REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY OF PANAY-GUIMARAS-NEGROS ISLAND BRIDGES PROJECT

Project Description For Public Scoping

CONSULTANT:

CCCC Highway Consultants Co., Ltd.

Project Description for Scoping

I. PROJECT BACKGROUND, GOALS AND OBJECTIVES

1.1 Project Background

The PGN Island Bridges Project is a part of the National Islands-Link Projects in the Philippines and it is one of the flagship projects of the Administration's Build, Build, Build program. A grant and technical assistance from the People's Republic of China Government through CCC Highways Consultants Co. Ltd.

1.2 Project Objectives and Rationale

The main goal of the project is to connect Panay Island, Guimaras Island and Negros Island to achieve the connection of the three islands, ensuring that pedestrians and vehicles can all-weather access the three islands, making the passage between the islands safer, faster and more convenient. Further promote the economic development of West Visayas (VI area).

In view of current local socio-economic level and traffic conditions, and the project is required to be open and connected with local roads, therefore, the technology standards for first-class highway is more practical for this project.

II. Alternatives, Project Type, Components and Size, Project Process/Technology

2.1 Project Alternatives

The feasibility study team has proposed the bridge sites and alignments based on the needs and suggestions raised by the Philippine side during the prefeasibility study and feasibility study stage, and taking into consideration of current conditions and planning of the local road networks as well as the results of all subject studies and controlling construction conditions in the project area. After comparative study, **Alignment B in Section-A and alignment D in Section-B are recommended. Figure 1** shows the layout of the bridge sites and alignments.

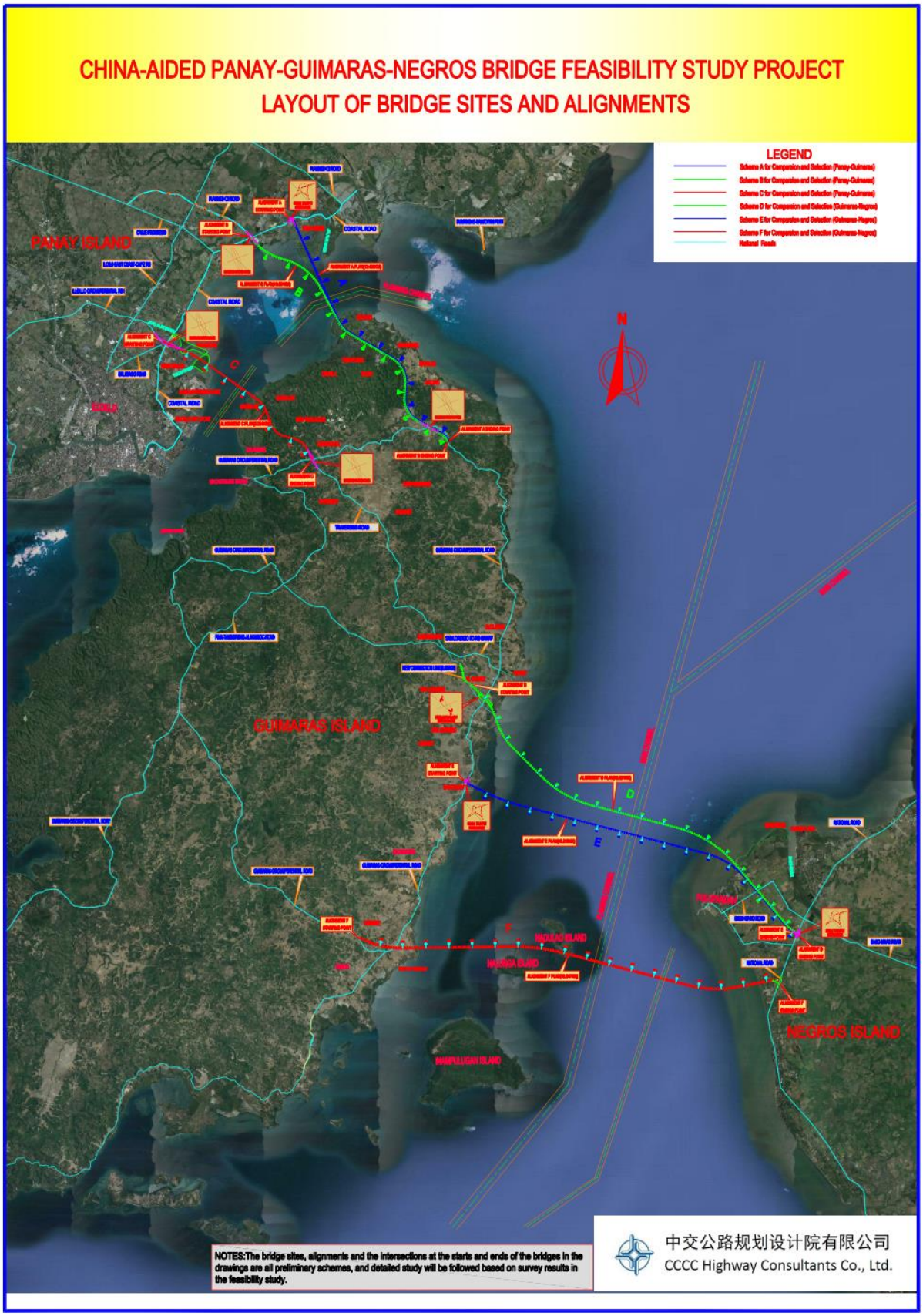

Figure 1. The layout of the bridge sites and alignments for section A and B

2.1.1 Section A (Panay-Guimaras Bridge)

Alignment B (Recommended Alignment): Alignment B connects to the intersection between the planned C2 Circumferential Road and coastal road at Iloilo City, and is designed with a rhombus type interchange to achieve traffic connection. Alignment B stretches northeastwards and crosses ILOILO Strait, and lands on the island at the north of Buenavista Town, GUIMARAS Province. After landing on the sland, the bridge alignment goes around the hill side, then, connects to the turning point of Guimaras Circumferential Rd, where a simple rhombus interchange is designed to meet the circumferential road for traffic connection. The length of the alignment is about 13.1 km in total.

