Chapter 3 Project Evaluation

3.1 Precondition

The precondition for the Project with regards to the obligation of Kiribati are the following:

- Temporary yard, stockyard, borrow pit and waste treatment area for the construction works shall be secured by the Kiribati side after the E/N.
- The E/N and G/A shall be followed and duty exemption requested shall be provided.
- Construction procedures for the products from Japan and third countries shall be taken rapidly.
- Consultation and support shall be provided by the Kiribati side, if any problems come up between the local people and third parties during the construction phase.

3.2 Necessary Input by Recipient Country

The following matters should be dealt with by the recipient country to develop and sustain the effect of the Project.

- The budget described in "2.5.1.2 Kiribati Contribution", of this report shall be secured in advance in order to smoothly implement the Project.
- The securing temporary yard and etc., shall be completed before the start of construction work.
- Though the removal of the road lightings along causeway shall be done by contractors, the securing of the storage space for the removed road lightings and installation of road lighting after the completion of the Project shall be implemented by the Kiribati side.
- Maintenance work shall be implemented and the necessary personal and budget shall be secured in accordance with "2.4 Project Operation Plan", in the report

3.3 Important Assumption

Nothing is noteworthy as important assumption.

3.4 Project Evaluation

3.4.1 Relevance

Implementation of the Project under Japanese Grant Aid has been determined to be valid for the following reasons:

- As described above, the causeway is only the road to connect Betio Island where the international port exists and Bairiki Island where the headquarters of administrative agencies and residential area are located. Therefore, it is expected that the Project will benefit a considerable number of people in Kiribati.

- The effect of the Project is a secure, safe and a smooth travel along Nippon causeway. These would consequently contribute to the improvement of people's living condition.
- By the full scale repair and strengthening of Nippon causeway, the maintenance cost of revetment for Nippon causeway will be remarkably reduced.
- Negative environmental and social impacts of the Project are relatively small.
- Operation and maintenance after the Project can be implemented by the Kiribati side under its own budget and staff without the need for very advance skill and technology.

3.4.2 Effectiveness

(1) Quantitative Effects

The expected quantitative effects of the Project are 1) the reduction of annual road traffic control day due to natural disaster, 2) the reduction of the revetment collapse, 3) the improvement of travel speed and 4) the reduction of maintenance/repair cost for revetment.

Indicators	Reference Value (Actual Value in 2015)	Target Value (2022) (After 3 years in service)
Number of day for road traffic control due to natural disaster	28 days (revetment repair work by king tide)	0 day
No. of revetment collapse	6 times	0 time
Average Travel Speed	20 km/h	40 km/h
Maintenance/repair cost for revetment	381,408 AUD	28,599 AUD

(1) Target Value of Average Travel Speed

Though the alignment of Nippon causeway are almost straight and flat and the design speed is 60 km/h, the free speed is assumed to be 50 km/h due to many trucks traffic. As it is also considered that the average toll payment time and waiting time at toll gate is 35 seconds and stopped time at roundabout near the end point is 15 seconds, the average travel speed is calculated as 40 km/h.

Travel time along Nippon causeway $= 3.2\ \text{km} / 50\ [\text{km/h}] \times 3600 + 35\ \text{sec.} + 15\ \text{sec.}$

$= 28.0\ \text{sec.} = 0.078\ \text{hour}$

Travel speed along Nippon causeway $= 3.2\ \text{km} / 0.078 = 41 \fallingdotseq 40\ [\text{km/h}]$

(2) Target Value of Maintenance/Repair Cost

Currently, when the revetment collapse occurred, repair work was implemented. In order to utilize the infrastructure for a longer life time, it is necessary to confirm the periodical inspection and minor maintenance annual cost. The annual maintenance cost for road revetment is estimated to be about 19,297 AUD and that for bridge section (l=l0m) is 9,302 AUD as described in "2.5.2 Operation and Maintenance Cost". So, the total annual maintenance cost is estimated to be 28,599AUD

(2) Qualitative Effects

The qualitative effects of the Project are as follows:

- Stable lifeline will be secured all year around
- The safety of pedestrians and vehicles will be improved
- Logistics and confluence between Betio and Bairiki will be secured all year around

APPENDIX

Appendix-1: Member List of Study Team

Table 1　Member List of Study Team

Name	Position	Organization
Mr. Masahiro Yoshimi	Team Leader	Japan International Cooperation Agency
Mr. Kojiro Suzuki	Expert on Marine Civil Engineering	Port and Airport Research Institute
Mr. Yasuhiro Watanabe	Project Planning	Japan International Cooperation Agency
Mr. Shingo Gose	Chief Consultant/Road Planning 1	CTI Engineering International Co.Ltd.
Mr. Ryuichi Ueno	Deputy Chief Consultant/Road Planning 2	CTI Engineering International Co.Ltd.
Mr. Satoshi Kawamura	Structure Design 1 (Revetment)	Ides Inc
Mr. Takayuki Tsuchida	Structure Design 2 (Bridge)	CTI Engineering International Co.Ltd.
Mr. Toyohiro Takagi	Natural Condition Survey (Geography ・Geology)	CTI Engineering International Co.Ltd.
Mr. Tsuyoshi Ikeda	Natural Condition Survey (Hydrographic Condition・Metrology・Seashore・Climate Change)	Ides Inc
Mr. Kentaro Sawada	Traffic Survey	CTI Engineering International Co.Ltd.
Mr. Hiromitsu Ogata	Construction Planning/Cost Estimation	CTI Engineering International Co.Ltd.
Mr. Takeshi Sato	Environmental/social consideration	Ides Inc.
Mr. Akihito Hiura	Recovery Works	CTI Engineering International Co.Ltd.

Appendix-2: Study Schedule

Table 2-1　Study Schedule（Site Survey 1）

No.	date	day	JICA			Consultants										
			総括 Team Leader 吉見 昌宏 Mr. Masahiro YOSHIMI	計画管理 Planning Coordinator 渡辺 泰弘 Mr. Yasuhiro WATANABE	海洋土木専門家 Ocean Civil Engineer 鈴木 高二郎 Mr. Kojiro SUZUKI	業務主任/道路計画/道路設計① Team Leader/Road Plan & Design 五瀬 伸吾 Mr. Shingo GOSE	副業務主任/道路計画/道路設計② Deputy Team Leader/Road Plan & Design 上野 隆一 Mr. Ryuichi UENO	構造物設計①(海岸/護岸) Structure Design(Coast /Revetment) 川村 敏 Mr. Satoshi kAWAMURA	構造物設計②(橋梁) Structure Design(Bridge) 土田 貴之 Mr. Takayuki TSUCHIDA	自然条件調査(地形・地質) Natural Condition Survey 高木 豊博 Mr. Toyohiro TAKAGI	自然条件調査(気象海象・海岸・気候変動) Natural Condition Survey 池田 剛 Mr. Tsuyoshi IKEDA	交通量調査 Traffic Volume Survey 澤田 賢太郎 Mr. Kentaro SAWADA	施工計画/積算 Construction Plan/Cost Estimation 緒方 博充 Mr. Hiromitsu OGATA	環境社会配慮 Social Environmental Consideration 佐藤 剛 Mr. Takeshi SATO	復旧工事 Restoration Work 稲浦 祥人 Mr. Akihito HIURA
1	5/23	Sat														
2	5/24	Sun														
3	5/25	Mon														
4	5/26	Tue	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →		Narita(13:55)KE706 → Incheon(16:20) Incheon(19:25)KE137 →								
5	5/27	Wed	→Nandi(8:35) →Suva(by car) Metting w ith JICA Fiji office, EOJ Suva(19:30)FJ024 → Nandi(20:30)	→Nandi(8:35) →Suva(by car) Metting w ith JICA Fiji office, EOJ Suva(19:30)FJ024 → Nandi(20:30)	→Nandi(8:35) →Suva(by car) Metting w ith JICA Fiji office, EOJ Suva(19:30)FJ024 → Nandi(20:30)	→Nandi(8:35)		→Nandi(8:35)								
6	5/28	Thu	Nandi(8:00)FJ231 → Tarawa(11:00) Inception Report explanation	Nandi(8:00)FJ231 → Tarawa(11:00) Inception Report explanation	Nandi(8:00)FJ231 → Tarawa(11:00) Inception Report explanation	Nandi(8:00)FJ231 → Tarawa(11:00) Inception Report explanation		Nandi(8:00)FJ231 → Tarawa(11:00) Inception Report explanation								
7	5/29	Fri	Site investigation w ith MPWU	Site investigation w ith MPWU	Site investigation w ith MPWU	Site investigation w ith MPWU		Site investigation w ith MPWU								
8	5/30	Sat	Site investigation	Site investigation	Site investigation	Site investigation		Site investigation								
9	5/31	Sun														
10	6/01	Mon	Meeting w ith CP	Meeting w ith CP	Meeting w ith CP	Meeting w ith CP		Meeting w ith CP								
11	6/02	Tue	MID Discussion w ith CP	MID Discussion w ith CP	MID Discussion w ith CP	MID Discussion w ith CP		MID Discussion w ith CP						13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発		
12	6/03	Wed	Signing Minutes of Meeting	Signing Minutes of Meeting	Signing Minutes of Meeting	Signing Minutes of Meeting		Signing Minutes of Meeting						8:35 Nadi着		
13	6/04	Thu	Tarawa(12:00)FJ230 → Nandi(15:00)	Tarawa(12:00)FJ230 → Nandi(15:00)	Tarawa(12:00)FJ230 → Nandi(15:00)	Tarawa(12:00)FJ230 → Nandi(15:00)	13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発	Tarawa(12:00)FJ230 → Nandi(15:00)	13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発				13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発	8:00 Nadi 発 → 11:00 Tarawa 着		
14	6/05	Fri	Nandi(8:30)FJ007 → Suva(9:00) Report to JICA Fiji office, EOJ Suva(19:30)FJ024 → Nandi(20:30)	Nandi(8:30)FJ007 → Suva(9:00) Report to JICA Fiji office, EOJ Suva(19:30)FJ024 → Nandi(20:30)	Nandi(9:55) KE138→ Incheon(17:35) Incheon(18:35)KE705 → Narita(20:55)	Nandi(8:30)FJ007 → Suva(9:00) Report to JICA Fiji office, EOJ	8:35 Nadi着 Nadi → Suva (by Car) Report to JICA Fiji office, EOJ	Nandi(8:30)FJ007 → Suva(9:00) Report to JICA Fiji office, EOJ	8:35 Nadi着 Nadi → Suva (by Car) Report to JICA Fiji office, EOJ				8:35 Nadi着 Nadi → Suva (by Car) Report to JICA Fiji office, EOJ			
15	6/06	Sat														
16	6/07	Sun								13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発	13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発	13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発				13:55 Narita 発 →16:20 Incheon 着 19:25 Incheon 発
17	6/08	Mon	Nandi(9:55) KE138→ Incheon(17:35) Incheon(18:35)KE705 → Narita(20:55)	Nandi(9:55) KE138→ Incheon(17:35) Incheon(18:35)KE705 → Narita(20:55)		13:30 Nadi 発 → 16:30 Tarawa 着	13:30 Nadi 発 → 16:30 Tarawa 着	13:30 Nadi 発 → 16:30 Tarawa 着	13:30 Nadi 発 → 16:30 Tarawa 着	8:35 Nadi着 13:30 Nadi 発 → 16:30 Tarawa 着	8:35 Nadi着 13:30 Nadi 発 → 16:30 Tarawa 着	8:35 Nadi着 13:30 Nadi 発 → 16:30 Tarawa 着	13:30 Nadi 発 → 16:30 Tarawa 着		8:35 Nadi着 13:30 Nadi 発 → 16:30 Tarawa 着
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										17:30 Tarawa 発 → 20:30 Nandi 着				
25	6/16	Tue														
26	6/17	Wed										9:55 Nadi 発 20:55 Narita 着				
27	6/18	Thu														
28	6/19	Fri														
29	6/20	Sat														
30	6/21	Sun														
31	6/22	Mon				12:00 Tarawa 発 → 15:00 Nandi 着	12:00 Tarawa 発 → 15:00 Nandi 着	12:00 Tarawa 発 → 15:00 Nandi 着	12:00 Tarawa 発 → 15:00 Nandi 着							
32	6/23	Tue														
33	6/24	Wed				9:55 Nadi 発 20:55 Narita 着	9:55 Nadi 発 20:55 Narita 着	9:55 Nadi 発 20:55 Narita 着	9:55 Nadi 発 20:55 Narita 着							
34	6/25	Thu														
35	6/26	Fri														
36	6/27	Sat														
37	6/28	Sun														
38	6/29	Mon												12:00 Tarawa 発 → 15:00 Nadi 着 16:30 Nadi 発 → 19:00 Suva	12:00 Tarawa 発 → 15:00 Nadi 着	
39	6/30	Tue														
40	7/01	Wed												Meeting w ith JICA Fiji Office 17:30 Suva 発 →18:00 Nadi 着	9:55 Nadi 発 20:55 Narita 着	
41	7/02	Thu								12:00 Tarawa 発 → 15:00 Nadi 着		12:00 Tarawa 発 → 15:00 Nadi 着				12:00 Tarawa 発 → 15:00 Nadi 着
42	7/03	Fri												9:55 Nadi 発 20:55 Narita 着		
43	7/04	Sat														
44	7/05	Sun														
45	7/06	Mon								9:55 Nadi 発 20:55 Narita 着		9:55 Nadi 発 20:55 Narita 着				9:55 Nadi 発 20:55 Narita 着

