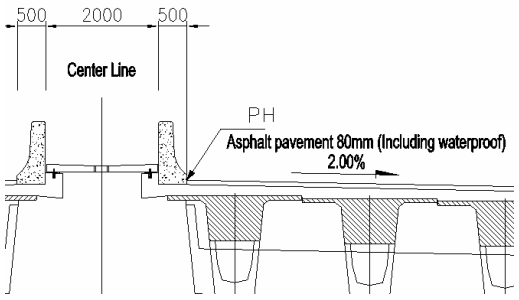



**Figure 4.9 Control point of profile for general section**

Bearing

Since the girder is fixed at interior piers, an ordinary rubber bearing is adopted due to economical reason. A movable pot bearing was adopted at end piers. The bearing is widely used for this type of bridge. Dowel is used for fixing device at interior pier.

Expansion joint

A finger type joint is applied for super T-girder. Details are given in the Bridge Design Report and design drawings.

c. Typical Cross Sections

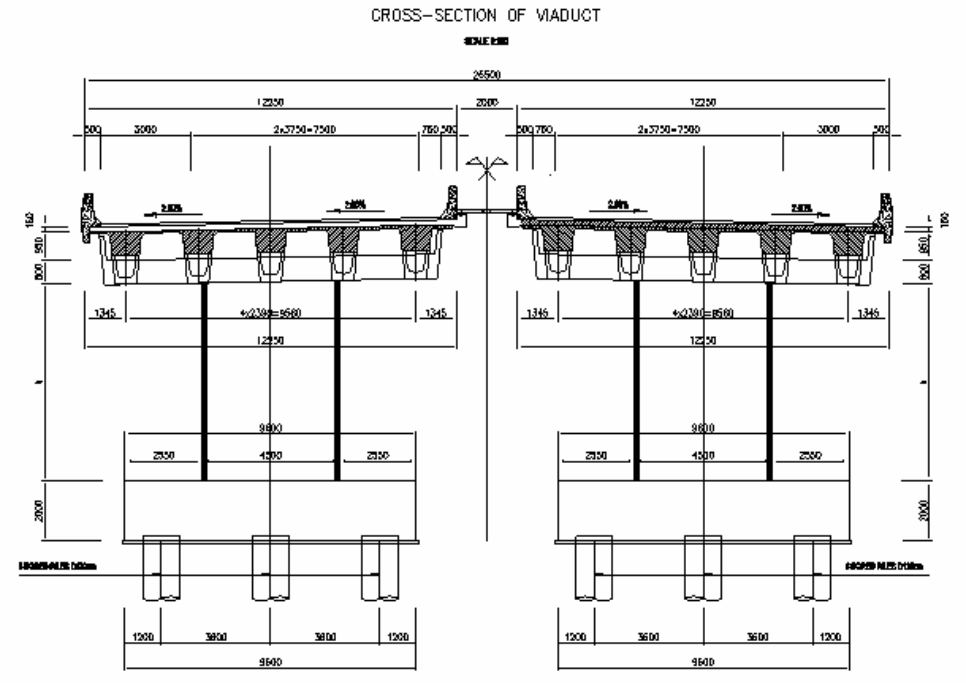



**Figure 4.17 Typical Cross Section of Super-T Girder**

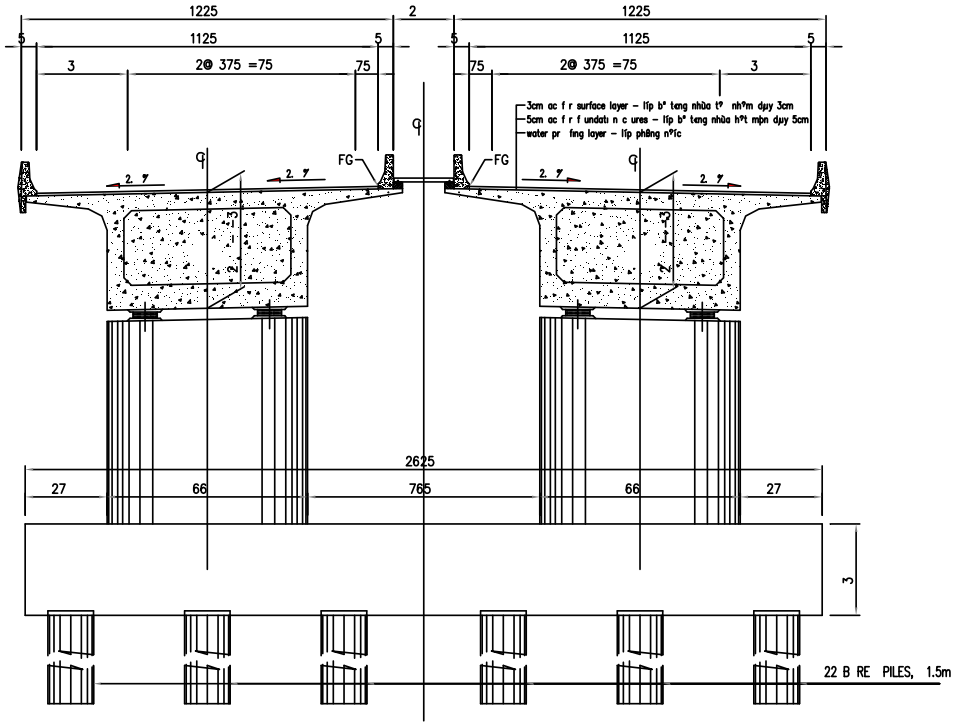



**Figure 4.18 Typical Cross Section of Box Girder**

d. Ring Road 2 Interchange

Alignment considering widening of bridge

It will be reviewed the alignment and bridge plan of intersection of previous design and to be proposed excellent in road-ability and structurally connectable design. As for design of RR2, the design of main route portion was already completed and construction is started. In the design of rampway it will be proposed that the structure will not affect to main line design as much as possible and will not change the pier position.

As a result of review of previous design of rampway, since the bridge pier position and the nodes position are not in agreement, reexamination is required in four (4) connection positions as shown in following figure. Alignment will be determined so that the relation between a pier position and the nose position of Phase II will be a position of "pier-2" of figure.

