

## 資 料

1. 調査団員・氏名
2. 調査行程
3. 関係者(面会者)リスト
4. 討議議事録(M/D)
5. 事業事前計画表(事業化調査時)
6. その他の資料・情報

## 1. 調査団員・氏名

現地調査（平成 19 年 9 月 19 日 ～ 平成 19 年 9 月 29 日）

	氏名	担当	所属
1	上條 哲也	総括	国際協力機構 東ティモール事務所所長
2	小柳 桂泉	計画管理	国際協力機構 無償資金協力部 業務第一グループ運輸交通・電力チ ーム主任
3	藤澤 博	業務主任/橋梁計画	日本工営株式会社
4	早川 知邦	自然条件調査/施工計画/積算	日本工営株式会社

## 2. 調查行程

現地調査（平成 19 年 9 月 19 日 ～ 平成 19 年 9 月 29 日）

Date			JICA Member		Consultant Member	
			Leader	Project Coordinator	Chief Consultant/ Bridge Planner	Natural Condition Surveyor Construction Planner/ Cost Estimator
			Mr. Kamijo	Mr. Koyanagi	Mr. Fujisawa	Mr. Hayakawa
1	18	Tue		Departure from Tokyo		
2	19	Wed		Arrival at Dili		
				Briefing from JICA Office		
				Courtesy Call on Embassy of Japan (EoJ)		
3	20	Thu		Visit to Mr. Pedro Lay, Minister for Infrastructure and Mr. Jose Gaspar R. C. Piedade, Permanent Secretary		
				Visit to Mr. Carlos Ximenes, Director of Environmental Service		
				Visit to Mr. Eusebio Jeronimo, Ministry of Finance		Collection of Unit Cost Meeting for Geo. Survey
				Meeting with DRBFC		
4	21	Fri		Movement from Dili to Mola Bridge with 2 officers of DRBFC (Bridge and Road)		
				Site Survey, Move to Suai		
5	22	Sat		Movement from Suai to Mola Bridge		
				Site Survey for Resettlement area, Move to Dili		
6	23	Sun		Internal Meeting		
				Collection of Unit Cost, Quarry Site Visit		
7	24	Mon		Discussion with MoI and DRBFC on Minutes of Discussion (M/D)		Collection of Unit Cost Cost Analysis
				Visit to Mr. Eusebio Jeronimo, MoF		
8	25	Tue		Discussion with Ministry of Finance on Minutes of Discussion (M/D)		Collection of Unit Cost Cost Analysis
				Signature of M/D by Minister for Infrastructure, Minister for Finance and Mission Leader		
				Report to EOJ		
9	26	Wed		Leave Dili	Data Collection and Analysis	Collection of Unit Cost
10	27	Thu		Arrival in Tokyo	Data Collection and Analysis	Meeting for Geo. Survey Cost Analysis
11	28	Fri			Data Collection and Reporting	Meeting for Geo. Survey Collection of Unit Cost
				Report to JICA		
12	29	Sat		Leave from Dili		
13	30	Sun		Arrival in Tokyo		

Legend

- EOJ: Embassy of Japan
- JICA: Japan International Cooperation Agency
- MoI: Ministry of Infrastructure
- DRBFC: Directorate of Roads, Bridges and Flood Control
- MoF: Ministry of Finance

### 3. 関係者(面会者)リスト

## 関係者リスト

(1) 財務省 (Ministry of Finance)

Ms. Emilia Pires, Minister

Mr. Eusebio da Costa Jeronimo, Director, National Directorate for Planning and External Assistance Coordination (NDPEAC)

Mr. Arlindo da Cruz Monteiro, Bilateral Officer, NDPEAC

Mr. Chandrasiri Perera, Budget Execution Advisor

(2) インフラ省 (Ministry of Infrastructure)

Mr. Pedro Lay da Silva, Minister

Mr. Domingos Dos Santos Caeiro, Secretary State for Public Works

Mr. Jose G. R. C. Piedade, Director General

Mr. Rui Hernani Freitas Guterres, Civil Engineer, Director of Roads, Bridges and Flood Control (DRBFC)

Mr. Milton Ramanata Monteiro, Bridge Engineer, DRBFC

Mr. Jose Augusto Freitas, Road Engineer, DRBFC

(3) 経済開発省 (Ministry of Economy and Development)

Mr. Carlos Ximenes, Director of Environmental Service

Mr. Antonio Lelo, EIA Coordinator

(4) 法務省 (Ministry of Justice)

Mr. Pedro de Sousa Xavier, Director of Land and Property

Mr. Pedro Tilman, Topographic Officer, Suai Regional Office

Mr. Julio da Tilman, Ainaro Regional Officer

(5) 天然資源局 (Secretary State for Natural Resources)

Mr. Vocente da Costa Pinto, Director of Geology and Mineral Resources

(6) 在東ティモール日本大使館

清水 健司 特命全権大使

小泉 崇 参事官

山口 忍 一等書記官

(7) 国際協力機構(JICA) 東ティモール事務所

上條 哲也 所長

**4. 討議議事録(M/D)**

**2007年9月25日調印**



**Minutes of Discussions  
on the Implementation Review Study  
on the Project for the Improvement of Mola Bridge  
in the Democratic Republic of Timor-Leste**

In response to the request from the Government of the Democratic Republic of Timor-Leste (hereinafter referred to as "Timor-Leste"), the Government of Japan decided to conduct an Implementation Review Study on the Project for the Improvement of Mola Bridge (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Timor-Leste the Implementation Review Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Tetsuya Kamijo, Resident Representative, JICA Timor-Leste Office, and is scheduled to stay in the country from September 19 to 29, 2007.

The Team held discussions with the officials concerned of the Government of Timor-Leste and conducted a field survey at the study area.


In the course of the discussions and field survey, both sides have confirmed the main items described in the attached sheets.

Dili, September 25, 2007




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Pedro Lay Da Silva  
Minister  
Ministry of Infrastructure  
Democratic Republic of Timor-Leste



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Tetsuya Kamijo  
Leader  
Implementation Review Study Team  
Japan International Cooperation Agency



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Emilia Pires  
Minister  
Ministry of Finance  
Democratic Republic of Timor-Leste

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to improve Mola Bridge on the road of Cassa-Suai section.

### 2. Project Site

The Project site is shown in Annex-1.

### 3. Responsible and Implementing Organizations

The responsible and implementing organization is the Ministry of Infrastructure.

The organization chart is shown in Annex-2.

### 4. Confirmation of the Components

After discussions, the both sides confirmed the Project components as listed below based on the result of the Detailed Design.

- Improvement of Mola Bridge (approximately 216m length)\*1
- Approach Retaining Wall of left side bank of Mola Bridge (approximately 10m length)
- Approach Road of right side bank of Mola Bridge (approximately 84m length)\*2

\*1/ Regarding the alignment of Mola Bridge, the both sides agreed to select the straight one described as Route-B in Annex-3, considering the road alignment, cross-section space of river, and construction cost, instead of the curved one described as Route-A in Annex-3, which was selected during the Basic Design Study Stage.

\*2/ Regarding the approach road of the right side bank of Mola Bridge, the Timor-Leste side shall construct a part of approach road (approximately 210m length), which pass through the settlement area and are not included in the Japan's Grant Aid, described in Annex-3. The Team explained to the Timor-Leste side that the construction of the approach road by the Timor-Leste side should be completed by the end of November 2009.

### 5. Japan's Grant Aid Scheme

(1) The Timor-Leste side understood the Japan's Grant Aid scheme explained by the Team, as described in Annex-4.