Figure 2: Layout of Alignment B (Section A)

2.1.2 Section B (Guimaras-Negros Bridge)

Alignment D (Recommended Alignment): This alignment starts from the east side of Cabano Town (the wind power generation farms), San Lorenzo City, Guimaras Province, and connects to the circumferential road, and also connects to the island-traversing road through a connecting road. At the intersection with the circumferential road, one simple interchange is designed to achieve traffic connection. Thereafter, it stretches southeastwards and crosses the strait perpendicular to the main fairway. It

lands on the island at the north side of Pulupandan Port, and finally connects to NEGROS State Highway. One interchange is designed at its end point to achieve traffic connection. This alignment is about 19.5 km in total length (including the connecting road).

Figure 3: Layout of Alignment D (Section B)

Summary of Alternative Alignments, its advantages and disadvantages

Alignments	Total length	Bridge length	Connection with Road	Construction difficulty	Pros &cons	Recommendation
A	12.5km	2.7km	Not direct connection with under-planning C2 or C3 Road. Far from Iloilo city	Few household building to be demolished, No other public building. Few mangrove	Sea-crossing bridge is small-scaled. Few building to be demolished. No direct connection with under-planning C2 or C3 Road. Far from Iloilo city. Soft soil foundation at landing area.	
B	13.1km	4.8km	Direct connection with Iloilo C2 Road	Few household building to be demolished, No other public building Few mangrove	Direct connection with under-planning C2 road. No traffic pressure brought to Iloilo city. Facilitating city development. A litter far from city. Larger construction scale	Recommended

C	8.5km	2.7km	Direct connection with Iloilo C1 Road	Pylon to be removed. Affecting port expansion as it's close to power plant and international port. High risk with sink holes. Hard to demolish church, gas station and community. Large amount of mangrove	Direct connection with C1. Close to city; Facilitating city development; Shorter alignment; Smaller construction scale. Brings traffic to Iloilo city. Passing large area of mangrove; Close to power plant and international. High risk with sink holes; Hard to demolish church, gas station and community.	
D	Main: 17.4km Connection Road:3.1km	12.5 km	Connected to circumferential road and traversing road directly. Smooth traffic. Shorter sea-crossing islands distance	Few household building to be demolished, No other public building	Pros：Smooth connection with circumferential road. Smooth traffic flow.，Short sea-crossing distance. Cons：Longer alignment and large project scale than alignment E.	Recommended
E	16.1km	11.9km	Not connected to circumferential road directly	Few household building to be demolished, No other public building	Pros：Better alignment and smaller project scale. Cons：No direct connection with traversing road. 5km away from traversing road in the north. Long operating distance. Long detour distance crossing the island.	

2.2 Project Components and Project Size

Alignment B and alignment D consist of the following components.

Table 1: Major Components and Size of Alignment B

Project Component	Location/Area Jurisdiction	Length/ Area
Major Components		
Segment3.1 *(Interchange)*	**Panay** *K0+000~K0+555*	0.555 km
Segment 3.2 *(Sea Cross Bridge)*	**Panay-Guimaras** *K0+555~k5+525*	4.970 km
Segment 3.3 *(link road)*	**Guimaras** *K5+525~K11+435*	5.910 km
Segment 3.4 *Interchange*	**Guimaras** *K11+435~K13+005*	1.57 km

Table 2: Major Components and Size of Alignment D

Project Component	Location/Area Jurisdiction	Length/ Area
Major Components		
Segment3.5 *(Interchange)*	**Guimaras** *K0+000~K1+902*	1.902 km
Segment 3.6 *(Sea Cross Bridge)*	**Guimaras –Negros** *K1+902~k15+012*	13.110 km
Segment 3.7 *(link road)*	**Negros** *k15+012~K18+260*	3.248 km
Segment 3.8 *（Interchange）*	**Negros** *K18+260~K18+557*	0.297 km

2.2.1 Alignment B and Alignment D

The standard cross-section width of the bridge is 20.2 m. The cross section is composed of 0.5 m + 1.5 m (emergency parking lane) + 2 × 3.65 m (carriageway width) + 1.6 m (middle bandwidth) + 2 × 3.65 m (carriageway width) +1.5 m (emergency parking lane) + 0.5 m.

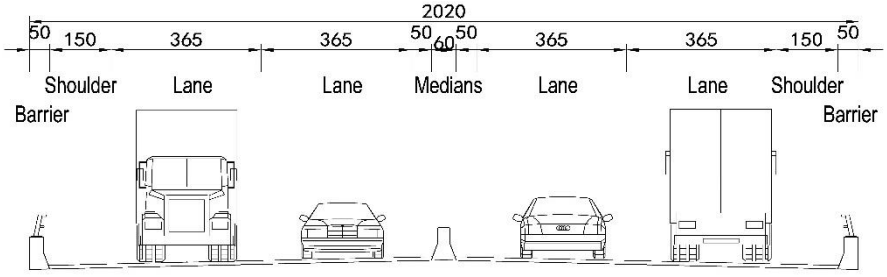

Figure 4: Typical Cross Section of the bridge

The bridge spans of the alignment B are as 58×30m + 15×100m + (360+680+360) m + 11×30m, which is shown in the following figure.