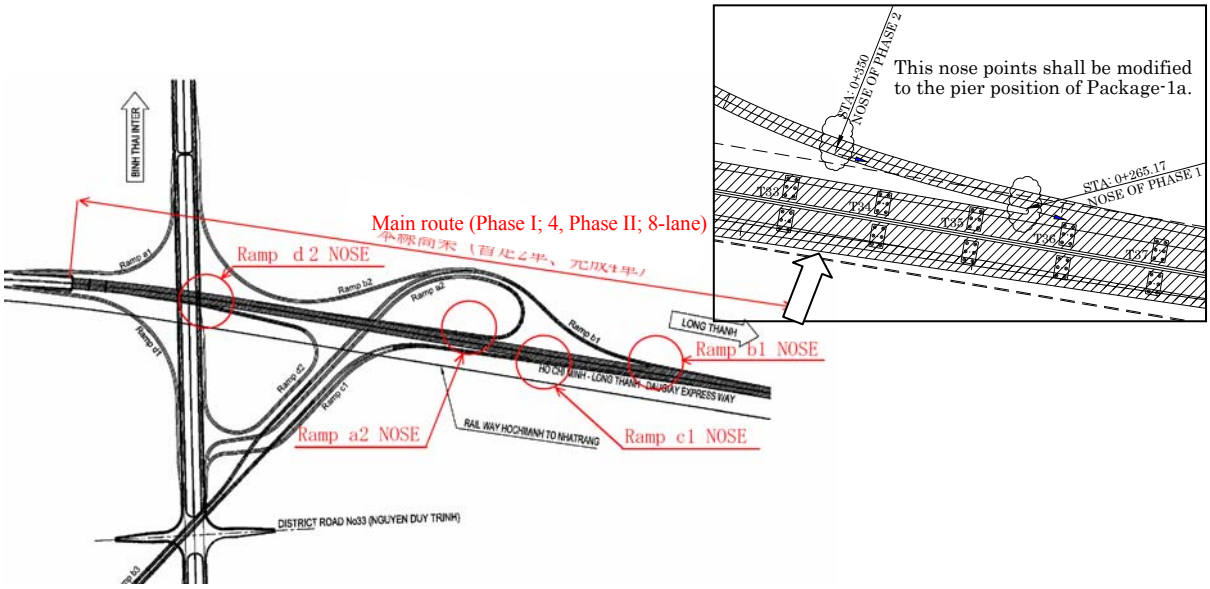



**Figure 4.19 Connection Part of Rampway with Thruway**

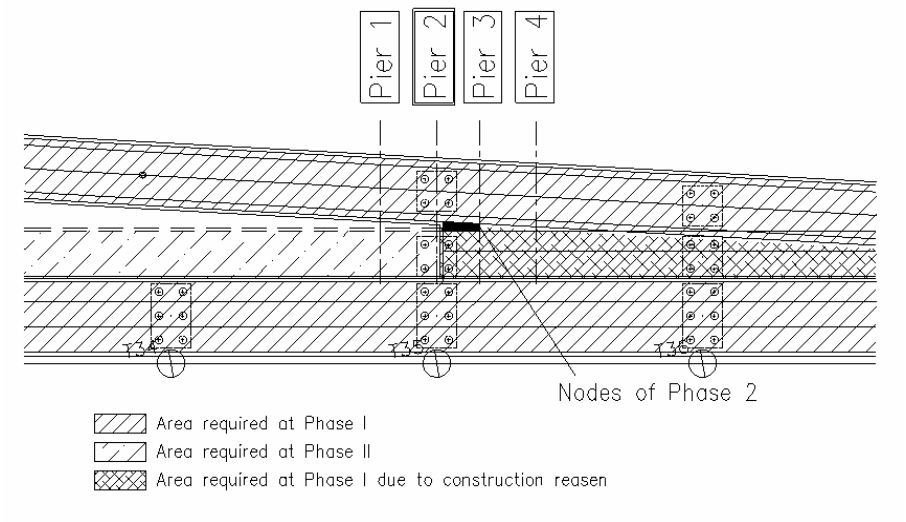



**Figure 4.20 Arrangement of Node Point and Design Section of Bridge**

Connection part of rampway bridge

The thruway and rampway are required to complete at the same schedule. And it is considered that it can construct at the same time as the main line. The connection structure of rampway will be designed as one system structure with the main line. The following points are taken into consideration in planning connection parts of structure.

- The joint of the longitudinal direction which has the possibility of a slip

accident does not use

- The structure is connectable at the time of widening in the future.
- Additional reinforcement is unnecessary to the existing structure.
- Neighboring construction is possible (if needed).

Recently, the example of widening is increasing in Japan, and construction equipment for neighboring construction and connection technique is developed. For the construction of Phase II construction, or when a deference of construction time between main route and rampway cannot avoid, use of such equipments is also proposed and the structure which can be connected to be designed.