(2) The Timor-Leste side will take the necessary measures, as described in Annex-5, for smooth implementation of the Project as a condition for the Japan's Grant Aid to be implemented.

### 6. Schedule of the study

(1) The Team will proceed to further study in Timor-Leste by September 29, 2007.

(2) JICA will prepare the report and send it to the Timor-Leste side by the end of January 2008.

### 7. Environmental and Social Considerations

(1) The both sides confirmed that the basic agreement has been already made with the affected people regarding the resettlement at the right side bank of Mola Bridge. The Timor-Leste side explained to the Team that any kind of cash compensation would not be paid to the affected people because the Project site is the government owned and that an alternate means for compensation

shall be considered by the Timor-Leste side.

(2) The Timor-Leste side shall complete the resettlement and site clearance before commencement of the construction work.


(3) The Team explained to the Timor-Leste side that it was required to obtain an approval of Environmental Management Plan (EMP) before the Cabinet Approval of Japan in consideration of the JICA Environmental and Social Considerations Guidelines. The Timor-Leste side shall obtain an approval of EMP from the Environmental Service, Ministry of Economy and Development by the end of January 2008.

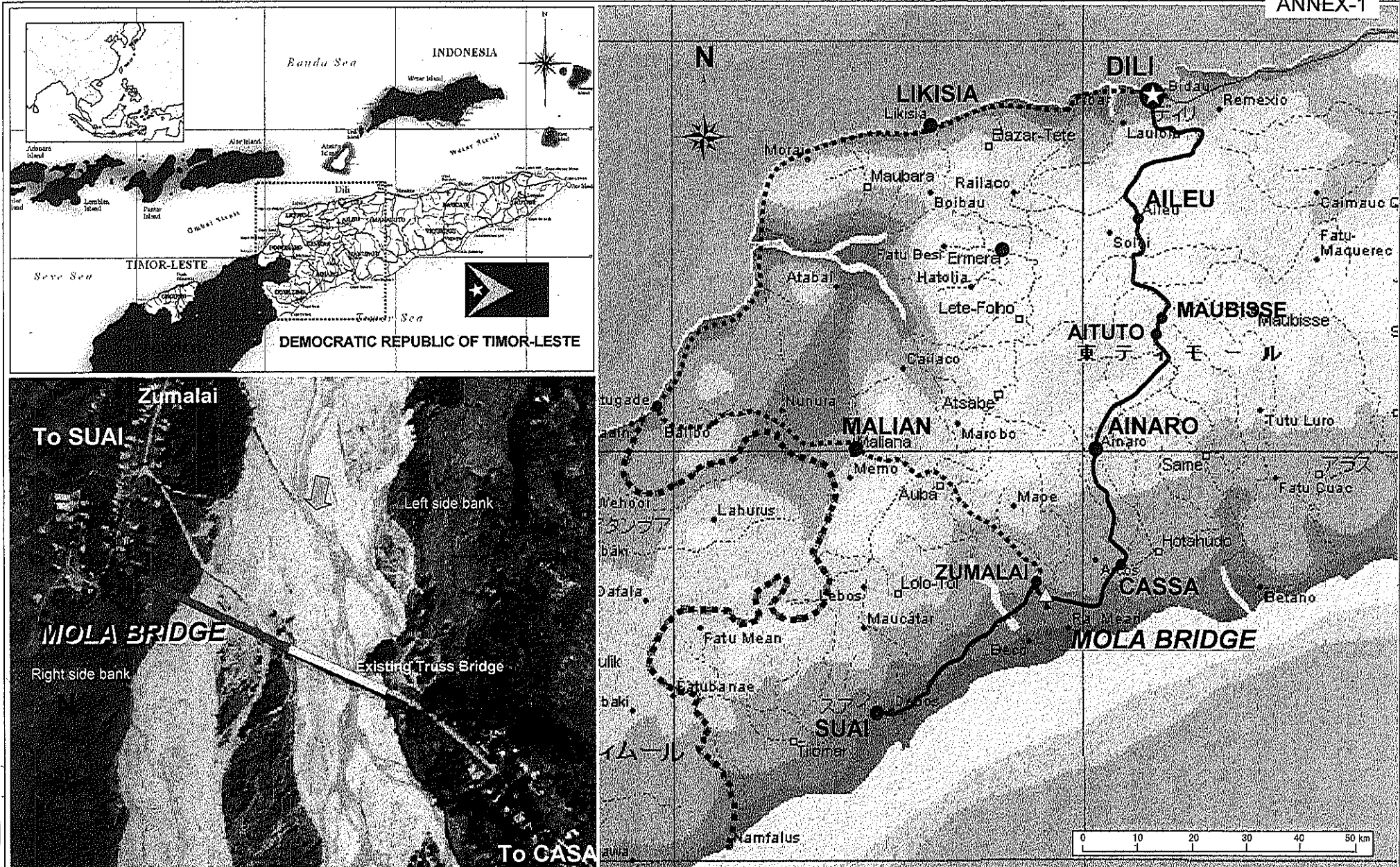
#### 8. Other relevant issues

(1) The Timor-Leste side shall rehabilitate the retaining wall around the abutment of the left side bank of the existing Mola Bridge before commencement of the construction work.

(2) The Timor-Leste side shall secure the land use for construction camp yard and its approach road, and temporary detour during the construction stage.

(3) The Timor-Leste side shall secure the usage of the quarry for rock from Mola riverbed and sand from Fourra riverbed for the Project.

