

第4章 プロジェクトの評価

4-1 事業実施のための前提条件

キリバス負担事項に係るプロジェクト実施のための前提条件は次のとおりである。

- ・ 本プロジェクト実施のために必要となる仮設ヤード、ストックヤード及び廃棄物処理場を E/N 締結後速やかに確保すること。
- ・ E/N、G/A を遵守し、必要となる免税措置を実施すること。
- ・ 日本国及び第三国からの輸入品について、迅速な関税手続きを実施すること。
- ・ 本体工事実施中、周辺住民及び他の第三者との問題が生じた場合、解決に向け協議・支援を行うこと。

4-2 プロジェクト全体計画達成のために必要な相手方投入（負担）事項

プロジェクトの効果を発現・持続するため相手国が取り込むべき事項は、以下のとおりである。

- ・ 本プロジェクトを円滑に遂行するために、本報告書「3.5.1.2 キリバス側負担経費」に記載した予算を事前に確保する。
- ・ 施工ヤード等の確保は工事開始までに確実に完了することが必要である。
- ・ コーズウェイ上の道路照明はコントラクターが撤去するが、照明の保管場所の確保とコーズウェイ完成後の照明の設置を確実に行うこと。
- ・ 本プロジェクトによって建設されるコーズウェイの長期的な機能を確保するために、本報告書「3.4 プロジェクトの運営・維持管理計画」に記載された維持管理業務とそれに必要な要員及び費用を確保する。

4-3 外部条件

外部条件として特筆すべきものはない。

4-4 プロジェクトの評価

4-4-1 妥当性

以下の点から我が国の無償資金協力により協力事業を実施することは妥当であると判断される。

- ・ 前述のとおり、唯一の国際港を有するベシオ島および行政機関及び行政機関本庁・居住地帯が位置するバイリキ島を結ぶ唯一の道路であるため、プロジェクトの裨益は相当数のキリバス国民である。
- ・ プロジェクトの効果として、ニッポン・コーズウェイにおける安全かつ円滑な走行が確保されることである、住民の生活改善にも寄与する。
- ・ ニッポン・コーズウェイの全面的な改修及び強靱化により、キリバス側の護岸の補修費は著しく縮減できる。
- ・ 本プロジェクトにおいて、環境面・社会面の負の影響がほとんどない。

- ・ キリバス側が独自の資金と人材・技術で完成後の運営・維持管理を行うことができる。

4-4-2 有効性

4-4-2-1 定量的効果

(1) 定量的効果

本プロジェクトの実施により期待できる定量的効果は、自然災害による年間通行規制の低減と護岸崩壊の削減、平均走行速度の向上及び MPWU の護岸補修費の削減である。

| 指標名 | 基準値 (2015 年) | 目標値 (2022 年【事業完成 3 年後】) |
|----------------------|--------------|----------------------------|
| 自然災害による 年間規制日数の低減 | 28 日* | 0 日 |
| 護岸崩壊の削減 (箇所) | 6 | 0 |
| 平均走行速度の向上 | 20km/時 | 40km/時 |
| 護岸の補修費の削減 | 381,408 豪ドル | 28,599 豪ドル |

*護岸崩壊による補修工事で片側交互規制が必要となる。

1) 平均旅行速度の目標値の設定

コーズウェイは、ほぼ直線でフラットな線形であり、設計速度は 60km/時であるものの大型車両も多くみられることから 50km/時とした。

また、始点は料金所における支払い及び待ち時間 (35 秒) と終点部における交差点 (ラウンドアバウト) の停止時間 (15 秒) を加算して、40km/時とした。

$$\begin{aligned} \text{コーズウェイの所要時間} &= 3.2\text{km} / 50[\text{km/時}] \times 3600 + 35 \text{ 秒} + 15 \text{ 秒} \\ &= 280 \text{ 秒} = 0.078 \text{ 時間} \end{aligned}$$

$$\text{コーズウェイの平均旅行速度} = 3.2\text{km} / 0.078 \text{ 時間} = 41 \div 40[\text{km/時}]$$

2) 維持管理費の目標値の設定

これまでは、損傷すると補修することで対応していたが、長期的に施設が活用されるためには定期的な点検と小補修といった維持管理費の確保が必要である。本報告の「3.5.2 運営・維持管理費」より、道路護岸の年間維持管理費 19,297 豪ドルと橋梁 (10m 区間) の年間維持管理費 9,302 豪ドルの合計として 28,599 豪ドルとした。

4-4-2-2 定性的効果

プロジェクトによる定性的効果は、下記のとおりである。

- ・ 安定したライフラインが一年中確保される。
- ・ 歩行者及び自転車の安全性が確保される。
- ・ ベシオ～バイリキ間の物流及び人流が一年中確保される。

APPENDIX

- Appendix-1 Member List of Study Team
- Appendix-2 Study Schedule
- Appendix-3 List of Parties Concerned in the Recipient Country
- Appendix-4 1st Minutes of Discussions
- Appendix-5 2nd Minutes of Discussions
- Appendix-6 3rd Minutes of Discussions
- Appendix-7 Technical Notes
- Appendix-8 Soft Component Plan
- Appendix-9 Cost Estimate of Pavement Type
- Appendix-10 Geotechnical Survey Result
- Appendix-11 Outline Design Drawings

Appendix-1: 調査団員・氏名

表 1 調査団員の構成

| 氏名 | 担当 | 所属 |
|----------------------------------|--------------------------|--------------------|
| 吉見 昌宏 (Mr. Masahiro Yoshimi) | 総括 | 国際協力機構(JICA) |
| 鈴木 高二郎 (Mr.Kojiro Suzuki) | 海洋土木専門家 | 港湾空港技術研究所 |
| 渡辺 泰弘 (Mr. Yasuhiro Watanabe) | 計画管理 | 国際協力機構(JICA) |
| 五瀬 伸吾 (Mr. Shingo Gose) | 業務主任/道路計画 1 | 株式会社 建設技研インターナショナル |
| 上野 隆一 (Mr. Ryuichi Ueno) | 副業務主任/道路計画 2 | 株式会社 建設技研インターナショナル |
| 川村 敏 (Mr. Satoshi Kawamura) | 構造物設計 1 (護岸設計) | 株式会社 Ides |
| 土田 貴之 (Mr. Takayuki Tsuchida) | 構造物設計 2 (橋梁設計) | 株式会社 建設技研インターナショナル |
| 高木 豊博 (Mr. Toyohiro Takagi) | 自然条件調査 (地形・地質) | 株式会社 建設技研インターナショナル |
| 池田 剛 (Mr. Tsuyoshi Ikeda) | 自然条件調査 (気象海象・海岸・気候変動) | 株式会社 Ides (補強) |
| 澤田 賢太郎 (Mr. Kentaro Sawada) | 交通量調査 | 株式会社 建設技研インターナショナル |
| 緒方 博充 (Mr. Hiromitsu Ogata) | 施工計画・積算 | 株式会社 建設技研インターナショナル |
| 佐藤 剛 (Mr. Takeshi Sato) | 環境社会配慮 | 株式会社 Ides |
| 樋浦 祥人 (Mr. Akihito Hiura) | 復旧工事 | 株式会社 建設技研インターナショナル |

Appendix-2: 調查行程

表 2-1 調査工程（第一次現地調査）

| No. | date | JICA | | | | Consultants | | | | | | | | | |
|-----|----------|--|---|---|---|--|---|---|---|---|---|---|--|--|--|
| | | Team Leader Team 長 Masahiro YOSHIM | Team Coordinator Team 調整員 Masahiro YOSHIM | Team Engineer Team 技師 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | Team Leader Team 長 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | Team Designer Team 設計 Masahiro YOSHIM | | | |
| 1 | 5/23 Sat | | | | | | | | | | | | | | |
| 2 | 5/24 Sun | | | | | | | | | | | | | | |
| 3 | 5/25 Mon | | | | | | | | | | | | | | |
| 4 | 5/26 Tue | | | | | | | | | | | | | | |
| 5 | 5/27 Wed | | | | | | | | | | | | | | |
| 6 | 5/28 Thu | | | | | | | | | | | | | | |
| 7 | 5/29 Fri | | | | | | | | | | | | | | |
| 8 | 5/30 Sat | | | | | | | | | | | | | | |
| 9 | 5/31 Sun | | | | | | | | | | | | | | |
| 10 | 6/01 Mon | | | | | | | | | | | | | | |
| 11 | 6/02 Tue | | | | | | | | | | | | | | |
| 12 | 6/03 Wed | | | | | | | | | | | | | | |
| 13 | 6/04 Thu | | | | | | | | | | | | | | |
| 14 | 6/05 Fri | | | | | | | | | | | | | | |
| 15 | 6/06 Sat | | | | | | | | | | | | | | |
| 16 | 6/07 Sun | | | | | | | | | | | | | | |
| 17 | 6/08 Mon | | | | | | | | | | | | | | |
| 18 | 6/09 Tue | | | | | | | | | | | | | | |
| 19 | 6/10 Wed | | | | | | | | | | | | | | |
| 20 | 6/11 Thu | | | | | | | | | | | | | | |
| 21 | 6/12 Fri | | | | | | | | | | | | | | |
| 22 | 6/13 Sat | | | | | | | | | | | | | | |
| 23 | 6/14 Sun | | | | | | | | | | | | | | |
| 24 | 6/15 Mon | | | | | | | | | | | | | | |
| 25 | 6/16 Tue | | | | | | | | | | | | | | |
| 26 | 6/17 Wed | | | | | | | | | | | | | | |
| 27 | 6/18 Thu | | | | | | | | | | | | | | |
| 28 | 6/19 Fri | | | | | | | | | | | | | | |
| 29 | 6/20 Sat | | | | | | | | | | | | | | |
| 30 | 6/21 Sun | | | | | | | | | | | | | | |
| 31 | 6/22 Mon | | | | | | | | | | | | | | |
| 32 | 6/23 Tue | | | | | | | | | | | | | | |
| 33 | 6/24 Wed | | | | | | | | | | | | | | |
| 34 | 6/25 Thu | | | | | | | | | | | | | | |
| 35 | 6/26 Fri | | | | | | | | | | | | | | |
| 36 | 6/27 Sat | | | | | | | | | | | | | | |
| 37 | 6/28 Sun | | | | | | | | | | | | | | |
| 38 | 6/29 Mon | | | | | | | | | | | | | | |
| 39 | 6/30 Tue | | | | | | | | | | | | | | |
| 40 | 7/01 Wed | | | | | | | | | | | | | | |
| 41 | 7/02 Thu | | | | | | | | | | | | | | |
| 42 | 7/03 Fri | | | | | | | | | | | | | | |
| 43 | 7/04 Sat | | | | | | | | | | | | | | |
| 44 | 7/05 Sun | | | | | | | | | | | | | | |
| 45 | 7/06 Mon | | | | | | | | | | | | | | |

AP2-1

表 2-3 調査工程（第三次現地調査）

| No. | date | day | Kiribati | | |
|-----|------|-----|--|--|--|
| | | | 総括 | 計画管理 | |
| | | | Team Leader | Planning Coordinator | |
| | | | 吉見 昌宏 Mr. Masahiro YOSHIMI | 渡辺 泰弘 Mr. Yasuhiro WATANABE | コンサルタント |
| 1 | 2/23 | Tue | Narita(13:55)KE704 → Incheon(16:20) | Narita(13:55)KE704 → Incheon(16:20) | Narita(13:55)KE704 → Incheon(16:20) |
| | | | Incheon(19:25)KE137 → | Incheon(19:25)KE137 → | Incheon(19:25)KE137 → |
| 2 | 2/24 | Wed | →Nandi(8:35) →Suva(by car) | →Nandi(8:35) →Suva(by car) | →Nandi(8:35) →Suva(by car) |
| | | | Report to JICA, Suva(17:30)FJ018 → Nandi(18:00) | Report to JICA, Suva(17:30)FJ018 → Nandi(18:00) | Report to JICA, Suva(17:30)FJ018 → Nandi(18:00) |
| 3 | 2/25 | Thu | Nandi(8:00)FJ231 → Tarawa(11:00) | Nandi(8:00)FJ231 → Tarawa(11:00) | Nandi(8:00)FJ231 → Tarawa(11:00) |
| | | | Kick-off Meeting | Kick-off Meeting | Kick-off Meeting |
| 4 | 2/26 | Fri | Explanation of DOD | Explanation of DOD | Explanation of DOD |
| 5 | 2/27 | Sat | Site investigation | Site investigation | Site investigation |
| 6 | 2/28 | Sun | Documentation | Documentation | Documentation |
| 7 | 2/29 | Mon | Explanation of DOD | Explanation of DOD | Explanation of DOD |
| 8 | 3/01 | Tue | M/D Discussion with C/P | M/D Discussion with C/P | M/D Discussion with C/P |
| 9 | 3/02 | Wed | Signing of M/D (Cabinet meeting) | Signing of M/D (Cabinet meeting) | Signing of M/D (Cabinet meeting) |
| 10 | 3/03 | Thu | Tarawa(12:00)FJ230 | Tarawa(12:00)FJ230 | Tarawa(12:00)FJ230 |
| | | | → Nandi(15:00) | → Nandi(15:00) | → Nandi(15:00) |
| 11 | 3/04 | Fri | Nandi(8:30)FJ007 → Suva(9:00) | Nandi(8:30)FJ007 → Suva(9:00) | Nandi(9:55) KE138 → Incheon(17:35) |
| | | | Report to EOJ, Suva(18:10)FJ024 → Nandi(18:40) | Report to EOJ, Suva(18:10)FJ024 → Nandi(18:40) | Incheon(18:35)KE705 → Narita(20:55) |
| 12 | 3/05 | Sat | Report w riting | Report w riting | |
| 13 | 3/06 | Sun | Report w riting | Report w riting | |
| 14 | 3/07 | Mon | Nandi(9:55) KE138 → Incheon(17:35) | Nandi(9:55) KE138 → Incheon(17:35) | |
| | | | Incheon(18:35)KE705 → Narita(20:55) | Incheon(18:35)KE705 → Narita(20:55) | |

Appendix-3:関係者リスト

表 3 関係者リスト

| Organization | Name | Position |
|--|----------------------|---|
| MPWU (Ministry of Public Works and Utilities) | Waysang Moti Kum Kee | Minister |
| | Benjamin Takataake | Secretary |
| | Mr. Teuea Tebau | OIC. Secretary (Architecture Sec.) |
| | Kireua B Kaiee | Director |
| | Nuati | Structure Engineer |
| | Panapa Pita | Senior Civil Engineer |
| | Tieraata Merit | Assistant Senior Civil Engineer |
| | Paul Taksbin | Quality Control Specialist |
| | Mr.Patrick Mannix | KRRP Technical Auditor and Advisor to the MPWU |
| | Mr.Ian Archer | KRRP President Engineer |
| PUB (Public Utility Board) | Mr. Tokaata Niata | CEO |
| | Mr. Itienang Timona | Water/sewerage manager |
| | Mr. Kiriati Birita | Power manager |
| MELAD/Enviornment Conservation Division | Mr. Puta Tofinga | EIA Officer |
| | Mr. Taulehia Pulefau | Senior Environment Officer |
| MELAD/Land Management Division | Mr. Tarakabu Tofinga | Senior Land Planning Officer |
| KPA | Arebaio Erika | IT Manager IOCC |
| MET (Meteorogical Office) | Thomas Zackious | |
| Shipping Agencies of Kiribati | Tekaai Mikaere | Manager |
| TE ATINIMARAWA Company Limited | Tebao Awerika | Chief Executive Officer |
| routhton international ltd | Mr. John McFarlane | Senior Engineer |
| McCONNELL DOWELL | Mr.Paul Banister | Quantity Surveyor |
| Car Driver | Teddy Taakai | |
| Standard Concrete Industries | Umesh Kumar | Head of Operation |
| | Naibuka Taukei | Masonary Manager |

Appendix-4: 1st Minutes of Discussions

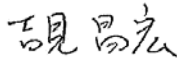
**MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR RECONSTRUCTION OF NIPPON CAUSEWAY
ON TARAWA TO ADAPT CLIMATE CHANGE
IN
REPUBLIC OF KIRIBATI**

In response to a request from the Government of the Republic of Kiribati (hereinafter referred to as "GoK"), Japan International Cooperation Agency (hereinafter referred to as "JICA") in consultation with the Government of Japan (hereinafter referred to as "GoJ") decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") for the Project for the Reconstruction of the Nippon Causeway on Tarawa to Adapt Climate Change (hereinafter referred to as "the Project").

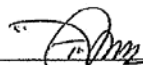
JICA dispatched the Preparatory Survey Team for the Outline design (hereinafter referred to as "the Team") to GoK, headed by Mr. Masahiro YOSHIMI, Executive Technical Advisor, Infrastructure and Peacebuilding Department of JICA, from May 28 to June 4, 2015.

The Team held a series of discussions with officials concerned of the GoK and conducted a field survey in the Project area. In the course of discussions and the field survey, both sides confirmed the main items described in the attached sheets. The Team will proceed to further studies and prepare the Preparatory Survey Report.

Tarawa June , 2015



Masahiro YOSHIMI
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



Terieta Mwenwenikeaki
Secretary
Ministry of Public Works & Utilities
Republic of Kiribati

ATTACHMENT

1. Objective of the Project

The objective of the Project is to ensure smooth and safe traffic by reconstruction of the Nippon Causeway, thereby contributing to ensure stable Inter-Islands traffic from Betio to Bailiki in Tarawa atoll.

2. Title of the Project

Both sides confirmed that the title of the project will be changed to "the Project for Reconstruction of Nippon Causeway on Tarawa to Adapt Climate Change" from "the Project for Reconstruction of Nippon Causeway on Tarawa to Combat Climate Change".

3. Project Site

Both sides confirmed the Project site as shown in Annex-1.

4. Objective of the Survey

Both sides confirmed that the objective of the Survey as follows:

- 4-1. To understand the background and objective of the Project and examine its impacts and appropriateness.
- 4-2. To identify the components, outline design and cost estimation of the Project based on the data and information collected from and the results of meetings with Kiribatian side.
- 4-3. To study the issues of environmental and social considerations through the site survey.
- 4-4. It should be noted that implementation of the Survey does not imply any decision or commitment by JICA to extend its grant for the Project at this stage.

5. Implementing Agency

Both sides confirmed the line agency and implementing agency as follows:

- 5-1. The implementing agency is Ministry of Public Works & Utilities (herein after referred to as "MPWU"). The implementing agency shall coordinate with all the relevant agencies to ensure smooth implementation of the project and ensure that the Undertakings are taken by relevant agencies properly and on time. The organization chart of MPWU is as shown in Annex-2.
- 5-2. After completion, MPWU will be responsible for maintenance and management of the causeway and the bridge constructed by the Project.

6. Items requested by the GoK

- 6-1. As a result of discussions, both sides confirmed that the items requested by the GoK are as follows:
 - Reconstruction or repair of the causeway including road pavement and seawalls
 - Reconstruction or repair of the bridge
- 6-2. JICA will assess the appropriateness of the above requested items through the survey and will report findings to the GoJ. The final components of the Project would be decided by the GoJ.

(S)

(S)

7. Japan's Grant Aid Scheme

- 7-1. The Kiribatian side understands the Japan's Grant Aid scheme explained by the Team, as described in Annex-3 and Annex-4, and necessary measures to be taken by the GoK.
- 7-2. The Kiribatian side understands to take the necessary measures, as described in Annex-6, for smooth implementation of the Project.

8. Schedule of the Study

The Preparatory Survey will be carried out under the following schedule. The schedule may be subject to change during the course of the survey.

- 8-1. The Team will visit Kiribati three (3) times in total before finalizing the Preparatory Survey Report.
- 8-2. When the contents of the draft Preparatory Survey Report are accepted in principle by the GoK, JICA will complete the final report and send it to the GoK around May 2016.

9. Environmental and Social Considerations

9-1. The Team explained that all JICA financed project shall comply with the JICA Guidelines for Environmental and Social Considerations (April, 2010) (herein after referred to as the "Guidelines"). The Project is tentatively categorized as "Category B," because the project is not considered as a large-scale road and bridge project, is not located in a sensitive area, and has none of the sensitive characteristics under the Guidelines, it is not likely to have significant adverse impact on the environment. The guidelines can be downloaded at the following URL.

http://www.jica.go.jp/english/our_work/social_environmental/guideline/pdf/guideline100326.pdf

- 9-2. The Team explained that JICA conducts an environmental review in accordance with the project category and refers to the environmental checklist for the road sector as attached in the Guidelines.
- 9-3. Both sides confirmed that Environmental Permit is necessary for the Project in accordance with the Environmental Assessment Regulations of Kiribati, and that MPWU shall obtain the permission for the Project through the following procedures.

- (1) MPWU shall submit an application to the Ministry of Environment, Lands and Agricultural Development (hereinafter referred to as "MELAD") for screening in line with the Environmental Impact Assessment (hereinafter referred to as "EIA") procedure. MPWU shall report to the JICA Fiji office the result of the screening conducted by MELAD.
- (2) MPWU shall prepare a scoping and a draft EIA report in accordance with the response by MELAD and also with a support from the consultant members of the Team.
- (3) MPWU shall submit the draft EIA report to MELAD, complete necessary procedures for EIA and obtain the Environmental Permit before the commencement of the Project. MPWU shall report the result of EIA to the JICA Fiji office.
- (4) MPWU shall bear the expenses of EIA procedures except the draft EIA report prepared by the consultant members of the Team.



10. Operation and Maintenance of the Facilities

- 10-1. The Kiribatian side agreed to secure enough staff and budgets necessary for appropriate operation and maintenance of the facilities constructed by the Project, including the periodical maintenance work after the completion of the Project.
- 10-2. The Kiribatian side will take every necessary action to maintain the drainage facilities and avoid clogging which could cause overflowing and damages to the road.
- 10-3. The Team explained and the Kiribatian side agreed that taking necessary actions to let the road users respect traffic regulations are fundamental regarding the following three issues to maintain the facilities and to ensure road safety.
 - 10-3-1. Although the project includes some facilities to ensure traffic safety such as guardrails, increasing traffic will inevitably raise the risks of accidents.
 - 10-3-2. Overloading truck which would exceed designed live load would cause earlier rehabilitation and shorter life.
 - 10-3-3. Proper asset management will impact greatly to maintenance cost and life span.

11. Other Relevant Issues

- 11-1. By following procedure, the Study to decide the design concept of reconstruction will be implemented.
 - (1) By the first mission in Kiribati and following analysis in Japan, Several alternative design concepts of reconstruction will be compared in accordance with damage level, maintainability, durability, workability and cost.
 - (2) During the second mission in Kiribati, by the series of discussion by both sides, One design concept will be decided.
 - (3) By the second mission in Kiribati and following analysis in Japan, the Team will finalize the draft design.
- 11-2. The reconstruction of the causeway will be carefully designed with a consideration of billow, design wave (height and period) and sea level (high water level and low water level) etc.
- 11-3. The Kiribatian side shall, at its own expense, provide the Team with the following items in cooperation with other organizations concerned
 - (1) security-related information as well as measures to ensure the safety of the survey team;
 - (2) information as well as support in obtaining medical service;
 - (3) data and information necessary for the Survey;
 - (4) counterpart personnel;
 - (5) credentials or identification cards if necessary;
 - (6) entry permits necessary for the survey team members to conduct field surveys;
 - (7) permission for the implementation of traffic survey;
 - (8) necessary arrangement for exemption of the taxes, duties, and any charges on equipment, machinery and other materials brought into Kiribati for the implementation of the Survey; and
 - (9) support in obtaining other privileges and benefits if necessary.

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11-4. The Kiribatian side agreed that the following undertakings should be taken by the Kiribatian side at the Kiribatian expenses under the Project if implementation of the Project is approved by the GoJ;

(1) Kiribatian side confirmed that the customs duties, internal taxes and other fiscal levies imposed in Kiribati with respect to the purchase of the products and the services shall be exempted in accordance with the regulations of E/N between the two Governments.

In case the exemption would not be processed in a timely manner, anyhow, both sides confirmed such tentative payment(s) would be owed by Kiribatian side.

- (2) to secure land necessary for the implementation of the Project including land for site office, plant yards, material storing yard, motor pool, temporary construction yard and waste disposal site;
- (3) to arrange issuance of license, permission and other necessary procedures for the Project;
- (4) to obtain the royalties/permission for taking raw materials such as stone/filling materials from the ocean-bed/borrow pit; and
- (5) to provide security measures for all concerned working for the Project.

12. Disclosure of Information

Both sides confirmed that the study results excluding the Project cost will be disclosed to the public after the completion of the Survey. All the study results including the Project cost will be disclosed to the public after all the verification of contracts for the Project by JICA are concluded.