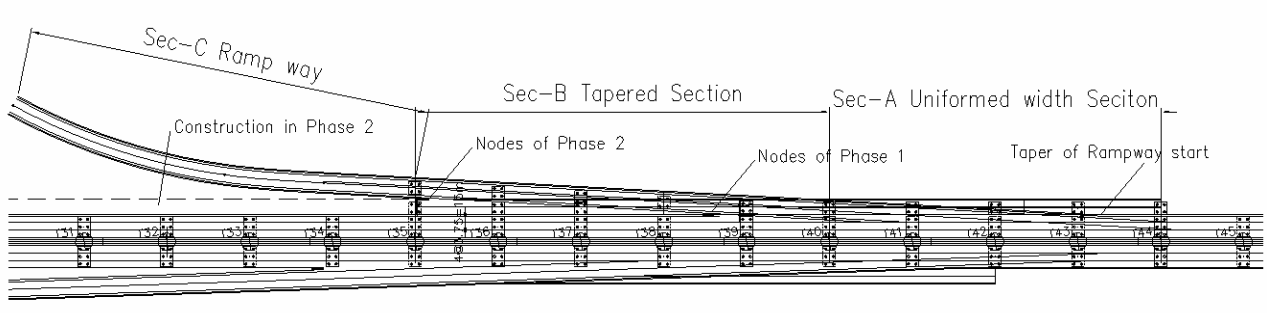



**Figure 4.21 Design Section of Bridge**

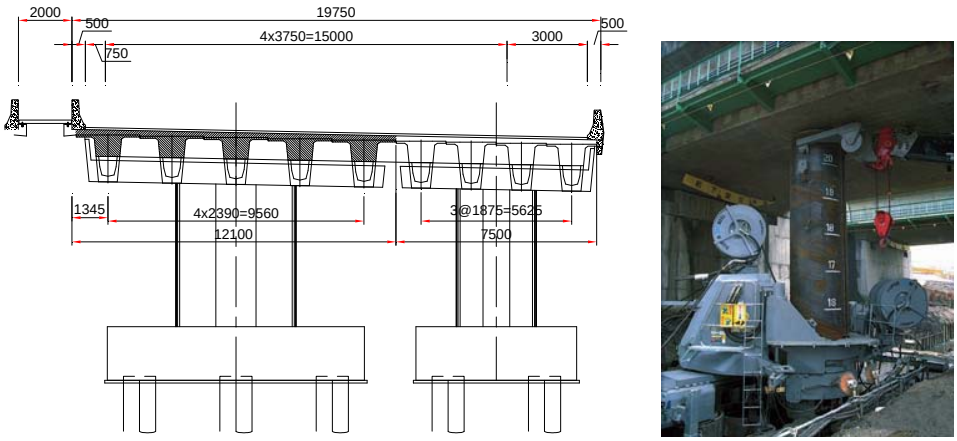



**Figure 4.22 Concept of Widening Section and Example of Equipment Neighboring Construction**

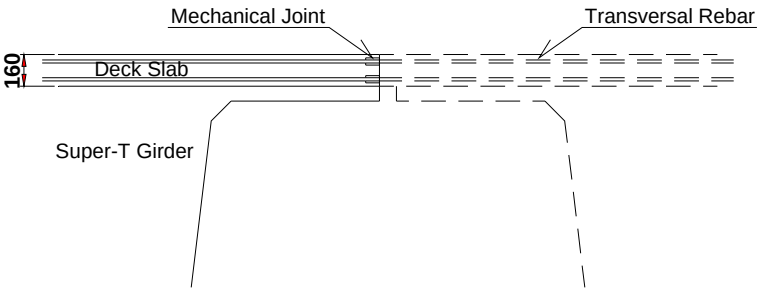



**Figure 4.23 Example of Connection Plan at Phase II**

Countermeasure for highway section

About embankment part, when construction of a rampway part is delayed, in order to increase the subsidence speed of embankment, the construction method which shortens the time such as Vacuum compression method (VCM) can be applied.

## 4.4 Cost Estimation and Construction Planning

(1) Data collection

The following data will be collected and studied for cost estimation:

- Material, Labor, Equipment and Fuel Cost
- Hauling cost of material
- Inflation ratio and Exchange rate in past 5 years
- Insurance cost
- Disposal cost of wastes

(2) Survey for Access Road/ Construction Road

The field survey will be conducted to sketch out the access road and existing road as well available lands for temporary construction road.

(3) Material Source Survey

It is necessary to determine location of borrow pit for embankment and back filling material; quarry site for fine and coarse aggregate of concrete, pavement and soft soil treatment in consideration of quality, quantity and hauling cost. These are the latest information and basis of cost estimation and construction plan.

(4) General Cost Estimation and Detailed Cost Estimation for each Package

The cost estimate will be based on the following basic components:

- Estimated Quantities
- Construction Period
- Working Days and Hours
- Equipment, Labor and Material Cost
- Field Work Efficiency (Production Rate)
- Mark up (OCM + Profit + Tax)
- Price Escalation

## 4.5 Preparation of Bidding Documents

The Consultant will obtain the guidelines and sample documents produced by the appropriate financing organizations, in this the Japan International Cooperation Agency (JICA). This institution recommends the use of the FIDIC forms of contract issued by the International Federation of Consulting Engineers. The Consultant will obtain the standard forms of contract suitable for the project: conditions for Construction of Civil works together with appropriate guidelines for the preparation of contract documentation. The Consultant will also obtain where possible

documentation prepared for similar projects in Vietnam.

Pre-qualification documents will be prepared based on the standard forms recommended by JICA modified to suit local conditions and the requirements of the Employer. These documents will be submitted to the Employer for comment and approval prior to the commencement of the pre-qualification process. The Consultant will assist the Employer with this process and the subsequent evaluation of applicants as necessary.

Bidding (Tender) documents will be prepared in accordance with the guidelines and standard forms referred to above. These documents will be prepared for each contract packages to suit the particular requirements of JICA and the requirements of each package as follows:

| Package | Location | Contract form | Finance |
|---|---|---|---|
| 7 | KM0+000 - KM2+000 | Construction of Civil Works | JICA |
| 8 | KM2+000 - KM4+000 | Construction of Civil Works | JICA |
| 9 | Ring Road 2 Interchange | Construction of Civil Works | JICA |

Although reference has been made to a pre-qualification process, the documents will be prepared on the initial assumption that bidding will be a two envelope process: a technical evaluation submission and a financial submission to be evaluated separately with only acceptable technically qualified tenders proceeding to financial evaluation. The documents for Construction of Civil Works will be prepared in five volumes as follows:

- Volume 1 Tender procedures, tender forms and Appendices.
- Volume 2 Conditions of Contract
- Volume 3 Technical Specification
- Volume 4 Bills of Quantities
- Volume 5 Drawings

These documents will be submitted to the Employer for comment and approval prior to the commencement of the tendering process.

The Consultant will assist the Employer with the tendering process and the tender evaluation process as required. These activities will include assessing and responding to Tenders questions during the tender period and disseminating responses to all invited tenders, and assisting with the confirmation of technical competence of submitted tenders and the financial evaluation of compliant tenders.