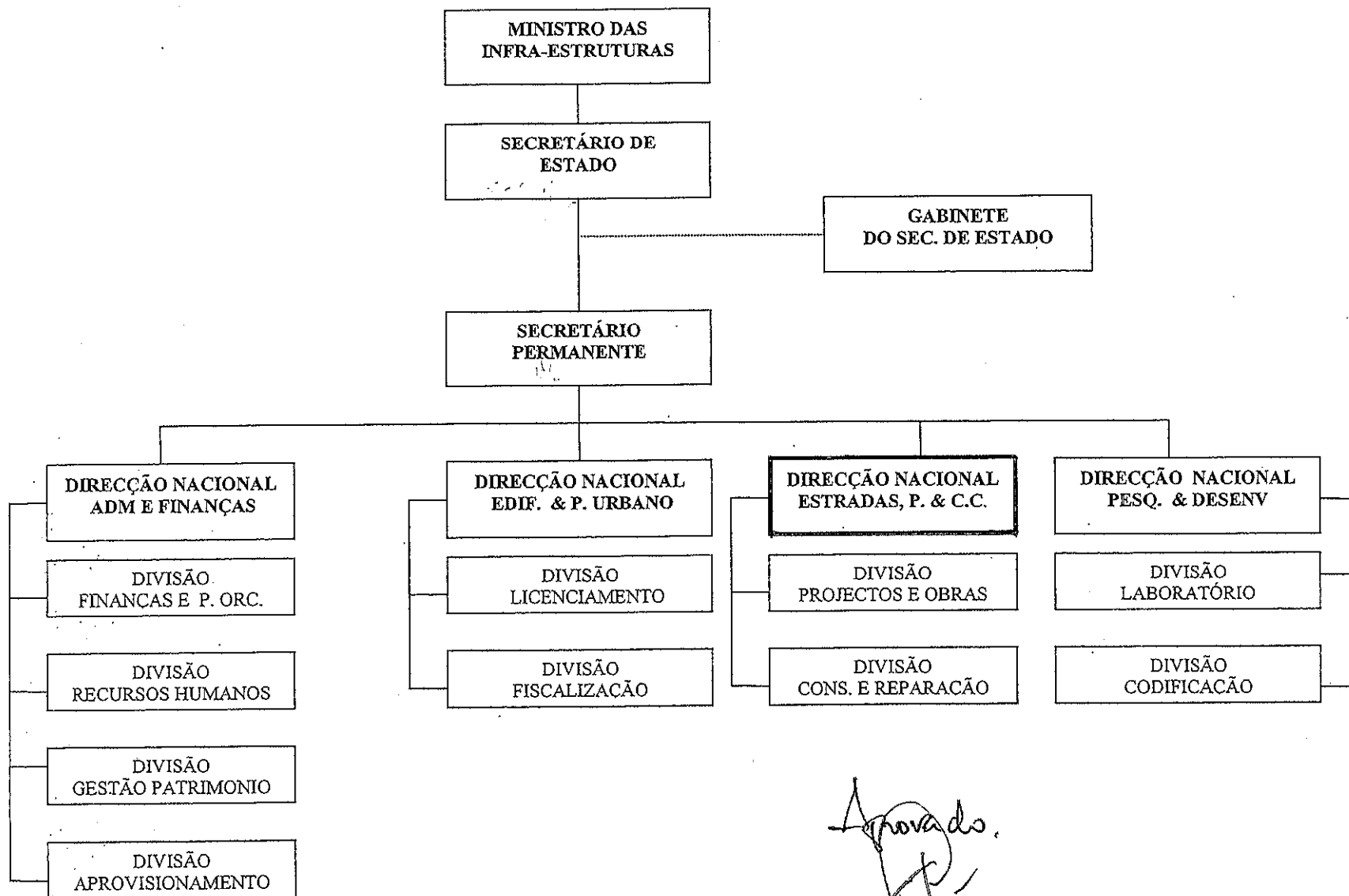




THE IMPLEMENTATION REVIEW STUDY ON THE PROJECT FOR THE IMPROVEMENT OF MOLA BRIDGE IN THE DEMOCRATIC REPUBLIC OF TIMOR-LESTE  
LOCATION MAP

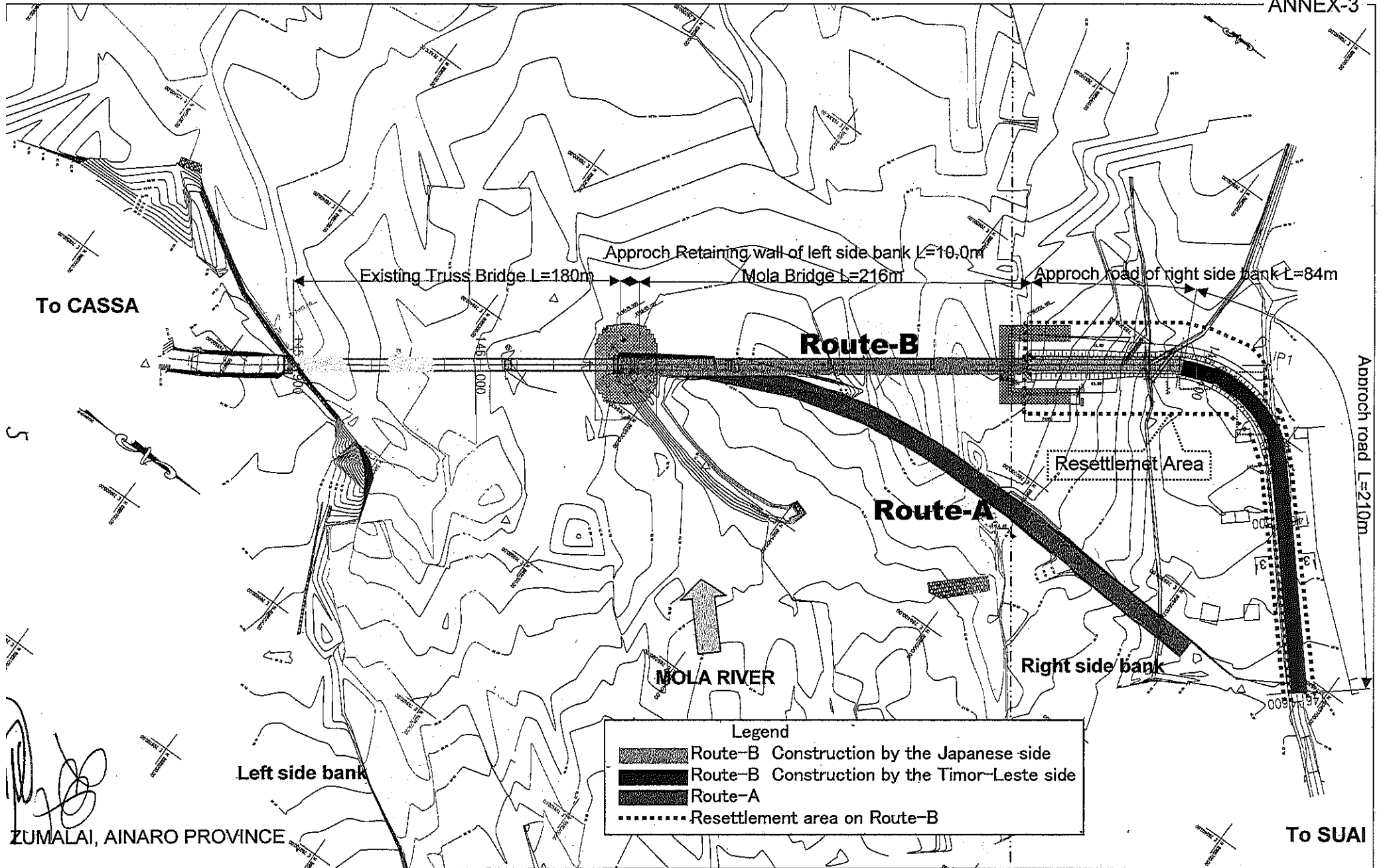
# MINISTÉRIO DAS INFRA-ESTRUTURAS

## ORGANIGRAMA DA SECRETARIA DE ESTADO DAS OBRAS PÚBLICAS



4

*Aprovado.*  
*Jose G. Piedade*



ZUMALAI, AINARO PROVINCE

LOCATION MAP OF ROUTE-A AND ROUTE-B

2

## JAPAN'S GRANT AID

The Grant Aid Scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

### 1. Grant Aid Procedures

Japan's Grant Aid Scheme is executed through the following procedures.

