Part II

1. Introduction

In Part II, feasibility studies on the selected 15 ports (as shown below) in Part I are discussed. The contents of the studies are as follows;

-Port Facilities Design and Construction Program

-Evaluation of Economic Analysis and Financial Analysis

-Social Environmental Conditions

-Administration and Operation of RoRo Terminal

-Project Proposals

SRNH		RoRo Port	Province	Island
Eastern SRNH Extension		Naval	Biliran	Biliran Is.
Western SRNH		Caticlan (Tabon).	Aklan	Panay Is.
		Dumangas,	Iloilo	Panay Is.
Central SRNH		San Antonio (Pilar)	Sorsogon	Luzon Is.
Esperanza	Masbate	Masbate Is.		
Daan Bantayan	Cebu	Cebu Is.		
Negros Souterhn Leyte SRNH		Toledo	Cebu	Cebu Is.
		Punta Engano	Cebu	Cebu Is.
		Getafe	Bohol	Bohol Is.
		Ubay	Bohol	Bohol Is.
Panay Leyte SRNH		Culasi (Ajuy)	Iloilo	Panay Is.
		Tabuelan	Cebu	Cebu Is.
		Bogo	Cebu	Cebu Is.
Panay Masbate SRNH		Balud	Masbate	Masbate Is.
Batangas Palawan SRNH		Taytay	Palawan	Palawan Is.

2. Design Conditions

2.1 Traffic Forecast

The traffic volume of each link foreseen in 2015 has been computed with the assumption that the traffic volume will grow at the rate estimated over the period from 2005 through 2015.

RORO cargo volume and number of passengers projected in 2015 are summarized in Table 2-1 and Table 2-2. These figures have been calculated on the basis of present cargo and passenger movement. Due to the improvement of traffic condition or other reasons, future RORO traffic volume could easily change. In such a case, that influence should be reflected in this traffic demand forecast.

Table 2-1 Future RORO Cargo Volume in 2015

Route	Link	Cargo 2005 (tons)	Region 1	Region 2	Average Growth Ratio	Cargo 2015 (tons)
Eastern Trunk Route	Matnog- Allen	1,772,017	5	8	6.65%	3,373,467
Eastern Trunk Route	Liloan, San Ricardo- Lipata	366,110	8	13	5.86%	647,039
Eastern Route Extension	San Andres - Masbate	21,840	5	5	6.77%	42,048
Eastern Route Extension	Esperanza - Kawayan	97,500	5	8	6.65%	185,615
Central Trunk Route	Pilar, San Antonio – Masbate	161,700	5	5	6.77%	311,317
Central Trunk Route	Esperanza – Daanbantayan	157,900	5	7	6.43%	294,319
Central Trunk Route	Cebu - Tubigon	105,860	7	7	6.08%	191,015
Central Trunk Route	Janga - Balingoan	214,415	7	10	5.69%	372,725
Central Trunk Route	Benoni, Guinsiliban - Balingoan	22,756	10	10	5.29%	38,104
Western Trunk Route	Batangas – Calapan	651,779	4.1	4.2	4.98%	1,059,154
Western Trunk Route	Roxas – Caticlan	163,061	4.2	6	7.58%	338,426
Western Trunk Route	Iloilo, Dumangas - Bacolod	190,442	6	6	10.53%	518,280
Western Trunk Route	Dumaguete, Siaton - Dapitan	132,296	7	9	7.66%	276,623
East – West 1	San Carlos - Toledo	114,285	6	7	8.31%	253,790
East – West 1	Pt. Engano - Getafe	114,285	7	7	6.08%	206,217
East – West 1	Ubay - Maasin	155,235	7	8	6.31%	286,106
East – West 1	San Ricardo - Lipata	366,110	8	13	5.86%	647,039
East – West 2	Ajuy – Cadiz, Victorias	74,300	6	6	10.53%	202,204
East – West 2	Escalante - Tabuelan	152,336	6	7	8.31%	338,289
East – West 2	Bogo - Palompon	114,400	7	8	6.31%	210,845
Panay - Sorsogon	Culasi - Balud	62,000	6	5	8.65%	142,131
Palawan - Luzon	San Jose - Coron - Taytay	147,400	4.2	4.2	4.62%	231,550
Palawan - Visayas	San Jose de Buenavista - Cuyo - Taytay	142,500	6	4.2	7.58%	295,752

Table 2-2 Future RORO Passenger Numbers in 2015

Route	Link	Passenger 2005 (persons)	Region 1	Region 2	Average Growth Ratio	Passenger 2015 (persons)
Eastern Trunk Route	Matnog- Allen	1,594,887	5	8	6.37%	2,957,478
Eastern Trunk Route	Liloan, San Ricardo- Lipata	435,499	8	13	5.86%	769,309
Eastern Route Extension	San Andres - Masbate	85,127	5	5	7.04%	168,085
Eastern Route Extension	Esperanza - Kawayan	104,300	5	8	6.37%	193,409
Central Trunk Route	Pilar, San Antonio – Masbate	360,600	5	5	7.04%	712,011
Central Trunk Route	Esperanza – Daanbantayan	206,600	5	7	5.25%	344,465
Central Trunk Route	Cebu - Tubigon	1,444,945	7	7	3.45%	2,028,412
Central Trunk Route	Janga - Balingoan	118,800	7	10	2.49%	151,852
Central Trunk Route	Benoni, Guinsiliban - Balingoan	386,287	10	10	1.52%	449,186
Western Trunk Route	Batangas – Calapan	1,123,086	4.1	4.2	4.81%	1,796,554
Western Trunk Route	Roxas – Caticlan	652,769	4.2	6	4.64%	1,026,903
Western Trunk Route	Iloilo, Dumangas - Bacolod	220,320	6	6	4.63%	346,431
Western Trunk Route	Dumaguete, Siaton - Dapitan	519,308	7	9	4.50%	806,469
East – West 1	San Carlos - Toledo	265,266	6	7	4.04%	394,171
East – West 1	Pt. Engano - Getafe	164,427	7	7	3.45%	230,822
East – West 1	Ubay - Maasin	137,925	7	8	4.58%	215,736
East – West 1	San Ricardo - Lipata	435,499	8	13	5.86%	769,309
East – West 2	Ajuy – Cadiz, Victorias	131,400	6	6	4.63%	206,613
East – West 2	Escalante - Tabuelan	159,860	6	7	4.04%	237,544
East – West 2	Bogo - Palompon	149,857	7	8	4.58%	234,399
Panay - Sorsogon	Culasi - Balud	74,700	6	5	5.84%	131,708
Palawan - Luzon	San Jose - Coron - Taytay	121,000	4.2	4.2	4.64%	190,442
Palawan - Visayas	San Jose de Buenavista – Cuyo - Taytay	71,500	6	4.2	4.64%	112,480

2.2 Natural Conditions

2.2.1 Oceanographic Conditions

Tide conditions at each RoRo terminal site are tabulated hereunder. Tide levels are derived from “Design Manual for Port and Harbor Facilities in the Philippine Ports Authority (1995)” and “Predicted Tide and Current Tables 2007, NAMRIA”.

Current and wave conditions at each RoRo terminal site are tabulated hereunder. Current velocity and direction are derived from the results of the current observations. Regarding wave conditions, due to unavailability of wave records, offshore wave height and period were predicted by using SMB method which will be used for the design of breakwater.

Table 2-3 Tide Conditions

RoRo Port	High Water Level HWL (m)	Design Low Tide DLT (m)	Remarks
1) Pilar/San Antonio/Sapa	+1.00	-0.25	
2) Caticlan/Tabon	+2.00	-0.40	
3) Dumangas	+1.89	-0.30	
4) Culasi/Ajuy	+1.89	-0.30	
5) Naval	+1.90	-0.30	
6) Daanbantayan	+1.80	-0.35	
7) Bogo	+1.80	-0.35	
8) Tabuelan	+1.80	-0.35	
9) Toledo	+1.85	-0.35	
10) P. Engano	+1.80	-0.35	
11) Getafe	+1.80	-0.30	
12) Ubay	+1.80	-0.30	
13) Esperanza	+1.90	-0.30	
14) Balud	+2.00	-0.40	
15) Taytay	+1.70	-0.30	

Note: Mean Lower Low Water (MLLW) = +0.00m

Table 2-4 Current and Wave Conditions

RoRo Port	Current		Wave			Remarks
	Velocity (knot)	Direction (azimuth)	Significant Height $H_{1/3}$ (m)	Period $T_{1/3}$ (sec)	Direction	
1) Pilar/San Antonio/Sapa	0.3	120deg	1.5	3.5	SW	
2) Caticlan/Tabon	0.7	280deg	1.5	3.5	NE	
3) Dumangas	2.0	110deg	-	-	-	
4) Culasi/Ajuy	-	-	-	-	-	
5) Naval	-	-	-	-	-	
6) Daanbantayan	0.5	30deg	1.6	4.0	NE	
7) Bogo	-	-	-	-	-	
8) Tabuelan	-	-	-	-	-	
9) Toledo	-	-	-	-	-	
10) P. Engano	-	-	-	-	-	
11) Getafe	-	-	-	-	-	
12) Ubay	-	-	-	-	-	
13) Esperanza	0.7	120deg	1.8	4.7	SW	
14) Balud	0.5	40deg	1.8	4.7	SW	
15) Taytay	-	-	-	-	-	

2.2.2 Climatic Conditions

Design wind is stipulated in the National Structural Code of the Philippines.

Wind Velocity:	V = 49 m/sec
Wind Pressure:	p = 245 kg/m2 (h > 30m)
	p = 196 kg/m2 (9m < h < 30m)
	p = 147 kg/m2 (0m < h < 9m)

2.2.3 Geotechnical Conditions

As the results of boring investigations, sub-soil conditions vary from soft to hard or shallow to deep at each RoRo terminal site. Boring logs with N-values and physical features are shown in the Appendix I-5-3-2.

2.2.4 Seismic Conditions

The seismic coefficient is calculated by the following formula:

Kh = Seismic Coefficient

Kh1 = Regional Seismic Coefficient

C1 = Factor for Subsoil Condition

C2 = Coefficient of Importance

Where, the regional seismic coefficient (C1) in the Philippines is specified as follows:

Region (1):	Palawan	C1 = 0.05
Region (2):	Panay, Negros, Cebu, Bohol, Zamboanga	C1 = 0.10
Region (3):	Other than the above	C1 = 0.15

Where, the factor of subsoil coefficient is specified as follows:

Thickness of Quaternary Deposits	Sand Gravel Layer	Ordinary Sand, Clay Subsoil	Poor Subsoil, N<4 C<1tf/m^2
Less than 5m	0.80	0.80	1.00
5 – 25m	0.80	1.00	1.20
More than 25m	1.00	1.20	1.20

Where, the coefficient of importance is classified as follows:

Special Class:	C2 = 1.5
Class A:	C2 = 1.2
Class B:	C2 = 1.0
Class C:	C2 = 0.5

Table 2-5 Seismic Coefficient

RoRo Port	Coefficients			Seismic Coefficient
	Kh1	C1	C2	
1) Pilar/San Antonio/Sapa	0.15	1.20	1.2	0.22
2) Caticlan/Tabon	0.10	1.00	1.2	0.12
3) Dumangas	0.10	1.20	1.2	0.14
4) Culasi/Ajuy	0.10	1.00	1.2	0.12
5) Naval	0.15	1.00	1.2	0.18
6) Daanbantayan	0.10	1.00	1.2	0.12
7) Bogo	0.10	1.00	1.2	0.12
8) Tabuelan	0.10	1.00	1.2	0.12
9) Toledo	0.10	1.00	1.2	0.12
10) P. Engano	0.10	1.00	1.2	0.12
11) Getafe	0.10	1.00	1.2	0.12
12) Ubay	0.10	1.00	1.2	0.12
13) Esperanza	0.15	1.00	1.2	0.18
14) Balud	0.15	1.00	1.2	0.18
15) Taytay	0.05	1.20	1.2	0.10

2.3 Vessels Conditions

Table 2-6 Standard Size and Specifications of RoRo Vessels

Type Specifications	Type I	Type II	Type III	Type IV	Type V	Remarks
GRT (Gross Tonnage)	5,000	2,000	1,000	700	500	
Loa (m)	125	90	69	52	44	
Lpp (m)	115	85	65	48	40	
Breadth (m)	20.0	16.8	14.0	12.8	11.8	
D (m)	17.0	10.6	9.8	9.2	8.5	Bottom car deck top
D' (m)	7.0	5.6	4.8	4.2	3.5	Freeboard deck
Draft (m)	5.5	4.2	3.6	3.2	2.6	
Dead Weight (ton)	2,800	1,070	665	400	255	
Cargo Dead Weight (ton)	1,500	625	375	225	175	
No. of Car Deck	2	1	1	1	1	
Number of Stowage Rows	5	5	4	3	3	
Load Capacity (No. of Vehicles)						
Case1: 22ton Trucks	60	25	15	9	7	
Case2: 8ton Trucks	88	35	22	12	9	
Case3: 4ton Trucks	126	50	30	23	16	
Passengers	600	500	400	320	240	
Max. Cruising Distance (NM)	8,000	1,200	800	800	800	
Cruising Speed (Knots)	18	16	15	13	12	

Among those in the table above, the following specifications shall be applied.

-Type II - 2000 GRT for Taytay port, and

-Type V - 500 GRT for all the ports other than Taytay

2.3.1 Berthing Conditions

Berthing Speed:	V = 30 cm/sec
Berthing Angle:	15 deg

2.4 Load Conditions

2.4.1 Unit Weight

Reinforced Concrete:	2.45 t/m^3
Plain Concrete:	2.3 t/m^3
Asphalt:	2.3 t/m^3
Steel:	7.85 t/m^3
Sand in air:	1.8 t/m^3
Sand in water:	1.0 t/m^3

2.4.2 Surcharge Load

Uniform Live Load:	q = 2.0 t/m^2 under Ordinary condition
	q'= 1.0 t/m^2 under Seismic condition
Wheel Load:	T-20

2.4.3 Service Life

Minimum 30 years

3. Facility Requirement

3.1 RoRo Port Layout Plans

3.1.1 Basic Concept

The basic concepts for the arrangement of the onshore facilities for a systematic operation of the terminal are discussed in "5.3.2 Standardization of Port Facilities".

To reduce the cost of berthing structures, an 8m wide breasting dolphins, 4m in water depth, with 4m wide passenger passageway are provided for terminals of short distances such as Daan Bantayan and Esperanza to cater for RORO vessels up to 500 GRT. A mooring dolphin is provided at the end of the breasting dolphin as shown on the layout plan for the bow and astern lines of vessels moored alongside the berthing facility.

For long distances such as the Taytay-Coron- San Jose route, a 15m wide by 100m long Pier berthing structure at 5m water depth is provided to cater for 2,000 GRT RoRo vessels and various types general cargo ships.

As per discussion with the CPA, Toledo Port will be catering for RoRo and general cargo vessels. Based on this information, a pier type of berthing structure is provided for Toledo, similar to Taytay Port. The preparation of layout plans for the proposed 15 RoRo Port Terminals is categorized as follows:

-Rehabilitation / Expansion of Existing RoRo Port Terminals

-New Development at Totally New Site

3.1.2 Layout Plans for Rehabilitation / Expansion

(1) The existing Port of Caticlan will be provided with a pier to cater both cargo and RoRo vessels and fixed ramps at both sides of the existing berthing structure for the entrance/exit of vehicles to and from the RoRo ships. The pier will also be used for the boarding/de-boarding of passengers through a manually operated boarding/de-boarding stairway. As can be seen, the terminal is provided with a breakwater to shelter the berthing area from wave actions particularly for the big waves occurring during the SW monsoon season.

(2) Provision of berthing facilities and ramps at the end of the causeway for Toledo and Culasi for the safe mooring of vessels. For safety of navigation particularly during night time operations, light beacons are provided at the end of the mooring facilities.

(3) Provision of land fills areas for Culasi and Toledo for the constructions of onshore facilities such as vehicle holding area, administration building, utility works, and sewage treatment facility among others as shown on the layout plan.

(4) Provision of fixed RC ramps for the existing pier and onshore facilities for the existing backup area of Naval Port for the construction of parking areas, administration building, utility works among others as shown on the layout plan.

(5) Provision of one additional fixed RC ramp for Dumangas and onshore facilities for the existing backup area for the construction of passenger terminal building, ticketing booth, coast guard house, sewage treatment plant, among other developments as shown on the layout plan.

(6) The berthing availability of the above ports appears to be quite high and this could be the reason why the ports are not provided with breakwaters.

3.1.3 Layout Plans for New Development

1) New Developments at Existing Landing Sites

(1) These include the Ports of Tabuelan, Punta Engano, Daan Bantayan, Bogo, Getafe and Ubay which are provided only with RC ramps for Mediterranean style docking. It is however noted that the RC ramps at Tabuelan, Daan Bantayan, Getafe and Ubay are constructed in shallow waters. Therefore, the layout plans located the berthing facilities in deeper water (4 to 5m depth) to avoid to the extent practicable dredging works and accumulation of silts to avoid costly maintenance dredging works in the future.

(2) The layout plan for Bogo is adjacent to the existing reclaimed area to reduce on construction cost.

(3) The existing causeways were used but widened to allow for two way traffic.

(4) In preparing the layout plans, utmost care was made not to hinder port operations during the construction of the terminals.

(5) Except for Daan Bantayan, the ports appear to be sheltered from monsoon waves and hence are not provided with breakwaters.

(6) In the case of Daan Bantayan, the orientation of the port prepared by the LGU was revised for ease of berthing approach and to attain sufficient water depth at the shortest possible distance. Although a relatively long causeway was provided to reach the design water depth of 4m minimum, this scheme is envisioned to avoid costly dredging works (should the Port be located near the shoreline) and accumulation of silts thereby avoiding costly maintenance dredging works in the future. The Port however is prone to wave actions during the occurrence of the Southwest monsoon season and therefore, a breakwater was provided to shelter the mooring area as shown in the layout plan.

2) Proposed Developments at New Sites

(1) These include the proposed ports at Taytay, San Antonio, Balud and Esperanza. As shown on the layout plans, the orientation of the Ports for Balud and Esperanza was made for ease of berthing approach, attaining sufficient water depth at the shortest possible distance and means of sheltering the mooring areas from monsoon waves.

(2) Similar to Daan Bantayan, Balud, Esperanza and San Antonio were provided with relatively longer causeways to reach the design water depth of 4m to avoid costly dredging works and accumulation of silts thereby avoiding costly maintenance dredging works in the future. Likewise, breakwaters are provided for Esperanza and Balud to shelter the mooring areas from southwest monsoon waves.

(3) The Site for the proposed Taytay Port is located in a sheltered cove in deep water very proximate to the shoreline. As shown on the layout plan, the port is connected to the access road with a very short causeway. Based on ocular inspection, the access channel leading to the terminal site is deep but the abundance of corals in the surrounding areas necessitate the undertaking of a detailed survey along the access channel should the development be pursued to identify any possible nearby shallow depths. These will be marked with lighted buoys to ensure safety of navigation in both day and night operations.

(4) Taytay Port is considered as the primary gateway for northern Palawan to cater for both cargo and passenger traffic. In order to harness the big potentials of the proposed development, the improvement of the access road must be made together with the development of the port.

3.1.4 Layout Plans for 15 RoRo Terminals

Based on the above mentioned concept and considerations, the layout plans for the 15 proposed RoRo Terminals were prepared as attached hereunder.

Note-1) The layout plans include all the basic facilities necessary to enhance safe operation and friendly services. Cost estimates were taken for all the facilities for feasibility study purposes.

Note-2) Based on comments from the Implementing Government Agencies concerned to reduce on cost of initial capital outlay, other options will be considered during the review/ update of the FS Report and preparation of detailed designs. The options will include the phasing of development or scaling down of building facilities and reclamation works with due consideration to mobilization cost.

Note-3) According to information, the PPA and CPA have prepared detailed plans for certain ports included in the RRTS Study in response to the directives of the Office of the President in a SONA relative to the enhancement of the Nautical Highways. Based on information, CPA/PPA will soon call for bidding of the said ports. However, at the time of the preparation of the FS Report, the detailed drawings prepared by PPA and CPA were not available and as such were not considered during the preparation of the FS development plans. Thus, the necessary adjustment to the developments plans will be made during the review and updating of the FS Report and detail design works of the proposed Project.