AP2-1

Table 2-2 Study Schedule（Site Survey 2）

No.	date	day	JICA: Team Leader Mr. Masahiko YOSHIMI	JICA: Planning Coordinator Mr. Yasuhiro WATANABE	Consultants: Team Leader/Road Plan & Design Mr. Shingo GOSE	Consultants: Deputy Team Leader/Road Plan & Design Mr. Ryuichi UENO	Consultants: Structure Design(Coast Revetment) Mr. Satoshi KAWAMURA	Consultants: Structure Design(Bridge) Mr. Takayuki TSUCHIDA	Consultants: Traffic Volume Survey Mr. Kentaro SAWADA	Consultants: Construction Plan/Cost Estimation Mr. Hiromitsu OGATA	Consultants: Social Environmental Consideration Mr. Takeshi SATO	Consultants: Restoration Work Mr. Akihito HIURA
3	8/15	Sat										
4	8/16	Sun										
5	8/17	Mon										
6	8/18	Tue				Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →					Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →
7	8/19	Wed				→ Nandi(8:55)	→ Nandi(8:55)					→ Nandi(8:55)
8	8/20	Thu	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Kyrgyz	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Nandi(9:00)FJ231 → Tarawa(11:00)	Nandi(9:00)FJ231 → Tarawa(11:00)			Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →		Nandi(9:00)FJ231 → Tarawa(11:00)
9	8/21	Fri	→ Nandi(8:55) → Suva(by car) Report to EOJ, Suva → Nandi	Kyrgyz	→ Nandi(8:55) → Suva(by car) Report to EOJ, Suva → Nandi (by car)					→ Nandi(8:55) → Suva(by car)		
10	8/22	Sat	Documentation	Bishkek(6:40)TK351 → Istanbul(13:50)SQ391 →	Documentation							
11	8/23	Sun	Documentation	Singapore(7:45)SQ207 → Melbourne(23:00)FJ910 →	Documentation							
12	8/24	Mon	Nandi(9:00)FJ231 → Tarawa(11:00) Kick-off Meeting	Nandi(9:00)FJ231 → Tarawa(11:00) Kick-off Meeting	Nandi(9:00)FJ231 → Tarawa(11:00) Kick-off Meeting							
13	8/25	Tue	MD Discussion with CP	MD Discussion with CP	MD Discussion with CP							
14	8/26	Wed	MD Discussion with CP (Cabinet meeting)	MD Discussion with CP (Cabinet meeting)	MD Discussion with CP (Cabinet meeting)							
15	8/27	Thu	MD Discussion with CP	MD Discussion with CP	MD Discussion with CP							
16	8/28	Fri	Signing Minutes of Meeting	Signing Minutes of Meeting	Signing Minutes of Meeting							
17	8/29	Sat	Site investigation	Site investigation	Site investigation							
18	8/30	Sun	Report writing	Report writing	Report writing					Suva(17:00)FJ016 → Nadi(17:50)		
19	8/31	Mon	Tarawa(12:00)FJ230 → Nandi(13:00)	Tarawa(12:00)FJ230 → Nandi(13:00)	Tarawa(12:00)FJ230 → Nandi(13:00)					Nadi(9:00)FJ231 → Tarawa(11:00)		
20	9/1	Tue	Nandi(8:30)FJ007 → Suva(9:00) Report to EOJ, Suva → Nadi	Nandi(8:30)FJ007 → Suva(9:00) Report to EOJ, Suva → Nadi	Nandi(8:30)FJ007 → Suva(9:00) Report to EOJ, Suva → Nadi (by Car)			Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →		Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	
21	9/2	Wed	Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)	Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)				→ Nandi(8:55)	→ Nandi(8:55)		→ Nandi(8:55)	
22	9/3	Thu			Nadi(9:00)FJ231 → Tarawa(11:00)	Tarawa(12:00)FJ230 → Nandi(13:00)		Nandi(9:00)FJ231 → Tarawa(11:00)	Nandi(9:00)FJ231 → Tarawa(11:00)		Nadi(9:00)FJ231 → Tarawa(11:00)	
23	9/4	Fri										
24	9/5	Sat										
25	9/6	Sun										
26	9/7	Mon				Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)						
27	9/8	Tue										
28	9/9	Wed										
29	9/10	Thu								Tarawa(12:00)FJ230 → Nandi(13:00) Nadi(16:00)FJ021 → Suva(16:30)		
30	9/11	Fri										
31	9/12	Sat										
32	9/13	Sun										
33	9/14	Mon					Tarawa(12:00)FJ230 → Nandi(13:00)				Tarawa(12:00)FJ230 → Nandi(13:00)	Tarawa(12:00)FJ230 → Nandi(13:00)
34	9/15	Tue										
35	9/16	Wed					Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)			Suva(17:00)FJ016 → Nadi(17:50)	Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)	Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)
36	9/17	Thu			Tarawa(12:00)FJ230 → Nandi(13:00)			Tarawa(12:00)FJ230 → Nandi(13:00)	Tarawa(12:00)FJ230 → Nandi(13:00)	Tarawa(12:00)FJ230 → Nandi(13:00)		
37	9/18	Fri			Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)				Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)	Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)		
38	9/19	Sat										
39	9/20	Sun										
40	9/21	Mon						Nandi(9:55) KE136 → Incheon(17:55) Incheon(18:55)KE705 → Narita(20:55)				
41	9/22	Tue										

Table 2-3　Study Schedule（Site Survey 3）

No.	date	day	Kiribati		
			総括 Team Leader 吉見　昌宏 Mr. Masahiro YOSHIMI	計画管理 Planning Coordinator 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) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →	Narita(13:55)KE704 → Incheon(16:20) Incheon(19:25)KE137 →
2	2/24	Wed	→Nandi(8:35)　→Suva(by car) Report to JICA, Suva(17:30)FJ018 → Nandi(18:00)	→Nandi(8:35)　→Suva(by car) Report to JICA, Suva(17:30)FJ018 → Nandi(18:00)	→Nandi(8:35)　→Suva(by car) Report to JICA, Suva(17:30)FJ018 → Nandi(18:00)
3	2/25	Thu	Nandi(8:00)FJ231 → Taraw a(11:00) Kick-off Meeting	Nandi(8:00)FJ231 → Taraw a(11:00) Kick-off Meeting	Nandi(8:00)FJ231 → Taraw a(11:00) 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 w ith C/P	M/D Discussion w ith C/P	M/D Discussion w ith 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	Taraw a(12:00)FJ230 → Nandi(15:00)	Taraw a(12:00)FJ230 → Nandi(15:00)	Taraw a(12:00)FJ230 → Nandi(15:00)
11	3/04	Fri	Nandi(8:30)FJ007 → Suva(9:00) Report to EOJ, Suva(18:10)FJ024 → Nandi(18:40)	Nandi(8:30)FJ007 → Suva(9:00) Report to EOJ, Suva(18:10)FJ024 → Nandi(18:40)	Nandi(9:55) KE138→ Incheon(17:35) 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) Incheon(18:35)KE705 → Narita(20:55)	Nandi(9:55) KE138→ Incheon(17:35) Incheon(18:35)KE705 → Narita(20:55)	

Appendix-3: List of Parties Concerned in the Recipient Country

Table 3　List of Parties Concerned in the Recipient Country

Organization	Name	Position
MPWU (Ministry of Public Works and Utilities)	Waysang Moti Kum Kee	Minister
	Benjamin Takataake	Secretary
	Teuea Tebau	OIC. Sectretary (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
	Patrick Mannix	KRRP Technical Auditor and Advisor to the MPWU
	Ian Archer	KRRP President Engineer
PUB (Public Utility Board)	Tokaata Niata	CEO
	Itienang Timona	Water/sewerage manager
	Kiriati Birita	Power manager
MELAD/Enviornment Conservation Division	Puta Tofinga	EIA Officer
	Taulehia Pulefau	Senior Environment Officer
MELAD/Land Management Division	Tarakabu Tofinga	Senior Land Planning Officer
KPA	Arebaio Erika	IT Manager IOCC
MET (Meteorogical Offce)	Thomas Zackious	
Shipping Agencies of Kiribati	Tekaai Mikaere	Manager
TE ATINIMARAWA Company Limited	Tebao Awerika	Chief Executive Officer
routhton international ltd	John McFarlane	Senior Engineer
McCONNELL DOWELL	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 Mwemwenikeaki
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.

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.