Annex-1: Project Sites

Annex-2: Organization Chart of MPWU

Annex-3: Japan's Grant Aid Scheme

Annex-4: Flowchart of Japan's Grant Aid Procedure

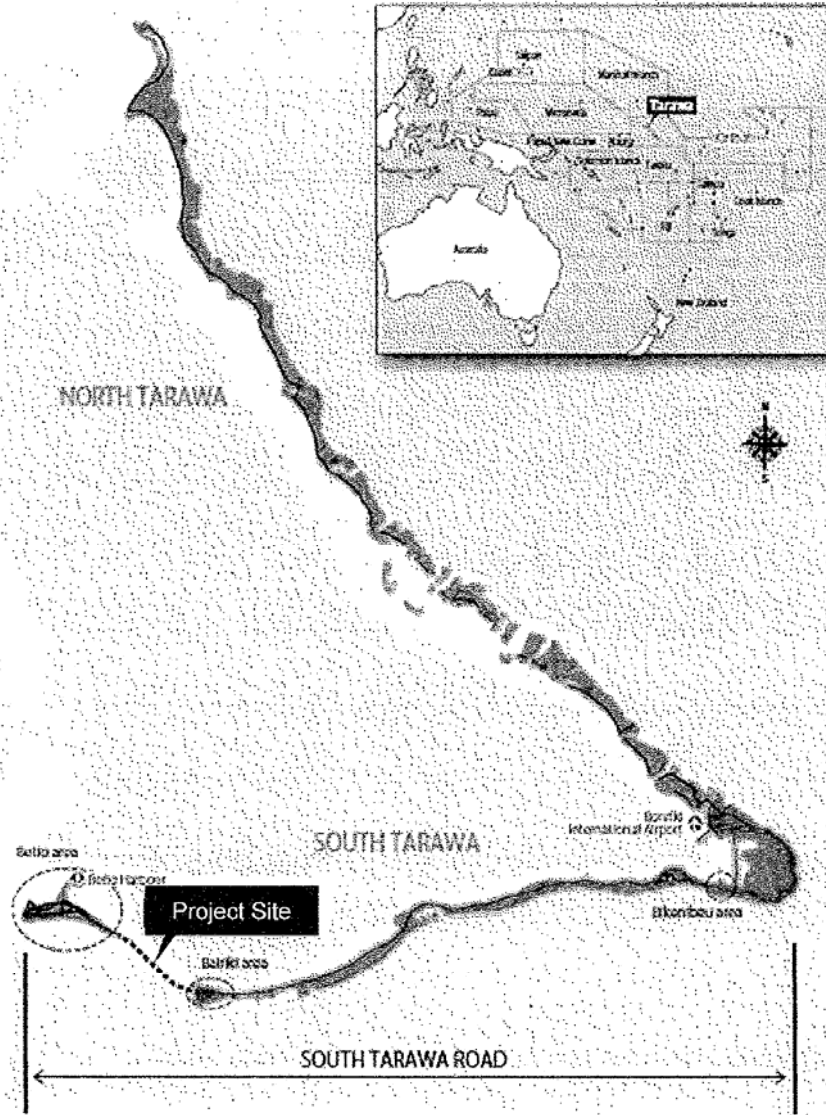
Annex-5: Financial Flow of Japan's Grant Aid

Annex-6: Major Undertakings to be taken by Each Government

Annex-7: Project Monitoring Report



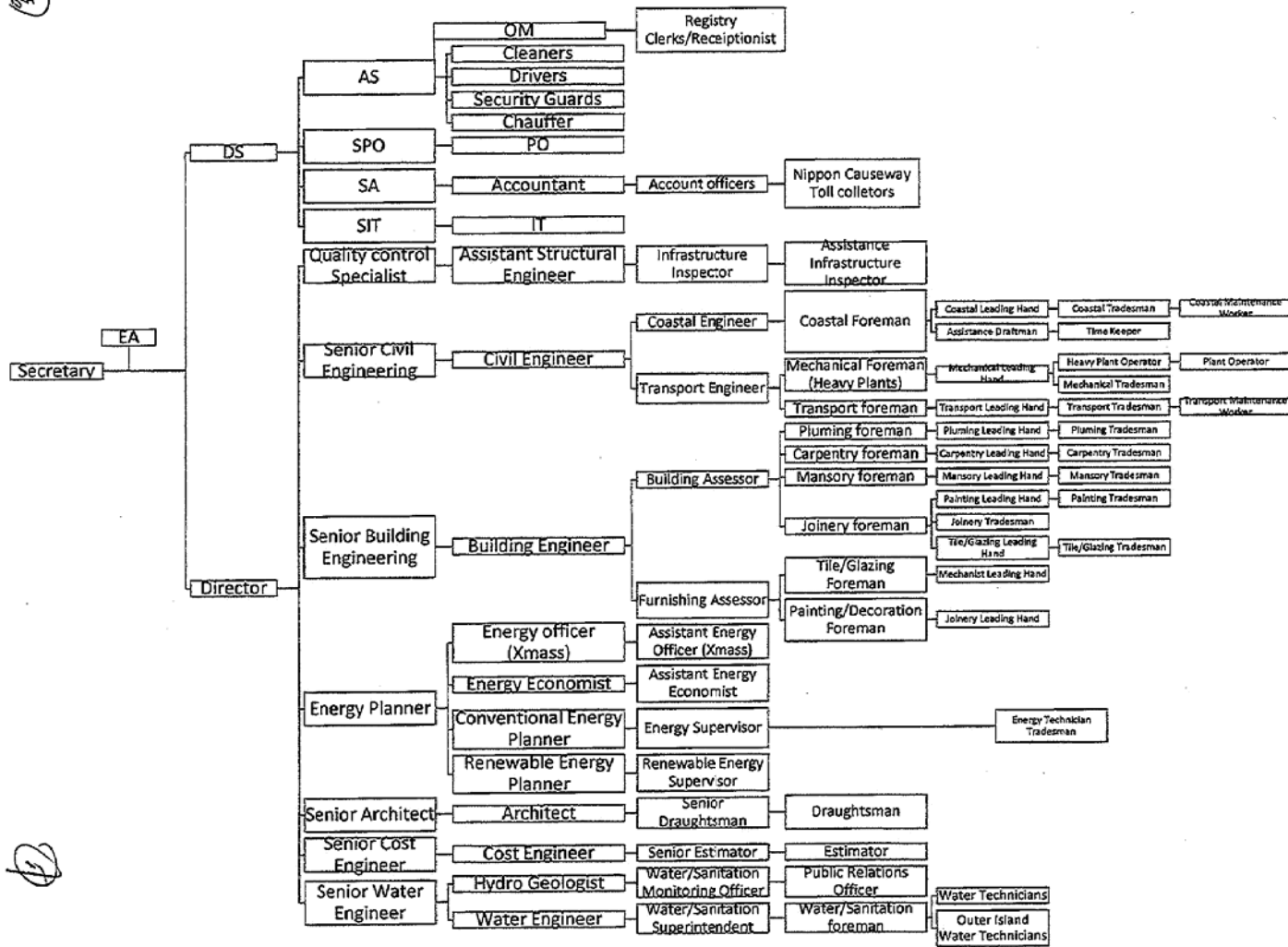
Annex-1: Project Site



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Annex-2: Organization Chart of MPWU



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Annex-3: Japan's Grant Aid Scheme

JAPAN'S GRANT AID

Based on a JICA law which was entered into effect on October 1, 2008 and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for Projects for construction of facilities, purchase of equipment, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development 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

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

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

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- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve 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 of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles, in accordance with the E/N, to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient

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country are to be purchased. The Grant Aid may be used for the purchase of the products or services of a third country, if necessary, taking into account the quality, competitiveness and economic rationality of products and services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals", in principle.

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by 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 Annex-6. The Japanese Government requests the Government of the recipient country to exempt all customs duties, internal taxes and other fiscal levies such as VAT, commercial tax, income tax, corporate tax, resident tax, fuel tax which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract, since the Grant Aid fund comes from the Japanese taxpayers.

(6) "Proper Use"

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

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or 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 under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"), in principle. JICA will execute the Grant Aid by making payments in Japanese yen, in principle, 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 JICA 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

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commissions paid to the Bank.

(10) Social and Environmental Considerations

The Government of the recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

(11) Monitoring

The Government of the recipient country must take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and must regularly report to JICA about its status by using the Project Monitoring Report (PMR).

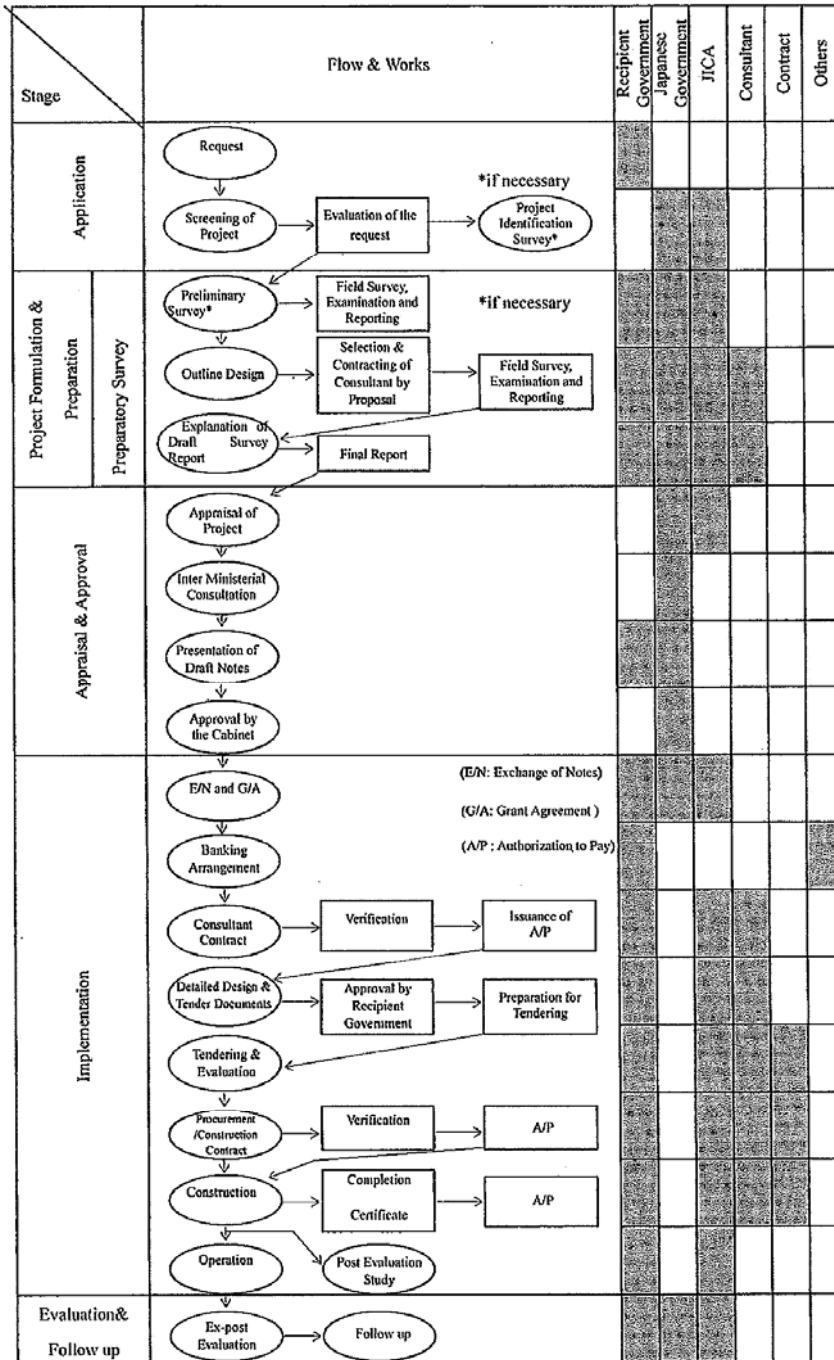
(12) Safety Measures

The Government of the recipient country must ensure that the safety is highly observed during the implementation of the Project.

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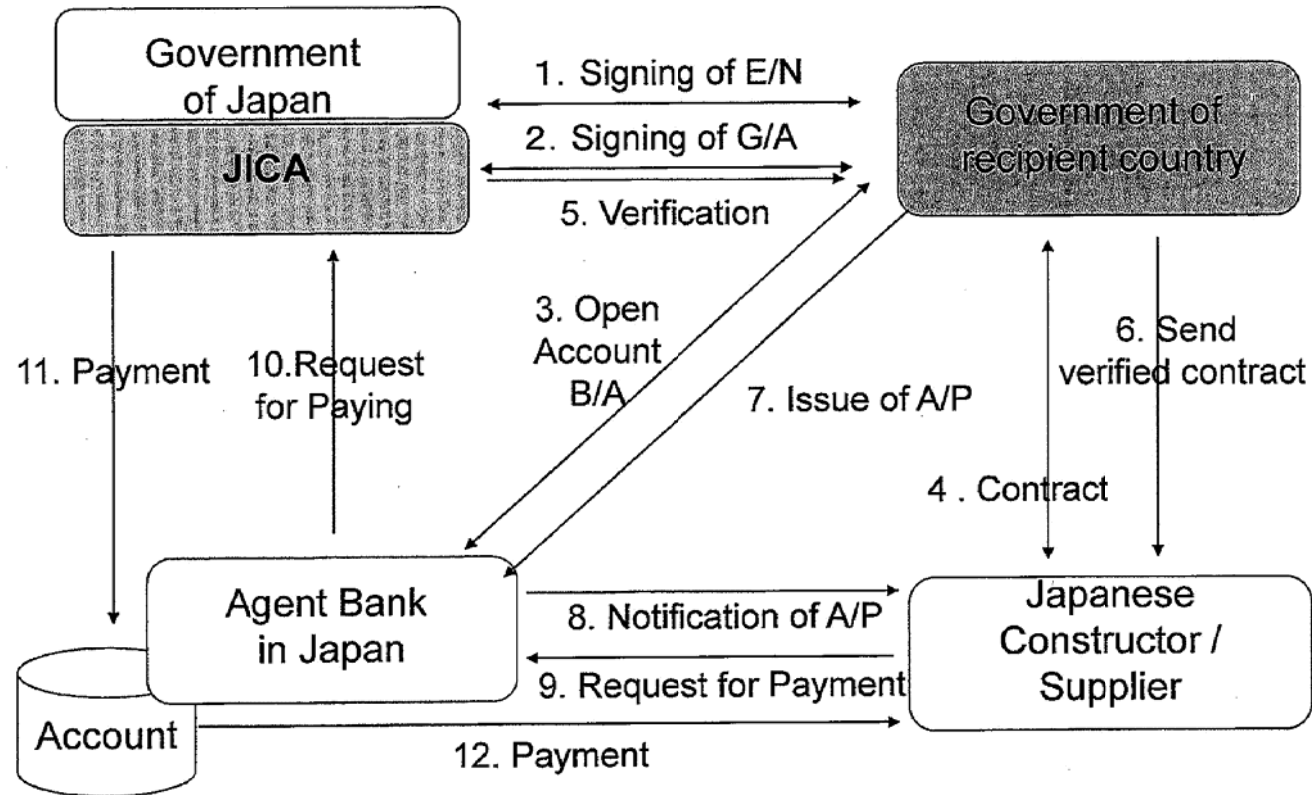
FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



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Financial Flow of Grant Aid



Annex-6: Major Undertakings to be taken by Each Government

Major Undertakings to be taken by Recipient Government

1. Before the Tender

| NO | Items | Deadline | In charge | Cost | Ref. |
|----|--|---|-------------|------|------|
| 1 | To approve IEE/EIA | within 1 month after G/A | MELAD | | |
| 2 | To implement EIA | before start of the construction and during the Project | MPWU /MELAD | | |
| 3 | To open Bank Account (Banking Arrangement (B/A)) | within 1 month after G/A | MOF | | |
| 4 | To secure lands 1) right of way for Sta. ***+***-Sta. ***+*** 2) temporary construction yard and stock yard near the Project area 3) borrow pit and disposal site near the Project area | before notice of the tender document | MELAD /MPWU | | |
| 5 | To obtain the planning, zoning, building permit | before notice of the tender document | MPWU | | |
| 6 | To clear, level and reclaim the following sites when needed | before notice of the tender document | MPWU | | |

2. During the Project Implementation

| NO | Items | Deadline | In charge | Cost | Ref. |
|----|---|---|-------------|------|------|
| 1 | 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 for A/P | within 1 month after the signing of the contract every payment | MPWU MOF | | |
| 2 | To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country 1) Tax exemption and customs clearance of the products at the port of disembarkation | during the Project | MPWU | | |
| 3 | To accord Japanese nationals whose services 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 | during the Project | | | |
| 4 | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be exempted; Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract | during the Project | MOF | | |
| 5 | To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the Project implementation | during the Project | MPWU | | |
| 6 | To submit environmental monitoring report to JICA Fiji Office | during the Project | MPWU | | |

3. After the Project

| NO | Items | Deadline | In charge | Cost | Ref. |
|----|---|--------------------------------------|-----------|------|------|
| 1 | To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine/Periodic inspection | After completion of the construction | MPWU | | |

Major Undertakings to be covered by the Grant Aid

| No | Items | Deadline | Cost Estimated (Million Japanese Yen)* | |
|----|--|----------|---|--|
| 1 | To construct roads/bridges (or To procure equipment) | | XX.XX | |
| | - Reconstruction of the road | | | |
| | - Reconstruction of the bridge | | | |
| | 1) To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country | | | |
| | a) Marine(Air) transportation of the products from Japan to the recipient country | | | |
| | b) Internal transportation from the port of disembarkation to the project site | | | |
| 2) | To construct access roads | | | |
| | a) Within the site | | | |
| 2 | To implement detailed design, tender support and construction supervision (Consultant) | | YY.YY | |
| 3 | Contingencies | | ww.wv | |
| | Total | | ZZ.ZZ | |

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

Organization Information

| | |
|--------------------------------------|--|
| Authority (Signer of the G/A) | Person in Charge _____ _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |
| Executing Agency | Person in Charge _____ _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |
| Line Ministry | Person in Charge _____ _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |

Outline of Grant Agreement:

| | |
|--------------------------|---|
| Source of Finance | Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____ |
| Project Title | |
| E/N | Signed date: Duration: |
| G/A | Signed date: Duration: |



1: Project Description

1-1 Project Objective

1-2 Necessity and Priority of the Project

- Consistency with development policy, sector plan, national/regional development plans and demand of target group and the recipient country.

1-3 Effectiveness and the indicators

- Effectiveness by the project

2: Project Implementation

2-1 Project Scope

Table 2-1-1a: Comparison of Original and Actual Location

| | | |
|-----------------|---|---|
| Location | Original: (M/D) Attachment(s):Map | Actual: (P/R and PCR) Attachment(s):Map |
|-----------------|---|---|

Table 2-1-1b: Comparison of Original and Actual Scope

| Items | Original | Actual |
|-------|----------|---------------|
| (M/D) | (M/D) | (P/R and PCR) |

2-1-2 Reason(s) for the modification if there have been any.

(P/R and PCR)

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2-2 Implementation Schedule
 2-2-1 Implementation Schedule

Table 2-2-1: Comparison of Original and Actual Schedule

| Items | Original | | Actual |
|--------------------------|--------------|-----|---|
| | DOD | G/A | |
| <i>(M/D)</i> | <i>(M/D)</i> | | <i>(P/R, PCR)</i> As of (Date of Revision) Please state not only the most updated schedule but also other past revisions chronologically. |
| Project Completion Date* | | | |

*Project Completion was defined as _____ at the time of G/A.

2-2-2 Reasons for any changes of the schedule, and their effects on the project.

(P/R and PCR)

2-3 Undertakings by each Government

2-3-1 Major Undertakings
 See Attachment 2.

2-3-2 Activities
 See Attachment 3.

2-4 Project Cost

2-4-1 Project Cost

Table 2-3-1 Comparison of Original and Actual Cost by the Government of Japan
 (Confidential until the Tender)

| Items | Original | | Actual | |
|--|---|--------|----------|--------|
| | Original | Actual | Original | Actual |
| Construction Facilities (or Equipment) | | | | |
| Consulting Services | - Detailed design - Procurement Management - Construction Supervision | | | |
| Total | | | | |

Note: 1) Date of estimation:
 2) Exchange rate: 1 US Dollar = Yen

Table 2-3-2 Comparison of Original and Actual Cost by the Government of XX

| Items | Cost (Million USD) | | | |
|-------|--------------------|--------|----------|--------|
| | Original | Actual | Original | Actual |
| | | | | |
| | | | | |
| Total | | | | |

Note: 1) Date of estimation:
 2) Exchange rate: 1 US Dollar = (local currency)

2-4-2 Reason(s) for the wide gap between the original and actual, if there have been any, the remedies you have taken, and their results.

(P/R, PCR)

2-5 Organizations for Implementation

2-5-1 Executing Agency:

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original: (M/D)

Actual, if changed: (P/R and PCR)

2-6 Environmental and Social Impacts

Report based on the agreed environmental checklist and monitoring form (See Attachment 4)

3: Operation and Maintenance (O&M)

3-1 O&M and Management

- Organization chart of O&M
- Operational and maintenance system (structure and the number, qualification and skill of staff or other conditions necessary to maintain the outputs and benefits of the project soundly, such as manuals, facilities and equipment for maintenance, and spare part stocks etc)

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| |
|-----------------|
| Original: (M/D) |
| Actual: (PCR) |

3-2 **O&M Cost and Budget**
 - The actual annual O&M cost for the duration of the project up to today, as well as the annual O&M budget.

| |
|-----------------|
| Original: (M/D) |
|-----------------|

4: Precautions (Risk Management)

- Risks and issues, if any, which may affect the project implementation, outcome, sustainability and planned countermeasures to be adapted are below.

| Original Issues and Countermeasure(s): (M/D) | |
|--|-------------------------------------|
| Potential Project Risks | Assessment |
| 1. | Probability: H/M/L |
| (Description of Risk) | Impact: H/M/L |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | Action during the Implementation: |
| | Contingency Plan (if applicable): |
| 2. | Probability: H/M/L |
| (Description of Risk) | Impact: H/M/L |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | Action during the Implementation: |
| | Contingency Plan (if applicable): |
| 3. | Probability: H/M/L |

(7)

(8)

| | |
|--|-------------------------------------|
| (Description of Risk) | Impact: H/M/L |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action during the Implementation: |
| | |
| | Contingency Plan (if applicable): |
| | |
| Actual issues and Countermeasure(s) | |
| (P/R and PCR) | |
| | |

5: Evaluation

5-1 Overall evaluation

Please describe your evaluation on the overall outcome of the project.

(PCR)

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

(PCR)

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Attachment

1. Project Location Map
2. Undertakings to be taken by each Government
3. Monthly Report
4. Monitoring report on environmental and social considerations

(P)

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Appendix-5: 2nd Minutes of Discussions

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR RECONSTRUCTION OF NIPPON CAUSEWAY
ON TARAWA TO ADAPT CLIMATE CHANGE
IN
REPUBLIC OF KIRIBATI
(The 2nd Mission)

On the basis of the preparatory survey in the Republic of Kiribati (hereinafter referred to as "Kiribati") in June, 2015 and following technical examination in Japan, Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared an Interim Report (hereinafter referred to as "the Report") on the Project for the Reconstruction of the Nippon Causeway on Tarawa to Adapt Climate Change (hereinafter referred to as "the Project").

The Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Masahiro YOSHIMI, Executive Technical Advisor, Infrastructure and Peacebuilding Department of JICA, explained to and consulted with Ministry of Public Works and Utilities (hereinafter referred to as "MPWU"), Government of Kiribati (hereinafter referred to as "GoK"), and the concerned officials of the GoK based on the Report and conducted a field survey in the Project area.

As a result of discussions and the field survey, both sides reconfirmed the contents of the Minutes of Discussions on the Preparatory Survey for the Project signed on June 9th, 2015, and additionally confirmed the main items described in the attached sheets.

The Team will proceed to further studies and prepare the Preparatory Survey Report.

Tarawa January 19, 2016

吉見 昌宏

Masahiro YOSHIMI
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



Teuea TEBAU
O.I.C. Secretary
Ministry of Public Works & Utilities
Republic of Kiribati

ATTACHMENT

1. 1. Field Survey

First Mission was conducted from May 28 to July 6, 2015 and Minutes of Discussions (hereinafter referred to as "M/D-1") was signed on June 9th, 2015.

Both sides confirmed Minutes of Discussions of Second Mission (hereinafter referred to as "M/D-2") is based on the M/D-1, therefore descriptions in the M/D-2 focused on necessary points to be added to the M/D-1.

2. Contents of the Interim Report

The Kiribatian side agreed and accepted in principle the contents of the Report explained by the Team.

