

**General Department of Vietnam Customs, Ministry of Finance
The Socialist Republic of Vietnam**

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR REINFORCEMENT
OF CUSTOMS FUNCTIONS OF MAJOR PORTS
IN
THE SOCIALIST REPUBLIC OF VIETNAM**

August, 2008

JAPAN INTERNATIONAL CORPORATION AGENCY (JICA)

JAPAN MARINE SCIENCE INC.

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PREFACE

In response to a request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct a basic design study on the Project for Reinforcement of Customs Functions of Major Ports in the Socialist Republic of Vietnam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Vietnam a study team from 25th December 2007 to 28th January 2008.

The team held discussions with the officials concerned of the Government of Vietnam and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Vietnam in order to discuss a draft basic design, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Socialist Republic of Vietnam for their close cooperation extended to the teams.

June, 2008

Masafumi Kuroki

Vice-President

Japan International Cooperation Agency

June 2008

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Reinforcement of Customs Functions of Major Ports in the Socialist Republic of Vietnam

This study was conducted by Japan Marine Science Inc. , under a contract to JICA, during the period from December 2007 to July 2008. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Vietnam and formulated the most appropriate basic design for the project under Japan's Grant Aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Hirokazu Nishimura

Project manager

Basic design study team on

The Project for Reinforcement of Customs Functions of Major Ports in the Socialist Republic of Vietnam

Japan Marine Science Inc.

Summary

The Socialist Republic of Vietnam (hereafter simply called “Vietnam”), since the introduction of Doi Moi policy in 1986, has made economic growth with 8 ~ 9 % of average annual growth rate from 1992 to 1997 based on the export progress and direct investments from foreign countries. After the tentative slow down of economic growth and direct foreign investment reflecting the Asian currency crisis, Vietnamese economy recovered since the middle of 1999. The economic growth rates registered 7.5 % from 2000 to 2006 in mean annual value, and 8.5% in 2007. The container throughput of Vietnam registered 3.43 million TEU in 2007, and still increasing at the rate higher than the economic growth rate.

Modernization of Vietnam’s Customs commenced substantially when the new Customs Act was established in 2001. In 2003, by establishing Modernization Plan for Customs Innovation and Development (Master Plan), it planned to transform traditional customs into modern ones management by introducing the risk-management methods. As for the international issues, measures to cope with terrorism have intensified globally since the 2001 terrorist attacks to US, and the security of international cargos is the focus of attention in all nations.

In Vietnam, the necessity to introduce anti-terrorism measures and safety inspections is growing responding to anti-terrorism moves in the United States such as the Container Security Initiative (CSI) during and after 2002, and the Safe Port Act, which came into effect in October 2006, and responding to the framework for securing the safety of international trade built by the World Customs Organization.

Specifically, there is a pressing need to introduce the ASEAN Single Window System in Vietnam, and achieve the target of standardized custom clearance procedures determined by WTO and ASEAN. In order to achieve this target, Vietnam has a two-stage approach: the related domestic systems will be consolidated by 2010, and then international requirements such as ASEAN Single Window will be achieved by 2012.

Hai Phong Port ,Vietnam’s major port in the north, located 100 Km east from the capital city Hanoi, and Tan Cang Cat Lai Port in Ho Chi Minh City, Vietnam’s major port in the south, handle 2.3 million TEU of container cargo, covering 67% of all container cargos of the country.

The two major ports face urgent issues such as improving the customs inspection methods and reducing

inspection time in accordance with the increase of the container cargos. The present manual container inspection by opening up containers, takes 1~2 hours per container. The total duration of customs inspection time has been increasing in proportion to the increase of export/import cargos. Detection of concealed goods in containers is not easy in case of manual inspection and the number of containers to be inspected nearly exceeds the manpower limit. Moreover, customs inspections in Vietnam have been placed too much importance on import cargo, and inspection of export cargo has been insufficient because of the man power limitation. The improvement of customs inspection method and reduction of the duration of container inspection time became the most urgent task in Vietnam.

Under these circumstances, in July 2006, Vietnam requested the Government of Japan the introduction of large scale X-ray equipment at Tan Cang Cat Lai Port and Hai Phong Port and the transfer of X-ray inspection technology under the Grant Aid Scheme.

The Government of Japan decided to conduct the basic design study, and JICA sent to Vietnam a study team from 25th December 2007 to 28th January 2008. The team held discussions with the officials concerned of the Government of Vietnam and conducted a field study at the study area. The team investigated the conditions of requested project sites, implementation scheme in Vietnam, natural conditions of project area, and conditions of related infrastructures.

After the team returned to Japan, further basic design studies were made on the extents of cooperation policy, specification of equipment, construction method of X-ray inspection buildings, etc. Then, a mission was sent to Vietnam from 26th May to 2nd June 2008 in order to discuss a draft basic design, and undertakings of Vietnamese side, and as a result, the present report was agreed.