Application	(Request made by the recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by the Cabinet)
Determination of Implementation	(The Note exchanged between the Governments of Japan and recipient country)

Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Scheme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

### 2. Basic Design Study

#### (1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.
- Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

## (2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is (are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

## 3. Japan's Grant Aid Scheme

### (1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

(2) "The period of the Grant Aid" means the one fiscal year, which the Cabinet approves, the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as national disaster, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

(3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, consulting, constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)



(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

- a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the Project,
- b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- c) To secure buildings prior to the procurement in case the installation of the equipment,
- d) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
- f) To accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(6) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(7) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(End)

### Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
5	To ensure unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
6	To accord Japanese nationals whose service may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		●
7	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		●
8	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
9	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)




## 5. 事業事前計画表(事業化調査時)

事業事前計画表（事業化調査時）

1. 案件名
東ティモール国モラ橋改修計画
2. 要請の背景（協力の必要性・位置付け）
<p>東ティモール国（以下「東ティ」国）は、1999年8月のインドネシア政府による拡大自治提案の可否を問う直接投票後の騒乱・破壊行為により、また、その前後の維持・管理不在により、家屋・インフラの大部分が破壊された。その後、国連東ティモール暫定行政機構（UNTAET）の暫定統治の下、独立に向けた国造りが行われ、経済的には大幅に回復したものの、2002年5月の独立以降、国際スタッフの大幅な減少などから、経済状況が悪化した。</p> <p>このような状況の中、「東ティ」国政府は、経済発展による貧困撲滅を目標とし、「国家開発計画」及び「中期支出計画」に基づき人材育成（教育）、保健、農業生産性向上、行政の効率化、インフラの整備等に重点をおいた施策を実施している。</p> <p>我が国は上記目標に基づき、1) 復興開発支援（インフラ復旧・開発、農林水産業開発、人材育成、NGO等に対する支援、憲法制定会議支援）、2) 人道支援（財政支援、物的支援、人的支援）、3) 難民支援、4) 多国籍軍支援、5) 国連PKO支援などを中心に、多方面からの支援を行っている。</p> <p>協力対象となるモラ橋は、首都ディリを起点に、農業開発の拠点となる南部地域の主要都市スアイを結ぶ幹線道路「ディリースアイ道路」の南部に位置し、「東ティ」国の国家開発計画、「市場経済による国土の開発」のための流通網を整備する上で重要である。</p> <p>ディリースアイ道路は、我が国PKO施設部隊による緊急復旧により通行可能となっていたものの、脆弱な地質と急峻な斜面、年平均2,500mmにも達する降雨により、度々被害を受けている。特に、山岳地帯を含むアイトットカーサ間の損傷は著しく、現状でも普通車の走行は困難であり、このまま放置すれば、路線としての機能が失われる懸念がある。本道路上のカーサスアイ間に位置するモラ橋についても、右岸側取付道路は2000年建設直後に洪水で流失し、雨季の増水時には通行不能な状態であり、橋梁の延長及び護岸工などの対策が必要となっている。このような状況を改善するため、「東ティ」国政府は我が国に対し、無償資金協力による道路及び橋梁の改修を要請した。</p>
3. プロジェクト全体計画概要
<p>(1) プロジェクト全体計画の目標</p> <p>カーサスアイ間におけるモラ橋を改修することにより、普通車を含めた車輛の通行性を確保する。</p> <p><u>裨益対象の範囲及び規模</u></p> <p>直接裨益人口：約316,000人（本事業対象地域のディリ市；約168,000人、アイリュウ県；約37,000人、アイナロ県；約55,000人、コバリマ県；約56,000人）</p> <p>間接裨益人口：約1,015,000人（本事業対象地域である「東ティ」国の人口；2006年調査）</p> <p>(2) プロジェクト全体計画の成果</p> <p>カーサスアイ間における<u>モラ橋及びその取付道路が改修される。</u></p> <p>(3) プロジェクト全体計画の主要活動</p> <ul style="list-style-type: none"> <li>・ <u>既設モラ橋の右岸側に新橋を建設する</u></li> <li>・ <u>取付道路を改修する</u>（右岸側210mは「東ティ」側負担）</li> </ul> <p>(4) 投入（インプット）</p> <p>ア <u>日本側：無償資金協力8.87億円</u></p> <p>イ 「東ティ」国側：</p>

(ア) 本無償資金協力案件の実施に関わる負担額：0.14 億円

(イ) 本無償資金協力案件対象施設の改修後の維持管理経費：年平均 0.015 億円

(5) 実施体制

主管官庁： インフラ省 (MOI)

実施機関： インフラ省道路・橋梁・治水局 (DRBFC)

4. 無償資金協力案件の内容

(1) サイト

東ティモール国マリアナ地区コバリマ県

(2) 概要

モラ橋及びその取付道路の改修

(3) 相手国負担事項

① 住民移転・用地収用

② 本事業実施にあたっての環境管理計画 (EMP) 承認の取得

③ 右岸側取付道路 (210m) の建設

(4) 概算事業費

概算事業費 9.01 億円 (無償資金協力 8.87 億円、「東ティ」国負担 0.14 億円)

(5) 工期

入札期間を含め約 17.5 ヶ月 (予定)