3. Methodology of reconstruction of Nippon Causeway

Both sides discussed the comparison of alternative methodologies of reconstruction of Nippon Causeway such as strengthening existing embankment or bridge construction. Kiribatian side understood the merits and demerits of these methodologies and the methodology recommended by Japan side based on the sea bank protection. The methodology is not only repairing the existing embankment but also strengthening it to adapt climate change.

Both side agreed that the methodology of reconstruction of Nippon Causeway is based on the sea bank protection as Annex-1. The detailed methodology will be chosen according to the degree of damage on each section of Nippon Causeway.

4. Safety Measures

- 5-1. To avoid accidents on site during the implementation of the Project, the Kiribatian side agreed to cause the consultant and the contractor to enforce safety measures such as setting safety assurance to the site, providing information for security control to public, and deploying adequate security personnel, based on "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" which has been published on JICA's URL below.

http://www.jica.go.jp/activities/schemes/oda_safety/ku57pq00001nz4eu-att/guidance_en.pdf

- 5-2. The Team recommended to the Kiribatian side to explain to the residents about the Project (necessity and significance, construction period, sites, impact etc.), so that consensus support can be obtained from them for the smooth operation of the Project.

5. Misconduct

If JICA receives information concerning suspected corrupt or fraudulent practices, MPWU shall take necessary measures in accordance with the Procurement Guidelines in the competition for, or in execution of, the contract funded by the Grant:

- (1) to provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public

organizations of Kiribati;

- (2) not to treat unfairly or unfavorably the physical persons and juridical persons, that provide the information.

Annex-1: The methodology of reconstruction of Nippon Causeway

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Annex-1: The methodology of reconstruction of Nippon Causeway

| Alternative | (A1/01) Present Slope Maintained | (A1/02) Overlaid with Fabrimat | (A1/03) Foot Protection Sheet Pile | (A1/04) Sheet Pile (Slope Retention) (Covered with Sand Bag) |
|-------------------------------------|---|--|---|---|
| Conceptual Sketch | | | | |
| Abstract | <ul style="list-style-type: none"> The present slope is maintained. The identified cracks and cavities under the slope should be filled. A repair of the slope covered with the accumulated sand is not required. New parapet wall is installed and the height of the road should be raised. | <ul style="list-style-type: none"> New fabrimat is overlaid on the present fabrimat slope. (The thickness of the new mat is 15 cm or 20 cm) The identified cracks and cavities under the slope should be filled. The existing foot protection will be removed, and covered with sand mats. New parapet wall is installed and the height of the road should be raised. | <ul style="list-style-type: none"> The sheet pile is driven at the slope toe to prevent scoring and sand suction. The slope should be maintained or overlaid by the fabrimat, if required. Possible as the alternative of the foot protection in alternative-3 New parapet wall is installed and the height of the road should be raised. | <ul style="list-style-type: none"> The sheet pile is driven at the slope shoulder and the present slope above the reef should be removed. The existing foot protection will be removed, and covered with sand mats. New parapet wall is installed and the height of the road should be raised. |
| Cost | <ul style="list-style-type: none"> Cost is the lowest than other alternatives. (Only rehabilitation of present slope.) All works can be carried out only with local materials in case of cavity filling by mortar. | <ul style="list-style-type: none"> Overlaid fabrimat and the foot protection are required, so the cost is higher than alternative-1. | <ul style="list-style-type: none"> Additional resources for driving the sheet pile need to be imported, so the cost is high. | <ul style="list-style-type: none"> Additional resources for driving the sheet pile need to be imported. (Length of the sheet pile is longer than alternative-3) The cost is highest than other alternatives. |
| Durability | <ul style="list-style-type: none"> The durability is the lowest than other alternatives. Since the potential risk of crack remained same as the present slope, the damage to the road cannot completely be prevented. Maintenance should be essential to keep the durability. | <ul style="list-style-type: none"> The durability is enhanced with coverage of new fabrimat. (Durable is higher than alternative-1) The damage to the road can be prevented by the present mat as a protection layer against sand suction even if the crack is generated on the new fabrimat. Maintenance of the new fabrimat should be required. | <ul style="list-style-type: none"> Durability of the slope bottom is strengthened by the sheet pile. Maintenance of overlaid fabrimat or present slope is required. The sheet pile requires a corrosion protection, but corrosion allowance may be sufficient because of underwater. | <ul style="list-style-type: none"> The damage to the road can be almost completely prevented by the sheet pile wall. Maintenance of the new sand bags should be required. The sheet pile requires a corrosion protection. |
| Workability | <ul style="list-style-type: none"> The rehabilitation works of the slope will be able to proceed irrespective of the road works. The good workability except for cavity filling as the experienced works in Kiribati. Difficult determination of quantities and identification of stoppage for the cavity filling. | <ul style="list-style-type: none"> The rehabilitation works of the slope will be able to proceed irrespective of the road works. The good workability except for cavity filling as the experienced works in Kiribati. Difficult determination of quantities and identification of stoppage for the cavity filling. The productivity of the foot protection work becomes lower in case of underwater. | <ul style="list-style-type: none"> The rehabilitation works of the slope will be able to proceed irrespective of the road works. The driving of the sheet pile into coral ground is possible, but not good productivity. | <ul style="list-style-type: none"> The rehabilitation works of the slope will be able to proceed irrespective of the road works. The driving of the sheet pile into coral ground is possible, but not good productivity. |
| Sustainability of Maintenance | <ul style="list-style-type: none"> Continuous maintenance should be managed as the present slope remained. Systematic process and organization should be secured to keep reliable maintenance. | <ul style="list-style-type: none"> Ease maintenance because of new slope. A continuous maintenance should be organized and managed against cracks. | <ul style="list-style-type: none"> In case of the present slope maintained, the necessity of the continuous maintenance is the same as required for alternative-1. In case of the overlaid slope, ease maintenance the same level of alternative-3. A continuous maintenance should be organized and managed against cracks. | <ul style="list-style-type: none"> Maintenance is required only for sand bags. |
| Environmental Social Considerations | <ul style="list-style-type: none"> No issues as far as the planned section. | <ul style="list-style-type: none"> No issues as far as the planned section | <ul style="list-style-type: none"> No issues as far as the planned section | <ul style="list-style-type: none"> No issues as far as the planned section |
| Others | <ul style="list-style-type: none"> Construction period is shorter than other alternatives. | <ul style="list-style-type: none"> Relatively short construction period. | <ul style="list-style-type: none"> Long construction period due to sheet pile driving included. | <ul style="list-style-type: none"> Long construction period as removal of the slope, and driving of the sheet pile. Re-use or recycling should be considered for removed materials in large quantity. Overtopping rate is minimized among alternatives. |
| Application | Applicable for the sections of no damaged and no potential risk for damage | Applicable for the damaged sections and small numbers of cracks and cavities | Applicable for the sections at bridge side where the existing sheet pile driven. Applicable as an alternative for ALT② | Applicable for the sections of mostly damaged and high risk of damage |

Appendix-6: 3rd Minutes of Discussions


MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR RECONSTRUCTION OF NIPPON CAUSEWAY
ON TARAWA TO ADAPT CLIMATE CHANGE
IN
REPUBLIC OF KIRIBATI
(Explanation of Draft Outline Design Report)

On the basis of the preparatory survey in the Republic of Kiribati (hereinafter referred to as "Kiribati") in June and August, 2015 and following technical examination in Japan, Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared an Draft Outline Design Report (hereinafter referred to as "the Report") on the Project for the Reconstruction of Nippon Causeway on Tarawa to Adapt Climate Change (hereinafter referred to as "the Project").

The Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Masahiro YOSHIMI, Executive Technical Advisor, Infrastructure and Peacebuilding Department of JICA, explained to and consulted with Ministry of Public Works and Utilities (hereinafter referred to as "MPWU"), Government of Kiribati (hereinafter referred to as "GoK"), and the concerned officials of the GoK based on the Report.

As a result of discussions, both sides confirmed the main items described in the attached sheets.

Tarawa March 2, 2016

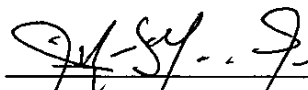


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ATTACHMENT

1. Components of the Draft Outline Design Report

As a result of Survey the Team identified two main components of the Project consisting of the following construction works. The Project site is shown in Annex 1. Kiribatian side agreed and accepted in principle the contents of the Report explained by the Team.

- a) Reconstruction of Nippon Causeway
- b) Widening and repairing of the bridge

2. Cost Estimation for the Project

Both sides confirmed that the Project cost estimation described in the Report was provisional and would be examined further by the Government of Japan for its final approval. The project costs are estimated and shown in Annex 2.

3. Confidentiality of the Cost Estimation and Specifications

Both sides confirmed that the Project cost estimation and technical specifications in the Report should never be duplicated or disclosed to any third parties until all the contracts of the Project are concluded.

4. Japanese Grant scheme

The Kiribatian side understands the Japanese Grant Scheme and its procedures as described in Annex 3, Annex 4 and Annex 5, and necessary measures to be taken by the Government of Kiribati.

5. Project Implementation Schedule

The Team explained to the Kiribatian side that the expected implementation schedule is as attached in Annex 6.

6. Expected outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Kiribatian side has responsibility to monitor the progress of the indicators and achieve the target in year 2022.

[Quantitative Effect]

There will be no closing road by natural disaster.

There will be no collapse of Nippon Causeway.

The speed of vehicles will increase to 40 km/h.

[Qualitative Effect]

Stable lifeline will be ensured all year round.

The safety of pedestrians and vehicles will be improved.

Logistics and confluence between Betio and Bairiki will be secured all year round.

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7. Technical assistance (“Soft Component” of the Project)

Considering the sustainable operation and maintenance of the provided facility, following technical assistance is planned to be provided under the Project. The Kiribatian side confirmed that it will assign necessary number of competent and appropriate counterparts as described in the Report.

8. Undertaking by Kiribatian Side

Both sides confirmed to undertakings described in Annex 7. The Kiribatian side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage. Contents of Annex 7 will be updated as the Detailed Design progresses, and will finally be used in the contract document.

8-1. There are the following two options for mining of coral sand and coral rock.

- Option 1: The contractor purchases coral sand and coral rock from Te Atimimarawa Co., LTD. (TACL) at the rate of equal to or less than Aus. \$ 20.0 per cubic meter.
- Option 2: The contractor pays TACL Aus. \$ 5.0 per cubic meter in case that it excavates coral sand and coral rock necessary for the Project using its own equipment.

8-2. The candidate of the construction yard is designated shown as in Annex 8. The construction yard will be decided by the cabinet and prepared by MPWU.

8-3. The utilities and the road lightings will be installed by MPWU.

8-4. The Team recommended to the Kiribatian side to explain to the residents about the Project (necessity and significance, construction period, sites, impact etc.), so that consensus support can be obtained from them for the smooth operation of the Project.

9. Monitoring during the Implementation

The Project will be monitored and reported once a quarter by the executing agency and using the Project Monitoring Report (PMR) in Annex 9.

10. Ex-Post Evaluation

JICA will conduct ex-post evaluation three (3) years after the project completion with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability) of the Project. Result of the evaluation will be publicized. The Kiribatian side is required to provide necessary support for them.

11. Issues to be Considered for the Smooth Implementation of the Project

Both sides confirmed the issues considered and will take necessary measures for the smooth implementation of the Project described in Annex 6.

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Both sides confirmed that MPWU should be responsible for coordinating co-operation with Kiribatian organizations concerned and local resident, for the smooth implementation of project in Nippon Causeway.

12. Schedule of the Study

JICA will complete the Final Report of the Preparatory Survey in accordance with the confirmed items and send it to the Kiribatian side around June, 2016.

13. Environmental and Social Considerations

13-1 General Issues

13-1-1 Environmental Guidelines and Environmental Category

The JICA mission explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as 'the Guidelines') is applicable for the Project. The Project is categorized as B because the Project is not located in a sensitive area, nor has it sensitive characteristics, nor falls it into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

13-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 10. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Kiribatian side shall submit the modified version to JICA in a timely manner.

13-2 Environmental Issues

13-2-1 Basic Environmental Impact Assessment (BEIA)

Both sides confirmed the BEIA report will be approved by MELAD in March, 2016. The EIA report is not required for the Project in the country's legal system.

13-2-2 Environmental Management Plan and Environmental Monitoring Plan

Both sides confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project is as Annex 11 and 12, respectively. Both side agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

13-3 Environmental and Social Monitoring

13-3-1 Environmental Monitoring

Both sides agreed that the Kiribatian side will submit results of environmental monitoring to JICA by using the monitoring form attached as Annex 13.

14. Other Relevant Issues

14-1. Operation and Maintenance of the Facilities

The team explained the importance of operation and maintenance of the facilities constructed by the Project

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considering that proper asset management impacts greatly on life-span of the facilities and its maintenance cost. The Kiribatian side shall secure enough staff and budgets necessary for appropriate operation and maintenance of the facilities. The annual operation and maintenance costs are estimated and shown in Annex 14.

14-2. Disclosure of Information

Both sides confirmed that the study results excluding the Project cost will be disclosed to the public after completion of the Preparatory Survey. All the study results including the project cost will be disclosed to the public after all the contracts for the Project are concluded.

Annex-1 Project Site

Annex-2 Project Cost Estimation

Annex-3 Japanese Grant

Annex-4 Flow Chart of Japanese Grand Procedures

Annex-5 Financial Flow of Japanese Grant

Annex-6 Project Implementation Schedule

Annex-7 Major Undertakings to be taken by Each Government

Annex-8 Construction yard

Annex-9 Project Monitoring Report

Annex-10 Environmental Checklist

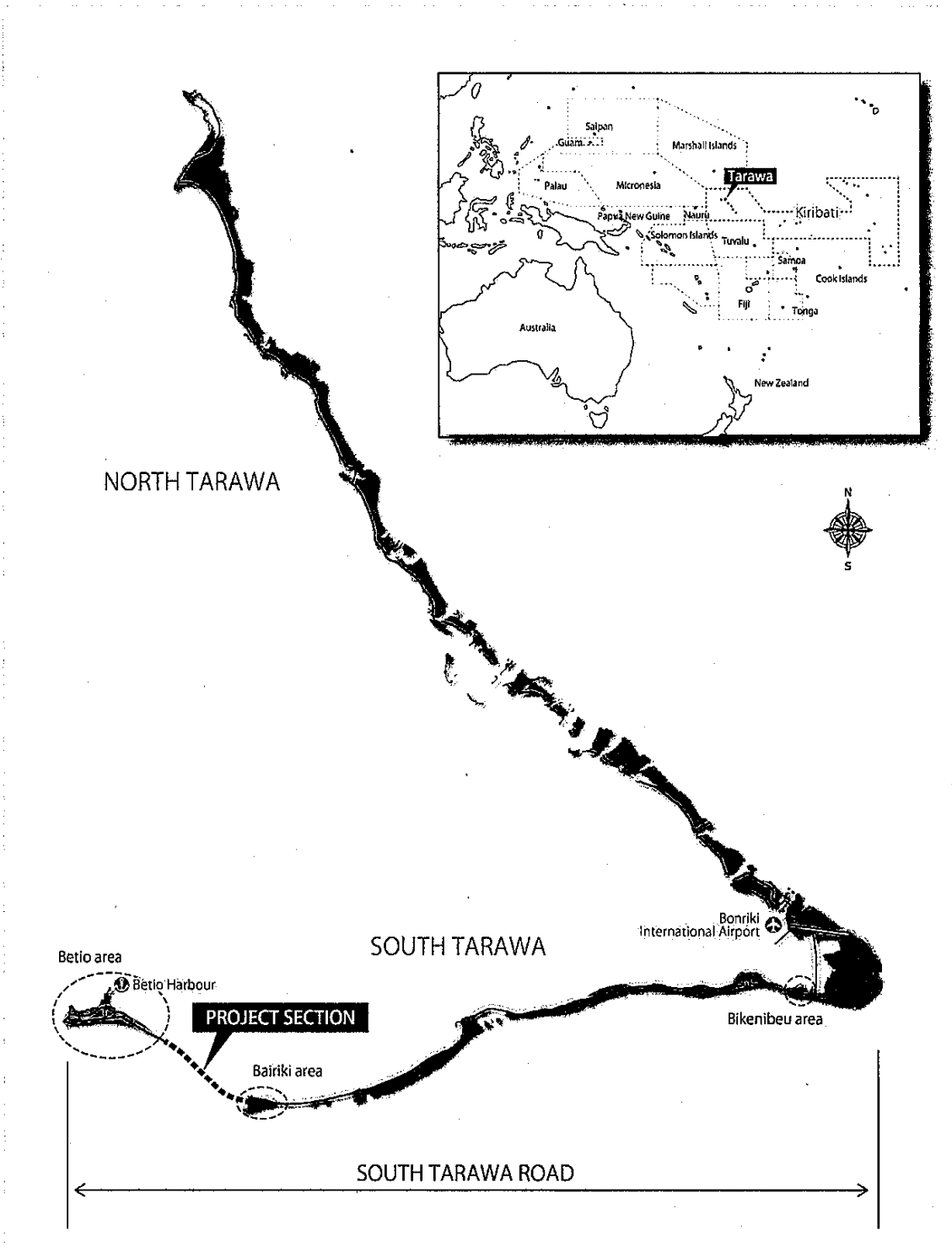
Annex-11 Environmental Management Plan

Annex-12 Environmental Monitoring Plan

Annex-13 Environmental Monitoring Form

Annex-14 Maintenance Cost Estimation

Project Site



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Project Cost EstimationCONFIDENTIAL

(1) Cost Borne by the Government of Japan

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| | |
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(2) Cost Borne by the Government of Kiribati

| Items | Cost Estimation (Aus. \$) |
|-------------------------|------------------------------|
| Bank Charges | 8,224 |
| Relocation of Utilities | 680,000 |
| Total | 688,224 |

(3) Conditions of Cost Estimation

- Estimated timing: September 2015
- Exchange rates: USD1.00 = 124.40 JPY
Aus. '\$ 1.00 = 94.36JPY
- Others: The project is implemented in accordance with the system of Japan's Grant Aid. The above cost estimation is not final, and GOJ is responsible for finalizing the ceiling amount of the Grant Aid assistance of the Project.

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Japanese Grant

JAPANESE GRANT

The Japanese Grant (hereinafter referred to as the “Grant”) is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant is not supplied through the donation of materials as such.

Based on a JICA law which was entered into effect on October 1, 2008 and the decision of the GOJ, JICA has become the executing agency of the Japanese Grant for Projects for construction of facilities, purchase of equipment, etc.

1. Grant Procedures

The Grant is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as “the G/A”)
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey**(1) Contents of the Survey**

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for

the implementation of the Project.

- Evaluation of the appropriateness of the Project to be implemented under the Grant Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant project. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve 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 of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

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3. Japanese Grant Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles, in accordance with the E/N, to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. The Grant may be used for the purchase of the products or services of a third country, if necessary, taking into account the quality, competitiveness and economic rationality of products and services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals", in principle.

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Project, the recipient country is required to undertake such necessary measures as Annex 7. The Japanese Government requests the Government of the recipient country to exempt all customs duties, internal taxes and

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other fiscal levies such as VAT, commercial tax, income tax, corporate tax, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract, since the Grant fund comes from the Japanese taxpayers.

(6) "Proper Use"

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

(7) "Export and Re-export"

The products purchased under the Grant should not be exported or 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 under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"), in principle. JICA will execute the Grant 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 JICA 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 paid to the Bank.

(10) Environmental and Social Considerations

The Government of the recipient country must carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of

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the recipient country and JICA Guidelines for Environmental and Social Consideration (April, 2010) .

(11) Monitoring

The Government of the recipient country must take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and must regularly report to JICA about its status by using the Project Monitoring Report (PMR).

(12) Safety Measures

The Government of the recipient country must ensure that the safety is highly observed during the implementation of the Project.

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Flow Chart of Japanese Grant Procedures

| stage | Flow & Works | Recipient Government | Japanese Government | JICA | Consultant | Contract | Others |
|-----------------------------------|--|----------------------|---------------------|------|------------|----------|--------|
| Application | | | | | | | |
| Project Formulation & Preparation | Preparatory Survey | | | | | | |
| Appraisal & Approval | | | | | | | |
| Implementation | <p>(E/N: Exchange of Notes) (G/A: Grant Agreement) (A/P: Authorization to Pay)</p> | | | | | | |
| Evaluation & Follow up | | | | | | | |

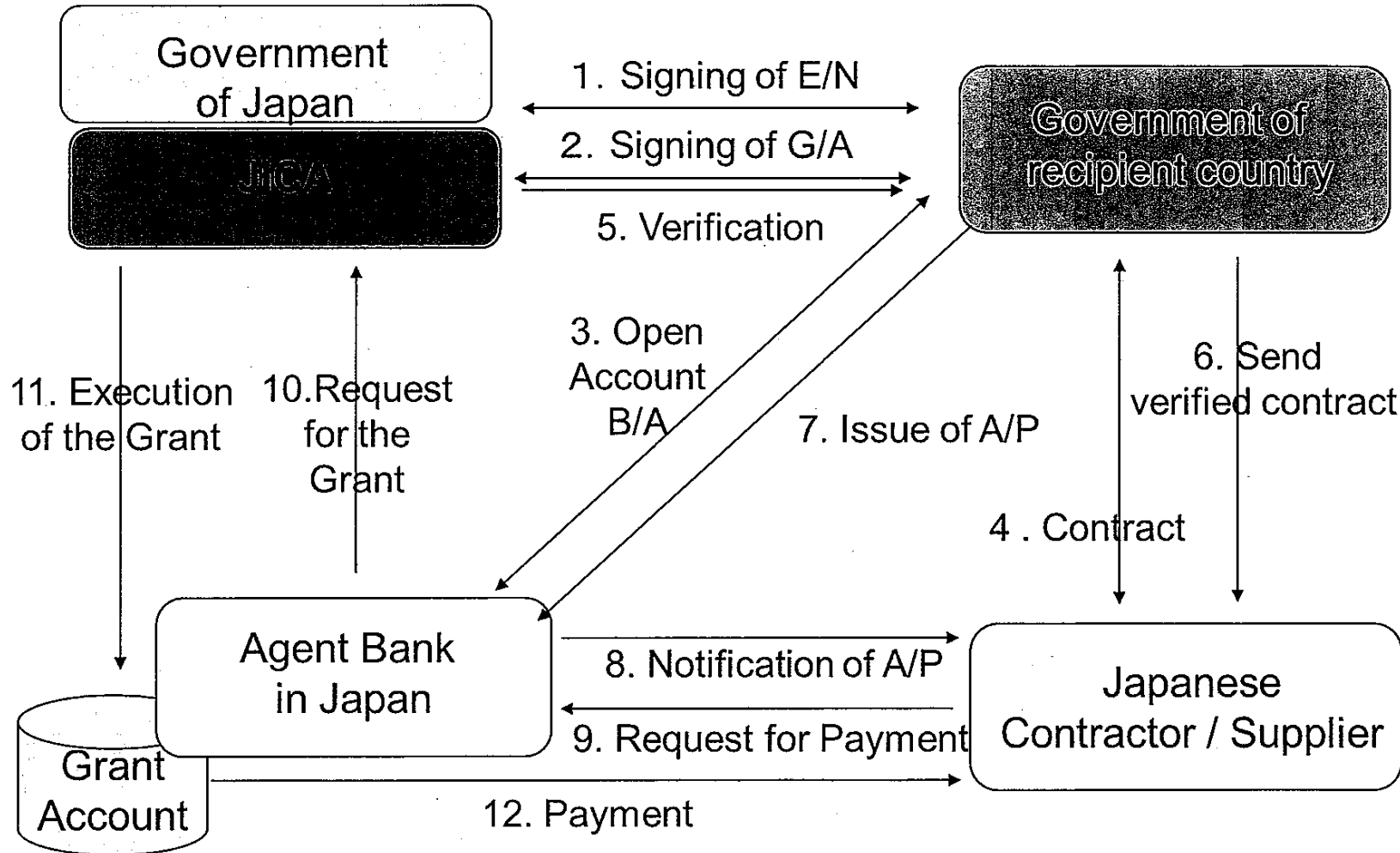
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Financial Flow of Japanese Grant



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Project Implementation Schedule

| Year | 2016 | | | | | | | | | | | | 2017 | | | | | | | | | | | | 2018 | | | | | | | | | | | | 2019 | | | |
|--|------|---|---|---|---|---|----|----|----|---|---|---|------|---|---|---|---|---|----|----|----|---|---|---|------|---|---|---|---|---|----|----|----|---|---|---|------|--|--|--|
| Month | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | | | |
| Cabinet Approval and Exchange of Note | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Consultant Contract and Approval | | | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Detailed Design | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tender Works | | | | | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Soft Component | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | | | | | |

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Major Undertakings to be taken by Each Government (DRAFT)