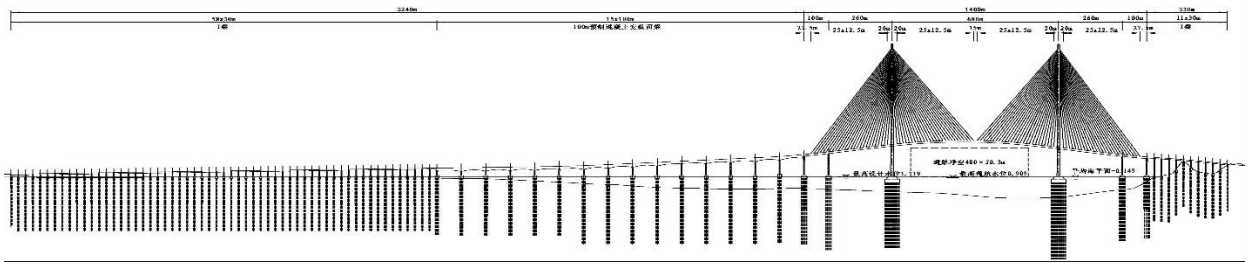

Figure 5: Sea Cross Bridge Profile (Alignment B)

Table 3: Major Components of Alignment B (*Sea Cross Bridge*)

Bridge scheme		Iloilo side		The main bridge	Guimaras side	
alignment		Shallow water	Deep Water		Deep Water	Shallow water
B	Superstructure	58×30m	15×100m	(360+680+360)m	-	11×30m
		Prefabricated grider	Concrete box girder	Twin-tower cable-stayed bridge		Prefabricated grider
	Foundation	Concrete pier	Concrete pier	Concrete pier	-	Concrete pier
		Pile foundation	Pile foundation	Pile foundation		Pile foundation

The bridge spans of the alignment D are as 20×30m + 66×100m + (360+680+360) m + 34×100m + 37×30m, which is shown in the following figure.

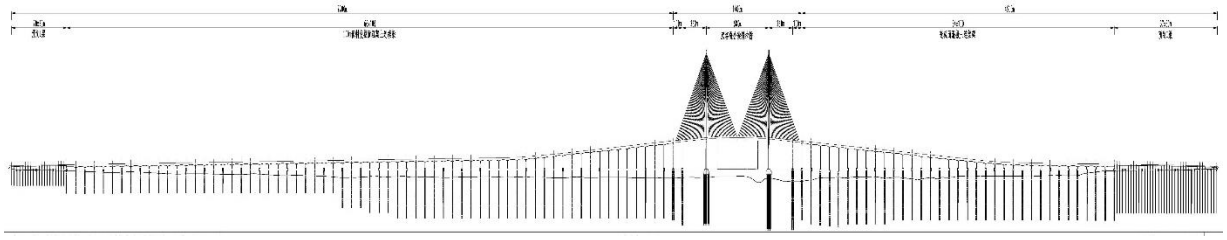

Figure 6: Sea Cross Bridge Profile (Alignment D)

Table 3: Major Components of Alignment D (*Sea Cross Bridge*)

Bridge scheme		Iloilo side		The main bridge	Guimaras side	
alignment		Shallow water	Deep Water		Deep Water	Shallow water
D	Superstructure	20×30m	66×100m	(360+680+360)m	34×100m	37×30m
		Prefabricated grider	Concrete box girder	Twin-tower cable-stayed bridge	Concrete box girder	Prefabricated grider
	Foundation	Concrete pier	Concrete pier	Concrete pier	Concrete pier	Concrete pier
		Pile foundation	Pile foundation	Pile foundation	Pile foundation	Pile foundation

2.2.2 Link Road

The typical cross-section of the link road of the project is as follows:

The width of the whole subgrade is 20.7 m, and the composition of cross section is 2×2×3.65 m, with middle bandwidth of 1.6 m (including 0.6 m width of the central median and 0.5 m width of the left curb belt), the width of hard shoulder is 2×1.5 m (including 0.5 m width of the right curb belt), and the width of the soil shoulder is 2×0.75 m.

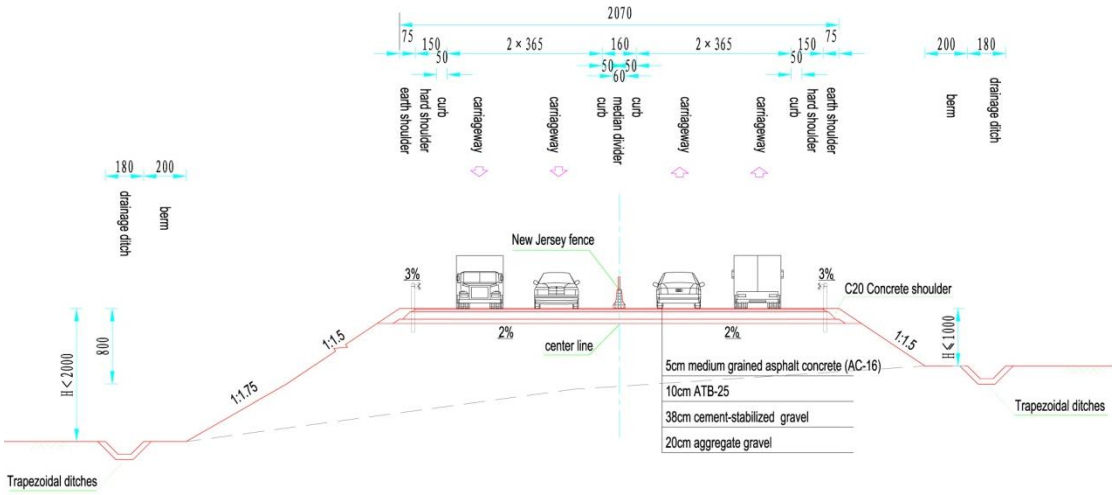

Figure 7: Typical Cross Section (link road)

2.2.3 Interchange

(1) Scheme of interchange of Alignment B starting point

In the interchange scheme of Alignment B starting point, the crossed road is COASTAL ROAD. Based on the main line and the longitudinal section of the crossed road as well as the forecast of turning traffic volume, diamond-shaped interchange is adopted, with an intersection between the ramp and the crossed road for channelization. The minimum radius of the ramp circle curve R = 400 m and the design speed is 40 km/h. According to the forecast of turning traffic volume, for one-way single-lane ramp and one-way two-lane ramp, the subgrade width are 9.0 m and 10.5 m respectively, the acceleration lane is in parallel and the deceleration lane is direct.