(6) 貧困、ジェンダー、環境及び社会面の配慮

① 橋梁計画に際し、住民移転・用地収用を最小限に抑えた。

5. 外部要因リスク

(1) 東ティモール国内の政情・治安が悪化しない。

(2) 大洪水や大地震などの想定外の天災が発生しない。

6. 過去の類似案件からの教訓の活用

特になし。

7. プロジェクト全体計画の事後評価に係る提案

(1) プロジェクト全体計画の目標達成を示す成果指標

	2007 年	2010 年
年間渡河不可能日数	60 日/年	0 日/年
乾季の渡河所要時間	10 分	40 秒

(2) その他の成果指標

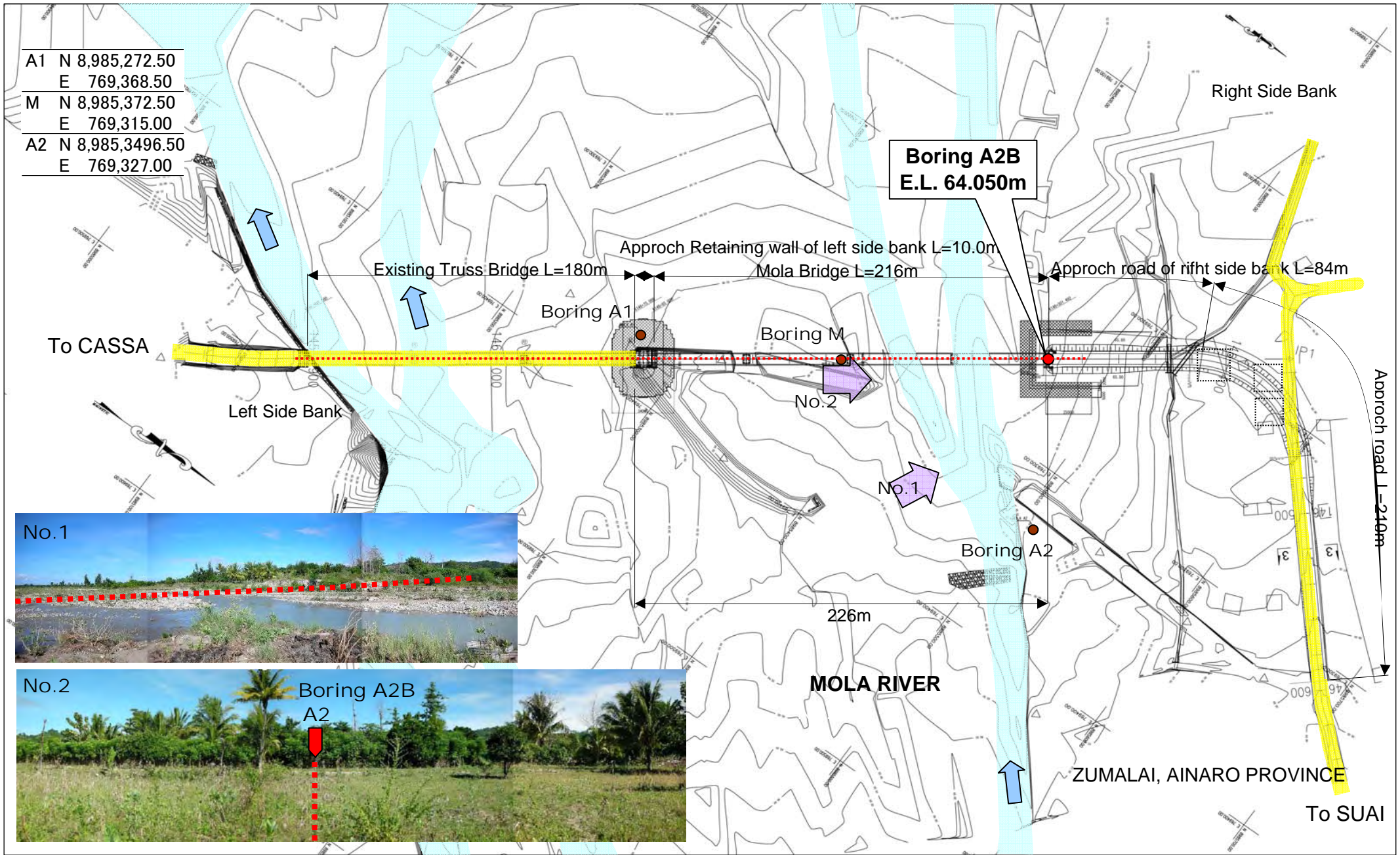
特になし。

(3) 評価のタイミング

2013 年以降 (施設完工後)

## 6. その他の資料・情報

### 地質調査



**LOCATION MAP OF GEOTECHNICAL INVESTIGATION**



Report No. GET07-5117

Bole hole elevation 64.050m STN 2 elevation 67.381m

**CLIENT:** NIPPON KOEI CO., LTD.

**PROJECT:** MOLA River Bridge, Suai District, Ainaro Province, Timor Leste **BORING NO.** BH # A2B

**DRILLING METHOD:** Mud Rotary **DIAM:** 90 mm **SHEET:** 1 OF 2

**SAMPLING METHOD:** 50 mm split spoon barrel **CORE BARREL:** HQ3/NQ3

DEPTH (m)	SAMPLES	(SPT) {REC} [RQD]	DESCRIPTION	SYMBOL	-0.075 (%)	Moisture Content (%)	CO <sub>3</sub> %	LL [PL] (%)	Maximum Size Boulder mm
1		{23},[0] 0.00-1.05, R-1	Dense to very dense light grey calcareous well graded <b>GRAVEL</b> rounded to sub-rounded with boulder, cobble and sand ( <b>GW</b> ) matrix ( <b>Tertiary river deposit</b> )						100
2		(50-10cm) 1.05-1.15, S-1	- with Silt and Sand ( <b>GW-GM</b> ) to 7.15m						
3		{56},[18] 1.15-2.40, R-2 (12/50-10cm) 2.40-2.65, S-2	* SPT N-Value will be reduce for engineering analyses due to presence of boulders, cobble and gravels.		7.7	4.5			85
4		{41},[0] 2.65-4.10, R-3 (7/15/50-12cm) 4.10-4.52, S-3	- yellowish light grey below 4.10 m		9.5	5.1			88
5		{53},[10] 4.52-5.75, R-4							
6		{6/22/22} 5.75-6.20, S-4	- dense below 5.75 m		5.1	7			125
7		{16},[0] 6.20-7.15, R5	- poorly graded ( <b>GP</b> ), 7.15 to 9.30 m						55
8		{10/18/20} 7.15-7.60, S-5			2.8	4.4			
9		{11},[0] 7.60-9.30, R-6							60
10		{9/18/22} 9.30-9.75, S-6 {27},[0] 9.75-10.30, R-7 (15/20/25) 10.30-10.75, S-7	- with Silt ( <b>GP-GM</b> ), 9.30 to 10.30 m  - Silty poorly graded <b>GRAVEL</b> with Sand ( <b>GM</b> ), 10.30 to 11.80 m		7.3	5.4			60
11		{14},[0] 10.75-11.80, R-8			12.3	10.1			82
12									
DATE		TIME	BORING DEPTH (m)	CASING DEPTH (m)	WATER DEPTH (m)	REMARKS			
25-Sep-07		0800	24.00	23.50	1.00	Logger: S. Abbas. Murtaza			





Report No. GET-07-5117

Bole hole elevation 64.050m STN 2 elevation 67.381m

<b>CLIENT:</b> NIPPON KOEI CO., LTD.								
<b>PROJECT:</b> MOLA River Bridge, Suai District, Ainaro Province, Timor Leste				<b>BORING NO.</b> BH # A2B				
<b>DRILLING METHOD:</b> Mud Rotarey			<b>DIAM:</b> 90 mm	<b>SHEET:</b> 2 OF 2				
<b>SAMPLING METHOD:</b> 50 mm split spoon barrel			<b>CORE BARREL:</b> HQ3/NQ3					
DEPTH (m)	SAMPLES	DESCRIPTION	SYMBOL	-0.075 (%)	Moisture Content (%)	CO <sub>2</sub> %	LL [PL] (%)	Maximum Size Boulder mm
13	(6/15/12) 11.80-12.25, S-8 (100),[34] 12.25-13.00, R-9	Medium dense yellowish grey calcareous poorly graded <b>GRAVEL (GP)</b> with boulder, cobble and sand matrix (Tertiary river deposit) <b>13.00 m</b>		4.6	4.7			173
14	(7/10/14) 13.00-13.45, S-9 (65),[0] 13.45-14.30, R-10	Medium dense yellowish grey calcareous Silty <b>GRAVEL (GM)</b> with boulder, cobble and sand matrix (Tertiary river deposit)		20.7	5.1			90
15	(12/15/22) 14.30-14.75, S-10	- dense with Sand below 14.30 m <b>15.35 m</b>		14.9	10.6			
16	(10/13/18) 15.35-15.80, S-11	Medium dense to dense grey <b>SILT</b> with Sand and little Gravel ( <b>MH</b> )						
17	(9/14/16) 16.20-16.65, S-12	- medium dense to 16.95 m		71.2	27.5		50.7 [39.1]	
18	(8/15/18) 16.95-17.40, S-13	- dense dark grey below 16.95 m						
19	(10/19/21) 17.80-18.25, S-14				10.9			
20	(14/23/31) 19.15-19.60, S-15	Very weak to weak brownish grey <b>Mudstone</b> , moderately to severely weathered [Hard Lean CLAY with Sand (CL)] <b>19.15 m</b>		74.2	11.4		48 [25]	
21	(12/19/25) 20.45-20.90, S-16				26.1			
22	(15/21/23) 21.60-22.05, S-17	- dark grey Sandy ( <b>CL</b> ) below 21.60 m						
23	(18/31/35) 22.55-23.00, S-18			59.8	10.3		46.9 [21.3]	
24	(20/30/33) 23.55-24.00, S-19							
DATE	TIME	BORING DEPTH (m)	CASING DEPTH (m)	WATER DEPTH (m)	REMARKS			
26-Sep-07	2200	24.00	23.50	1.00	Logger: S. Abbas. Murtaza			

# SYMBOLS AND TERMS USED ON BORING LOGS

SOIL AND ROCK TYPES (SHOWN IN SYMBOL COLUMN)										SAMPLER TYPES (SHOWN IN SAMPLES COLUMN)			
Sand	Silty Sand	Silt	Clay	Gravel	Limestone	Sandstone	Conglomerate	Backfill	Concrete	Split Barrel	Core Barrel		
Predominant type shown heavy													

## TERMS DESCRIBING DENSITY CONDITION FOR CONSISTENCY

The condition of coarse grained soils may be obtained by performing sampler penetration tests or cone penetrometer tests. Approximate correlation between these tests and the density condition are given below:

DENSITY CONDITION	SPT VALUES, N	CONE TIP RESISTANCE, MPa
Very loose	< 4	< 2
Loose	4 to 10	2 to 4
Medium dense	10 to 30	4 to 12
Dense	30 to 50	12 to 20
Very dense	> 50	20

Density versus SPT value relationship is after Terzaghi and Peck, 1968. See Lacroix and Horn, 1973 if non-standard samplers are used. Density versus cone tip resistance relationship given above, after Meyerhof 1965; is a function of depth also; see Schmertmann, 1978.