For the concrete specification of the large scale X-ray Inspection Equipment, it is assumed that one set of the ordinary specification of equipment (Average duration of inspection: 20 trailers/hour) for each port is sufficient to cover the present inspection of all containers for customs clearance, taking into account the anticipated reduction of inspection rate because of the promotion of risk-management in the future.

The specifications of X-ray inspection equipment, such as power of X-ray energy, penetration power, and penetration directions are investigated, based on the circumstances that the main targets of the inspection

cargo are the smuggled machines such as machines, cars, weapons, and narcotics.

Accompany with the X-ray inspection facility, the radiation shield and protection facilities are to be installed. Considering the nature of the facility and its operation condition, the radiation shielding walls should have sufficient thickness; and shielding walls, shielding doors and ventilation holes have to be adequately placed with highly durable materials. For the arrangement of the X-ray inspection facility, it is designed to avoid traffic intersection with trailers for the purpose of efficient inspection.

The outline of the plan is as follows.

Equipment and facilities	Purpose	Numbers
Large scale X-ray inspection equipment:	Inspection of container contents by X-ray clairvoyance	One system for Tan Cang Cat Lai Port and one system Hai Phong Port
Facility for X-ray inspection equipment	1. Container cargo inspection station for X-ray equipment installation and operation • Include shield doors and ventilation equipments 2. Office building • Remote control room of X-ray system • Image analysis room • Meeting room • Electric control room • Machine shop • Sleep break room for X-ray operation staffs Reinforced concrete structure with pile foundation Roof: Steel beam made Roof material: Polyester processed Galvanized steel plate Thickness: 0.6 mm Eaves height: 6,500 mm One storied building Floor area: 1,065.17 square meter	One building for Tan Cang Cat Lai Port and one building Hai Phong Port

When this project is implemented with Japanese government grant aid, the total project cost is estimated approximately 2.079 billion yen (Japanese: 1.753 billion yen, Vietnamese side: 326 million yen). The main cost for Vietnamese side will be soil improvement works (Hai Phong), construction of visual inspection

facility, warehouse, security measures, water supply arrangement, electric power arrangement, telephone arrangement. The total duration of works will be around 18.5 months for each port including tender process. It is assumed that Tan Cang Cat Lai project will be implemented first, and Hai Phong project will be implemented after the soil improvement works is finished.

After the project is finalized, the Operation and Maintenance of the X-ray facilities and equipment will be undertaken by Ho Chi Minh Customs and Hai Phong Customs under the jurisdiction of the General Department of Vietnam Customs (GDVC). GDVC has to prepare new budgets for the operation and maintenance management of the large scale X-ray inspection equipment as this is the first experience for GDVC. The operation and maintenance cost is estimated to be around 17 million yen per year, which constitute around 1.3~4.7% of total budget. GDVC is already confirmed to prepare and deliver 25~172 million yen during 5 years until 2012 for the large scale X-ray inspection equipment. Vietnamese sides have plans to establish “X-ray Inspection Center” as their district branch level organizations, and intend to establish expertise divisions and arrange new staffs. The maintenance of the X-ray equipment will be outsourced to the X-ray system manufacturer.

The following effects are expected by implementing the project. All the Vietnamese customs inspectors are the direct beneficiaries of this project, and all the Vietnamese people (85.2 million people in 2007) are the indirect beneficiaries of this project.

(1) Direct effects

- 1) The inspection time saving per container;- inspection time with X-ray will be reduced to 15~20 minutes from 60~120 minutes without X-ray or increment of productivity by 4~6 times.
- 2) Cargo damage due to weather condition can be reduced by switching from the present outdoor manual container inspection to the non-destructive inspection.
- 3) Anti-terrorism efforts at Ho Chi Minh and Hai Phong Customs will be reinforced by thorough inspection.
- 4) The present manual container inspection, which are performed at many locations in Tan Cang Cat Lai Port and at more than five locations in Hai Phong city, will be integrated at one location, thus preventing from

blocking traffic in container yards by inspection and contributing to the safety of harbor traffic and container inspection.

5) Decrease of manual inspection number contribute to the protection of export/import cargos from damage.

(2) Indirect benefits

1) The container inspection will be carried out safely and speedily, and will be capable for handling the growing volume of import and export cargos in the future.

2) Speedy customs inspection will promote the direct investments from overseas.

3) By shifting from manual open-up container inspection to nondestructive inspection, the efficiency of the General Department of Vietnam Customs will be improved with decreases in the number of surveyors and their management work, as well as savings for open-up container inspection in Hai Phong due to the consolidation of inspection stations.

4) Cooperating with risk-management will contribute to the modernization of Vietnam's Customs inspection.

5) Introduction of the X-ray Inspection Equipment will significantly promote the computerization of customs inspection, which will contribute to the early realization of "ASEAN Single Window" which embodies countermeasures of the General Customs Bureau of the World Customs Organization (WCO), the World Trade Organization (WTO), and ASEAN.