Major Undertakings to be taken by Recipient Government

1. Before the Tender

| NO | Items | Deadline | In charge | Cost | Ref. |
|----|---|--------------------------------------|-----------|------|------|
| 1 | To approve IEE/EIA | within 1 month after G/A | MELAD | | |
| 2 | To implement EIA | before start of the construction | MPWU | | |
| 3 | To open Bank Account (Banking Arrangement (B/A)) | within 1 month after G/A | MOF | | |
| 4 | To secure lands 1) temporary construction yard and stock yard near the Project area 2) borrow pit and disposal site near the Project area | before notice of the tender document | MPWU | | |
| 5 | To obtain the planning, zoning, building permit | before notice of the tender document | MPWU | | |
| 6 | To clear, level and reclaim the following sites when needed | before notice of the tender document | MPWU | | |

2. During the Project Implementation

| NO | Items | Deadline | In charge | Cost | Ref. |
|----|---|---|-------------|--|------|
| 1 | 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 for A/P | within 1 month after the signing of the contract every payment | MPWU MOF | Around 5,000(JPY)/time 0.1% of payment amount | |
| 2 | To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country 1) Tax exemption and customs clearance of the products at the port of disembarkation | during the Project | MPWU | | |
| 3 | To accord Japanese nationals whose services 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 | during the Project | | | |
| 4 | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be exempted; Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract | during the Project | MOF | | |
| 5 | 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 | during the Project | MPWU | | |
| 6 | Relocation of Utilities(Installation of water pipe, electric cable and communication cable) | | MPWU | Approx. 680 thousand (AUD) | |
| 7 | To submit environmental monitoring report to JICA Fiji Office | during the Project | MPWU | | |

3. After the Project

| NO | Items | Deadline | In charge | Cost | Ref. |
|----|---|--------------------------------------|-----------|------|------|
| 1 | To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine/Periodic inspection | After completion of the construction | MPWU | | |

Major Undertakings to be covered by the Grant Aid

| No | Items | Deadline | Cost Estimated (Million Japanese Yen)* | |
|----|--|----------|--|--|
| | 1) Reconstruction of Nippon Causeway (Earthworks, Revetment, Pavement) | | | |
| | 2) Bridge Repair and Widening | | | |
| | 3) To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country | | | |
| | Others (Incidental Facilities, Temporary Works) | | | |
| 2 | To implement detailed design, tender support and construction supervision (Consultant) | | | |
| | Contingencies | 5% | | |
| 2 | Total | | | |
| 3 | | | | |
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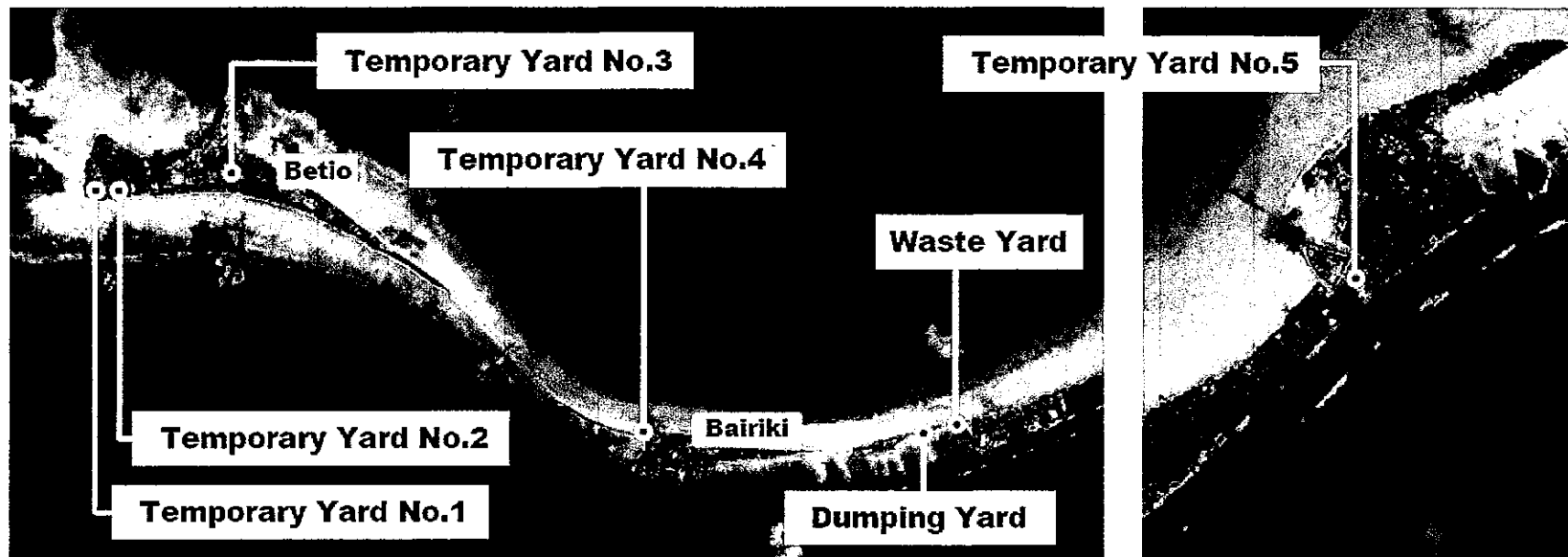
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Construction Yard

The candidate of the construction yard was designated as below by MPWU. It will be decided by the cabinet and prepared by MPWU.

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Location Map of the Candidate Construction Yard

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Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
 20XX, Month

Organization Information

| | |
|--------------------------------------|--|
| Authority (Signer of the G/A) | _____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |
| Executing Agency | _____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |
| Line Agency | _____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |

Outline of Grant Agreement:

| | |
|--------------------------|---|
| Source of Finance | Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____ |
| Project Title | |
| E/N | Signed date: Duration: |
| G/A | Signed date: Duration: |

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1: Project Description

1-1 Project Objective

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1-2 Necessity and Priority of the Project

- Consistency with development policy, sector plan, national/regional development plans and demand of target group and the recipient country.

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1-3 Effectiveness and the indicators

- Effectiveness by the project

| Quantitative Effect (Operation and Effect indicators) | | |
|---|----------------|--------------|
| Indicators | Original (Yr) | Target (Yr) |
| | | |
| | | |
| | | |
| Qualitative Effect | | |
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2: Project Implementation

2-1 Project Scope

Table 2-1-1a: Comparison of Original and Actual Location

| | | |
|-----------------|--|--|
| Location | Original: (M/D) Attachment(s):Map | Actual: (PMR) Attachment(s):Map |
|-----------------|--|--|

Table 2-1-1b: Comparison of Original and Actual Scope

| Items | Original | Actual |
|---|----------|--|
| (M/D) 'Soft component' shall be included in 'Items'. | (M/D) | (PMR) Please state not only the most updated schedule but also other past revisions chronologically. All change of design shall be recorded regardless of its degree. |

(Sample)Table 2-1-1b: Comparison of Original and Actual Scope

| Items | Original | Actual |
|---------------------------------------|--|--|
| 1. Upgrading of the Kukum Highway | length 20km, single lane (3.47m*2), path(1.25m*2) Concrete Pavement 200mm (motor lane only) | length 20km, single lane (3.47m*2), path(1.00m*2) Concrete Pavement 200mm (motor lane only) |
| 2. Replacement of Old Mataniko Bridge | Bridge length 40m, Width 9.5m, path(1.00m*2), compound steel box-girder bridge, Inverted T type-abutment spread foundation | Ditto |

2-1-2 Reason(s) for the modification if there have been any.

| |
|-------|
| (PMR) |
|-------|

2-2 Implementation Schedule
 2-2-1 Implementation Schedule

Table 2-2-1: Comparison of Original and Actual Schedule

| Items | Original | | Actual |
|--|--------------|-----|--|
| | DOD | G/A | |
| <i>[M/D]</i> | <i>(M/D)</i> | | <i>(PMR)</i> As of (Date of Revision) |
| 'Soft component' shall be stated in the column of 'Items'. | | | Please state not only the most updated schedule but also other past revisions chronologically. |
| Project Completion Date* | | | |

*Project Completion was defined as _____ at the time of G/A.

(Sample)Table 2-2-1: Comparison of Original and Actual Schedule

| Items | Original | | Actual |
|-----------------------------------|----------------|----------------|---------------------|
| | DOD | G/A | |
| Cabinet Approval | 11/2015 | - | - |
| E/N | 12/2015 | 1/2016 | 24/1/2016 |
| G/A | 12/2015 | 1/2016 | 24/1/2016 |
| Detailed Design | 12/2015-4/2016 | 1/2016-5/2016 | 1/2016-5/2016 |
| Tender Notice | 5/2016 | 5/2016 | 1/6/2016 |
| Tender | 6/2016 | 6/2016 | 15/7/2016 |
| (Lot1) Construction Period | 7/2016-11/2018 | 7/2016-11/2018 | 8/8/2016-30/11/2018 |
| (Lot2) Installarion of Equipement | 7/2016-6/2018 | 7/2016-6/2018 | 6/8/2016-30/60/2017 |
| Project Completion Date | 11/2018 | 11/2018 | 30/11/2018 |
| Defect Liability Period | 11/2019 | 11/2019 | 30/11/2019 |

*Project Completion was defined as Check-out of Construction work at the time of G/A.

2-2-2 Reasons for any changes of the schedule, and their effects on the project.

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2-3 Undertakings by each Government

2-3-1 Major Undertakings

See Attachment 2.

2-3-2 Activities

See Attachment 3.

2-3-3 Report on RD

See Attachment 4.

2-4 Project Cost

2-4-1 Project Cost

Table 2-4-1a Comparison of Original and Actual Cost by the Government of Japan
(Confidential until the Tender)

| | Items | | Cost (Million Yen) | |
|--|---|--------|-----------------------|--|
| | Original | Actual | Original | Actual |
| Construction Facilities (or Equipment) | 'Soft component' shall be included in 'Items'. | | | Please state not only the most updated schedule but also other past revisions chronologically. |
| Consulting Services | - Detailed design - Procurement Management - Construction Supervision | | | |
| Total | | | | |

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

Table 2-4-1b Comparison of Original and Actual Cost by the Government of Kiribati

| | Items | | Cost (Million USD) | |
|-------|----------|--------|-----------------------|--|
| | Original | Actual | Original | Actual |
| | | | | Please state not only the most updated schedule but also other past revisions chronologically. |
| Total | | | | |

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = (local currency)

(Sample)Table 2-4-1a Comparison of Original and Actual Cost by the Government of Japan
(Confidential until the Tender)

| Items | | | Cost (Million Yen) | |
|-------------------------|---|----------------|--------------------------|---------|
| | Original | Actual | Original ¹⁾²⁾ | Actual |
| Construction Facilities | 1. Outpatient Department 2. Operation Theatre, Casualty Unit, Maternity Ward | Ditto Ditto | 1,169.5 | 1,035.0 |
| Equipment | 1) Primary and Secondary Surveillance Radars at Chittagong Int'l Airport 2) Access Control System for Dhaka Int'l Airport 3) Doppler VOR/DME at Saidpur Airport 4) Aerodrome Simulator for Civil Aviation Training Center 5) Baggage Inspection System for Dhaka Int'l Airport 6) Airport Fire Fighting Vehicles for Dhaka Int'l Airport | Ditto | 2,374.6 | 2,110.0 |
| Consulting Services | - Detailed design - Procurement Management - Construction Supervision - Soft Component | Ditto | 0.87 | 0.87 |
| Total | | | 3544.97 | 3145.87 |

Note: 1) Date of estimation: October, 2014
2) Exchange rate: 1 US Dollar = 99.93 Yen

(Sample)Table 2-4-1b Comparison of Original and Actual Cost by the Government of Kiribati

| Items | | | Cost (1,000 Taka) | |
|-----------------------------|---|--------|--------------------------|--------|
| | Original | Actual | Original ¹⁾²⁾ | Actual |
| Dhaka International Airport | Modification of software of existing Rader Data Processing System | Ditto | 8,000 | |
| | Provision of a partition, lighting, air conditioning and electric power supply at transfer hold baggage check point | Ditto | 5,000 | |
| | Replacement of five doors in the international passenger terminal building | Ditto | 4,000 | |
| Chittagong Int'l Airport | Preparation of the radar site including felling of trees, clearing and grabbing | Ditto | 5,000 | |
| Total | | | 22,000 | |

Note: 1) Date of estimation: October, 2014
2) Exchange rate: 1 US Dollar = 0.887 Bangladesh Taka (local currency)

2-4-2 Reason(s) for the wide gap between the original and actual, if there have been any, the remedies you have taken, and their results.

(PMR)

2-5 Organizations for Implementation

2-5-1 Executing Agency:

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original: (M/D)

Actual, if changed: (PMR)

2-6 Environmental and Social Impacts

- The results of environmental monitoring as attached in Attachment 5 in accordance with Schedule * of the Grant Agreement.
- The results of social monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- Information on the disclosed results of environmental and social monitoring to local stakeholders, whenever applicable.

3: Operation and Maintenance (O&M)

3-1 O&M and Management

- Organization chart of O&M
- Operational and maintenance system (structure and the number ,qualification and skill of staff or other conditions necessary to maintain the outputs and benefits of the project soundly, such as manuals, facilities and equipment for maintenance, and spare part stocks etc)

Original: (M/D)

Actual: (PMR)

3-2 O&M Cost and Budget

- The actual annual O&M cost for the duration of the project up to today, as well as the annual O&M budget.

Original: (M/D)

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4: Precautions (Risk Management)

- Risks and issues, if any, which may affect the project implementation, outcome, sustainability and planned countermeasures to be adapted are below.

| Original Issues and Countermeasure(s): (M/D) | |
|--|-------------------------------------|
| Potential Project Risks | Assessment |
| 1. | Probability: H/M/L |
| (Description of Risk) | Impact: H/M/L |
| | Analysis of Probability and Impact: |
| | Mitigation Measures: |
| | Action during the Implementation: |
| | Contingency Plan (if applicable): |
| | |
| 2. | Probability: H/M/L |
| (Description of Risk) | Impact: H/M/L |
| | Analysis of Probability and Impact: |
| | Mitigation Measures: |
| | Action during the Implementation: |
| | Contingency Plan (if applicable): |
| | |
| 3. | Probability: H/M/L |
| (Description of Risk) | Impact: H/M/L |
| | Analysis of Probability and Impact: |
| | Mitigation Measures: |
| | Action during the Implementation: |
| | Contingency Plan (if applicable): |
| | |
| Actual issues and Countermeasure(s) | |
| (PMR) | |

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5: Evaluation at Project Completion and Monitoring Plan

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan for the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Undertakings to be taken by each Government
3. Monthly Report
4. Report on RD
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Final Report Only)

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Environmental Checklist

| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|---------------------------|---|--|------------------------------|--|
| 1 Permits and Explanation | (1) EIA and Environmental Permits | (a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government? | (a)N (b)N (c)N (d)N | (a) The JICA expert team submitted draft EIA (BEIA) report to MPWU in December 2015 (need to check whether MPWU has submitted BEIA to MELAD) (b) EIA approval is expected to be obtained by end of March 2016 (need to check review status and schedule with MELAD). (c) EIA not approved yet. (d) There are no other environmental permits required. |
| | (2) Explanation to the Local Stakeholders | (a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design? | (a)Y (b)Y | (a) Public consultation meeting was held on September 2015 by MPWU. Around 20 people participated including local residents. There was no objections raised towards the project once the concerns raised by the participants were answered. Once submitted, the project's EIA report will be posted for public comment in accordance to the local EIA regulation. (b) The stakeholders had no objection on the project design. |
| | (3) Examination of Alternatives | (a) Have alternative plans of the project been examined with social and environmental considerations? | (a)Y | (a) The following two reconstruction options were initially considered: Option 1: Reconstruction of Causeway by strengthening of existing structures without any alteration to the roadway alignment Option 2: Reconstruction of Causeway by replacing with a new bridge (3 km) The two options were compared by considering factors such as cost, durability, construction and maintenance difficulties, and environmental impacts. While option 2 had certain advantages over option 1 (e.g. higher durability), option 1 was selected mainly due to lower cost, easiness of construction and maintenance, and no requirement of land acquisition. Once option 1 was adopted, various strengthening options were compared for the Causeway structures (e.g. revetment, roadway, bridge), considering mainly factors such as cost, durability and difficulty of construction and maintenance. There were no major differences in the environmental impacts between each option. |
| 2 Pollution Control | (1) Air Quality | (a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse? | (a)N (b)N | (a) Due to the resurfacing of the roadway, the local air quality is expected to improve as there will be less dust emitted from the passing vehicles. (b) There are no industrial areas near the Causeway. |

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| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|-----------------------|-------------------------|--|--------------------------------------|--|
| | (2) Water Quality | (a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards? | (a)N (b)N (c)N | (a) There will be no earthmoving activities that may cause soil runoff. (b) Surface runoff will be discharged to the sea. (c) There will be no facilities that discharges effluents. In the construction phase, concrete washwater will be generated from the concrete plant but washwater will be retained on site by collecting into a settlement pond (see 5(1) for more details). |
| 2 Pollution Control | (3) Wastes | (a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations? | (a)N | (a) There will be no waste generating facilities. Construction waste will be managed in accordance to waste management plan (see 5(1) for more details) |
| | (4) Noise and Vibration | (a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards? | (a)N | (a) Due to the resurfacing of the roadway, the local noise level is expected to improve as there will be less noise emitted from the passing vehicles. |
| 3 Natural Environment | (1) Protected Areas | (a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas? | (a)N | (a) There are no protected areas around the Causeway. |
| 3 Natural Environment | (2) Ecosystem | (a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered? (f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments? | (a)N (b)N (c)N (d)N (e)N | (a) A coral reef is distributed along the reef slope. However, no impacts are expected as the reef slope is more than 400-500 m from the Causeway. (b) Two endangered species (one coral and one fish species) under IUCN Red List have been identified in the reef slope area. However, no impacts are expected as the reef slope is more than 400-500 m from the Causeway. (c)-(f) No significant ecological impacts are expected as the project involves only reconstruction of the existing Causeway structures. |

(5)

| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------------------|----------------------------|---|--|--|
| | (3) Hydrology | (a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows? | (a)N | (a) No impacts are expected as the project involves only reconstruction of the existing Causeway structures. |
| | (4) Topography and Geology | (a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff? | (a)N (b)N (c)N | (a)-(c) No impacts are expected as the project involves only reconstruction of the existing Causeway structures. |
| 4 Social Environment | (1) Resettlement | (a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established? | (a)N (b)N (c)N (d)N (e)N (f)N (g)N (h)N (i)N (j)N | (a)-(j) No resettlement is required. |

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| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------------------|--|---|--|---|
| 4 Social Environment | (2) Living and Livelihood | <p>(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts?</p> <p>(b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?</p> <p>(d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)?</p> <p>(e) Is there any possibility that roads will impede the movement of inhabitants?</p> <p>(f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?</p> | <p>(a)N (b)Y (c)N (d)N (e)N (f)N</p> | <p>(a) No new roads will be installed.</p> <p>(b) There will be temporary water use restrictions around the construction area for example during revetment and bridge reconstruction. Impacts of such restrictions are likely to be minor as the restrictions will be limited in area and duration. The local people will be informed beforehand when such restrictions occur.</p> <p>(c) The risk of infectious diseases spreading is low as the majority of the work force will be from the local area.</p> <p>(d)-(f) No impacts are expected as the project involves only reconstruction of the existing Causeway structures.</p> |
| | (3) Heritage | <p>(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?</p> | (a)N | <p>(a) There are no archeological, historical, cultural and religious heritage sites around the project site.</p> |
| | (4) Landscape | <p>(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?</p> | (a)N | <p>(a) No impacts are expected as the project involves only reconstruction of the existing Causeway structures.</p> |
| | (5) Ethnic Minorities and Indigenous Peoples | <p>(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?</p> <p>(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?</p> | <p>(a)N (b)N</p> | <p>(a) (b) There are no ethnic minorities and indigenous peoples around the project site.</p> |

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| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------|------------------------|--|------------------------------|--|
| | (6) Working Conditions | <p>(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p> | (a)N (b)Y (c)Y (d)Y | <p>(a) No</p> <p>(b)-(d) Construction works will be conducted in accordance to JICA's safety guideline "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects (2014)". Following are some of the main safety measures that will be implemented:</p> <ul style="list-style-type: none">- Preparation of safety plan- Implementation of environment, health and safety (EHS) induction programs for all workers- Provision of personal protective equipment (PPE)- Strict compliance to speed limits- Avoid using roads with high risk of accidents- Placement of warning signs and traffic control officers (e.g. during traffic restrictions) |

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MA

| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------|---------------------------------|--|-------------------------------|---|
| 5 Others | (1) Impacts during Construction | <p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p> | <p>(a)Y (b)Y (c)Y</p> | <p>(a) One of the main environmental concerns during the construction phase is the potential pollution that may arise from the operation of the asphalt and concrete plants and waste generation. Following are the main mitigation measures planned for the asphalt and concrete plants and waste generation.</p> <p>-The main concern for the asphalt plant is the dust generated from the aggregate drying process. Dust emission from this process is planned to be reduced significantly by installing primary and secondary dust collection units.</p> <p>-The main concern for the concrete plant is the concrete washwater generated from agitator washout and charging areas, slumping station and so on. The washwater will include concrete materials (e.g. cement, sand, aggregates) and will be highly alkaline. The plant will be designed so that all washwater (including contaminated stormwater) are retained on site by collecting and diverting the washwater to an impermeable settling pond, and reusing the captured washwater. Discharge of washwater will only be allowed providing that pH and suspended solid levels are within World Bank discharge standard (pH: 6-9, suspended solids:< 50 mg/l).</p> <p>-Waste management is a key issue, especially since South Tarawa has limited landfill capacity and no facility to receive hazardous wastes. Waste volume will be minimized by promoting 3R (reduce, reuse and recycle), and any wastes that cannot be appropriately reused/recycle or disposed in South Tarawa will be transported and disposed overseas.</p> <p>(b) Impacts on natural environment are unlikely providing that the planned pollution control measures are properly implemented.</p> <p>(c) There will be temporary water use restrictions around the construction area for example during revetment and bridge reconstruction. Impacts of such restrictions are likely to be minor as the restrictions will be limited in area and duration. The local people will be informed beforehand when such restrictions occur.</p> |

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| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------|---|---|--|---|
| | (2) Monitoring | <p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?</p> | <p>(a)Y (b)Y (c)Y (d)N</p> | <p>(a)(b) Monitoring will be conducted through combination of field measurement and visual inspection. Covered items are air quality, water quality, soil, noise, odor and waste. See Environmental Monitoring Plan for more details.</p> <p>(c) Monitoring will be conducted by the construction contractor and supervising consultant. Cost for monitoring equipment is included in the project budget. A qualified and experienced environmental officer is planned to be assigned on the contractors team and supervising consultant.</p> <p>(d) Reporting will be conducted in accordance to the conditions stipulated in the EIA approval. The construction contractor will nevertheless be required to report regularly to the construction supervisor and MPWU.</p> |
| | Reference to Checklist of Other Sectors | <p>(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).</p> <p>(b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).</p> | <p>(a) (b)</p> | <p>(a)(b) Not relevant</p> |

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| Category | Environmental Item | Main Check Items | Yes: Y No: N | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------|---------------------------------------|--|-----------------|--|
| NOTE | Note on Using Environmental Checklist | (a) If necessary, the impacts to trans boundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as trans boundary waste treatment, acid rain, destruction of the ozone layer, or global warming). | (a) | (a) Wastes that cannot be appropriately reused/recycle or disposed in South Tarawa will be transported and disposed overseas. Sufficient budget is secured so that wastes are appropriately disposed overseas. |

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.