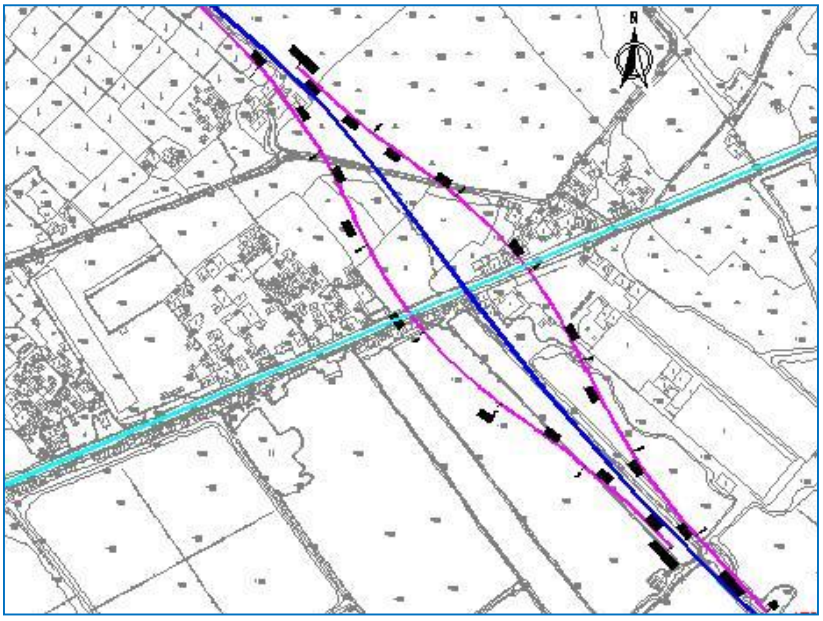

Figure 8: Alignment B Starting Point Interchange Scheme

(2) Interchange scheme of Alignment B end point

In the interchange scheme of Alignment B end point, the crossed road is GUIMARAS CIRCUMFERENTIAL ROAD. Based on the main line and the longitudinal section of the crossed road as well as the forecast of turning traffic volume, the rhombus interchange is adopted, with an intersection between the ramp and the crossed road for channelization. The minimum radius of the ramp circle curve R = 400 m and the design speed is 40 km/h. According to the forecasted turning traffic volume, one-way single-way ramp and one-way two-lane ramp are adopted with the subgrade width of 9.0 m and 10.5 m, the acceleration lane is in parallel and the deceleration lane is direct.

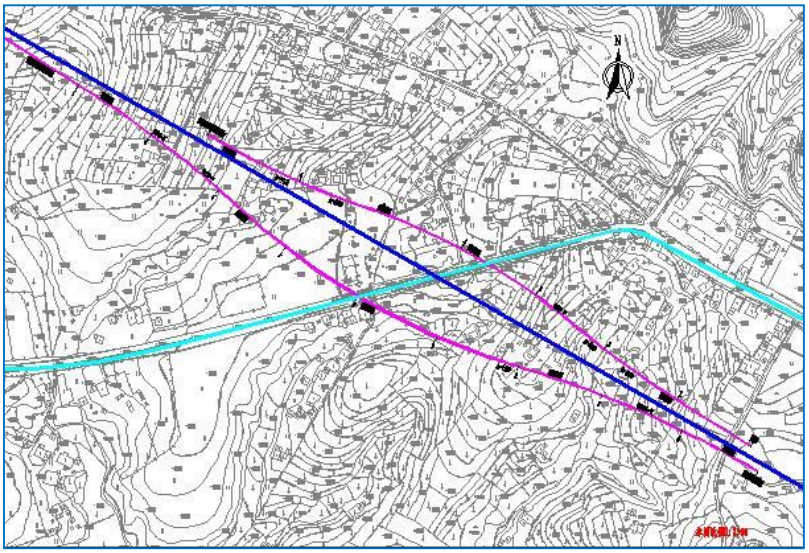

Figure 9: Alignment B End Point Interchange Scheme

(3) Interchange scheme at Alignment D starting point

In the interchange scheme for Alignment D starting point, the crossed road is GUIMARAS CIRCUMFERENTIAL ROAD. Based on the main line and the longitudinal section of the crossed roads as well as the forecast of turning traffic volume, partial clover leave interchange is adopted, with an intersection between the ramp and the crossed roads for channelization. The minimum radius of circle curve for the ramp is R = 60 m and the design speed is 40 km/ h. According to the forecasted turning traffic volume, one-way single-lane ramp is adopted, and the width of subgrade is 9.0 m. The subgrade width of two-way ramp is 16.5 m. the acceleration lane is in parallel and the deceleration lane is direct.