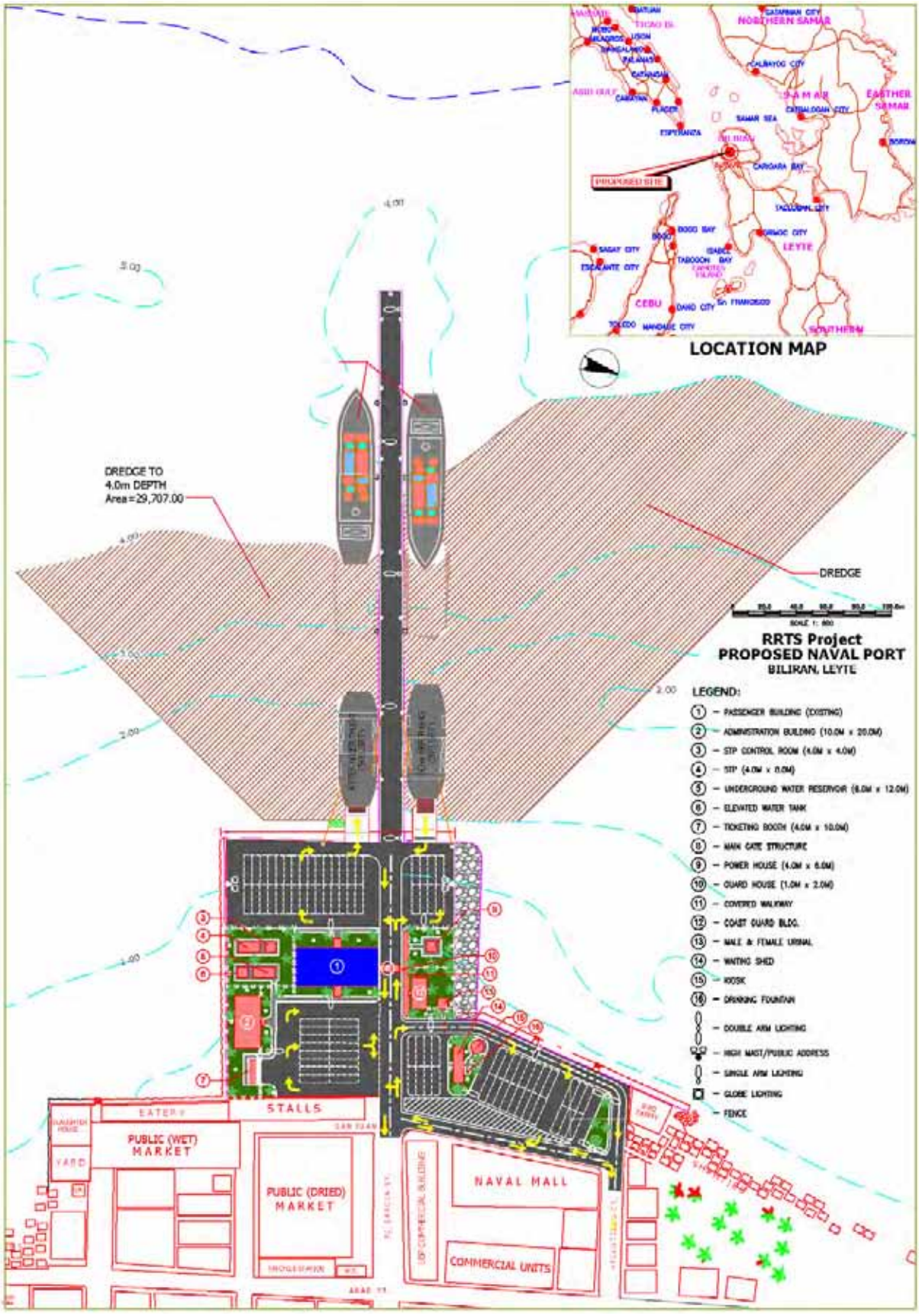


Figure 3-1 Naval Port Terminal Payout Plan

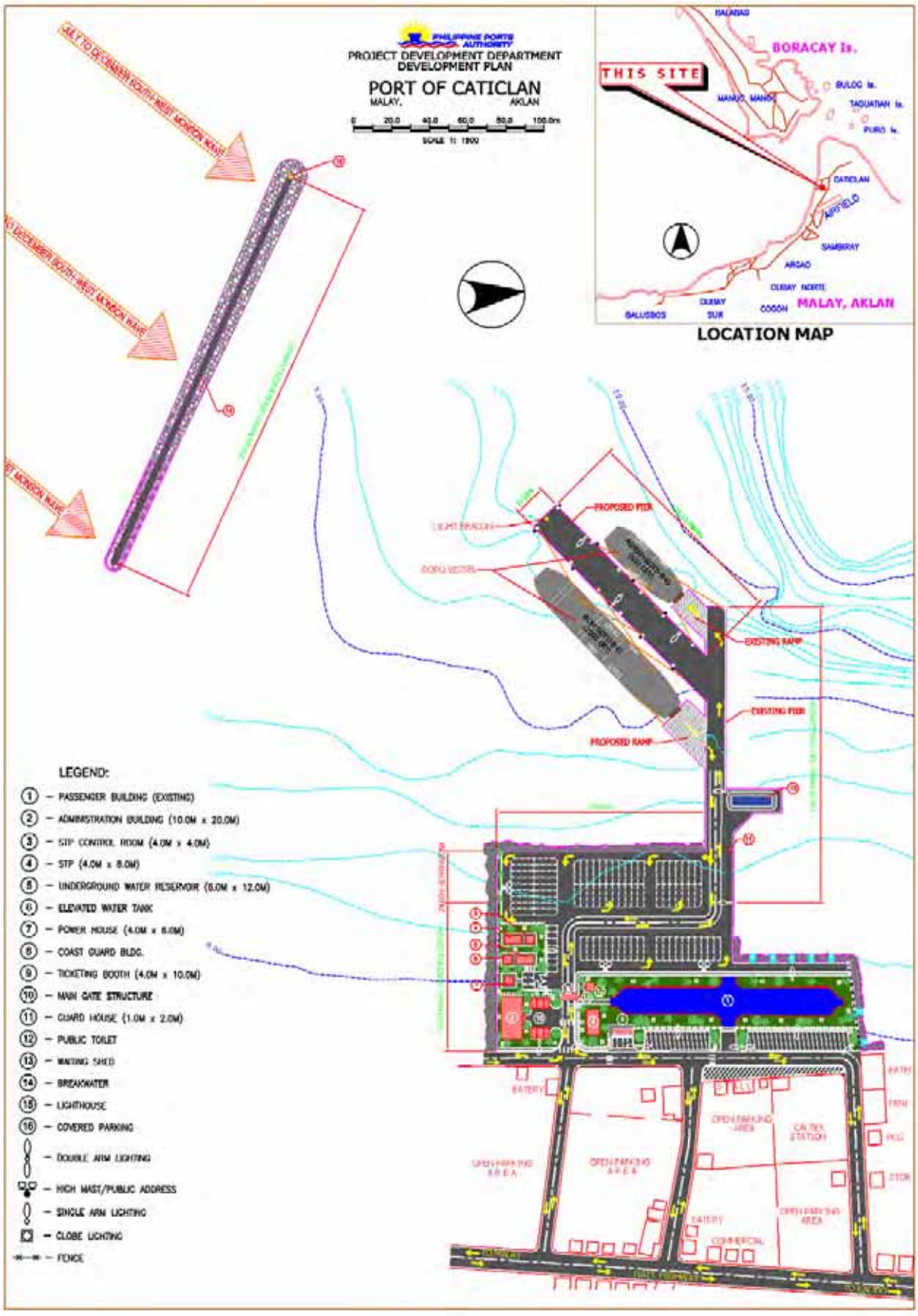


Figure 3-2 Caticlan/Tabon Port Terminal Payout Plan

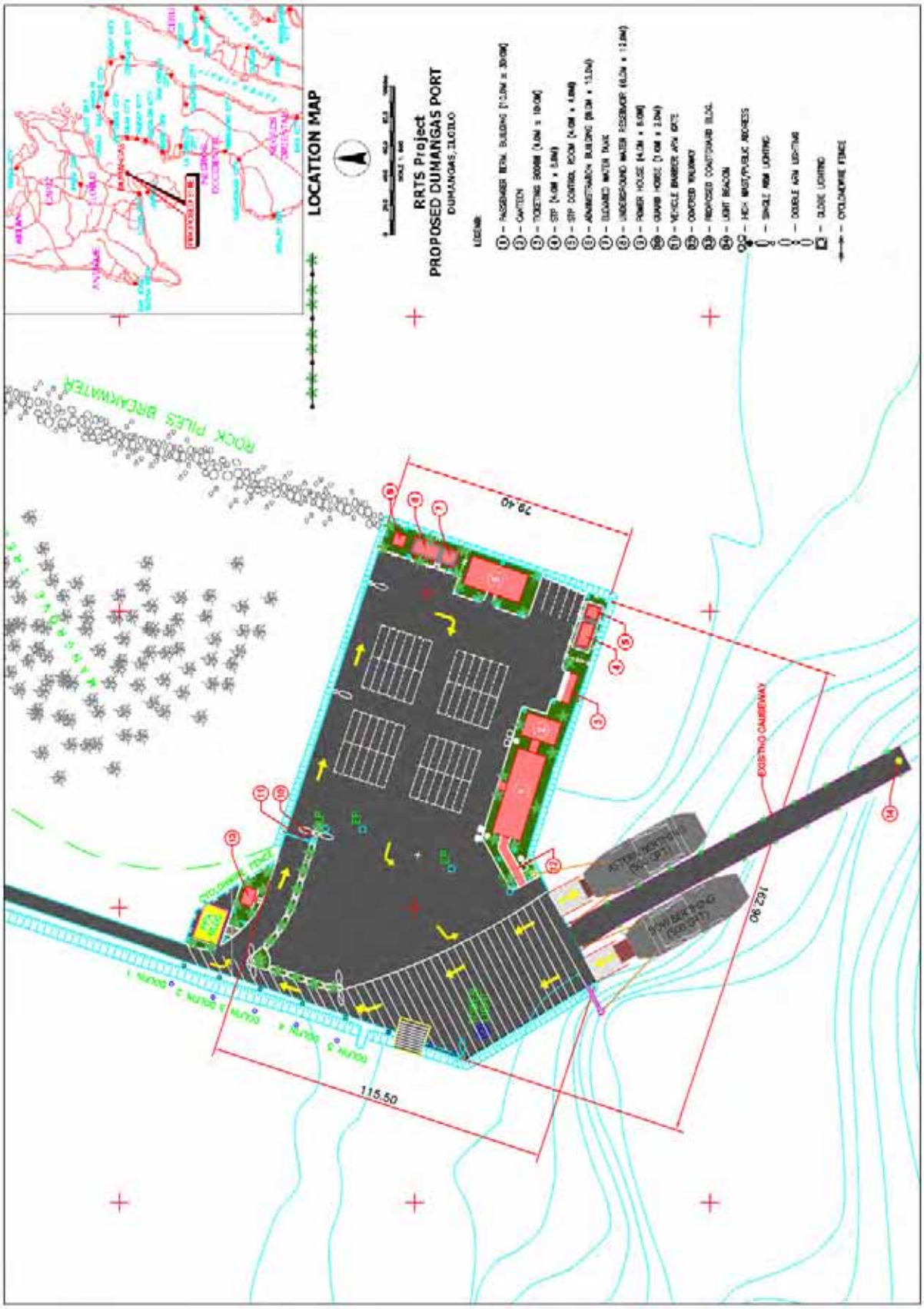


Figure 3-3 Dumangas Port Terminal Payout Plan

Figure 3-4 San Antonio Port Terminal Payout Plan

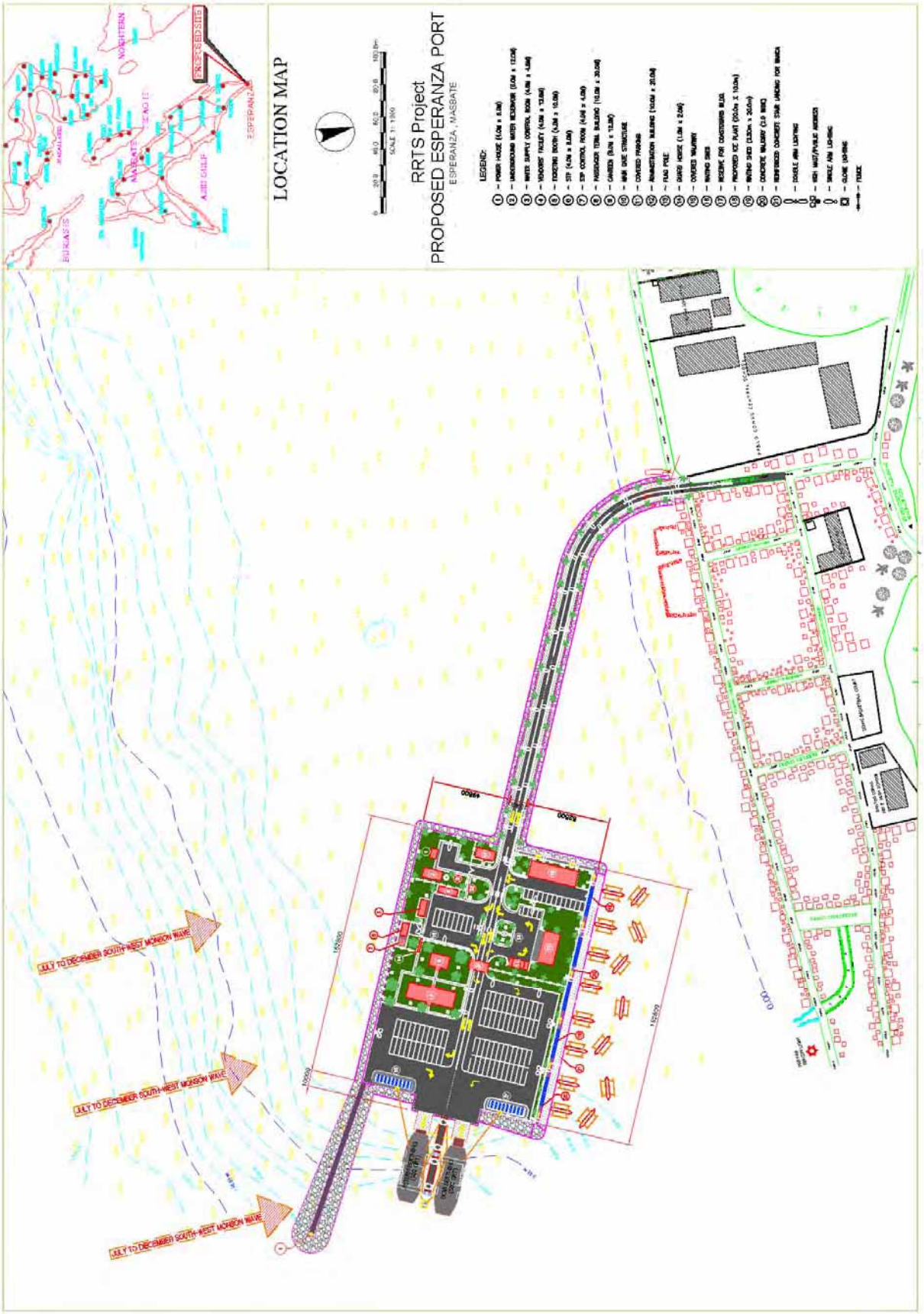


Figure 3-5 Esperanza Port Terminal Payout Plan

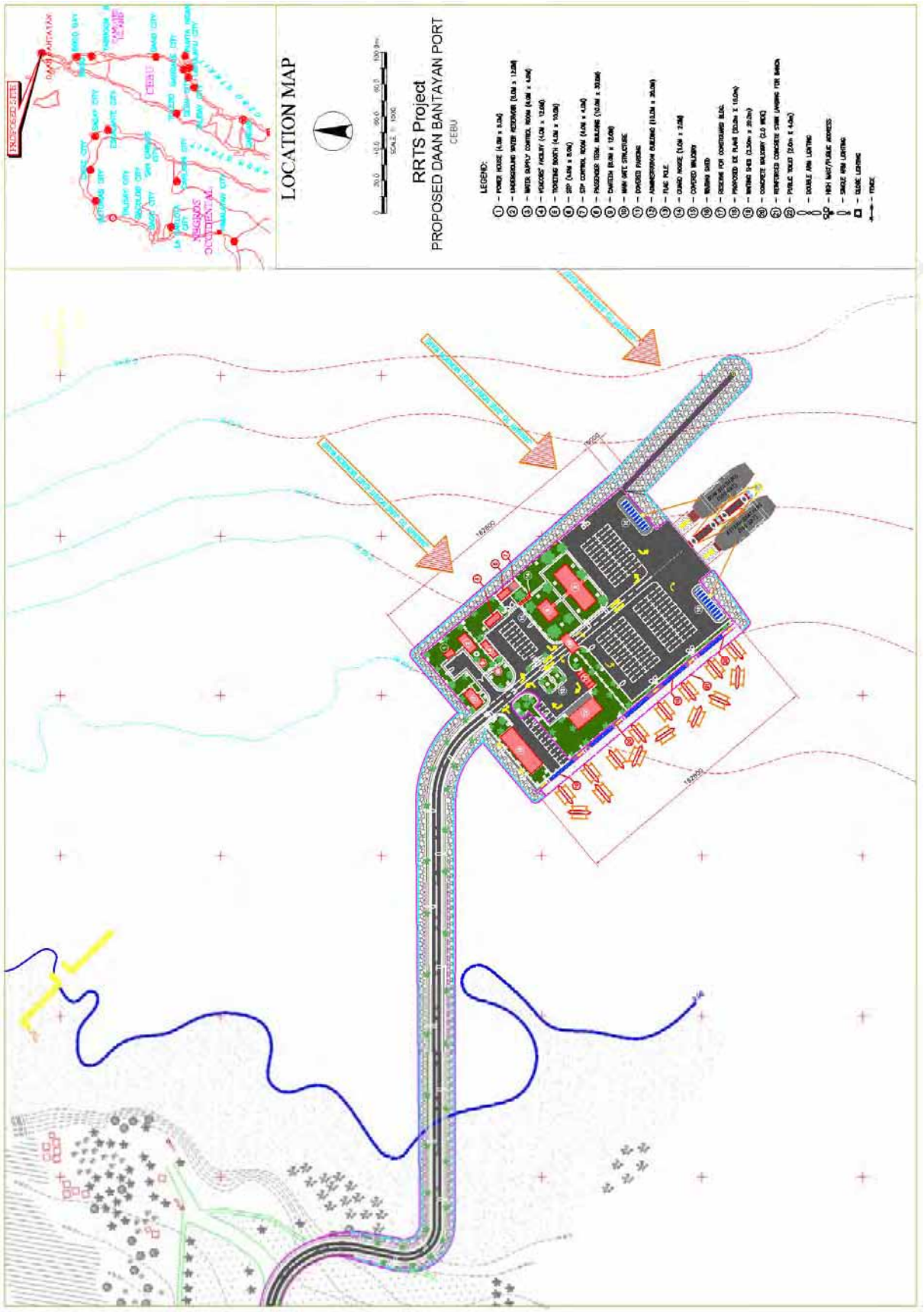


Figure 3-6 Daan Bantayan Port Terminal Payout Plan

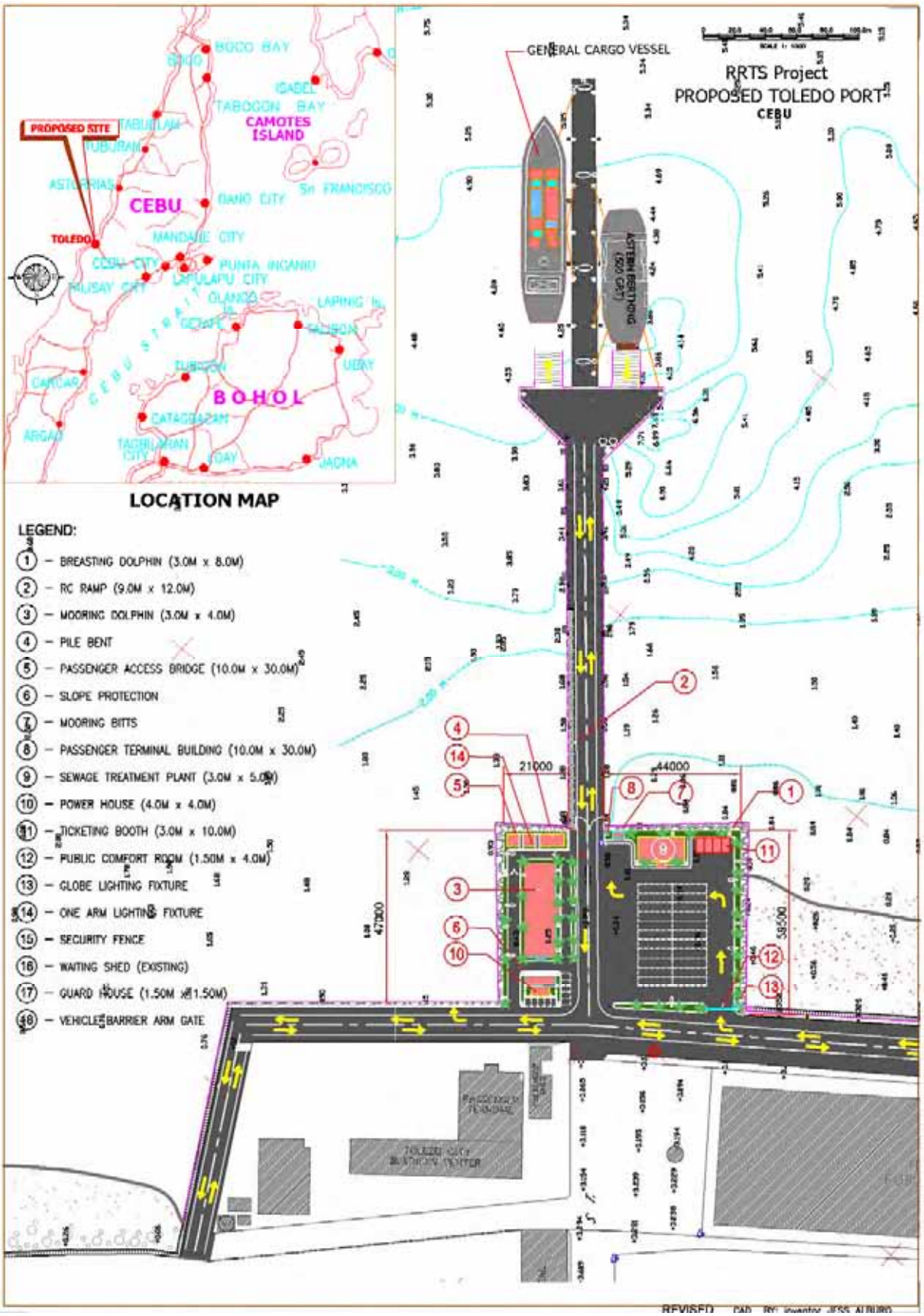


Figure 3-7 Toledo Port Terminal Payout Plan

Figure 3-8 Punta Engano Port Terminal Payout Plan

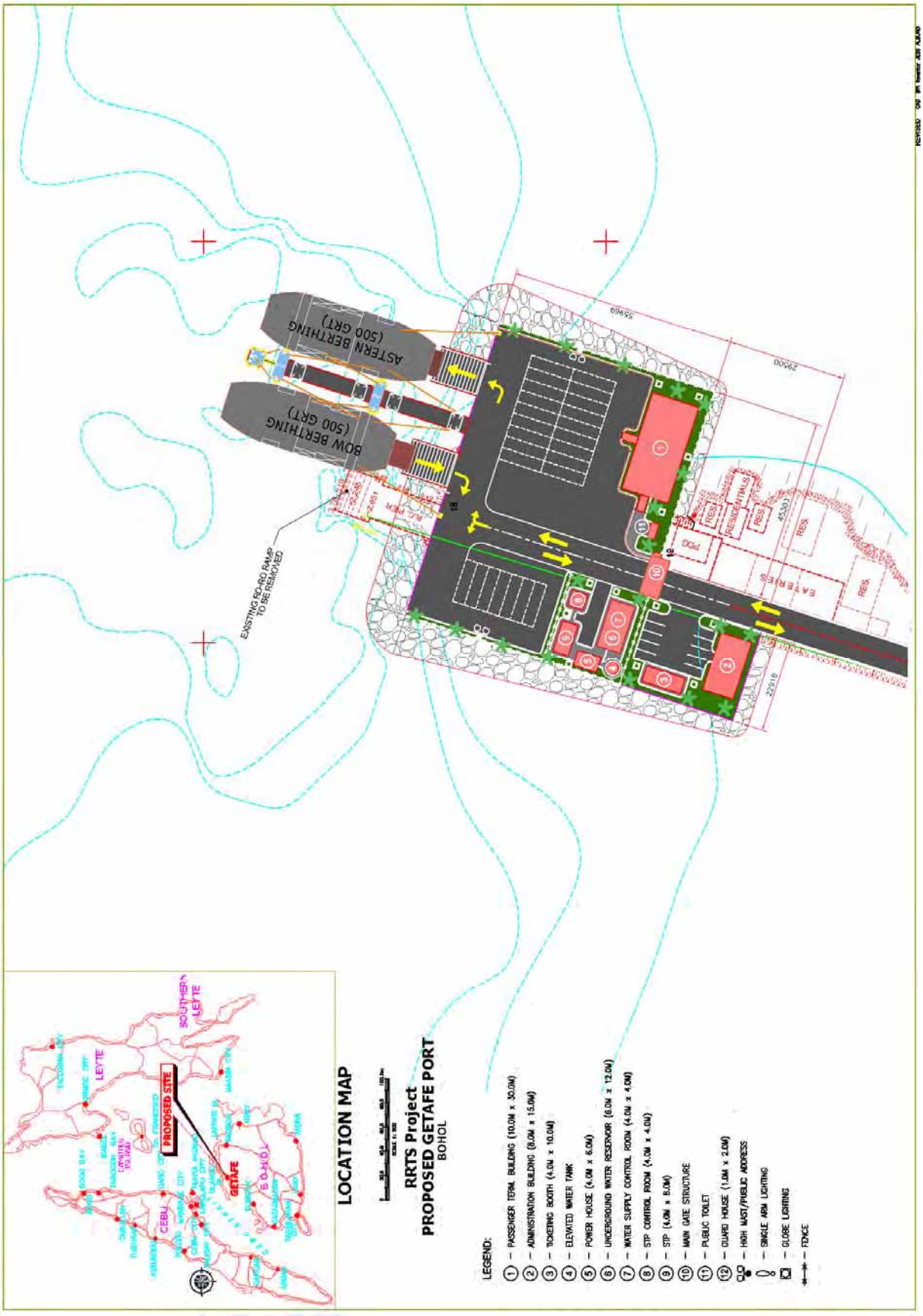


Figure 3-9 Getafe Port Terminal Payout Plan

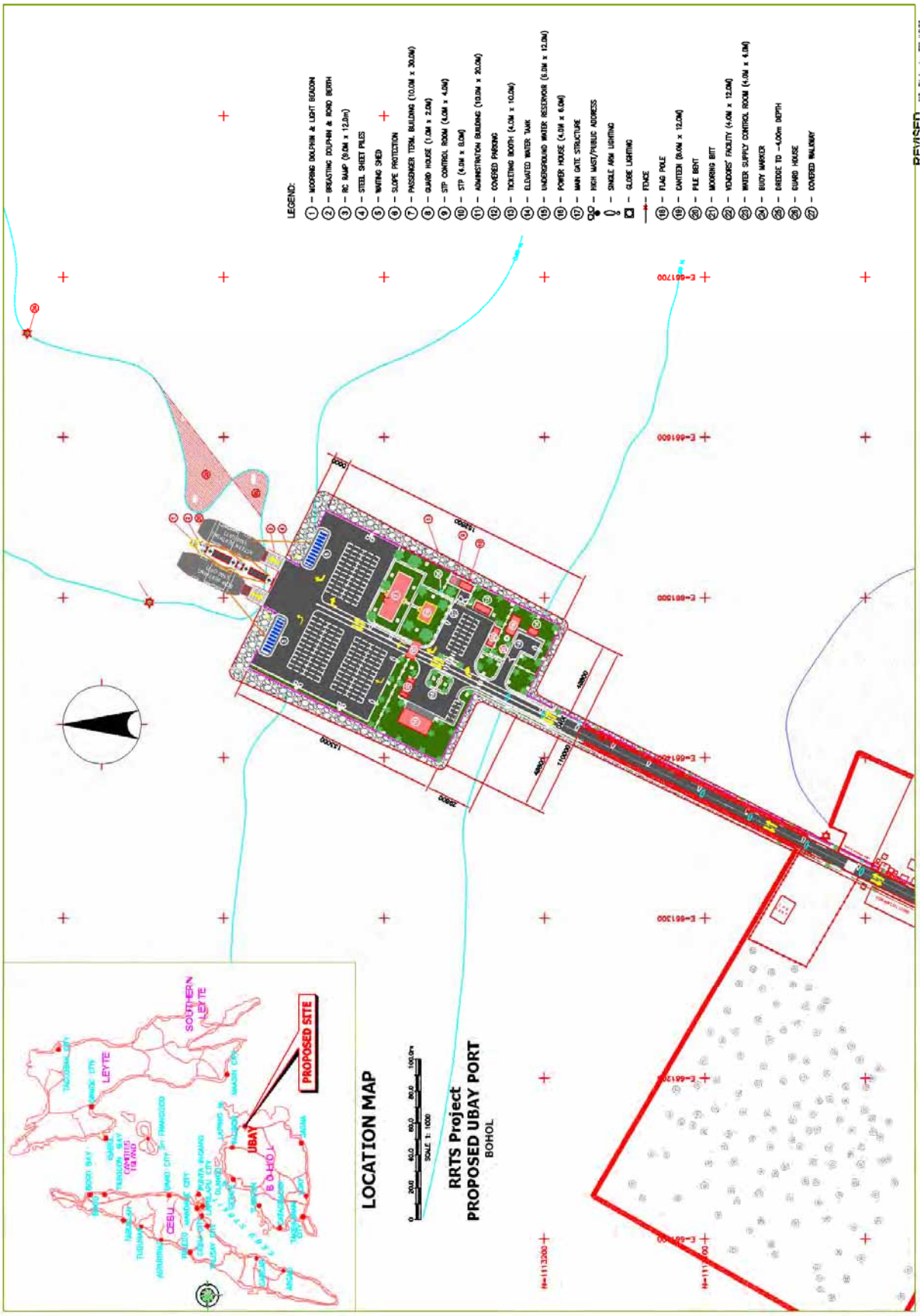


Figure 3-10 Ubay Port Terminal Payout Plan

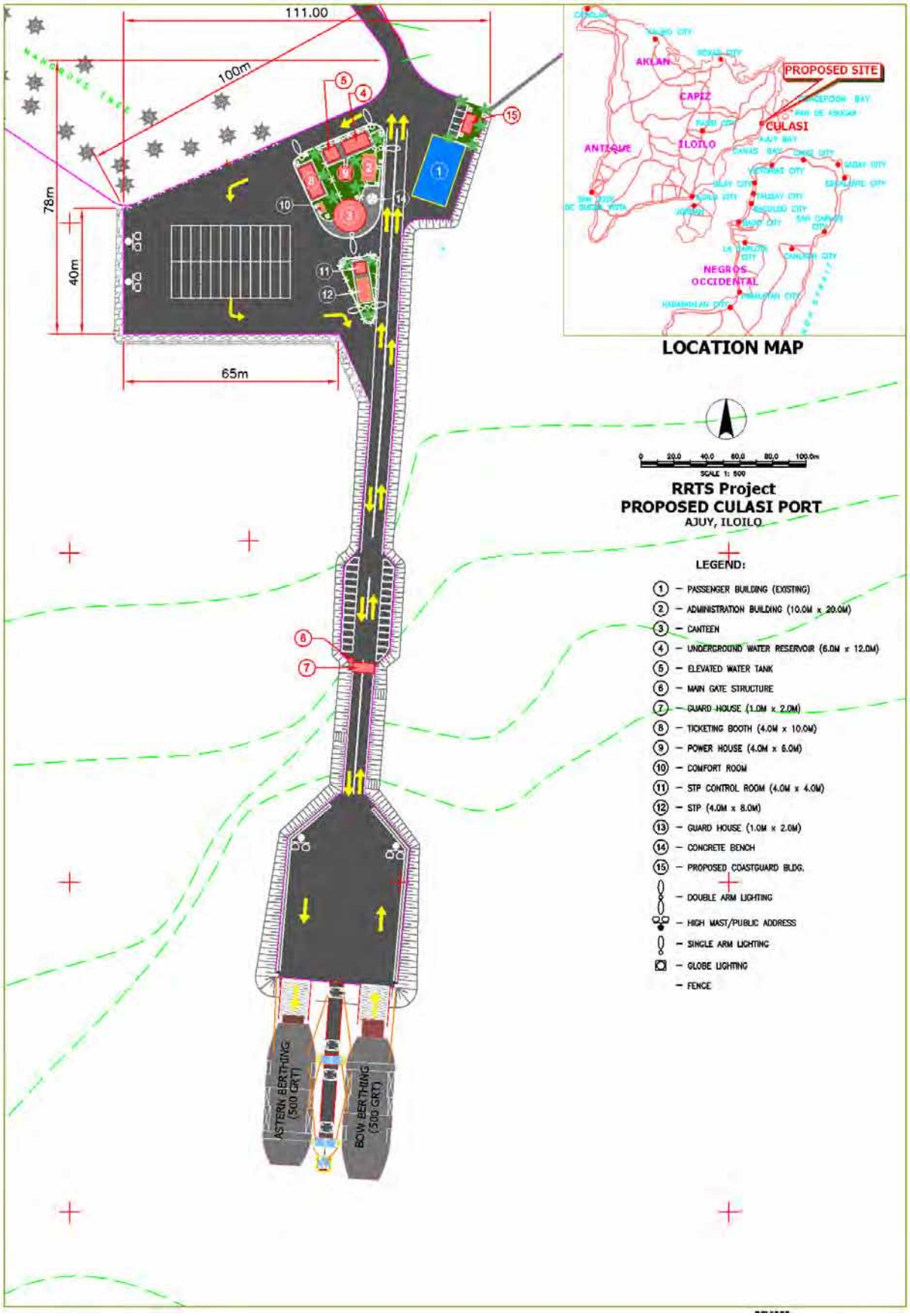


Figure 3-11 Culasi/Ajuy Port Terminal Payout Plan

Figure 3-12 Tabuelan Port Terminal Payout Plan

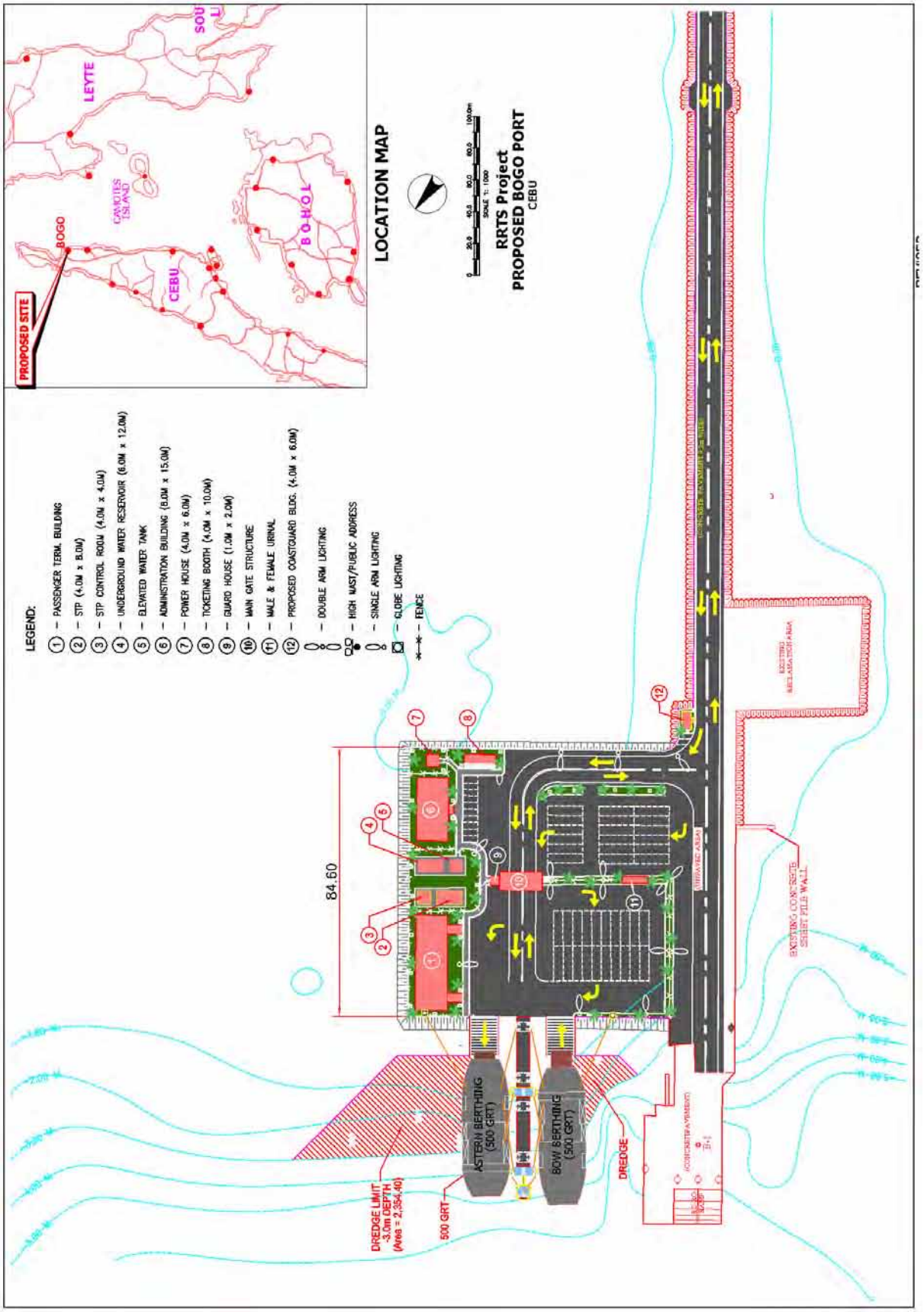


Figure 3-13 Bogo Port Terminal Payout Plan

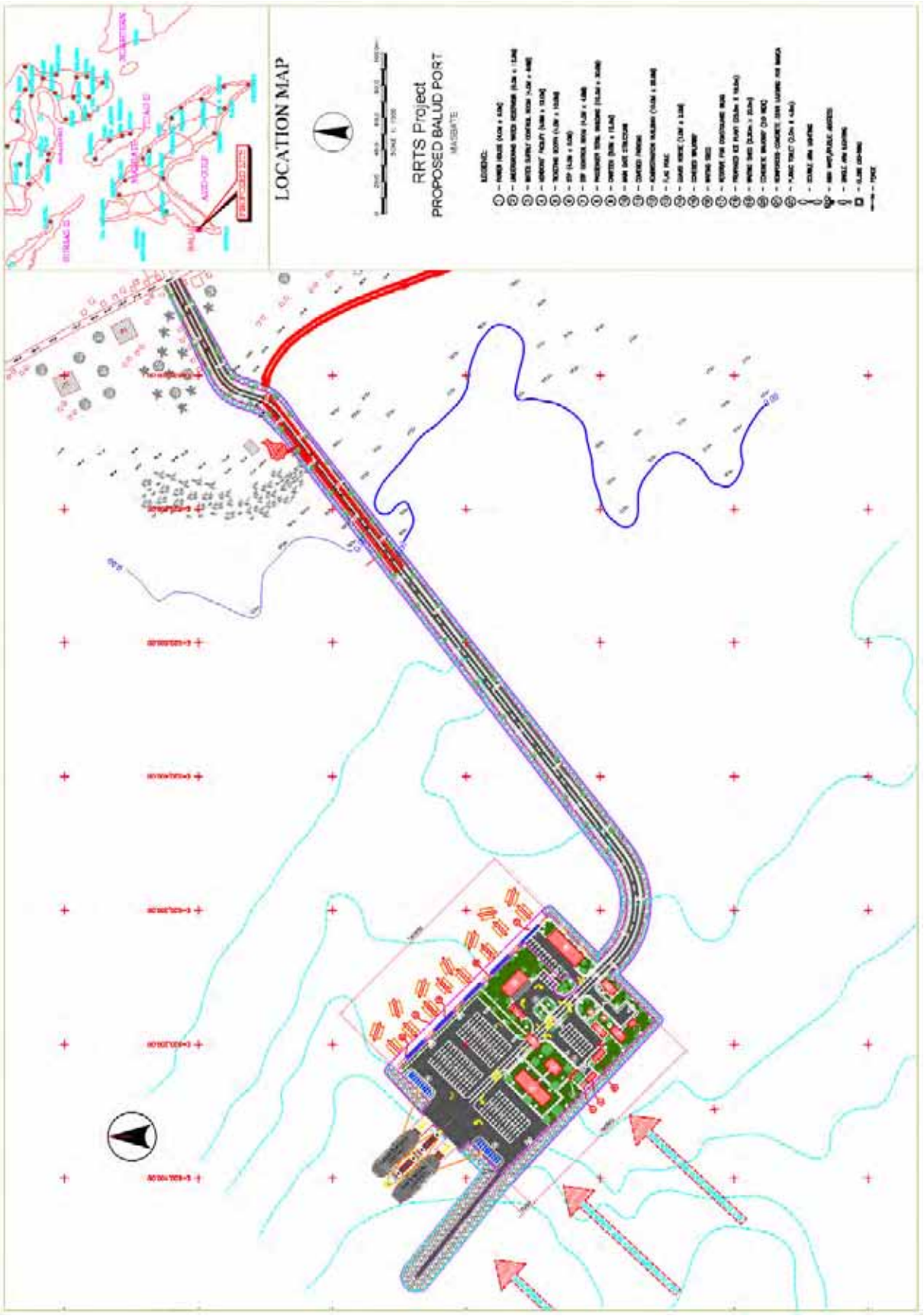


Figure 3-14 Balud Port Terminal Payout Plan

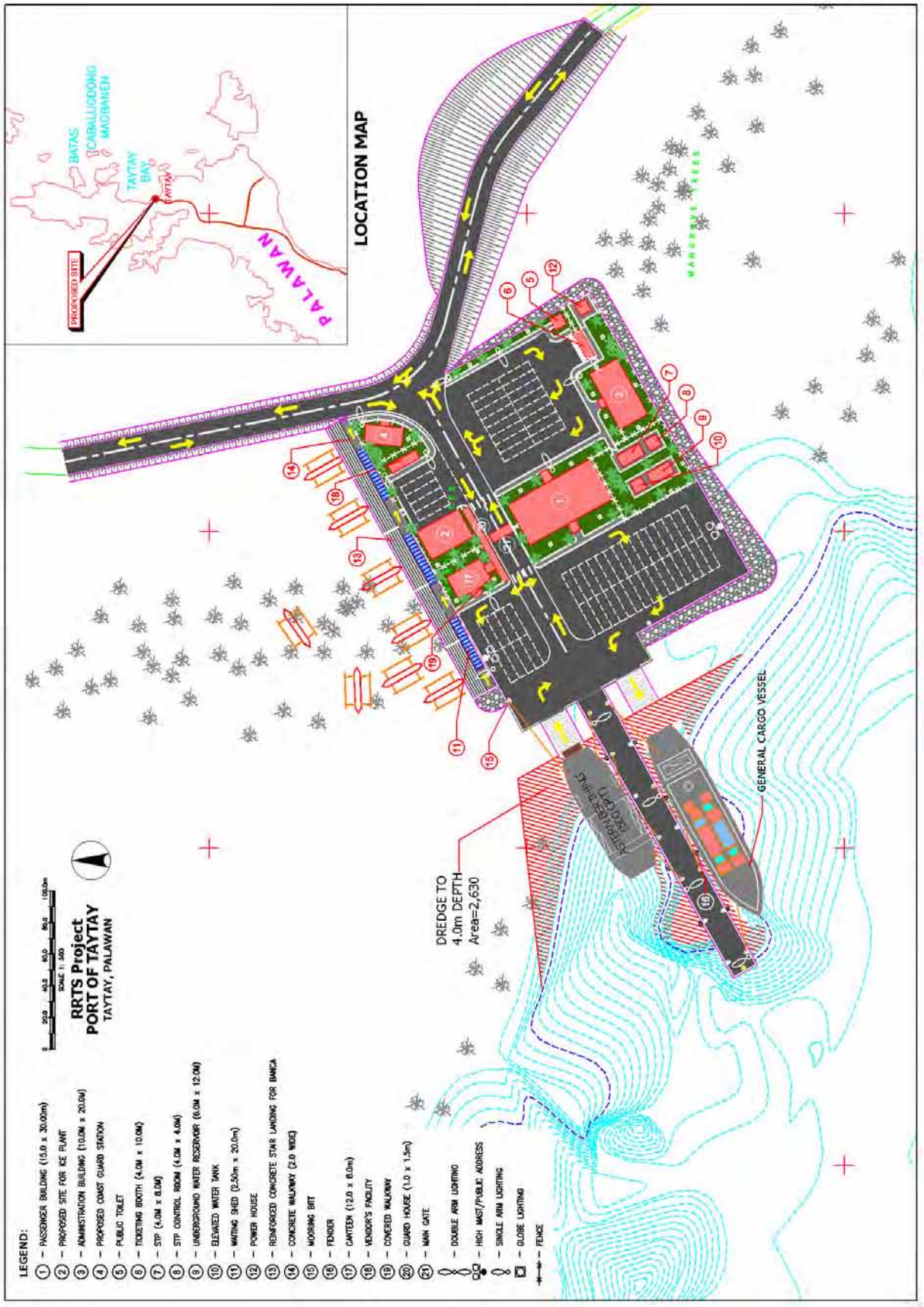


Figure 3-15 Taytay Port Terminal Payout Plan

3.2 Basic Design

The basic design for RoRo terminals is largely divided into 6 divisions as follows:

-Marine Works

-Berthing Facilities

-Navigation Aid Facilities

-Civil Works

-Utilities Work

-Electrical Works

-Appurtenant Works

3.2.1 Reclamation Area

(1) The reclamation area was estimated based on the vehicle holding capacity of the RoRo vessels, area of the building facilities including the underground reservoir, sewage treatment plant and parking areas for the general public and employees, greeneries and road network inside the terminal premises.

(2) As stated elsewhere in the Report, the vehicle holding capacity for Type 5 (500 GRT) vessel is 16 units average. Considering the berthing of 2 vessels simultaneously, some 32 slots will be needed for the vehicle holding area of the Terminal. Taking account of future expansion, an allowance of 16 slots is considered for a total of 48 slots of vehicle holding space. The total vehicle holding space will cover an area of some 3,000 m^2 including the space needed for the road network for access and maneuvering of vehicles for an orderly traffic flow.

(3) The building facilities including the underground reservoir, elevated water tank and sewerage treatment plant will occupy a space of about 800 m^2. Considering the area for road network, greeneries and the parking spaces for employees and the general public, some 7,000 m^2 of space is estimated to be required.

(4) Breakdown of the estimated space for the terminal facilities is shown hereunder:

· **Vehicle Holding Space**

16 slots @ 18m2/slot x 2vessels + 16 slots (future) @ 18m2/slot = 864 m^2

Road Network for Access and Maneuvering in Vehicle Holding Area

35m x 35m – 16 @ 18m2/slot = 937m^2

35m x 50m – 32 @ 18m2/slot = 1,174m^2

Sub-total = 864 + 937 + 1,174 = 2,975m^2

· **Parking Space for General Public and PMO Employees and Customers**

22 slots @ 18 m^2/slot = 396m2

· **Road Network Outside of the Terminal Operation Premises**

8m @ 400m = 3,200m^2

· **Administration Bldg. and Greeneries**

40 persons @ 6m2/person including allowance for meeting room = 240m^2

Greeneries: 8m x 20 = 160m^2

Subtotal = 240 + 160 = 400m^2

· **Terminal Passenger Bldg.**

200 passengers (based on peak season for Cataingan) @ 1.5m^2/passenger = 300m^2

Greeneries: 8m x 30 = 240m^2

Subtotal = 300 + 240 = 540 m^2

· **Other Building Facilities/Utility Works/Greeneries = 2,500 m^2**

TOTAL = 2975 + 396 + 3,200 + 400 + 540 + 2,500 = **1.0 ha**

3.2.2 Marine Works

(1) Comprise of dredging, reclamation, revetment to contain and protect the reclaimed fills, parapet as part of the revetment and breakwater in certain terminals to protect the mooring areas from monsoon waves either from the northeast or southwest direction.

(2) As can be seen on the layout plans, as much as practicable, the berthing facilities was located in the offing at natural depths ranging from 4 to 5m to allow the safe maneuvering and mooring of the objective vessels. Locating the berthing structures in the offing will also avoid costly dredging works and minimize the accumulation of silts at the berthing areas thereby averting costly maintenance dredging works in the future.

(3) Reclamation materials may either be wet or dry fills provided that it is free from organic matters and other foreign debris.

(4) As shown on the drawings and for purposes of estimation, the breakwater will consist of 5 to 50 kg. cobble stones, 1 to 3 tons armor stones and crown plain block concrete to reduce the volume of rock materials. The stability of the armor stones and crown concrete will be checked against the design wave heights based on hind-casting studies to be conducted during the detailed design phase.

3.2.3 Berthing Facilities

(1) As stated elsewhere in the Report, two standard type of berthing facilities are adopted. One is the pier type; 15m wide x 100 meters long with 5m of water depth to cater for 2000 GRT RORO (Taytay) and various sizes of general cargo vessels.

(2) For economy, the other type comprises of two units of breasting dolphin 8m x 3m x 80cm thick with berthing depth of 4m spaced at 23.5m to cater for RORO vessels up to 500 GRT as shown on the drawings.

(3) The berthing structures were provided with battered piles to resist the berthing impacts of the objective vessels and seismic forces based on a combination of deadweight and uniformly distributed live loads. The pile bent structures and mooring facilities are also provided with battered piles to resist seismic forces.

(4) As shown on the drawings, a 4m wide passenger passageway hollow slab superstructure on pile bents are provided between the breasting dolphins and the steel sheet pile quay wall for the embarkation and disembarkation of passengers through a manually operated boarding/de-boarding stairway.

(5) The passenger walkway is detached from the breasting dolphin so that it will not be affected by any movement of the breasting facility caused by the berthing impact of vessels.

(6) The berthing facilities are provided with cylindrical fenders to accommodate the berthing of RORO vessels at lowest low and highest high tidal ranges. The structure is also provided with 50 ton capacity bitts for the mooring of vessels.

(7) A mooring dolphin is provided at the end of the breasting dolphins (on sea) as shown on the drawings to take the bow/astern lines of the RORO vessels berthed alongside the breasting

dolphins.

(8) Pursuant to PPA standard, the berthing facilities are provided with two sets of fixed type RORO ramps (9m x 12m x .80m in height each) at maximum slope of 10%, on both sides of the berthing structure. One ramp will cater for bow berthing while the other will cater for astern berthing.

(9) The mooring dolphins and frontage of the ramps will be provided with V Type rubber fenders for protection.

(10) The berthing facility, ramp structures and pile bent facility will be constructed of RC superstructure on steel pipe pile substructure.

(11) The reclaimed fills at the back of the ramps are contained by steel sheet pile wall structure as shown on the drawings, to avoid possible settlement in the future to avert the occurrence of differential elevations between the landside facility and the berthing /ramp structures.

3.2.4 Navigation Aids Facilities

(1) The berthing facilities will be provided each with a light beacon as shown to enhance safety of navigation of vessels during approach particularly during night time operations.

(2) Lighted buoy will be provided along the access channels where needed to identify areas of shallow depths to enhance safety of navigation in both day and night operations.

3.2.5 Utilities Work

(1) The utilities work comprise of the drainage system, sewerage system, water supply system and firefighting system.

(2) The drainage system will be designed based on a 5 year recurrence interval at 60mm/hour rainfall intensity. The potable water supply requirements will be designed based on the number of passengers and staffs to operate the terminal facility at 100 liters per persons per day including the requirements of the RORO vessels at 5000 liters per day.

(3) Potable water will be tapped from the Local Water Work Utilities Administration (LUWWA) in the Locality.

(4) Where the capacity is not sufficient, other sources will be considered including the development of at least 2 deep wells to ensure continuous and sufficient supply even when one is under maintenance.

(5) The sewerage treatment plant will be designed based on the number of passengers and personnel to operate the terminal in accordance with DENR requirements.

(6) For safety of operations, the terminal passenger building and the administration building are provided with firefighting facilities in accordance with domestic regulations.

3.2.6 Civil Works

(1) The civil work facilities comprise the construction of two lanes causeway and access road, sidewalks, pavement, pavement markings, traffic signs, landscaping and demolition of existing structures where required.

(2) The causeway will be constructed of fill to be contained by stone revetment including concrete parapet as shown on the drawings.

(3) The capacity of the vehicle holding area is estimated based on the capacity of the RORO vessel at 35 units average vehicles for Type II (2,000 GRT) vessels and 9 units average vehicles for Type 5 (500 GRT) vessels.

(4) As shown, the estimated truck holding capacity is about 30 units including allowance. The pavement of the road network inside the terminal premises including the access road and

causeway will be constructed of 25 cm thick concrete for durability.

(5) The pavement of the parking area, truck holding area, sidewalks and apron of the berthing facilities will be constructed of interlocking blocks concrete for durability and ease of maintenance.

(6) The inclusion of greeneries or landscaping as integral part of a port terminal has increasingly been the trend worldwide. As in the case of the Port of Yokohama, the proposed ports are provided with greeneries to enhance its warmth as service oriented facilities.

3.2.7 Building Works

(1) The building facilities comprise of the passenger terminal, administration building, control house, power house, waiting shed, guard house, banca landing shed, ticketing booth, public toilet, coast guard station and terminal vendors' facility.

(2) Notable among the buildings are the passenger terminal and the administration building which occupies a major part of the cost of the building facilities.

(3) The design capacity of the objective vessels is 500 passengers for Type III vessels and 240 passengers for Type V vessels. Considering however that traffic will generate over the next several years, an average of about 200 passengers per trip was considered.

(4) This assumption is based on the capacity of Cataingan Port, Masbate during at 200 passengers per trip bound for Cebu during peak seasons. Therefore at 1.5 sq.m. per passenger, the floor area for the passenger terminal building is estimated at 300 sq. m. including provisions for other amenities such as lavatories and hallways.

(5) Should passenger traffic increase significantly in the future, sufficient space is available for the expansion of the terminal building.

(6) The administration building will house the Port Management Office (PMO) staffs for the operations and management of the Terminal which will be cater services for the general public.

(7) At 30 to 40 persons to be serviced per day including the PMO staffs and at 6 sq. m. per person including provisions for related amenities such as office spaces, conference room, waiting space for port users to be serviced, hallways and comfort rooms, the floor area is estimated at 240 m^2.