In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Environmental Management Plan(EMP)

| Item | Potential impacts | Mitigation measures | Implementation responsibility | Supervision responsibility | Estimated cost |
|-----------------|---|---|-------------------------------|----------------------------|---|
| Air pollution | Dust emission from asphalt plant | <ul style="list-style-type: none"> • Use of asphalt plant equipped with primary and secondary dust collection systems and other standard dust suppression measures (e.g. shielded conveyor). • Locate aggregate stockpile where dust dispersion towards sensitive receptors can be minimized. • Keeping aggregate stockpiles and exposed surfaces in damp condition. • Minimizing height of aggregate stockpile to reduce wind erosion. • Covering of aggregate stockpile when not actively being used. • Use of closed/covered trucks for aggregate transportation. • Additional dust suppression measures (e.g. installation of wind screen) to be implemented if deemed necessary (e.g. if asphalt plant is to be located near residential areas). | Construction contractor | Supervising consultant | Cost of dust collection system to be included in the plant procurement cost. Cost of wind screen: US\$10,000 Other costs negligible |
| | Dust emission from concrete plant | <ul style="list-style-type: none"> • Use of concrete plant equipped with standard dust suppression measures (e.g. enclosed conveyor and hopper). • Locate major dust sources (e.g. cement silo, aggregate stockpile) where dust dispersion towards sensitive receptors can be minimized. • Store cement in sealed and dust-tight storage silos. • Keeping aggregate stockpiles and exposed surfaces damp. • Minimizing height of aggregate stockpile to reduce wind erosion. • Covering of aggregate stockpile when not actively being used. • Use of closed/covered trucks for aggregate transportation. • Additional dust suppression measures (e.g. installation of wind screen) to be implemented if deemed necessary (e.g. if concrete plant is to be located near residential areas). | Construction contractor | Supervising consultant | Cost of wind screen: US\$20,000 |
| | Dust and exhaust gas emissions from construction site | <ul style="list-style-type: none"> • Use of well-maintained vehicles and equipment. Vehicles emitting "excessive emission" to be removed until repaired. • Keeping exposed surfaces damp. • Use of closed/covered trucks when transporting dusty materials. | Construction contractor | Supervising consultant | Negligible |
| Water pollution | Washwater discharge from concrete plant | <ul style="list-style-type: none"> • All washwater to be collected and diverted to an impermeable settling pond. • Discharge to the environment to be avoided by reusing the captured washwater onsite. • Discharge to be allowed only if pH and suspended solid concentration | Construction contractor | Supervising consultant | Construction cost of settling pond: US\$ 1,000 |

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| Item | Potential impacts | Mitigation measures | Implementation responsibility | Supervision responsibility | Estimated cost |
|-----------------|---|---|-------------------------------|----------------------------|----------------|
| | | are within 6-9 and < 50 mg/l respectively. | | | |
| | Washwater discharge from concrete mixer and pump trucks | <ul style="list-style-type: none"> All washwater to be collected onsite and transport to concrete plant settling pond for reuse. | Construction contractor | Supervising consultant | Negligible |
| | Increase of seawater pH levels through fresh concrete injection into fabrimat. | <ul style="list-style-type: none"> Strict mitigation measures (e.g. work only during low tide) to be implemented if significant impacts are identified through monitoring. | Construction contractor | Supervising consultant | Negligible |
| | Increase of seawater turbidity through excavation works and fresh concrete injection into fabrimat. | <ul style="list-style-type: none"> Strict mitigation measures (e.g. work only during low tide, installation of silt curtain) to be implemented if significant turbidity dispersion (e.g. if turbidity plume reaches the reef slope area) is observed through monitoring. | Construction contractor | Supervising consultant | Negligible |
| | Oil leakage from construction equipment | <ul style="list-style-type: none"> Regular inspection of oil and fuel leaks. Leaking equipment to be removed until repaired. Oil spill response kit (e.g. oil booms, absorbents) to be readily available at the construction site. | Construction contractor | Supervising consultant | Negligible |
| Soil pollution | Spillage of hazardous liquids | <ul style="list-style-type: none"> Hazardous substances to be stored only in specialized containers and designated storage facility. Storage facility to be located as far as possible from sensitive areas (e.g. groundwater wells) and well secured from the public. Storage facility to be roofed and bunded with an impermeable base. Posting of warning signs at the storage facility. Spill response kit to be placed at the storage facility. Hazardous substances only to be handled by trained staff. | Construction contractor | Supervising consultant | Negligible |
| Noise/vibration | Noise from asphalt and concrete plants | <ul style="list-style-type: none"> Locate noisy equipment and other noise sources (e.g. truck entrance and exit points) as far as possible from sensitive receptors. In principal, plant operation to be limited to normal working hours and no operation on Sundays and public holidays. Implementation of regular noise monitoring (target value: < 65 dB). Additional noise suppression measures (e.g. covering of noisy units) to be implemented if noise levels at nearest sensitive receptor consistently exceeds 65 dB or in case of consistent complaints. | Construction contractor | Supervising consultant | Negligible |
| | Noise from pile-driving works | <ul style="list-style-type: none"> Use of low noise pile driver (vibratory pile driver). In principal, pile driving works to be limited to normal working hours and no operation on Sundays and public holidays. Implementation of noise monitoring when close (e.g. within 50 m) to sensitive receptors (e.g. residential areas). Additional noise suppression measures to be implemented (e.g. | Construction contractor | Supervising consultant | Negligible |

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| Item | Potential impacts | Mitigation measures | Implementation responsibility | Supervision responsibility | Estimated cost |
|-----------|-------------------------------------|--|-------------------------------|----------------------------|---|
| | | covering of noisy equipment) if noise levels at nearest receptor consistently exceeds 65 dB or in case of consistent complaints. | | | |
| Odor | Odor from asphalt plant | <ul style="list-style-type: none"> • Maintaining asphalt cement at proper working temperature. • Use of closed/covered trucks for asphalt concrete transportation. • Use of odor control products (e.g. additives to reduce odor) in case of consistent complaints. | Construction contractor | Supervising consultant | Negligible |
| Waste | Construction wastes | <ul style="list-style-type: none"> • Maximize reuse and recycling. • Storage of wastes only in designated areas. • Storage of hazardous wastes in specialized containers and facility. • Removal of hazardous wastes from Kiribati that cannot be reused/recycled or treated/disposed in Kiribati. • Non-hazardous wastes to be disposed at local landfill providing that they do not significantly reduce the landfill capacity. • Provision of sufficient quantity of waste containers for each waste type. • Strict prohibition of littering and implementation of awareness programs. • Daily clean-ups at the construction sites. | Construction contractor | Supervising consultant | Cost for oversea transportation and disposal of hazardous waste: US\$ 200,000 |
| Water use | Temporary restrictions in water use | <ul style="list-style-type: none"> • Informing of local people beforehand when restrictions occur. | Construction contractor | Supervising consultant | Negligible |
| Accidents | Accidents due to construction works | <ul style="list-style-type: none"> • Compliance to JICA's safety guideline. • Implementation of safety induction programs for all workers. • Strict compliance to speed limits. • Avoid using roads with high risk of accidents. • Placement of warning signs and traffic control officers. | Construction contractor | Supervising consultant | Negligible |

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Environmental Monitoring Plan (EMoP)

| Category | Aim | Method | Frequency | Implementation responsibility | Estimated cost |
|-----------------|--|---|--|-------------------------------|---|
| Air pollution | To check whether excessive dust and exhaust gas are not emitted from asphalt/concrete plant and other construction sites | Visual inspection of: • Dust emissions from asphalt plant exhaust stacks • Fugitive dust emissions from asphalt/concrete plant (e.g. aggregate stockpile, cement silos) and construction site • Exhaust gas emissions from construction vehicles and equipment | • 3/week • Daily on receipt of any complaints | Construction supervisor | Part of supervision cost |
| Water pollution | To check whether concrete plant and other construction activities are not causing water pollution | Visual inspection of: • Settling pond and drainage system • Oil leaks of construction equipment • Presence of oil films around construction site | • 2/week • Daily on receipt of any complaints | Construction supervisor | Part of supervision cost |
| | To check seawater pH levels during fabrimat concrete injection works | Measurement of seawater pH levels with portable pH meter at set distances from fabrimat installation site (e.g. 1, 5, 10 and 20 meters) and reference site. | • At least 3 times at the start of fabrimat installation works | Construction contractor | US\$ 600 (cost of portable pH meter) |
| | To check extent of turbidity dispersion during excavation and fabrimat concrete injection works | Observation of turbidity plume dispersion. | • 3/week • Daily on receipt of any complaints | Construction supervisor | Part of supervision cost |
| Soil pollution | To check of any leaks of hazardous liquids | Inspection of storage and handling areas of hazardous liquids. | • 1/week | Construction supervisor | Part of supervision cost |
| Noise | To check whether excessive noise are not emitted from asphalt/concrete plant and pile driving works | Measurement of noise levels (LAeq) with portable sound meter at nearest sensitive receptor (Target value: < 65 dB). | • 3/week • Daily on receipt of any complaints | Construction contractor | US\$ 1,300 (cost of portable sound meter) |
| Odor | To check whether excessive odor is not emitted from asphalt plant | Check presence of odor at nearest sensitive receptor. | • 3/week • Daily on receipt of any complaints | Construction supervisor | Part of supervision cost |
| Waste | To check whether wastes are stored and handled in accordance to the contractor's Waste Management Plan | Visual inspection | • 1/week | Construction supervisor | Part of supervision cost |

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Environmental Monitoring Form

1. Pre-construction phase

(1) Comments from the public and MELAD regarding the EIA

| Monitoring item | Comments | Response of MOI |
|--|----------|-----------------|
| Contents of formal comments from the public on the EIA | | |
| Contents of formal comments from MELAD on the EIA | | |

2. Construction phase

(1) Noise (L_{Aeq})

| Week | Location | Reference standard (dB) | Weekly Ave. (dB) | Weekly Max. (dB) | Compliance status (e.g. no. of days that exceeded reference standard) | Measures implemented in case of non-compliance |
|------|--------------------------------------|-------------------------|------------------|------------------|---|--|
| | Boundary of nearest residential area | 65*1 | | | | |

*1: Based on IFC guideline value

(2) Air quality

| Week | Location | Method | Compliance status | Measures implemented in case of non-compliance |
|------|-------------------|---|-------------------|--|
| | Asphalt plant | Visual inspection of dust emission from exhaust stack and fugitive dust | | |
| | Concrete plant | Visual inspection of fugitive dust | | |
| | Construction site | Visual inspection of exhaust gas emission from construction vehicles and machines | | |

(3) Water quality

| Week | Location | Method | Compliance status | Measures implemented in case of non-compliance |
|------|-------------------|--|-------------------|--|
| | Concrete plant | Visual inspection of settling pond and drainage system | | |
| | Construction site | Visual inspection of oil leaks of construction equipment and oil films | | |
| | Construction site | Measurement of seawater pH levels | | |
| | Construction site | Visual inspection of turbidity dispersion | | |

(4) Soil

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| Week | Location | Method | Compliance status | Measures implemented in case of non-compliance |
|------|---|---|-------------------|--|
| | Storage and handling areas of hazardous liquids | Visual inspection of leaks of hazardous liquids | | |

(5) Odor

| Week | Location | Method | Compliance status | Measures implemented in case of non-compliance |
|------|---------------|---|-------------------|--|
| | Asphalt plant | Checking of odor at nearest sensitive receptor. | | |

(6) Waste

| Week | Location | Method | Compliance status | Measures implemented in case of non-compliance |
|------|--------------------|--|-------------------|--|
| | Waste storage area | Checking whether wastes are stored and handled in accordance to the contractor's Waste Management Plan | | |

Maintenance Cost Estimation

Annual Maintenance Cost Estimation is Aus. \$ 28,599

Annual Maintenance Cost of Embankment Section

| Items | Facilities | Inspection Items | Frequency | Personnel | Equipment | Total Number | Cost (Aus.\$) |
|-----------------------|-----------------------|---------------------|----------------------------|------------|-----------------------------------|-------------------------|---------------|
| Periodical Inspection | Pavement | Cracks etc. | 12 times/year | 4 persons | Scoop/Hammer/ Sickle/Barricade | 48 persons/year | 874 |
| | Revetment | Cracks etc. | | | | | |
| | Drainage | Sediment | 1 day/time | | Pickup | 12 vehicles/year | 960 |
| | | Deposition/Obstacle | | | | | |
| Subtotal | | | | | | | 1,834 |
| Daily Inspection | Pavement | Cleaning | 4 times/year 2 day/time | 10 persons | Scoop/Barricade | 80 persons/year | 1,456 |
| | | | | | Small Truck | 16 vehicles/year | 1,920 |
| | Subtotal | | | | | | |
| Repair | Pavement | Crack, etc. | 1 times/year | 6 persons | Worker | 24 persons/year | 437 |
| | | | | | Plate Compactor | 4 vehicles/year | 200 |
| | Revetment | Crack, etc. | 4 day/time | | Small Truck | 4 vehicles/year | 960 |
| | Incidental Facilities | Crack, etc. | | | Asphalt | 2.0m ³ /year | 10,000 |
| | | | Roadbed Material | | 30.0m ³ /year | 2,250 | |
| | | | Lane Marking | | 12.0m ³ /year | 240 | |
| Subtotal | | | | | | | 14,087 |
| Total | | | | | | | 19,297 |

Annual Maintenance Cost of Bridge Section

| Items | Facilities | Inspection Items | Frequency | Personnel | Equipment | Total Number | Cost (Aus.\$) |
|-----------------------|-----------------------|------------------------------------|-----------------------------|-----------|-----------------------------------|-------------------------|-----------------|
| Periodical Inspection | Pavement | Crack etc. | 12 times/year 1 day/time | 2 persons | Scoop/Hammer/ Sickle/Barricade | 24 persons/year | 437 |
| | Drainage | Sediment | | | | | |
| | | Deposition/Obstacle | | | | | |
| | Box Culvert | Damage/Deformation/Peeling etc. | | | Pickup | 24 vehicles/year | 960 |
| | Incidental Facilities | Railing | | | | | |
| Subtotal | | | | | | | 1,397 |
| Daily Inspection | Pavement | Cleaning | 4 times/year 2 day/time | 5 persons | Scoop/Barricade | 40 persons/year | 728 |
| | Drainage | Removal of Obstacle or Sediment | | | | | |
| | | Bridge | | | Cleaning | Small Truck | 8 vehicles/year |
| | Subtotal | | | | | | |
| Repair | Pavement | Crack, etc. | 1 times/year | 6 persons | Worker | 24 persons/year | 437 |
| | Drainage | Crack, etc. | | | 4 day/time | Plate Compactor | 4 vehicles/year |
| | Box Culvert | Crack, etc. | Bridge Railing | | | Small Truck | 4 vehicles/year |
| | Incidental Facilities | Bridge Railing | | | Asphalt | 1.0m ³ /year | 5,000 |
| | | | | | Traffic Marking | Lane Marking | 5.0m/year |
| | Subtotal | | | | | | |
| Total | | | | | | | 9,302 |

Appendix-7: Technical Notes

Technical Notes

The Second Site Survey

On

The Preparatory Survey

For

The Project for Reconstruction of Nippon Causeway on Tarawa

To Adapt Climate Change

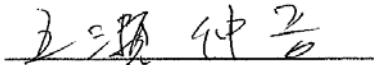
In

Republic of Kiribati

The JICA Survey Team for the Preparatory Survey (the Survey Team) and the representative of the Ministry of Public Works & Utilities (the MPWU) which is the responsible and implementing organization for the Project for Reconstruction of Nippon Causeway on Tarawa to Adapt Climate Change (the Project) have agreed upon the items described in the attached Technical Notes. Based on the Technical Notes, the Survey Team will carry out the basic design and the cost estimate for the Project including the scope and the cost of the urgent countermeasure work (Middle Term) through analysis of the Second Site Survey findings and discussions with concerned authorities in Japan.

The results of the analysis and basic design will be presented and explained in February, 2016. On the other hand, the scope and the cost for the urgent countermeasure work will be prepared on the assumption that the work will start in around middle of November, 2015.

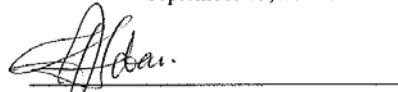
September 15, 2015 in Kiribati



Dr. Shingo GOSE

Chief Consultant

JICA Survey Team



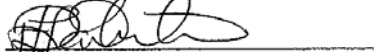
Mr. Teuea TEBAU

O.I.C. Secretary

Ministry of Public Works & Utilities

Government of the Republic of Kiribati

Witness



Ms. Eera TEAKAI

Assistant Secretary

Ministry of Environmental and Land
Agriculture Development (MELAD)

Government of the Republic of Kiribati

Technical Notes for the Second Site Survey

The MPWU basically agreed with the candidate alternative options shown or described in this Technical Notes. While the MPWU's preferable options are to be taken account of, selection of the most appropriate option will be finalized through analysis and consultation with concerned authorities in Japan. In case that there are options which it is difficult for the MPWU to accept, the options are indicated in the tables of candidate alternative options or described in sections below.

1. Application of Design Guidelines

Reference shall be made to the following manuals and standard specifications for the outline design requirements of roads, bridges and revetments.

- Highway Structure Code, Japan Road Association (JRA), 2015.
- Technical Standards and Commentaries for Port and Harbor Facilities in Japan, 2009.
- Specifications for Highway Bridges, Japan Road Association (JRA), 2012.

In addition to the above guidelines when other aspects are not covered or when a safer or more efficient requirement is indicated, the design of the causeway shall refer to other appropriate standards, including

- AASHTO Policy on Geometric Design of Highways and Streets, 2004.
- AASHTO Guide for Design of Pavement Structures, 1993.

2. Typical Cross Sections of Causeway and Bridge

- The typical cross sections of the causeway and the bridge will be determined from the two cross sections shown in **Table 1-1** and **Figure 1-1**, respectively, of **Annex 1**.
- Utilities shall be structurally separated from the main part of causeway.

3. Navigation Clearance of the Bridge

- The maximum size of vessel passing under the bridge shall be considered for the navigation clearance.
- A fisher vessel with the out board engine, the scale of which is 6.4m in length, 2.0m in width and 0.78 in maximum draught, shall be assumed as the maximum size of vessel.
- The vertical clearance of waterway shall be maintained with Mean Sea Level (MSL).

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4. Design Tidal Levels

- Design tidal levels for the road and parapet design including its height shall be determined based on the tidal conditions shown in **Table 2-1 of Annex 2**.
- The following are recommended for design tidal level according to the recommendations described in the table.
 - For the road design, the design tidal level is recommended to be **+2.85m** that rises by 31cm from the original design level of **+2.54m**, considering level-rise of HWL.
 - For the revetment and parapet design including its height, the design tidal level of **+3.10 m and +3.30 m** are recommended taking into consideration level rises due to El Nino event and the climate change until 2045 with the combinations of the design waves.
- Elevations of the road surface and the top of the parapet are determined following the original design method and studying wave overtopping volume shown in **Table 3-1 and 3-2 of Annex 3** as tentative results.
- The above elevation for the parapet design will be basically applied to the main section of causeway facing the ocean considering the scale of wave external forces.

5. Road Pavement

- The most appropriate pavement type including dimensions of the structures will be determined Based on comparison study on pavement types with pavement structures shown in **Table 4-1 of Annex 4**.

6. Revetment Improvement Measures

- Improvement measures for the revetment are aimed at strengthening of the existing causeway.
- Among applicable improvement measures shown in **Table 5-1 of Annex 5**, each improvement measure will be applied according to the extent of damage and the scale of external wave force.

7. Bridge Improvement Alternatives

- It is confirmed that the bridge has no severe damage and totally maintained the soundness as analyzed and described in the Interim Report.
- The Survey Team recommended that the bridge shall be repaired at minor damage portions at concrete wall and slab, and widen shoulders with expansion of footpath.

8. Acquisition of Environmental License

- The Environmental License process will be made corresponding to Basic EIA

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(BEIA) as shown in **Figure 6-1 of Annex 6**, in case that strengthening alternative is selected as a causeway improvement measure.

- The MPWU agreed that acquisition of the Environmental License should be made by the end of March of 2016.

9. Urgent Countermeasures (Middle Term)

- The urgent countermeasures are intended to maintain the function of causeway until commencement of the construction work of the Project.
- Comparison study on the candidate countermeasures with recommendations is shown in **Table 7-1 of Annex 7**, which includes proposed demarcation between the MPWU and JICA sides.
- The MPWU has promised the Survey Team to allocate budget for the recommended urgent countermeasure demarcated in the table, implementation of which is to start in around middle of November if JICA approves carrying out this urgent countermeasure.
- Pending matters shown in the table will be determined through consultation with JICA.

10. Mining of Coral Sand and Coral Rock

- There are the following two options for mining of coral sand and coral rock.
 - Option1: The contractor purchases coral sand and coral rock from Te Atimimarawa Co., Ltd. (TACL) at the rate of equal to or less than Aus. \$ 20.0 per cubic meter.
 - Option 2: The contractor pays TACL Aus. \$ 5.0 in case that it excavates coral sand and coral rock necessary for the Project using its own equipment.

11. Construction Yard

- The MPWU designated the places as candidate construction yards for the Project, shown in **Figure 8-1 of Annex 8**.
- However, since the Cabinet endorsement is required for this matter, the MPWU promised that it would raise this matter at the Cabinet Meeting and inform its result to the Survey Team through e-mail.

12. Start Point and End Point of Objective Section

- The MPWU confirmed the objective section requested by the MPWU for reconstruction of the Nippon Causeway is approximately 3.2 km, with its start and end point as shown in **Table9-1 of Annex 9**.

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Table 1-1 Cross Section Alternatives (Section with utilities Separated from Causeway Structure)

| Alternatives | | Alternative 1 | Alternative 2 | Alternative 3 |
|---------------|-------------|---|---|--|
| Cross Section | | | | |
| Description | | <ul style="list-style-type: none"> ● Carriage way width is 3.0m, while shoulder/footpath width is 1.5m. ● The other spaces are used for RC boxes for utilities. ● Utilities are laid out on both sides. ● Space for utilities is to be secured twice the size of the present utilities considering future demand increase. ● Possibility that whether RC box part for small utilities such as telecommunication cable and electric power cable can be utilized as footpath or not will be studied. | <ul style="list-style-type: none"> ● Carriage way width is 3.0m, while shoulder/footpath width is 1.5m. ● The other spaces including the center median are used for RC boxes for utilities. ● Water pipe is placed on the center of road, which plays a role as center median. ● Telecommunication and electric power cables are laid out on both sides. ● This alternative has the advantage that three types of utilities could be placed with being completely separated. ● Space for utilities is to be secured in the same manner as Alternative 1. ● Possibility that whether RC box for telecommunication cable and electric power cable placed on both sides can be utilized as footpath or not will be studied. | <ul style="list-style-type: none"> ● Carriage way width is 3.0m, while shoulder/footpath width is 1.75m. ● All utilities are placed on the lagoon side avoiding the ocean side that stronger waves strike than the lagoon side. ● Road width is wider than that of the other alternatives. ● This alternative has the advantage that utilities could be placed under the road surface along the section where a large amount of sand has accumulated on lagoon side. ● Disadvantage of this alternative is to shift the road center line by about 75 cm from the current center line. ● Space for utilities is to be secured in the same manner as Alternative 1. ● Possibility that whether RC box part for telecommunication cable and electric power cable can be utilized as footpath or not will be studied. |
| Comments | Survey Team | Not preferable : This alternative is less attractive than the other alternatives in terms of advantages. | Preferable : Maintenance work will be easier than the other alternatives, because three types of utilities are installed with being completely separated. | Most preferable : Road width is wider than the other alternatives because space for utilities can be made most compact among all alternatives. |
| | MPWU | — | Preferable | Most preferable |

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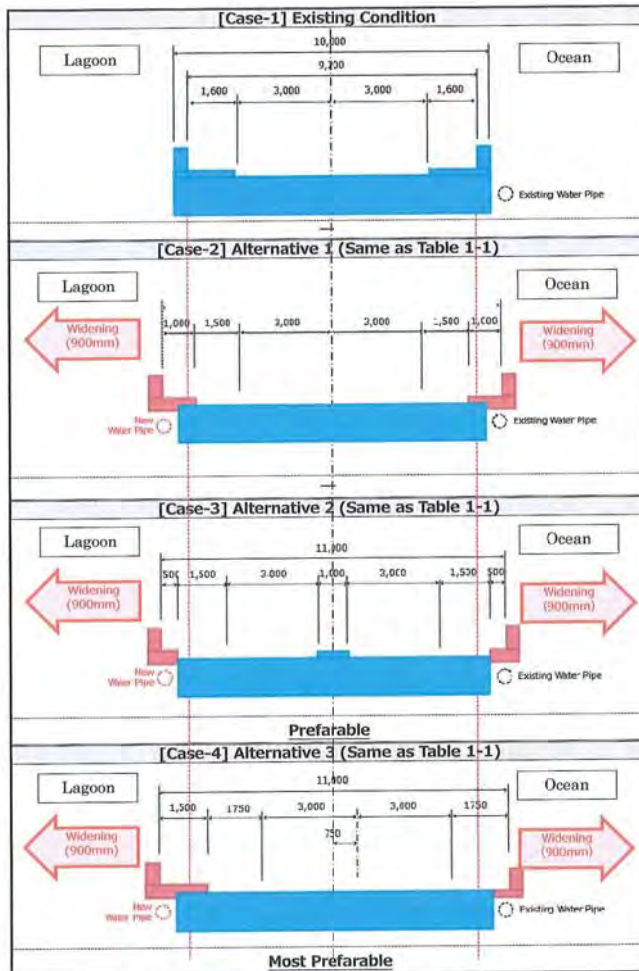


Figure 1-1 Cross Section Alternatives (Bridge Section)