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

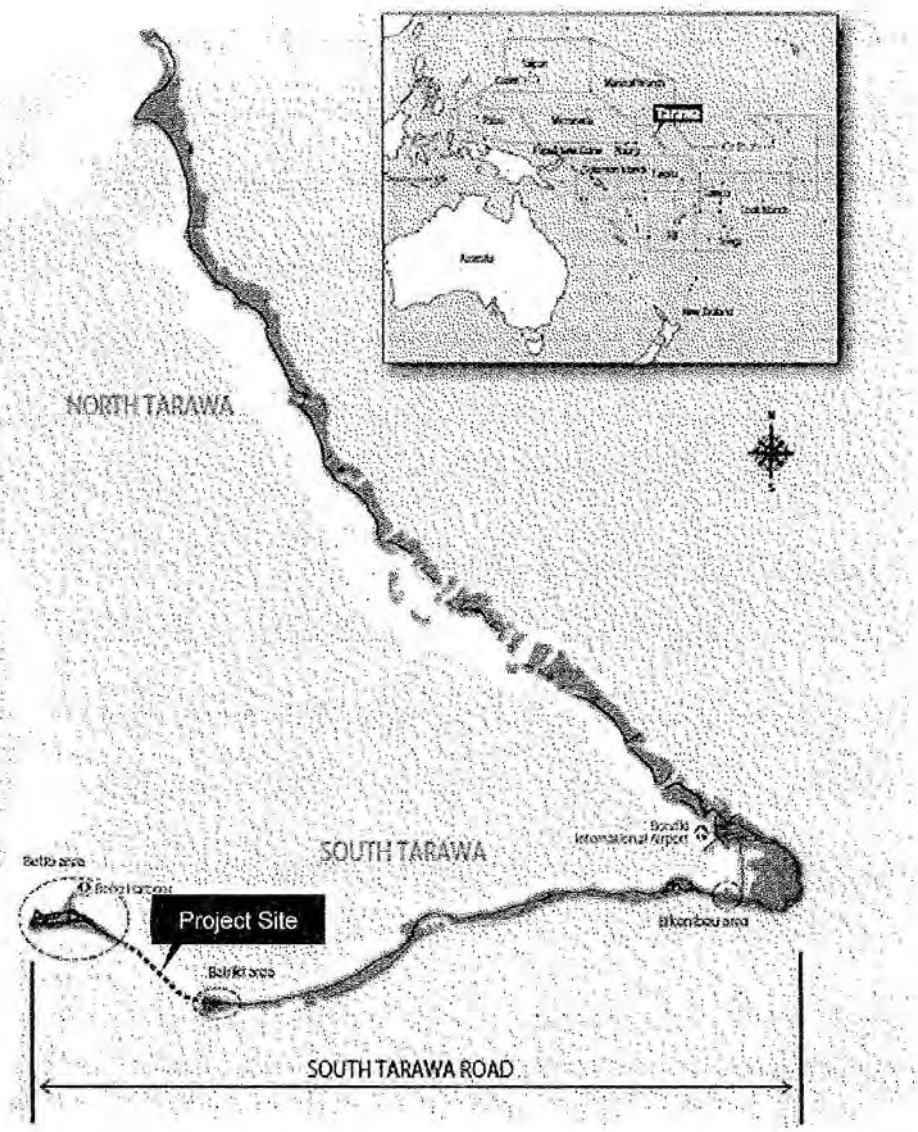
(5) to provide security measures for all concerned working for the Project.

12. Disclosure of Information

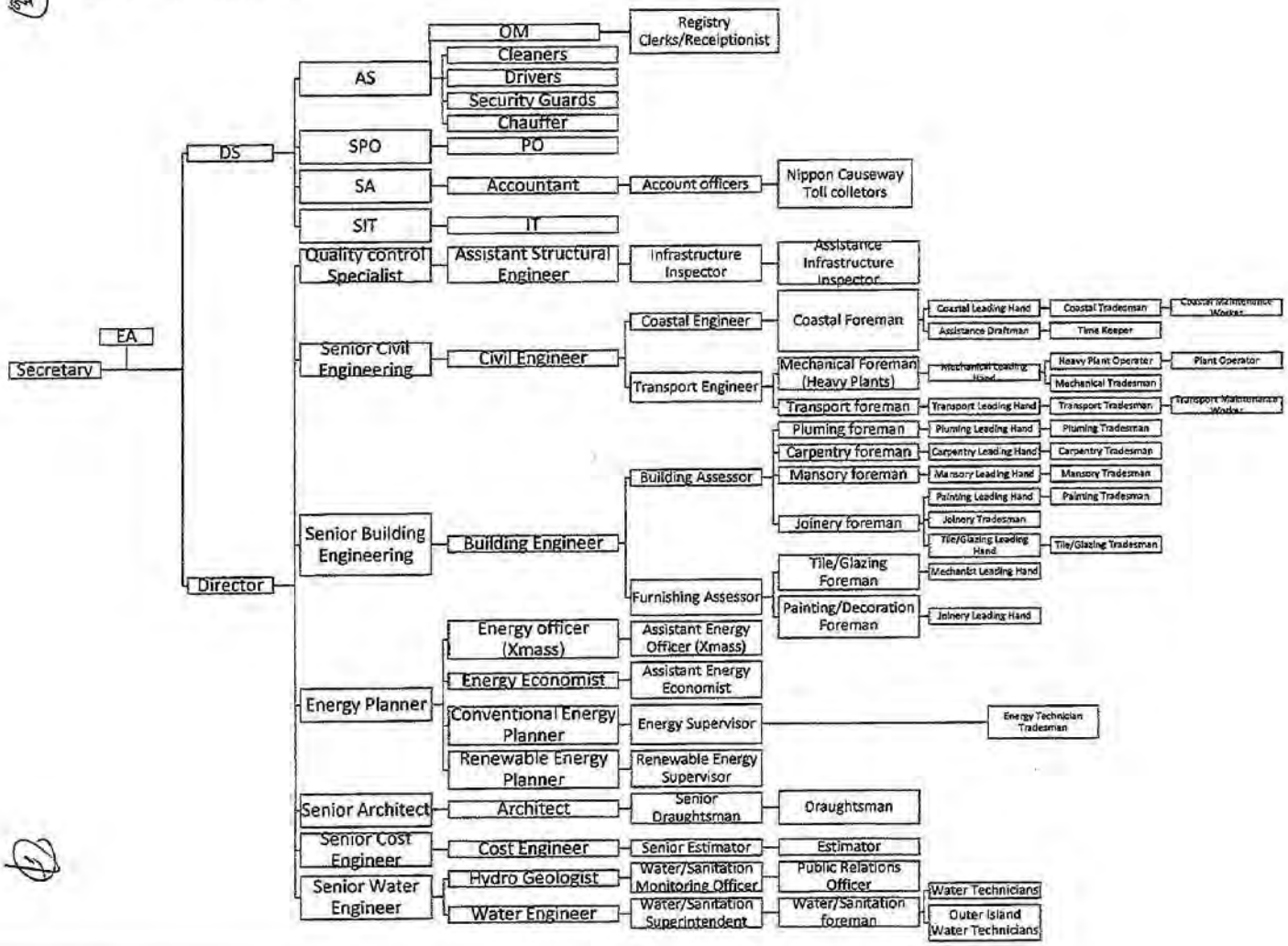
Both sides confirmed that the study results excluding the Project cost will be disclosed to the public after the completion of the Survey. All the study results including the Project cost will be disclosed to the public after all the verification of contracts for the Project by JICA are concluded.

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



Annex-2: Organization Chart of MPWU



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.

- 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 singed 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

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

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

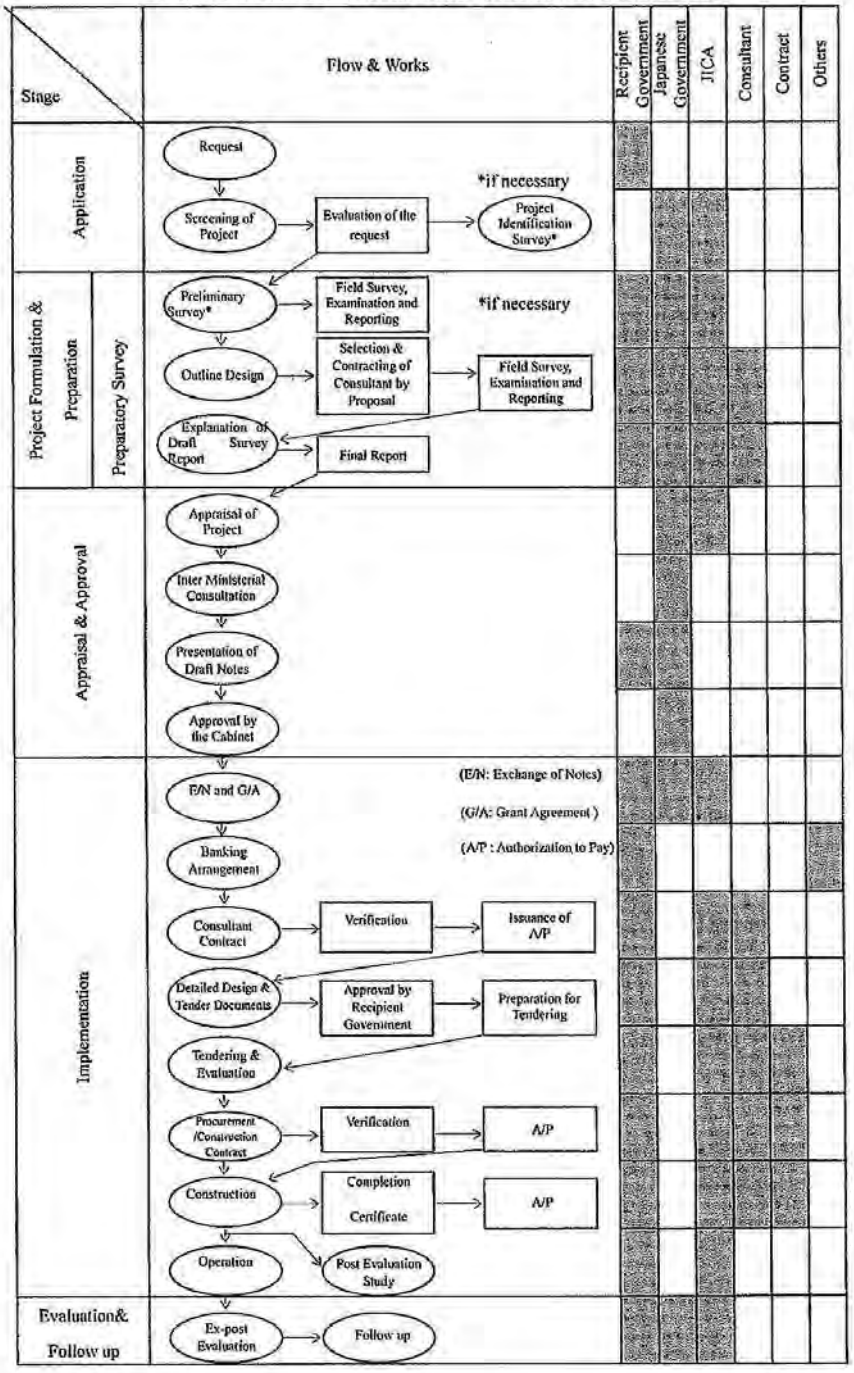
The Government of the recipient country must take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and must regularly report to JICA about its status by using the Project Monitoring Report (PMR).