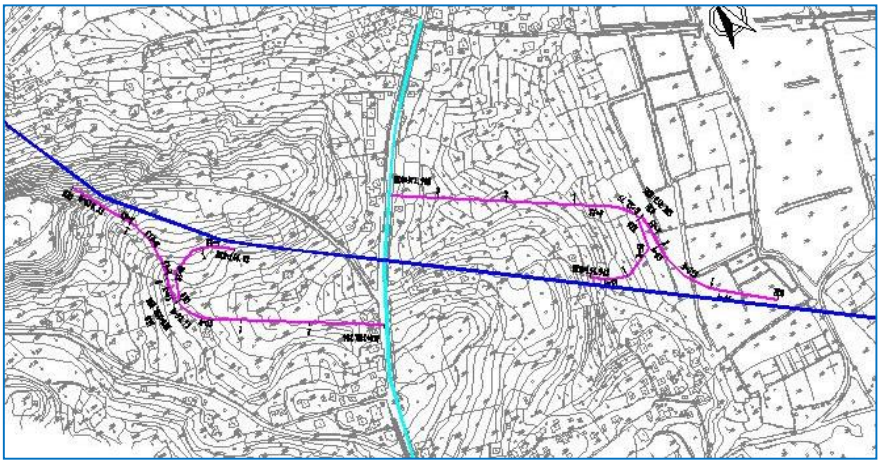

Figure 10: Interchange Scheme of Alignment D Starting Point

(4) Interchange scheme of Alignment D end point

In the interchange scheme of Alignment D end point, the crossed road is NATIONAL ROAD. Based on the mainline and the longitudinal section of crossed roads as well as the forecasted turning traffic volume, T-type interchange is adopted, the minimum radius R = 80 m of the ramp circle curve is designed at a speed of 40km/h. According to the prediction of turning traffic volume, one-way single-lane and one-way two-lane ramps are adopted with the subgrade width of 9.0 m and 10.5 m respectively. The acceleration lane is in parallel and the deceleration lane is direct.

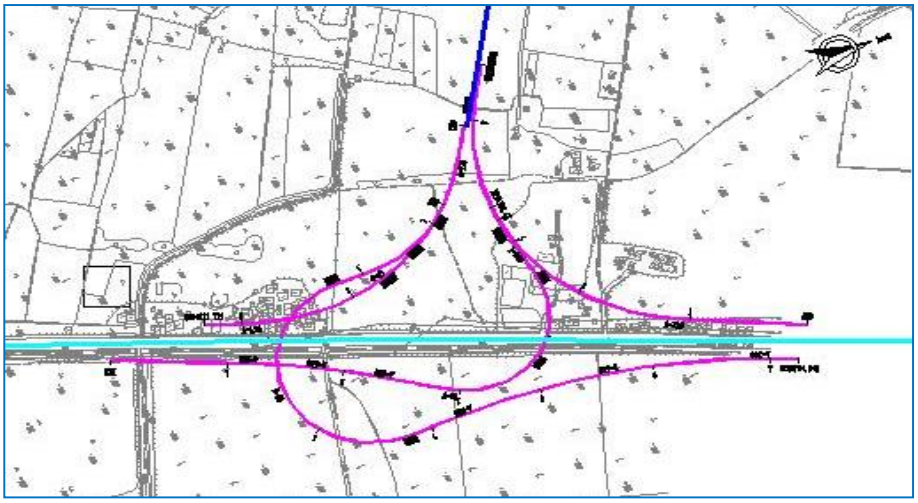

Figure 11: Interchange Scheme of Alignment D End Point

2.3 Project Process/technology (including toxic chemicals that will be used or produced and maybe released to the environment)

2.3.1 Pre-Construction

Determination at designed speed at present, for the highway connected with the two-sections cross-sea bridge in this project, the traffic conditions are general, and the highest driving speed on most sections is 60 km/h, being able to reach 80 km/h for several sections, therefore, the difference between the design speed of this project and the speed of connecting roads on two sides cannot be too great.

At the same time, there is hilly landform in the places where the route passes through Guimaras Island, and the terrain on some sections is more undulating, and the lands in the corridor belt of the bridge channel are private domains mostly, with more residential areas distributed. To minimize scale of removal is the main idea for route layout on this section. Too high plane indexes will result in greater quantities of removal, and increasing the implementation difficulty of this project on later stage.

Therefore, in combination with the existing topographic conditions, geological survey data and the traffic conditions and speed of the existing adjacent roads, it is suggested that the design speed of this project is adopted with 80 km/ h.

The main technical standards of this project are as follows.

(1) Road grade: first-class highway;

(2) Design service life:100 years;

(3) Design driving speed: 80 km/ h;

(4) Standard bridge width: 23.2 m, See Figure 3.5-2 for specific road width division;

(5) Bridge design load: highway- Class I.

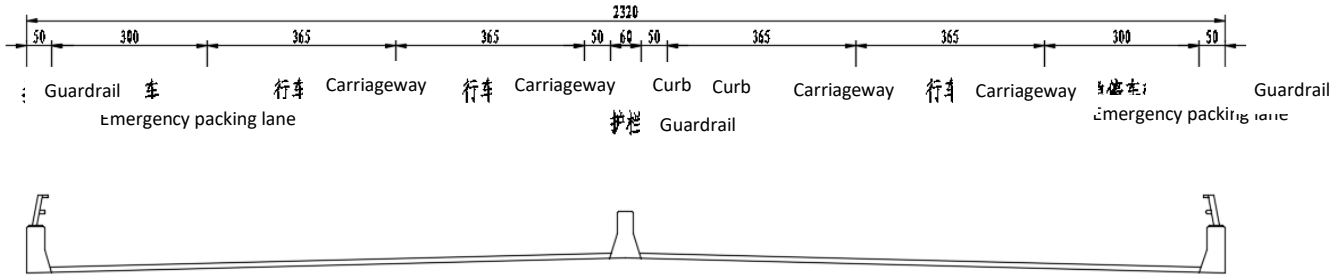

Figure 12. Standard Cross Section of Bridge

2.4 Project Resource Utilization

In the wiring section of the two sea-crossing bridges, a large amount of roadbed filling is required. At present, the filling and excavation parts of each island are required to utilize the local gravel soil for resource utilization.

Water and electricity for construction need to be connected to local municipal pipelines and contact with local production and life.