3.2.8 Electrical Works

(1) Electrical works will comprise the power supply system including provisions for indoor and outdoor lightings. The design for the lighting system will be based on the following:

-For open yard:	30 lux
-For street lightings:	20 lux
-Indoor lightings:	300 to 500 lux average

(2) Due to the occurrence of frequent brownouts in the countryside nationwide, the PPA has made it a mandatory requirement to provide all ports under its administration with a 400 KVA standby generator. With this in consideration, the proposed ports under the RRTS Project were provided with standby generators.

3.2.9 Appurtenant Works

(1) These include the perimeter fence to enhance security and control gates for vehicular and passenger traffic entering the terminal operations premises.

(2) As stated elsewhere in the Report only passengers and vehicles with valid tickets are allowed to enter the terminal operations premises.

(3) The proposed ports will be provided each with a public address system to enhance services related to management and operation of the terminal.

3.3 Standard Structures

Such major infrastructure as breakwater, mooring dolphins, piers, revetment and sheet pile wall were designed. The standard structural drawings are attached hereafter.

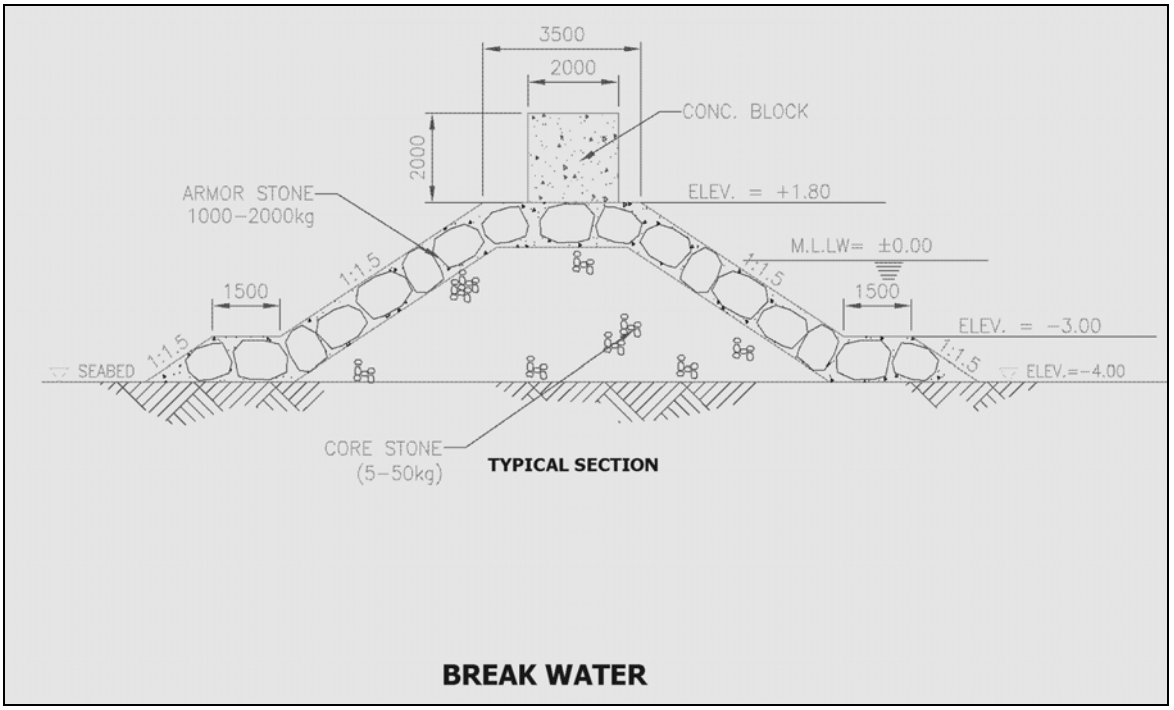


Figure 3-16 Typical Section of Break Water

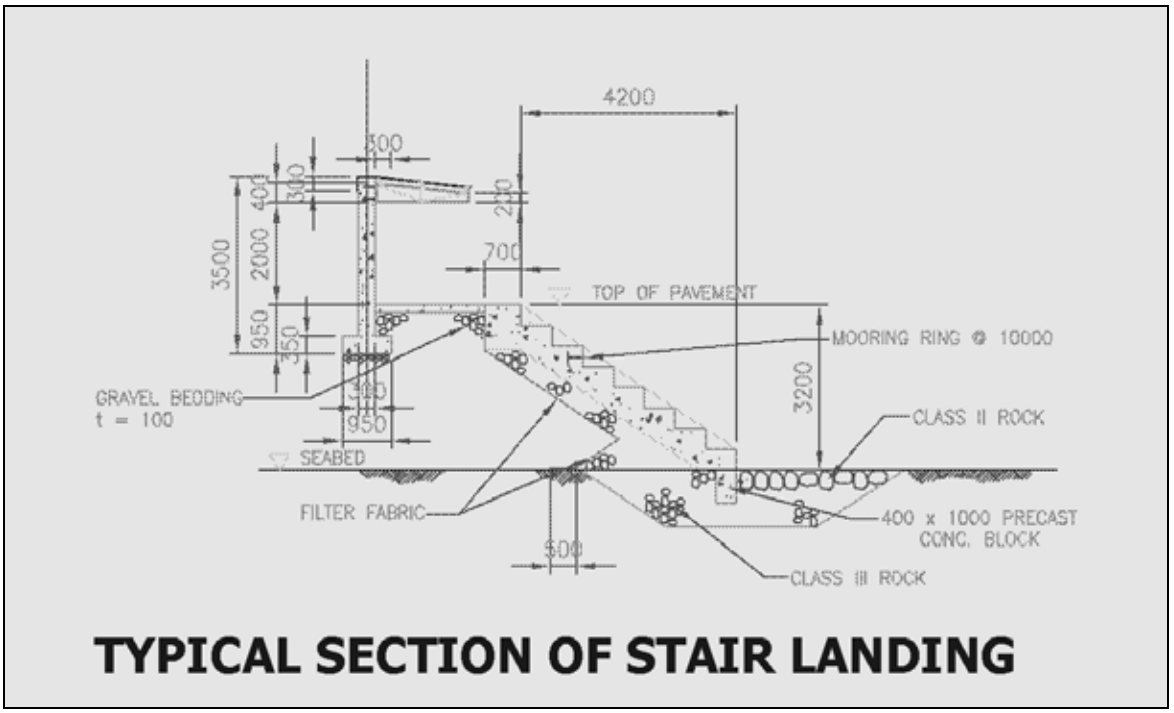


Figure 3-17 Typical Section of Stair Landing

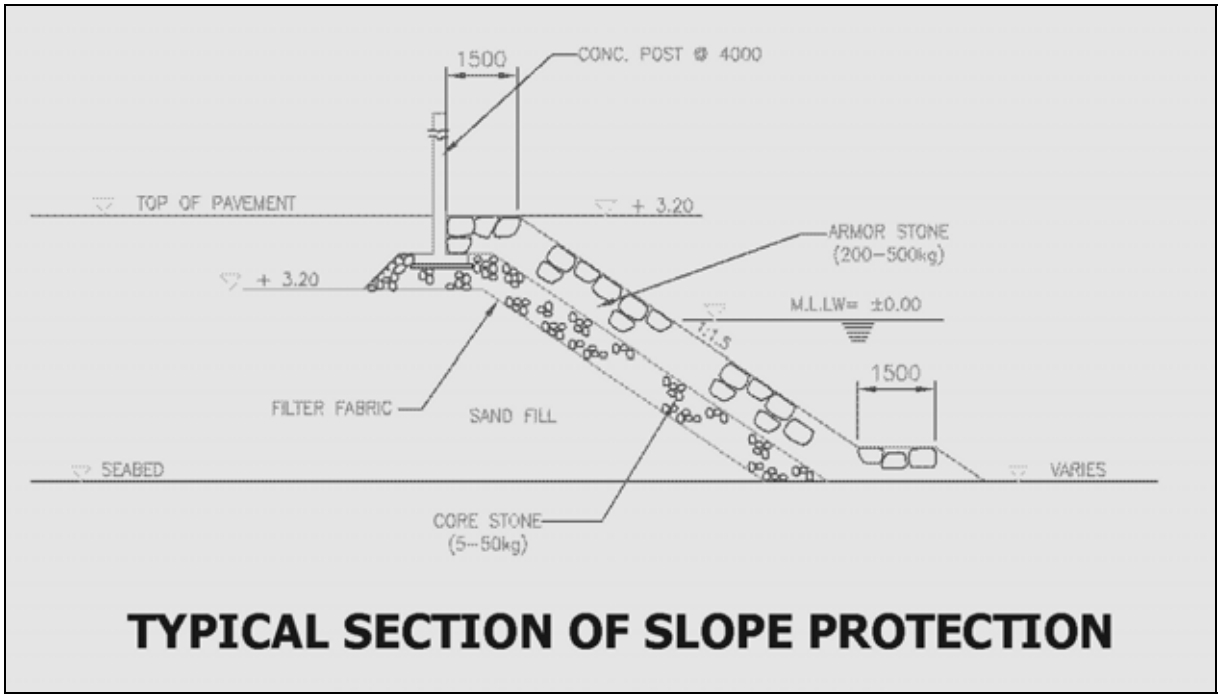


Figure 3-18 Typical Section of Slope Protection

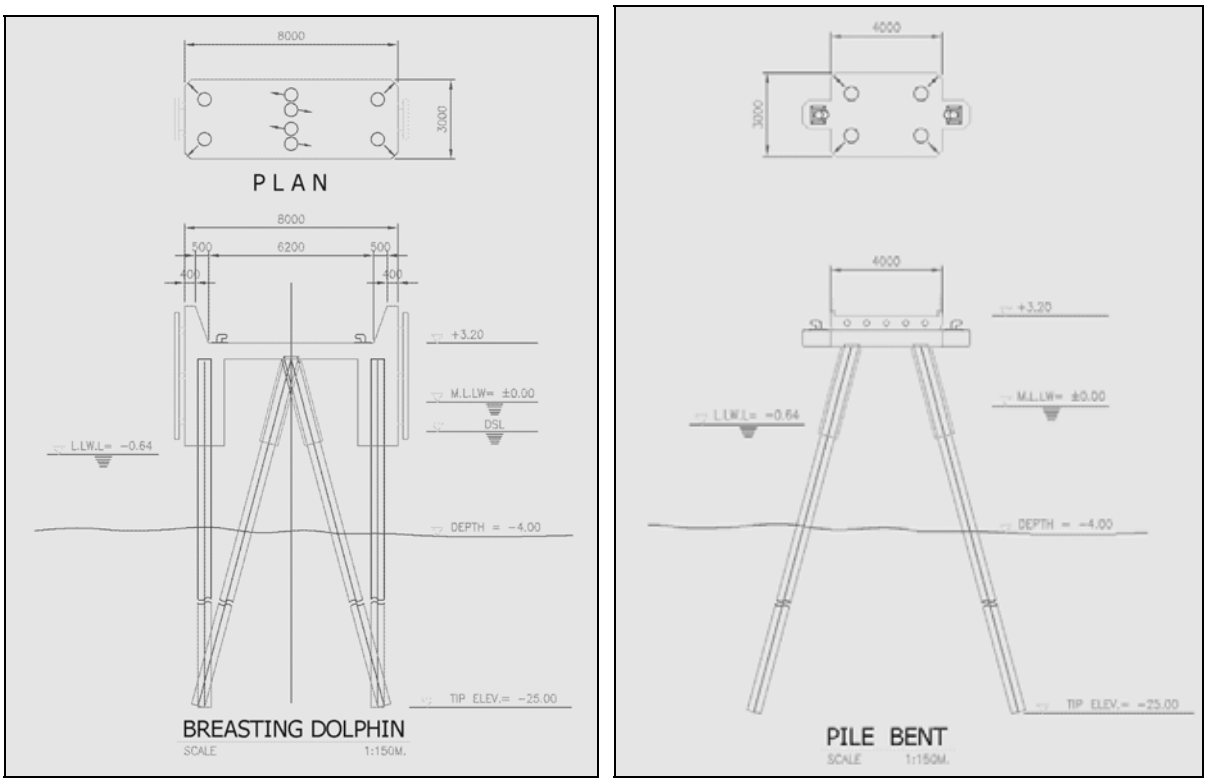


Figure 3-19 Typical Section of Breasting Dolphin

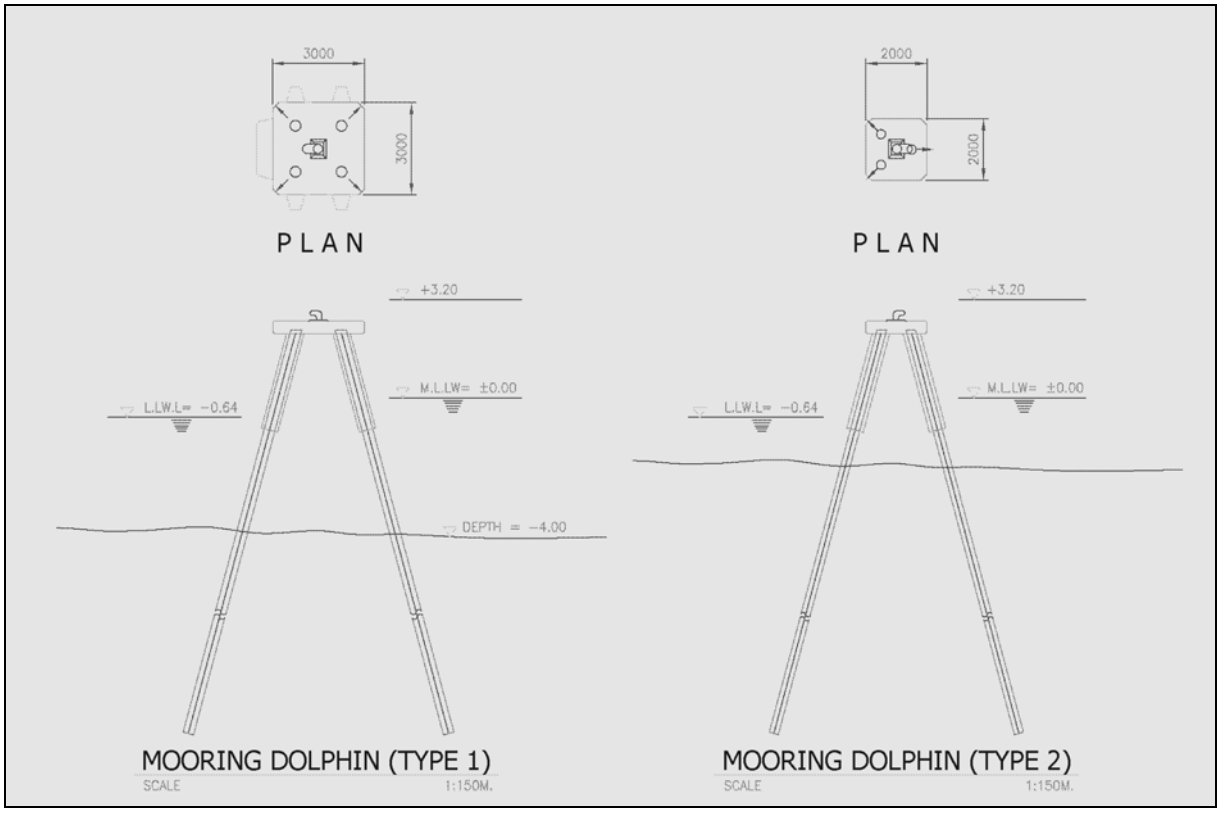


Figure 3-20 Typical Section of Mooring Dolphin

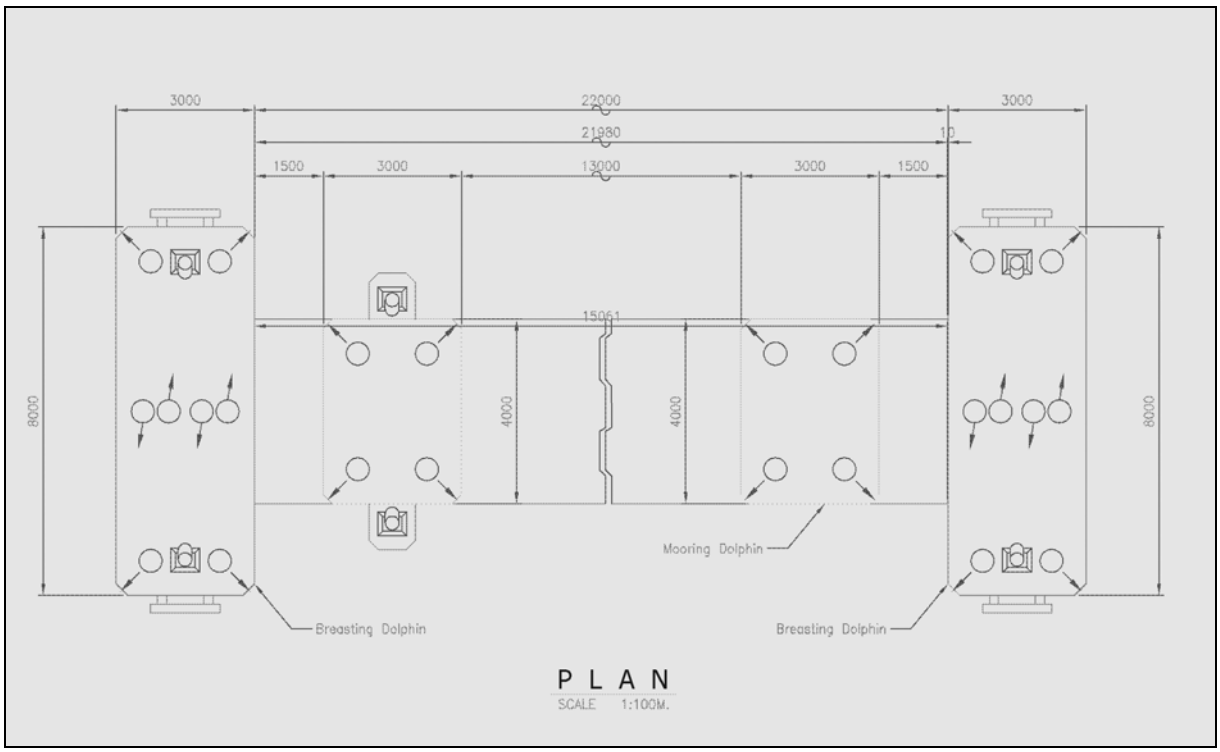


Figure 3-21 Plan of Breasting Dolphin

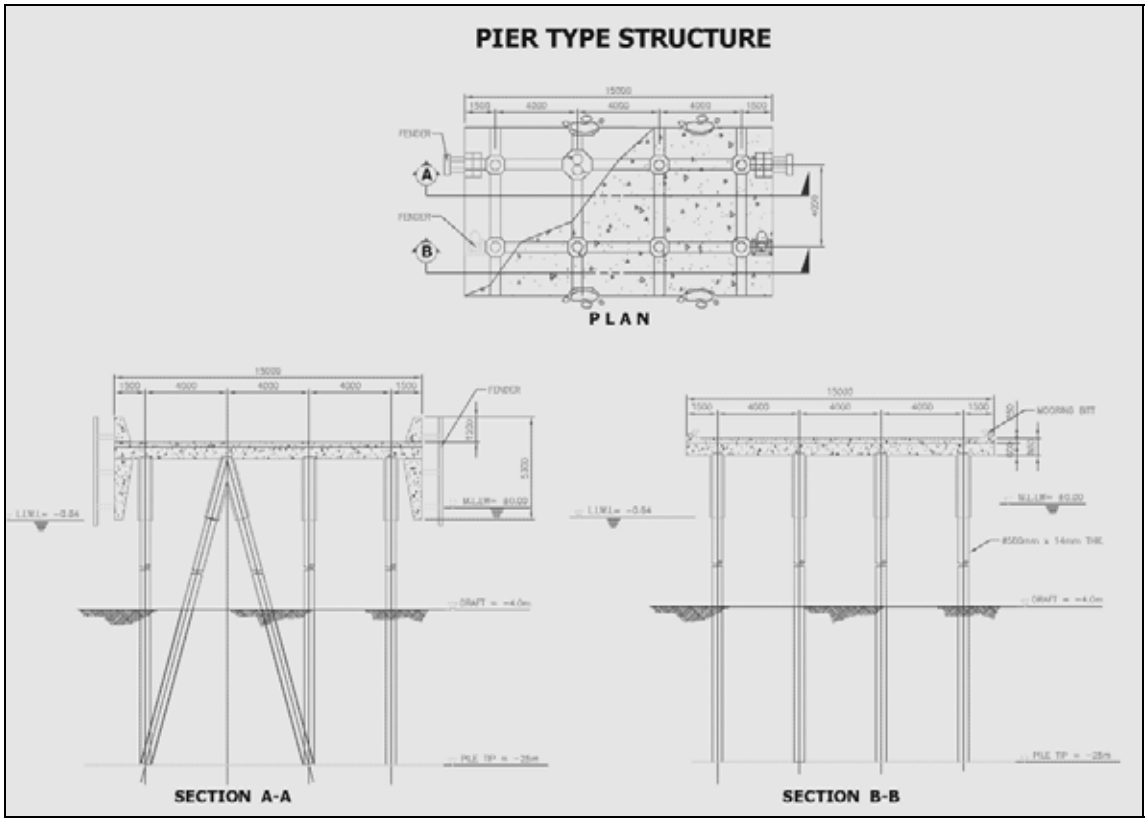


Figure 3-22 Typical Section of Pier Type Structure

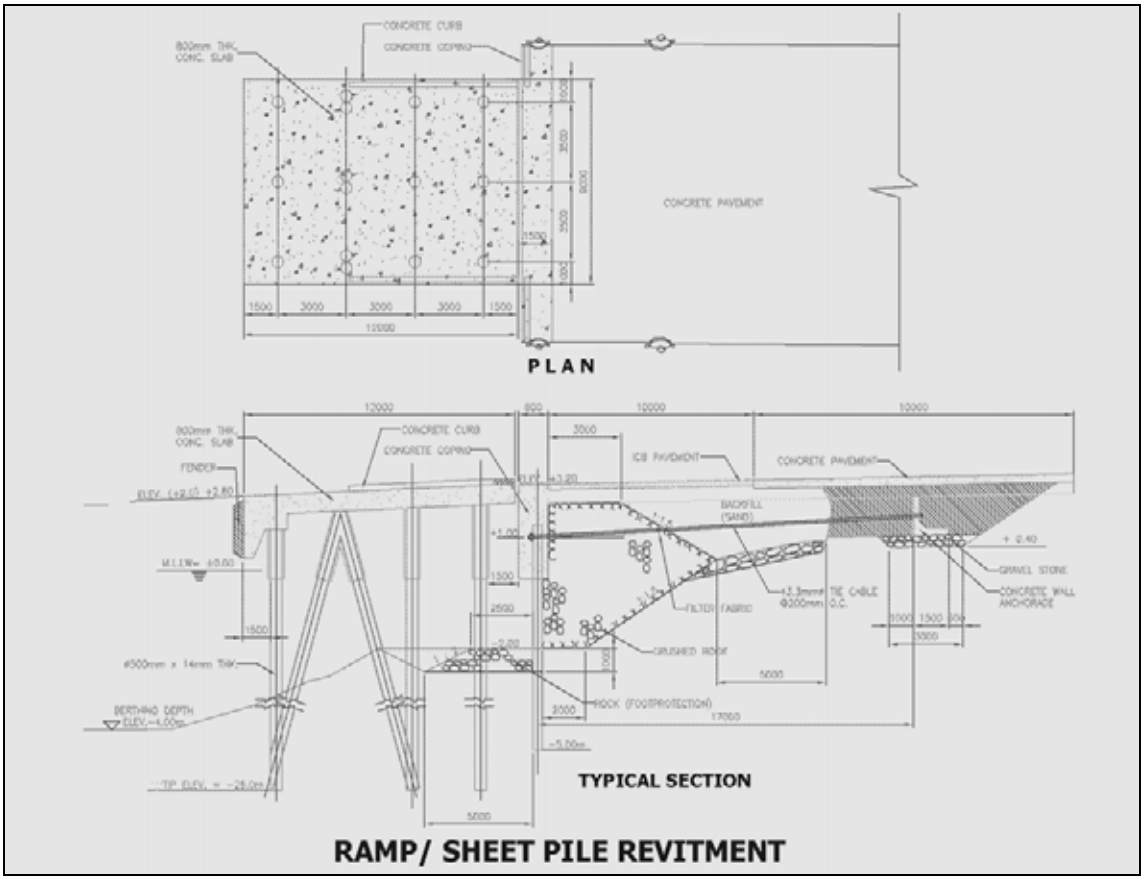


Figure 3-23 Plan and Typical Section of Ramp/Sheet Pile Revetment

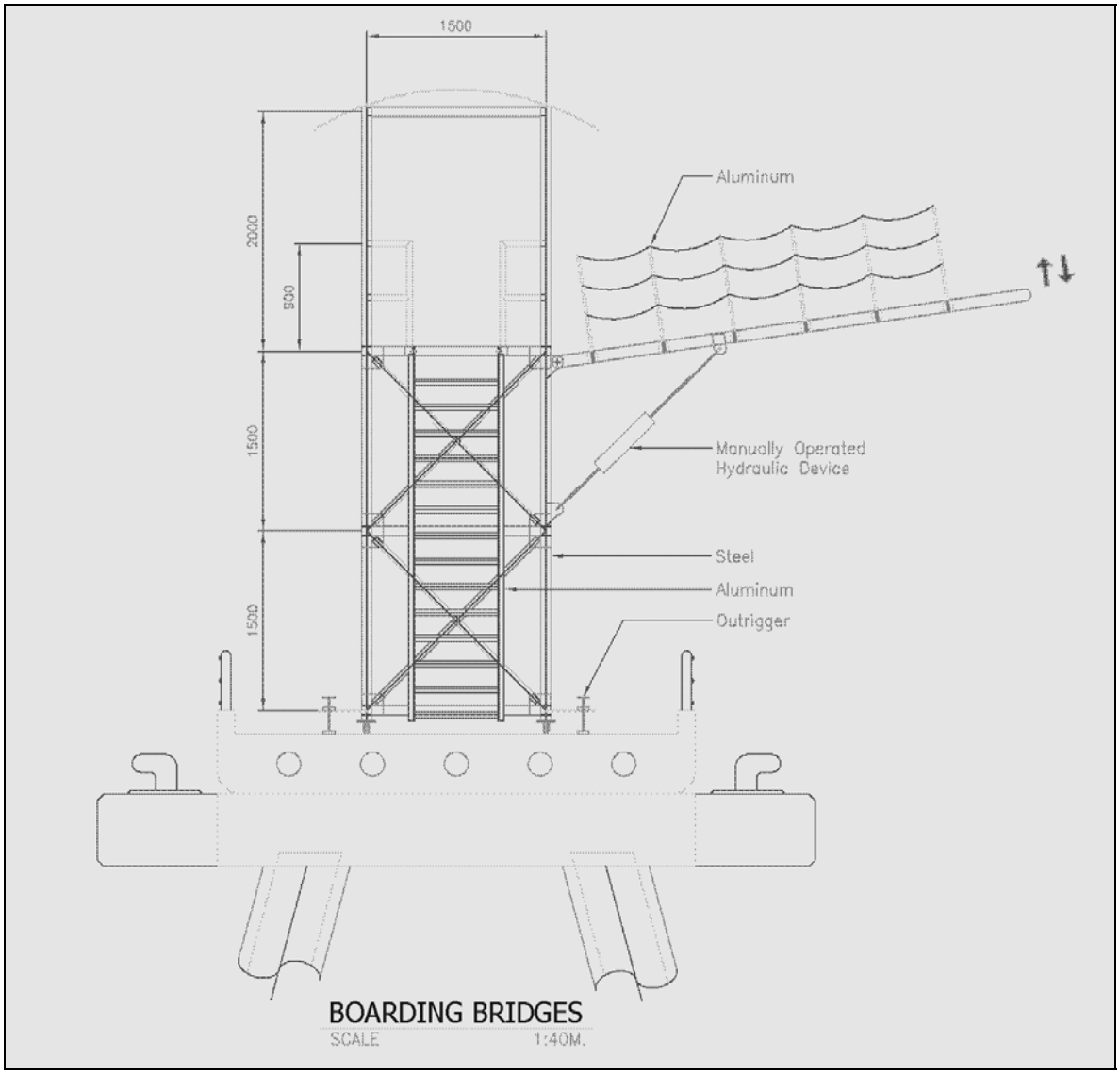


Figure 3-24 Typical Section of Boarding Bridge

4. Cost Estimates

4.1 Estimated Construction Costs

The estimated construction costs for the development of the RoRo terminals are categorized into several divisions such as marine works including berthing facilities, navigational aids, civil works, building works, utility works, electrical works including lighting system, appurtenant works and access road. The unit costs as described in Part 1, Section 5.3.3 are used for the estimation. The breakdown of the estimates is attached in the Appendix II-4-1-1.

The Table below summarizes the estimated construction costs for the proposed 15 including the related highway access, as well as those included under the PPA umbrella.

Table 4-1 Summary of Estimated Cost

Unit: Thousand Pesos

RRTS Route	RoRo Port	Admin.	Candidate for F/S	Highway	PPA Development Project
Eastern SRNH	Matnog	PPA			242,209
	San Ricardo	PPA			186,439
	Lipata	PPA			309,010
	Naval	PPA	**150,168**		
Western SRNH	**Caticlan**	LGU/PPA	**464,978**		
	Dumangas	PPA	**115,240**		
	Siaton	PPA			226,733
Central SRNH	**San Antonio**	PPA	**309,747**		402,639
	Esperanza	PPA	**366,771**	**183,549**	
	Daan Bantayan	LGU	**372,750**		
Negros-S.Leyte SRNH	**Toledo**	CPA	**239,229**		
	Punta Engano	CPA	**276,281**		
	Getafe	PPA	**205,187**		
	Ubay	PPA	**286,664**		
Panay-Leyte SRNH	**Culasi/Ajuy**	LGU	**241,749**		
	Tabuelan	CPA/LGU	**297,396**		
	Bogo	CPA/LGU	**209,625**		
Panay-Masbate SRNH	**Balud**	LGU	**384,225**	**244,742**	
Iloilo-Palawan SRNH	San Jose	PPA			651,478
	Taytay	PPA	**291,228**	**122,366**	244,814

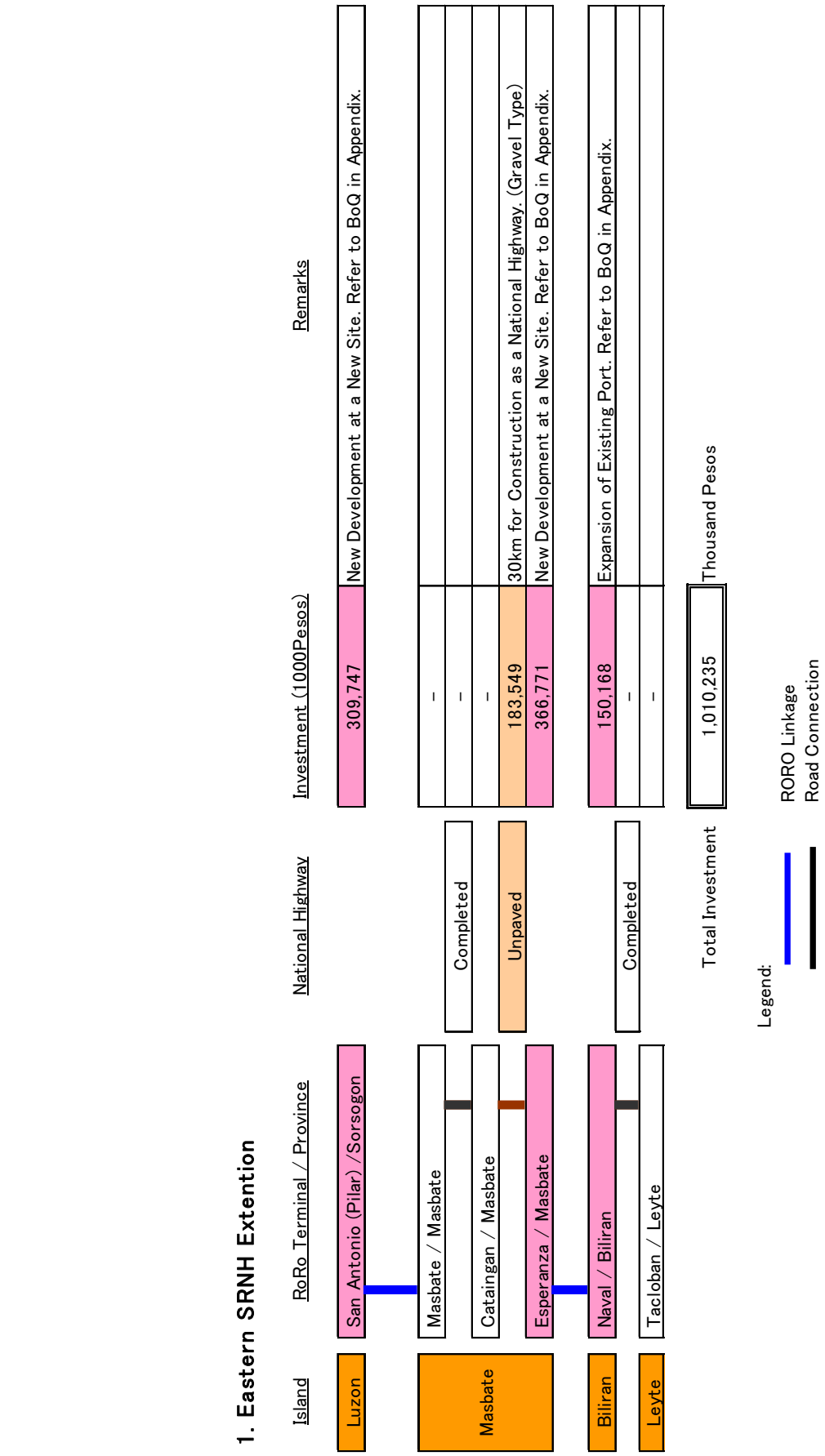
4.2 Development by Route

The estimated costs tabulated hereunder apply to the Western corridor route, Central corridor route, Eastern corridor extension route, East-West lateral route-1, East-West lateral route-2, Panay-Sorsogon route, Palawan-Luzon route and Palawan-Panay route which comprise of eight terminal RORO Ports.