## 4.6 Environmental Assessments

(1) Scope of work

- To review and summarize the existing EIA documents (1) EIA prepared by CEPT which was approved by MONRE, (2) EIA prepared under the PPTA and (3) EIA prepared under SAPROF based on latest guidelines, laws, decrees, and circulars and ensure recommendations in the EIA.
- To prepare and update the mitigation plan including the EMP taking into account the additional information obtained during the detailed design of the expressway. To ensure the inclusion of mitigation measures required in the EIA during detailed design stage
- To reflect environmental mitigation measures during the construction stage recommended in the EIA documentation prepared under the PPTA and updated EMP into the procurement document of civil works. Time-bound list of mitigation measures will become a part of the construction contract documentation.
- To propose capacity building Plan for strengthening the environmental management ability of Expressways operation.
    - To prepare short and mid-term development plans for the assessment and management of environmental impacts arising from expressway projects.
    - To propose an institutional framework and training needs, prepare training materials and conduct training for VEC staff on environmental safeguards.
    - To prepare and present workshops on specific topics, such as vehicle emissions, automobile noise, good practices on construction management, and etc.
    - Organize, and participate in, formal training for VEC on Environmental Assessment and Management and the application of a consultative approach via a short 2-3 day course available in Hanoi through the Vietnam MONRE or other organization.
- To prepare the following environmental assessments in accordance with the request from ADB:
    - Rapid Environmental Assessment.
    - Environmental Categorization.

(2) Approach

The general flow of works is presented in **Figure 4.5**. These tasks are discussed in detail in **Table 4.18**.

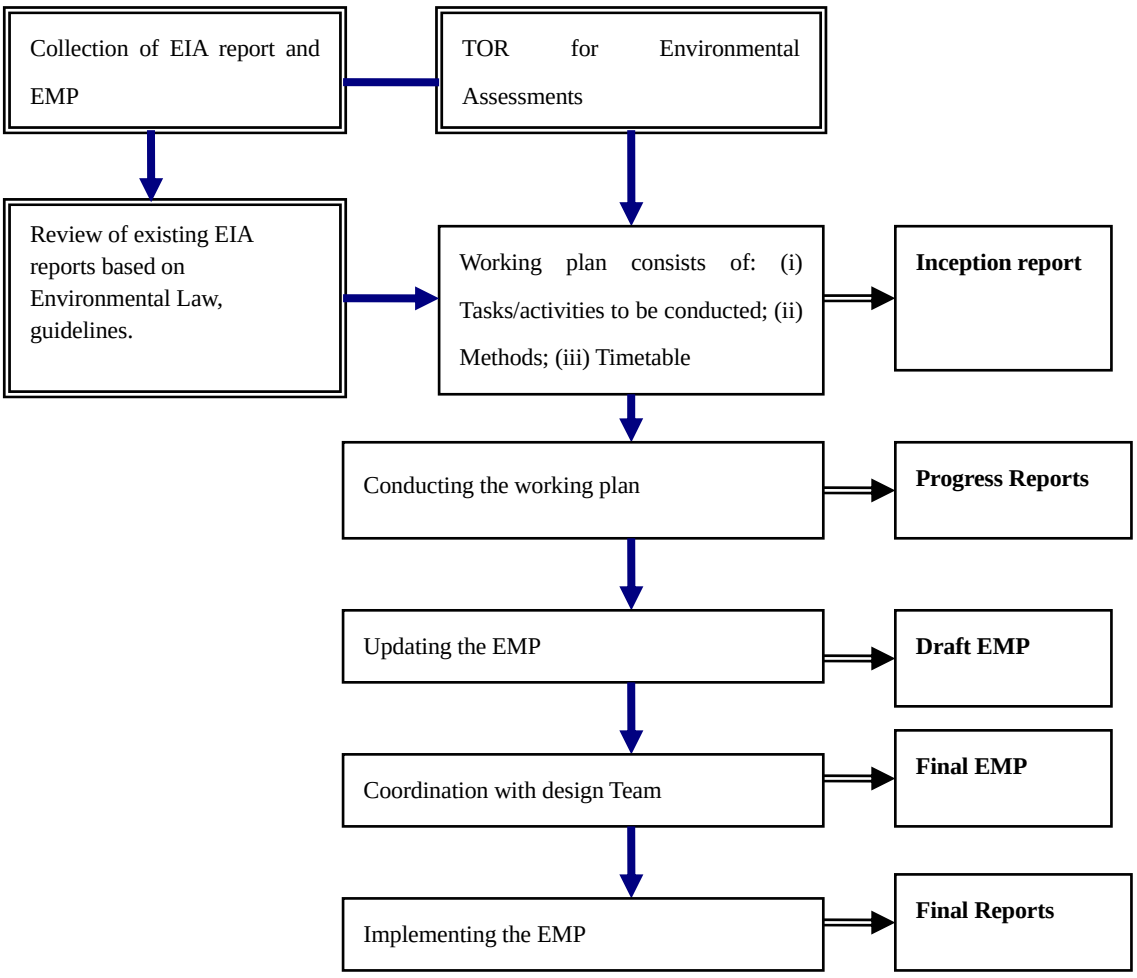



**Figure 4.9 The general flow of works**

**Table 4.18 Major works and methods**

| No | Work items | Purposes | Methods |
|---|---|---|---|
| 1 | Collection of Existing EIA reports and new information refer to environmental Law | To prepare information for review work | Coordination with SEPUM, BAECCO Field reconnaissance |
| 2 | Confirmation of legal procedures and compliance with Environmental Law | To confirm Environmental Procedures compliance with Vietnamese Environmental Law and guidelines. | Confirmation of condition with approved letter for EIA |
| 3 | Summary mitigation measures and update EMP. | To ensure environmental mitigation measures in to detailed design and construction method. | Environmental obligation to the contractor |
| 4 | Checking audit Detailed Measurement | To confirm the effect of measures and to audit the prediction in EIA. | Interview to necessary specialist, if necessary. For example, Noise level simulation method. |
| 5 | Proposal of additional mitigation measures | In case of design change from the point of EIA, additional counter is necessary. | For example site condition such as distance to sensitive area |
| 6 | co-ordination with design Team | To concrete mitigation measure | Information sharing of detailed design. |
| 7 | Finalizing updated EMP | To ensure environmental mitigation measures in to detailed design and construction method. | Environmental obligation document to the contractor |

| | | | |
|---|---|---|---|
| 8 | Proposal of the capacity building Plan for EMP to VEC | To assist VEC to implement detailed environmental management programs for safety operation of Expressway | Desk work |
| 9 | Preparing EMP trainings course and document for staffs | To build up capacity for daily EMP and to suggest action in case of emergency to environmental staff | Introduction of Vietnamese Environmental scheme such as TCVN and method for survey |
| 10 | Implementation of the workshop for EMP | To provide training and capacity building to VECs and relating agencies | Lecture by slide<br>Text manual for action plan. |
| 11 | Final report | To provide technical assistances to VEC and for implementing the EMP | Desk work |