III. Project Location

The Panay (Metro Iloilo) - Guimaras – Negros Island Bridges (PGN) Project is located in Region Ⅵ in the Philippines. It will connect Panay Island, Guimaras Island and Negros Island with bridge A and bridge B. Bridge A connects Panay Island and Guimaras Island, and bridge B connects Guimaras Island and Negros Island. Refer to map. Table 1 presents the locations of the PGN project.

Table 3: Locations traversing the PGN Project

List of Municipalities affected by the PGN Project
Leganes, Iloilo
Municipality of Leganes
Barangay Gua-an
Buenavista, Guimaras
Municipality of Buenavista
Barangay Cansilayan
Barangay Banban
Barangay Navalas
Barangay San Miguel
Barangay Getulio
Barangay Dagsa-an
Barangay Salvacion
San Lorenzo, Guimaras
Municipality of San Lorenzo
Barangay M. Chavez
Pulupandan, Negros Island
Municipality of Pulupandan
Barangay Tapong
Barangay Canjusan

Barangay Pag Ayon
Barangay Zone 4A
Barangay Ubay

IV. Proposed EIA Study Area

Figure 13(a) Monitor Sampling station along P-G Bridge

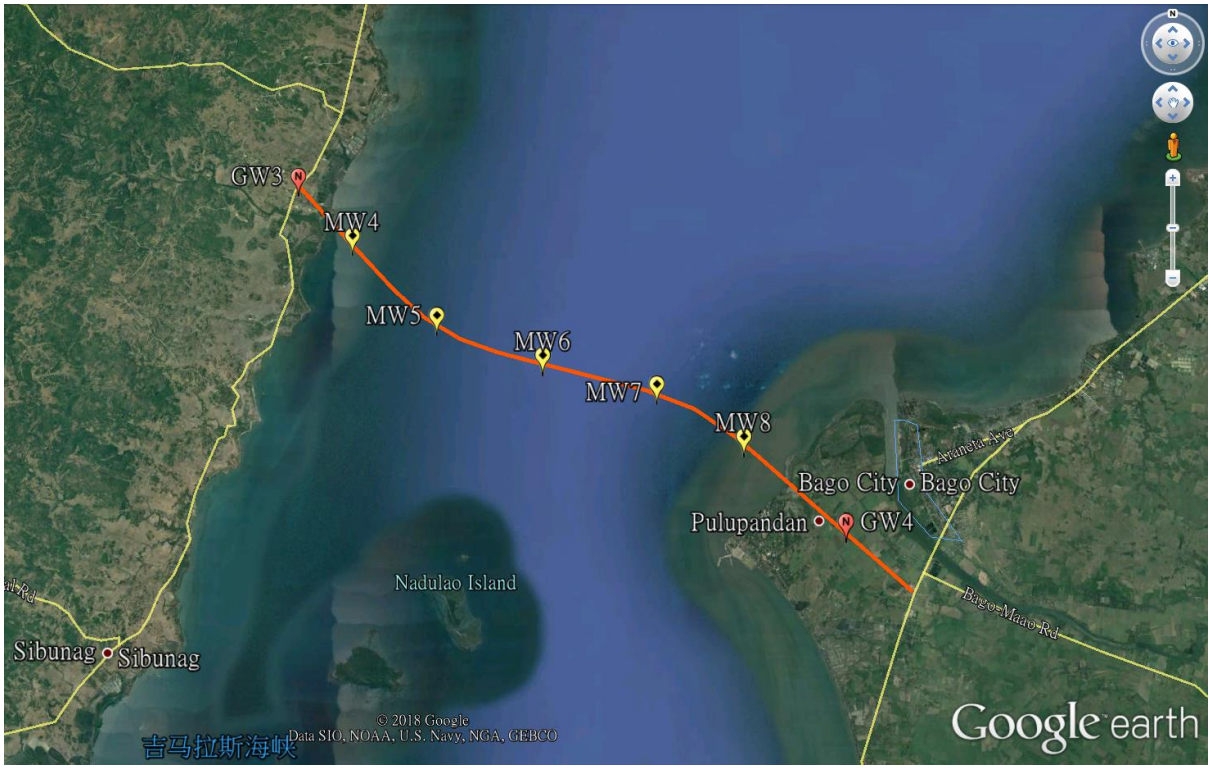

Figure 13 (b) Monitor Sampling station along G-N Bridge

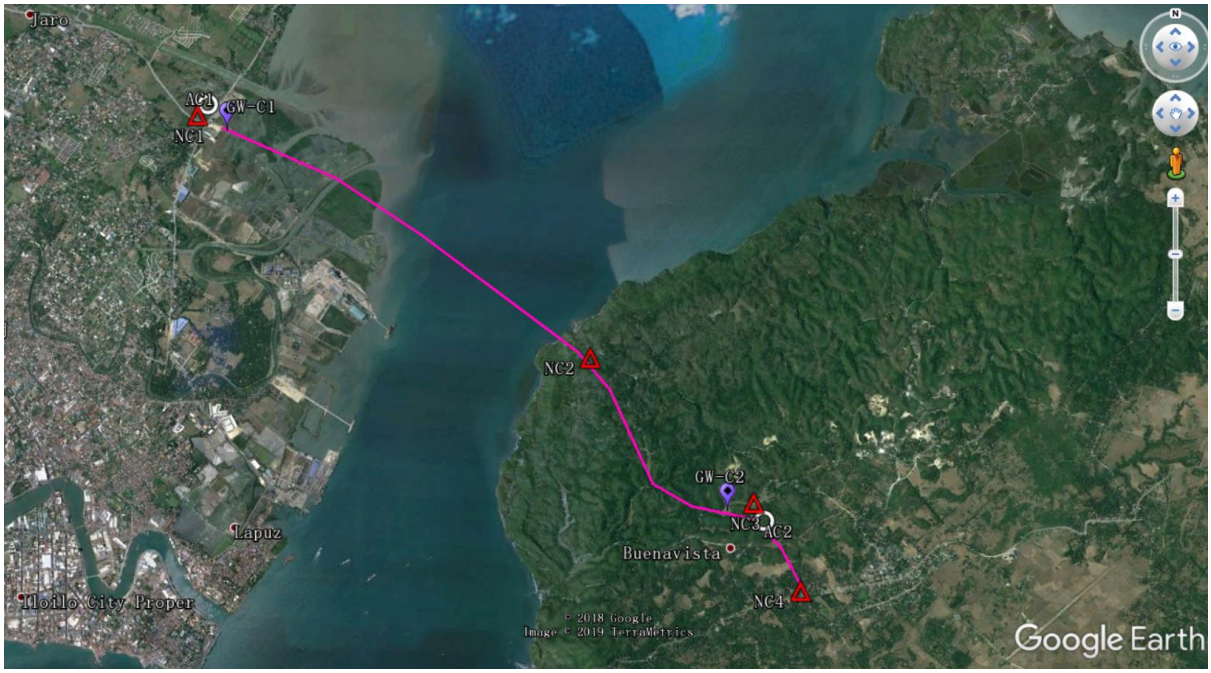

Figure 13 (c) Monitor Sampling station along P-G Bridge Line C

Figure 14 (d) Air and Noise Sampling station along P-G-N Bridge

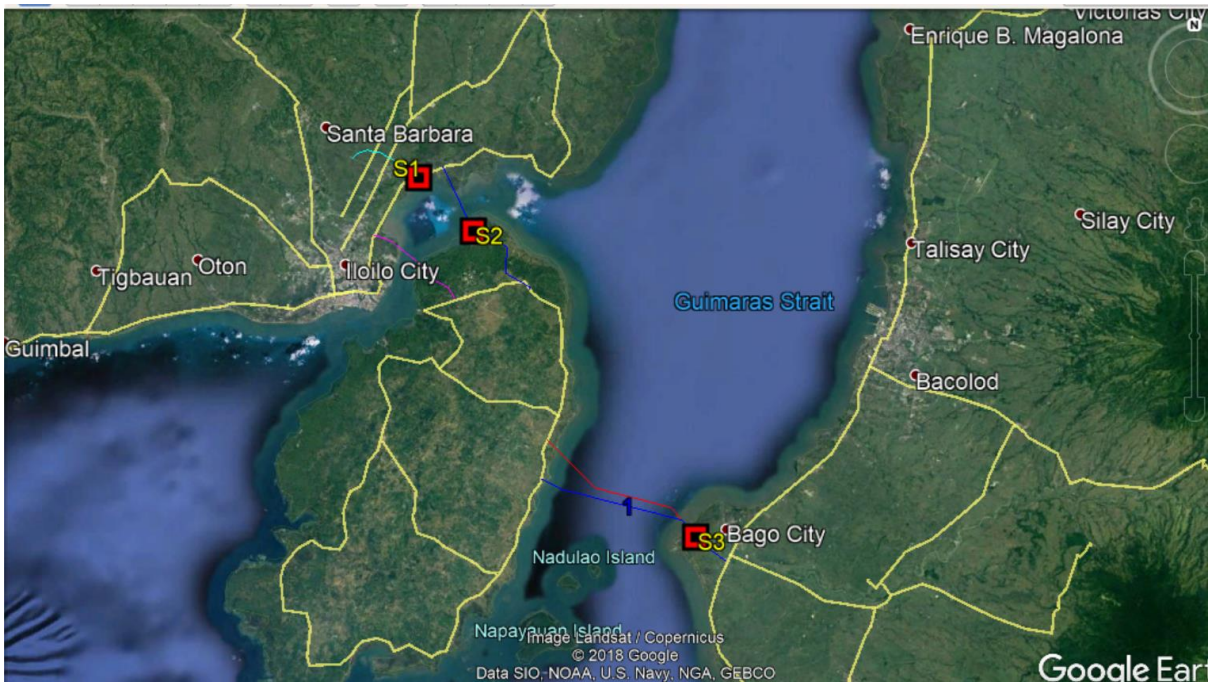

Figure 14 (e) Soil Sampling station along P-G-N Bridge

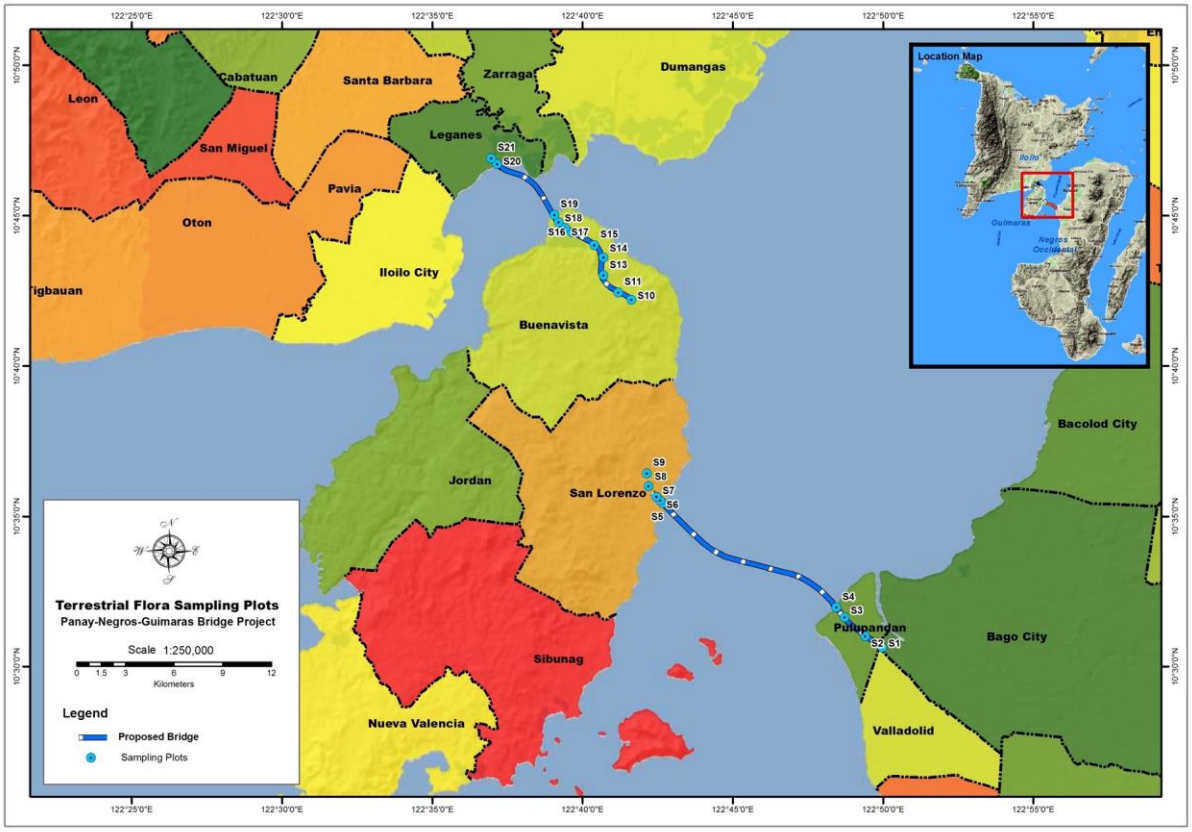

Figure 14 (f) Terrestrial Flora and Fauna Sampling station along P-G-N Bridge

V. Photos

Considering Alignment C is close Iloilo city, it will facilitate city development and transportation. However, once Alignment C brings traffic into Iloilo city, there'll be traffic congestion. In addition, Alignment C goes through mangroves near Iloilo. Then it's near to Iloilo international port and 900m from power plant, which will affect the port's future expansion. Also, it passes area with sink holes that can cause great risk in the project. At last, there are pylon, church, gas station and community at the end of Alignment C, which means resettlement work is difficult and huge.