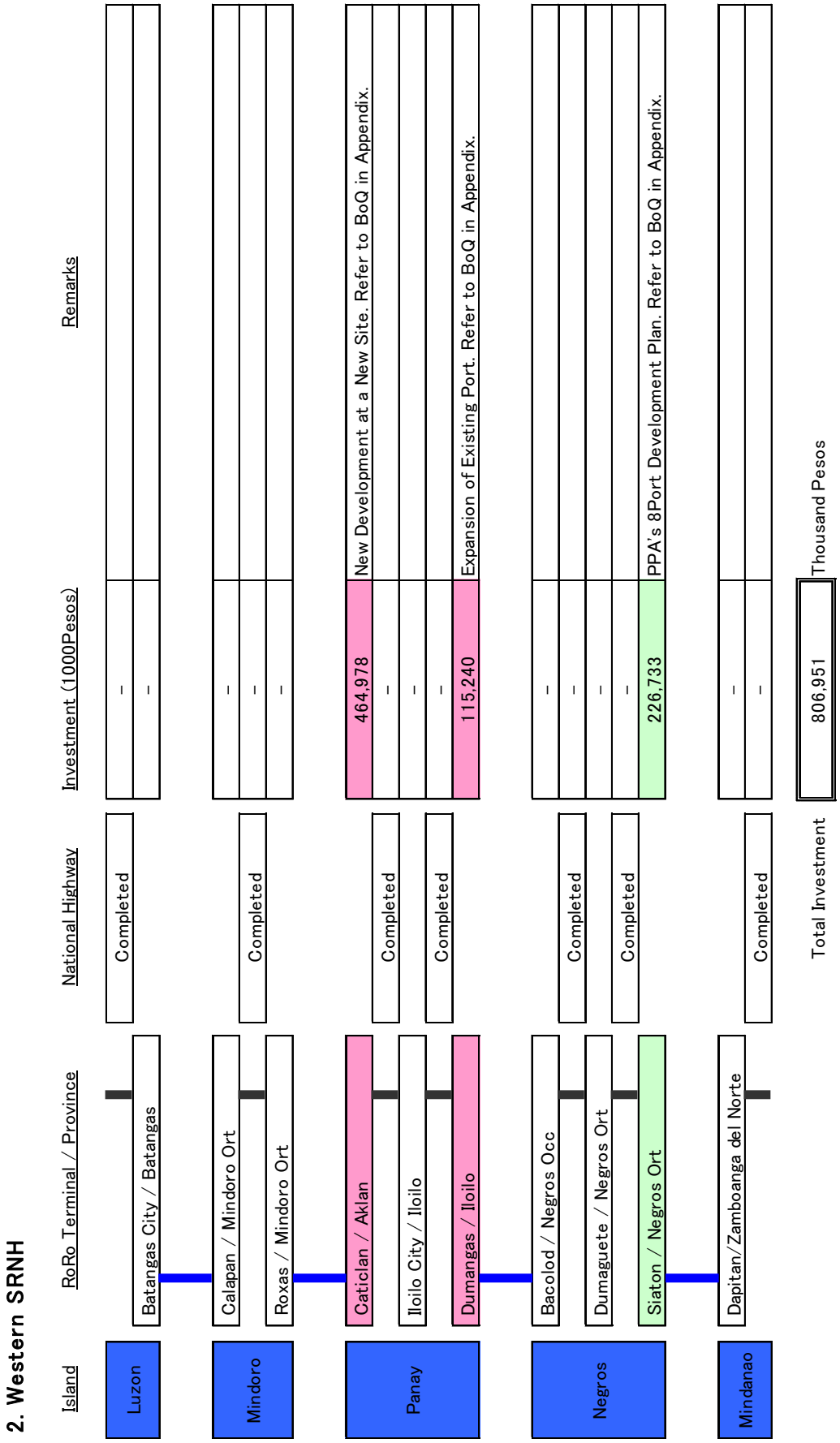
Table 4-2 Investment by RRTS Route

RRTS Route	Investment (1,000Pesos)	Remarks
1. Eastern SRNH Extension	1,010,235	Incl Esperanza Hwy
2. Western SRNH	806,951	
3. Central SRNH	1,232,817	Incl Esperanza Hwy
4. Negros-S.Leyte SRNH	1,007,361	
5. Panay-Leyte SRNH	748,770	
6. Panay-Masbate SRNH	938,704	Incl Balud Hwy
7. Batangas-Palawan SRNH	1,065,072	Incl Taytay Access
8. Iloilo-Palawan SRNH	586,762	Incl Taytay Access

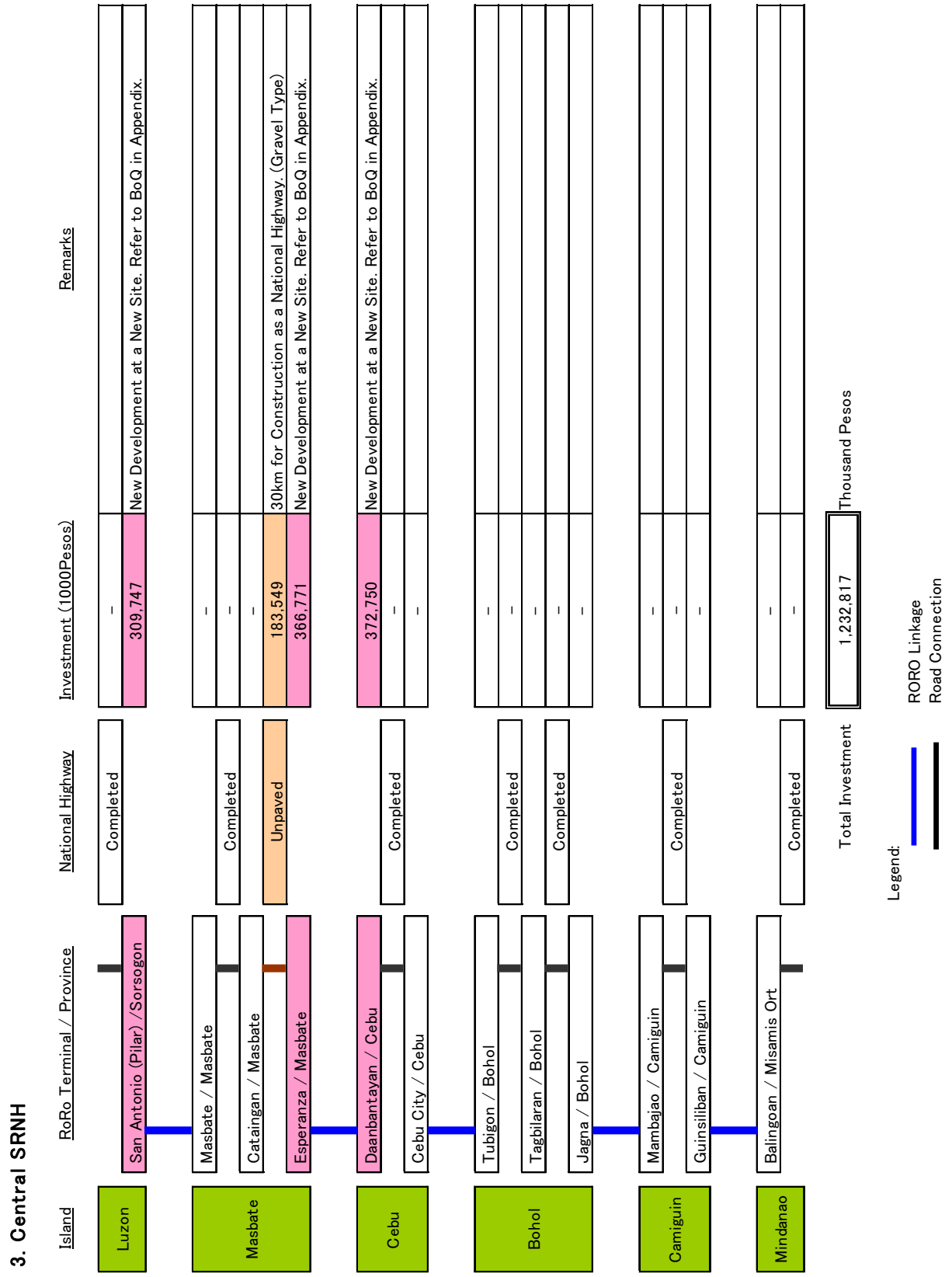
The breakdown of the cost estimates are shown in the tables hereafter.

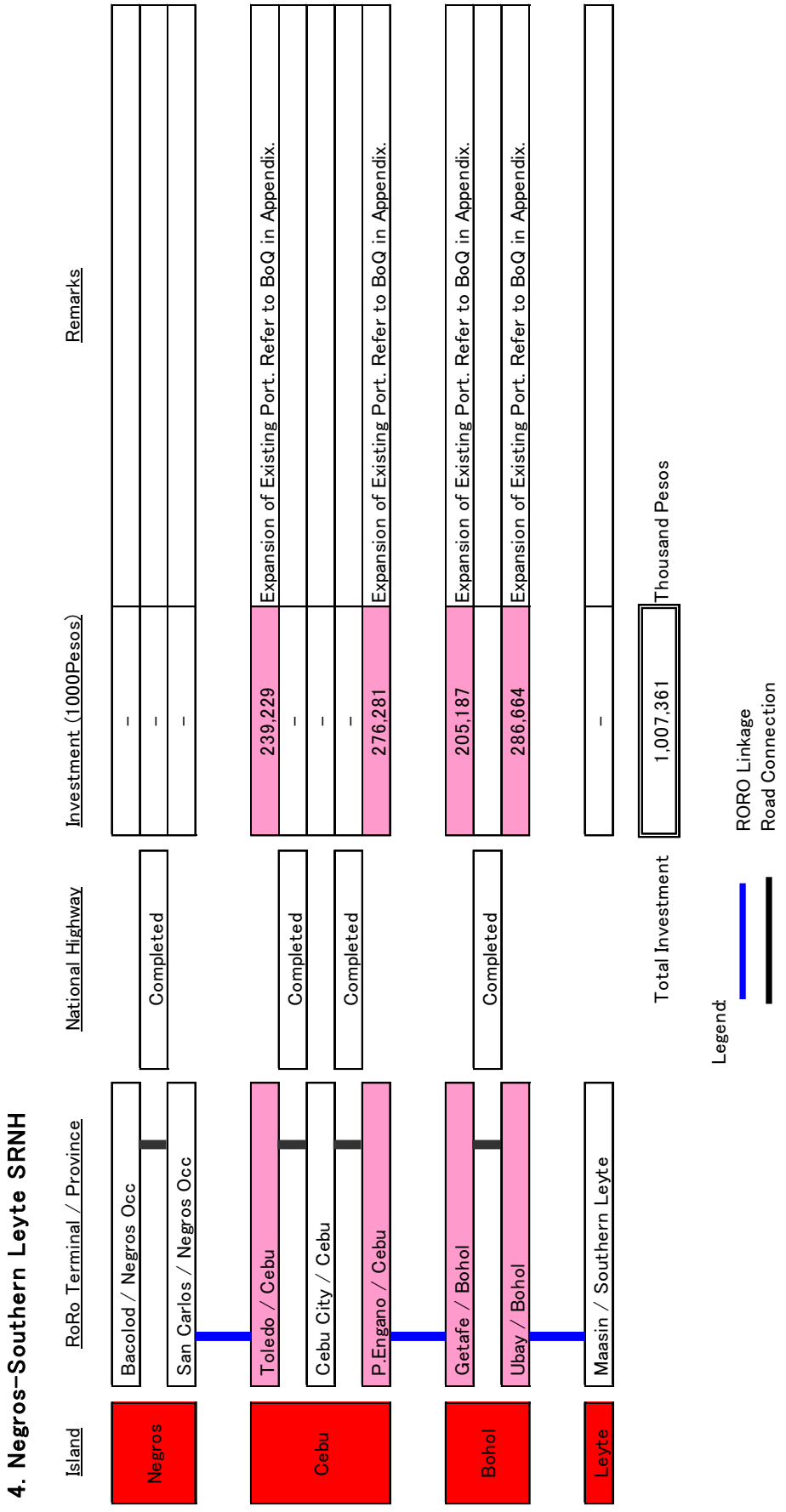

1. Eastern SRNH Extention
Island
RoRo Terminal / Province
National Highway
Investment (1000Pesos)
Remarks
Luzon
San Antonio (Pilar) /Sorsogon
309,747
New Development at a New Site. Refer to BoQ in Appendix.
Masbate
Masbate / Masbate
Completed
–
–
Cataingan / Masbate
Unpaved
–
30km for Construction as a National Highway. (Gravel Type)
Esperanza / Masbate
183,549
366,771
New Development at a New Site. Refer to BoQ in Appendix.
Biliran
Naval / Biliran
Completed
150,168
Expansion of Existing Port. Refer to BoQ in Appendix.
–
Leyte
Tacloban / Leyte
–
–
Total Investment
1,010,235
Thousand Pesos
Legend:
RORO Linkage
Road Connection

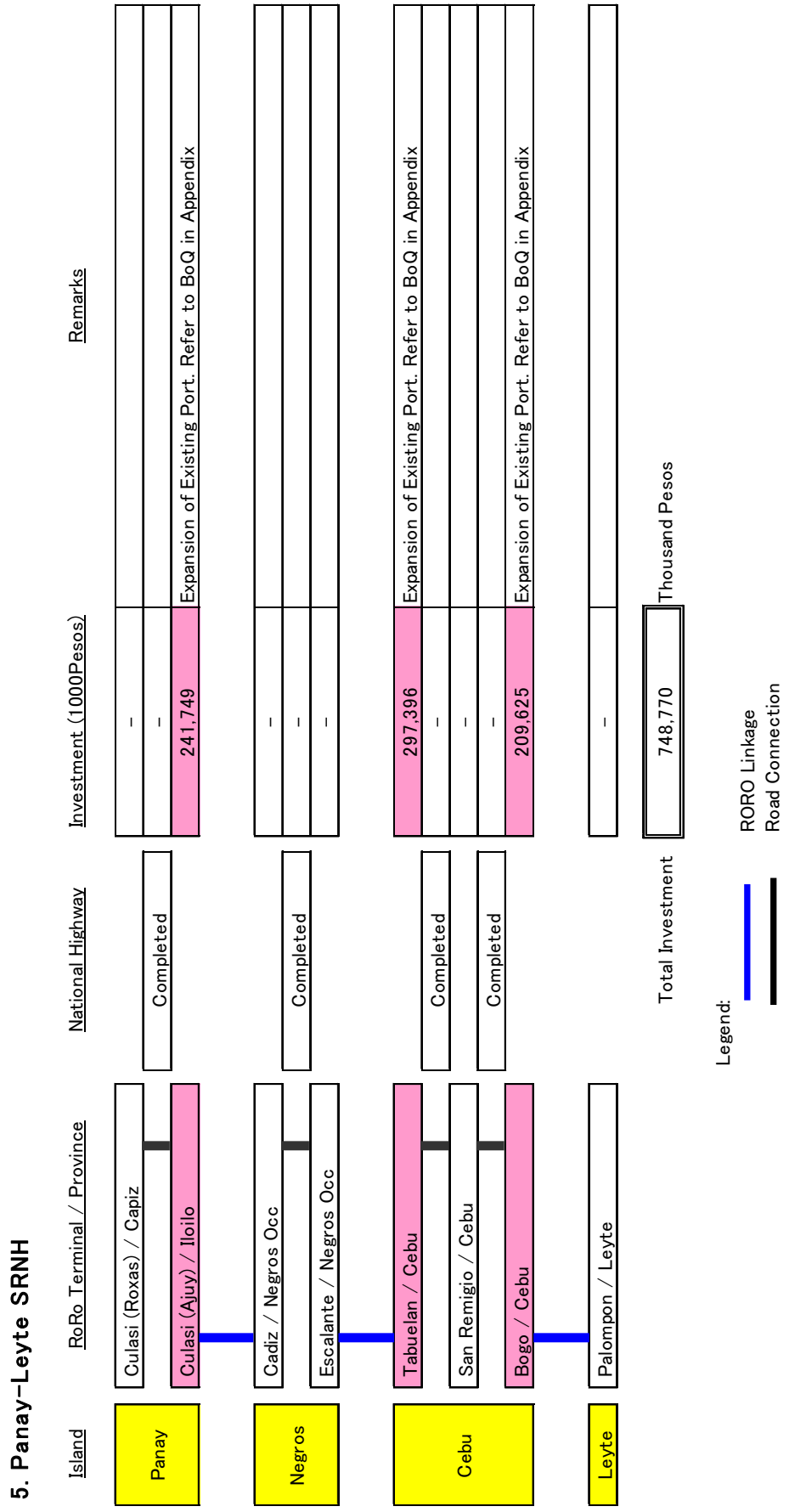
2. Western SRNH

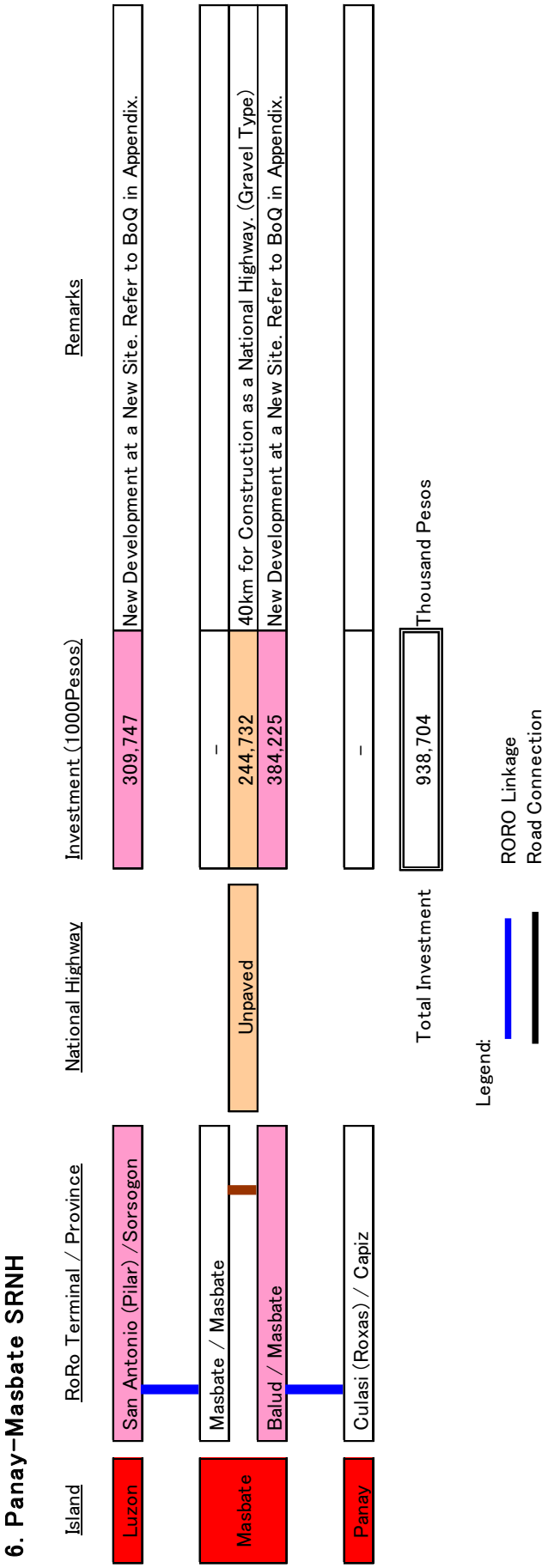


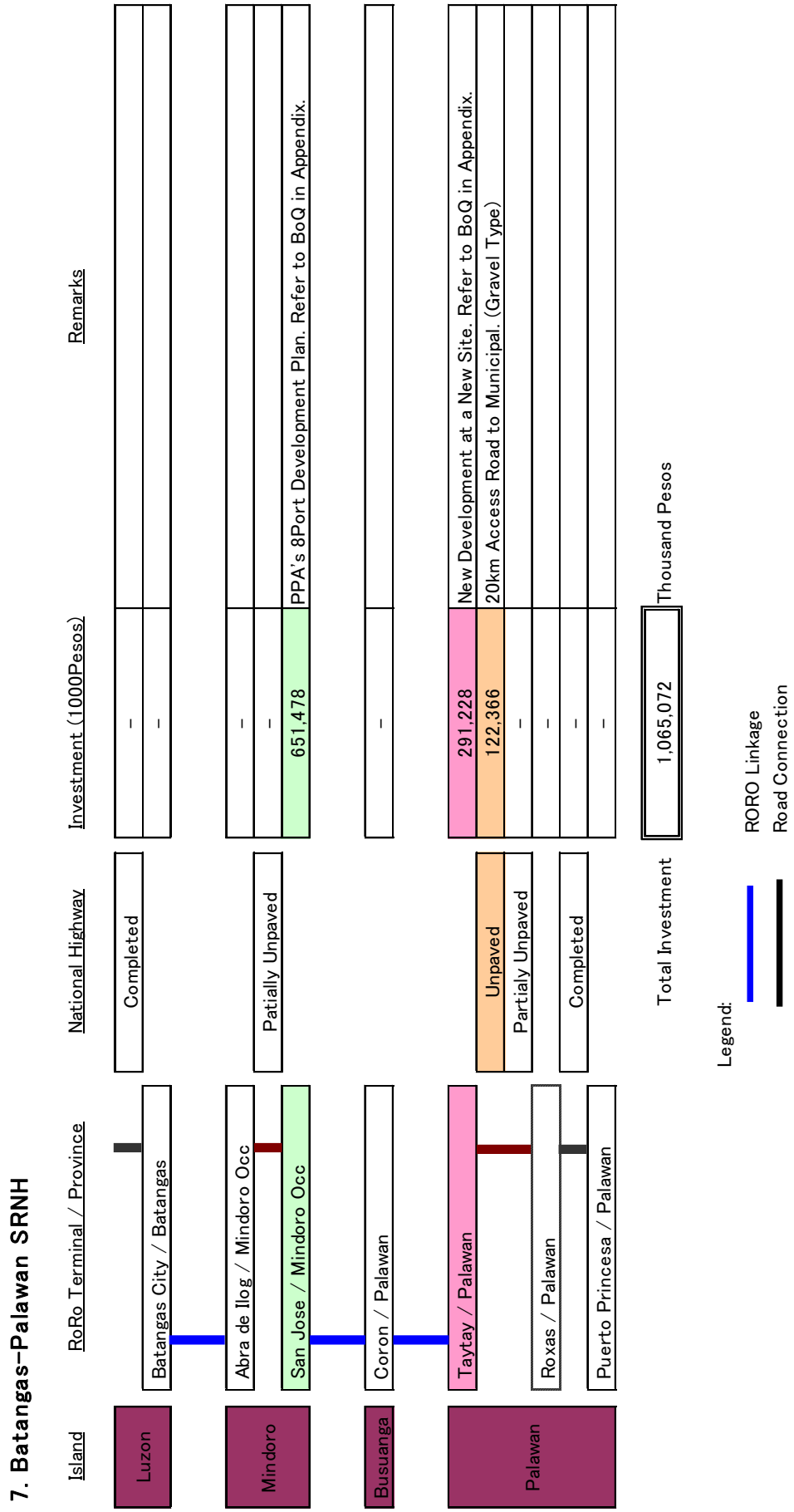
3. Central SRNH

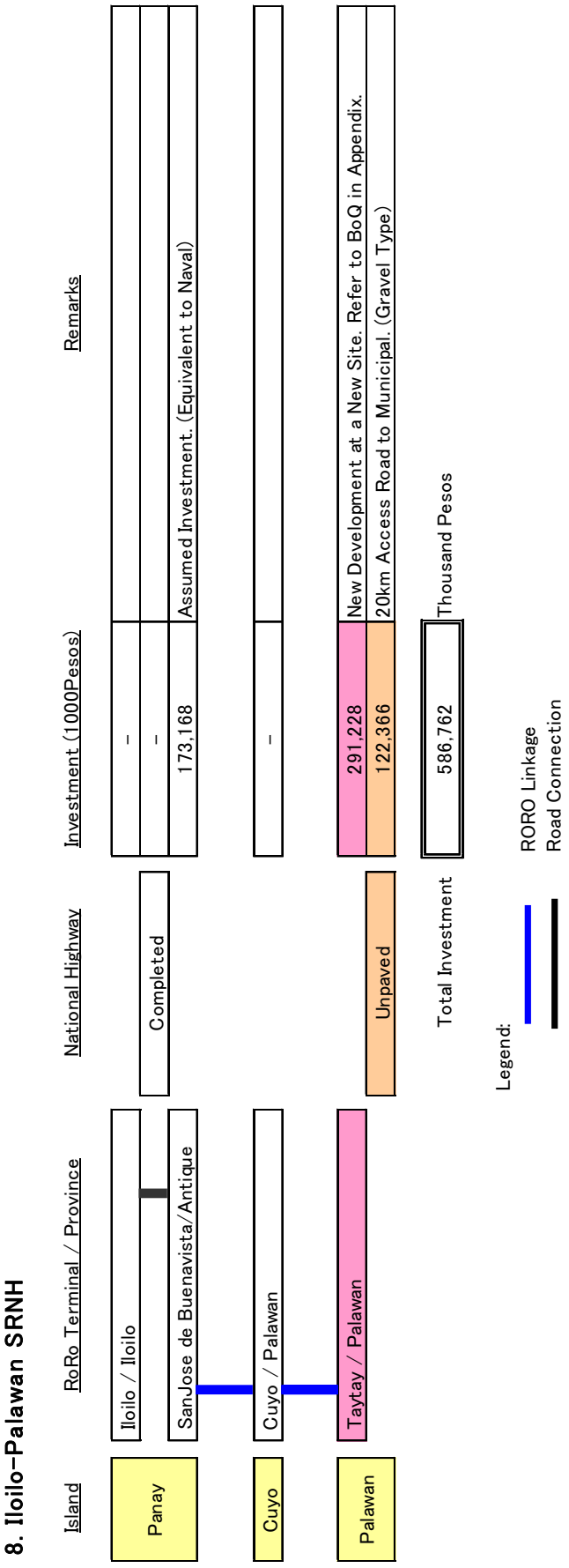



4. Negros–Southern Leyte SRNH
Island
RoRo Terminal / Province
National Highway
Investment (1000Pesos)
Remarks
Negros
Bacolod / Negros Occ
San Carlos / Negros Occ
Completed
–
–
–
Cebu
Toledo / Cebu
Cebu City / Cebu
P.Engano / Cebu
Completed
Completed
Completed
239,229
–
–
–
276,281
Expansion of Existing Port. Refer to BoQ in Appendix.
Expansion of Existing Port. Refer to BoQ in Appendix.
Bohol
Getafe / Bohol
Ubay / Bohol
Completed
205,187
286,664
Expansion of Existing Port. Refer to BoQ in Appendix.
Expansion of Existing Port. Refer to BoQ in Appendix.
Leyte
Maasin / Southern Leyte
–
Total Investment
1,007,361
Thousand Pesos
Legend
RORO Linkage
Road Connection


5. Panay–Leyte SRNH
Island
RoRo Terminal / Province
National Highway
Investment (1000Pesos)
Remarks
Panay
Culasi (Roxas) / Capiz
Culasi (Ajuy) / Iloilo
Completed
–
241,749
Expansion of Existing Port. Refer to BoQ in Appendix
Negros
Cadiz / Negros Occ
Escalante / Negros Occ
Completed
–
–
Cebu
Tabuelan / Cebu
San Remigio / Cebu
Bogo / Cebu
Completed
Completed
297,396
–
–
209,625
Expansion of Existing Port. Refer to BoQ in Appendix
Expansion of Existing Port. Refer to BoQ in Appendix
Leyte
Palompon / Leyte
–
Total Investment
748,770
Thousand Pesos
Legend:
RORO Linkage
Road Connection


6. Panay–Masbate SRNH
Island
RoRo Terminal / Province
National Highway
Investment (1000Pesos)
Remarks
Luzon
San Antonio (Pilar) /Sorsogon
309,747
New Development at a New Site. Refer to BoQ in Appendix.
Masbate
Masbate / Masbate
–
Balud / Masbate
Unpaved
244,732
40km for Construction as a National Highway. (Gravel Type)
384,225
New Development at a New Site. Refer to BoQ in Appendix.
Panay
Culasi (Roxas) / Capiz
–
Total Investment
938,704
Thousand Pesos
Legend:
RORO Linkage
Road Connection


7. Batangas–Palawan SRNH
Island
RoRo Terminal / Province
National Highway
Investment (1000Pesos)
Remarks
Luzon
Batangas City / Batangas
Completed
–
–
Mindoro
Abra de Ilog / Mindoro Occ
Patially Unpaved
–
San Jose / Mindoro Occ
651,478
PPA's 8Port Development Plan. Refer to BoQ in Appendix.
Busuanga
Coron / Palawan
–
Palawan
Taytay / Palawan
Unpaved
291,228
New Development at a New Site. Refer to BoQ in Appendix.
Partialy Unpaved
122,366
20km Access Road to Municipal. (Gravel Type)
Roxas / Palawan
Completed
–
Puerto Princesa / Palawan
–
Total Investment
1,065,072
Thousand Pesos
Legend:
RORO Linkage
Road Connection


8. Iloilo–Palawan SRNH
Island
RoRo Terminal / Province
National Highway
Investment (1000Pesos)
Remarks
Panay
Iloilo / Iloilo
SanJose de Buenavista/Antique
Completed
–
–
173,168
Assumed Investment. (Equivalent to Naval)
Cuyo
Cuyo / Palawan
–
Palawan
Taytay / Palawan
Unpaved
291,228
New Development at a New Site. Refer to BoQ in Appendix.
122,366
20km Access Road to Municipal. (Gravel Type)
Total Investment
586,762
Thousand Pesos
Legend:
RORO Linkage
Road Connection

4.3 Estimated Investment Cost and Schedule

4.3.1 General

The estimated investment costs to pursue the implementation of the proposed project include a Physical Contingency of 10%, Consultancy Services Fee of 7% and VAT (Value Added Tax of 12%. The costs are apportioned into Local component and "Foreign component for economic evaluation purposes.

Development of the fifteen (15) candidate terminal ports will be undertaken in 2 Packages. Package A will comprise of San Antonio, Balud, Esperanza, Naval, Daan Bantayan and Taytay covering the Central and Masbate routes. Package B will comprise of the succeeding ports thereafter.

Development will take three (3) years reckoned from the start of the Consultancy service which takes 1 year and 2 years for the construction. The disbursement schedule is prepared based on 2-year construction period for new developments and about one year for the improvement and expansion of existing ports.

Table 4-3 - Table 4-6 hereafter show the envisioned investment, construction schedule for both Package A and Package B including the related Road Package.

4.3.2 Packaging of Construction Works

Based on the Feasibility Studies, construction of the proposed 15 terminal ports is scheduled up to 2015. Under this scenario, construction will be undertaken into 2 Packages for the whole completion of the Project by 2015. Package A construction will cater for the urgent development program and Package B construction for the succeeding ports thereafter. With regards to the packaging scenarios, refer to "10. Project Proposals" hereafter.

Table 4-3 Required Investment and Schedule for RRTS Project - Package A

Unit : 1,000 Peso

Package	RoRo Port for F/S	Year / Breakdown	Total			1st Year		2nd Year		3rd Year	
			Local	Foreign	Total	Local	Foreign	Local	Foreign	Local	Foreign
Package A	San Antonio	Construction Works	123,899	185,848	309,747	0	0	61,949	92,924	61,949	92,924
		Physical Contingency (10%)	12,390	18,585	30,975	0	0	6,195	9,292	6,195	9,292
		Sub Total_Construction	136,289	204,433	340,722	0	0	68,144	102,217	68,144	102,217
	Balud	Construction Works	153,690	230,535	384,225	0	0	76,845	115,268	76,845	115,268
		Physical Contingency (10%)	15,369	23,054	38,423	0	0	7,685	11,527	7,685	11,527
		Sub Total_Construction	169,059	253,589	422,648	0	0	84,530	126,794	84,530	126,794
	Esperanza	Construction Works	146,708	220,063	366,771	0	0	73,354	110,031	73,354	110,031
		Physical Contingency (10%)	14,671	22,006	36,677	0	0	7,335	11,003	7,335	11,003
		Sub Total_Construction	161,379	242,069	403,448	0	0	80,690	121,034	80,690	121,034
	Naval	Construction Works	60,067	90,101	150,168	0	0	36,040	54,060	24,027	36,040
		Physical Contingency (10%)	6,007	9,010	15,017	0	0	3,604	5,406	2,403	3,604
		Sub Total_Construction	66,074	99,111	165,185	0	0	39,644	59,467	26,430	39,644
	Daan Bantayan	Construction Works	149,100	223,650	372,750	0	0	74,550	111,825	74,550	111,825
		Physical Contingency (10%)	14,910	22,365	37,275	0	0	7,455	11,183	7,455	11,183
		Sub Total_Construction	164,010	246,015	410,025	0	0	82,005	123,008	82,005	123,008
	Taytay	Construction Works	116,491	174,737	291,228	0	0	58,246	87,368	58,246	87,368
		Physical Contingency (10%)	11,649	17,474	29,123	0	0	5,825	8,737	5,825	8,737
		Sub Total_Construction	128,140	192,210	320,351	0	0	64,070	96,105	64,070	96,105
	Total for Construction	Construction Works	749,956	1,124,933	1,874,889	0	0	380,985	571,477	368,971	553,457
		Physical Contingency	74,996	112,493	187,489	0	0	38,098	57,148	36,897	55,346
		Total_Construction	824,951	1,237,427	2,062,378	0	0	419,083	628,624	405,868	608,802
	Consultancy	Consulting Service	52,497	78,745	131,242	18,374	27,561	18,374	27,561	15,749	23,624
		Physical Contingency (10%)	5,250	7,875	13,124	1,837	2,756	1,837	2,756	1,575	2,362
		Total_Consultancy	57,747	86,620	144,366	20,211	30,317	20,211	30,317	17,324	25,986
	Total_Construction_Consultancy		882,698	1,324,047	2,206,744	20,211	30,317	439,294	658,941	423,192	634,788
		VAT (12%)	264,809	0	264,809	6,063	0	131,788	0	126,958	0
		Grand Total	1,147,507	1,324,047	2,471,554	26,275	30,317	571,083	658,941	550,150	634,788

Component	Local	Foreign
Construction Works	40%	60%

Consulting Service Cost	7%	of Construction Works

Progress	Total	1st Year	2nd Year	3rd Year
Construction (Expansion)	100%	0%	60%	40%
Construction (New Devlp)	100%	0%	50%	50%
Consulting Service	100%	35%	35%	30%

Table 4-4 Required Investment and Schedule for RRTS Project - Package B

Unit : 1,000 Peso

Package	RoRo Port for F/S	Breakdown \ Year	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Package B	Dumangas	Construction Works	46,096	69,144	115,240	0	0	27,658	41,486	18,438	27,658
		Physical Contingency (10%)	4,610	6,914	11,524	0	0	2,766	4,149	1,844	2,766
		Sub Total_Construction	50,706	76,058	126,764	0	0	30,423	45,635	20,282	30,423
	Culasi/Ajuy	Construction Works	96,700	145,049	241,749	0	0	58,020	87,030	38,680	58,020
		Physical Contingency (10%)	9,670	14,505	24,175	0	0	5,802	8,703	3,868	5,802
		Sub Total_Construction	106,370	159,554	265,924	0	0	63,822	95,733	42,548	63,822
	Toledo	Construction Works	95,692	143,537	239,229	0	0	57,415	86,122	38,277	57,415
		Physical Contingency (10%)	9,569	14,354	23,923	0	0	5,741	8,612	3,828	5,741
		Sub Total_Construction	105,261	157,891	263,152	0	0	63,156	94,735	42,104	63,156
	Tabuelan	Construction Works	118,958	178,438	297,396	0	0	71,375	107,063	47,583	71,375
		Physical Contingency (10%)	11,896	17,844	29,740	0	0	7,138	10,706	4,758	7,138
		Sub Total_Construction	130,854	196,281	327,136	0	0	78,513	117,769	52,342	78,513
	Bogo	Construction Works	83,850	125,775	209,625	0	0	50,310	75,465	33,540	50,310
		Physical Contingency (10%)	8,385	12,578	20,963	0	0	5,031	7,547	3,354	5,031
		Sub Total_Construction	92,235	138,353	230,588	0	0	55,341	83,012	36,894	55,341
	Punta Engano	Construction Works	110,512	165,769	276,281	0	0	55,256	82,884	55,256	82,884
		Physical Contingency (10%)	11,051	16,577	27,628	0	0	5,526	8,288	5,526	8,288
		Sub Total_Construction	121,564	182,345	303,909	0	0	60,782	91,173	60,782	91,173
	Getafe	Construction Works	82,075	123,112	205,187	0	0	49,245	73,867	32,830	49,245
		Physical Contingency (10%)	8,207	12,311	20,519	0	0	4,924	7,387	3,283	4,924
		Sub Total_Construction	90,282	135,423	225,706	0	0	54,169	81,254	36,113	54,169
	Ubay	Construction Works	114,666	171,998	286,664	0	0	68,799	103,199	45,866	68,799
		Physical Contingency (10%)	11,467	17,200	28,666	0	0	6,880	10,320	4,587	6,880
		Sub Total_Construction	126,132	189,198	315,330	0	0	75,679	113,519	50,453	75,679
	Catialan	Construction Works	185,991	278,987	464,978	0	0	92,996	139,493	92,996	139,493
		Physical Contingency (10%)	18,599	27,899	46,498	0	0	9,300	13,949	9,300	13,949
		Sub Total_Construction	204,590	306,885	511,476	0	0	102,295	153,443	102,295	153,443
	Total for Construction	Construction Works	934,540	1,401,809	2,336,349	0	0	531,073	796,610	403,466	605,199
		Physical Contingency	93,454	140,181	233,635	0	0	53,107	79,661	40,347	60,520
		Total_Construction	1,027,994	1,541,990	2,569,984	0	0	584,181	876,271	443,813	665,719
	Consultancy	Consulting Service	65,418	98,127	163,544	22,896	34,344	22,896	34,344	19,625	29,438
		Physical Contingency (10%)	6,542	9,813	16,354	2,290	3,434	2,290	3,434	1,963	2,944
		Total_Consultancy	71,960	107,939	179,899	25,186	37,779	25,186	37,779	21,588	32,382
	Total_Construction_Consultancy		1,099,953	1,649,930	2,749,883	25,186	37,779	609,367	914,050	465,401	698,101
		VAT (12%)	329,986	0	329,986	7,556	0	182,810	0	139,620	0
		Grand Total	1,429,939	1,649,930	3,079,869	32,742	37,779	792,177	914,050	605,021	698,101

Component	Local	Foreign
Construction Works	40%	60%

Consulting Service Cost	7%	of Construction Wokrs

Progress	Total	1st Year	2nd Year	3rd Year
Construction (Expansion)	100%	0%	60%	40%
Construction (New Devlp)	100%	0%	50%	50%
Consulting Service	100%	35%	35%	30%

Table 4-5 Required Investment and Schedule for RRTS Project - Road Package (Gravel Road Construction)

Unit : 1,000 Peso

Package	Road for F/S	Breakdown \ Year	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Road	Esperanza	Construction Works	146,839	36,710	183,549	0	0	88,104	22,026	58,736	14,684
		Physical Contingency (10%)	14,684	3,671	18,355	0	0	8,810	2,203	5,874	1,468
		Sub Total_Construction	161,523	40,381	201,904	0	0	96,914	24,228	64,609	16,152
	Balud	Construction Works	195,786	48,946	244,732	0	0	117,471	29,368	78,314	19,579
		Physical Contingency (10%)	19,579	4,895	24,473	0	0	11,747	2,937	7,831	1,958
		Sub Total_Construction	215,364	53,841	269,205	0	0	129,218	32,305	86,146	21,536
	Tay tay	Construction Works	97,893	24,473	122,366	0	0	58,736	14,684	39,157	9,789
		Physical Contingency (10%)	9,789	2,447	12,237	0	0	5,874	1,468	3,916	979
		Sub Total_Construction	107,682	26,921	134,603	0	0	64,609	16,152	43,073	10,768
	Total for Construction	Construction Works	440,518	110,129	550,647	0	0	264,311	66,078	176,207	44,052
		Physical Contingency	44,052	11,013	55,065	0	0	26,431	6,608	17,621	4,405
		Total_Construction	484,569	121,142	605,712	0	0	290,742	72,685	193,828	48,457
	Consultancy	Consulting Service	66,078	16,519	82,597	23,127	5,782	23,127	5,782	19,823	4,956
		Physical Contingency (10%)	6,608	1,652	8,260	2,313	578	2,313	578	1,982	496
		Total_Consultancy	72,685	18,171	90,857	25,440	6,360	25,440	6,360	21,806	5,451
	Total_Construction_Consultancy		557,255	139,314	696,568	25,440	6,360	316,182	79,045	215,633	53,908
		VAT (12%)	83,588	0	83,588	3,816	0	47,427	0	32,345	0
		Grand Total	640,843	139,314	780,157	29,256	6,360	363,609	79,045	247,978	53,908

Component	Local	Foreign
Construction Works	80%	20%

Consulting Service Cost	15%	of Construction Wokrs

Progress	Total	1st Year	2nd Year	3rd Year
Construction (New Devlp)	100%	0%	60%	40%
Consulting Service	100%	35%	35%	30%

Table 4-6 Required Investment and Schedule for RRTS Project - Concrete Road Construction (Reference Only)

Unit : 1,000 Peso

Package	Road for F/S	Breakdown (Year)	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Road	Esperanza	Construction Works	523,906	130,976	654,882	0	0	314,343	78,586	209,562	52,391
		Physical Contingency (10%)	52,391	13,098	65,488	0	0	31,434	7,859	20,956	5,239
		Sub Total_Construction	576,296	144,074	720,370	0	0	345,778	86,444	230,518	57,630
	Balud	Construction Works	698,541	174,635	873,176	0	0	419,124	104,781	279,416	69,854
		Physical Contingency (10%)	69,854	17,464	87,318	0	0	41,912	10,478	27,942	6,985
		Sub Total_Construction	768,395	192,099	960,494	0	0	461,037	115,259	307,358	76,839
	Tay tay	Construction Works	349,270	87,318	436,588	0	0	209,562	52,391	139,708	34,927
		Physical Contingency (10%)	34,927	8,732	43,659	0	0	20,956	5,239	13,971	3,493
		Sub Total_Construction	384,197	96,049	480,247	0	0	230,518	57,630	153,679	38,420
	Total for Construction	Construction Works	1,571,717	392,929	1,964,646	0	0	943,030	235,758	628,687	157,172
		Physical Contingency	157,172	39,293	196,465	0	0	94,303	23,576	62,869	15,717
		Total_Construction	1,728,888	432,222	2,161,111	0	0	1,037,333	259,333	691,555	172,889
	Consultancy	Consulting Service	125,737	31,434	157,172	44,008	11,002	44,008	11,002	37,721	9,430
		Physical Contingency (10%)	12,574	3,143	15,717	4,401	1,100	4,401	1,100	3,772	943
		Total_Consultancy	138,311	34,578	172,889	48,409	12,102	48,409	12,102	41,493	10,373
	Total_Construction_Consultancy		1,867,200	466,800	2,333,999	48,409	12,102	1,085,742	271,435	733,049	183,262
		VAT (12%)	280,080	0	280,080	7,261	0	162,861	0	109,957	0
		Grand Total	2,147,279	466,800	2,614,079	55,670	12,102	1,248,603	271,435	843,006	183,262

Component	Local	Foreign
Construction Works	80%	20%

Consulting Service Cost	8%	of Construction Wokrs

Progress	Total	1st Year	2nd Year	3rd Year
Construction	100%	0%	60%	40%
Consulting Service	100%	35%	35%	30%

5. Construction Program

5.1 Construction Plan

5.1.1 Construction Sequence/Concept

(1) The construction of the port terminal complex comprise of many disciplines of expertise including marine works, civil works, utilities work, building works, electrical works and miscellaneous related works. However, the most critical item of work which should be immediately pursued and completed at the earliest possible time is the marine works which comprise the causeway, reclamation, berthing facilities and breakwater.