The consistencies of cohesive soils may be obtained by performing undrained shear strength tests. Degrees of consistency are given below:

CONSISTENCY	UNDRAINED SHEAR STRENGTH, kPa
Very soft	< 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	> 200

## TERMS CHARACTERIZING SOIL STRUCTURE

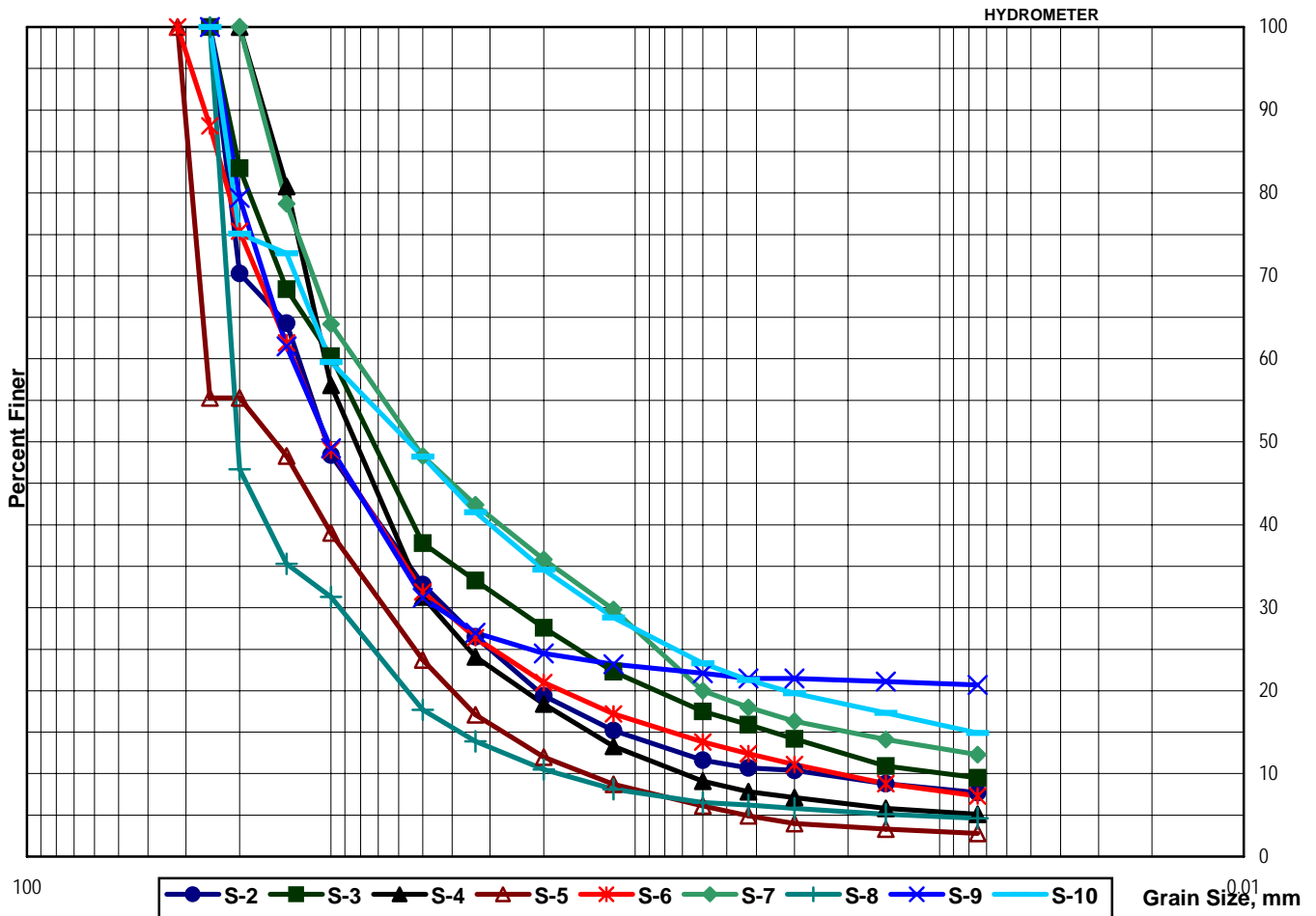
Parting	- horizontal inclusion of different soil type less than 3-mm thick
Seam	- horizontal inclusion of different soil type 3 to 75-mm thick
Layer	- horizontal inclusion of different soil type greater than 75-mm thick
Pocket	- inclusion of different soil type that is smaller than the diameter of the soil sample
Fissured	- containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical
Interbedded	- composed of alternate layers of different soil types
Silty	- containing 12 to 50 percent silt size particles
Calcareous	- containing 12 to 50 percent carbonates
Carbonate	- containing more than 50 percent carbonates

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with ASTM D 2487-90 and D 2488-90