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Table 2-1 Recommended Tidal Levels

| Levels related to Tide | Design Tide at the Original Design | Recommended Design Tidal Level | | |
|----------------------------------|--|--------------------------------|---------------------------------|--|
| | | High Tide (King Tide) | King Tide (Under El Niño Phase) | King Tide (under El Niño and Sea Level Rise) |
| Tidal Level (m) | MHWS +2.54 | HWL +2.85 | +2.85 | +2.85 |
| Level Rise due to El Niño event | — | — | +25cm | +25cm |
| Level Rise due to Climate Change | — | — | — | +20cm |
| Design Tide (m) | +2.54 | +2.85 | +3.10 | +3.30 |
| Road Design | ---- | o | ---- | ---- |
| Revetment and Parapet* | | o | o | o |
| Remarks | *: Design tidal levels shown in this table are used as the basis for estimation of external forces striking revetment and overtopping rates at the top of parapet through study on each event's combination, its occurrence probability and allowable wave overtopping volume. | | | |

Datum: SEAFRAME, MHWS(Mean High Water Spring) ≈ HWL(High Water Level)

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Table 3-1 Overtopping Rate and Limits (Ocean Side- Preliminary)

| Items | Original Design | Case of Analysis | | | | | | |
|--|-----------------|---|--------------------------------------|--|-------------------------|---|---|--|
| | | Design Tidal Level (Base) | | | Sensitive Analysis | | | |
| | | High Tide (King Tide) | King Tide (Under El Niño Phase) | King Tide (under El Niño and Sea Level Rise) | Long Period (King Tide) | Long Period Medium Offshore Wave Height (King Tide) Under El Niño | Medium Wave Offshore Height (King Tide) | Daily Offshore Wave Height (King Tide) |
| Offshore Wave Height (m) | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 3.5 | 3.5 | 2.0 |
| Offshore Wave Period (s) | 9.3 | 9.3 | 9.3 | 9.3 | 15.0 | 15.0 | 9.3 | 9.3 |
| Design Tidal Level (m) | +2.54 | +2.85 | +3.10 | +3.30 | +2.85 | +3.30 | +3.10 | +2.85 |
| Wave Height at Revetment (m) | 0.70 | 0.82 | 0.89 | 0.95 | 0.92 | 0.86 | 0.74 | 0.63 |
| Parapet Height (m) | +4.54 | +5.0 | +5.0 | +5.0 | +5.0 | +5.0 | +5.0 | +5.0 |
| Overtopping Rate (m ³ /m/s) | 0.00 | 0.00 (0.01: Existing Parapet Height) | 0.01 (0.02: Existing Parapet Height) | 0.02 (0.03: Existing Parapet Height) | 0.01 | 0.01 | 0.00 | 0.00 |
| Permissible Overtopping Rate (m ³ /m/s) | — | 0.02 | | | | | | |
| Applied Conditions | — | limit for vehicles under traffic control, but prevention of road damage | | | | | | |

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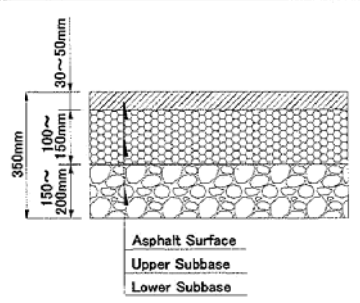
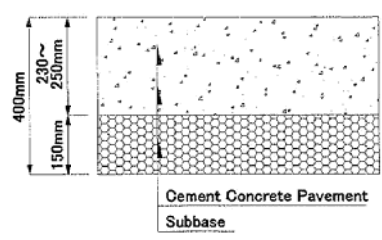
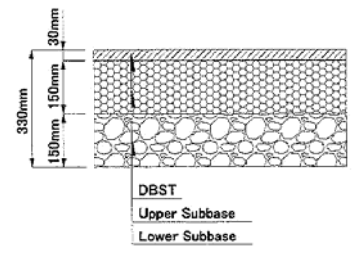
Table 3-2 Overtopping Rate and Limits (Lagoon Side - Preliminary)

| Items | Original Design | Case of Analysis | | | | |
|--|-----------------|---|---------------------------------|--|-------------------------|--|
| | | Design Tidal Level (Base) | | | Sensitive Analysis | |
| | | High Tide (King Tide) | King Tide (Under El Niño Phase) | King Tide (under El Niño and Sea Level Rise) | Long Period (King Tide) | Daily Offshore Wave Height (King Tide) |
| Offshore Wave Height (m) | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 2.0 |
| Offshore Wave Period (s) | 9.3 | 9.3 | 9.3 | 9.3 | 15.0 | 9.3 |
| Design Tidal Level (m) | +2.54 | +2.85 | +3.10 | +3.30 | +2.85 | +2.85 |
| Wave Height at Revetment (m) | 0.70 | 0.98 | 1.08 | 1.15 | 1.11 | 0.86 |
| Parapet Height (m) | +4.54 | +5.00 | +5.00 | +5.00 | +5.00 | +5.00 |
| Overtopping Rate (m ³ /m/s) | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 |
| Permissible Overtopping Rate (m ³ /m/s) | — | 0.02 | | | | |
| Applied Conditions | — | limit for vehicles under traffic control, but prevention of road damage | | | | |

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Table4-1 Comparison of Pavement Types

| Items | [ALT-1] Asphalt Concrete | [ALT-2] Cement Concrete | [ALT-3] DBST (Double Bituminous Surface Treatment) |
|--------------------|---|---|---|
| Pavement Structure |  <p>Asphalt Surface Upper Subbase Lower Subbase</p> |  <p>Cement Concrete Pavement Subbase</p> |  <p>DBST Upper Subbase Lower Subbase</p> |
| Initial Period*1 | 10 years | 20years | 3 to 5 years |
| Maintenance | <ul style="list-style-type: none"> ➤ The pavement is maintained by patching and sealing as routine maintenance. ➤ Overlay of the pavement is required every 10 years. | <ul style="list-style-type: none"> ➤ The pavement is maintained by patching and sealing as routine maintenance. ➤ Resurfacing of the pavement is required every 20 years. | <ul style="list-style-type: none"> ➤ The pavement is maintained by patching and sealing as routine maintenance. ➤ Overlay or Resurfacing of the pavement are required every 3 to 5 years. |
| Total Evaluation | Study Team | Pavement types will be studied in consideration of initial cost and life cycle cost (LCC). | |
| | MPWU | It is desirable to be chosen the cheapest pavement type in consideration of the initial cost and the life cycle cost. | |

*1: Asphalt concrete pavement is required overlay after 10 years, Cement concrete pavement is required resurfacing after 20 years, DBST is required resurfacing of overlay after 3 to 5 years.

Shoulder pavement types will be studied including concrete type in consideration of the overtopping impact.

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Table 5-1 Improvement Measures of Revetment

| Alternative | 【Option-1】: Present Slope Maintained | 【Option-2】: Overlaid with Fabrimat | 【Option-3】: Foot Protection Steel Sheet Pile |
|--------------------|---|---|--|
| Conceptual Sketch | | | |
| Description | The present slope is maintained. The identified cracks and cavities under the slope should be filled. A repair of the slope covered with the accumulated sand is not required. New parapet wall is installed and the height of the road should be raised. | New fabrimat is overlaid on the present fabrimat slope. (The thickness of the new mat is 15 cm or 20 cm)The identified cracks and cavities under the slope should be filled. The existing foot protection will be removed, and covered with sand mats. New parapet wall is installed and the height of the road should be raised. | The sheet pile is driven at the slope toe to prevent scoring and sand suction. The slope should be maintained or overlaid by the fabrimat, if required. New parapet wall is installed and the height of the road should be raised. |
| Applicable Section | Sections where current damage and potential risk of damage is small. | Sections where relatively large damage and serious cracks including voids are observed. | Large section of Biriki side facing the ocean. |

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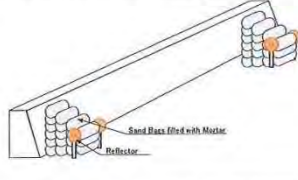
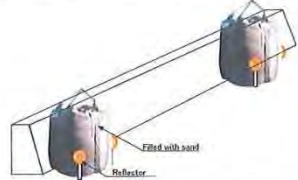
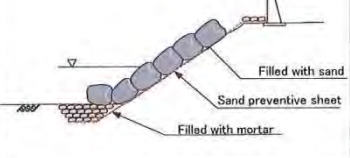
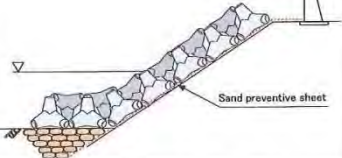
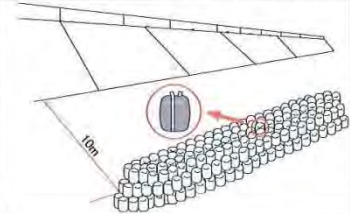
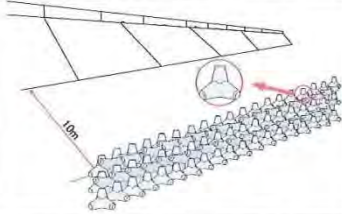
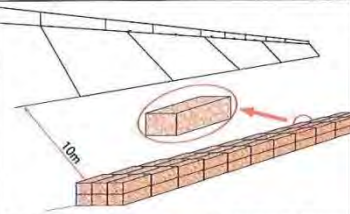

| Main activities | 2015 | | | | | 2016 | | |
|--|------|---|----|----|----|------|---|---|
| | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| Preparation and submission of application form | ■ | | | | | | | |
| Evaluation of application form (screening) | | ■ | | | | | | |
| Public consultation meeting | | ■ | | | | | | |
| Preparation of draft BEIA | | ■ | ■ | ■ | | | | |
| Checking of draft BEIA by MPWU | | | | ■ | | | | |
| Submission of draft BEIA | | | | ■ | | | | |
| Evaluation of draft BEIA (around 3 months) | | | | | ■ | ■ | ■ | |
| Public display of draft BEIA (1 month) (public consultation meeting if requested) | | | | | ■ | | | |
| Finalization of BEIA (1 week) | | | | | | | | ■ |
| Decision making and processing of license (around 2 weeks) | | | | | | | | ■ |
| Issuance of environmental license | | | | | | | | ■ |

Grey bar: task of MPWU/JICA Black bar: task of ECD

Figure 6-1 Schedule of Environmental License acquisition (in case of BEIA)

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Table7-1 (1/3) Comparison chart of emergency countermeasures

| Parapet protection | | |
|---------------------|--|--|
| Method | Mortar sandbags (P-1) | Large sandbags (P-2) |
| Conceptual diagram |  |  |
| Outline | Install mortar sandbags behind the parapet by manpower | Install weather resistant large sandbags behind the parapet by using backhoe |
| Slope protection | | |
| Method | Large sandbags (SL-1) | Wave-dissipating blocks (SL-2) |
| Conceptual diagram |  |  |
| Outline | Install geotextile sheet on the slope, then install weather resistant large sandbags on a slope for slope protection | Install geotextile sheet on the slope, then install wave dissipating block on a slope for slope protection and wave dissipation. |
| Offshore breakwater | | |
| Method | Large sandbags (SL-3) | Wave-dissipating blocks (SL-4) |
| Conceptual diagram |  |  |
| Outline | Construct offshore breakwater around 10m from the slope toe by weather resistant large sandbags | Construct offshore breakwater around 10m from the slope toe by blocks |
| Method | Gabions (SL-5) | Soldier pile and lagging method (SL-6) |
| Conceptual diagram |  |  |
| Outline | Install gabions around 10m from the slope to bay backhoe | Apply soldier pile and lagging method. Drive steel sheet piles at the foot of the slope toe and install timbers |

Taka

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Table7-1 (2/3) Comparison chart of emergency countermeasures

| Method | Parapet protection | | | | | | Slope protection | | | | | | |
|----------------------------------|--|---|---|--|--|--|--|-------|----------------------------------|--|------|-------------|---|
| | Mortar sandbags (P-1) | | | Large sandbags (P-2) | | | Large sandbags (SL-1) | | | Wave-dissipating blocks (SL-2) | | | |
| Conceptual diagram | manpower | | | | | | | | | | | | |
| Outline | Install mortar sandbags behind the parapet by manpower | | | Install weather resistant large sandbags behind the parapet by using backhoe | | | Install geotextile sheet on the slope, then install weather resistant large sandbags on a slope for slope protection | | | Install geotextile sheet on the slope, then install wave dissipating block on a slope for slope protection and wave dissipation. | | | |
| Main equipment | ✓ Dump truck 4t (owned by MPWU) | | | ✓ Back hoe (owned by MPWU) ✓ Dump truck 4t (owned by MPWU) | | | ✓ Back hoe (owned by MPWU) ✓ Dump truck 4t (owned by MPWU) ✓ Truck crane | | | ✓ Truck crane 2 nos. ✓ Concrete mixer | | | |
| Budget allocation (plan) | | MPWU | JICA | | MPWU | JICA | | MPWU | JICA | | MPWU | JICA | |
| | Sandbags | ○ | × | Large sandbags | × | ○ | L- sandbags/geotex sheet | × | ○ | Cement | × | ○ | |
| | Sand | ○ | × | sand | ○ | × | Sand | ○ | × | Aggregates | × | ○ | |
| Labor | ○ | × | Dump truck/backhoe | ○ | × | Dump truck/backhoe | ○ | × | Geotextile sheet | ○ | × | Supervision | × |
| Assumed burden charge for 2,520m | A\$ 41,000 | ¥ | Assumed burden charge for 2,520m | A\$ 60,000 | ¥ | Assumed burden charge for 2,500m | A\$ 0.38M | ¥ | Assumed burden charge for 2,500m | A\$ 5.2M | ¥ | | |
| Workability /construction Period | Easy | | | Easy | | | Easy execution. Because installation work shall be done by a crane set on the causeway. | | | Necessary for large fabrication and storage yard. Needs long period for fabrication. Installation work shall be done by a crane set on the causeway. | | | |
| Applicable policies | Where concrete parapet exists. | | | | | | Construction shall be conducted where large damages are observed. | | | | | | |
| Location plan | | | | | | | | | | | | | |
| Const. length | 2,520m | | | | | | 1,000m | | | | | | |
| Characteristic | It will not work if the slopes collapse. | | | It will not work if the slopes collapse. Sand shall be filled in the large sandbags. | | | Contents of sandbags shall be coral sand | | | Diversion use shall be possible. | | | |
| Comments | Study team: Better to conduct with slope protection | MPWU: Better to conduct with slope protection | Study team: Better to conduct with slope protection | MPWU: Better to conduct with slope protection | Study team: Easy execution and repair. | MPWU: The best, but no availability of crane | Study team: Needs long period High cost | MPWU: | | | | | |

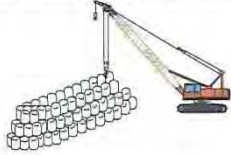
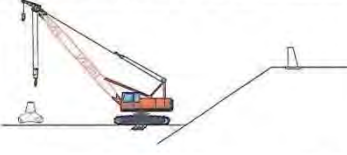

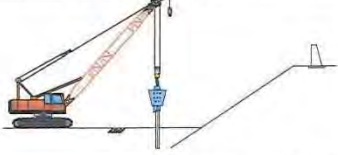
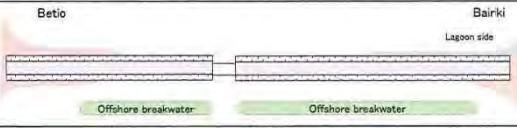
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Table7-1 (3/3) Comparison chart of emergency countermeasures

| Offshore breakwater | | | | | | | | | | | | |
|----------------------------------|--|----------|------|---|----------|------|--|----------|------|--|-------|------|
| Method | Large sandbags (SL-3) | | | Wave-dissipating blocks (SL-4) | | | Gabions (SL-5) | | | Soldier pile and lagging method (SL-6) | | |
| Conceptual diagram |  | | |  | | |  | | |  | | |
| Outline | Construct offshore breakwater around 10m from the slope toe by weather resistant large sandbags | | | Construct offshore breakwater around 10m from the slope toe by blocks | | | Install gabions around 10m from the slope to bay backhoe | | | Apply soldier pile and lagging method. Drive steel sheet piles at the foot of the slope toe and install timbers | | |
| Main equipment | <ul style="list-style-type: none"> ✓ Back hoe (owned by MPWU) ✓ Dump truck 4t (owned by MPWU) ✓ Crawler crane ✓ Concrete mixer | | | <ul style="list-style-type: none"> ✓ Truck crane (for fabrication) ✓ Crawler crane (for installation) ✓ Concrete mixer | | | <ul style="list-style-type: none"> ✓ Back hoe (owned by MPWU) ✓ Dump truck 4t (owned by MPWU) ✓ Concrete mixer | | | <ul style="list-style-type: none"> ✓ Crawler crane ✓ Vibratory hammer | | |
| Budget allocation (plan) | | MPWU | JICA | | MPWU | JICA | | MPWU | JICA | | MPWU | JICA |
| | Large sandbags | × | ○ | Cement | ○ | × | Gabions | × | ○ | H beams | × | ○ |
| | cement | ○ | × | Aggregates | ○ | × | Rubble stones | × | ○ | | × | ○ |
| | Aggregates | ○ | × | Dump truck/backhoe | ○ | × | Sump truck/backhoe | ○ | × | Crawler crane | △ | △ |
| | Dump truck/backhoe | ○ | × | Concrete mixer | ○ | × | Concrete mixer | ○ | × | Vibratory hammer | △ | △ |
| | Concrete mixer | ○ | × | Crawler crane | △ | △ | Labor | ○ | × | Labor | × | ○ |
| | Crawler crane | △ | △ | Truck crane | △ | △ | Supervision | × | ○ | Supervision | × | ○ |
| | Labor | × | ○ | Labor | ○ | × | | | | | | |
| | Supervision | × | ○ | Supervision | × | ○ | | | | | | |
| | Assumed burden charge for 2,700m | A\$ 2.2M | ¥ | Assumed burden charge for 2,700m | A\$ 6.9M | ¥ | Assumed burden charge for 2,700m | A\$ 1.3M | ¥ | Assumed burden charge for 2,700m2. | A\$ | ¥ |
| Workability /construction Period | Poor. Because installation can be done only low tide. Workable hours shall be only more or less 60hours per month for installation works | | | Poor. Because necessary for large fabrication and storage yard. Needs long period for fabrication. Installation work shall be done only low tide. Workable hours shall be only more or less 60hours per month for installation works. | | | Poor. Because necessary for large storage yard. Installation work shall be done only low tide. Workable hours shall be only more or less 60hours per month for installation works. | | | Poor. Because necessary for large storage yard. Installation work shall be done only low tide. Workable hours shall be only more or less 60hours per month for installation works. | | |
| Applicable policies | Construction shall be conducted except sandy shore of ocean side, sandbag slopes are constructed and channel. | | | | | | | | | | | |
| Location plan |  | | | | | | | | | | | |
| Const. length | 2,700m | | | | | | | | | | | |
| Characteristic | Mortar shall be filled in the large sandbags. | | | Diversion use shall be possible | | | Necessary to import rubble stones. | | | Diversion use for materials shall not be expected for main construction works. | | |
| Comments | Study team: Needs long period | MPWU: | | Study team: Needs long period High cost | MPWU: | | Study team: Needs long period | MPWU: | | Study team: Needs long period | MPWU: | |

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Annex 8

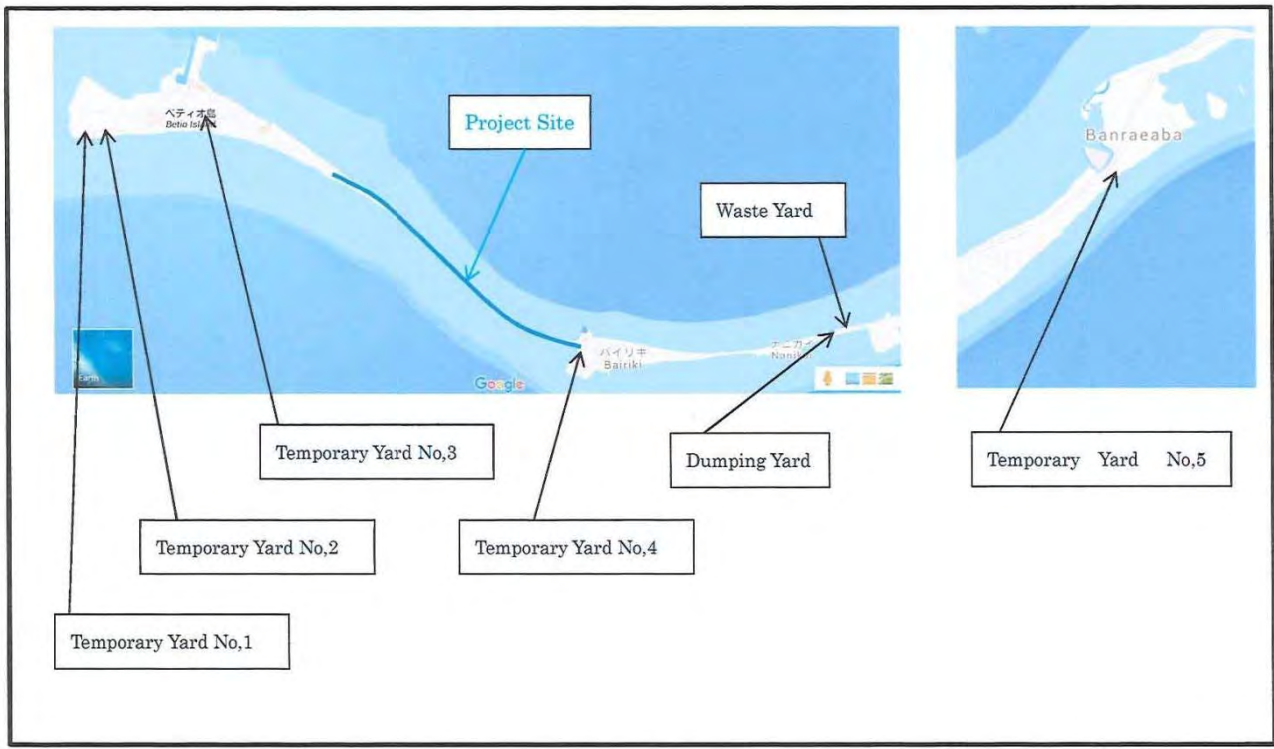
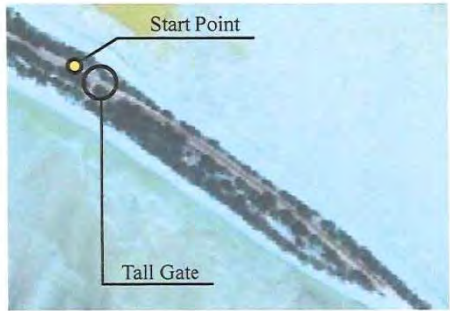





Figure8-1 Candidate Construction Yards

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Table9-1 Start Point and End Point of Objective Section

| Start Point | End Point |
|--|---|
|  <p>Start Point</p> <p>Tall Gate</p> |  <p>Parabolic Antenna</p> <p>Mary's Motel</p> <p>End Point</p> |
|  <p>Start Point</p> |  <p>End Point</p> |
| <p>Start point of objective section is edge of lagoon side parapet near the tall gate.</p> | <p>End point of objective section is in front of the parabolic antenna near the Mary's Motel.</p> |

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AP7-17

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Appendix-8: ソフトコンポーネント計画

キリバス国ニッポン・コースウェイ改修計画準備調査

ソフトコンポーネント計画書

(1) ソフトコンポーネントを計画する背景

我が国の無償資金協力「漁船水路・島嶼連絡路建設計画」（1985 年）により整備されたニッポン・コースウェイ（長さ 3.2km、幅 11m）は、同国に一つしかない国際港が位置するベシオ島と行政機関及び住民が多く居住するバイリキ島を結ぶライフラインとしての唯一の道路である。このコースウェイは、老朽化に加えて、潮流や気候変動の影響とされる高潮等による浸食が進み崩落が頻発している。公共事業省（MPWU）による補修工事は実施されているものの、盛土の流出防止や護岸改修等の抜本的な対策となっておらず、またその補修方法も不十分であるため、今後護岸が更に崩壊し、道路の機能を失うことが懸念される。

本プロジェクトでコースウェイ本体の改修・強靱化を実施するとともに、持続的な効果発現のために、供用後の適切な維持管理が求められる。そこで、本プロジェクトにおいて、ソフトコンポーネントを組み込むことにより、MPWU によりコースウェイの維持管理が適切に実施されるよう、補修工法等にかかる技術移転を実施するものである。

(2) ソフトコンポーネントの目標

ソフトコンポーネントの目標は、「プロジェクト完成後、キリバス国側によるコースウェイの維持管理が持続的かつ効果的に実施される。」であり、この目標が達成されることにより、無償資金協力事業の効果が持続的に発現することが期待される。