(12) Safety Measures

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

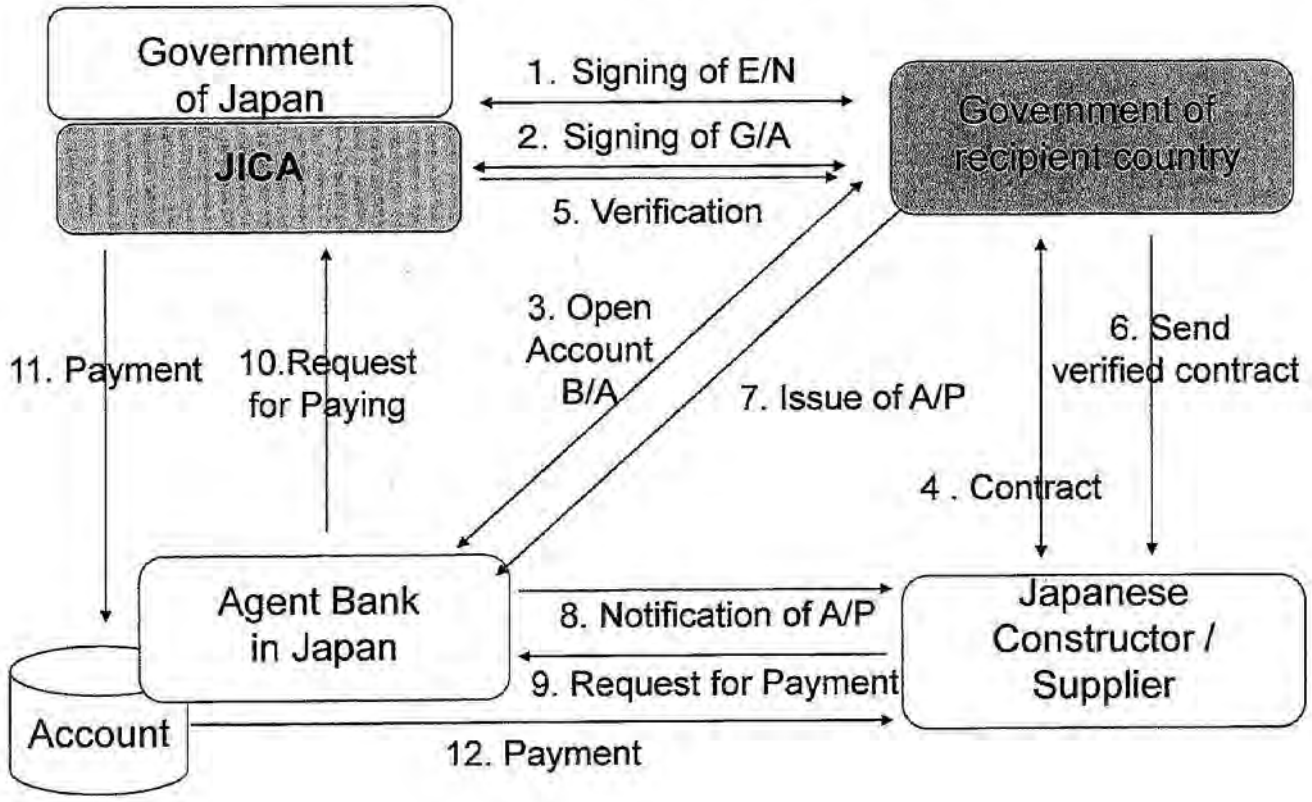
Annex-4

FLOW CHART OF JAPAN's GRANT AID PROCEDURES



Annex-5

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	within 1 month after the singing of the contract	MPWU		
	2) Payment commission for A/P	every payment	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.ww	
	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/Rand 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)

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	
[M/D]	*(M/D)*		*(P/R,PCR)* 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			Cost (Million Yen)	
	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)

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

(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)

Attachment

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

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

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

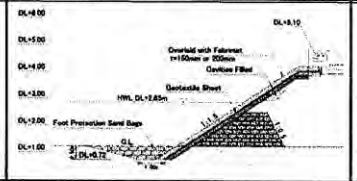
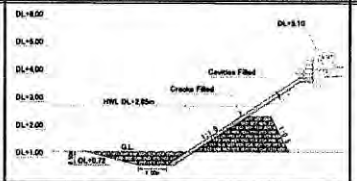
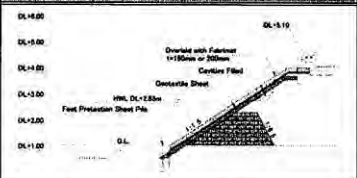
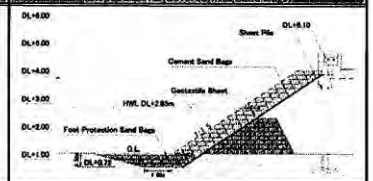
19/01

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

Annex-1: The methodology of reconstruction of Nippon Causeway

Alternative	[ALT①] : Present Slope Maintained	[ALT②] : Overlaid with Fabrimat	[ALT③] : Foot Protection Sheet Pile	[ALT④] : Sheet Pile Wall (Slope Removal/Covered with Sandbags)
Conceptual Sketch				
Abstract	➢ 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. ➢ 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.	➢ 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	➢ 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.	➢ Overlaid fabrimat and the foot protection are required, so the cost is higher than alternative-1.	➢ Additional resources for driving the sheet pile need to be imported, so the cost is high.	➢ 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	➢ 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.	➢ 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.	➢ 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.	➢ 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	➢ 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 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.	➢ 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.	➢ 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	➢ Continuous maintenance should be managed as the present slope remained. ➢ Systematic process and organization should be secured to keep reliable maintenance.	➢ Ease maintenance because of new slope. ➢ A continuous maintenance should be organized and managed against cracks.	➢ 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.	➢ Maintenance is required only for sand bags.
Environmental Social Considerations	➢ No issues as far as the planned section.	➢ No issues as far as the planned section	➢ No issues as far as the planned section	➢ No issues as far as the planned section
Others	➢ Construction period is shortes than other alternatives.	➢ Relatively short construction period.	➢ Long construction period due to sheet pile driving included.	➢ 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

Masahiro YOSHIMI
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Benjamin Tokataake
Secretary
Ministry of Public Works & Utilities
Republic of Kiribati

Witness

Eriati Manaima
Secretary
Ministry of Finance and Economic Development
Republic of Kiribati

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.

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.

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

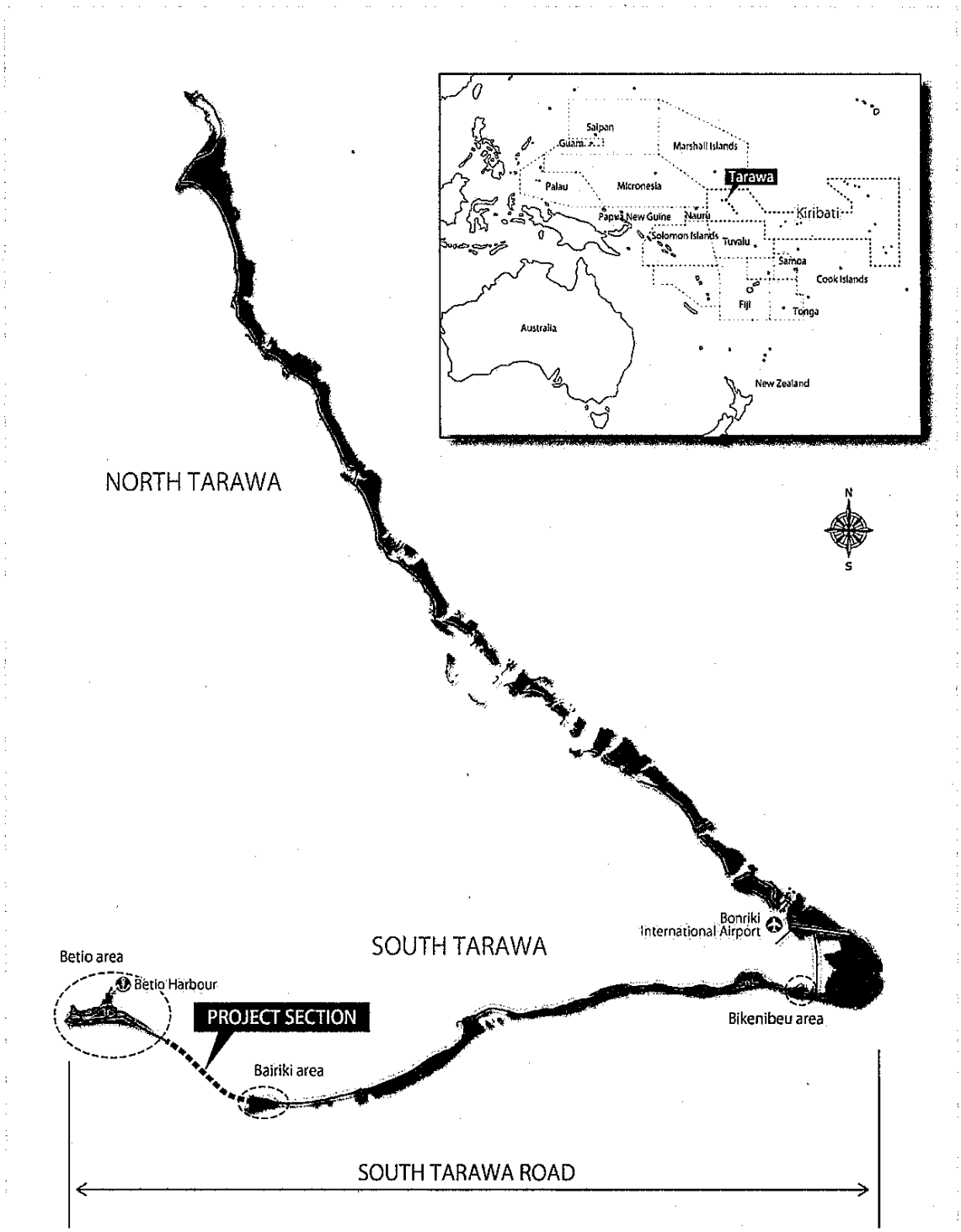
considering that proper asset management impacts greatly on life-span of the facilities and its maintenance cost. The Kiribatian side shall secure enough staff and budgets necessary for appropriate operation and maintenance of the facilities. The annual operation and maintenance costs are estimated and 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 Environnemental Checklist
Annex-11 Environnemental Management Plan
Annex-12 Environmental Monitoring Plan
Annex-13 Environmental Monitoring Form
Annex-14 Maintenance Cost Estimation

Project Site



Project Cost Estimation

CONFIDENTIAL

(1) Cost Borne by the Government of Japan

This part is closed due to the confidentiality

(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.