(2) The causeway will be the primary means of access for the delivery of fill materials for the construction of the reclamation by the end dumping method and for the delivery of materials and equipment needed for the construction of utilities work, building facilities, roads, electrical works and other related facilities on the reclaimed area.

(3) When the port complex is finally completed, it is the primary means of access between the terminal and the hinterland.

(4) The utilities work, building facilities, pavement works, electrical and related works could be completed within one year provided that the reclamation works has already been completed.

(5) Construction could be undertaken simultaneously and should accomplishments fall behind schedule, progress could be expedited with the deployment of additional labor and equipment and provision of materials on time. Therefore, the constructions of the on-land facilities are considered not critical.

(6) The construction of the berthing facilities is likewise critical because an early completion would allow the use of the terminal while the construction of other inland facilities is being pursued.

(7) In view of the foregoing, the construction program should be concentrated towards the early completion of the Marine Works. Construction program to complete the marine works in one year is described hereunder.

5.1.2 Construction Method

1) Causeway and Reclamation Area

(1) The causeway and the reclamation will be constructed of fills to be contained by stone revetments for protection against wave actions.

(2) Volume wise the quantity of fills and stones are relatively small, thus, dry fills from inland quarries are envisioned to be used although this will not prevent the Contractor from using wet fills provided that the materials comply with the Specifications, at no additional cost to the Project.

(3) Assuming that construction will be pursued with dry fills and stones from approved quarries, hauling will be undertaken by 10 wheel dump trucks.

(4) The fills will be placed onto the sea by the end dumping method and push towards the offing by D4 bulldozer(s).

(5) Fills above water level will be spread evenly by a bulldozer or grader and compacted to 95% density with sheep foot and tandem roller at every 15 cm layer.

(6) When sufficient fills have been placed, stones will be stockpiled by class along the reclaimed areas and/or along the shore to facilitate the placing of the revetment works where and when needed.

(7) Prior to placement, staking out to identify the limits of construction will be made using battered boards and strings to establish the elevation, slope/grade and thickness of materials to be placed.

(8) Filter cloth (geo-textile sheets) will be placed manually onto the graded surface and retained in position. Sheets should be placed as neatly as possible without waving or gathering and without lapping width.

(9) Placing of rocks will start from the toe upwards using the battered board and strings as guide.

(10) Cobble stones will be placed after the filter cloths are properly laid, by backhoe, chute or other practical means. Final adjustment of elevation, slope/grade and filling of voids will be done manually.

(11) Armor rocks will be placed individually after the placing of cobble stones has been completed, by slings using 4 ton crane trucks or other practical means to ensure interlocking of the armor stones and minimizing of voids to produce an even grade and slope.

(12) Placing of revetment works could be undertaken in segments. Accomplishment could be expedited with the deployment of additional labor gang comprising of 5 skilled/unskilled laborers supported with additional equipment and logistics.

(13) Assuming that one (labor) gang could accomplish some 3 to 5 lineal meters of revetment per day, the deployment of 4 to 5 labor gangs supported with additional equipment will increase the output from 4 to 5 folds.

2) Delivery of Fills

(1) Based on the foregoing, delivery of fills which are very critical for completing the works are described hereunder.

(2) Using Daan Bantayan as a model port because of it's comparatively bigger quantity of fill and stone materials as compared with the rest of the RRTS Ports, the number of 10 wheeler dump trucks for hauling is estimated as follows:

-Dry Fills: 81,580 m^3 to be placed in 8 months period.

-Monthly Delivery: 81,580/8 = 10,200 m^3/month

-Daily Delivery: 10,200/25days = 408 m^3/day

-Hourly Delivery: 408/8 = 51 m^3/hour

-Required number of units of 10 m^3 capacity 10 wheeler dump trucks assuming a minimum of 4 trips per dump truck per day: 51/10*4 = 1.2 trucks/hr say 2 considering voids and wastage. At 8 hours/day a fleet of **16** dump trucks will be needed.

3) Delivery of Stones

(1) Stone Materials: 18,604m^3 (for revetment & breakwater) to be delivered in 4 months.

(2) Monthly Delivery: 18,604/4 = 4,651 m^3/month.

(3) Daily Delivery: 4,651/25 = 186 m^3/day.

(4) Hourly Delivery: 186/8 = 23 m^3/hour.

(5) Required number of units of 10 m^3 10 wheeler dump trucks, assuming a minimum of 2 trips per day: 23/10*2 = 1 truck / hr. say 2 considering voids and wastage. At 8 hours/day, a fleet of **16** dump trucks will be needed. Should delivery fall behind schedule, additional dump trucks could be deployed.

4) Quarry

(1) The quarry should be provided with 2 units of D8 bulldozers (just in case one breaks down) for the stockpiling of stones at the quarry site and 2 units of 3m3 capacity pay loader and/or 2 units

of 2m^3 backhoe for loading of the stones onto the dump trucks.

5) Breakwater

(1) Placing of cobble stones for the construction of the breakwater will be done by the end dumping method with the final adjustment of elevation and slope/grade to be done manually by skilled divers/laborers.

(2) The armor stones will be placed individually by skilled laborers with the use of a 60 ton capacity crawler crane on 1200 ton capacity barge for stability.

(3) Barge movement will be undertaken by a 1500 hp tug boat.

(4) The barge should be equipped with 4 winches to allow precise positional adjustments during placing works. The completion of the breakwater however is not as critical as the causeway and reclamation and as such completion in one year is not mandatory.

(5) To facilitate construction and placing, the concrete crown should be pre-cast into blocks to reduce its weight within a tolerable limit to facilitate the placing. Weight of pre-cast concrete should be determined at boom down position (of the crawler crane), preferably at 15 to 20 tons/lift.

(6) At 2m in height x 2m in width、the crown could be pre-cast in two blocks at 1m height x 2m wide x 4m long. At this size, the weight is 20 tons. To enhance the factor of safety against slipping from wave pressure, an interlock should be provided at the mid of the block.

6) Berthing and Ramp Structures

(1) Construction of the berthing including the ramp structures will depend on the completion of the pile driving works.

(2) As previously mentioned, two standard types of berthing structures is planned for the Project. One is the breasting dolphin type and the other is the pier type.

(3) For purposes of illustrating the construction methodology, the pier type is adopted because this entails greater quantity of pile driving works and concrete pouring.

(4) Assuming a low side of 4 piles per day for the driving operation, and considering the Proposed Taytay Port as a model, the 156 piles for the Pier and ramps will be driven in placed in 39 days. At 20 operational days per month, it would take about 60 days to drive all the piles in placed including allowance for bad weather conditions.

(5) Piles driven in placed must be supported with steel or wooden bracings to protect it from swaying and buckling due to wave actions particularly during the occurrence of rough sea condition.

(6) After all the piles are driven in placed, construction of the superstructure will follow. At 30 to 35m^3 per pouring, placing the 588 m^3 of concrete for the superstructure of the pier and ramp structures will take about 16 pouring.

(7) At 2 weeks per preparation for scaffoldings and placing of reinforcing bars and embedded items including concrete pouring and initial curing, construction is estimated at 8 months.

(8) It is noted that pile driving operations on land or at sea should not be allowed during the curing of the concrete since any vibrations arising there from will cause unwarranted cracks or damage to the concrete structure.

(9) Pile driving works will be conducted by a 1 unit pile driving equipment, K32 diesel hammer or equivalent mounted on 1200 ton barge. The barge should be equipped with 4 winches to facilitate precise positioning adjustment to enhance driving operation, 1 unit of 60 ton capacity crawler crane with 30m boom mounted on 1200 ton barge for the staging of piles and for the feeding of piles into the pile driving leader, 1 unit of 1500 hp tug boat for moving the barges and 1 unit of service boat.

(10) Should preparation of scaffolding and placing of reinforcing bars and embedded items fall behind schedule, additional labor gangs to expedite the accomplishments could be deployed.

7) Sheet Piling Works

(1) The sheet piling structure to contain the fills at the back of the berthing and ramp facilities could be driven either from the sea side by an electric generator driven vibratory hammer on 1200 ton barge or behind the reclaimed area whichever is more convenient by the Contractor.

(2) At 5 lineal meters per day, it would take about 3 weeks including allowance to drive the 62 lineal meters of steel sheet piles.

(3) While driving of the sheet piles is expected not to pose difficulties, the structure which will temporarily be standing alone as a cantilever wall must be fully supported with bracings in order to avoid possible buckling of the structure (due to wave actions particularly during the occurrence of bad weather conditions) until such time that the backfill and tie rods are provided.

8) Concrete Batching Plant

(1) Considering the concreting works for the marine and on land facilities, a 30m computer aided concrete batching plant is deemed necessary.

(2) Considering that all the proposed ports are located in the countryside, a concrete batching plant of the minimum capacity required must be mobilized to ensure the pursuance of concreting works at all times.

5.2 Construction Schedule

The Construction Schedule for each of the proposed RoRo Port Terminal is prepared as shown in Table 5-1 to Table 5-15.

The construction shall be scheduled to complete within three (3) years starting from Consultancy service and followed by Construction works. The Tables below show construction schedule based on a 2-year construction period for new development and about one year for the improvement and expansion of existing ports.

Table 5-1 Construction Schedule for Naval Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-2 Construction Schedule for Caticlan Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-3 Construction Schedule for Dumangas Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-4 Construction Schedule for San Antonio Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-5 Construction Schedule for Esperanza Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-6 Construction Schedule for Daan Bantayan Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-7 Construction Schedule for Toledo Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-8 Construction Schedule for Punta Engano Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-9 Construction Schedule for Getafe Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-10 Construction Schedule for Ubay Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-11 Construction Schedule for Culasi (Ajuy) Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-12 Construction Schedule for Tabuelan Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Tab	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-13 Construction Schedule for Bogo Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-14 Construction Schedule for Balud Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

Table 5-15 Construction Schedule for Taytay Port

Items of Work	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Mobilization																								
2. Marine Works																								
3. Navigation Aids																								
3. Utilities Work																								
4. Building Works																								
5. Civil Works																								
6. Electrical Works																								
7. Appurtenant Works																								

6. Evaluation of Economic Feasibility

6.1 Objectives and Methodology

The objective of the economic analysis is to appraise the economic feasibility for construction project of RoRo vessel terminal and road on new SRNH routes, and expansion project of RoRo vessel terminal in the existing SRNH routes, focusing on the RoRo terminal and road development projects in the target year 2015, from the viewpoint of the national economy.

"With" and "Without" cases are composed in the economic analysis. All benefits and costs of the SRNH routes are calculated in market price at first, and then converted into economic price. Evaluation of the SRNH is carried out using this economic price, based on the border price concept.

There are various kinds of methods to evaluate the feasibility of infrastructure investment projects. The following three methods are typical ones.

-Economic Internal Rate of Return (EIRR)

-Cost Benefit Ratio (B/C)

-Net Benefit (B-C)

Economic Internal Rate of Return (EIRR) is a rate which makes the present value of project costs equal to the present value of the project benefits at the base year. EIRR means a real and gross profit ratio of a project which is measured from the economic and social point of view. Cost Benefit Ratio (B/C) is ratio of the present value of project benefits to the present value of the project.

The present value is calculated assuming the given discount rate. In this analysis, the social discount rate or the opportunity cost of capital in the Philippines (15%) is an evaluation criterion for EIRR, and is used as the given discount rate. Net Benefit (B-C) is residual present value of project benefits, after subtracting the present value of project costs. In general, EIRR is the most popular index for evaluating a project among the above three indices. In this study, economic internal rate of return (EIRR) based on cost-benefit analysis is adopted in order to appraise the feasibility of project.

6.2 Economic Analysis

6.2.1 "With" and "Without" Case

In the cost-benefit analysis, benefits and costs of projects are defined as the difference between "With" and "Without" case of projects. Therefore, the definition of "With" and "Without" case is very important in order to evaluate the feasibility of the port development projects. The following conditions are assumed in this economic analysis.

1) "With" Case

In an economic analysis, benefits are mainly brought by reduction of transport cost/traveling time through the new SRNH routes and increasing operation efficiency through new standardization of RoRo vessel terminal. Therefore, the "With" case scenario includes construction and expansion of RoRo vessel terminal, expansion of road and procurement of RoRo vessels in the SRNH routes.

2) "Without" Case

No investment is made for the existing port. The forecast volume of cargoes and number

of passengers are same as "With" case. The passengers, cargoes and vehicles transport on the existing routes.

6.2.2 Prerequisites of Economic Analysis

In order to estimate costs and benefits of projects, the following requisites are assumed for analysis.

· Base Year

-The base year here means the standard year when costs and benefits are estimated in the analysis. Each project has its own "base year".

· Project Life

-Taking the depreciation period of main port facilities into account, the period of calculation for the economic analysis (project life) is assumed to be 30 years (2012-2041) after the completion of project implementation.

· Foreign Exchange Rate

-Foreign exchange rate adopted for this analysis is US$1.00= 118 yen = 46 Pesos (August 2007), the same rate as used in the cost estimation.

6.2.3 Economic Prices

1) Method of Conversion from Market Prices to Economic Prices

For the economic analysis, prices are expressed at economic prices rather than market prices, based on the border price concept. There are various methods to convert market prices to economic prices. Here, economic prices are calculated by eliminating transfer items such as taxes and subsides etc. In general, all costs and benefits are divided into three categories: labor, tradable goods and non-tradable goods. And labor is further classified in to skilled labor and unskilled labor. As for skilled labor, economic price is determined by multiplying by the conversion factor for consumption. The prices of tradable goods are expressed in CIF and FOB value for import goods and export goods respectively. These values indicate the actual border price. However, since the border price of non-tradable goods cannot be converted directly, the border price of inputs that are needed to produce non-tradable goods must be examined and adopted.

2) Transfer Items

Import and export duties, other taxes and subsidies are merely transfer items which do not actually reflect any consumption of nature resources. Therefore, these transfer items should be eliminated from costs and benefits of projects for the economic analysis.

3) Conversion Factor

There are 4 kinds of conversion factor for labor and goods:

-Standard conversion factor (SCF),

-Conversion factor for consumption (CFC)

-Conversion factor for skilled labor, and

-Conversion factor for unskilled factor

Each conversion factor is determined as follows.

· Standard conversion factor (SCF)

Standard conversion factor is introduced to the analysis to determine the economic price of certain goods which cannot be directly revalued at the border price. These goods include most non-tradable goods and services. The standard conversion factor of the Philippines is estimated to be 0.972 by average SCF from 2001 to 2005, applying the following simple approximate equation and basic data.

$$SCF = \frac{(X + M)}{(X + M + D)}$$

Where:

X: Commodity exports

M: Commodity imports

D: Import duty

Table 6-1 Basic Data for Estimation of SCF from 2000 to 2005

(Unit: Million pesos at current price)

Year	Export (FOB)	Import (FOB)	Import Duties & Taxes	SCF
2001	32,150	33,057	96,232	0.971
2002	35,208	39,237	96,250	0.975
2003	36,231	40,471	106,092	0.973
2004	39,681	44,039	122,471	0.972
2005	41,255	47,418	141,730	0.969
			Average (2001-2005)	0.972

Source: 2006 Philippine Statistical Yearbook

· Conversion factor for consumption

Conversion factor for consumption is introduced to convert market price of consumption goods into the border price. Conversion factor for consumption is usually calculated in the same manner as standard conversion factor, replacing total imports and exports by those of consumption goods only. However, value for abovementioned consumption goods has not been announced officially. In this analysis, “foreign exchange premium (1.2)” which is derived from the NEDA guideline, will be adopted to determine the conversion factor for consumption goods. Conversion factor for consumption is expressed by the following equation:

$$CFC = 1/1.2 = 0.833$$

· Conversion factor for skilled labor

The cost of skilled labor is calculated based on actual market wages, assuming that the market mechanism is properly functioning. However, since the market wages are domestic costs or market costs, they must be converted into the border price by multiplying the market wages by the CFC. Therefore, conversion factor for skilled labor is equal to CFC.

$$\begin{aligned} Conversion\ Factor\ for\ Skilled\ Labor &= Market\ Wage\ Rate \times CFC \\ &= 1.0 \times 0.833 \\ &= 0.833 \end{aligned}$$

· Conversion factor for unskilled labor

Since wages which are paid to unskilled labor during project implementation are usually far from the above opportunity cost, these market wages should not be introduced to the analysis as the economic value of unskilled labor. Unskilled labors are usually provided from the agricultural sector. In this economic analysis, the economic cost of unskilled labor is estimated based on a simplified measure of the opportunity cost, considering the productivity of the agricultural sector.

$$\begin{aligned} \textit{Conversion Factor for Unskilled Labor} &= (\textit{Opportunity Cost/Wor ker's Cost of Construction}) \times \textit{CFC} \\ &= (160.0/210.0) \times 0.833 \\ &= 0.634 \Rightarrow 0.6 \end{aligned}$$

6.2.4 Cost of Projects

· Components of Projects

Components of project cost are tabulated in the Table 6-2. Values of components are converted from the financial price basis into the economic price basis. The economic cost of initial construction cost or rehabilitation cost of port facilities and road, and procurement costs of RoRo vessels are shown in Table 6-3.

Table 6-2 Components of Project Costs

Components of Project Costs	Definition of Components of Project Costs
Construction Cost	This is the initial construction cost or rehabilitation cost of port facilities and highways, and procurement costs of secondhand RoRo vessels. Furthermore, residual values of RoRo vessel costs appropriate to end year of project life.
Maintenance Cost	It is an annual cost for maintaining expected functions or throughput of the facilities and RoRo vessels. Cost of maintaining facilities and vessels are usually estimated by a fixed proportion of original construction and purchasing costs, excluding costs of dredging and reclamation costs. Usually, fixed portions for facilities and vessels are 1% and 5%, respectively. Moreover, the Bureau of Maintenance (BOM) of the DPWH is in charge of maintaining the national roads as well as apportioning the fund to each regional office based on the Equivalent Maintenance Kilometer (EMK) system as following computation. EMK = (LR x FS x FW) + (LB x FB) Where: LR = length of roan in km, FS = surface/traffic factor, FW = width factor, LB = length of bridge in l.m., FB = bridge factor Then, gravel road maintenance cost of Balud and Esperanza section can be applied for 101(P/v.u) and 76(P/v.u), respectively.
Operation Cost	It is an annual cost for operating the facilities and vessel. It is mainly composed of personal cost, communication cost, travel cost material and fuel cost. Personnel cost is based on the present financial data of port authorities, and have to convert into the economic price by CFC for skilled labor. Other costs are usually estimated as 40% of personnel costs. Operation cost of RoRo vessels estimate approx. 20 million pesos per year for 500GRT, and approx. 102 million pesos per year for 2,000 GRT on 10 years by installments.

Table 6-3 Economic Price of Project and RoRo Vessels Procurement Costs

Route	Link	Economic Cost (1,000 pesos)	
1. Western SRNH	Batangas – Calapan – Roxas – **Caticlan** –	Construction Cost of Caticlan Port	***P418,021***
		Purchase Cost of 11 RoRo Vessels (500 GRT)	***P1,130,738***
	Dumangas – Bacolod – Dumaguete, Siaton -	Construction Cost of Dumangas Port	***P98,532***
		Purchase Cost of 9 RoRo Vessels (500 GRT)	***P641,413***
2. Central SRNH	**San Antonio**– Masbate– **Esperanza** – **Daan Bantayan** – Cebu	Construction Cost of San Antonio Port, Esperanza Port and Daan Bantayan	***P943,305***
		Purchase Cost of 17 RoRo Vessels (500 GRT)	***P1,745,700***
		Gravel Pavement Construction Cost	***P203,067***
3. Eastern SRNH Ext.	San Antonio - Masbate- Esperanza - **Naval**	Construction Cost of Naval Port	***P128,395***
		Purchase Cost of 5 RoRo Vessel (500 GRT)	***P595,125***
4. Negros-S. Leyte SRNH	Bacolod - San Carlos - **Toledo** -	Construction Cost of Toledo Port	***P204,544***
		Purchase Cost of 3 RoRo Vessels (500 GRT)	***P317,400***
	Pt. Engano - **Getafe- Ubay** - Maasin- San Ricardo -	Construction Cost of Pt. Engano, Getafe and Ubay Ports	***P656,762***
		Purchase Cost of 11RoRo Vessel (500 GRT)	***P1,051,388***
5. Panay-Leyte SRNH	**Ajuy** – Cadiz– Escalante - **Tabuelan** – **Bogo** -	Construction Cost of Ajuy, Tabuelan and Bogo Ports	***P640,208***
		Purchase Cost of 13 RoRo Vessels (500 GRT)	***P1,196,863***
6. Panay - Masbate SRNH	Culasi - **Balud**	Construction Cost of Balud Port	***P345,423***
		Purchase Cost of 3 RoRo Vessel (500 GRT)	***P347,156***
		Gravel Pavement Construction Cost	***P270,756***
7. Batangas-Palawan SRNH	San Jose – Coron – **Taytay**	Construction Cost Taytay Port (50% of total cost) and San Jose Port	***P782,409***
		Purchase Cost of 3 RoRo Vessel (2,000 GRT)	***P981,956***
		Gravel Pavement Construction Cost	***P67,689***
8. Iloilo-Palawan SRNH	San Jose de Buenavista – Cuyo– **Taytay**	Construction Cost Taytay Port (50% of total cost) and San Jose de	***P303,409***
		Purchase Cost of 3 RoRo Vessel (2,000 GRT)	***P981,956***
		Gravel Pavement Construction Cost	***P67,689***

6.2.5 Benefits of Projects

1) Benefit Items

Owing to the new RoRo vessel terminals and highway projects, Philippians economy enjoy:

1) Reduction of cargo transport cost
2) Reduction of passenger travel time
3) Saving of vessel fuel cost by RoRo vessel system
4) Reduction of cargo damages, pilferage and robbery cost by security and safety facilities
5) Reduction of vessel operation cost by smooth mooring operation system
6) Reduction of vehicle operation cost in smooth access road and adequate parking area system
7) Reduction of suspension of shipping services
8) Passenger suspension time reduction
9) Saving vehicle operation costs (VOCs) in the views of running cost, fixed costs and time costs
10) Reduction of investment cost for storage or warehouse and cargo handling equipment.
11) Promotion of logistics business
12) Promotion of market of high value perishable agricultural or fish products with shorter travel time.
13) Promotion of service businesses at the port and along the connecting highways
14) Encourage travel and promotion of tourism businesses.
15) Promotion of shipbuilding and improvements in ship maintenance
16) Improvement of maritime transport safety

From various benefits of the Projects, items above 1) to 9) are adapted to EIRR analysis as direct economic benefits. The benefit items in each route are in the following table.

Table 6-4 Benefit items in each Route

	Route	1. Western SRNH		2. Central SRNH	3. Eastern SRNH Ext.	4. Negros-S. Leyte SRNH		5. Panay-Leyte SRNH	6. Panay - Masbate SRNH	7. Batangas-Palawan SRNH	8. Iloilo-Palawan SRNH
	Link	Batangas – Calapan – Roxas – **Caticlan** –	**Dumangas** – Bacolod – Dumaguete, Siaton -	**San Antonio**– Masbate– **Esperanza** – **Daan**	San Antonio - Masbate- Esperanza - **Naval**	Bacolod - San Carlos - **Toledo** -	**Pt. Engano - Getafe- Ubay** - Maasin- San	**Ajuy** – Cadiz– Escalante - **Tabuelan** – **Bogo** -	Culasi - **Balud**	San Jose – Coron – **Taytay**	San Jose de Buenavista – Cuyo– **Taytay**
1) Reduction of Cargo Transport Cost			○	○			○	○	○	○	○
2) Reduction of Passenger Travel Time			○	○			○	○	○	○	○
3) Saving of Vessel Fuel Cost by RoRo Vessel System		○	○	○	○	○	○	○	○	○	○
4) Reduction of Cargo Damages and Pilferage Cost by Security and Safety Facilities		○	○	○	○	○	○	○	○	○	○
5) Reduction of Vessel Operation Cost by Smooth Mooring Operation System		○	○	○	○	○	○	○	○	○	○
6) Reduction of Vehicle Operation Cost in Smooth Access Road and Adequate Parking Area Sy		○	○	○	○	○	○	○	○	○	○
7) Reduction of Suspension of Shipping Services		○									
8) Passenger Suspension Time Reduction		○									
9) Saving vehicle operation costs (VOCs) in the views of running cost, fixed costs and time cost				○					○		

2) Calculation of Benefits

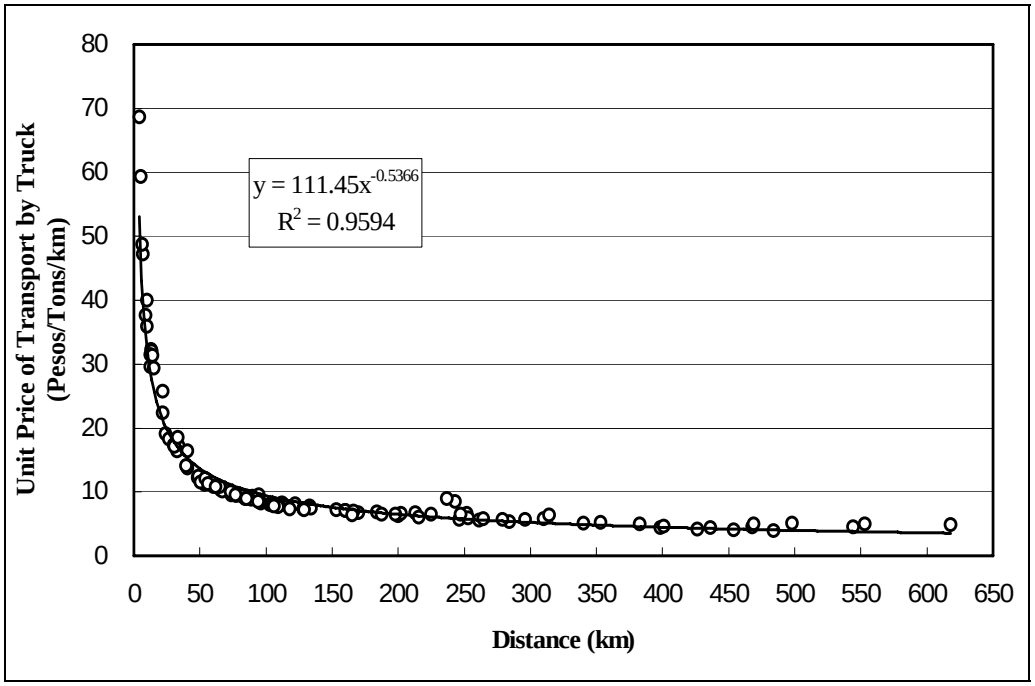
i) Reduction of Cargo Transport Cost and Passenger Travel Time

The benefits were calculated from comparison between the existing transport cost and proposed transport cost in route by route. Following table shows the results of benefits of cargo transport cost and passenger travel time including shortcut distance in routes.

The reduction benefits of cargo transport cost are based on the existing transport cost of land transport by truck, liner shipping transport cost and RoRo vessel transport cost. The details of three kinds of transport cost benefits in economic prices show in Appendix II-6-2-1. The existing transport cost in market prices in profit was multiplied 80% to convert economic price. The following Figure 6-1 to Figure 6-3 show unit price per ton per km by distance. Based on formula on each Fig, the transport cost in economic were estimated.

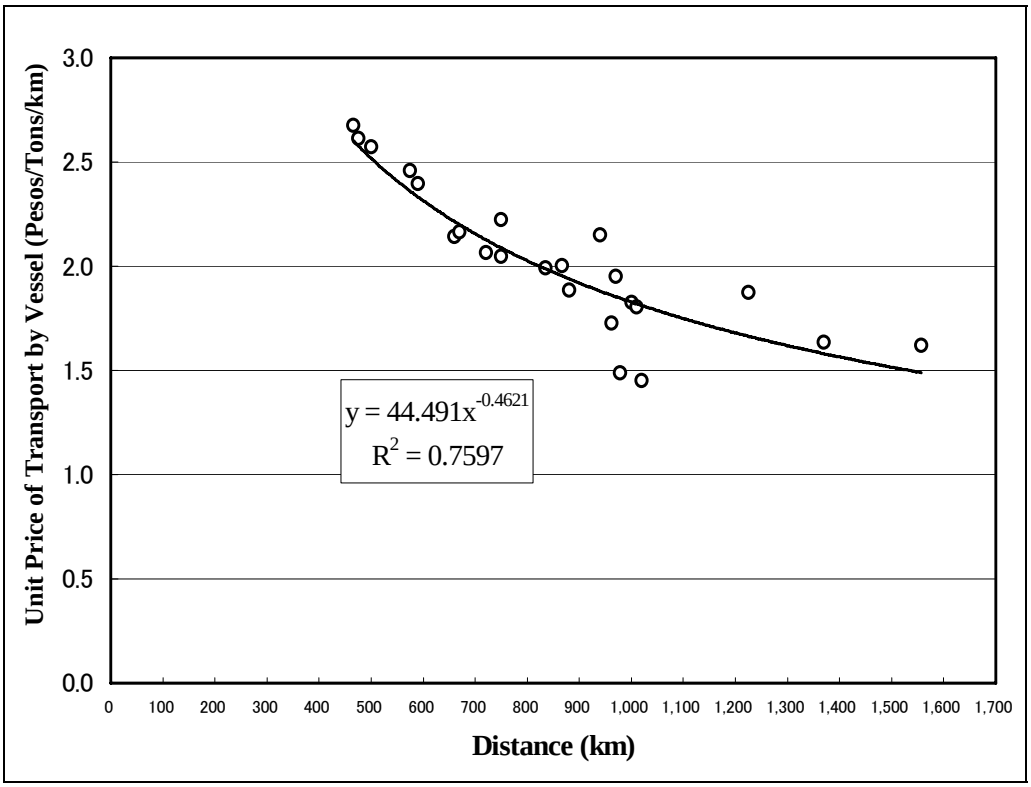
Table 6-5 Benefits of Cargo Transport Cost and Passenger Travel Time

Route	RRTS Link	Without Case, With Case and Benefits			
1. Western SRNH	**Dumangas** – Bacolod – Dumaguete, Siaton - Dapitan	① ***Cargo Transport Flow: Dumangas-Bacolod Route***			***20% of Cargo Vol. & Passenger Nos***
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Iloilo⇒Bacolod	381	2.0	44.4
		● With Case:			
		Dumangas⇒Bacolod	235	1.2	26.0
		○ Balance	**146**	**0.8**	**18.4**
2. Central SRNH	**San Antonio**– Masbate– **Esperanza** – **Daan Bantayan** – Cebu	② ***Cargo Transport Flow: Legazpi-Cebu Route:***			***95% of Cargo Volume***
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Legazpi→Matnog⇒Allen→Ormoc⇒Cebu,	2,745	19.2	587.5
		● With Case:			
		Legazpi→San Antonio⇒Masbate→Esperanza⇒Daan Bantayan→Cebu	2,462	13.2	387
		○ Balance	**283**	**6.0**	**200.5**
		③ ***Cargo Transport Flow: Cagayan de Oro –Legazpi Route:***			***5% of Cargo Volume***
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Cagayan de Oro⇒Manila→Legazpi	4,675	56.5	1,505
		● With Case:			
		Cagayan de Oro⇒ Cebu → Daan Bantayan ⇒ Esperanza → Masbate ⇒ San Antonio →	3,689	21.9	644
		○ Balance	**986**	**34.6**	**861**
4. Negros-S. Leyte SRNH	**Pt. Engano** - **Getafe**-**Ubay** - Maasin- San Ricardo - Lipata	④ ***Passenger Transport Flow: Pt. Engano - Maasin***			
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Cebu⇒Tubigon→Ubay⇒Maasin	1,650	6.0	170
		● With Case:			
		PT. Engano⇒Getafe→Ubay⇒Maasin	1,429	5.0	79
		○ Balance	**221**	**1.0**	**91**
5. Panay-Leyte SRNH	**Ajuy** – Cadiz– Escalante - **Tabuelan** – **Bogo** - **Palompon**	⑤ ***Cargo and Passenger Transport Flow: Cebu ー Tacloban Route***			
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Cebu⇒Ormoc→Tacloban	1,981	8.4	237
		● With Case:			
		Cebu→Bogo⇒Palompon→Tacloban	1,723	7.4	261
		○ Balance	**258**	**1.0**	**-24**
6. Panay - Masbate SRNH	Culasi - **Balud**	⑥ ***Cargo Transport Flow: Iloilo-Masbate Route***			
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Iloilo⇒Manila⇒Masbate	3,991	45.0	1,090
		● With Case:			
		Iloilo→Culasi⇒Balud→Masbate	1,806	6.5	257
		○ Balance	**2,185**	**38.5**	**833**
7. Batangas-Palawan SRNH	San Jose – Coron – **Taytay**	⑦ ***Cargo and Passenger Transport Flow: Manila ⇒Taytay Route***			
		● Without Case:	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Manila⇒Puerto Princesa→Taytay	5,759	29.1	873
		● With Case:			
		Manila→Batangas⇒Abla de Ilog→San Jose⇒Colon⇒Taytay	4,090	21.9	615
		○ Balance	**1,669**	**7.2**	**258**
8. Iloilo-Palawan SRNH	San Jose de Buenavista – Cuyo– **Taytay**	⑧ ***Cargo and Passenger Transport Flow: Iloilo ⇒Taytay Route***			
		● Without Case: Present Cargo and Passenger Transport	Trans. Cost (Pesos/ton)	Time (hrs)	Dis. (Km)
		Iloilo⇒Cuyo⇒Puerto Princesa→Taytay	4,679	29.1	693
		● With: RRTS Transport Flow			
		Iloilo→San Jose de Buenavista⇒Cuyo→Taytay	2,965	12.7	359
		○ Balance	**1,714**	**16.4**	**334**



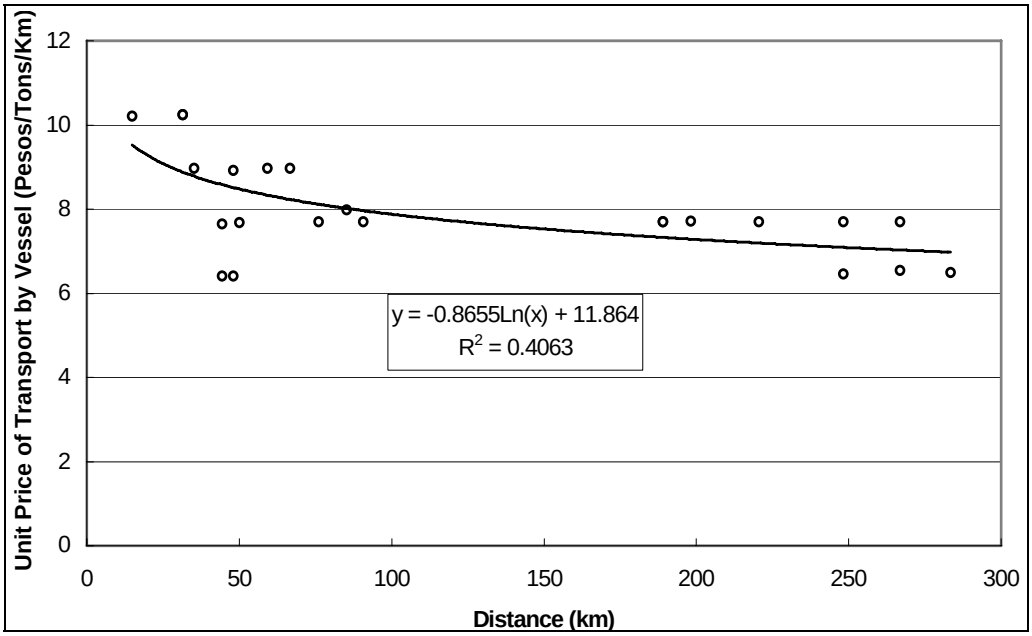
Source: Study Team, estimated based on the data of Confederation of Truckers Association of Philippines. Inc. (CTAP)

Figure 6-1 Unit Price of Transport Cost by Truck (Economic Price)



Source: Study Team, estimated based on the data of Negros Navigation and Wiliam, Gothong and Aboitiz

Figure 6-2 Unit Price of Transport Cost by Long-distance Shipping (Economic Price)



Source: Study Team, estimated based on the data of Montenegro Shipping Lines Inc.