(3) ソフトコンポーネントの成果

本コンポーネントで達成すべき成果は以下のとおりである。

- ① 舗装及び護岸の損傷原因、補修方法等が理解される。
- ② 舗装及び護岸の維持管理マニュアルが作成される。
- ③ 舗装及び護岸の補修技術が習得される。

(4) 成果達成度の確認方法

- ① 維持管理マニュアルの完成（組織と役割、日常点検、補修方法等を含む）
- ② アンケートによる C/P の理解度

(5) ソフトコンポーネントの活動（投入計画）

【対象者】

- ・MPWU の道路維持管理担当者 約 10 名

道路維持管理（点検・補修）は、MPWU の道路維持管理担当者の直営により実施されている。必要に応じて、地元コミュニティと契約をし、マンパワーを確保している状況である。よって、本ソフトコンポーネントでは、MPWU の道路維持管理担当者が、コースウェイを適切に維持管理できるようになることを目指す。また、MPWU が地元コミュニティに維持管理方法を指導できるよう、技術支援を行う。

| | 舗装小補修（ポットホール補修） | 護岸小補修 |
|------------|--|--|
| 現状の維持管理レベル | <ul style="list-style-type: none"> ■維持管理計画がない <ul style="list-style-type: none"> ・点検・清掃が実施されていない。 ・維持管理計画がなく、損傷が発生してから事後的に対応。予算の配布も事後対応である。 ・損傷が長期間放置され、拡大する傾向にある。 ■補修技術の不足 <ul style="list-style-type: none"> ・砂を詰め、足で踏み固める等の技術しかない。 | <ul style="list-style-type: none"> ■維持管理計画がない <ul style="list-style-type: none"> ・点検が実施されていない。 ・維持管理計画がなく、損傷が発生してから事後的に対応。予算の配布も事後対応である。 ・損傷が長期間放置され、拡大する傾向にある。 ■補修技術の不足 <ul style="list-style-type: none"> ・空洞に砂を詰め、水締めする等の技術しかない。 <ul style="list-style-type: none"> ・チップングなどはせず、クラックにモルタルを塗布（剥離しやすい）。 |
| 目指すべきレベル | <ul style="list-style-type: none"> ■維持管理計画に基づく実施 <ul style="list-style-type: none"> ・維持管理計画に基づき、点検や補修を実施する。 ・維持管理を実施するための予算を事前に確保する。 ・点検・清掃が実施できるようになる。 ■補修技術の向上 <ul style="list-style-type: none"> ・ポットホールを適切に補修できるようになる。（清掃、常温合材の投入、締め）・地元コミュニティに指導できるようになる。 | <ul style="list-style-type: none"> ■維持管理計画に基づく実施 <ul style="list-style-type: none"> ・維持管理計画に基づき、点検や補修を実施する。 ・維持管理を実施するための予算を事前に確保する。 ・点検を実施できるようになる。 ■補修技術の向上 <ul style="list-style-type: none"> ・護岸のクラックを適切に補修できるようになる。（チップング、モルタル塗布） <ul style="list-style-type: none"> ・地元コミュニティに指導できるようになる。 |

（専門家） 護岸補修1名、舗装補修1名（計2.30M/M）

（活動内容）

持続的な維持管理を実施するために、維持管理マニュアルを作成する。また、セミナーにて、道路損傷事例や補修方法を学んだ上で、現場補修実習も行い実践的な能力を身につけ、本事業完成後に小規模補修が確実にできるような活動を行う。

なお、補修実習箇所は、一般道路のポットホールが出来ている箇所と、ニッポン・コースウェイと同種の護岸でのクラックが入っている箇所を選定して行う。これにより、ニッポン・コースウェイの維持管理が行えるよう技術習得する。

- ・ 維持管理計画の策定：5日（舗装5日）
- ・ 維持管理マニュアルの作成：10日（舗装・護岸それぞれ5日）
- ・ セミナー準備：4日（舗装・護岸それぞれ2日）
- ・ セミナー実施：4日（舗装・護岸それぞれ2日）
- ・ 補修実習：32日（舗装・護岸それぞれ16日）
- ・ その他（移動・内容振り返り）：14日

| 活動項目 | 団員（日数） | | 実施時期 | | |
|-------------------------|--------|----|---------------------|---------|---------|
| | 舗装 | 護岸 | 2019年1月 | 2019年2月 | 2019年3月 |
| 出国／移動 | 2 | 2 | ■ | | |
| 維持管理計画の策定（CP協議2日，作成3日） | 5 | | ■ ■ | | |
| 補修マニュアルの作成（CP協議2日，作成3日） | 5 | 5 | ■ ■ ■ | | |
| セミナー準備 | 2 | 2 | | ■ | |
| セミナー（予備日含む） | 2 | 2 | | ■ | |
| 現場補修実習（護岸・舗装小補修） | 16 | 16 | ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ | | |
| ソフトコン内容振り返り（アンケート） | 2 | 2 | | ■ | |
| JICA事務所報告／帰国 | 4 | 2 | | | ■ ■ |

なお、補修実習の内訳は以下のとおりである。

<実施演習>

| 舗装小補修（ポットホール補修） | 護岸小補修 |
|--|--|
| <ul style="list-style-type: none"> 定期点検(舗装・排水溝)、ポットホール補修・排水溝清掃 10人を3～4人のパーティに分けて実施 1パーティあたり3日(点検・補修・清掃) 地元コミュニティへの指導(コンサルタント補助)2日 稼働率0.7と想定 <p>∴ (3パーティ×3日間+2日間) ÷ 0.7 ≒ 16日間</p> | <ul style="list-style-type: none"> 定期点検(護岸)、護岸小補修 10人を3～4人のパーティに分けて実施 1パーティあたり3日(点検・補修) 地元コミュニティへの指導(コンサルタント補助)2日 稼働率0.7と想定 <p>∴ (3パーティ×3日間+2日間) ÷ 0.7 ≒ 16日間</p> |

各活動の具体的内容、対象者、実施方法、実施期間、事業主体、成果品の各項目について、表1に示す。

(6) ソフトコンポーネントの実施リソースの調達方法

維持管理にかかる技術支援を行うにあたり、「キ国」ではローカルコンサルタントの人材の確保が難しく再委託型は困難であるため、邦人コンサルタント要員を用いて技術支援を行う受注コンサルタント直接支援型こととする。

また、法人コンサルタントとともに活動の実施体制を管理し、機材調達や関係機関との調整等を支援するため、MPWUの維持管理部署から担当者を1名カウンターパートとして配置する。ソフトコンポーネントの活動を円滑に進めるとともに、「キ国」側のオーナーシップの醸成を狙いとしている。

(7) ソフトコンポーネントの実施工程

本工事の概略計画を含む全体工程（表2）のとおり。

(8) ソフトコンポーネントの成果品

- ① ソフトコンポーネント計画完了計画書（和文）
- ② アスファルト舗装並びに護岸の維持管理マニュアル（英文）

(9) 相手国負担事項

本事業にて改修されるコーズウェイは、キリバス国公共事業省（MPWU）が運営維持管理を実施する。上記のソフトコンポーネントの目標達成にあたり、この前提条件に基づいて、キリバス国側が責任をもって実施すべき活動内容は、以下のとおりである。

- ・ カウンターパートの提供（土木技術課（CES）の職員）
- ・ 研修施設の提供（MPWU 内の会議室の使用）
- ・ 邦人コンサルタントの作業室の提供
- ・ 舗装及び護岸の補修演習にかかる資材費用（セメント等）
- ・ 舗装及び護岸の補修実習にかかる建設機材（MPWU 所有）

また、ソフトコンポーネントを含むプロジェクト完了後も、継続的に維持管理が実施されるよう、下記の点を「キ」国側の責務事項として認識させ、実施するよう求める。

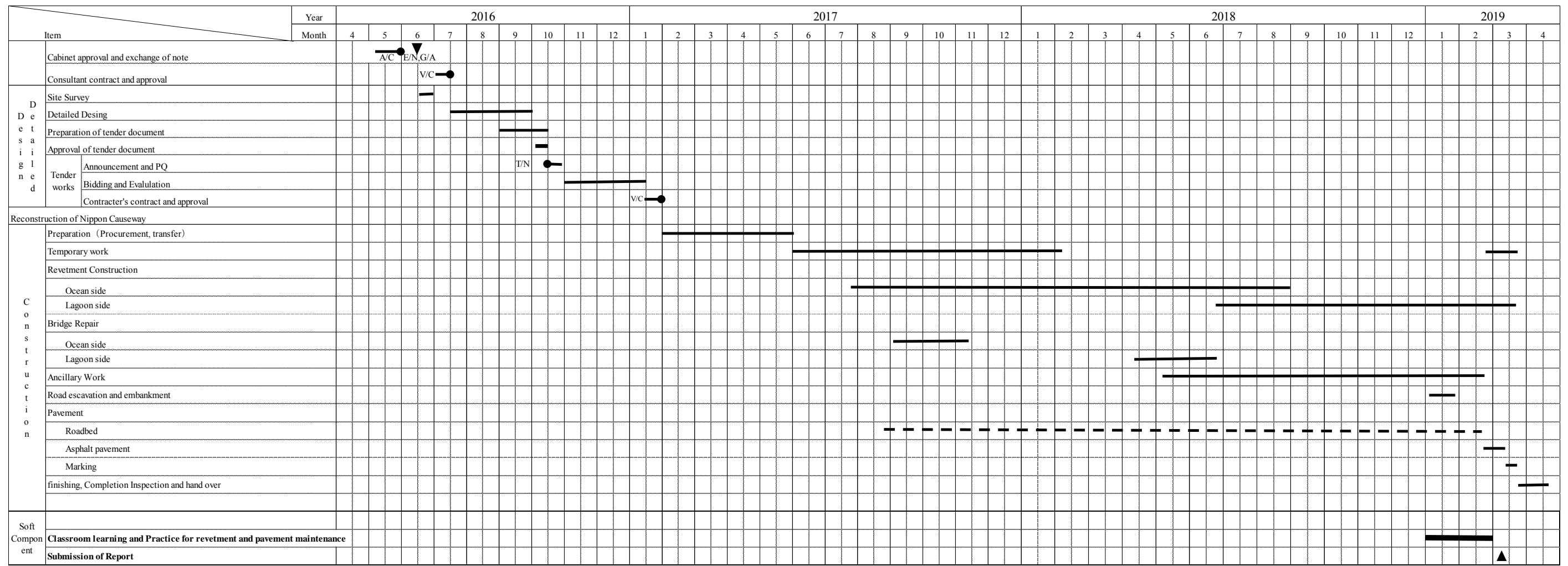
- 維持管理計画に基づく点検・補修・清掃の実施
- 定期的な点検・補修のための予算配布の実施
 - これまでは補修が必要な際に、閣議に申請して補修費用を受け取るという事後対応であった。プロジェクト完了後は、毎年維持管理予算が確保されることが必要である。

阻害要因として、維持管理の重要性の理解不足により、予算が配賦されないことが挙げられる。予算の財源としては、ニッポン・コーズウェイの料金収入を充てることを見込まれるが、現状のような事後的な配賦ではなく、維持管理のために事前に予算が配賦されることが必要である。予算の配賦や維持管理の継続的な実施については、セミナーや補修実習を通してその重要性を強く説明していくとともに、可能な限り「キ」国側に、維持管理予算の配賦と継続的な実施をコミットさせることが望ましい。

表1 ソフトコンポーネント活動計画

| 成果 | 活動内容 | 実施方法 | 期間 | ターゲットグループ | 実施リソース | 成果品 |
|----------------------------|----------|---|------------|----------------------|---------------------------------------|----------------------------|
| ① 舗装及び護岸の損傷原因、補修方法等が理解される。 | ・セミナー | ・以下をセミナーにて説明する -アスファルト舗装の破損の種類とその原因 -点検、補修工法、緊急時の対応 | 2019年1月～2月 | MPWU 土木技術課の職員 10名 | 法人コンサルタント 2.70MM カウンターパート 1名 | ・維持管理マニュアル |
| ② 舗装及び護岸の維持管理マニュアルが作成される。 | ・マニュアル作成 | ・点検から補修までの方法が記載されたマニュアルを、C/Pと協働して作成する。 | | MPWU 土木技術課の職員 4名 | | |
| ③ 舗装及び護岸の補修技術が習得される。 | ・現場実習 | ・護岸補修並びにアスファルト小補修(ポットホール) | | MPWU 土木技術課の職員 10名 | | ・完了報告書(アンケートによる理解度評価の結果含む) |

表 2 本体工事の概略計画を含む全体工程



Completion Report
O&M Manual

Appendix-9:舗装タイプ別費用算出表

Precondition

割引率 i = 12 %
 解析期間 = 20 年

LCC

| No. | Year | Discounted *1 | Asphalt Concrete Pavement | | | Cement Concrete Pavement | | | DBST | | | Remarks |
|-------|------|------------------|------------------------------|----------------------|----------------------|-----------------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|--------------|
| | | | Initial Cost (JPY) | Maintenance (JPY) | Total | Initial Cost (JPY) | Maintenance (JPY) | Total | Initial Cost (JPY) | Maintenance (JPY) | Total | |
| 1 | 2015 | 1.000 | | | | | | | | | | |
| 2 | 2016 | 0.893 | | | | | | | | | | |
| 3 | 2017 | 0.797 | | | | | | | | | | |
| 4 | 2018 | 0.712 | 965,393,000 | | 965,393,000 | 1,197,618,000 | | 1,197,618,000 | 816,105,000 | | 816,105,000 | Construction |
| 5 | 2019 | 0.636 | | | | | | | 794,000 | | | 供用初年 |
| 6 | 2020 | 0.567 | | | | | | | 1,419,000 | | | 供用2年目 |
| 7 | 2021 | 0.507 | | | | | | | 176,479,000 | | 176,479,000 | 供用3年目 |
| 8 | 2022 | 0.452 | | | | | | | 565,000 | | | 供用4年目 |
| 9 | 2023 | 0.404 | | 505,000 | 505,000 | | | | 1,010,000 | | | 供用5年目 |
| 10 | 2024 | 0.361 | | 451,000 | 451,000 | | | | 125,614,000 | | 125,614,000 | 供用6年目 |
| 11 | 2025 | 0.322 | | 402,000 | 402,000 | | | | 402,000 | | | 供用7年目 |
| 12 | 2026 | 0.287 | | 719,000 | 719,000 | | | | 719,000 | | | 供用8年目 |
| 13 | 2027 | 0.257 | | 642,000 | 642,000 | | | | 89,410,000 | | 89,410,000 | 供用9年目 |
| 14 | 2028 | 0.229 | | 121,282,000 | 121,282,000 | | | | 286,000 | | | 供用10年目 |
| 15 | 2029 | 0.205 | | | | | 256,000 | | 512,000 | | | 供用11年目 |
| 16 | 2030 | 0.183 | | | | | 228,000 | | 63,640,000 | | 63,640,000 | 供用12年目 |
| 17 | 2031 | 0.163 | | | | | 204,000 | | 204,000 | | | 供用13年目 |
| 18 | 2032 | 0.146 | | | | | 182,000 | | 364,000 | | | 供用14年目 |
| 19 | 2033 | 0.130 | | 163,000 | 163,000 | | 163,000 | | 45,298,000 | | 45,298,000 | 供用15年目 |
| 20 | 2034 | 0.116 | | 145,000 | 145,000 | | 145,000 | | 145,000 | | | 供用16年目 |
| 21 | 2035 | 0.104 | | 130,000 | 130,000 | | 207,000 | | 259,000 | | | 供用17年目 |
| 22 | 2036 | 0.093 | | 231,000 | 231,000 | | 185,000 | | 14,496,000 | | 14,496,000 | 供用18年目 |
| 23 | 2037 | 0.083 | | 207,000 | 207,000 | | 165,000 | | 103,000 | | | 供用19年目 |
| 24 | 2038 | 0.074 | | 39,050,000 | 39,050,000 | | 72,546,000 | | 72,546,000 | | | 供用20年目 |
| Total | | | 965,393,000 | 163,927,000 | 1,129,320,000 | 1,197,618,000 | 74,281,000 | 1,270,164,000 | 816,105,000 | 521,903,000 | 1,331,042,000 | |
| Ratio | | | 1.18 | | 1.00 | 1.47 | | 1.12 | 1.00 | | 1.18 | |

*1: ASSHTO(P.I-49)より

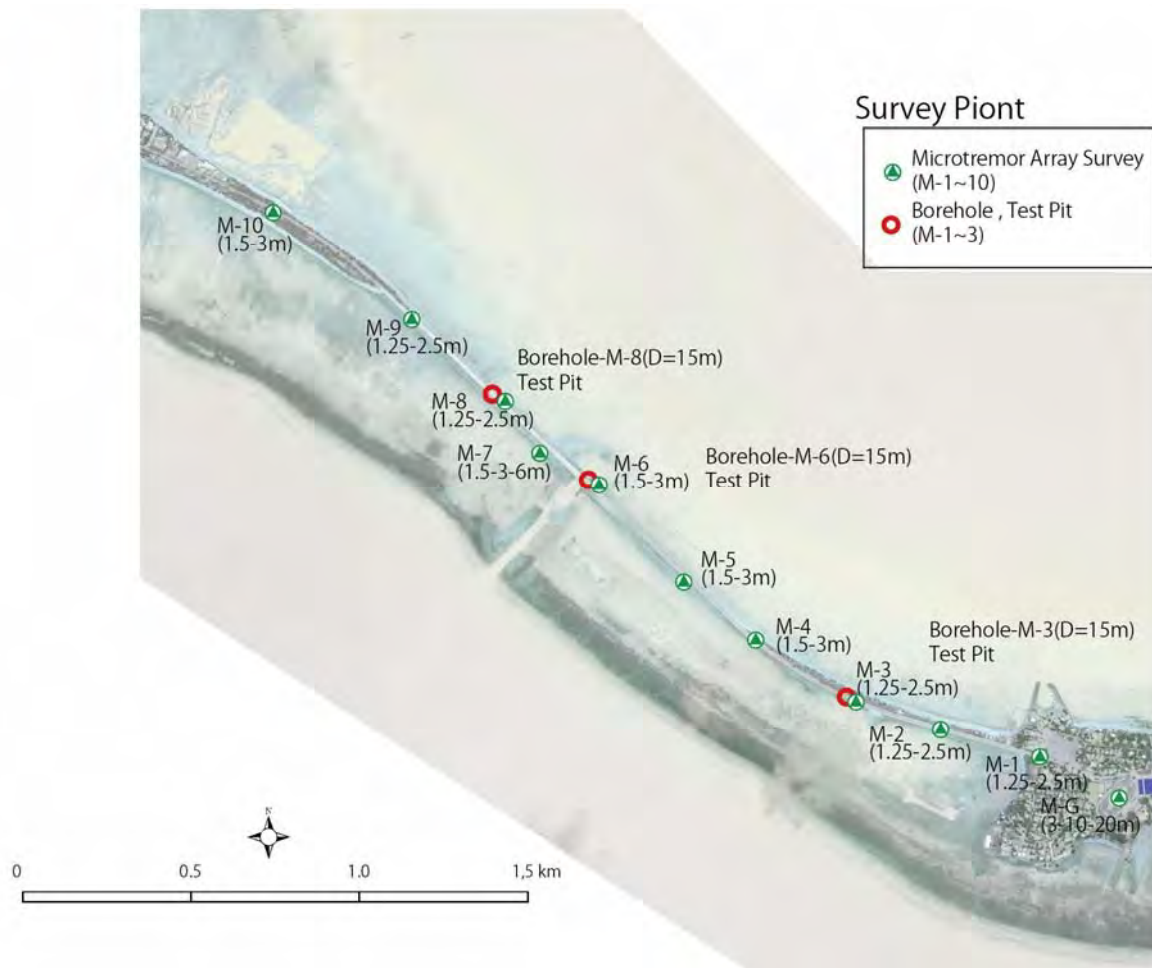
Initial Cost

| Asphalt Concrete Pavement | | | | | |
|-----------------------------|--------------------|-----------|------------|-----------|-------------|
| Items | Unit Cost (JPY/m2) | Width (m) | Length (m) | Area (m2) | Cost (JPY) |
| Asphalt (t=50mm) | 15,000 | 10 | 1,570 | 14,915 | 223,725,000 |
| | 15,000 | 11 | 1,660 | 18,260 | 273,900,000 |
| Upper Base Course (t=150mm) | 7,000 | 10 | 1,570 | 14,915 | 104,405,000 |
| | 7,000 | 11 | 1,660 | 18,260 | 127,820,000 |
| Lower Base Course (t=150mm) | 7,100 | 10 | 1,570 | 14,915 | 105,896,500 |
| | 7,100 | 11 | 1,660 | 18,260 | 129,646,000 |
| Total | | | | | 965,392,500 |

| Cement Concrete Pavement | | | | | |
|-----------------------------|--------------------|-----------|------------|-----------|---------------|
| Items | Unit Cost (JPY/m2) | Width (m) | Length (m) | Area (m2) | Cost (JPY) |
| Cement Concrete (t=250mm) | 29,000 | 10 | 1,570 | 14,915 | 432,535,000 |
| | 29,000 | 11 | 1,660 | 18,260 | 529,540,000 |
| Lower Base Course (t=150mm) | 7,100 | 10 | 1,570 | 14,915 | 105,896,500 |
| | 7,100 | 11 | 1,660 | 18,260 | 129,646,000 |
| Total | | | | | 1,197,617,500 |

| DBST | | | | | |
|---------------------------|--------------------|-----------|------------|-------------|-------------|
| Items | Unit Cost (JPY/m2) | Width (m) | Length (m) | Volume (m3) | Cost (JPY) |
| DBST (t=30mm) | 10,500 | 10 | 1,570 | 14,915 | 156,607,500 |
| | 10,500 | 11 | 1,660 | 18,260 | 191,730,000 |
| Upper Base Course (150mm) | 7,000 | 10 | 1,570 | 14,915 | 104,405,000 |
| | 7,000 | 11 | 1,660 | 18,260 | 127,820,000 |
| Lower Base Course (150mm) | 7,100 | 10 | 1,570 | 14,915 | 105,896,500 |
| | 7,100 | 11 | 1,660 | 18,260 | 129,646,000 |
| Total | | | | | 816,105,000 |

Appendix-10: 地質調查結果



Map of the survey points

Stratigraphic formations

| 土層区分 Soil Facies | S 波速度 Swave velocity m/sec | S 波からの換算 N 値 Mean Converted N value* | 実測 N 値の平均値 Mean measured N value* |
|--|----------------------------------|--|---|
| 道路盛土 Road embankment | 72~291 | 8 | 21 |
| 固結したサンゴ礁最上部層 cemented reef top sediment(cay rock) | ~500 | 19 | 31 |
| 未固結堆積物層 unconsolidated sediment(sand and gravel) | ~500 | 19 | 15 |
| サンゴ層 Corals | 500~600 | 50~ | - |
| 溶脱した石灰岩層 leached limestone | 600~ | - | - |