**Table 4.19 Schedule**

| No | Work items | 2008 | | | |
|---|---|---|---|---|---|
| | | Aug | Sep | Oct | Nov |
| | | 1 | 2 | 3 | 4 |
| 1 | Collection of Existing EIA reports and new information refer to environmental Law | | | | |
| 2 | Confirmation of legal procedures and compliance with Environmental Law | | | | |
| 3 | Summary mitigation measures and update EMP fo PKG-1A | | | | |
| 4 | Checking audit Detailed Measurement | | | | |
| 5 | Proposal of additional mitigation measures | | | | |
| 6 | co-ordination with design Team | | | | |
| 7 | Finalizing updated EMP | | | | |
| 8 | Propoal of the capacity building Plan for EMP to VEC | | | | |
| 9 | Preparing EMP trainning course and document for staffs | | | | |
| 10 | Implementation of the workshop for EMP | | | | |
| 11 | Finalizing report | | | | |

## 4.7 Resettlement Plan

(1) Scope of work

- To prepare and update Resettlement Plan (RP) in accordance with ADB guidelines based on the detailed designs prepared under these services. ADB guidelines have been applied in this project including ADB's Policy on Involuntary Resettlement (1995) guided by Operations Manual on Involuntary Resettlement (OM/F2, 2006) and other relevant policies and guidelines such as Gender (1998), Indigenous Peoples (1998), Accountability (2003), and Public Communications (2005).
- To carry out a social, poverty and gender analysis (social impact assessment) in accordance with ADB guidelines and Viet Nam requirements.

The above objectives also cover the impact of the project on ethnic minorities and vulnerable groups, and on dispersion of sexually transmitted diseases, socio-economic profiles and poverty reduction effects of affected communities.

(2) Approach

The general flow of works is presented in **Figure 4.6**. These tasks are discussed in detail in **Table 4.20**.