It is confirmed that this project is significant, as it will dissolve the congestion problems of custom inspection in Tan Cang Cat Lai Port and Hai Phong Port, and improve efficiency of cargo distribution systems and promote the safety of export/import cargo.

In order to maximize the effect of this project, Vietnamese side should take the followings measures on Operation and Maintenance;

1) Establishing operating system of X-ray Inspection Center

To review the managing and operating system of X-ray Inspection Center and plan to establish the operating system of the center by performing organizational reforms to Ho Chi Minh Customs and Hai Phong

Customs concurrently.

2) Establishing training program

To plan to respond to the training program of the manufacturer and prepare subsequent familiarization and training program responding to the operating system.

3) Conducting computerization program of customs system and risk management modernization program

To plan to incorporate computerization of customs system and risk management modernization program as a future operating method for the large scale X-ray Inspection Equipment and for improving the efficiency of customs inspection as a whole.

The general outline of the plan is as follows.

Equipment and facilities	Purpose	Numbers
Large scale X-ray inspection equipment:	Inspection of container contents by X-ray clairvoyance	One system for Tan Cang Cat Lai Port and one system Hai Phong Port
Facility for X-ray Inspection Equipment	<ol style="list-style-type: none"> 1. Container cargo inspection station for X-ray equipment installation and operation <ul style="list-style-type: none"> • Include shield doors and ventilation equipments 2. Office building <ul style="list-style-type: none"> • Remote control room of X-ray system • Image analysis room • Meeting room • Electric control room • Machine shop • Sleep break room for X-ray operation staffs Reinforced concrete made, Pile basement Roof: Steel beam made Roof material: Polyester processed Galvanized steel plate Thickness: 0.6 mm Eaves height: 6,500 mm One storied building Floor area: 1,065.17 square meter	One building for Tan Cang Cat Lai Port and one building Hai Phong Port

When this project is implemented with Japanese government grant aid, the total project cost is estimated approximately 2.079 billion yen (Japanese: 1.753 billion yen, Vietnamese side: 326 million yen). The main cost for Vietnamese side will be soil improvement works (Hai Phong), visual inspection facility, warehouse, security measures, water supply arrangement, electric power arrangement, telephone arrangement. The total term of works will be around 18.5 months for each port including tender process. It is assumed to implement Tan Cang Cat Lai project in the first place, as Hai Phong project will be implemented after the soil improvement works have finished.

After the project is finalized, the operation and maintenance control management of the X-ray facilities and equipment will be taken charge by Ho Chi Minh Customs and Hai Phong Customs under the jurisdiction of the General Department of Vietnam Customs(GDVC). GDVC has to prepare new budgets for the operation

and maintenance management of the big scale X-ray inspection equipments as this is the first experience for GDVC. The operation and management cost is estimated around 17 million yen per year, which constitute around 1.3~4.7% of total budget. GDVC is already confirmed to prepare and deliver 25~172 million yen during 5 years until 2012 for the big scale X-ray inspection equipments. Vietnamese sides have plans to establish “X-ray Inspection Center” as their district branch level organizations, and intend to establish expertise divisions and arrange new staffs. The maintenance of the X-ray equipments will be outsourced from the expertise X-ray system maintenance companies.

The following effects are expected by implementing the project. All the Vietnamese customs inspectors are the direct beneficiaries of this project, and all the Vietnamese people (85.2 million people in 2007) are the indirect beneficiaries of this project.

(1) Direct effects

- 1) The inspection time per container, which takes 60~120 minutes with the conventional open-up inspection, can be reduced to 15~20 minutes, which will improve inspection efficiency by 4~6 times.
- 2) Cargo damage due to weather can be reduced by switching from the present outdoor open-up container inspection to the nondestructive inspection performed from outside containers.
- 3) Anti-terrorism efforts at Ho Chi Minh and Hai Phong Customs will be improved by thorough inspections.
- 4) The present open-up container inspections, which are performed at many locations in Tan Cang Cat Lai Port and at more than five locations in Hai Phong city, will be integrated at one location, thus preventing inspections from blocking traffic in container yards and contributing to the safety of harbor traffic and container inspections.
- 5) Decrease of open container inspection number contribute to the protection of export/import caggos from damage.

(2) Indirect effects

- 1) The container inspection will be carried out safely and speedily, and will be able to respond to an increase in import and export cargos in the future.
- 2) Speedy customs inspections will contribute to direct investments from overseas.
- 3) By shifting from manual open-up container inspection to nondestructive inspection with fewer personnel, the efficiency of the General Department of Vietnam Customs will be improved with decreases in the number of surveyors and their management work, as well as savings for open-up container inspection stations in Hai Phong due to the consolidation of inspection stations.
- 4) Cooperating with risk-management will contribute to the modernization of Vietnam's Customs inspections.
- 5) Introduction of the X-ray Inspection Equipment will significantly promote the computerization of customs inspections, which will contribute to the early realization of "ASEAN Single Window]" which embodies countermeasures of the General Customs Bureau of the World Customs Organization (WCO), the World Trade Organization (WTO), and ASEAN.