Church at the end of Alignment C

Gas station at the end of alignment C

Alignment A is the yellow one. Its starting point connects somewhere in the middle of coastal road, C2 Road and C3 Road, with 2km distance from C2 road. After passing large area of fish ponds, alignment A crosses over the strait. Once landing on Guimaras Island, it goes along the northeast side of the island 'til it connects Guimaras Circumferential Road. Total length of Alignment A is 12.5km.

Large area of fish pond in Alignment A (mollisol）

4 –lanes road at starting point in Alignment A

Alignment B is the red one. Its starting point connects the intersection of coastal road and under-planning C2 Road. After extending into southeast, Alignment B shares the same bridge site with Alignment A. It also has the same alignment with alignment A after it lands on Guimaras Island. Total length of Alignment B is 13.1km. This alignment connects the under-planning C2 road. And it won't bring traffic pressure to Iloilo city, which means it will facilitate city's future development. However, it's far away from Iloilo city; compared to Alignment A, the total length is more and bridge scale is larger.

Salt Farm in Alignment B

VI. Project Proponent

Proponent: Department of Public Works and Highways
Proponent Address: Bonifacio Drive, Port Area, Manila

Consultant: People's Republic of China Government through CCC Highways Consultants Co. Ltd.

VII. Projected Timeframe of the Project Phases

Expected:
Construction of the Bridge Foundation began in 2022