GRAIN SIZE ANALYSIS

Report No. GET07-5117



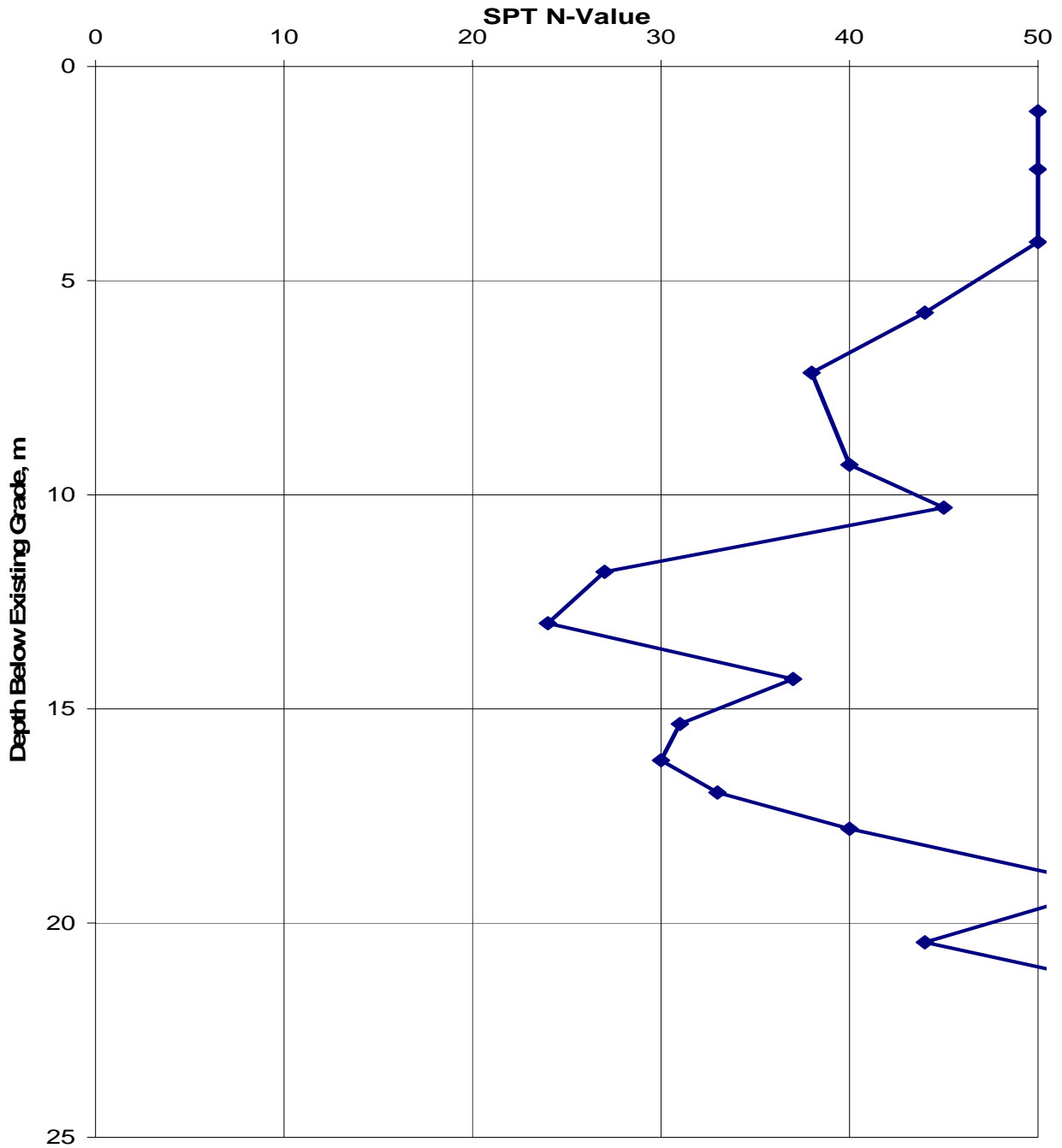
GRAVEL / KANKAR		SAND			SILT / CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Specimen Identification	Depth m	Sample Nos.	Classification	-0.075
● B-A2B	2.65	S-2	Well Graded GRAVEL with Silt and Sand (GW-GM)	7.7
■ B-A2B	4.52	S-3	Well Graded GRAVEL with Silt and Sand (GW-GM)	9.5
▲ B-A2B	6.20	S-4	Well Graded GRAVEL with Silt and Sand (GW-GM)	5.1
△ B-A2B	7.60	S-5	Poorly Graded GRAVEL (GP)	2.8
⋈ B-A2B	9.75	S-6	Poorly Graded GRAVEL with Silt (GP-GM)	7.3
◆ B-A2B	10.75	S-7	Silty GRAVEL with Sand (GM)	12.3
+ B-A2B	12.25	S-8	Poorly Graded GRAVEL (GP)	4.6
× B-A2B	13.45	S-9	Silty Poorly Graded GRAVEL (GM)	20.7
- B-A2B	14.75	S-10	Silty GRAVEL with Sand (GM)	14.9

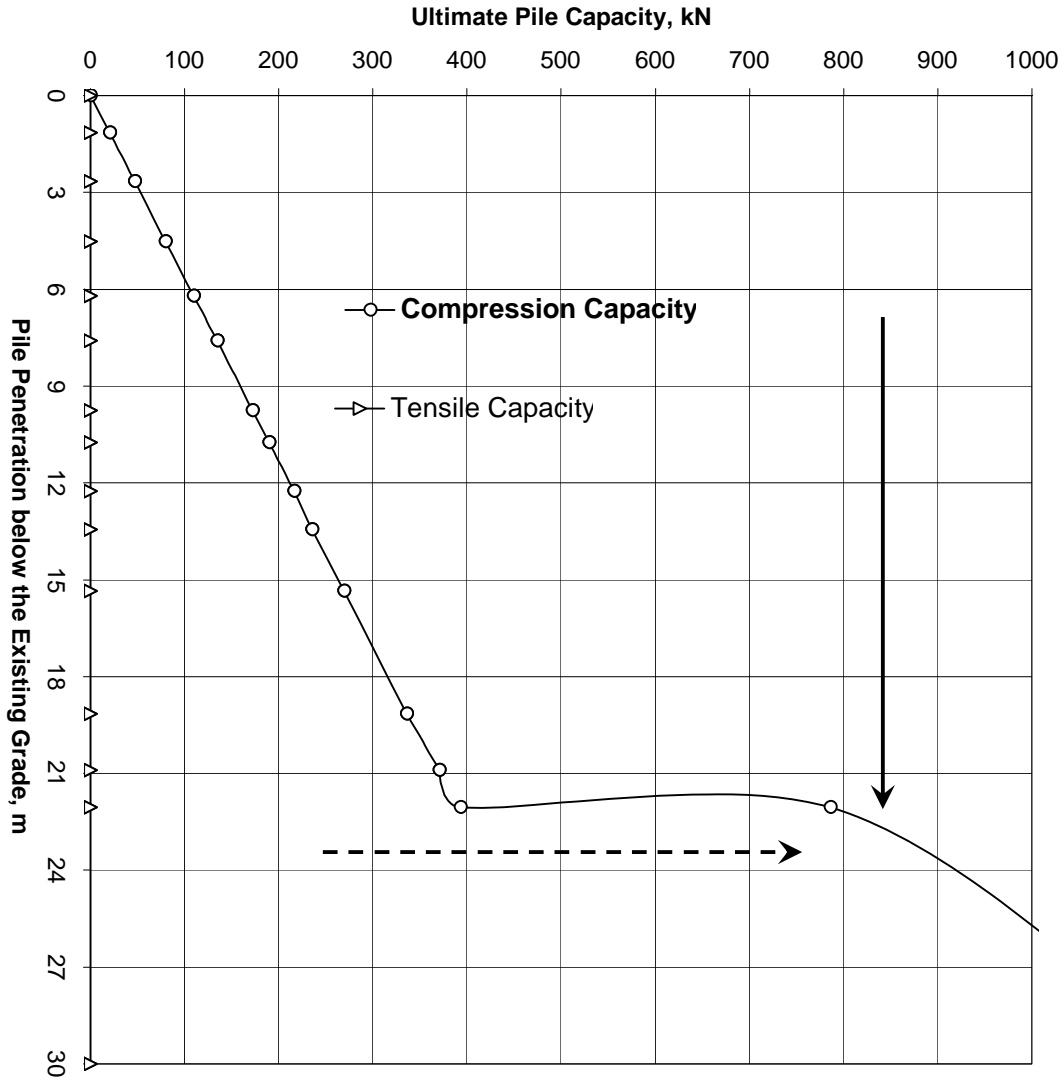
**GRAIN SIZE CURVES**  
**MOLA River Bridge, Suai District Ainaro Province, Timor Leste**  
**PLATE - 5**