It is confirmed that this project is significant to implement as it will dissolve the congestion problems of customs inspection due to the lack of inspection facilities in Tan Cang Cat Lai Port and Hai Phong Port, improve efficiencies of cargo distribution systems and confirm the safety of export/import cargo.

After the implementation of this project, Vietnamese side should take note followings on operation and maintenance management;

1) Establishing operating system of X-ray Inspection Center

To review the managing and operating system of X-ray Inspection Center and plan to establish the operating system of the center by performing organizational reforms to Ho Chi Minh Customs and Hai Phong Customs concurrently.

2) Establishing familiarization and training program

To plan to respond to the familiarization and training program of the manufacturer and prepare

subsequent familiarization and training program responding to the operating system.

3) Cooperation with computerized program of customs system and risk management modernization program

To plan to incorporate computerized program of customs system and risk management modernization program as a future operating method for the large scale X-ray Inspection Equipment and for improving the efficiency of customs inspections as a whole.

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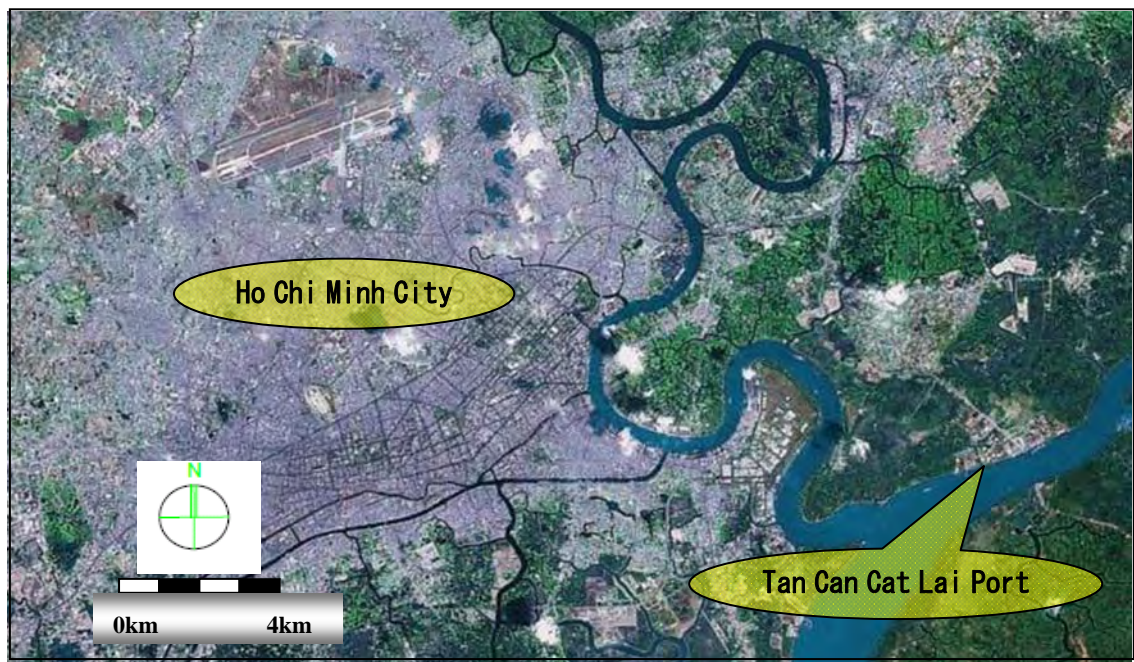
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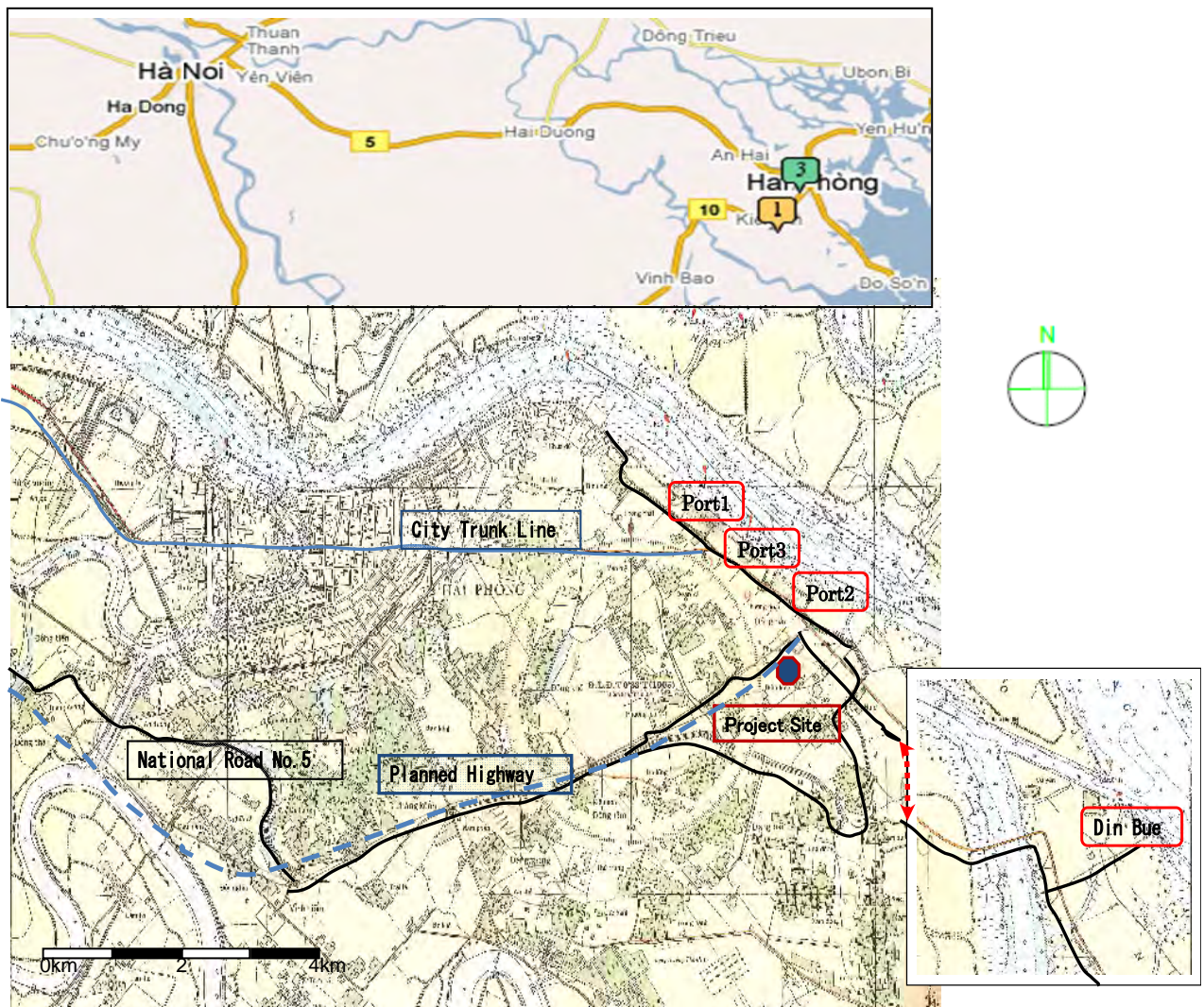
Location Map/Perspective