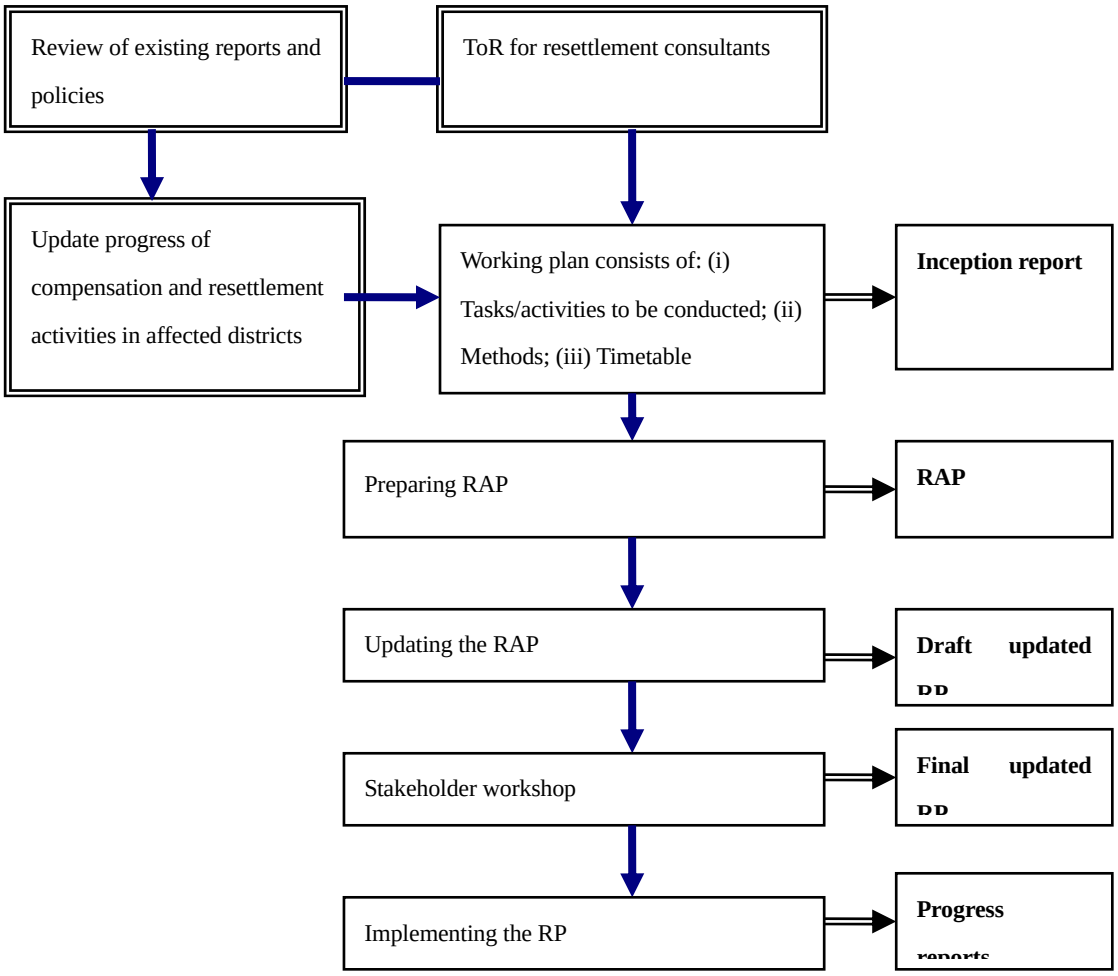



**Figure 4.10 The general flow of works**

**Table 4.20 Major works and methods**

| No | Work items | Purposes | Methods |
|---|---|---|---|
| 1 | Prepare the RAP of "missing link" | To prepare RAP in accordance with ADB guidelines based on FS report | Socio-economic Survey (SES) and Inventory of Losses (IoL): |
| 2 | Review of existing reports and policies | Find out the GAPs between ABD policies and Vietnamese policies | Gap analysis |
| 3 | Collect secondary data and information | -Update progress of compensation, resettlement and livelihood activities<br>-Finding livelihood options in project areas<br>-Collect current decisions, legal documents relating to resettlement issues of the HLD project. | Attend monthly or weekly meeting with District Compensation Councils (DCCs) and SEPMU<br>Key informant interviews based on check lists of |

| No | Work items | Purposes | Methods |
|---|---|---|---|
| | | | necessary information |
| 4 | Consultation meetings | - To consult with participants on the draft RP | Focus group discussion: separate consultation with different topics and groups of APs |
| 5 | Detailed measurement surveys-DMS | -Obtain full database of APs and their loss assets to prepare land compensation award papers.<br>-Assess incomes, identify productive activities, target groups and plan for income restoration<br>-Develop relocation options and social preparation for vulnerable groups | Conduct supplement interview using household Questionnaire |
| 6 | Resettlement site survey | Carry out feasibility study of the final sites identified; confirm available resources and facilities and identify requirements to improve replacement sites accordance with ADB guidelines and Vietnamese legislations. | Meeting with relating agencies, design and construction companies.<br>Interview key informants based on a check list<br>Observations |
| 7 | Prepare the draft updated resettlement plans | Integrating and analyzing data, information, results of field studies to prepare the draft updated RP | Desk study |
| 8 | Finalize the Updated RP | To complete the Updated Resettlement plan according to suggestions recorded at the consultation meetings | Desk study |
| 9 | Assist VEC and DCCs to implement and monitor the RP | To provide technical assistances to VEC and DCCs for implementing the RP | Will be specified when the RP completed |

(3) Description of methods

Proposed methods are described below. These may be supplemented by Participatory Rapid Appraisal (PRA) methods.

a. Socio-economic Survey (SES) and Inventory of Losses (IoL):

Survey the effects of land acquisition and other affected assets including Inventory of Losses, all fixed assets (such as residential land, business land, agricultural land including ponds, marshes, houses, stalls and shops, the works such as fences, graves, wells, trees having business value, etc.) located in the corridor of project are identified, measured and verified the ownerships. Determining the impact of the fixed assets, the impact on production capabilities, and living activities of the household. Information on the number of affected households, number of members of affected households, income, income levels and legal ownership of productive assets

b. Semi-structured interviews:

Interviews to key persons will be conducted using semi-structured interviews based on a checklist of information which is to be collected. Key informants and stakeholders will be selected from local leaders, residents or persons with special knowledge or experience about resettlement activities and implementation. They are should be chairman of People committee of affected communes/wards, leader of women unions, heads of affected hamlets/quarters and head of DCC of

project-affected districts.

For key informants and stakeholders, semi-structured interviews will be carried out with a view of obtaining background information that can not be obtained from reports or surveys. Some of this information relates to the conditions vulnerable groups such as old and disabled, ethnic minorities etc., and includes programs for training as well as other specific measures and services that may be provided, as part of the development of the project.

Besides interviewing the key persons, project affected persons also will be interviewed randomly about compensation, relocation and the satisfaction of APs. Persons belonging to vulnerable group also will be taken into account of these interviews.

c. Collecting secondary/available documents:

For general background information on the affected communities, the reports and development plans of the respective districts and communes/wards will be acquired and studied. This also includes eventual specific information from line organisations at district and provincial levels, such as Department of Natural Resources (DONRE), Department of Agriculture and Rural development (DARD), Department of Industry (DOI), Department of Labour, Invalid and Social Affairs (DOLISA) etc.

The team members also will be responsible for collecting reports, data relating to resettlement issues from various sources such as job service offices, training centers, health stations, schools, pagodas, churches, etc.

d. Structured direct observations

Another PRA tool will be used is a structured direct observation. Field observations on status of resettlement implementation, plus individual or group interviews for cross-checking purposes will be conducted every time the team going to the field. In-depth case studies of APs and host populations from various social classes will be carried out to assess impact of resettlement.

e. Consultation meetings

The team will assist the affected districts in organizing the public consultation meetings . The main technique to be used in the consultation meetings is focus group discussion. Specific topics such as land compensation payments, services at resettlement sites, income restoration, and gender issues will be discussed in open-ended group sessions. These group will be divided according to their categories, which will be revealed thank to social survey.

f. RRA Survey using questionnaire

Resettlement consultants will conduct a supplement survey, in combination with DMS, using household questionnaire. It will be used to assess incomes, identify productive activities, and plan for income restoration, to develop relocation options and social preparation phase for vulnerable groups. The survey questionnaires will be briefed fully on the requirements of the survey and policy needs, including eligibility and entitlement categories, if they have already been defined prior to the survey.

**Table Schedule of Resettlement Plan**

| No. | Work items | Responsible | 2010 | | | | | | | | | | | 2011 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| 1 | prepare Resettlement Plan (RP) for 4km section and RR2 Interchange | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Prepare an updated Resttlement plan (RP) of the 4km section and RR2 Interchange | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Implement and monitor the updated RPs of the 4km section and RR2 Interchange | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Complete the updated resettlement plan for the section from km4+00-54+983 | | | | | | | | | | | | | | | | | | | | | | | |

# 5 IMPLEMENTATION OF THE DETAILED ENGINEERING DESIGN

## 5.1 Organization of the Consultant

Organization of the Consultant for the detailed engineering design is shown in **Figure 5.1**.