Construction of Superstructure and Road Pavement began in 2025
Construction of ancillary facilities began in 2027
Open in 2028

VIII. Preliminary Identified Environmental Aspects for each alternative

Predicted Impact	Degree of the significance	Duration, Extent and Magnitude of Impact
PRE-CONSTRUCTION PHASE		
Loss and Damage to property	NOT RELEVANT	NOT RELEVANT
Loss of trees and vegetative cover	MODERATE	IRREVERSIBLE SHORT TERM
Change in land use as a consequence of development	LOW	LOW
CONSTRUCTION PHASE		
LAND		
Soil contamination	MODERATE	IRREVERSIBLE, SHORT TERM
Generation of Spoils and Construction Waste Disposal	HIGH	SHORT TERM
Impair local aesthetic or scenic resources	LOW	REVERSIBLE SHORT TERM
GEOHAZARD		
Damage of structures due to liquefaction	LOW	SHORT TERM
Flooding	Low	SHORT TERM
Tsunami	Low	SHORT TERM
WATER		

Predicted Impact	Degree of the significance	Duration, Extent and Magnitude of Impact
Increase in siltation rates along surface and marine waters	LOW	SHORT TERM
Damage to Marine Flora	LOW	IRREVERSIBLE, SHORT TERM
Displacement of Marine Fauna	LOW	SHORT TERM
Contamination of ground water	LOW	SHORT TERM
Decrease ground water flow	LOW	SHORT TERM
Occurrence of flooding	MODERATE	SHORT TERM
Contamination on nearby bodies of water	LOW	SHORT TERM
AIR/NOISE		
Increase in particulate matter (dust) and levels of gaseous emission	HIGH	REVERSIBLE SHORT TERM
Increase in noise and vibration levels	HIGH	REVERSIBLE SHORT TERM
Global warming	LOW	SHORT TERM
PEOPLE		
Traffic Congestion	HIGH	SHORT TERM
Interruption of service utilities (water, power)	MODERATE	SHORT TERM
Incidence of construction-related accidents	HIGH	SHORT TERM
Loss of historical structure	NOT RELEVANT	NOT RELEVANT
Pose human health and safety hazards	MEDIUM	SHORT TERM
Generation of employment/ local hired labor	BENEFICIAL	LONG TERM
Enhanced economic activity	BENEFICIAL	LONG TERM