Location Map

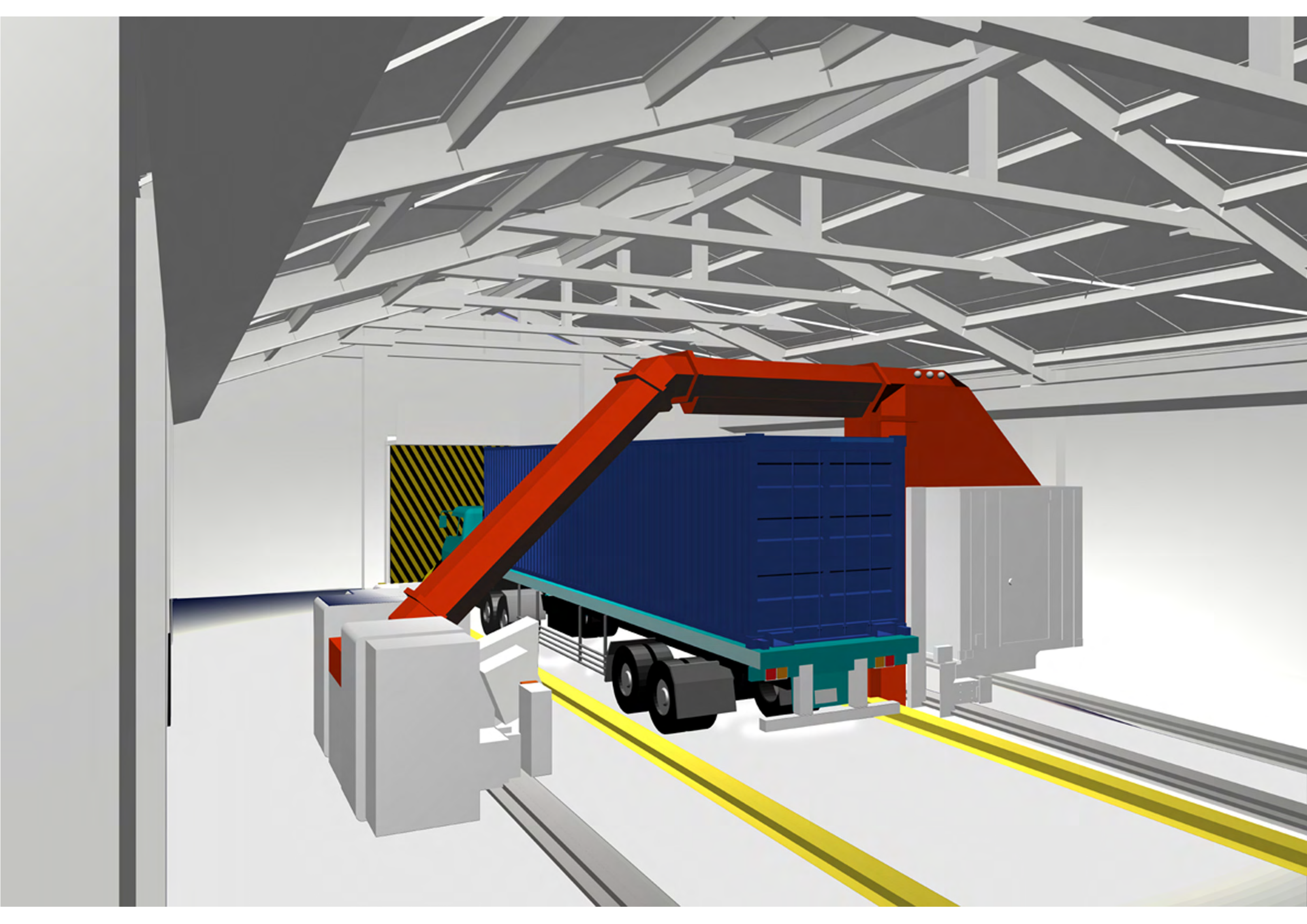


Location Map of Tan Cang Cat Lai Port



Location Map of Hai Phong Port





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Abbreviations

ASEAN	Association of Southeast Asian Nations
ASTM	American Society for Testing and Materials
CSI	Container Security Initiative
DAC	Development Assistant Committee, United Nations
GDP	Gross Domestic Product
GL	Ground Line
ICRP	International Commission on Radiological Protection
JIS	Japan Industrial Standard
MeV	Mega Electron Volt
μSV	Micro Sievert
OJT	On the Job Training
PC	Precast Concrete
RC	Reinforced Concrete
WCO	World Customs Organization
WTO	World Trade Organization

Chapter 1 Background and development of the project

1-1 Present sector issues

1-1-1 Present conditions and issues

Modernization of the General Department of Vietnam Customs is ranked as a major issue in the modernization plan of the national administrative functions (Master Plan for Development of National Administrative Functions up to 2010). Modernization of Vietnam's Customs commenced substantially when the new Customs Act was established in 2001. In 2002, Five-year Plan for Promoting Information Technology (Master Plan) was prepared. In 2003, by establishing Modernization Plan for Customs Innovation and Development (Master Plan), it planned to transform customs management from traditional to modern one based on risk-management methods. Then, the Customs Act was revised to conform to the international standard in 2005, and various specific procedures related to customs enforcement such as customs taxation, applicable tax rate, and tax collection were established in accordance with the export and import duties enacted in 2006 (No. 45/2005/QH11), government ordinance (No. 149/2005/ND-CP), and related ministerial ordinances. According to the modernization plan and revisions of systems, yearly performance targets of individual programs for introducing IT, reforming organizations, and personnel training were determined up to 2010. The introduction of the X-ray inspection systems into Vietnamese Customs is stipulated as the most urgent tasks.