Figure 6-3 Unit Price of Transport by RoRo Vessel Shipping (Economic Price)

The reduction benefits of cargo transport cost can be assumed as follows.

B_1 = $(TC_{w/o} - TC_{w/h})$ x ((VTy3 x 2 tons) + (VTy4 x 9 tons))

Where

B_2 = Reduction of cargo transport cost
$TC_{w/o}$ = Existing **Transport Cost* on "Without case" (per ton)
$TC_{w/h}$ = Transport Cost on "With case" (per ton)

**Transport Cost:* Transport Cost is based on "Door to Door System", therefore, it is not only included land and sea transport cost, but also port handling cost, tracking cost of origin and destination.

VTy3 = Vehicle Volume of Type 3 (Mainly truck and trailer) on Demand Forecast (per year)
VTy4 = Vehicle Volume on Type 4 (Mainly jeepney) on Demand Forecast (per year)

The reduction benefits of passenger travel time are based on minimum wage in each region. Based on interviews with passengers, about 50% passengers travel for work. The cost from reduction of passenger travel time can be estimated as follows:

B_2 = $(TT_{w/o} - TT_{w/h})$/365 days x MinW x Pas x SR x WPR

Where

B_2 = Reduction Passenger Travel Time
$TT_{w/o}$ = Travel Time on "Without case" (hour)
$TT_{w/h}$ = Travel Time on "With case" (hour)
MinW = Agricultural minimum wage (Peso/hour)

According to Philippines Year Book 2006, agricultural minimum wage by region as follows.

Area	Wage	Area	Wage
Region V	157 pesos	Region VIII	165 pesos
Region VI	140 pesos	Region IV	122 pesos
Region VII	173 pesos		

Pas = Number of passenger per year
SR = Shadow Wage Rate = 0.6
WPR = Working People Rate = 50%

ii) Saving of Vessel Fuel Cost by RoRo Vessel System

On the new standardization RoRo terminal system, RoRo vessel can be save fuel for idling a vessel engine with adequate mooring system. Idling time for fuel saving is estimated one hour per accommodation at RoRo terminal. Saving of vessel fuel cost by RoRo vessel system can be estimated as follows:

$B_3 = (FC_{w/o} - FC_{w/h}) \times 365 \text{ days} \times \text{Trip}$

Where

B_3 = Saving of Vessel Fuel Cost
$FC_{w/o}$ = Fuel Consumption Cost (pesos) on "Without case"
$FC_{w/h}$ = Fuel Consumption Cost (pesos) on "With case"
Trip = Trips per day

iii) Reduction of Cargo Damages, Pilferage and Robbery Cost by Security and Safety Facilities

Proposed new standardization RoRo terminal can minimize cargo damages, pilferage and robbery cost because of new security and safety system. Minimization of cargo damages are estimated as follows.

$B_4 = (CDR_{w/o} - CDR_{w/h}) \times CV \times CC$

Where

B_4 = Reduction of Cargo Damages and Pilferage Cost
$CDR_{w/o}$ = Cargo Damages/Pilferage Rate (%) on "Without case"
$CDR_{w/h}$ = Cargo Damages/Pilferage Rate (%) on "With case"
CV = Cargo Volume ton per year
CC = Cargo Cost per ton (Average 2004& 2003 in regional area is assumed in Table 6-6

Table 6-6 Cargo Cost per Ton in Regional Area

Region	2004			2003			2004&2003
	Quantity (Tons)	Value (1,000 Pesos)	Value/Quantity (Pesos)	Quantity (Tons)	Value (1,000 Pesos)	Value/Quantity (Pesos)	Value/Quantity (Pesos)
NCR	2,413,089	87,561,235	36,286	2,293,294	77,563,964	33,822	35,085
CAR	0	0	0	0	0	0	0
I - Ilocos	46753	565,998	12,106	47,021	863,870	18,372	15,248
II - Cagayan Valley	0	0	0	0	0	0	0
III - Central Luson	6,994,155	65,705,997	9,394	8,330,726	58,629,172	7,038	8,113
IVa - Calabarzon	3,274,197	13,372,791	4,084	2,233,597	6,984,785	3,127	3,696
IVb - Minaropa	960,879	15,986,468	16,637	2,349,438	12,640,609	5,380	8,648
V - Bicol	228,021	5,026,752	22,045	358,950	5,465,903	15,227	17,876
VI - Western Visayas	2,034,981	37,949,525	18,649	1,836,058	32,911,492	17,925	18,305
VII - Central Visayas	1,859,463	49,189,181	26,453	1,836,144	44,881,003	24,443	25,455
VIII - Eastern Visayas	508,583	31,845,773	62,617	567,660	30,849,682	54,345	58,254
IX - Zamboanga Peninsul	405,938	8,329,475	20,519	352,982	6,689,739	18,952	19,790
X - Northern Mindanao	2,155,547	38,926,804	18,059	3,130,561	26,292,624	8,399	12,338
XI - Davao Region	1,299,989	11,384,167	8,757	1,067,031	7,809,519	7,319	8,109
XII - Soccsksargen	1,359,564	18,281,279	13,446	1,776,640	19,681,910	11,078	12,105
XIII - Carga	928,885	18,911,498	20,359	790,627	16,877,219	21,347	20,813
ARMM	96,471	1,602,740	16,614	57,796	3,906,121	67,585	35,710
Total	24,566,515	404,639,683	16,471	27,028,525	352,047,612	13,025	14,666

Source: Commodity Flow in the Philippines 2004, National Statistics Office

iv) Reduction of Vessel Operation Cost by Smooth Mooring Operation System

Proposed new standardization RoRo terminal includes two ramps for high tide and low tide. Therefore, RoRo vessel can be smoothly accommodated to berth in any tidal range. Thus, with this standardization system, average one hour of vessel accommodation would be saved. Moreover, in the existing poor and damaged ramps such as Toledo Port, average three hours of vessel by tidal range would be solved.

$$B_5 = (MOT_{w/h} - MOT_{w/o}) \times CV \times CC$$

Where

B_5 = Reduction of Vessel Operation Cost by Smooth Mooring Operation System
$MOT_{w/h}$ = Mooring Operation Time per one Trip (hour) on “With case”
$MOT_{w/o}$ = Mooring Operation Time per one Trip (hour) on “Without case”
CV = Cargo Volume ton per year
CC = Cargo Cost per ton in regional area

v) Reduction of Vehicle Operation Cost in Smooth Access Road and Adequate Parking Area System

Proposed new standardization RoRo terminal includes paved access road from national road and ample space in parking lot. Therefore,

$$B_6 = (VOC_{w/h} - VOC_{w/o}) \times NV$$

Where

B_6 = Reduction of Vehicle Operation Cost in Smooth Access Road and Adequate Parking Area System
$VOC_{w/h}$ = Vehicle Operation Cost per one Trip (hour) on “With case”
$VOC_{w/o}$ = Vehicle Operation Cost per one Trip (hour) on “Without case”
NV = Number of Vehicle per year

vi) Reduction of Suspension of Shipping Services

Proposed Caticlan RoRo terminal includes breakwater for protection of seasonal high waves. Therefore, no suspension of shipping services is occurred in new terminal.

$B_7 = (SOC_{w/h} - SOC_{w/o}) \times SOC \times 365$ days

Where

B_7 = Reduction of Suspension of Shipping Services
$SOD_{w/h}$ = Shipping Operation Days per year on "Without case"
$SOD_{w/o}$ = Shipping Operation Days per year on "With case"
SOC = Shipping Operation Cost per day

vii) Passenger Suspension Time Reduction

In proposed Caticlan new RoRo terminal, no suspension time for passenger is occurred in new terminal.

$B_8 = (SOC_{w/o} - SOC_{w/h}) \times MinW \times Pas \times SR \times WPR$

Where

B_8 = Passenger Suspension Time Reduction
$SOD_{w/o}$ = Shipping Operation Days per year on "Without case"
$SOD_{w/h}$ = Shipping Operation Days per year on "With case"
MinW = Agricultural minimum wage (Peso/hour)
Pas = Number of passenger per year
SR = Shadow Wage Rate = 0.6
WPR = Working People Rate = 50%

viii) Saving vehicle operation costs (VOCs) in the views of running cost, fixed costs and time costs

Vehicle operating costs or VOC are those costs incurred by vehicles on the road under ideal conditions. The VOC is divided into three main components, namely: Running Cost, Fixed Cost and Time Cost.

Running cost is traveled distance-related and composed of fuel costs, lubricant costs, tire costs, maintenance and repair costs and part of distance-related depreciation cost. Fixed cost is composed of time-related depreciation costs, capital cots, crew costs and overhead costs.

The basic VOC are usually provided by the DPWH. Shown in Table are the VOC's at May 2003 price levels. The existing roads in the current road network without the proposed project are considered in "bad" condition under Gravel type of surface, while the Improvement Road Project is considered in "Gravel good" condition.

Table 6-7 VOC (Excluding Tax) as of May 2003

SURFACE		VEHICLE TYPE	Running Cost	Fixed Cost	R + F	Time
Type	Condition		(P/km)	(P/km)	(P/km)	(P/hr)
Paved	Fair	Car/Van	8.244	0.265	8.509	57.840
		Jeepny	5.688	1.299	6.987	85.680
		Bus	9.724	2.343	12.067	324.600
		Truck	12.506	2.752	15.258	0.000
		Motorcycle	1.032	0.096	1.128	34.200
		Tricycle	1.260	1.611	2.871	12.840
	Bad	Car/Van	9.618	0.398	10.016	57.840
		Jeepny	6.636	1.984	8.584	85.680
		Bus	11.968	3.569	15.537	324.600
		Truck	15.392	4.192	19.584	0.000
		Motorcycle	1.204	0.239	1.443	34.200
		Tricycle	1.470	2.818	4.288	12.840
Gravel	Fair	Car/Van	10.992	0.554	11.546	57.840
		Jeepny	7.584	2.713	10.297	85.680
		Bus	14.212	4.908	19.120	324.600
		Truck	18.278	5.764	24.042	0.000
		Motorcycle	1.376	0.239	1.615	34.200
		Tricycle	1.680	2.818	4.498	12.840
	Bad	Car/Van	13.053	0.933	13.986	57.840
		Jeepny	9.006	4.570	13.576	85.680
		Bus	17.204	8.262	25.466	324.600
		Truck	22.126	9.703	31.829	0.000
		Motorcycle	1.634	0.319	1.953	34.200
		Tricycle	1.995	5.637	7.632	12.840

The values of VOC's shown above are assumed with constant price for the entire evaluation period.

· VOC Savings

The VOC savings for the proposed project are mainly based on savings due to improved road conditions (VOC1) as shown in the following equations:

VOC Savings = VOC1

VOC1 = (VOC: Existing Road－VOC: Good Road)・No. of Vehicles・Road Section (km)

In this study, following situation will be adopted and VOC is shown in Table 6-8.

Existing Road = Gravel Bad, Good Road (improved) = Gravel Fair

The total benefits from VOC savings are calculated as the sum of all the VOC savings per mode (or vehicle type).

Table 6-8 Difference VOC between Gravel Bad and Gravel Fair

SURFACE		VEHICLE TYPE	Running Cost	Fixed Cost	R + F	Time
Type	Condition		(P/km)	(P/km)	(P/km)	(P/hr)
Gravel	Fair	Car/Van	2.061	0.379	2.440	57.840
		Jeepny	1.422	1.857	3.279	85.680
		Bus	2.992	3.354	6.346	324.600
		Truck	3.848	3.939	7.787	0.000
		Motorcycle	0.258	0.080	0.338	34.200
		Tricycle	0.315	2.819	3.134	12.840

· VOC Time Savings

Balud Section: Proposed Length = 40km

-Existing Speed Condition = 15km/hr, Travel Time = 40km / 15km/hr = 2.67hr

-After Improved Speed Condition = 50km/hr, Travel Time = 40km / 50km/hr = 0.80hr

-Reducible Travel Time = 2.67hr – 0.80hr = 1.87hr

Esperanza Section: Proposed Length = 30km

-Existing Speed Condition = 20km/hr, Travel Time = 30km / 20km/hr = 1.50hr

-After Improved Speed Condition = 50km/hr, Travel Time = 30km / 50km/hr = 0.60hr

-Reducible Travel Time = 1.50hr – 0.60hr = 0.90h

· Generated Traffic Benefits

Generated traffic is defined as the increased in traffic bought about by the road improvement. The increase in traffic occurs because road conditions are improved and transport cost/prices falls.

Generated traffic as a function of the normal traffic comes from the transport cost reduction, increased in crop production and others.

After developed RoRo port at Balud and Esperanza, and road improvement of the sections, through traffic volume of the sections will be increased comparer with existing. In this study the trough traffic is assumed as follows.

-Inhabitant of main Province, city, municipality, and barangay in Masbate Island will go to the new RoRo ports one time in one year.

-Component of communication to the RoRo ports are 10% motorcycles, 20% cars, 30% Jeepneys and 40% buses.

-Number of riding persons are 4 motorcycles, 6cars, 20 jeepney, 60 buses

-Increase rate: 5% / year

-On above assumption, the result of the trough traffic is shown in Table 6-9 and Figure 6-4.

Table 6-9 Population of Each City in Masbate Island and Future through Traffic Volume

To Esperanza					
City	Population	Motercycle	Car	Jeepny	Bus
Masbate	71,441	7,144	14,288	21,432	28,576
Mobo	28,233	2,823	5,647	8,470	11,293
Uson	43,825	4,383	8,765	13,148	17,530
Dimasalang	21,550	2,155	4,310	6,465	8,620
Palanas	24,666	2,467	4,933	7,400	9,866
Cataigan	46,593	4,659	9,319	13,978	18,637
Pio. V. Corpuz	21,519	2,152	4,304	6,456	8,608
Esperanza	16,209	1,621	3,242	4,863	6,484
Total	274,036	27,404	54,807	82,211	109,614
Number of Vehicles		27,404	36,538	16,442	7,308
Number of Vehicles (From/to)		**54,807**	**73,076**	**32,884**	**14,615**
To Balud					
Masbate	71,441	7,144	14,288	21,432	28,576
Miragros	44,575	4,458	8,915	13,373	17,830
Balud	30,068	3,007	6,014	9,020	12,027
Total	146,084	14,608	29,217	43,825	58,434
Number of Vehicles		14,608	19,478	8,765	3,896
Number of Vehicles (From/to)		**29,217**	**38,956**	**17,530**	**7,791**

Number of Vehicle: v / year

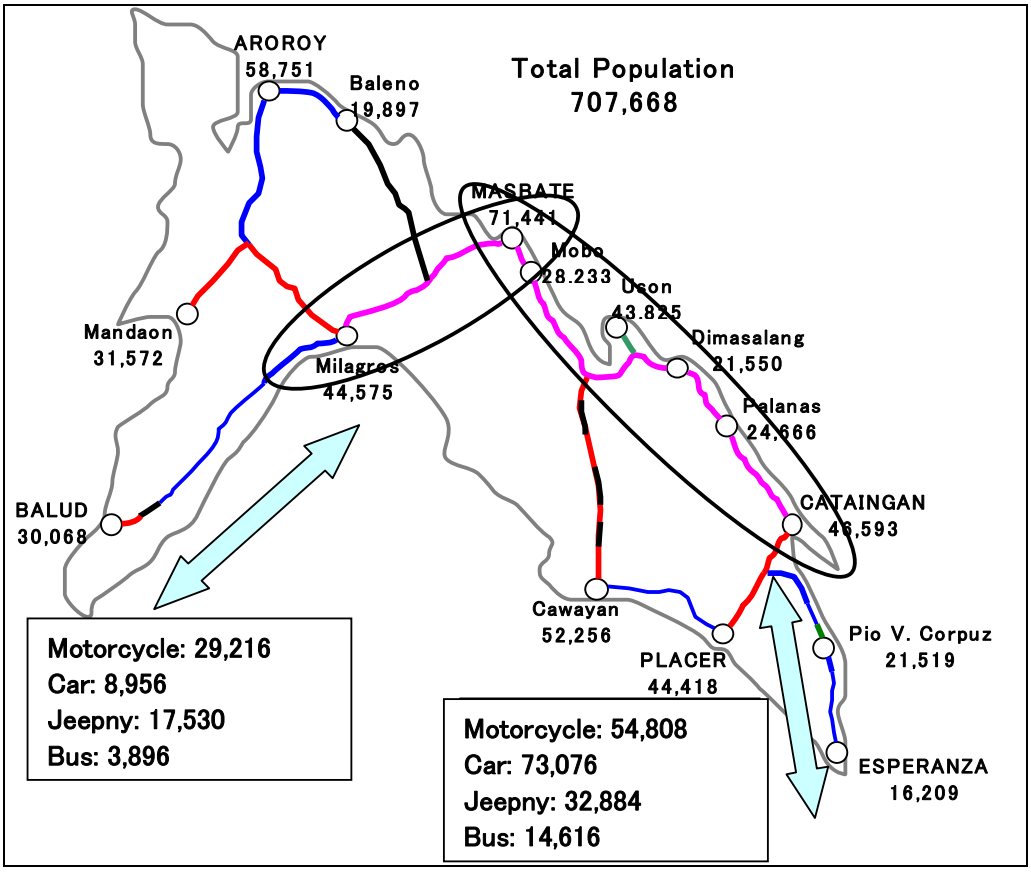


Figure 6-4 Population of Each City in Masbate Island and Future through Traffic Volume

6.2.6 Economic International Rate of Return (EIRR)

1) Calculation of EIRR

EIRR is introduced to the economic analysis to appraise the economic feasibility of projects. EIRR is the discount rate which makes the present value of project costs equal to the present benefits during the project life. It is calculated by using the following formula,

$$\sum_{i=1}^{n} \frac{Bi - Ci}{(1+r)^{i-1}} = 0$$

Where:

n: Project life

Bi: Benefit in the i-th year: first year is the base year

Ci: Cost in the i-th year

R: Discount rate

2) EIRR Results

EIRR of the base case of the new SRNH routes and expansion and improvement project of RoRo vessel terminal in the existing SRNH routes are estimated all more than 15%/annum. The rate exceeds the social discount rate or opportunity cost of capital in the Philippine.

Accordingly, it can be concluded that the project is economically feasible.

3) Sensitivity Analysis

In order to examine the feasibility of a project when the given assumptions are changed, the following sensitivity analysis is carried out.

-Project costs increase by 10% and 20%, and

-Project benefits decrease by 10% and 20%

On the results of sensitivity analysis, four routes such as Dumangas – Bacolod – Dumaguete, Siaton - Dapitan in Western SRNH, Panay-Leyte SRNH, Panay - Masbate SRNH, Iloilo-Palawan SRNH can be concluded that the projects are economically feasible, even if the project cost is increased 20% and at same time, the benefits is decreased by 20% from the base case. Thus, above four routes are more beneficial to the national economy than the other routes.

Table 6-10 EIRR of the New SRNH and Existing Western SRNH

SRNH	Route (RoRo links)	EIRR	Sensitivity Analysis								
		Base Case	Cost	0%	0%	10% up	20% up	10% up	10% up	20% up	20% up
			Benefit	-10%	-20%	0%	0%	-10%	-20%	-10%	-20%
1. Eastern SRNH Ext.	**San Antonio - Masbate- Esperanza - Naval**	**28.6%**		25.2%	21.5%	25.5%	22.7%	22.2%	18.6%	19.5%	16.1%
2. Western SRNH	**Batangas – Calapan – Roxas – Caticlan – Iloilo**	**15.4%**		13.2%	9.7%	13.4%	10.9%	10.3%	6.8%	7.7%	4.0%
	Iloilo-Dumangas – Bacolod – Dumaguete, Siaton - Dapitan	**88.9%**		78.8%	68.1%	79.8%	71.7%	70.1%	59.7%	62.4%	52.4%
3. Central SRNH	**Legaspi-San Antonio– Masbate– Esperanza – Daan Bantayan – Cebu**	**19.4%**		17.1%	14.7%	17.3%	15.5%	15.2%	12.8%	13.4%	11.1%
4. Negros-S. Leyte SRNH	**Bacolod - San Carlos - Toledo - Cebu**	**22.8%**		19.5%	16.2%	19.8%	17.3%	16.8%	13.7%	14.4%	11.5%
	Cebu-Pt. Engano - Getafe- Ubay - Maasin- San Ricardo - Lipata	**22.2%**		19.2%	16.1%	19.5%	17.1%	16.7%	13.8%	14.5%	11.7%
5. Panay-Leyte SRNH	**Roxas-Ajuy – Cadiz– Escalante - Tabuelan – Bogo - Palompon -Tacloban**	**37.1%**		32.7%	28.1%	33.1%	29.6%	28.9%	24.7%	25.8%	21.8%
6. Panay - Masbate SRNH	**Roxas - Culasi - Balud - Masbate**	**34.8%**		32.0%	29.1%	32.3%	30.1%	29.6%	26.8%	27.5%	24.9%
7. Batangas-Palawan SRNH	**Batangas - Abra de Ilog - San Jose – Coron – Taytay - Puerto Princesa**	**16.4%**		14.1%	11.6%	14.3%	12.4%	12.0%	9.6%	10.2%	7.8%
8. Iloilo-Palawan SRNH	**Iloilo - San Jose de Buenavista – Cuyo– Taytay**	**51.3%**		46.3%	41.0%	46.8%	42.8%	42.0%	36.9%	38.2%	33.2%

7. Evaluation of Financial Feasibility

7.1 Methodology and Prerequisites

7.1.1 Purpose of the Financial Analysis

The purpose of the financial analysis is to appraise the financial feasibility of the fifteen ports development plan. The analysis focuses on the viability of the project itself.

7.1.2 Methodology of the Financial Analysis

1) Viability of the Project

The purpose of the financial analysis is to judge the financial feasibility of the project. The viability of the project is analyzed using the Discount Cash Flow Method and appraised by the FIRR (Financial Internal Rate of Return). The FIRR is a discount rate that makes the costs and the revenues during the project life equal, and evaluates profitability of the project. FIRR is calculated using the following formula:

$$\sum_{i=1}^{n} \frac{Bi - Ci}{(1 + r)^{i-1}} = 0$$

n : project life
Bi : revenues in the i-th year
Ci : costs in the i-th year
R : discount rate

In the course of analysis costs and benefits taken into account for the calculation of the FIRR are summarized as follows:.

Cost; a. Total investment cost including initial capital and reinvestment for renewal

b. Operating cash expenses

Benefit; a. Port operating revenue

When the calculated FIRR exceeds the interest rate (weighted average interest rate) of the total funds the project investments, the project is regarded as financially feasible.

7.1.3 General Prerequisites of the Financial Analysis

1) Scope of the Analysis

The scope of the analysis is as follows:

(1) Each development plan for the fifteen ports covers only the RoRo terminal. The number of vehicle and passenger transported through the terminal is assumed to be the RoRo related ones which is shown in the Traffic Forecast in Part Ⅰ Chapter 8 of this report.

(2) The financial analysis takes the port management body as an implementation body.

(3) The financial analysis based on this assumption assesses the financial viability of the project independently of the managing condition of the implementation body. Some financial institutions

use this method.

2) With Case and Without Case

In conducting a financial analysis, the revenue is generally calculated by determining the amount of income to be lost or gained in two different case scenarios: the "with case" and the "without case".

"Without case" means the income is lost when the project is actually carried out. When the implementing body of the project operates existing facilities by which it earns the income prior to the new service begins, the amount should be excluded from the income of the project.

Table 7-1 Port Administration and Present RORO Service

Name of Port	Link	Administration	RORO service
San Antonio	Masbate	New	None
Esperanza	Daanbantayan	New	None
	Naval		
Daanbantayan	Esperanza	New	None
Naval	Esperanza	New	None
Balud	Culasi	New	None
Ajui	Cadiz	LGU(improvement)	None
Tabuelan	Escalante	LGU(improvement)	Operational
Bogo	Parompon	LGU(improvement)	None
Caticlan	Roxas	LGU(improvement)	Operational
Dumangas	Bacolod	PPA(improvement)	Operational
Toledo	San Carlos	CPA(improvement)	Operational
Pt.Engano	Getafe	CPA(improvement)	Operational
Getafe	Pt.Engano	PPA(improvement)	Operational
Ubay	Maasin	PPA(improvement)	Operational
Taytay	Coron, Cuyo	New	None

3) Project Life and Price Level

Taking account of the conditions of the long-term loans and the service lives of the port facilities, the project life for the financial analysis is determined to be 30 years, following the 3-year period for the construction of the facilities beginning in 2009.

For the estimation of costs, expenditures and revenues prices are fixed at the 2007 level.

7.2 Cost and Revenue Items

7.2.1 Traffic Forecast

Traffic Forecast is estimated based on Part 1, Chapter 8. Loading capacity of vessel assigned by each route is as follows. A maximum of 36 services / day is set based on RoRo vessel loading capacity.

Table 7-2Capacity of RoRo Vessel

Type	Capacity (Lane Meter)
500GRT	120 m
2,000GRT	360 m

7.2.2 Port Charges and Revenues

The revenues from the port activities are calculated based on Vehicle Type (Table 7-3), Passenger (Table 7-4), Gross tonnage of vessel (Table 7-5, Table 7-6).

Table 7-3 RoRo Terminal Fee for Vehicles

Vehicle Type	Lane Meter	Denomination (Php)
Type 1	1 - 3	56.00
Type 2	>3 - 5	112.00
Type 3	>5 - 7	224.00
Type 4	>7- Up	448.00

The denominations stated on the above table is inclusive of twelve percent (12%) Value Added Tax (VAT).

Table 7-4 Passenger Terminal Fee

Type	Usage(Php)
1 Person	10
Reference(present)	
Batangas	10
Cebu	25
Bacolod	15
Toledo	10
Ormoc	22.4

Table 7-5 Port Tariffs for Vessel

Type of Charge	Unit	Philippine Latest
Usage Fee at Gov		Php
6GRT to 100GRT	Per day	61.00
> 100GRT	Per GRT	0.60

Table 7-6 Port Tariffs (1 day)

Type	Usage		
500GRT	PHP 0.60	x	500 GRT = Php 300
2,000GRT	PHP 0.60	x	2,000 GRT = Php 1,200

7.2.3 Initial Investment Costs

The initial investments of RoRo ports development are estimated in Part I Chapter 4, and the costs included in the financial analysis are shown in Table 7-7.

Table 7-7 Construction Cost and Schedule

[Unit: Thousand Pesos]

Name of Port	2009	2010	2011	Total
San Antonio	9,349	200,154	198,818	408,321
Esperanza	11,071	237,002	235,420	483,492
Daanbantayan	11,251	240,865	239,258	491,374
Naval	4,533	115,537	77,888	197,957
Balud	11,597	248,280	246,623	506,501
Ajuy	7,297	185,998	125,388	318,683
Tabuelan	8,977	228,812	154,251	392,039
Bogo	6,327	161,282	108,727	276,336
Caticlan	14,035	300,461	298,456	612,953
Dumangas	3,478	88,664	59,772	151,914
Toledo	7,221	184,059	124,081	315,361
Pt.Engano	8,339	178,528	177,337	364,205
Getafe	6,193	157,868	106,425	270,486
Ubay	8,653	220,555	148,685	377,892
Taytay	8,790	188,187	186,931	383,908

7.2.4 Maintenance and Repair Costs

The annual maintenance and repair costs for the port facilities are calculated as 1% of the initial construction cost taking the service lives into consideration.

7.2.5 Operation Cost

-In the course of the calculation of personnel and administration costs, the increment costs are to be estimated.

-In the case of new ports, it is assumed as 15% of the port operating revenue estimating based on the past performance of PPA in 2003, 2004, 2005.

-In the case of repair of existing ports, it is assumed as 15% for increment cost of port income between with case and without case.

7.3 Financial Analysis of Port Development Project

7.3.1 Financial Analysis

The results of FIRR calculation of the Base Case are shown in Table 7-8. Result of FIRR for 15 Ports showed low value in all cases. Sensitivity analysis is conducted to examine the impact of unexpected future changes. The following nine cases are envisaged;

Case 1 : The project cost increases by 10%

Case 2 : The revenue decreases by 10%

Case 3 : The project cost increases by 10% and the revenue decreases by 10%

Case 4 : Increases by 10% of the tariff rate is assumed every 5 year after 2010

Case 5 : Double price of the tariff rate is assumed after 2010

Case 6 : 20% of project cost subsidized by the government

Case 7 : 40% of project cost subsidized by the government

Case 8 : Traffic volume increases by 10%

Case 9 : Traffic volume increases by 20%

Table 7-8 Results of FIRR

Name of Port	FIIR (%) Case									
	Base case	1	2	3	4	5	6	7	8	9
San Antonio	3.3	2.7	2.6	2.0	5.9	8.0	4.7	6.6	3.9	4.4
Esperanza	3.5	2.9	2.8	2.2	6.2	8.5	5.0	7.1	4.2	4.8
Daanbantayan	-	-	-	-	3.0	4.8	1.8	3.6	-	1.5
Naval	3.1	2.5	2.4	1.8	5.7	8.0	4.6	6.6	3.7	4.3
Balud	-	-	-	-	-	-	-	-	-	-
Ajui	1.5	-	-	-	4.1	6.2	2.9	4.7	2.1	2.6
Tabuelan	0.8	-	-	-	3.5	5.9	2.3	4.3	1.4	2.0
Bogo	1.5	0.9	-	-	4.2	6.6	3.0	4.9	2.1	2.7
Caticlan	-	-	-	-	2.7	4.8	-	2.3	-	-
Dumangas	4.8	4.3	4.2	3.7	9.7	17.4	6.0	7.5	5.3	5.8
Toledo	-	-	-	-	2.3	4.8	-	1.7	-	-
Pt.Engano	-	-	-	-	-	2.6	-	-	-	-
Getafe	-	-	-	-	2.1	4.6	-	1.5	-	-
Ubay	-	-	-	-	2.2	4.6	-	1.7	-	-
Taytay	3.9	3.2	3.1	2.5	6.6	9.3	5.5	7.8	4.6	5.2
Package A	1.8	1.2	1.1	-	4.4	6.5	3.2	5.2	2.4	3.0
Package B	-	-	-	-	3.4	5.9	1.4	3.1	-	-
15 Ports	-	-	-	-	3.8	6.2	2.2	4.0	1.4	2.0

7.3.2 Possible Financing Scheme

1) Evaluation of FIRR

The funds for the implementation of the project are assumed to be raised as follows;

(1) Foreign Currency

Source : Fund from Japan Bank for International Cooperation (JBIC)

Interest rate : 1.5% per annum

Repayment : 30 years, including a grace period of 10 years

(2) Local Currency

Source : Fund from Development Bank of the Philippines

Interest rate : 7% per annum (Initial two years)

For remaining period, add annual adjustment coefficient to PDSR

Repayment : 15 years, including a grace period of 2 years

At this point in time, rate of portion of foreign currency and local currency is not fixed. Therefore, we have conducted the evaluation using foreign currency (JBIC) for the total amount of financing. According to the result of FIRR, many ports could not be financially independent in the Base Case.

2) Development

(1) Improvement plan of FIRR

According to the result of the sensitivity analysis, increasing the port charge such as in Case 4 and Case 5, and reduction of initial investment such as in Case 6 and Case7, significantly improves FIRR.

(2) Reduction of initial investment

Burden share of initial investment cost by Government is necessary to improve financial soundness. Here, we examine the initial investment which will be borne by the Government. Developed facilities are transferred to the port management free of charge by the Government, after which the port management body carries out maintenance and repair of these facilities. It is assumed that a JBIC loan will be utilized for both facilities subsidized by the Government and facilities constructed by the port management body. For ports with negative FIRR, it is calculated that the Government will have to bear part of the initial investment cost for the FIRR to become 2.0%. The results of FIRR calculation in the case of government support are shown in Table 7-9.

Table 7-9 Results of FIRR in case of Government Support

Name of Port	Government subsidy (Percentage on construction cost)
	Adjustment of FIRR; 2.0%
Daanbantayan	30.0%
Balud	84.5%
Ajuy	12.0%
Tabuelan	22.0%
Bogo	12.0%
Caticlan	48.0%
Toledo	54.0%
Pt.Engano	74.5%
Getafe	58.0%
Ubay	55.0%

In this way, when a revision of port dues is not done, it is necessary for Government subsidies to show in Table 7-9 among initial investment costs. In development of RoRo terminal, government subsidy the facilities which it shows Table 7-10. Port management body bears other construction costs and maintenance / operating cost in port dues

In principle, PPA, CPA develops basic facilities by Government subsidies and port management body develops operation facilities by port dues.

Table 7-10 Item of Government Support

	Basic facilities				Operation facilities						
Item	Marine Works	Navigational Aids	Berthing Facilities	Civil Works	Utilities Works	Electrical Works	Lightings	Appurtenant Works	Access Road	Building Works	RORO Ramp, Fender
Daanbantayan	■										
Balud	■	■	■	■	■	■	■	■			
Ajuy	■										
Tabuelan	■										
Bogo	■										
Caticlan	■										
Toledo	■	■	■	■							
Pt.Engano	■	■	■	■	■	■					
Getafe	■	■	■	■	■						
Ubay	■	■	■	■							

3) Development Scheme

· Scheme to implement the infrastructure projects proposed in the study

Given the great importance of national transport infrastructure, it is considered appropriate that government agencies directly implement the infrastructure projects (with the exception of RoRo vessel operations) proposed in the study as follows.

-RoRo Terminals; PPA, CPA

· DOTC shall be the sole agency responsible for receiving loans to implement the projects.

Calculation results of FIRR are different in each port. With the exception of ports with highly profitable links, network function is not shown. For this reason, PPA or CPA carries out port development with the support of the Government as described above so that each port can be profitable. Primary contractor (PPA, CPA) pays port development costs for facilities which are eligible for Government support. In the other facilities, port management body bears development costs.

Based on the result of FIRR, ports were classified according to the following three development methods.

Table 7-11 Development Scheme

Name of Port	Developments scheme
San Antonio Esperanza Naval Dumangas Taytay	JBIC loan
Daanbantayan Ajui Tabuelan Bogo Caticlan Toledo Ubay	JBIC loan Government subsidy for basic facilities
Balud Pt.Engano Getafe	JBIC loan Government subsidy for basic facilities Revision of Port charges

It should be noted that a revised port tariff was assumed in the case of Balud and Getafe.

－Condition of preliminary calculation－

Source: Fund from JBIC, Interest rate; 1.5% per annum, Repayment: 30 years

Basic facilities: Government subsidy

Operation facilities: Port management body

Port charges: Adjustment of FIRR; 2.0%

－Result of preliminary calculation－

Port of Balud: Port tariff is raised by 22％

Port of Pt.Engano: Port tariff is raised by 17％ Port of Getafe: Port tariff is raised by 8％

7.4 Financial Assessment of RoRo Ship Operation

7.4.1 Methodology

A detailed financial analysis of RoRo ship operation is quite difficult, because the ship procurement cost, which is one of the largest elements of shipping cost, varies in accordance with demand and supply within ship market. The fuel cost and maintenance cost also vary depending on the age of ship.

Therefore, revenues generated by a round trip have been estimated to make a comparative assessment of financial feasibility. The procedure of the computation of revenues is as follows:

(1) Computation of revenue per round trip is computed for existing RoRo links

Based on the port statistics of annual vehicle and passenger traffic and annual trips made by all the RoRo ships at Calapan Port, revenue per trip has been computed for the year 2005.

(2) Evaluation criterion

With an assumption that the shipping lines operating RoRo ships at Batangas - Calapan is gaining profit or, in other words, not losing money, the amount of revenue per trip obtained above is used as the criterion whether the RoRo ship operation is profitable or not.

(3) Computation of revenue per trip at the new RoRo links

Revenues per trip are computed for some new RoRo links based on the traffic forecast.

(4) Comparative evaluation of financial feasibility

Comparing the revenue per trip between the existing links and new links and the per trip at a new link is no less than that of existing link, the ship operation is assessed to be financially viable.

7.4.2 Calculation of Revenue at Existing RoRo Links

Port statistics at Calapan and Roxas Port include number of vehicle units by type as well as volume of transport equipment and number of passengers. Assuming that all the RoRo ships called on Calapan Port in 2005 were employed in Batangas-Calapan Link, average cargo volume and passenger per trip are calculated as shown in Table 7-12.