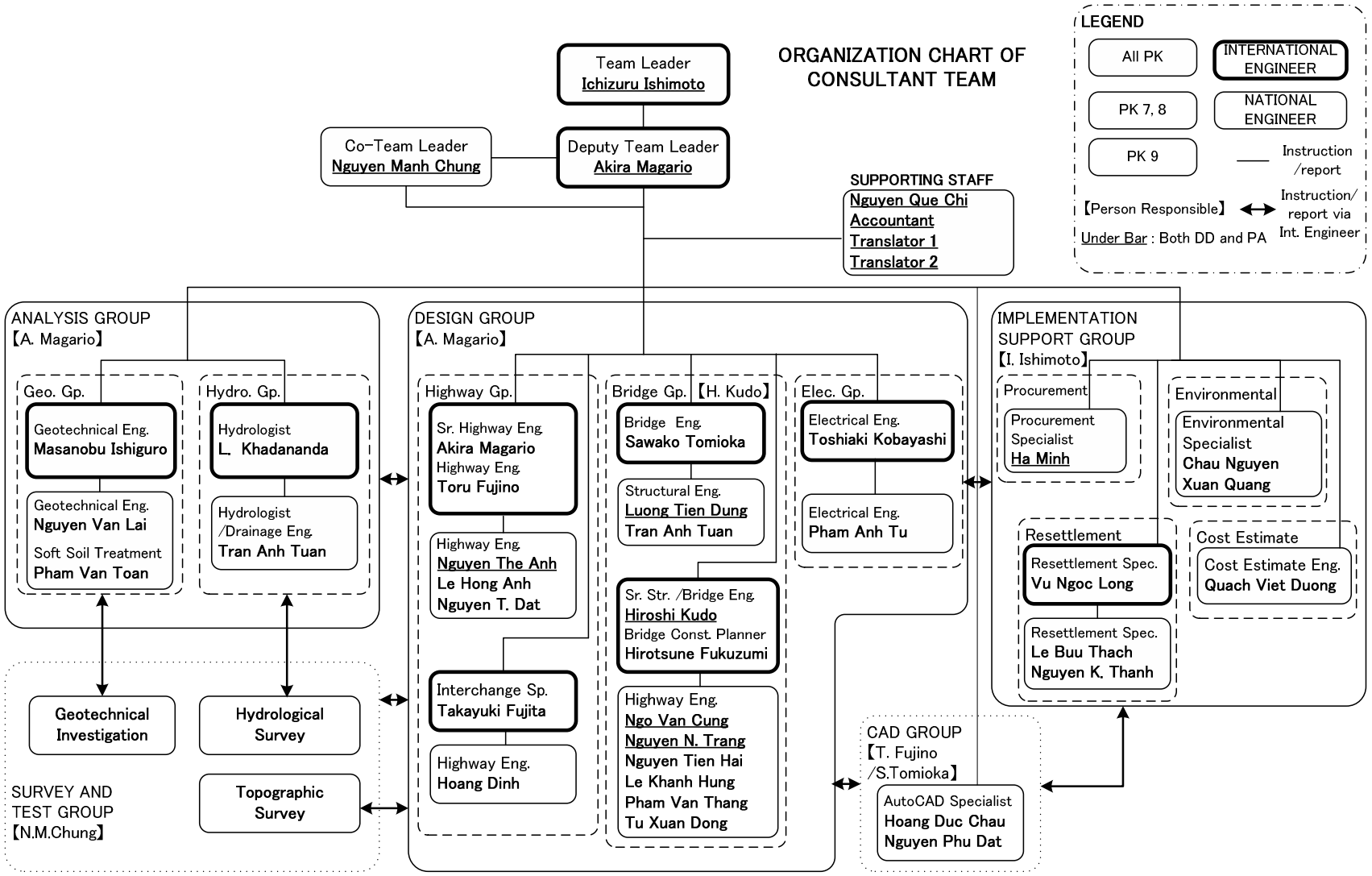



**Figure 5.1 Organization of the Consultant**

## 5.2 Work Schedule

### 5.2.1 Work Schedule

The technical assistance project shall be completed in 4 months for detailed design and 4 months for tender assistance. The design has been officially started since July 1, 2010.

The work schedule of the project is shown in Table 5.1.

**Table 5.1 Work Schedule of the Design and Tender Assistance**

| Contract Package | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | Jul | Aug | Sep | Oct | Nov | Dec |
| PK7 (KM0+000 - KM2+000) | Survey | | | | | |
| | Design | | | | | |
| | | | Procurement Assistance | | | |
| PK8 (KM2+000 - KM4+000) | Survey | | | | | |
| | Design | | | | | |
| | | | Procurement Assistance | | | |
| PK9 (RR2 IC) | Survey | | | | | |
| | Study | | | | | |
| | | Design | | | | |
| | | | Procurement Assistance | | | |

### 5.2.2 Staffing Schedule

The staffing schedule of the Consultant is shown in **Table 5.2**.

**Table 5.2 Staffing Schedule of the Consultant (International Staff)**

| No | Name | Position | Location of | Month 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total person-month input Home | Field | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Staffing Schedule | | | | | | | | | | | | | |
| I International | | | | | | | | | | | | | |
| 1 | Ichizuru ISHIMOTO | Team Leader | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 2.00 | 2.00 |
| 2 | Akira MAGARIO | Deputy Team Leader/ Sr.Highway Engineer | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 6.00 | 6.00 |
| 3 | Hiroshi KUDOU | Sr.Bridge Engineer | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 6.00 | 6.00 |
| 4 | Lamsal Khadananda | Sr. Hydrologist | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 1.00 | 1.00 |
| 5 | Masanobu ISHIGURO | Soft Soil Treatment Specialist | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 1.00 | 1.00 |
| 6 | Toshiaki KOBAYASHI | Electrical Engineer | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 1.00 | 1.00 |
| 7 | Vu Ngoc Long | Resettlement Specialist | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 4.00 | 4.00 |
| 8 | Toru HUJINO | Highway Engineer 1 (PK7A7B) | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 1.00 | 1.00 |
| 9 | Takayuki FUJITA | Highway Engineer 2 (PK8) | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 3.00 | 3.00 |
| 10 | Sawako TOMIOKA | Bridge Engineer 1 (PK7A,7B) | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 4.00 | 4.00 |
| 11 | Hirotsune FUKUZUMI | Bridge Engineer 2 (PK8) | [Home] | | | | | | | | | | |
| | | | [Field] | | | | | | | | | 2.00 | 2.00 |
| Sub-Total | | | [Home] | | | | | | | | 0.00 | | 31.00 |
| | | | [Field] | | | | | | | | | 31.00 | |