Vietnam became a member of ASEAN in 1995 and a member of WTO in 2007, thus it is urgently needed to upgrade the standards of customs procedures to the international level. As a specific issue, it faces implementation of [Establishment of Single Window System] specified in the protocol of ASEAN. In order to achieve this target, Vietnam has a two-stage approach: the related domestic systems will be consolidated by 2010, and then international requirements such as ASEAN Single Window will be achieved by 2012.

1-1-2 Development plan

The General Department of Vietnam Customs recognizes that to promote the modernization of customs procedures, employment of the latest computerized equipment is one of the important issues, and recognizes that the X-ray Equipment is an important element. Introduction of the large scale X-ray Equipment will transform the traditional customs inspection, which depends on manpower, into a modernized inspection based on objective screening standards, which will shorten inspection times. Furthermore, the effects of the computerized customs system can be further enhanced by connecting the large scale X-ray Equipment online with computerized customs system in the future. Trial introduction of the computerized customs system started in 2000, and trial operation of the computerized customs procedures started at Hai Phong Customs and Ho Chi Minh Customs in 2005. At present, the computerized customs information-processing systems are operated at the center located in the General

Department of Vietnam Customs and at sub-centers located at eight district customs offices across the country.

The present issues are to rationalize customs inspection and respond to an increasing volume of inspection by combining X-ray inspection and innovations in the risk-management system, and to respond equally to export and import cargos in a departure from the present situations where it is obliged to place emphasis on import cargo inspection (At present, the inspection rate of export cargos by opening up containers is 10% and that of import cargos is 30%), and also to plan effective anti-terrorism countermeasures. Other issues are to contribute to the efficiency of cargo distribution as a whole by reducing the customs inspection time with the introduction of the large scale X-ray Equipment, and also to make customs officials respond to compliance and anti-terrorism measures.