The s-wave structure detected by the microtremor array survey

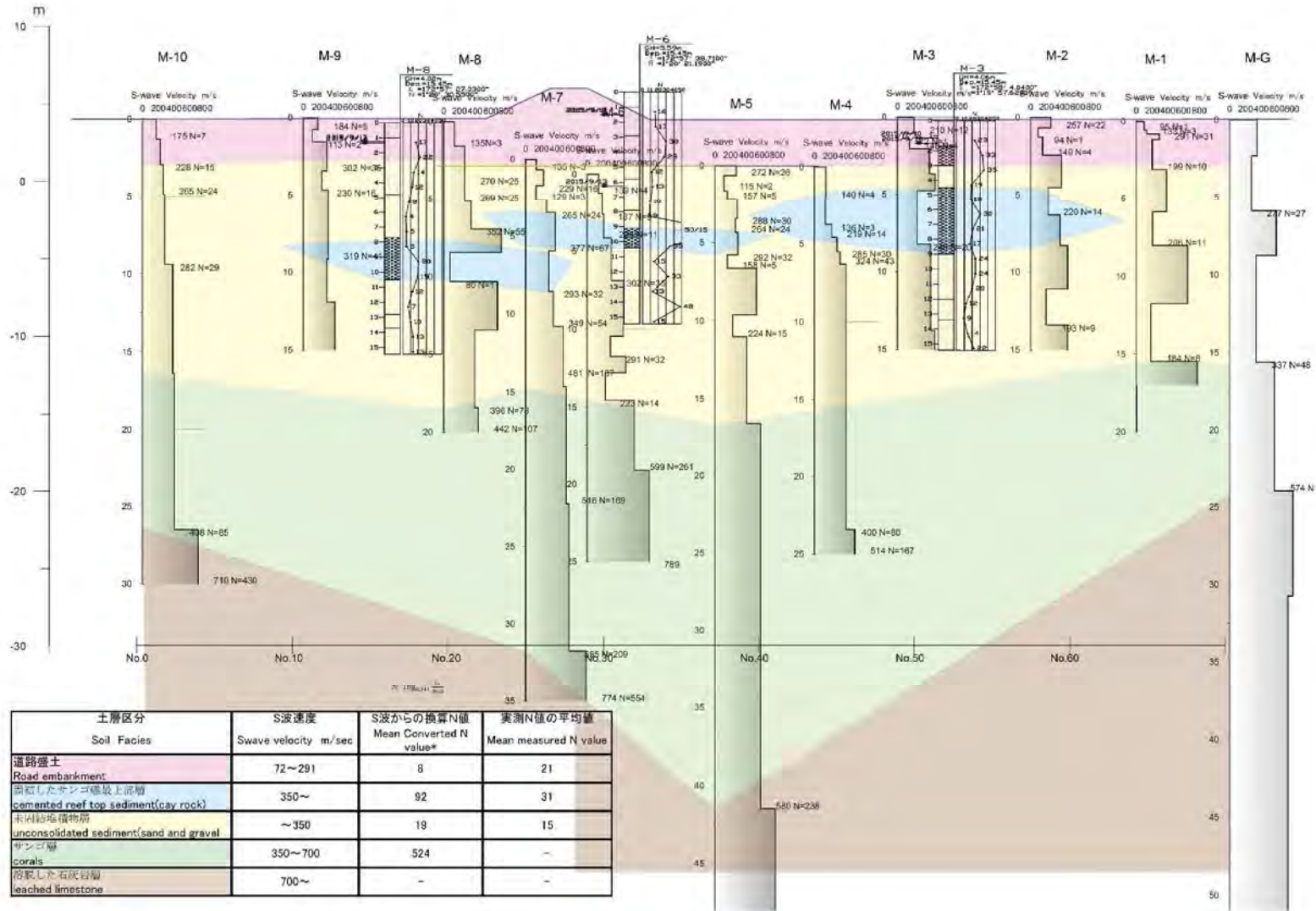
Bairiki Side

| M-01 | | | M-02 | | | M-03 | | | M-04 | | | M-05 | | | M-06 | | |
|-----------------------|-------------|---------|-----------------------|-------------|---------|-----------------------|-------------|---------|-----------------------|-------------|---------|-----------------------|-------------|---------|-----------------------|-------------|---------|
| S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m |
| 95 | 0.6 | 0.6 | 257 | 0.7 | 0.7 | 210 | 1.1 | 1.1 | 140 | 2.0 | 2.0 | 272 | 0.6 | 0.6 | 139 | 1.2 | 1.2 |
| 133 | 0.3 | 0.8 | 94 | 0.6 | 1.3 | 72 | 0.3 | 1.4 | 136 | 1.7 | 3.8 | 115 | 1.0 | 1.6 | 187 | 1.4 | 2.6 |
| 291 | 0.4 | 1.2 | 149 | 1.2 | 2.4 | 148 | 0.7 | 2.1 | 219 | 0.8 | 4.6 | 157 | 0.5 | 2.1 | 205 | 1.5 | 4.1 |
| 199 | 1.9 | 3.1 | 391 | 2.1 | 4.5 | 407 | 1.6 | 3.7 | 285 | 0.9 | 5.5 | 288 | 1.3 | 3.4 | 302 | 2.7 | 6.9 |
| 388 | 2.8 | 5.9 | 220 | 1.8 | 6.3 | 480 | 1.1 | 4.8 | 324 | 0.8 | 6.3 | 264 | 0.9 | 4.3 | 460 | 3.6 | 10.5 |
| 206 | 2.2 | 8.0 | 373 | 2.0 | 8.3 | 248 | 3.5 | 8.2 | 400 | 17.1 | 23.4 | 292 | 1.5 | 5.8 | 291 | 1.3 | 11.8 |
| 656 | 3.7 | 11.8 | 472 | 2.8 | 11.1 | 420 | 5.6 | 13.8 | 514 | | | 158 | 0.9 | 6.6 | 492 | 1.0 | 12.8 |
| 184 | 3.7 | 15.5 | 193 | 2.3 | 13.4 | 476 | | | | | | 533 | 3.0 | 9.6 | 223 | 1.8 | 14.6 |
| 776 | | | 468 | | | | | | | | | 224 | 1.4 | 11.0 | 599 | 4.6 | 19.1 |
| | | | | | | | | | | | | 407 | 5.6 | 16.6 | 789 | | |
| | | | | | | | | | | | | 580 | 24.87 | 41.49 | | | |
| | | | | | | | | | | | | 776 | | | | | |

Betio Side

| M-07 | | | M-08 | | | M-09 | | | M-10 | | |
|-----------------------|-------------|---------|-----------------------|-------------|---------|-----------------------|-------------|---------|-----------------------|-------------|---------|
| S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m | S-wave Velocity (m/s) | Thickness m | Depth m |
| 135 | 0.7 | 0.7 | 135 | 1.6 | 1.6 | 184 | 0.8 | 0.8 | 175 | 1.3 | 1.3 |
| 229 | 1.0 | 1.7 | 270 | 2.1 | 3.6 | 113 | 0.8 | 1.6 | 228 | 1.6 | 2.9 |
| 129 | 0.9 | 2.6 | 269 | 1.5 | 5.1 | 302 | 1.9 | 3.4 | 265 | 1.9 | 4.9 |
| 265 | 0.9 | 3.5 | 352 | 1.8 | 7.0 | 230 | 1.2 | 4.7 | 282 | 4.5 | 9.4 |
| 377 | 2.5 | 5.9 | 739 | 1.5 | 8.5 | 319 | 4.5 | 9.2 | 387 | 7.0 | 16.4 |
| 293 | 2.6 | 8.5 | 80 | 1.9 | 10.3 | 300 | 2.8 | 11.9 | 408 | 9.7 | 26.1 |
| 349 | 2.3 | 10.8 | 689 | 3.1 | 13.5 | 403 | | | 710 | | |
| 481 | 3.9 | 14.7 | 396 | 5.0 | 18.4 | | | | | | |
| 516 | 7.6 | 22.2 | 442 | | | | | | | | |
| 555 | 9.5 | 31.7 | | | | | | | | | |
| 774 | | | | | | | | | | | |

| |
|---------------|
| Embankment |
| Sediment |
| Cemented Reef |
| Corals |
| Limestone |






Geological cross section in longitude direction

DRILLING LOG

PROJECT NAME The Project for Reconstruction of Nippon Causeway on Tarawa to Adapt Climate Change in Republic of Kiribati

PROJECT NAME _____

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
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| | | | | | | | | | | | |
|-----------|--|--|----------------|---|---------------------------|-----------------|---|----------------|-----------------|---|--|
| Hole No. | M-3 | | Location | No. 49+32.6m L5.0m | | | | Latitude | 1° 19' 57.62" | | |
| Client | Japan International Cooperation Agency (JICA) | | | Period | 09/Sep/2015 ~ 11/Sep/2015 | | | Longitude | 172° 58' 04.04" | | |
| Surveyer | CTI Engineering International Co., Ltd. Contact | | Chief Engineer | Gose Shingo | | Charge Engineer | Tamura Masaharu | | Core Appraiser | Tamura Masaharu | |
| Elevation | GH=4.06m | | Dip |  | | Direction |  | | Angle |  | |
| Depth | 15.45m | | Equipment | Drilling Machine | | YBM 05DA2 | | Hummer Dropper | Hook | | |
| | | | | Engine | | YANMAR NFD9 | | Pump | YBM GP-5 | | |

| Scale (m) | Elevation (m) | Thickness (m) | Depth (m) | Core Log | Classification | Color | Relative Density | Note | Standard Penetration Test | | | | | Insite Test | | Sampling | | Drilling Date | | |
|-----------|---------------|---------------|-----------|----------|----------------|-------|------------------|---|---------------------------|-------------|----|----|---------|-------------|------------------|-----------|-----|---------------|--------|---------------|
| | | | | | | | | | Water Table (m) / Date | Blow / 10cm | | | N Value | Depth (m) | Test Name Result | Depth (m) | No. | | Method | Lab Test Name |
| | | | | | | | | | | 0 | 10 | 20 | | | | | | | | |
| | | | | | | | | Medium sand with Pebble Gravel content 6% Low water content | 9.10 | 6 | 7 | 10 | 23 | | | | | | | |
| | 2.36 | 1.70 | 1.70 | | | | | Coral rock (Pebble) with sand Medium~Very Coarse sand Rock is hard Low water content | 1.50 | 7 | 12 | 14 | 33 | | | | | | | |
| | 1.06 | 1.30 | 3.00 | | | | | Very Coarse main size Fine~Medium sand content Common water content | 2.45 | 10 | 11 | 14 | 35 | | | | | | | |
| | -0.44 | 1.30 | 4.50 | | | | | Weathering Coral rock Broken by hammer Matrix is Very Coarse~Very Fine sand | 3.45 | 5 | 6 | 8 | 19 | | | | | | | |
| | | | | | | | | Very Coarse~Medium sand Massive Depth 8~10.0m: Pebble | 4.45 | 4 | 5 | 9 | 18 | | | | | | | |
| | | | | | | | | Fine~Medium grain size sand With Pebble content 6% High water content | 5.45 | 16 | 8 | 8 | 30 | | | | | | | |
| | | | | | | | | Very Coarse~Coarse grain size sand Fine~Medium sand content High water content | 6.45 | 4 | 7 | 6 | 17 | | | | | | | |
| | -7.91 | 3.00 | 12.00 | | | | | | 7.45 | 7 | 8 | 9 | 24 | | | | | | | |
| | -9.34 | 1.40 | 13.40 | | | | | | 8.45 | 4 | 4 | 4 | 12 | | | | | | | |
| | | | | | | | | | 9.45 | 7 | 8 | 9 | 24 | | | | | | | |
| | | | | | | | | | 10.45 | 8 | 7 | 5 | 20 | | | | | | | |
| | | | | | | | | | 11.45 | 4 | 4 | 4 | 12 | | | | | | | |
| | | | | | | | | | 12.45 | 5 | 3 | 3 | 9 | | | | | | | |
| | | | | | | | | | 13.45 | 3 | 4 | 7 | 14 | | | | | | | |
| | | | | | | | | | 14.45 | 0 | 4 | 12 | 22 | | | | | | | |
| | -11.39 | 2.05 | 15.45 | | | | | | 15.45 | | | | | | | | | | | |

Hole No. : M-3
Location : No. 49+32.6m L5.0m
Elevation: GH=4.06m



DRILLING LOG

PROJECT NAME The Project for Reconstruction of Nippon Causeway on Tarawa to Adapt Climate Change in Republic of Kiribati

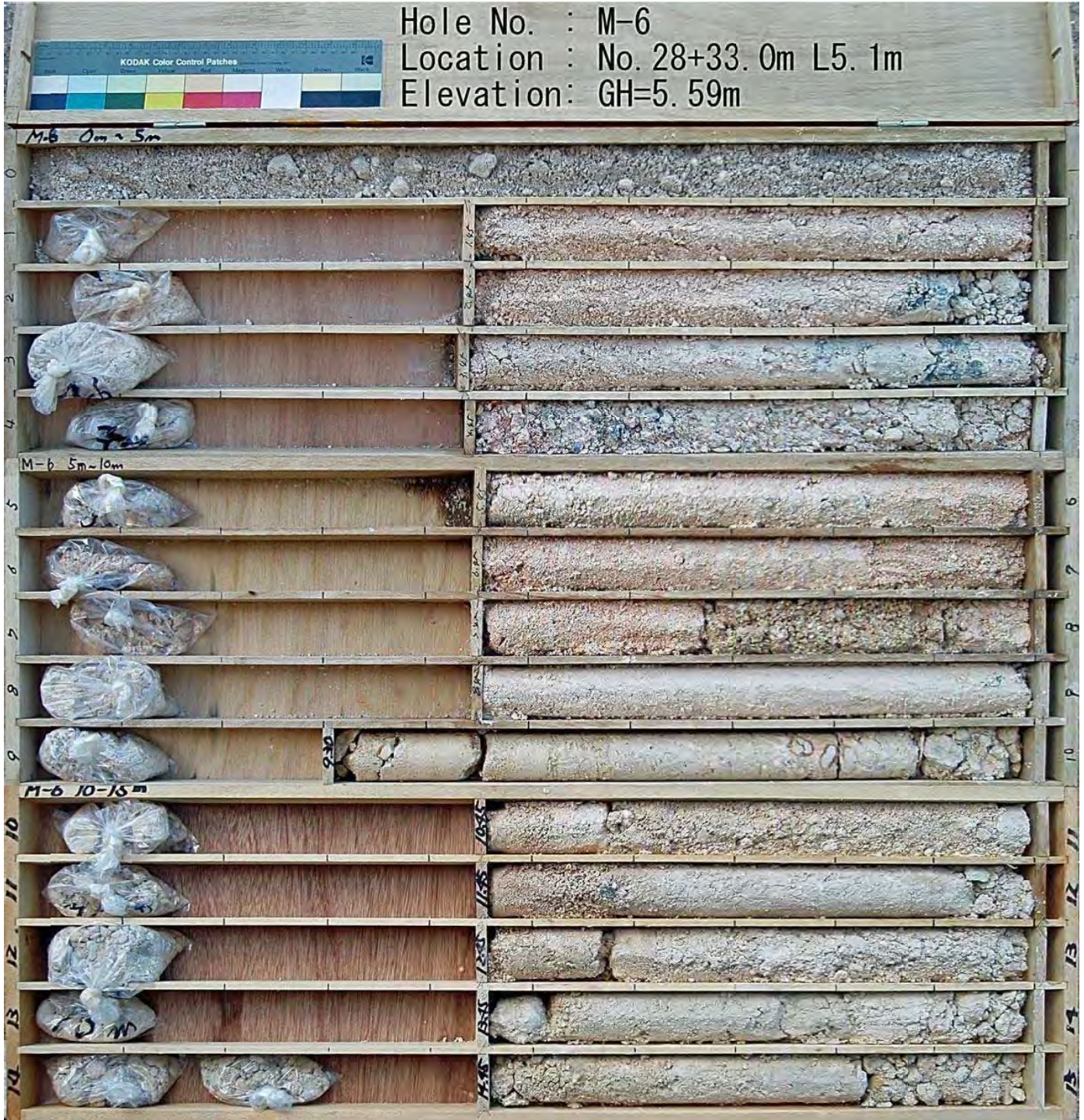
PROJECT NAME _____

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| | | | | | | | | | | |
|-----------|---|--|----------------|--------------------|---------------------------|-----------------|----------------|-----------------|-----------------|----------------|
| Hole No. | M-6 | | Location | No. 28+33.0m L5.1m | | | | Latitude | 1° 20' 21.19" | |
| Client | Japan International Cooperation Agency (JICA) | | | Period | 11/Sep/2015 ~ 13/Sep/2015 | | | Longitude | 172° 57' 38.71" | |
| Surveyer | CTI Engineering International Co., Ltd. Contact | | Chief Engineer | Gose Shingo | Charge Engineer | Tamura Masaharu | Core Appraiser | Tamura Masaharu | Driller | Uwano Tomohisa |
| Elevation | GH=5.59m | | | | | YBM 05DA2 | | Hummer Dropper | | Hook |
| Depth | 15.45m | | | | | YANMAR NFD9 | | Pump | | YBM GP-5 |

| Scale (m) | Elevation (m) | Thickness (m) | Depth (m) | Collum | Classification | Color | Relative Consistency | Note | Water Table (m) / Date | Standard Penetration Test | | | | | Insite Test | | Sampling | | Drilling Date | | |
|-----------|---------------|---------------|-----------|--------|----------------|--------|----------------------|---|------------------------|---------------------------|-------------|----|------------------------|---------|-------------|------------------|-----------|-----|---------------|--------|---------------|
| | | | | | | | | | | Depth (m) | Blow / 10cm | | Blow Count / Fine (cm) | N Value | Depth (m) | Test Name Result | Depth (m) | No. | | Method | Lab Test Name |
| | | | | | | | | | | | 0 | 10 | | | | | | | | | |
| | 4.59 | 1.00 | 1.00 | | Sand | Grey | | Course sand with Pebble Gravel content 5% Low water content | 9/12 1.02 | 3 | 6 | 7 | 16 | | | | | | | | |
| | | | | | Sand | Brown | | Very Coarse~Coarse grain sand Pebble content 5% Massive Low water content | 9/12 1.40 | 7 | 2 | 8 | 17 | | | | | | | | |
| | 2.69 | 1.90 | 2.90 | | Sand | Medium | | Medium~Very Coarse sand With Grumule~Pebble (Coral rock) Rock is hard Gravel content 30% Common water content | 9/12 2.43 | 14 | 8 | 8 | 30 | | | | | | | | |
| | | | | | Sand | White | | Medium sand with Pebble Massive Gravel content 5% Low water content | 9/12 3.45 | 7 | 9 | 12 | 28 | | | | | | | | |
| | -0.21 | 2.90 | 5.80 | | Sand | White | | Depth 7.7~7.9m: Very Coarse sand High water content | 9/12 4.15 | 3 | 4 | 5 | 12 | | | | | | | | |
| | | | | | Sand | White | | Fine sand Common water content | 9/12 5.15 | 3 | 6 | 4 | 13 | | | | | | | | |
| | -2.31 | 2.10 | 7.90 | | Sand | White | | Fine sand Common water content | 9/12 6.41 | 3 | 3 | 4 | 10 | | | | | | | | |
| | | | | | Sand | White | | Fine sand Common water content | 9/12 7.43 | 2 | 3 | 4 | 9 | | | | | | | | |
| | -3.51 | 1.30 | 9.10 | | Sand | White | | Fine sand Common water content | 9/12 8.15 | 2 | 3 | 4 | 9 | | | | | | | | |
| | | | | | Sand | White | | Fine sand Common water content | 9/12 9.17 | 2 | 3 | 4 | 9 | | | | | | | | |
| | | | | | Sand | White | | Fine sand Common water content | 9/12 9.70 | 2 | 3 | 4 | 9 | | | | | | | | |
| | -4.81 | 1.30 | 10.40 | | Sand | White | | Weathering Coral rock Broken by hammer Matrix is Very Coarse~Very Fine sand | 9/12 10.15 | 10 | 12 | 13 | 35 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 10.45 | 3 | 6 | 6 | 15 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 11.15 | 9 | 10 | 14 | 33 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 12.13 | 4 | 5 | 4 | 13 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 12.45 | 7 | 7 | 10 | 24 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 13.15 | 4 | 5 | 4 | 13 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 14.12 | 7 | 7 | 10 | 24 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 14.45 | 15 | 15 | 15 | 45 | | | | | | | | |
| | -9.86 | 5.05 | 15.45 | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 15.13 | 15 | 15 | 15 | 45 | | | | | | | | |
| | | | | | Sand | White | | Fine~Very Coarse grain size sand With Pebble content 5~10% Heterogeneity Common~High water content | 9/12 15.45 | 15 | 15 | 15 | 45 | | | | | | | | |

Hole No. : M-6
Location : No. 28+33.0m L5.1m
Elevation: GH=5.59m



DRILLING LOG

PROJECT NAME The Project for Reconstruction of Nippon Causeway on Tarawa to Adapt Climate Change in Republic of Kiribati

PROJECT NAME _____

| | | | | | | | | | |
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| | | | | | | | | | | | |
|-----------|--|--|----------------|-------------------|---------------------------|-----------------|----------------|------------------|-----------------|----------------|----------|
| Hole No. | M-8 | | Location | No. 19+4.4m L5.0m | | | | Latitude | 1° 20' 30.55" | | |
| Client | Japan International Cooperation Agency (JICA) | | | Period | 14/Sep/2015 ~ 15/Sep/2015 | | | Longitude | 172° 57' 27.03" | | |
| Surveyer | CTI Engineering International Co., Ltd. Contact | | Chief Engineer | Gose Shingo | Charge Engineer | Tamura Masaharu | Core Appraiser | Tamura Masaharu | Driller | Uwano Tomohisa | |
| Elevation | GH=4.02m | | | Direction | Angle | Level | Equipment | Drilling Machine | YBM 05DA2 | | |
| Depth | 15.45m | | | | | | | | Hummer Dropper | Hook | |
| | | | | | | | | Drilling Engine | YANMAR NFD9 | Pump | YBM GP-5 |

| Scale (m) | Elevation (m) | Thickness (m) | Depth (m) | Collume | Classification | Color | Relative Consistency | Note | Water Table (m) / Date | Standard Penetration Test | | | | Insite Test | | Sampling | | Drilling Date |
|-----------|---------------|---------------|-----------|---------|----------------|-------|----------------------|---|------------------------|---------------------------|-------------|------------------------|----|-------------|------------------|-----------|-----|---------------|
| | | | | | | | | | | Depth (m) | Blow / 10cm | Blow Count / Pene (cm) | | Depth (m) | Test Name Result | Depth (m) | No. | |
| | | | | | | | | | | | | 0 | 10 | | | | | |
| | 3.02 | 1.00 | 1.00 | | Sand | Grey | | Fine~Medium sand with Pebble Gravel content 5~10% Poor water content | | 1.15 | 4 | 8 | 8 | 17 | | | | |
| | | | | | Sand | White | | Fine~Very Coarse sand with Pebble Gravel content 15% Many blue colored gravel Heterogeneity High water content | | 1.43 | 6 | 7 | 9 | 22 | | | | |
| | | | | | Sand | Grey | | Fine~Very Coarse grain sand with Pebble Gravel content 15~20% High water content | | 2.15 | 6 | 7 | 9 | 22 | | | | |
| | | | | | Sand | Grey | | Depth 8~5.0m: Fine sand | | 2.44 | 4 | 5 | 5 | 14 | | | | |
| | -0.78 | 3.80 | 4.80 | | Sand | Grey | | Fresh coral rock gravel with sand Gravel size is Pebble~Core Maximum core length is 30cm Matrix is Fine~Very Coarse sand High water content | | 3.15 | 4 | 5 | 5 | 14 | | | | |
| | | | | | Sand | Grey | | Fine~Medium sand with Pebble Gravel content 45% High water content | | 3.45 | 3 | 6 | 3 | 12 | | | | |
| | | | | | Sand | Grey | | Medium grain sand with Pebble Gravel content 45% Low water content | | 4.15 | 3 | 6 | 3 | 12 | | | | |
| | | | | | Sand | Grey | | Course~Very Coarse grain sand with Pebble Gravel content 45% Low water content | | 4.63 | 2 | 3 | 3 | 8 | | | | |
| | | | | | Sand | Grey | | | | 5.15 | 2 | 3 | 3 | 8 | | | | |
| | | | | | Sand | Grey | | | | 5.43 | 1 | 2 | 1 | 4 | | | | |
| | | | | | Sand | Grey | | | | 6.15 | 1 | 2 | 1 | 4 | | | | |
| | | | | | Sand | Grey | | | | 6.43 | 1 | 2 | 1 | 4 | | | | |
| | | | | | Sand | Grey | | | | 7.15 | 1 | 2 | 1 | 4 | | | | |
| | | | | | Sand | Grey | | | | 7.43 | 1 | 2 | 1 | 4 | | | | |
| | | | | | Sand | Grey | | | | 8.15 | 1 | 2 | 1 | 4 | | | | |
| | | | | | Sand | Grey | | | | 8.43 | 3 | 12 | 5 | 20 | | | | |
| | | | | | Sand | Grey | | | | 9.15 | 5 | 6 | 8 | 19 | | | | |
| | | | | | Sand | Grey | | | | 10.15 | 3 | 4 | 5 | 15 | | | | |
| | | | | | Sand | Grey | | | | 10.43 | 2 | 3 | 2 | 7 | | | | |
| | | | | | Sand | Grey | | | | 11.15 | 3 | 4 | 5 | 15 | | | | |
| | | | | | Sand | Grey | | | | 11.43 | 2 | 3 | 2 | 7 | | | | |
| | | | | | Sand | Grey | | | | 12.15 | 2 | 3 | 2 | 7 | | | | |
| | | | | | Sand | Grey | | | | 12.43 | 3 | 4 | 6 | 13 | | | | |
| | | | | | Sand | Grey | | | | 13.15 | 3 | 4 | 6 | 13 | | | | |
| | | | | | Sand | Grey | | | | 13.43 | 3 | 4 | 6 | 13 | | | | |
| | | | | | Sand | Grey | | | | 14.15 | 3 | 4 | 6 | 13 | | | | |
| | | | | | Sand | Grey | | | | 14.43 | 3 | 4 | 6 | 13 | | | | |
| | | | | | Sand | Grey | | | | 15.15 | 3 | 4 | 6 | 13 | | | | |
| | | | | | Sand | Grey | | | | 15.43 | 3 | 4 | 6 | 13 | | | | |

Hole No. : M-8
Location : No. 19+4.4m L5.0m
Elevation: GH=4.02m