SPT N-Value PLOT

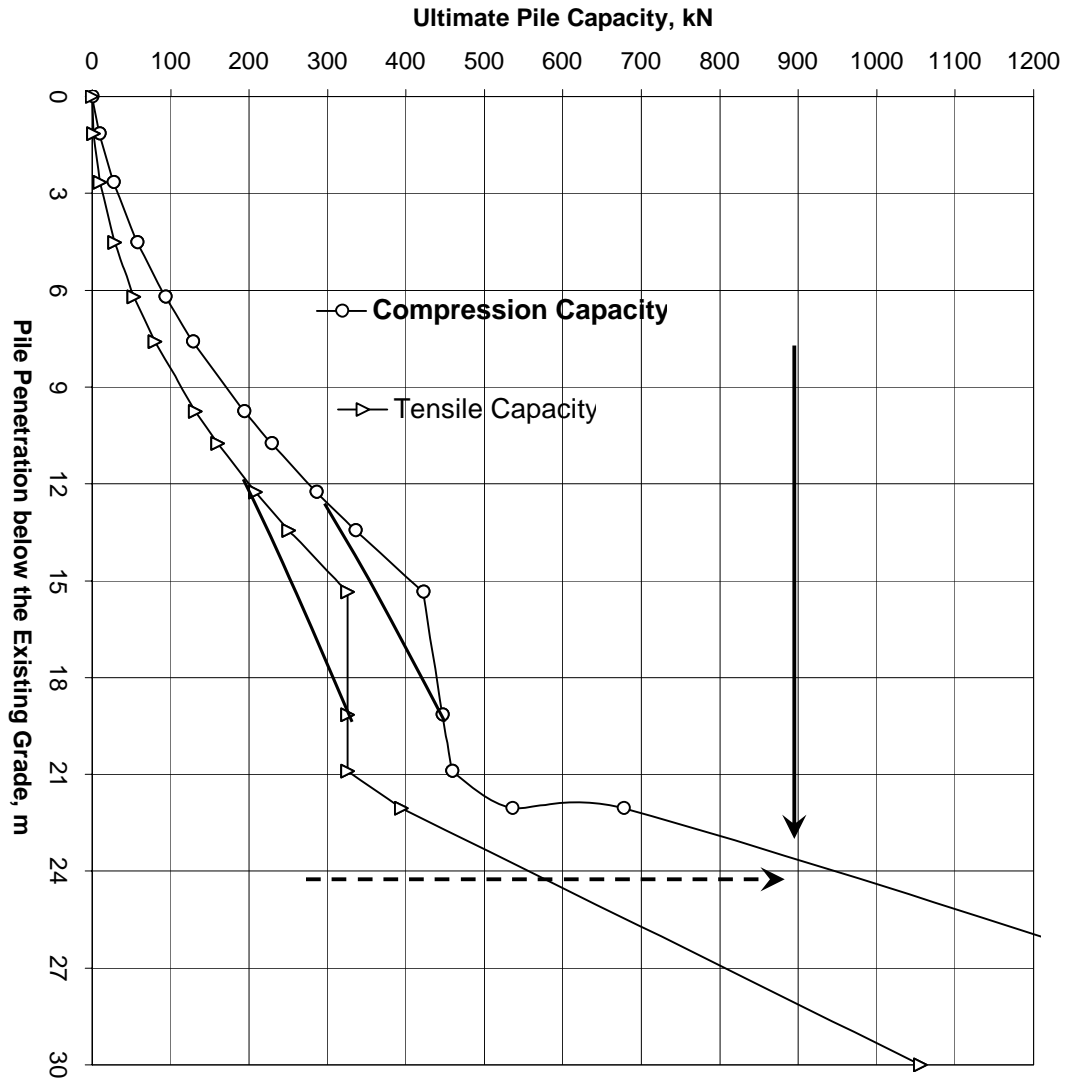
Report No. GET07-5117



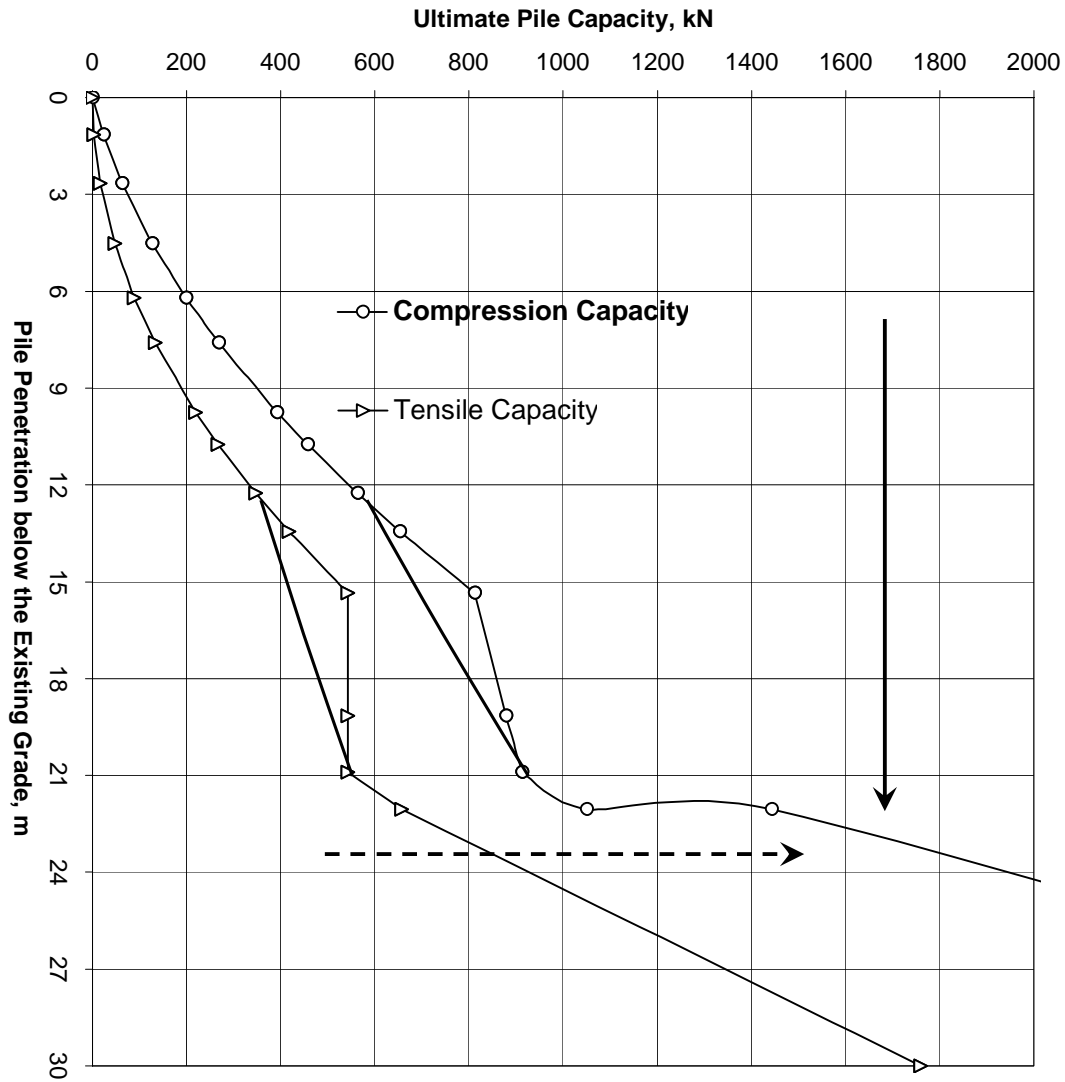
SPT N-VALUE Vs DEPTH PLOT  
MOLA River Bridge, Suai District  
Ainaro Province, Timor Leste



Ultimate Pile Capacity Vs Depth  
H-Pile or Square Pre-Cast Concrete Pile ( 0.5m diameter)  
MOLA River Bridge, Suai District,  
Ainaro Province, Timor Leste  
PLATE- 7



Ultimate Pile Capacity Vs Depth  
Bored Cast-in-situ Concrete Pile (0.3m diameter)  
MOLA River Bridge, Suai District,  
Ainaro Province, Timor Leste  
PLATE- 8



**Ultimate Pile Capacity Vs Depth**  
**Bored Cast-in-situ Concrete Pile (0.5m diameter)**  
**MOLA River Bridge, Suai District,**  
**Ainaro Province, Timor Leste**  
**PLATE- 9**