## Table 5.3 Staffing Schedule of the Consultant (Domestic Staff)

| No | Name | Position | Location of | Month 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total person-month input Home | Field | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Staffing Schedule** | | | | | | | | | | | | | |
| **II National** | | | | | | | | | | | | | |
| 1 | Nguyen Manh Chung | Co-Team Leader/ Highway Engineer | [Field] | | | | | | | | | 6.00 | 6.00 |
| 2 | Tran Anh Tuan | Hydrological/ Drainage Engineer | [Field] | | | | | | | | | 1.00 | 1.00 |
| 3 | Nguyen Van Lai | Geotechnical Engineer | [Field] | | | | | | | | | 2.00 | 2.00 |
| 4 | Pham Van Toan | Soft Soil Treatment Specialist | [Field] | | | | | | | | | 2.00 | 2.00 |
| 5 | Pham Anh Tu | Electrical Engineer | [Field] | | | | | | | | | 1.00 | 1.00 |
| 6 | Ha Minh | Procurement Specialist | [Field] | | | | | | | | | 4.00 | 4.00 |
| 7 | Chau Nguyen Xuan Quang | Environmental Specialist | [Field] | | | | | | | | | 4.00 | 4.00 |
| 8 | Le Buu Thach | Resettlement Specialist 1 | [Field] | | | | | | | | | 4.00 | 4.00 |
| 9 | Nguyen Khac Thanh | Resettlement Specialist 2 | [Field] | | | | | | | | | 4.00 | 4.00 |
| 10 | Quach Viet Duong | Cost Estimator/ Construction Planner | [Field] | | | | | | | | | 4.00 | 4.00 |
| 11 | Nguyen The Anh | Highway Engineer 1 (PK7A) | [Field] | | | | | | | | | 5.00 | 5.00 |
| 12 | Le Hong Anh | Highway Engineer 2 (PK7B) | [Field] | | | | | | | | | 4.00 | 4.00 |
| 13 | Nguyen Thanh Dat | Highway Engineer 3 (An Phu) | [Field] | | | | | | | | | 5.00 | 5.00 |
| 14 | Hoang Dinh | Highway Engineer 4 (PK8) | [Field] | | | | | | | | | 5.50 | 5.50 |
| 15 | Luong Tien Dung | Bridge Engineer 1 (PK7A) | [Field] | | | | | | | | | 5.00 | 5.00 |
| 16 | Tran Anh Tuan | Bridge Engineer 2 (PK7B) | [Field] | | | | | | | | | 4.00 | 4.00 |
| 17 | Ngo Van Cung | Bridge Engineer 3 (PK8) | [Field] | | | | | | | | | 5.50 | 5.50 |
| 18 | Nguyen Ngoc Trang | Bridge Engineer 4 (PK8) | [Field] | | | | | | | | | 5.50 | 5.50 |
| 19 | Han Van Huynh | Bridge Engineer 5 (PK8) | [Field] | | | | | | | | | 4.50 | 4.50 |
| 20 | Le Khanh Hung | Bridge Engineer 6 (PK8) | [Field] | | | | | | | | | 4.50 | 4.50 |
| 21 | Pham Van Thang | Bridge Engineer 7 (PK8) | [Field] | | | | | | | | | 4.50 | 4.50 |
| 22 | Tu Xuan Dong | Bridge Engineer 8 (PK8) | [Field] | | | | | | | | | 4.50 | 4.50 |
| **Sub-Total** | | | [Field] | | | | | | | | **0.00** | **89.50** | **89.50** |
| **III Supporting Staff** | | | | | | | | | | | | | |
| 23 | Nguyen Que Chi | Administrator/ Secretary | [Field] | | | | | | | | | 7.00 | 7.00 |
| 24 | TBN | Accountant | [Field] | | | | | | | | | 6.00 | 6.00 |
| 25 | TBN | Translator 1 | [Field] | | | | | | | | | 6.00 | 6.00 |
| 26 | TBN | Translator 2 | [Field] | | | | | | | | | 6.00 | 6.00 |
| 27 | Hoang Duc Chau | CAD Operator 1 (Highway) | [Field] | | | | | | | | | 6.00 | 6.00 |
| 28 | Nguyen Phu Dat | CAD Operator 2 (Bridge) | [Field] | | | | | | | | | 5.00 | 5.00 |
| **Sub-Total** | | | [Field] | | | | | | | | **0.00** | **36.00** | **36.00** |

## 5.3 Submission of Reports

The Consultant will submit the following reports in accordance with the TOR requirements.

Table 5.2 and 5.3 shows the title of the reports and timing of the submission.

**Table 5.2 Reporting Schedule**

| Report | Schedule |
|---|---|
| Inception Report | End of the first month |
| Progress Report | Monthly |
| Final Updated Resettlement plans including the section Km0-Km4 | End of the 4th month |
| Final Updated EIA and EMP Reports including the section Km0-Km4 | End of the 4th month |
| Project Completion Report (PCR) | End of the services |

**Table 5.3 Documents Schedule**

| Document | Schedule |
|---|---|
| Survey Documents | End of the 3rd month |
| General design document of line geometry, intersection, and bridge for 4km section including RR2 Interchange | End of the 3rd month |
| Document of updated pegging-out and land acquisition based on design for 4km section including RR2 Interchange | End of the 4th month |
| Document of engineering design, Document of cost estimate, and Bidding Document first contract package | End of the 4th month |
| Document of engineering design, Document of estimated cost and total estimated cost of other packages | End of the 5th month |
| Documents of procurement of civil works | End of the 6th month |
| Final Document of engineering designs and bidding documents | 2 weeks afterresults of appraisal of the Client |