In 2005, 12 RoRo ships were employed in the RoRo ferry service between Calapan - Batangas Link. Average size of the 12 ships was about 500 GRT. Calapan Port was called on by a total of 9,556 ships. This means 9,556 round trips were made by 12 ships. Thus on the average a ship made 2.5 round trips per day.

The port statistics also shows that, in 2005, 690,795 tons of transport equipment and 1,305,000 passengers were handled. The total number of vehicle units handled in 2005 was 253,575 units, and the break down by Type of vehicles is also given. Dividing total number of each Type of vehicles by the total number of trips, the composition of the vehicle types carried during a trip is calculated: Type I; 0.7, Type II; 9.6, Type III; 11.1 and Type IV; 5.1 units. The average number of passengers is also calculated to be 137.

With the assumption that the average lane meter for each Type as shown in the Table, the average load factor is estimated to be 63.5%. Applying the vehicle and passenger charges currently employed in the Batangas -Calapan link, the revenue per trip is calculated to be 75,414 pesos (vehicle 53,564 Pesos and passenger 21,850 pesos).

Table 7-12 Per trip Revenue calculation for Batangas - Calapan Link

Batangas - Calapan (2005)

Ship Employed	12	Distance	24 N. Miles				
Ship calls	9,556	2005 Actual					
Trip per ship	796	per year	2.5 per day				
Cargo	690,795	2005 Actual	72.3 t per trip				
Vehicle Type	I	II	III	IV	Total		
Vehicle number	6,426	92,014	106,216	48,919	253,575		
Vehicla Per Trip	0.7	9.6	11.1	5.1	26.5	RoRo ship	
Unit Lane-Meter	1.5	4	6	9		L.M. Capa.	Load Fac.
Total L-M	1.0	38.5	66.7	46.1	152.3	240	63.5%
Charge (Peso/Unit)	250	1,300	2,250	3,100			
Revenue/trip PhP	168	12,518	25,009	15,869	**53,564**		
Paqssenger	1,305,000	2005 Actual				Total reve./trip (Pesos)	
Pax Per Trip	137	Pax/Trip	160	peso/Pax	**21,850**		**75,414**

Source: Study Team

In the same manner, per trip revenue for Roxas - Caticlan Link is calculated (see Table 7-13). The average revenue per trip is 175,552 Pesos, with 75,783 pesos from vehicle charge and 98,768 pesos from passenger charge. The RoRo ships deployed in Roxas - Calapan link are larger than those deployed in Batangas - Calapan Link. Though the average Load Factor is low, the per-trip revenue is about twice as large as that of Batangas - Calapan Link due to the large number of passenger in the link, the average passenger. Since the average size of RoRo ship is about 1,500 GRT, the operation coast must be larger.

Table 7-13 Per-trip Revenue Calculation for Batangas - Calapan Link

Roxas-Caticlan (2005)

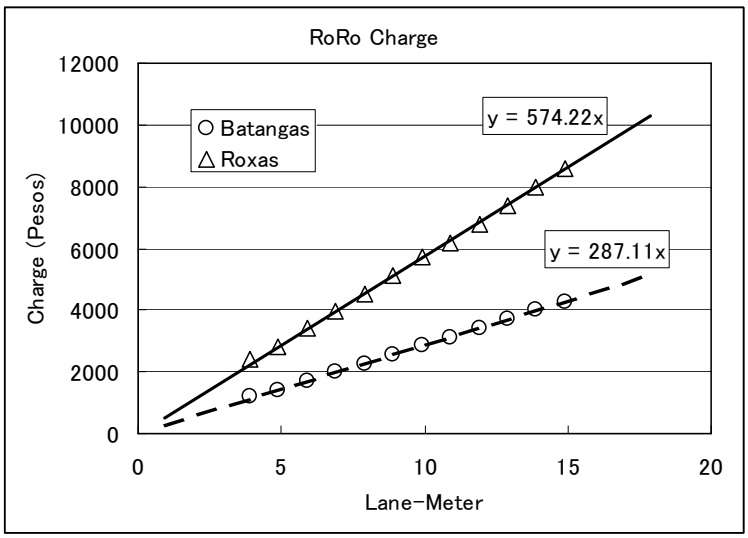
Ship Employed	3	Distance	46 N. Miles				
Ship calls	2,181	2005 Actual					
Trip per ship	727	per year	2 per day				
Cargo ton	174,275	2005 Actual	239.7 ton/trip				
Vehicle Type	I	II	III	IV	Total		
Vehicle number	868	20,576	3,628	19,415	44,487		
Vehicle per trip	0.4	9.4	1.7	8.9		RoRo ship	
Unit Lane-Meter	1.5	4	6	9		L.M. Capa.	Load Fac.
Total L-M	0.6	37.7	10.0	80.1	128.4	400	**32.1%**
Charge (Peso/Unit)	500	2,600	3,400	5,100			
Revenue per Trip	199	24,529	5,656	45,400	**75,783**		
Passenger	652,769	2005 Actual				Total reve./trip (Pesos)	
Pax Per Trip	299	Pax/Trip	330 peso/Pax		**98,768**		**174,552**

Source: Study Team

7.4.3 Calculation of Revenue at New RoRo Links

The vehicle charge of RoRo ship has been estimated from the current tariff employed in Batangas-Calapan and Roxas - Caticlan. The amount of vehicle charge applied for Roxas - Calapan link is almost double of that applied for Batangas -Calaopan Link. Since the distance of the former links is 46 nautical miles, while the distance of the latter is 24 nautical miles, the charge seems to be proportional to the distance. It is also observed that the vehicle charge is also proportional to Lane-meter (see Figure 7-1). Thus, the vehicle charge that is currently applied for these two RoRo links can be well approximated by the following equation:

$$(\text{Charge, Peso}) = 12 \times (\text{Nautical Mile}) \times (\text{Lane-Meter}) \quad \cdots\cdots\cdots \quad (1)$$



Source: PPA PMO Calapan, editied by Study Team

Figure 7-1Vehicle Charge v.s. Lane-meter

The average per-trip revenues have been calculated for Esperanza- Daan Bantayan, San Antonio (Pilar) - Masbate and Culasi-Balud Links on the basis of forecast traffic in 2015. The results are shown in Table 7-14, Table 7-15 and Table 7-16.

Table 7-14 Per-trip Revenue Calculation for Esperanza - Daan Bantayan Link

Esperanza- Daan Bantayan (2015)

Ship Employed	3	Distance	28	N. Miles			
Ship calls	4,380	2015 Esti.					
Trip per ship	1,460	per year	4	per day			
Cargo ton	294,319	2015 Esti.	201.6	ton/trip			
Vehicle Type	I	II	III	IV	Total		
Vehicle number	2,278	31,296	28,686	29,314	91,574		
Vehicle per trip	0.5	7.1	6.5	6.7		RoRo ship	
Unit Lane-Meter	1.5	4	6	9		L.M. Capa.	Load Fac.
Total L-M	0.8	28.6	39.3	60.2	128.9	240	**53.7%**
Charge (Peso/Unit)	300	1550	2650	3650			
Revenue per Trip	156	11,075	17,356	24,428	**53,015**		
Passenger	344,465					Total reve./trip (Pesos)	
Pax Per Trip	79	Pax/Trip	190	peso/Pax	**14,943**		**67,958**

Source: Study Team

Table 7-15 Per-trip Revenue Calculation for San Antonio-Masbate

Pilar - Masbate (2015)

Ship Employed	3	Distance	34	N. Miles			
Ship Calls	4,380	2015 Esti.					
Trip per ship	1,460	per year	4	per day			
Cargo ton	311,317	2015 Esti.	213.2	ton/trip			
Vehicle Type	I	II	III	IV			
Vehicle number	2,409	33,103	30,343	31,007	96,862		
Vehicle per trip	0.6	7.6	6.9	7.1		RoRo ship	
Unit Lane-Meter	1.5	4	6	9		L.M. Capa.	Load Fac.
Total L-M	0.8	30.2	41.6	63.7	136.3	240	56.8%
Charge (Peso/Unit)	355	1850	3200	4400			
Revenue per Trip	195	13,982	22,168	31,149	**67,494**		
Passenger	344,465					Total reve./trip (Pesos)	
Pax Per Trip	79	Pax/Trip	230	peso/Pax	**18,088**		**85,582**

Source: Study Team

Table 7-16 Per-trip Revenue Calculation for San Antonio-Masbate

Culasi-Balud (2015)

Ship Employed	2	Distance	35	N. Miles			
Annual trip	2,190	2015 Esti.					
Trip per ship	1,095	per year	3	per day			
Cargo ton	142,131	2015 Esti.	129.8	ton/trip			
Vehicle Type	I	II	III	IV	Total		
Vehicle number	1,100	15,113	13,855	14,156	44,224		
Vehicle per trip	0.5	6.9	6.3	6.5		RoRo ship	
Unit Lane-Meter	1.5	4	6	9		L.M. Capa.	Load Fac.
Total L-M	0.8	27.6	38.0	58.2	124.5	240	51.9%
Charge (Peso/Unit)	360	1900	3250	4500			
Revenue per Trip	181	13,112	20,561	29,088	**62,941**		
Passenger	131,708					Total reve./trip (Pesos)	
Pax Per Trip	60	Pax/Trip	230	peso/Pax	**13,832**		**76,774**

Source: Study Team

The distance of these three new RoRo links are longer than that of Batangas-Calapan Link as shown in Table 7-17 and the profitable level of revenue per trip would be higher due to the longer travel. With the adjustment for the distance, the profitable levels of revenue per trip are given

as shown in the fourth column of the table. The estimated revenues per trip for the three new links are 20 to 30% lower then the profitable levels.

Since the Load Factors are still lower than that observed in Batangas - Calapan link and the revenue per trip would be improved as the traffic grows in later years. In addition, the reason why the revenues per trip in the new links seem to be smaller than that of Batangas - Calapan Link is the fewer number of passengers per trip. The macro forecast employed in the traffic forecast might have underestimated the passenger traffic. As discussed in Section 8.3, Volume I, the potential passenger traffic through these three links would be considerable and it is very likely the passenger traffic is induced once long-distance buses start operation. This would lead substantial improvement in the revenue of RoRo shipping service.

Table 7-17 Evaluation of Financial Feasibility of Ship Operation at New RoRo Links

RoRo Link	Distance N. Miles	Distance Ratio	Profitable per trip Revenue (P)	Estimated Revenue (P)	Load Factor
Batangas - Calapan	24	1.00	75,414		63.5%
Esperanza- Daan Bantayan	28	1.17	87,983	67,958	53.7%
Pilar - Masbate	34	1.42	106,837	85,582	56.8%
Culasi-Balud	35	1.46	109,979	76,774	51.9%

Source: Study Team

8. Environmental and Social Conditions

8.1 Introduction

8.1.1 Background

The Philippines is an archipelagic country with a unique geography characterized by the more than 7,100 islands within its territorial boundaries. Laid out from north to south are three major islands – Luzon, Visayas and Mindanao with string of the other islands and islets scattered along the general north-south axis.

The inherent geographical conditions present difficulties in planning and implementing an efficient nationwide transportation network that is seamless and cost-effective. It is on this very basis that the Philippine Government has envisioned a Nautical Highway which consists of several trunk routes that covers the whole country. At present, there are four major north-south trunk routes being implemented/expanded by the Government: Pan-Philippine Highway, Pan-Philippine Highway Extension, Central Nautical Highway and the Western Nautical Highway. Several complementary routes running east to west provide means and services to move people and products from west to east and vice versa. For these major and complementary routes, RoRo facilities are being put up to complement those which have been or are being constructed to cater to the needs of conventional shipping services like inter-island ferry service.

Development of the individual routes and ports is being undertaken by the Government for over a decade. "The Study on the Master Plan for the Strategic Development of the National Port System in the Republic of the Philippines – 2004 JICA" proposed and identified 54 RoRo ports on the basis of the social and economic needs of each region and the country as a whole. However environmental and social surveys/considerations at individual ports as a material for selection of RoRo routes/ports have not been undertaken in the Master Plan, and it was thus expected to conduct the said environmental/social evaluations in parallel with the Feasibility Study on the Development of RoRo Terminal System.

The Feasibility Study on the Development of RoRo Terminal System nationwide will identify priority routes for development in the coming decade until 2015 from among routes in the approved nationwide traffic network. Immediately following this study will be the selection of the most technically, socially and environmentally suitable sites will be proposed for financial and economic evaluation.

This study module therefore will provide appropriate information that will enable the RRTS Project Study Team to make a well informed decision as to what RoRo terminals proposed for development will be prioritized on the basis of environmental and social considerations.

8.1.2 Objectives of the Study

The Roll-On Roll-Off Road Terminal System (RRTS) for Mobility Enhancement Project is part of the realization of the Government's Sustainable Logistics Development Program (SLDP) the main infrastructure of which is the Nautical Highway that stretches from Luzon through Visayas and Mindanao. Due to the potential of project-related activities from pre-construction, construction and operation to impinge on the natural and social environment in each of the respective port sites where the RoRo terminals are located, it is necessary and timely that an assessment of the probable impacts of such activities are carried out for each project sites at this stage of the Feasibility Study to enable the Project Proponent – the Department of Transportation and Communications (DOTC) as well as the financier of the Projects in this case the Japan International Cooperation Agency (JICA) of Japan to study the environmental and social implications of project-related activities vis a vis overall project planning effort and project viability.

The Initial Environmental Examination (IEE) aims to examine at an early stage of project development and assess the potential impacts of activities related to the implementation of 20 individual RORO Terminal Projects in different sites in Region IV-B, V, VI, VII, VIII and X. With the results of such examination and assessment, the IEE also aims to formulate doable environmental management and social development plans that will mitigate or enhance potential impacts of the Projects. In addition, the IEE will present a monitoring program that need to be put in place to ensure implementation of such measures and programs. Thus, the IEE Checklist for RRTS Project documents the process and findings regarding the potential environmental and social consequences of implementing RoRo Terminal projects at the sites identified for such purpose.

8.1.3 Limitations of the Study

The preparation of this IEE Checklist study was carried as a first-stage attempt to assess potential environmental and social implications of each of the Projects on the basis of what physical and structural components are available as of February-March-May-June 2007. Thus, only preliminary layouts and structural dimensions were made as primary inputs into the preparation of Project Descriptions. As well, the same inputs were used in figuring out the type and nature of activities projected to be undertaken at each site.

Evidently, the IEE checklist generated in this study are not intended to be the final documentary inputs for the acquisition of environmental compliance certificates from the Environment Management Bureau (EMB) Department of Environment and Natural Resources (DENR) of the Government of the Philippines. The IEE results are more useful in refining the level of feasibility of each project by providing an objective assessment of what and how the prospective Project activities in each site can affect either adversely or beneficially the environment – both natural and social environment.

For this reason, the mandatory steps which individual infrastructure projects of this nature must undergo have not been followed through. Notwithstanding this, initial scoping with EMB-DENR were carried out in Regions IV-B, V, VI, VII, VIII, X and with the Palawan Sustainable Development Council (PSDC) in the case of the Taytay Port , to at least determine what would be required by GOP regulatory agency in terms of type and the scope of environmental study to be done for each project site.

8.2 Project Description

The proposed RRTS Projects are located in the Visayas area along the Eastern SRNH, Western SRNH, Central SRNH and supplemental lateral routes. These proposed projects are located in the following towns, cities and islands: (Total of 21 ports)

(1) Eastern SRNH (Extension)

1-1) Kawayan RoRo Port, (Bgy Balite),

1-2) Naval RoRo Port, (Brgy. Santissimo, Rosario Poblacion), Naval, Northern Leyte Province, Biliran Isd.

(2) Western SRNH

2-1) Caticlan RoRo Port, (Bgy Tabon) Malay, Aklan Province, Panay Isd.

2-2) Dumangas RoRo Port, (Bgy. Nalu-oyan), Dumangas, Iloilo Province, Panay Island

(3) Central SRNH

3-1) San Antonio RoRo Port, Brgy. San Antonio (Sapa), Pilar, Sorsogon

3-2) Esperanza RoRo Port, (Bgy Poblacion), Esperanza, Masbate, Masbate Isd.

3-3) Daan Bantayan RoRo Port, (Bgy. Maya), Daanbantayan, Cebu Province, Cebu Isld.

3-4) Benoni RoRo Port, (Bgy Benoni), Mahinog, Camiguin Province, Camiguin Isd.

3-5) Balingoan RoRo Port, Bgy. Poblacion), Balingoan, Misamis Oriental Province, Mindanao Isd.

(4) Negros-Southern Leyte SRNH

4-1) Toledo RoRo Port, (Bgy Poblacion), Toledo City, Cebu Isd.

4-2) Punta Engano RoRo Port, (Bgy Pta Engano) Lapu-lapu City, Cebu Isd.

4-3) Getafe RoRo Port, (Bgy Poblacion), Getafe, Bohol Province, Bohol Isd.

4-4) Ubay RoRo Port, (Bgy Poblacion), Ubay, Bohol Province, Bohol Isd

4-5) Tapal RoRo Port, (Bgy Tapal), Ubay, Bohol Province Bohol Isd.

(5) Panay-Leyte SRNH

5-1) Culasi/Ajuy RoRo Port (Bgy Culasi), Ajuy, Iloilo Province, Panay Isd.

5-2) Victorias RoRo Port, (Bgy Villa Miranda), Victorias City, Negros Occidental Province, Negros Isd.

5-3) Tabuelan RoRo Port, (Bgy. Poblacion), Tabuelan, Cebu Province, Cebu Isd.

5-4) Bogo RoRo Port, (Bgy Polambato), Bogo, Cebu Province, Cebu Isd.

(6) Panay-Masbate SRNH

6-1) Balud RoRo Port, (Bgy Poblacion),Balud, Masbate Province, Masbate Isd.

(7) Batangas-Palawan SRNH

7-1) Taytay RoRo Port, (Brgy. Bantulan,) Taytay, Palawan Island

(8) Iloilo-Palawan SRNH

8-1) San Jose de Buenavista RoRo Port, (Bgy Poblacion), San Jose Buenavista, Antique Province, Panay Isd.

The components of the 21 RoRo projects vary in terms of the scope of works, as well as in magnitude and scale for each component. Typical works include construction, dredging, reclamation, construction of pier and RoRo ramp, terminal building, pavement, and access road improvement, among others.

It will be emphasized that each of the scope described are pre-feasibility estimates.

8.3 Impact Prediction and Mitigation/Enhancement Measures

8.3.1 Guidelines in Impact Prediction of Port Project

The potential environmental and social consequences of port development projects have been given extensive analysis generating official guides both in general and specific terms by various multilateral organizations, funding agencies and regulatory bodies both internationally and locally. For example, the World Bank (B) has released in 1990 the technical paper "*Environmental Considerations for Ports and Harbor Development*", which presented in checklist form the potential adverse impacts of such projects. The Japan International Cooperation Agency (JICA) and for that matter, Japan Bank for International Cooperation (JBIC) also follows its own guidelines contained in the "*Guidelines for Environmental and Social Considerations*" which forms part of the technical assistance agreement signed between the Government through the DOTC on February 2006.

The Asian Development Bank (ADB) for its part uses its guidelines entitled "*Environmental Parameters of Ports and Harbors Projects*" for this purpose while the International Association of Ports and Harbors (IAPH) employs its own guidelines embodied in "*IAPH Guidelines for Environmental Planning and Management in Ports and Coastal Area Developments*" which came into effect in 1989 which like that of the WB, contains a checklist of potential adverse impacts of port projects.

In the case of the Government of the Philippines, its regulatory agency led by the DENR-EMB also developed a range of criteria and guidelines that are applied to determine what level or depth of environmental impact assessment and what possible impacts to evaluate for various projects including ports and harbor development for the regulatory clearances and permitting purposes among others. For the on-going RRTS Project, the assessment of environmental and social consequences of the individual projects was decided to be a checklist IEE level considering that the technical feasibility study is still on-going and for RORO Projects, EMB-DENR would generally call for an IEE Checklist.

Notwithstanding that the scope and level of the environmental impact assessments for RRTS was pegged in the TOR to be only IEE checklists, the Environmental and Social study group consulted with the EMB-DENR Regions IV-B, V, VI, VII, VIII and X. Formal technical (first level) scoping was conducted. It was agreed that an Environmental Performance Review and Management Plan (EPRMP) be prepared for all existing Ro-Ro Ports (Naval, Benoni, Balingoan, Dumangas, San Jose Buenavista, Toledo, Punta Engaño, Getafe, Ubay, Tapal, Culasi/Ajuy, and Tabuelan) and a full Initial Environment Examination (IEE) will be required for the rest of the new ones (Daan Bantayan, Caticlan/Tabon, Balud, Kawayan, Esperanza, Victorias, San Antonio and Taytay).In addition, the Scoping checklists were prepared and agreed upon between the study group (in behalf of DOTC) and EMB-DENR Region IV-B, V, VI, VII, VIII and X.

In both JICA's Guidelines on Environmental and Social Considerations for JICA-funded projects and the rules and regulations being observed by the Department of Environment and Natural Resources of the Philippine government, prediction of potential impacts of port project implementation on both the natural (biological, physical and chemical environments) as well as social and economic environments are very important considerations.

In RRTS Project, the specific guidelines for IEE Checklist preparation which EMB currently follows were used as a template for a generic type of RORO Port development. However, in the actual analysis and evaluation of environmental and social consequences for each of the 18 RORO Port Projects, the impacts – both adverse and beneficial – were weighed based upon the available site-specific information on the type and magnitude of structures or works schemed of as well as the prevailing environmental and social conditions in the vicinity and impact areas of each site. The resulting impact prediction and formulation of corresponding mitigation and/or enhancement measures in this report are in no way comprehensive considering that as mentioned in the Limitations of the Study, information/data gaps persist at this point in time of the overall Project Study

8.3.2 Environmental and Social Monitoring Plans

To ensure the implementation of the proposed environmental and social development plans, a monitoring system need to be set up and put into motion. A multi-partite monitoring team (MMT) composed of representatives from government, the proponent and non-government organizations will comprise the group tasked to carry out the monitoring of plan implementation.

8.4 Result of IEE Check List

21 port sites were surveyed for IEE Checklist among which 15 port sites were selected for a Feasibility Study. With respect to the individual port project for which environmental and social considerations have so far been evaluated, the summary of recommendations is presented in the

following tabulation.

Table 8-1 Summary Environmental Issues and Concerns/Recommendations

Route/RoRo Site	Environmental and Social Issues/Concerns		Recommendations
	Environmental	Social / Economic	
1. Eastern SRNH Extension			
1.1 Kawayan	a) Erosion problems could cause sedimentation of harbor basin and berthing area. b) Dredging and reclamation can cause seawater pollution and disturbance to marine life. c) A geologic fault line traverses part of Kawayan.	a) Transfer /removal of several formal and few informal settlers along access road and a public 2-storey building; ROW acquisition can take some time.	a) Design of port facilities need to examine implications of the fault line and possible ground movement. b) Proper mitigation such as silt curtain is needed to avoid seawater pollution due to dredging or erosion. c) Naval port is thought to be a better RoRo port than Kawayan in terms of environmental and social considerations.
1.2 Naval	a) Pollution of seawater and possible disturbance to marine life during reclamation and dredging operations. Some mangrove trees maybe removed.	a) No significant social issues.	a) Deploying silt curtain around the dredging activity will lessen environmental issues. b) Social issues do not pose as threat to project implementation.
2. Western SRNH			
2.1 Caticlan (Tabon)	a) Large dredging and reclamation will pose threat to water quality and disturbance to marine life.	a) Only a few private buildings will be relocated. b) Acquisition of the beachfront property is an urgent activity to transfer ownership to LGU. Only 1000 sqm has so far been acquired.	a) ROW issue must be tackled first in coordination with the claimant-owners. b) LGU and Port Management (PPA). Implementation of adequate mitigation measures must be observed. c) Monitoring should be regular. Environmental and social issues can be resolved. d) Development of the existing Caticlan port seems to be more advantageous in terms of environmental considerations.
2.2 Dumangas	a) Pollution of seawater and possible disturbance to marine life during reclamation and dredging operations. b) Some mangrove trees maybe removed.	a) No significant social issues.	a) Deploying silt curtain around the dredging activity will lessen environmental issues. b) Social issues do not pose as threat to project implementation.
3. Central SRNH			
3.1 San Antonio (Sapa), Pilar	a) Whale Shark (*Butanding*) feeding grounds along Ticao Pass during Feb-May of the year can be disturbed during construction (by noise, Siltation) and port operation (by RORO ships/boats and dredging). b) Reduction in draft due to sedimentation during operation stage. c) Hazardous waste discharge and seawater pollution due to accidents/negligence. d) Hazardous waste discharge and seawater pollution due to accidents/negligence.	a) Land Ownership of ROW needs to be confirmed. b) Resistance of Barangay leaders to relocate RORO Port site away from the original site. c) Effect of increase in migrant workers port workers on the available social services in Barangay and in Pilar. d) Road congestion during operation especially along the road leading to Barangay San Antonio. e) Road congestion during operation especially along the road leading to Barangay San Antonio.	a) Carry out comparative evaluation of the cost of acquiring and developing alternative site versus cost of ROW Acquisition and relocation of families occupying ROW at original site. The cost effective (lesser cost) alternative will be adopted. b) Verification with Register of Deeds and Bu. of Lands on actual owners of land. c) Maintenance dredging along navigation channel and harbor. d) Restrict or ban loading and unloading of haz-waste cargo at port. e) Implementation of a responsive traffic management plan during construction and especially during operation phases.

Route/RoRo Site	Environmental and Social Issues/Concerns		Recommendations
	Environmental	Social / Economic	
3.2 Esperanza	a) Trees may have to be transferred. b) Dredging and reclamation will generate seawater water pollution and disturbance to marine life.	a) Demolition/removal of houses along the Access road ROW.	a) Replant trees or compensate owner of trees/crops to be cut. b) LGU to consider relocation and compensation of affected families. c) Put in place such mitigation measures as silt curtain to minimize seawater pollution and damage to marine life.
3.3 Daan Bantayan	a) Removal of some mangrove trees. b) Pollution of seawater during dredging operations. c) Wastewater and solid waste management.	a) Land Ownership of part of project site is not yet fully transferred to LGU from private owner. b) Access road ROW needs to be acquired for widening of road.	a) Provincial Government is implementing a RORO Project at present. Proposed RORO Project will cover additional needs of this on-going Project. b) LGU must fast-rack acquisition of ROW/ownership of land. c) Mangrove trees must be replaced/ or transplanted if possible. d) Put in place such mitigation measures as silt curtain and sewage treatment to minimize seawater pollution and damage to marine life.
3.4 Benoni	a) Pollution of seawater and possible disturbance to marine life during reclamation and dredging operations.	a) Relocation of buildings /residences inside the PPA Terminal reservation.	a) Since project activities do not include access road widening, issue is not critical. b) A RAP must however still be prepared by LGU of Mahinog and Benoni. c) Deploying silt curtain around the dredging activity will lessen environmental issues.
3.5 Balingoan	a) No major issue except that previous dredging more than 5 years ago was attributed to the decline of fish catch in the waters in the vicinity of Balingoan. This can be repeated when dredging takes place during construction.	a) Relocation of buildings/ residences inside the PPA Port reservation if access road widening will require removal of around 14 informal dwellings.	a) Environmental issues can be addressed with no serious difficulty. b) LGU in coordination with PPA to tackle with relocation and compensation of affected informal dwellings.
4. Negros-Southern Leyte SRNH			
4.1 Toledo	a) Dredging may cause seawater pollution and disturbance to marine life.	a) No social issues.	a) No serious environmental and social issues. b) Mitigation measures such as silt curtain and monitoring of dredging operations must be put in place.
4.2 Punta Engano	a) Few tree cutting along the access road ROW. b) Seawater pollution may arise due to dredging and reclamation which will affect marine life.	a) LGU (Barangay) complaints of non-involvement in CPA project and no share in port revenues.	a) LGU and CPA cooperation and dialogue to settle differences. b) Mitigation measures such as silt curtain must be put in place to minimize dredging effects to water quality and marine life.
4.3 Getafe	a) Major dredging and reclamation will affect water quality and disturbance to marine life.	a) A few houses may be demolished if access road ROW widening is undertaken.	a) Mitigation measures such as silt curtain and monitoring of dredging operations must be put in place. b) LGU and Owner must implement the RAP to relocate affected families. c) Social issue can be settled.

Route/RoRo Site	Environmental and Social Issues/Concerns		Recommendations
	Environmental	Social / Economic	
4.4 Ubay	a) Major dredging and reclamation will affect water quality and disturbance to marine life.	a) Relocation of affected informal dwellers near the PPA port gate.	a) Mitigation measures such as silt curtain and monitoring of dredging operations must be put in place. b) LGU and Owner must implement the RAP to relocate affected informal settlers. c) Social issue can be settled.
4.5 Tapal	a) Substantial dredging and reclamation will to water quality and to marine life; Tree cutting is a minor issue.	a) No social issues.	a) Mitigation measures such as silt curtain and monitoring of dredging operations must be put in place. b) No serious social issues.
5. Panay-Leyte SRNH			
5.1 Culasi/Ajuy	a) Substantial dredging and reclamation will affect water quality and disturbance to marine life.	a) No social issues.	a) Mitigation measures such as silt curtain and monitoring of dredging operations must be put in place. b) No serious social issues.
5.2 Victorias	a) Substantial dredging and reclamation will affect water quality and disturbance to marine life. b) Sedimentation comes from Malinao River upstream of the proposed site.	a) Several formal dwellers (in City Govt. reclaimed land reserved for housing relocation at the proposed port site) to be relocated again. b) Road ROW will displace other dwellers. Congestion of vicinity of port site.	a) Relocation action plan must be drawn up to resettle formerly relocated families. b) Extensive mitigation measures and monitoring of dredging operations must be put in place. c) Regular dredging must be done during operation. d) Victorias seems to have no potential site for development in terms of both environmental /social issues.
5.3 Tabuelan	a) Major dredging and reclamation will affect water quality and disturbance marine life.	a) Relocation of LGU-built commercial shops at port site.	a) Mitigation measures such as silt curtain and regular monitoring of dredging operations must be put in place. b) Since structure is LGU-built, there is no social issue to seriously affect the Project
5.4 Bogo	a) Substantial dredging and reclamation will to affect water quality and disturbance to marine life. Tree cutting is a minor issue.	a) Some fish pens /fish cages maybe transferred in the proposed reclamation site.	a) Mitigation measures such as silt curtain and monitoring of dredging operations must be put in place. b) No serious social issues provided damage to fish pens/cages are reasonably compensated.
6. Panay-Masbate			
6.1 Balud	a) Presence of some mangrove trees. b) Pollution of seawater during dredging operations. c) Access road construction can cause soil erosion problems and air pollution.	a) ROW for access road may cause demolition of 5 houses.	a) Environmental and social issues should be addressed in coordination with LGU. b) Mitigation measures such as safe driving control during construction of access road must be put in place. c) Mangrove trees must be replaced by replanting in designated areas.

Route/RoRo Site	Environmental and Social Issues/Concerns		Recommendations
	Environmental	**Social / Economic**	
7. Batangas-Palawan SRNH			
7.1 Bantulan, Taytay, Palawan	a) Removal of old mangroves lining the shore near the proposed site. b) Presence of corals along the navigation channel to the port. Some of this may be displaced during the dredging operation and by boats propellers. c) The access road opened up some forested areas and which may increase the possibility of illegal logging.	a) The fish cages located in the channel leading to the project site will be affected by the increased frequency of boat navigation in the area. b) The opening of the access road may encourage entry of outsiders into the area.	a) Since it may not be possible to avoid removing some old mangroves during the construction phase, it is suggested that for every tree cut, ten new seedlings will be planted in a suitable place other than the site. b) If possible, select the route or orientation of the navigation channel such that most of the corals will be avoided, thus eliminating the possibility of boats hitting them. c) Assign a forest guard to monitor the forested areas as well as entry of people. Trees cut to make way for the road should be replaced by planting new seedlings in other suitable areas. Indigenous species should be used. New people in the area should be reported to the Barangay Chairperson. d) Convince the owners of the fish cages to transfer to another area.
8. Iloilo-Palawan SRNH			
8.1 San Jose Buenavista	a) Needed dredging activities can cause seawater pollution and disturbance to marine life. Sedimentation at berthing area and harbor basin.	a) A few houses may be transferred if access road ROW widening is undertaken.	a) No serious environmental and social issues to be addressed. b) Regular dredging if done should put in place mitigation measures such as silt curtain to prevent excessive water pollution.

Note) [shaded box] show 15 Candidate Ports subject to Feasibility Study.

8.5 Recommendations

8.5.1 Updating of Technical Information

The preparation of this Initial Environmental Examination (IEE) Checklist relied largely on the preliminary technical information describing the individual project components and projected activities that the Study Team has assumed prior to commence IEE Checklist works. Obviously, as the feasibility studies and basic design progress, the outputs may cause information gaps. Such information that must be inputted into the checklist and the Project Description are necessary to make the checklist whole and complete.

It is thus recommended that the specific technical information regarding each port project be made available as soon as they are finalized and ready in order that corresponding updating of the checklist can be made by the proponent (DOTC). When the final selection and feasibility level plans and designs are completed, it is recommended that formal consultations and technical scoping be made with appropriate EMB-DENR Regional Offices to firm up the type and list of impact assessment activities as well as other related and special environmental studies to be considered in the environmental impact evaluation of each project.

8.5.2 Resettlement Framework (Institutional Framework and Roles of the Concerned Government Agencies)

Various government agencies shall assist, coordinate, monitor, oversee, and/or observe the operation of resettlement according to their powers and responsibilities. Such government agencies are listed below along with their roles and functions. Those agencies shall, in addition to their respective existing powers and functions, render assistance for the task for Republic Act No. 7279, and perform the following:

1) Local Government Units (LGUs)

In the process of resettlement of settlers, the responsibilities of sending and receiving LGUs are varied and quite important.

Sending LGUs

The sending LGUs, assisted by concerned government agencies, have to be involved throughout processes of resettlement operation until the relocation of all families have completed.

- Establish communication and rapport with recognized resident community leaders.
- Meet the affected families and explain the need to relocate families, procedures, and guidelines on relocation and resettlement, schedule of the census and tagging, etc.
- Physical survey to determine the boundary of the land to be cleared of squatters, tagging the houses, preparation of household list, conduct of actual census, preparation of a master list for pre-qualification, issuance of 30-day notice.
- The LGU, with the cooperation of government agencies, hold consultation meetings, preparation of required documents for affected families.
- Observe and monitor dismantling of the houses, and eviction of the families from original places.

Receiving LGUs

Major responsibilities of the receiving LGUs in coordination with concerned government agencies is to prepare the resettlement sites beforehand, and to provide various social services after the relocation of resettled families. In addition, the Department of Social Welfare and Development

regional offices in the municipalities are to provide livelihood assistance to the relocates.

2) Task Force on Relocation and Resettlement/Action Team

Upon project implementation wherein affected families have been identified for relocation, the Implementing Body shall form a Task Force Team to handle the process. In the case of DOTC in coordination with ATO/ PPA, a Project Office is to be formed to inform and orient the affected families of their roles and responsibilities in the relocation process. Likewise, they shall facilitate the in the social preparation of the affected families or communities. The Figure 8-1 hereunder shows the proposed organizational structure.

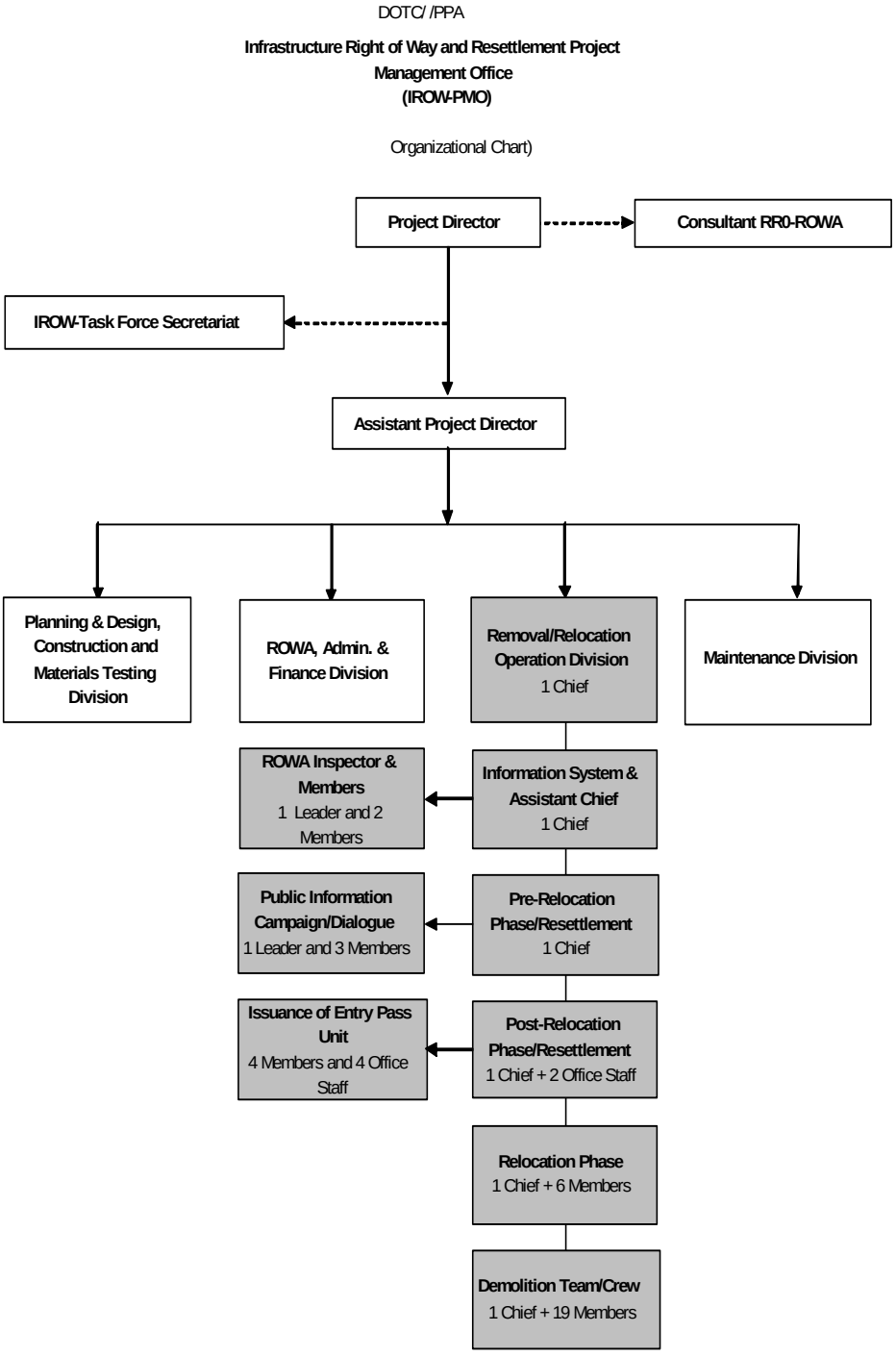


Figure 8-1 DOTC-Infrastructure Right of Way and Resettlement Project Management Office

3) Inter-Agency Committee

The Implementing Body shall also inform concerned government agencies of the city/municipality to form an Inter-Agency Committee to prepare for the relocation of the affected people. The member agencies of the Committee are composed of the Implementing Body and Government agencies with the DOTC / PPA as the lead agencies:

- LGU (Local Government Unit)
- HUDCC (Housing and Urban Development Coordinating Council)
- NHA (National Housing Authority)
- NAPC (National Anti-Poverty Commission)
- PCUP (Presidential Commission for the Urban Poor)
- DSWD (Department of Social Welfare and Development)
- CHR (Commission on Human Rights)
- DOH (Department of Health) and
- DECS (Department of Education, Culture and Sports)

The tasks of HUDCC, NAPC, PCUP, and CHR of the Inter-Agency Committee are varied as specified by RA No. 7279. However, the tasks of these four agencies are more of a coordinating, monitoring, observing or supervising nature. While the tasks of the Implementing Body, LGU, DSWD, NHA, DOH and DECS are to provide actual assistance of depending on their mandated task.