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.

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

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

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

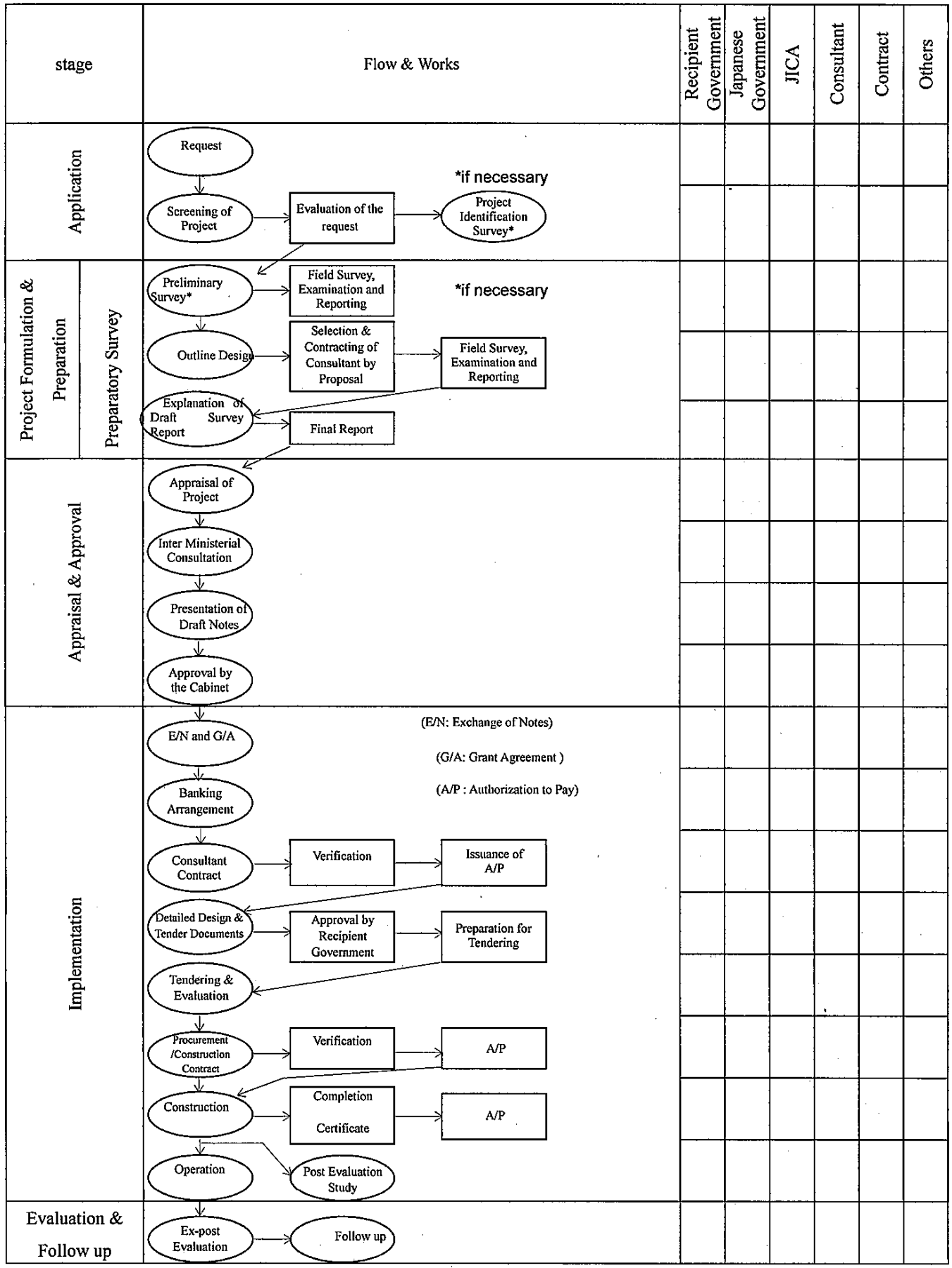
(11) Monitoring

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).

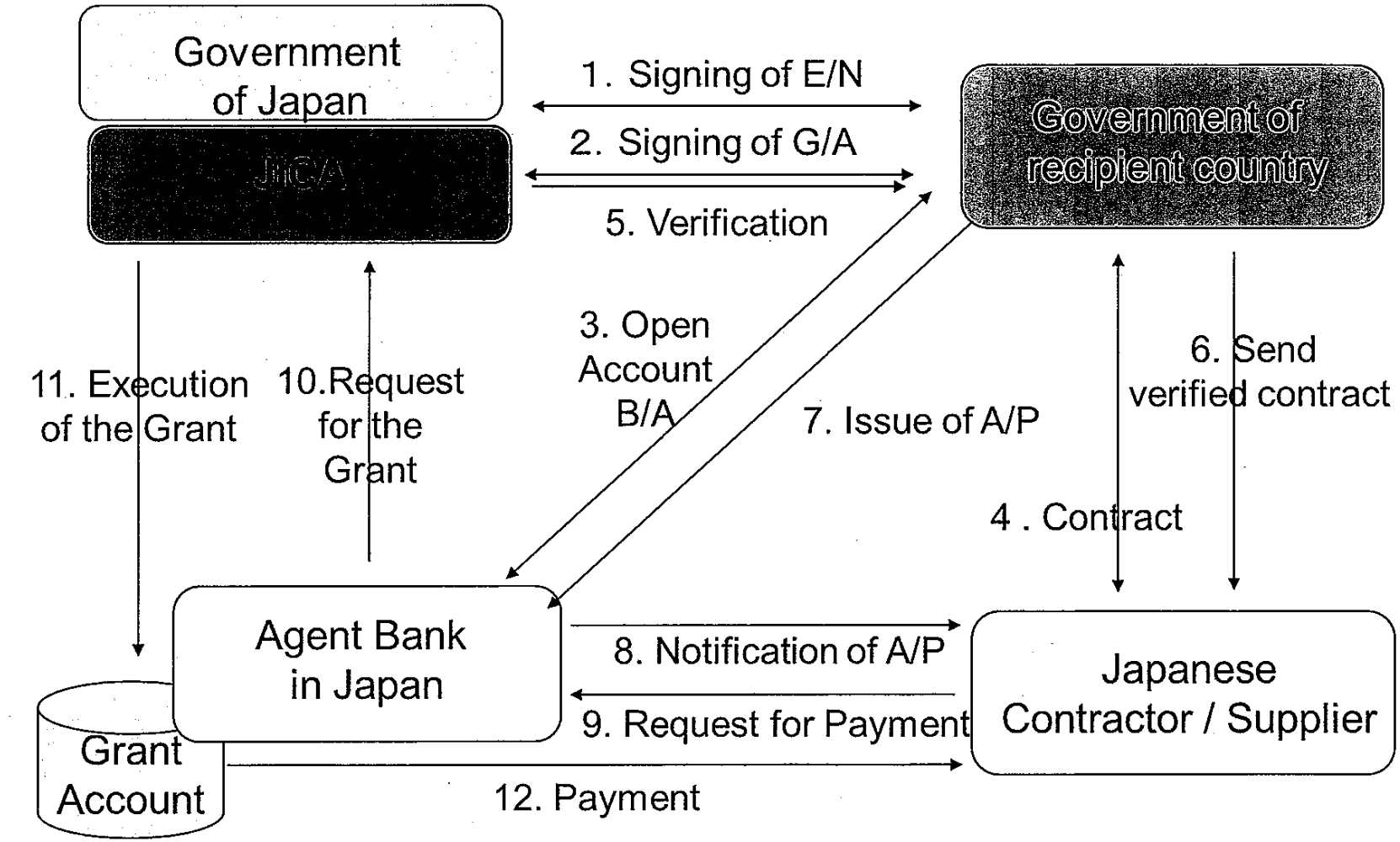
(12) Safety Measures

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

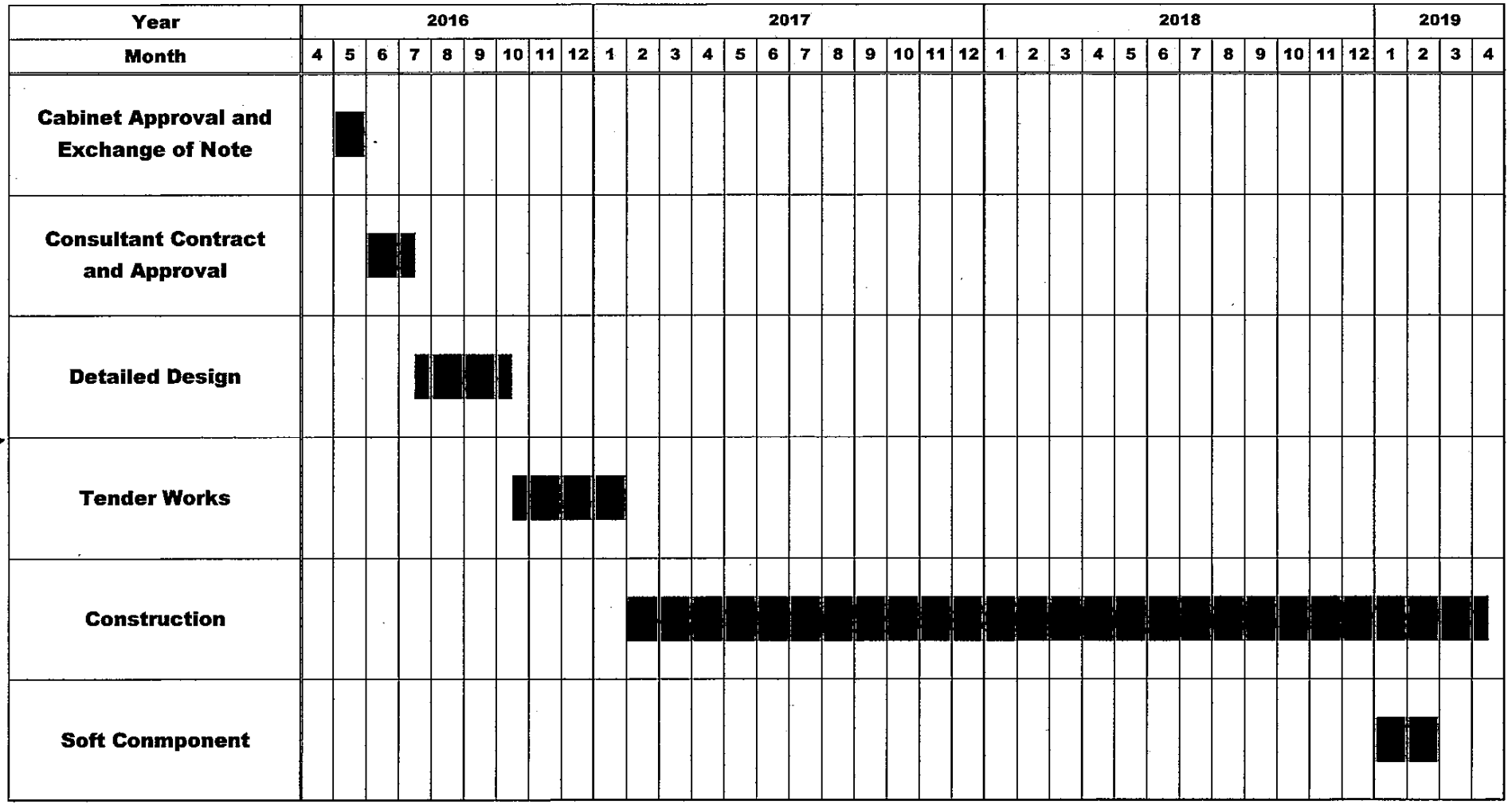
Flow Chart of Japanese Grant Procedures



Financial Flow of Japanese Grant



Project Implementation Schedule



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	within 1 month after the singing of the contract	MPWU	Around 5,000(JPY) / time	
	2) Payment commission for A/P	every payment	MOF	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