1-1-3 Socio-economic environment

Since the introduction of Doi Moi policy, Vietnamese economy has been developed at steady rate based on the export progress and direct investments from foreign countries. The annual economic growth rates from 1992 to 1997 registered 8 ~ 9 %. After the tentative slow down of economic growth and direct foreign investment reflecting the Asian currency crisis, Vietnamese economy recovered from the middle of 1999. The economic growth rates registered 7.5 % from 2000 to 2006 in mean annual value, and 8.5% in 2007. The Vietnam's per capita GDP was US\$809 in 2007 (IMF), and it achieved an economic growth rate of 8.5% in 2007. The GDP shares are 24%, 37%, and 39% for primary industries, secondary industries, and tertiary industries, respectively, and the secondary industries are expanding significantly. In recent years, market-oriented economic reforms and integration into the global economy have been promoted; and, in 2007 it achieved formal entry into the WTO. The value of trade increased significantly: in 2007, the values of exports and imports increased to US\$48.4 billion (increase of 22% over previous year) and US\$60.8 billion (increase of 36% over previous year), respectively, indicating significant economic growth. On the other hand, worries such as a chronically trade deficit, immature investment environment, etc. still remain. The major trade items: crude oil, sewing product, textiles, fishery product, etc. are exported, and machinery (parts), petroleum products, fabrics, iron and steel, etc. are imported.

1-2 Background, development, and outline of the grant aid request

The most urgent tasks of Vietnamese Customs are to improve the customs inspection capabilities for both import and export container cargos by reducing cargo inspection times with the introduction of X-ray Inspection Equipment, which will improve the efficiency of logistics management, cope with the compliance issues by establishing objective screening standards of customs inspection through employing X-ray analysis, and enhance security and anti-terrorism measures.

The General Department of Vietnam Customs recognizes that to promote modernization of customs procedures, employing the latest computerized equipment is one of the important issues, and understands that X-ray equipment is an important element. Vietnam's major ports, Hai Phong Port in the north and Tan Cang Cat Lai in the south, covering 2.3 million TEU (67% of all 3.43 million TEU in 2007) container cargos of the country, face urgent issues such as improving customs inspection methods, which include reduction of inspection times in accordance with an increase of container cargos. The container inspection time, which takes 1~2 hours per container at present, can be significantly reduced to an average of 20 minutes per container by introducing the large scale X-ray Equipment, and the efficiency of cargo distribution will be improved. Meanwhile, it plans to respond to the compliance issues and also anti-terrorism measures, which have been substantially disregarded up until now.

Under these circumstances, it has requested the introduction of large scale X-ray Equipment at Tan Cang Cat Lai and Hai Phong Port.

Content of initial request is as follows:

- ① The large scale X-ray Equipment (specification: 4-6 MeV) (one unit each for Hai Phong and Tan Cang Cat Lai Port)
- ② Transfer of X-ray inspection technology

1-3 Condition of project site and surrounding area

Tan Cang Cat Lai Port is located in a suburb of Ho Chi Minh city and acts as the trans-shipment port for inland water transportation, and is close to the major inland container depot (trade cargo transportation base located inland other than harbors and airports) through orbital roads surrounding outside of the city. Cai Mep/Thi Bai district is scheduled to start in full operation in 2015, and until then, Tan Cang Cat Lai acts as the major port handling export and import containers for the whole area of south Vietnam. After full operation of Cai Mep Thi Vai district, Tan Cang Cat Lai will continue its role as the major port handling containers in Ho Chi Minh city and its surrounding area.

The project site in Hai Phong can accommodate the traffic inflow of containers from the pier without passing through the city, and is positioned at the point where the orbital road of the city crosses National Route 5 and the expressway on which work is scheduled to start in the near future. The site area is 16,000 square meters, which is sufficient for the X-ray inspection station. The site was created by reclaimed swampland, therefore, it was found from a boring survey that soil reinforcement is needed and the Government of Vietnam is scheduled to conduct such reinforcement work in 2008.

1-3-1 Preparatory situation of related infrastructure

Access roads around the periphery of Tan Cang Cat Lai site are the orbital road, which bypasses Ho Chi Minh city and National Routes, which connect the whole of the south. Electric power, water mains, and sewerage required for the large scale X-ray Inspection Equipment and facilities will be connected to the main lines at Tan Cang Cat Lai.

Related new infrastructure of the Hai Phong Port site will be prepared by the Government of Vietnam, and the main electric power, water, and sewerage required for the large scale X-ray Inspection Equipment and facilities will be installed by the Government of Vietnam.

1-3-2 Natural conditions

(1) Results of topographic survey

In the case of Tan Cang Cat Lai Port, the landscape of the planned site for installing the large scale X-ray Inspection Equipment was surveyed by a plane-table method. The ground plane of the planned premises is flat.