4) Key Housing Agencies

Among various tasks related to resettlement, key housing agencies such as HUDCC and NHA play major roles for the provision of socialized housing and other assistance, or monitoring and supervising the entire operation. HUDCC shall, through the key housing agencies, provide local government units with necessary support such as:

- Formulation of standards and guidelines as well as providing technical support in the preparation of town and land use plan.
- Assistance in obtaining funds and other resources needed in urban development and housing programs in their areas of responsibilities.

NHA:	Upon request of LGUs provides technical and other forms of assistance in the implementation of their respective urban development and housing programs with the objective of augmenting and enhancing the local government capabilities in the provision of housing.
NHMFC:	Provides/administers community mortgage program (Regulations #9-93 Section 2.e) (Sec. 40.c)
HLURB:	Prepares guidelines for the inventory and identification of sites for socialized housing and provides training and technical assistance in the conduct of inventory. (Sec. 5-5.2. “Guidelines for inventory and identification of land and sites for socialized housing)
HGC :	Shall design an appropriate guarantee scheme to encourage financial institutions to go into direct lending for housing (Section 40.d)

9. Administration and Operation of RoRo Terminals

9.1 Port Administrative and Operation Body

Given the great importance of national transport infrastructure, it is considered appropriate that government agencies directly administrate and operate the infrastructure projects (with the exception of RoRo vessel operations) proposed in the study as follows.

-RoRo Terminals; PPA, CPA

Given the current state of privatization and decentralization, it is also necessary, however, to formulate a system enabling the government to entrust the management/operations of RoRo terminals to private entities by lease or concession when they request to manage and operate the terminals for themselves. However, it will be first necessary to carefully examine their business plans.

It is also recommendable for the government to formulate a system to properly supervise and guide LGUs and private entities which have been entrusted with the management of RoRo terminals (in other words, implemented projects which cannot be taken over by government agencies).

-Method of lease; Government agency has accounting capital and leases it to private sector and pays lease tariff to government agency. Lessee takes responsibility for maintenance of facilities and service provision.

-Method of concession; In the long term, responsibility for construction of facilities and operation and management will be transferred to the private sector. Government agency holds ownership of facilities. Private sector carries out development port facilities and operation/management, and obtains operational revenue. Private sector must pay concession fee (usage fee) to government agency.

9.2 Port Operation Scheme

9.2.1 Port Charges

Current RoRo-related port charge is at an extremely low level. The port tariff for vessel is particularly low. For this reason a vessel moors longer than necessary. Therefore, the tariff scheme should be changed from per a day to per hour basis.

In this way, a vessel will spend the minimum time berthing, and the efficiency of quay operation will be improved.

In addition, the RoRo terminal fee for vehicle and passenger should be increased step by step to improve the financial soundness of port administration and operation body.

-For example, increases by 10% of the tariff rate is assumed every 5 years after 2010

9.2.2 Port Procedure for Collecting Fees

To improve convenience for users, terminal fee should be collected only once instead of twice as it is at present (at the time of terminal use and vessel boarding).

Shipping operator collects terminal fee for vehicle and passenger before boarding after terminal gate passage. Then shipping operator pays a terminal fee for vehicle to the port management body at a later date.

Flow of procedures is as follows;

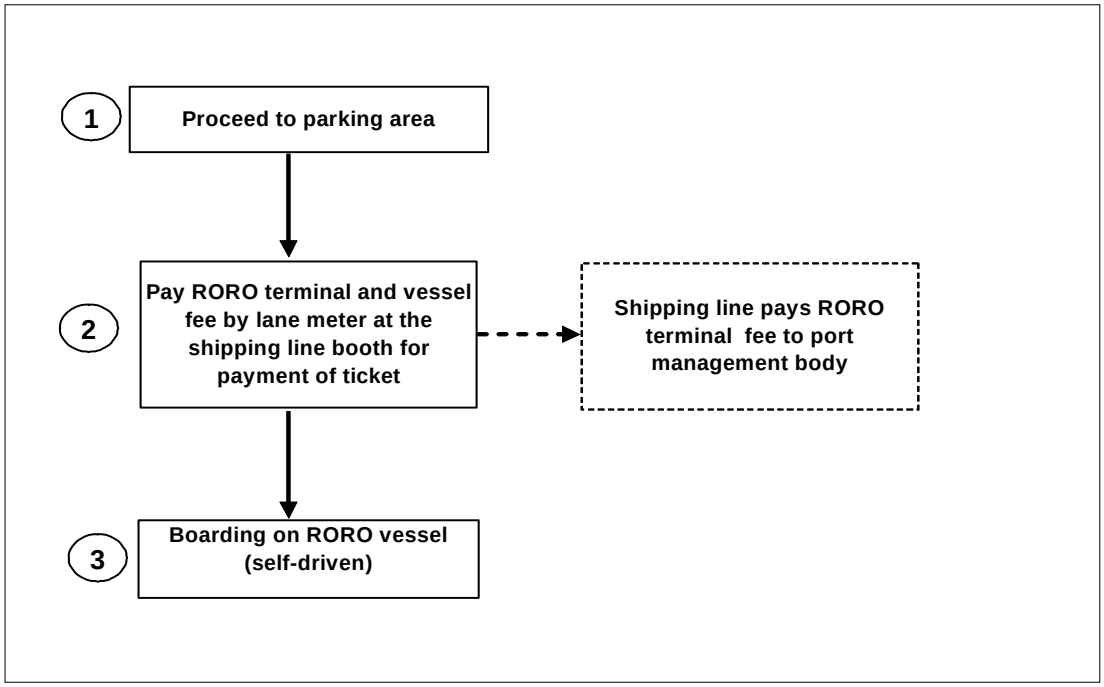


Figure 9-1 Procedures for RoRo Vehicle Owners

9.2.3 Navigation of Vessel

By revising the tariff system and thereby reducing dwelling time, on-time vessel service can be secured.

9.3 Security Measures for Port Facilities

The security system currently implement at main ports should be introduced to all ports (see Figure 9-2).

Security check of vehicles is rarely carried out at present. In this situation, weapons such as guns can be carried by vehicle. Accordingly, it is necessary to carry out a security check of each vehicle (inside trunk and vehicle bottom) at the terminal gate (see Figure 9-3).

Especially for ports with large numbers of passengers, a security camera should be installed. A sign indicating that the area is being monitored should also be erected.

Vehicles are often overloaded at present. This can be dangerous during rough seas as the vessel may roll. For this reason, overloaded vehicles should be prohibited from embarking.

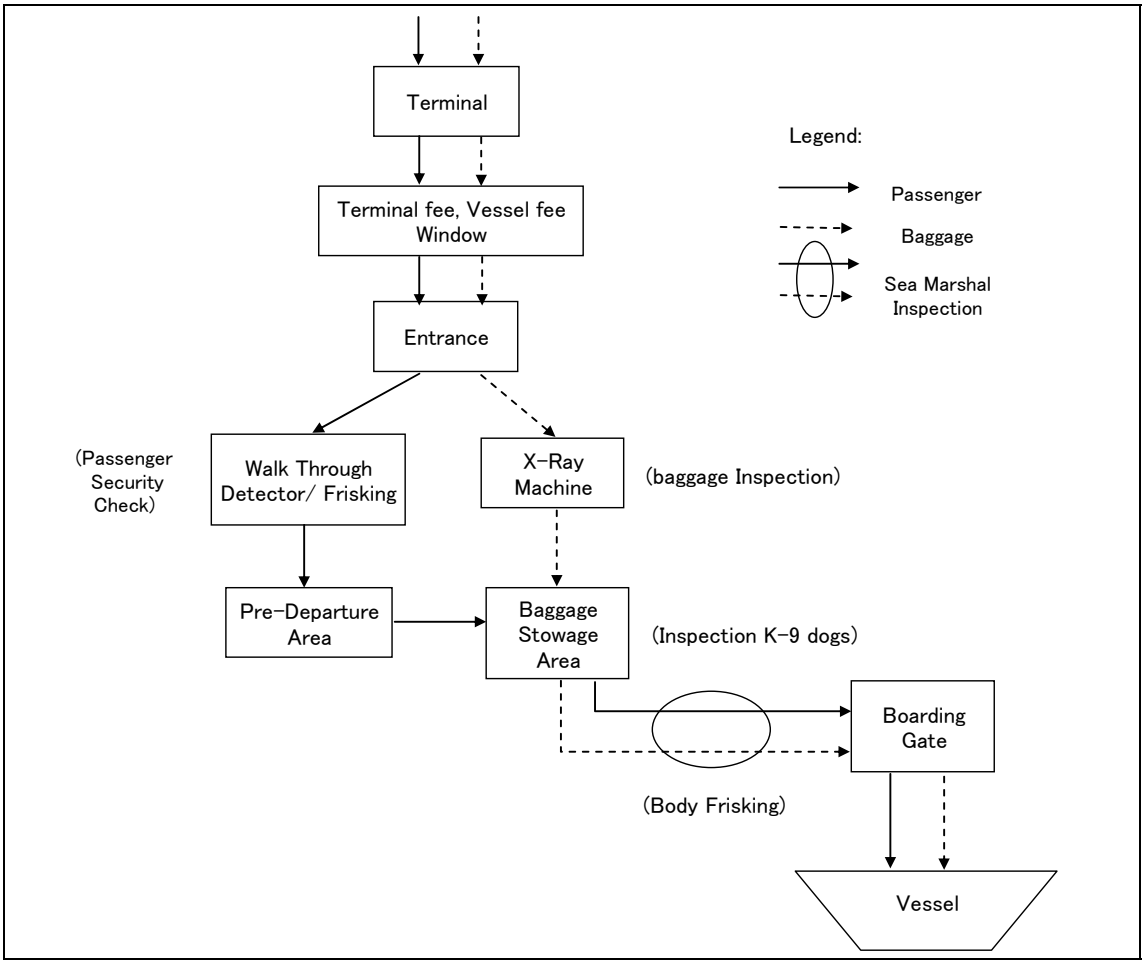


Figure 9-2 Passenger Handling Procedure – Outgoing

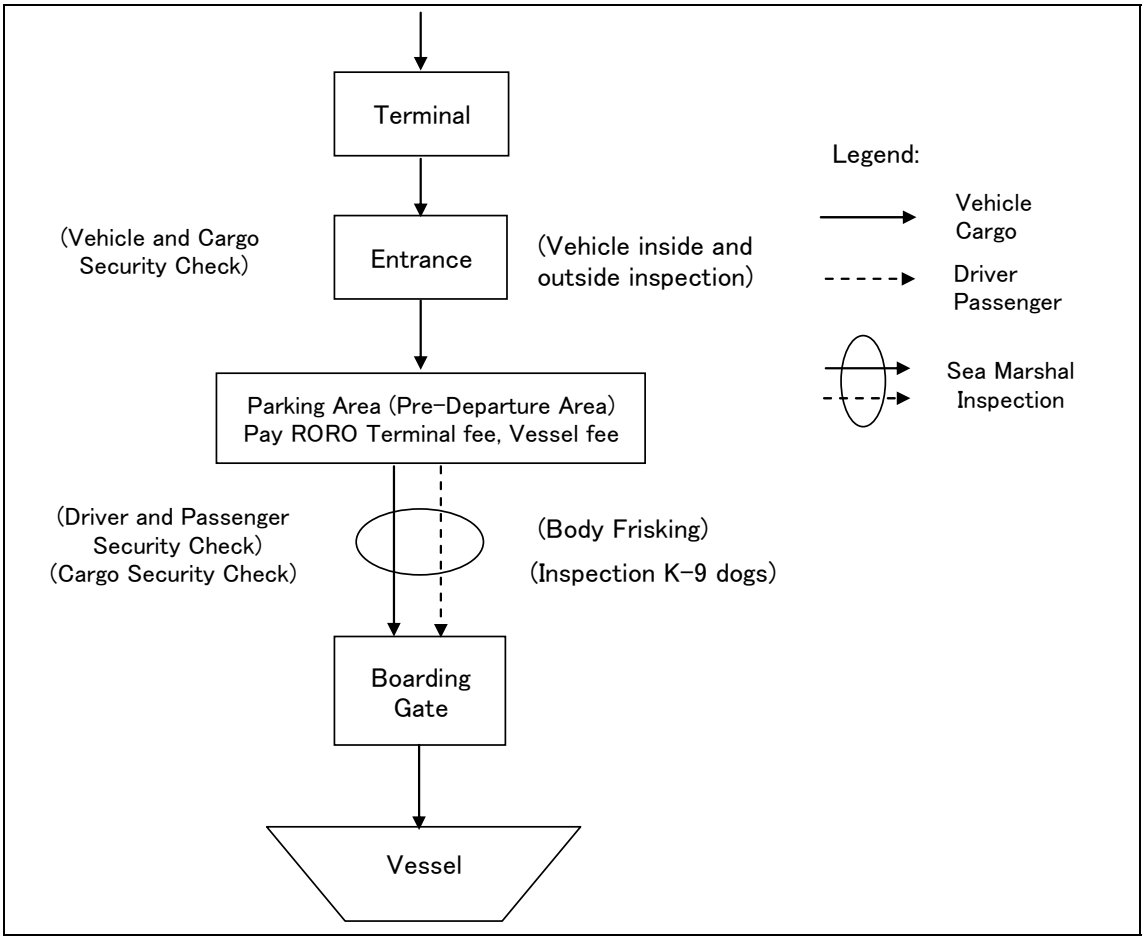


Figure 9-3Vehicle Handling Procedure – Outgoing

10. Project Proposals

10.1 General

The estimated investment costs to pursue the implementation of the proposed project include a Physical Contingency of 10%, Consultancy Services Fee of 7% and VAT (Value Added Tax) of 12%. The costs are apportioned into Local component and "Foreign component" for economic evaluation purposes.

Development of the fifteen (15) candidate terminal ports will be undertaken in 2 Packages. Package A will comprise of San Antonio, Balud, Esperanza, Naval, Daan Bantayan and Taytay covering the Central and Masbate routes. Package B will comprise of the succeeding ports thereafter.

Development will take three (3) years reckoned from the start of the Consultancy service which takes 1 year and 2 years for the construction. The disbursement schedule is prepared based on 2-year construction period for new developments and about one year for the improvement and expansion of existing ports.

Table 10-1 - Table 10-4 hereafter show the envisioned investment, construction schedule for both Package A and Package B including the related Road Package.

10.2 Packaging of Construction Works

1) Concept

(1) Based on the Feasibility Studies, construction of the proposed 15 terminal ports is scheduled up to 2015. Under this scenario, construction will be undertaken into 2 Packages for the whole completion of the Project by 2015. Package A construction will cater for the urgent development program and Package B construction for the succeeding ports thereafter.

(2) Package A comprises the development of 6 ports. These include Taytay which based on the study results show a high potential traffic volume both for passenger and cargo and the Biliran/Masbate corridor to provide the shortest link between the Visayas Region and the eastern Pan Philippine Highway via the Daan Bantayan – Naval – San Antonio, Naval – Esperanza – Masbate – San Antonio and Culasi – Balud – Masbate – San Antonio Routes.

(3) In order to harness the potentials of these developments, the access roads between Esperanza and Cataingan, Balud and Mariposa, and San Antonio and Legaspi must be fully developed into an all weather type of roads.

(4) Package B development comprises the construction of 9 ports in the Central Visayas Region along the Dumangas – Bacolod – Toledo (via San Carlos) – Pt. Engano Route, Pt Engano – Getafe – Ubay (by land) – Maasin (not included as part of the development) Route and Tabuelan – Bogo (by land) – Esperanza Route. The roads in these areas are fully developed except the access road between Daan Bantayan Municipality and the terminal site.

(5) However, should the proposed Project be pursued during the incumbency of the present administration, then construction of the 15 ports should be undertaken all together to substantially complete it by 2010.

2) Contract Packaging

i) 2 Package Scenario

(1) As discussed above, Package A will comprise the construction of 6 ports estimated at some Php 2 billion.

(2) Considering the scattered sites, it is quite inducing to divide the contract into several packages

say 3 or 2 Ports per Package.

(3) At 3, the estimated cost will average some Php 670 million for 2 ports or Php 335 million per port.

(4) However, previous experience with the construction of the Feeder Ports Project showed that while the packaging of the construction of the Project into several small contracts have induce many small time contractors, it also discouraged reputable big time contractors from joining the bidding exercise.

(5) The primary reason is due to the low cost of the contract package coupled with the scattered sites which would not merit for the mobilization of heavy equipment and plant, delivery of construction materials and deployment of staffs and skilled laborers. The greatest demerit is the poor quality of works compounded by the greatly delayed completion of the Project.

(6) In view of the foregoing, it might be advisable to package the construction of the 6 terminal ports into one contract package considering the following advantages:

-The higher cost would induce many reputable big time contractors to participate in the bidding exercise.

-With one prime contractor, supervision of the works will be facilitated and quality of works could be controlled more effectively with efficiency and expediency.

-This will also facilitate the control of progress accomplishment should any item of work falls behind schedule, particularly for works along the critical path.

-Under this scenario, the prime contractor could sublet certain items of work to approved subcontractors as well as to approved specialty firms.

ii) 1 Package Scenario

(1) Should the construction of the said 15 ports be pursued at one time so that the whole of the Project would substantially be completed by 2010, the development could be packaged into 2 contracts estimated at Php 2.3 billion each.

(2) At this size, reputable prime contractors are envisioned to participate in the bidding exercises because the cost is quite attractive.

(3) In packaging the works, particular care should be taken to group together terminal sites of relatively short distances to facilitate the mobilization of heavy equipment and plant, delivery of construction materials, deployment of staffs and skilled laborers and monitoring/supervision of the works.

Table 10-1 Required Investment and Schedule for RRTS Project - Package A

Unit : 1,000 Peso

Package	RoRo Port for F/S	Breakdown (Year)	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Package A	San Antonio	Construction Works	123,899	185,848	309,747	0	0	61,949	92,924	61,949	92,924
		Physical Contingency (10%)	12,390	18,585	30,975	0	0	6,195	9,292	6,195	9,292
		Sub Total_Construction	136,289	204,433	340,722	0	0	68,144	102,217	68,144	102,217
	Balud	Construction Works	153,690	230,535	384,225	0	0	76,845	115,268	76,845	115,268
		Physical Contingency (10%)	15,369	23,054	38,423	0	0	7,685	11,527	7,685	11,527
		Sub Total_Construction	169,059	253,589	422,648	0	0	84,530	126,794	84,530	126,794
	Esperanza	Construction Works	146,708	220,063	366,771	0	0	73,354	110,031	73,354	110,031
		Physical Contingency (10%)	14,671	22,006	36,677	0	0	7,335	11,003	7,335	11,003
		Sub Total_Construction	161,379	242,069	403,448	0	0	80,690	121,034	80,690	121,034
	Naval	Construction Works	60,067	90,101	150,168	0	0	36,040	54,060	24,027	36,040
		Physical Contingency (10%)	6,007	9,010	15,017	0	0	3,604	5,406	2,403	3,604
		Sub Total_Construction	66,074	99,111	165,185	0	0	39,644	59,467	26,430	39,644
	Daan Bantayan	Construction Works	149,100	223,650	372,750	0	0	74,550	111,825	74,550	111,825
		Physical Contingency (10%)	14,910	22,365	37,275	0	0	7,455	11,183	7,455	11,183
		Sub Total_Construction	164,010	246,015	410,025	0	0	82,005	123,008	82,005	123,008
	Taytay	Construction Works	116,491	174,737	291,228	0	0	58,246	87,368	58,246	87,368
		Physical Contingency (10%)	11,649	17,474	29,123	0	0	5,825	8,737	5,825	8,737
		Sub Total_Construction	128,140	192,210	320,351	0	0	64,070	96,105	64,070	96,105
	Total for Construction	Construction Works	749,956	1,124,933	1,874,889	0	0	380,985	571,477	368,971	553,457
		Physical Contingency	74,996	112,493	187,489	0	0	38,098	57,148	36,897	55,346
		Total_Construction	824,951	1,237,427	2,062,378	0	0	419,083	628,624	405,868	608,802
	Consultancy	Consulting Service	52,497	78,745	131,242	18,374	27,561	18,374	27,561	15,749	23,624
		Physical Contingency (10%)	5,250	7,875	13,124	1,837	2,756	1,837	2,756	1,575	2,362
		Total_Consultancy	57,747	86,620	144,366	20,211	30,317	20,211	30,317	17,324	25,986
	Total_Construction_Consultancy		882,698	1,324,047	2,206,744	20,211	30,317	439,294	658,941	423,192	634,788
		VAT (12%)	264,809	0	264,809	6,063	0	131,788	0	126,958	0
		Grand Total	1,147,507	1,324,047	2,471,554	26,275	30,317	571,083	658,941	550,150	634,788

Component	Local	Foreign
Construction Works	40%	60%

Consulting Service Cost	7%	of Construction Works

Progress	Total	1st Year	2nd Year	3rd Year
Construction (Expansion)	100%	0%	60%	40%
Construction (New Devlp)	100%	0%	50%	50%
Consulting Service	100%	35%	35%	30%

Table 10-2 Required Investment and Schedule for RRTS Project - Package B

Unit : 1,000 Peso

Package	RoRo Port for F/S	Breakdown / Year	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Package B	Dumangas	Construction Works	46,096	69,144	115,240	0	0	27,658	41,486	18,438	27,658
		Physical Contingency (10%)	4,610	6,914	11,524	0	0	2,766	4,149	1,844	2,766
		Sub Total_Construction	50,706	76,058	126,764	0	0	30,423	45,635	20,282	30,423
	Culasi/Ajuy	Construction Works	96,700	145,049	241,749	0	0	58,020	87,030	38,680	58,020
		Physical Contingency (10%)	9,670	14,505	24,175	0	0	5,802	8,703	3,868	5,802
		Sub Total_Construction	106,370	159,554	265,924	0	0	63,822	95,733	42,548	63,822
	Toledo	Construction Works	95,692	143,537	239,229	0	0	57,415	86,122	38,277	57,415
		Physical Contingency (10%)	9,569	14,354	23,923	0	0	5,741	8,612	3,828	5,741
		Sub Total_Construction	105,261	157,891	263,152	0	0	63,156	94,735	42,104	63,156
	Tabuelan	Construction Works	118,958	178,438	297,396	0	0	71,375	107,063	47,583	71,375
		Physical Contingency (10%)	11,896	17,844	29,740	0	0	7,138	10,706	4,758	7,138
		Sub Total_Construction	130,854	196,281	327,136	0	0	78,513	117,769	52,342	78,513
	Bogo	Construction Works	83,850	125,775	209,625	0	0	50,310	75,465	33,540	50,310
		Physical Contingency (10%)	8,385	12,578	20,963	0	0	5,031	7,547	3,354	5,031
		Sub Total_Construction	92,235	138,353	230,588	0	0	55,341	83,012	36,894	55,341
	Punta Engano	Construction Works	110,512	165,769	276,281	0	0	55,256	82,884	55,256	82,884
		Physical Contingency (10%)	11,051	16,577	27,628	0	0	5,526	8,288	5,526	8,288
		Sub Total_Construction	121,564	182,345	303,909	0	0	60,782	91,173	60,782	91,173
	Getafe	Construction Works	82,075	123,112	205,187	0	0	49,245	73,867	32,830	49,245
		Physical Contingency (10%)	8,207	12,311	20,519	0	0	4,924	7,387	3,283	4,924
		Sub Total_Construction	90,282	135,423	225,706	0	0	54,169	81,254	36,113	54,169
	Ubay	Construction Works	114,666	171,998	286,664	0	0	68,799	103,199	45,866	68,799
		Physical Contingency (10%)	11,467	17,200	28,666	0	0	6,880	10,320	4,587	6,880
		Sub Total_Construction	126,132	189,198	315,330	0	0	75,679	113,519	50,453	75,679
	Catialan	Construction Works	185,991	278,987	464,978	0	0	92,996	139,493	92,996	139,493
		Physical Contingency (10%)	18,599	27,899	46,498	0	0	9,300	13,949	9,300	13,949
		Sub Total_Construction	204,590	306,885	511,476	0	0	102,295	153,443	102,295	153,443
	Total for Construction	Construction Works	934,540	1,401,809	2,336,349	0	0	531,073	796,610	403,466	605,199
		Physical Contingency	93,454	140,181	233,635	0	0	53,107	79,661	40,347	60,520
		Total_Construction	1,027,994	1,541,990	2,569,984	0	0	584,181	876,271	443,813	665,719
	Consultancy	Consulting Service	65,418	98,127	163,544	22,896	34,344	22,896	34,344	19,625	29,438
		Physical Contingency (10%)	6,542	9,813	16,354	2,290	3,434	2,290	3,434	1,963	2,944
		Total_Consultancy	71,960	107,939	179,899	25,186	37,779	25,186	37,779	21,588	32,382
	Total_Construction_Consultancy		1,099,953	1,649,930	2,749,883	25,186	37,779	609,367	914,050	465,401	698,101
		VAT (12%)	329,986	0	329,986	7,556	0	182,810	0	139,620	0
		Grand Total	1,429,939	1,649,930	3,079,869	32,742	37,779	792,177	914,050	605,021	698,101

Component	Local	Foreign
Construction Works	40%	60%

Consulting Service Cost	7%	of Construction Wokrs

Progress	Total	1st Year	2nd Year	3rd Year
Construction (Expansion)	100%	0%	60%	40%
Construction (New Devlp)	100%	0%	50%	50%
Consulting Service	100%	35%	35%	30%

Table 10-3 Required Investment and Schedule for RRTS Project - Road Package (Gravel Road Construction)

Unit : 1,000 Peso

Package	Road for F/S	Breakdown / Year	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Road	Esperanza	Construction Works	146,839	36,710	183,549	0	0	88,104	22,026	58,736	14,684
		Physical Contingency (10%)	14,684	3,671	18,355	0	0	8,810	2,203	5,874	1,468
		Sub Total_Construction	161,523	40,381	201,904	0	0	96,914	24,228	64,609	16,152
	Balud	Construction Works	195,786	48,946	244,732	0	0	117,471	29,368	78,314	19,579
		Physical Contingency (10%)	19,579	4,895	24,473	0	0	11,747	2,937	7,831	1,958
		Sub Total_Construction	215,364	53,841	269,205	0	0	129,218	32,305	86,146	21,536
	Tay tay	Construction Works	97,893	24,473	122,366	0	0	58,736	14,684	39,157	9,789
		Physical Contingency (10%)	9,789	2,447	12,237	0	0	5,874	1,468	3,916	979
		Sub Total_Construction	107,682	26,921	134,603	0	0	64,609	16,152	43,073	10,768
	Total for Construction	Construction Works	440,518	110,129	550,647	0	0	264,311	66,078	176,207	44,052
		Physical Contingency	44,052	11,013	55,065	0	0	26,431	6,608	17,621	4,405
		Total_Construction	484,569	121,142	605,712	0	0	290,742	72,685	193,828	48,457
	Consultancy	Consulting Service	66,078	16,519	82,597	23,127	5,782	23,127	5,782	19,823	4,956
		Physical Contingency (10%)	6,608	1,652	8,260	2,313	578	2,313	578	1,982	496
		Total_Consultancy	72,685	18,171	90,857	25,440	6,360	25,440	6,360	21,806	5,451
	Total_Construction_Consultancy		557,255	139,314	696,568	25,440	6,360	316,182	79,045	215,633	53,908
		VAT (12%)	83,588	0	83,588	3,816	0	47,427	0	32,345	0
		Grand Total	640,843	139,314	780,157	29,256	6,360	363,609	79,045	247,978	53,908

Component	Local	Foreign
Construction Works	80%	20%

Consulting Service Cost	15%	of Construction Wokrs

Progress	Total	1st Year	2nd Year	3rd Year
Construction (New Devlp)	100%	0%	60%	40%
Consulting Service	100%	35%	35%	30%

Table 10-4 Required Investment and Schedule for RRTS Project - Concrete Road Construction (Reference Only)

Unit : 1,000 Peso

Package	Road for F/S	Breakdown (Year)	Total Local	Total Foreign	Total Total	1st Year Local	1st Year Foreign	2nd Year Local	2nd Year Foreign	3rd Year Local	3rd Year Foreign
Road	Esperanza	Construction Works	523,906	130,976	654,882	0	0	314,343	78,586	209,562	52,391
		Physical Contingency (10%)	52,391	13,098	65,488	0	0	31,434	7,859	20,956	5,239
		Sub Total_Construction	576,296	144,074	720,370	0	0	345,778	86,444	230,518	57,630
	Balud	Construction Works	698,541	174,635	873,176	0	0	419,124	104,781	279,416	69,854
		Physical Contingency (10%)	69,854	17,464	87,318	0	0	41,912	10,478	27,942	6,985
		Sub Total_Construction	768,395	192,099	960,494	0	0	461,037	115,259	307,358	76,839
	Tay tay	Construction Works	349,270	87,318	436,588	0	0	209,562	52,391	139,708	34,927
		Physical Contingency (10%)	34,927	8,732	43,659	0	0	20,956	5,239	13,971	3,493
		Sub Total_Construction	384,197	96,049	480,247	0	0	230,518	57,630	153,679	38,420
	Total for Construction	Construction Works	1,571,717	392,929	1,964,646	0	0	943,030	235,758	628,687	157,172
		Physical Contingency	157,172	39,293	196,465	0	0	94,303	23,576	62,869	15,717
		Total_Construction	1,728,888	432,222	2,161,111	0	0	1,037,333	259,333	691,555	172,889
	Consultancy	Consulting Service	125,737	31,434	157,172	44,008	11,002	44,008	11,002	37,721	9,430
		Physical Contingency (10%)	12,574	3,143	15,717	4,401	1,100	4,401	1,100	3,772	943
		Total_Consultancy	138,311	34,578	172,889	48,409	12,102	48,409	12,102	41,493	10,373
	Total_Construction_Consultancy		1,867,200	466,800	2,333,999	48,409	12,102	1,085,742	271,435	733,049	183,262
		VAT (12%)	280,080	0	280,080	7,261	0	162,861	0	109,957	0
		Grand Total	2,147,279	466,800	2,614,079	55,670	12,102	1,248,603	271,435	843,006	183,262

Component	Local	Foreign
Construction Works	80%	20%

Consulting Service Cost	8%	of Construction Wokrs

Progress	Total	1st Year	2nd Year	3rd Year
Construction	100%	0%	60%	40%
Consulting Service	100%	35%	35%	30%

11. Conclusions and Recommendations

11.1 Conclusions

The priority routes proposed in the study were not selected based on the grounds that each of them has great potential in terms of future traffic demand but that collectively they can form an effective nationwide trunk traffic network. As the proposed trunk traffic network is considered to be able to cope effectively with traffic demand to be generated among regions and islands all over the country at least in the coming three decades, the most important step to be taken is to develop this trunk traffic network as soon as possible recognizing that this trunk traffic network is one of the most basic and indispensable national infrastructures to support social/economic development of the nation.

The improvement and development of the fifteen RORO terminals proposed in the study should be followed by the improvement of the other RORO terminals on the priority routes to ensure that all terminals meet the same structural standards. At the same time, it is also necessary to improve the existing roads and highways continuously. Only through these efforts can transport safety, environmental preservation and a reduction in transport time be realized, thereby enhancing the social and economic development of the nation as a whole.

The traffic routes which can not be covered by the above-mentioned efforts are those which connect small remote islands, those which cater to local traffic demand within regions and those used exclusively for industrial purposes. Different from the above-mentioned trunk traffic routes, it is considered appropriate that these traffic routes be developed mainly by the related LGUs and private entities.

11.2 Recommendations

11.2.1 Tasks of DOTC for the RRTS Development

1) Institutional strengthening and arrangements for the RRTS development as directed by AO 123

(1) Authorization of the eight SRNH as a National Project

(2) Designation of implementing agencies of the project component of SRNH

· Implementing agencies for the projects of the national Government

-Construction and maintenance of Highways: DPWH

-Construction of basic facilities and administration of the RoRo terminals: PPA/CPA

· Implementing Agencies for the project components of SRNH

-Acquisition of ROW and construction of Access Roads: PPA/CPA/LGU's

-Construction of RoRo ramp, Fender, Terminal Building: PPA/CPA/LGU/Private

(3) Budget allocation

Authorization of Public Investment Program for the SRNH and approval of budgets.

(4) Preparation of guidelines for the application of the Implementing Rules and Regulations (IRR) of EO 170 Series

While EO170 aims at private investment and IRR's have been issued by the agencies concerned, no substantial actions have been taken by the private sector. This is due to the lack of the guidelines for the application of IRR's and the criteria to be employed in the evaluation of the

application. Thus, detailed guidelines and evaluation criteria should be prepared to clarify the requirements of the RoRo terminal infrastructure and operational schemes

(5) Preparation of the procedure and evaluation criteria for the selection of RoRo ferry operator and appointment of evaluation committee members

For the selection of shipping lines who will operate RoRo ferries along the new RoRo links in SRNH, the selection procedure and criteria should be prepared and the members of the evaluation committee should be appointed.

(6) Financially sound operation of RoRo terminal

DOTC should take steps to establish a rational tariff system for the efficient use of the RoRo terminals. To date, the port tariff has been set at very low level without any concrete policy. It should be clarified what cost items should be paid for by the tariff. If the tariff is too low to cover operation and maintenance expenditures of the terminal, sustainable service is impossible. Tariff can be used as a tool, (if it is charged on a per hour basis instead of per day), to encourage RoRo ships to depart on schedule. The established rules and criteria for the revision of tariff will make it simple and quick to raise the tariff in accordance with inflation.

2) Institutional Strengthening of DOTC for the smooth implementation of the SRNH Projects

(1) Establishment of Project Management Office (PMO) of SRNH

A PMO should be established within DOTC, to manage SRNH projects and day-to-day coordination with the agencies concerned. The PMO is also responsible for assisting LGUs with their project implementation.

(2) Establishment of the procedure of consigning the RoRo terminals to LGU

At those RoRo terminals administrated by LGU's, the port facilities constructed by the central government may be transferred or consigned to LGU's for administration and operation. The procedure should be agreed upon between DOTC and respective LGU's prior to the project implementation.

3) Further RRTS development in the future

(1) Improvement of the efficiency, safety and compliance with regulations at private RoRo terminals

SRNH include Private RoRo terminals. Many of these private terminals need upgrading to comply with the development standards for RoRo terminals of SRNH. DOTC should negotiate with the operators of respective terminals and prepare the programs that will assist private operators in fulfilling requirements.

(2) Development of the whole RRTS

In addition to SRNH, RRTS includes remote island routes and feeder routes which also need to be developed in the future. DOTC should continue studying the traffic demands along these RRTS routes and examine if the routes are feasible for regular RoRo services.

(3) Periodical implementation of Origin and Destination survey

No charges are imposed on cargoes on vehicles traveling in RRTS, and no information of commodity flow is obtained. For the preparation of future development plan of RRTS, Origin and Destination surveys should be conducted periodically. It is recommended to carry out O-D survey

every year to monitor passenger and cargo flows throughout RRTS.

(4) Sustainable procurement of RoRo ships

It is becoming more difficult for shipping lines to procure RoRo ships in secondhand ship markets. Thus, some supportive programs for ship procurement are needed for the sustainable RoRo service along SRNH. One of the possible measures is a ship leasing program financially supported by the government. Detailed schemes of ship leasing have been proposed in the Domestic Shipping Development Plan, 2006. DOTC should proceed with the actual steps to realize these programs. The domestic shipbuilding business should be promoted through financial and technical supports and assistance from the government.