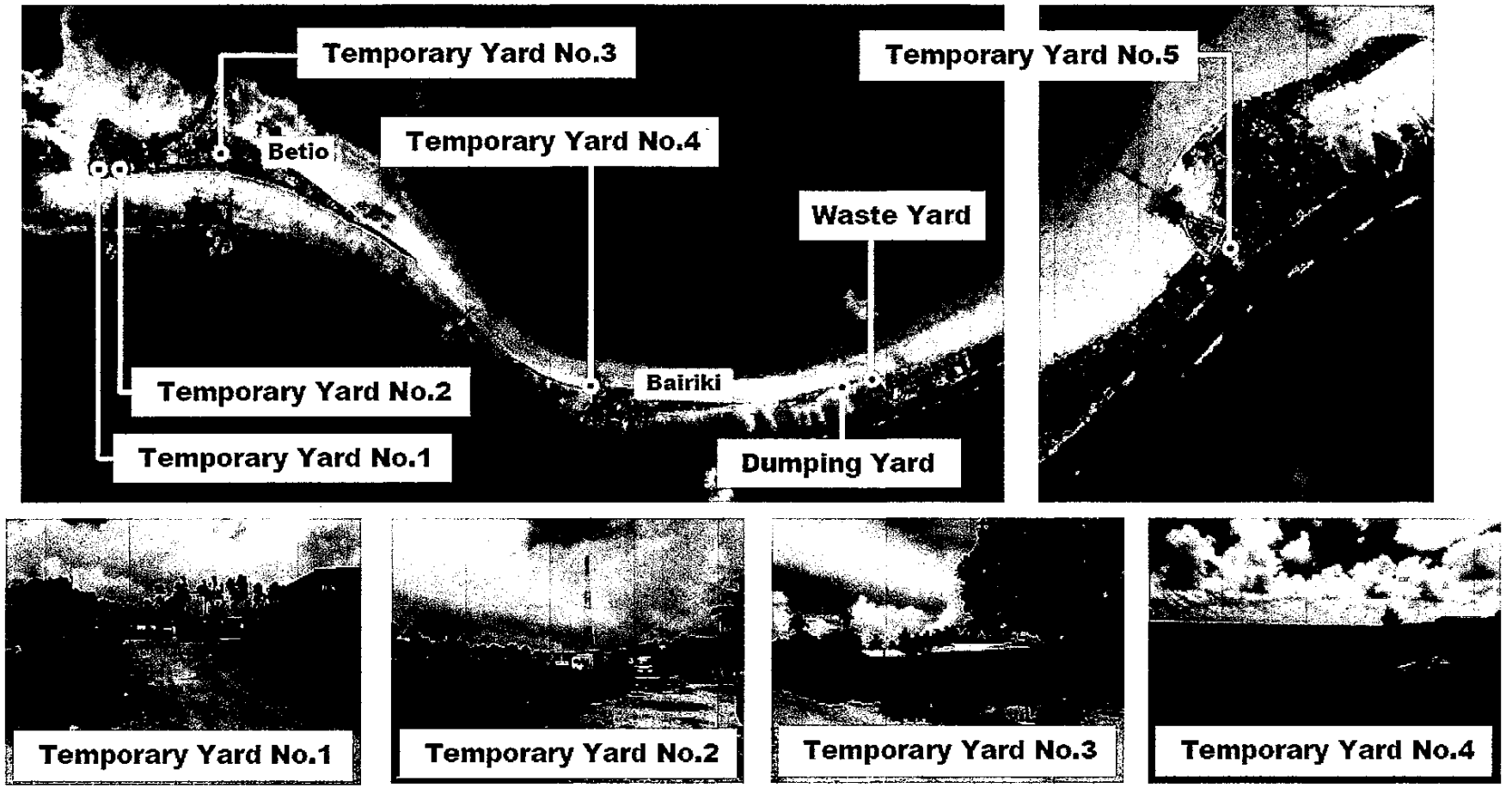
NO	Items	Deadline	In charge	Cost	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine/Periodic inspection	After completion of the construction	MPWU		

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			
			3,575	
	Others (Incidental Facilities, Temporary Works)			
2	To implement detailed design, tender support and construction supervision (Consultant)			
	Contingencies	5%		
2	Total		3,956	
3				

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.



Location Map of the Candidate Construction Yard

AP6-18

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:

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

Quantitative Effect (Operation and Effect indicators)		
Indicators	Original (Yr)	Target (Yr)
Qualitative Effect		

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 th e most updated schedul e but also other past re visions chronologically. All change of design shal l 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) Conc rete Pavement 200mm (moto r 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	
[M/D]	*(M/D)*		*(PMR)* 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 Amended 13/3/2017
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.

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)*

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)	

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)

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.

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.

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.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(2) Living and Livelihood	(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? (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? (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? (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)? (e) Is there any possibility that roads will impede the movement of inhabitants? (f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	(a)N (b)Y (c)N (d)N (e)N (f)N	(a) No new roads will be installed. (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. (c) The risk of infectious diseases spreading is low as the majority of the work force will be from the local area. (d)-(f) No impacts are expected as the project involves only reconstruction of the existing Causeway structures.
	(3) Heritage	(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?	(a)N	(a) There are no archeological, historical, cultural and religious heritage sites around the project site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a)N	(a) No impacts are expected as the project involves only reconstruction of the existing Causeway structures.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a)N (b)N	(a) (b) There are no ethnic minorities and indigenous peoples around the project site.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(6) Working Conditions	(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? (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? (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.? (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?	(a)N (b)Y (c)Y (d)Y	(a) No (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: - 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)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a)Y (b)Y (c)Y	(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. -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. -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). -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. (b) Impacts on natural environment are unlikely providing that the planned pollution control measures are properly inplemented. (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.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (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?	(a)Y (b)Y (c)Y (d)N	(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. (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. (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.
	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). (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).	(a) (b)	(a)(b) Not relevant

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 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. Suffcient 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	• 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	• 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$20,000
	Dust and exhaust gas emissions from construction site	• Use of well-maintained vehicles and equipment. Vehicles emitting "excessive emission" to be removed until repaired. • Keeping exposed surfaces damp. • Use of closed/covered trucks when transporting dusty materials.	Construction contractor	Supervising consultant	Negligible
Water pollution	Washwater discharge from concrete plant	• All washwater to be collected and diverted to an impermeable settling pond. • Discharge to the environment to be avoided by reusing the captured washwater onsite. • Discharge to be allowed only if pH and suspended solid concentration	Construction contractor	Supervising consultant	Construction cost of settling pond: US$ 1,000

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	• 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.	• 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.	• 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	• 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	• 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	• 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	• 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

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	• 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	• 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	• Informing of local people beforehand when restrictions occur.	Construction contractor	Supervising consultant	Negligible
Accidents	Accidents due to construction works	• 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

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

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

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 1 day/time	4 persons	Scoop/Hammer/ Sickle/Barricade	48 persons/year	874
	Revetment	Cracks etc.					
	Drainage	Sediment Deposition/Obstacle					
					Pickup	12 vehicles/year	960
	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						3,376
Repair	Pavement	Crack, etc.	1 times/year 4 day/time	6 persons	Worker	24 persons/year	437
					Plate Compactor	4 vehicles/year	200
	Revetment	Crack, etc.			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/ 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.					
	Incidental Facilities	Railing			Pickup	24 vehicles/year	960
	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	960
	Subtotal						1,688
Repair	Pavement	Crack, etc.	1 times/year 4 day/time	6 persons	Worker	24 persons/year	437
	Drainage	Crack, etc.			Plate Compactor	4 vehicles/year	200
	Box Culvert	Crack, etc.			Small Truck	4 vehicles/year	480
	Incidental Facilities	Bridge Railing			Asphalt	1.0m^3/year	5,000
	Traffic Marking	Lane Marking			Lane Marking	5.0m/year	100
	Subtotal						6,217
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).

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 contactor 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

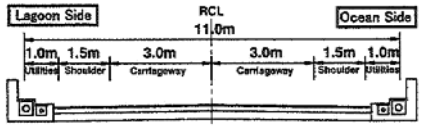
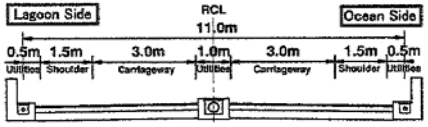
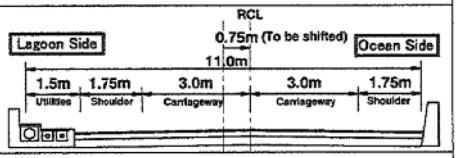
- The MPWU designated the places as candidate construction yards for the Project, shown in **Figure 8-1 of Annex 8.**
- However, since the Cabinet endorsement is required for this matter, the MPWU promised that it would raise this matter at the Cabinet Meeting and inform its result to the Survey Team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

Annex 1

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

Alternatives		Alternative 1	Alternative 2	Alternative 3
Cross Section				
Description		• 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.	• 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.	• 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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Annex 1