In the case of Hai Phong Port, the ground plane of the planned premises is flat and lower than the front road (Nguyen Binh Khiem street) surface by approximately 0.45~0.50 m, which is the same sea level as Hon Dau – Do Son – Hai Phong observation points. There are warehouses in the northeast of the premises and a container yard in the southeast area of the premises, and the road to container yard is routed in southwest area adjacent to the premises.

(2) Soil surveys at Tan Cang Cat Lai and Hai Phong project sites

From the results of the ground survey at the Tan Cang Cat Lai project site, it was disclosed that the ground is composed of the following layers: from ground level (GL) to 1.10 m depth is earth filling; GL-1.10 m~2.70 m is a sand layer of N value 10~20; GL-2.70 m~17.30 m is a sandy clay layer of N value 2~3; GL-17.30 m~21.70 m is a clay layer of N value 8~10; and, at depths more than GL-21.70 there is a sand layer of N value greater than 50. Considering that the planned building has one story, the floor laden weight is 20.0 KN/m^2 and the floor is not allowed to sink unevenly to ensure equipment performance, so a pile foundation is employed with a sand layer of N value greater than 50 in depth more than GL-21.70 as a supporting layer.

From the results of the ground survey at the Hai Phong Port site, it was disclosed that the ground was composed of the following layers: from ground level (GL) to 1.70 m depth is a loose sand layer; GL-1.70 m~10.20 m is a silt layer of N value 1~3; GL-10.20 m~38.00 m is a silt clay layer of N value 4~10; and at a depth of more than GL-38.00 there is a sand layer of N value greater than 52. Considering functionality, it employs a pile foundation using a sand layer of N value greater than 52 in

depth more than GL-38.00 as a supporting layer in the same way as Tan Cang Cat Lai. The survey results show that the Hai Phong site needs the soil improvement before commencing a construction work.

(3) Climate conditions

1) Climate

The entire land area of Vietnam is located south of the northern circle and extends near the equator. Therefore, it is heavily affected by the southwest monsoon. It is affected by typhoons during the period from July to November, and in particular, the central part of the nation is liable to be affected. Hai Phong has a temperate climate, and the rainy season is from April to October.

Temperature: The average minimum temperature in Hai Phong is 13.7 degrees in January, the average maximum temperature is 32.9 degrees in July, and the average temperature during the past five years has been 24.5 degrees. The temperature in Hai Phong does not change throughout the year, and the average temperature for the three-year period from 2004 to 2006 was 28.1 degrees.

Table 1-1 Temperature, Rainfall, and Humidity of Ho Chi Minh

	Jan	Feb	Mar	Apr	Maay	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Temperature (Centigrade)	26.9	27.5	28.5	29.8	29.5	28.5	27.7	28.0	27.8	27.6	28.1	26.7
Mean Rainfall (mm)	0.1	24.3	2.9	78.3	235.6	220.0	250.8	232.2	238.1	317.9	125.9	49.0
Mean Humidity (%)	70.0	69.0	69.3	71.3	74.7	79.3	81.0	80.0	80.7	80.7	75.7	74.0

Note: Tan Son Hoa Weather Station (Mean 2004~2006)

Table 1-2 Temperature, Rainfall, and Humidity of Hai Phong

	Jan	Feb	Mar	Apr	Maay	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Temperature (Centigrade)	16.4	18.1	19.8	24.2	27.0	28.8	28.6	27.8	27.2	25.2	22.2	18.2
Mean Rainfall (mm)	17.4	20.6	25	49.2	256.6	282.2	422.8	360.6	202.8	46.8	46.4	12.6
Mean Humidity (%)	81	88.2	86.2	86	84.2	84.8	85	87.2	80.6	77.8	79.6	74.6

Note: Bai Chai Weather Station (Mean 2002~2006)

2) Rainfall

The average annual rainfall in Hai Phong was 1,512 mm for five-year period from 2002 to 2006. The average annual rainfall in Ho Chi Minh was 1,774 mm for the three-year period from 2004 to 2006.

3) Humidity

The average humidity in Hai Phong was 78.5% for the five-year period from 2002 to 2006. The average humidity in Ho Chi Minh was 75% for the three-year period from 2004 to 2006.

4) Sunshine hours

The average sunshine hours/year for the five-year period from 2002 to 2006 was 2,025 hours in Ho Chi Minh and 1,416 hours in Hai Phong.

5) Natural disasters

In Ho Chi Minh, there is frequent flooding in the central and south area and on the Mekong river and its tributaries. However, Tan Cang Cat Lai Port where the large scale X-ray Inspection Equipment and facilities will be installed has not experienced flooding, so no particular measures are taken.

In Hai Phong, because the infrastructure has yet to be improved, the roads flood due to rainfall accompanying typhoons. Therefore, equipment in the inspection room and the floor of the office building will be established at an elevated location of 1200 mm above ground level.

1-3-3 Consideration to the environment

Applicable Standards of Recommendation of International Commission on Radiological Protection (ICRP-60) will be observed to protect from radiation leakage accidents.