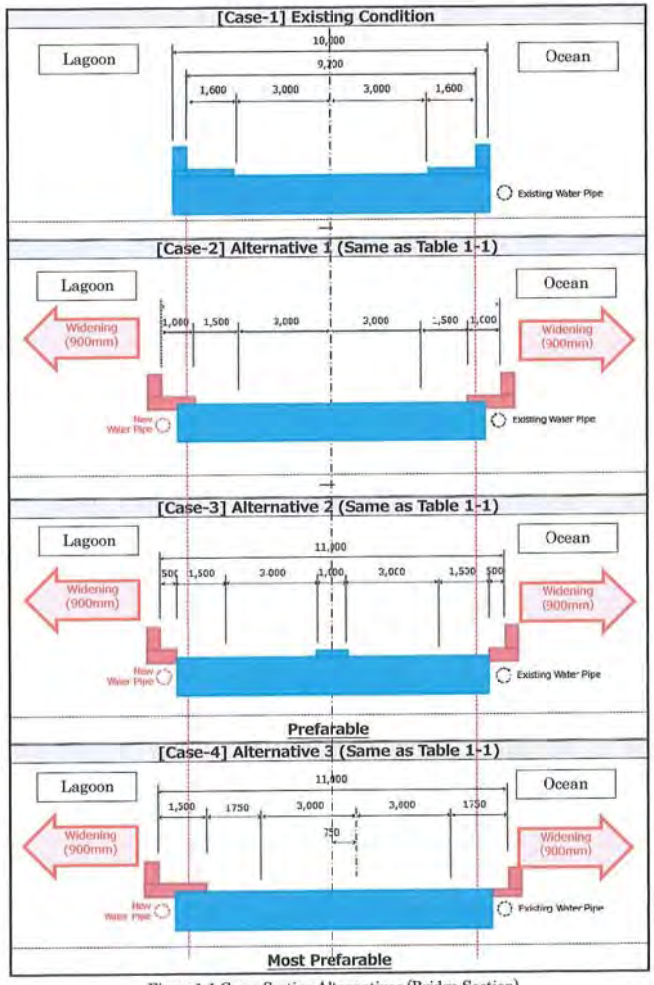

Figure1-1 Cross Section Alternatives (Bridge Section)

Annex 2

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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Annex 3

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						

Datum: SEAFRAME

Annex 3

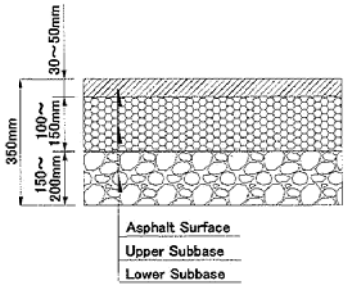
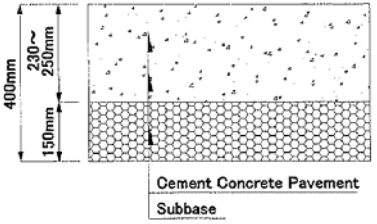
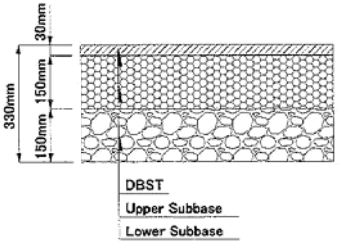
Table 3-2 Overtopping Rate and Limits (Lagoon Side - Preliminary)

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				

Datum: SEAFRAME

Annex 4

Table4-1 Comparison of Pavement Types

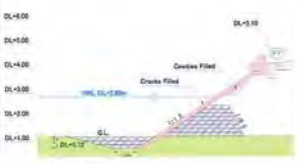
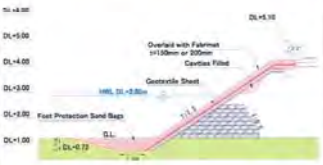
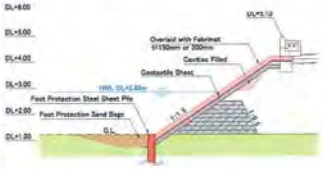
Items		[ALT-1] Asphalt Concrete	[ALT-2] Cement Concrete	[ALT-3] DBST (Double Bituminous Surface Treatment)
Pavement Structure				
Initial Period*1		10 years	20years	3 to 5 years
Maintenance		➢ The pavement is maintained by patching and sealing as routine maintenance. ➢ Overlay of the pavement is required every 10 years.	➢ The pavement is maintained by patching and sealing as routine maintenance. ➢ Resurfacing of the pavement is required every 20 years.	➢ 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.

Annex 5

Table5-1 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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Annex 6

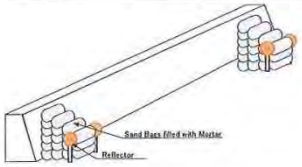
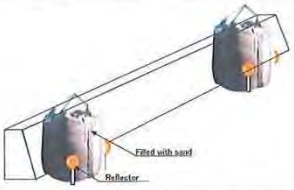
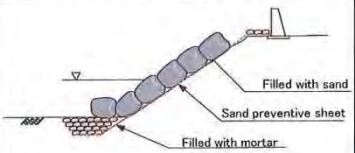
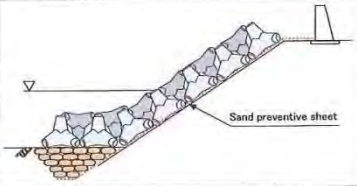
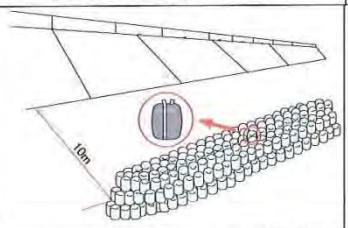
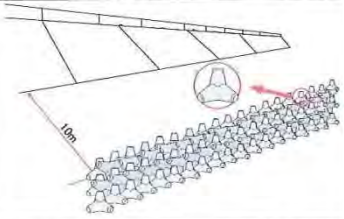
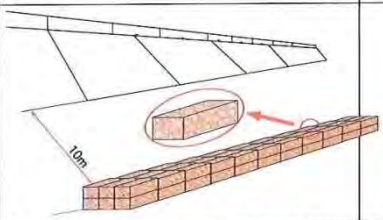
Main activities	2015					2016		
	8	9	10	11	12	1	2	3
Preparation and submission of application form								
Evaluation of application form (screening)								
Public consultation meeting								
Preparation of draft BEIA								
Checking of draft BEIA by MPWU								
Submission of draft BEIA								
Evaluation 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)

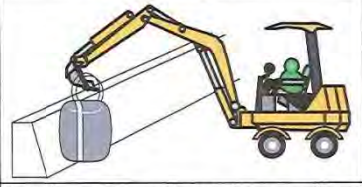
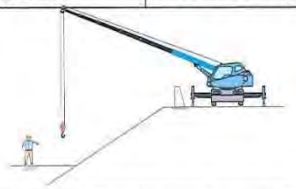
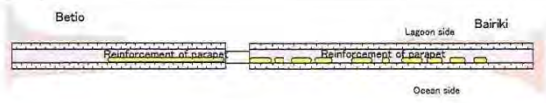
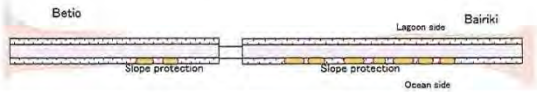
Annex 7

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

Parapet Protection	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	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

Annex 7

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

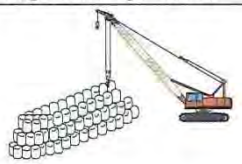
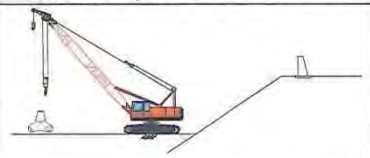
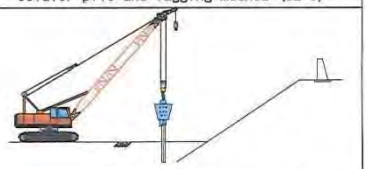
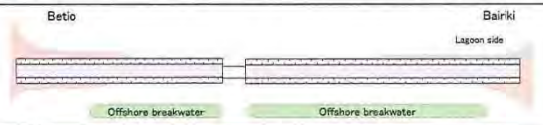
	Parapet protection						Slope protection					
Method	Mortar sandbags (P-1)			Large sandbags (P-2)			Large sandbags (SL-1)			Wave-dissipating blocks (SL-2)		
Conceptual diagram	manpower											
Outline	Install mortar sandbags behind the parapet by manpower			Install weather resistant large sandbags 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	×	○	Labor	○	×	Truck crane	△	△	Dump truck/backhoe	×	○
				Supervision	×	○	Labor	○	×	Truck crane	△	△
							Supervision	×	○	Concrete mixer	○	×
										Labor	×	○
										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$ 0.33M	¥	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:	

△:Pending matter

A-10

AP7-14

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	✓ Back hoe (owned by MPWU) ✓ Dump truck 4t (owned by MPWU) ✓ Crawler crane ✓ Concrete mixer	✓ Truck crane (for fabrication) ✓ Crawler crane (for installation) ✓ Concrete mixer	✓ Back hoe (owned by MPWU) ✓ Dump truck 4t (owned by MPWU) ✓ Concrete mixer	✓ Crawler crane ✓ Vibratory hammer
Budget allocation (plan)	MPWU / JICA	MPWU / JICA	MPWU / JICA	MPWU / JICA
	Large sandbags: × / ○ cement: ○ / × Aggregates: ○ / × Dump truck/backhoe: ○ / × Concrete mixer: ○ / × Crawler crane: △ / △ Labor: × / ○ Supervision: × / ○	Cement: ○ / × Aggregates: ○ / × Dump truck/backhoe: ○ / × Concrete mixer: ○ / × Crawler crane: △ / △ Truck crane: △ / △ Labor: ○ / × Supervision: × / ○	Gabions: × / ○ Rubble stones: × / ○ Sump truck/backhoe: ○ / × Labor: ○ / × Supervision: × / ○	H beams: × / ○ : × / ○ Crawler crane: △ / △ Vibratory hammer: △ / △ Labor: × / ○ 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:

△:Pending matter

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AP7-15

Annex 8

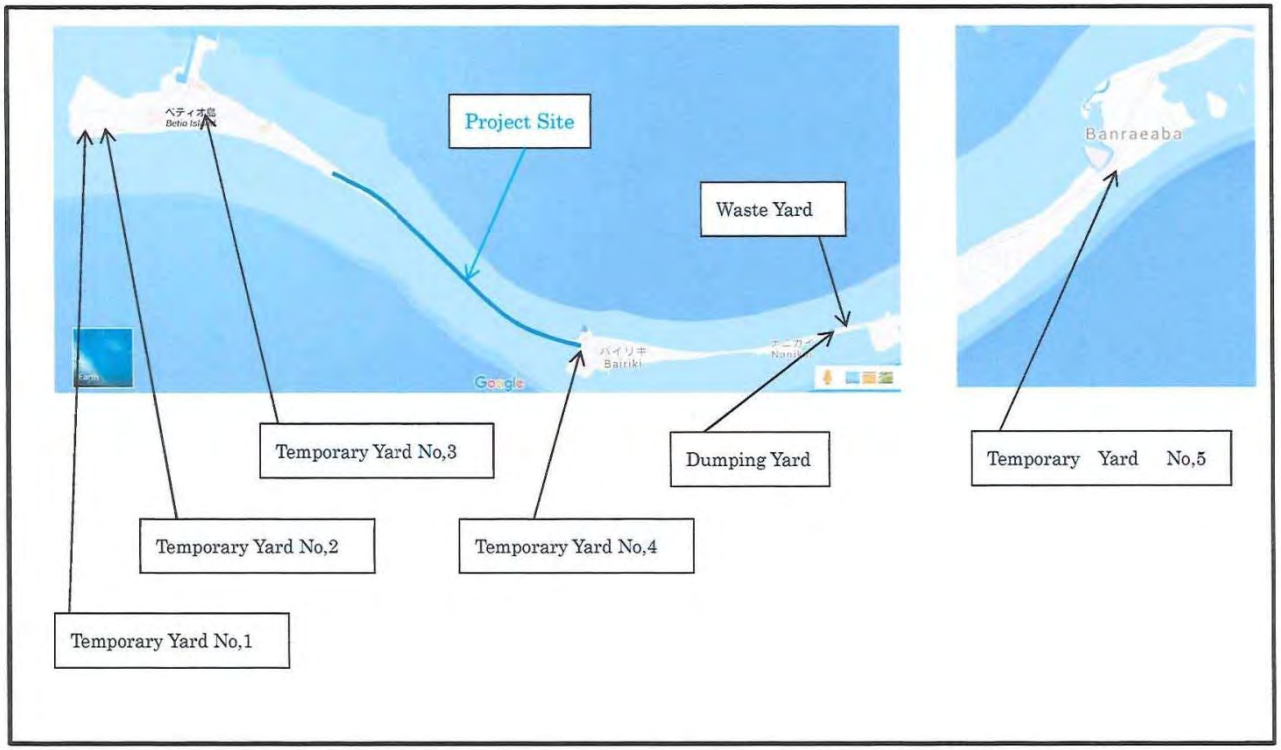
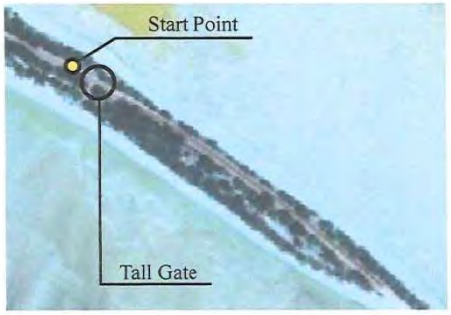
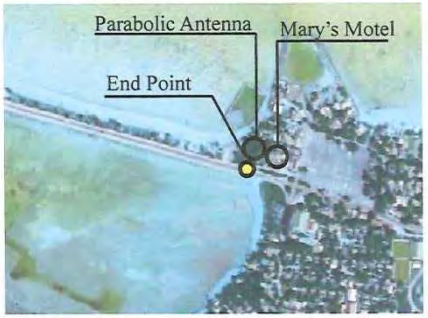


Figure8-1 Candidate Construction Yards

Annex 9

Table9-1 Start Point and End Point of Objective Section

Start Point	End Point
	
	
Start point of objective section is edge of lagoon side parapet near the tall gate.	End point of objective section is in front of the parabolic antenna near the Mary's Motel.

Appendix-8: Soft Component Plan

Soft Component Plan

(1) Background

Nippon Causeway (L=3.2km, W=11m) was constructed in 1985 as Batio-Bairiki Causeway Fisheries Channel Project by Japan grant. It is the only road to connect the international port at Betio island and the headquarters of administrative agencies and residential area at Bairiki island.

Aside from being old, the Causeway has incurred serious damages from king tide and strong tide brought about by the impact of climate change.

The subject roads are being maintained by MPWU. More serious collapse of revetment in the future will lose its road function due to no radical countermeasures such as protection of sand embankment, revetment repair and insufficient maintenance.

In order to have a sustainable efficiency, the Project will implement the repair and strengthening of the Causeway and adequately maintain after reconstruction. Therefore, a technical transfer will be proposed to implement the adequate operation and maintenance by MPWU.

(2) Objectives

The objective of the soft component is to implement the sustainable and effective operation and maintenance(O&M) of Nippon Causeway at Kiribati side. It is also expected that to achieve this above objectives is to effect appearance of the Japan grant project.

(3) Outputs (Direct Effects)

The Outputs to be achieve in this component are as follows:

- To understand the cause of damages and repair method for pavement and revetment
- To prepare the O&M manual for pavement and revetment
- To acquire the techniques for pavement and revetment maintenance by C/Ps

(4) Confirmation of Output

- Completion of operation and maintenance manual (included in the O&M organization and roles, inspection, repair method, etc.)
- Understanding of C/P by questionnaire

(5) Activities (Inputs)

About 10 maintenance staff in MPWU

O& M is managed directly by MPWU themselves at present. When MPWU needs the additional man-power, they contract with local community then hire the workers. It is expected that MPWU will be

able to maintain the Causeway more adequately through the soft component's implementation. The soft component contains also the improvement of maintenance supervision for local community.

Table 1 Present Maintenance Level and Target Level for MPWU

	Pavement minor repair(Pot-hole repair)	Revetment minor repair
Present Maintenance Level	**No O&M plan** ● No inspection/cleaning ● Since there is no O&M Plan, repair works were done after the serious damage. Repair budget distribution was done after the serious damage. ● Since damages were left for long time, they tend to worsen. **Lack of repair technology** ● Currently pot holes were filled with a sand then compacted by manual.	**No O&M plan** ● No inspection. ● Since there is no O&M Plan, repair works were done after the serious damage. Repair budget distribution was done after the serious damage. ● Since damages were left for long time, they tend to worsen. **Lack of repair technology** ● Currently cavities were filled with sand then water-biding only. ● No use of chipping. Cement mortar was used for crack.(easy to remove the cement mortar)
Target Maintenance Level	**Conduct O&M based on the O&M Plan** ● Based on the O&M plan, inspection and repair will be implemented. ● To implement a proper O&M, necessary O&M budget will be secured in advance. ● Inspection and cleaning will be able to be implemented by MPWU. **Improvement of repair technology** ● A proper repair for pot hole(cleaning, use of cold asphalt and compaction) ● A proper supervision for local community	**Conduct O&M based on the O&M Plan** ● Based on the O&M plan, inspection and repair will be implemented. ● To implement a proper O&M, necessary O&M budget will be secured in advance. ● Inspection will be able to be implemented by MPWU. **Improvement of repair technology** ● A proper repair for revetment (chipping, cement mortar) ● A proper supervision for local community

To achieve above target, necessary activities will be done as follows

Experts:

Revetment Maintenance - 1 person, Pavement Maintenance - 1 person (Total 2.3M/M)

Activities:

Operation and maintenance manuals will be prepared in order to implement a sustainable O&M. After learning the road damaged causes and maintenance method through seminars, a site practice will be done in order to acquire the C/P's practical capability.

As Nippon Causeway will be reconstructed during soft component, site practice will be selected from other ordinary roads. Candidate locations are the asphalt pavement section with pot holes and the revetment section with many cracks.

- Formulation of O&M plan: 5days(Pavement - 5 days)
- Preparation of O&M manual: 10 days (Pavement and Revetment, 5days each)
- Preparation of Seminar: 4days (Pavement and Revetment, 2days each)

- Seminar: 4 days (Pavement and Revetment, 2days each)
- Practice for maintenance (pothole and revetment repair): 32days（Pavement and Revetment, 16 days each）
- Others (summary of soft component expert transit):14 days

Table 2　Activity Schedule for Soft Component

Activity Items	Expert(day) Pavement	Revetment	Implementing Schedule 2019 Jan.	2019 Feb.	2019 Mar.
Departure/Move	2	2	■		
Formulation of O&M Plan	5		■ ■		
O&M Manual Preparation(Revetment, Pavement Repair)	5	5	■ ■ ■		
Seminar Preparation	2	2	■		
Seminar(Revetment, Pavement Repair)	2	2	■		
Site Practice(Revetment, Pavement Repair)	22	22	■ ■ ■ ■ ■ ■ ■ ■ ■		
Summary of Soft component (inc. questionnaire)	2	2		■	
JICA Reporting/return Japan	4	2		■ ■	

(6) Procurement method of implementing resource

A technical transfer will be implemented by the Japanese Consultants. A counterpart from MPWU will be required in order to procure the construction machines and materials, and to support coordination with the related organization. This is the aim to implement the smooth soft component activities and to create the ownership of Kiribati side.

(7) Implementation Schedule of Soft Component

The implementation schedule of soft component is shown in Table 3.

(8) Output Materials

① Soft Component Plan Completion Report
② Manual of Operation and Maintenance for Asphalt Pavement, Manual of Operation and Maintenance for Revetment

(9) Responsibility of the Kiribati Side

MPWU is the responsible agency for the operation and maintenance of the Nippon Causeway reconstructed by this Project. To achieve the above goal of the soft component, the activities to be implemented by MPWU are as follows:

- Provision of Counter Parts (C/Ps) (from Civil Engineer Section's employee）
- Provision of training facilities (use of conference room in MPWU)
- Provision of work space for the Consultant

- Provision of materials (mortal etc.) for embankment and asphalt pavement's training
- Provision of construction machine to be use for embankment and asphalt pavement's training
- Provision of workers for embankment and asphalt pavement's training

It is important that the proper asset management impacts on the life span of the facilities and its maintenance cost.

After the reconstruction of the facilities, the Kiribati side will be required as follows

- To implement the inspection and cleaning of the facilities based on the O&M plan
- To secure the budget for the periodic inspection and maintenance

Table-3 Soft Component Activity Plan

Output	Activity	Method	Period	Target Group	Recourse	Output Material
To understand the cause of damages and repair method for pavement and revetment	Seminar	Presentation in Seminar -types of pavement damage and cause -inspection, maintenance method and measures emergency	2019 Jan - Feb	MPWU Civil Engineer 10 person	Japanese Consultant 2-3 MM C/P 1 person	O&M Manual
To prepare the O&M manual for pavement and revetment	Manual	O&M manual which covered from inspection method to repair method will be prepared with C/P		MPWU Civil Engineer 4 person		
To acquire the techniques for pavement and revetment maintenance by C/Ps	Practice for maintenance	Repair of revetment and small repair for pothole		MPWU Civil Engineer 10 person		Soft Component Plan Completion Plan

Table 4　Table Implementation Schedule

Item			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				A/C	E/N,G/A																																			
	Consultant contract and approval					V/C																																			
Design	Detailed	Site Survey																																						
		Detailed Desing																																						
		Preparation of tender document																																						
		Approval of tender document																																						
		Tender works	Announcement and PQ						T/N																																
			Bidding and Evalulation																																						
			Contracter's contract and approval											V/C																											
Reconstruction of Nippon Causeway																																								
Construction	Preparation（Procurement, transfer）																																							
	Temporary work																																							
	Revetment Construction																																							
		Ocean side																																						
		Lagoon side																																						
	Bridge Repair																																							
		Ocean side																																						
		Lagoon side																																						
	Ancillary Work																																							
	Road escavation and embankment																																							
	Pavement																																							
		Roadbed																																						
		Asphalt pavement																																						
		Marking																																						
	finishing, Completion Inspection and hand over																																							
Soft Component																																								
	Classroom learning and Practice for revetment and pavement maintenance																																							
	Submission of Report																																							

Completion Report
O&M Manual

Appendix-9: Cost Estimate of Pavement Type

Precondition

Discount rate i = 12%

Analysis period 20 years

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		184,000		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)

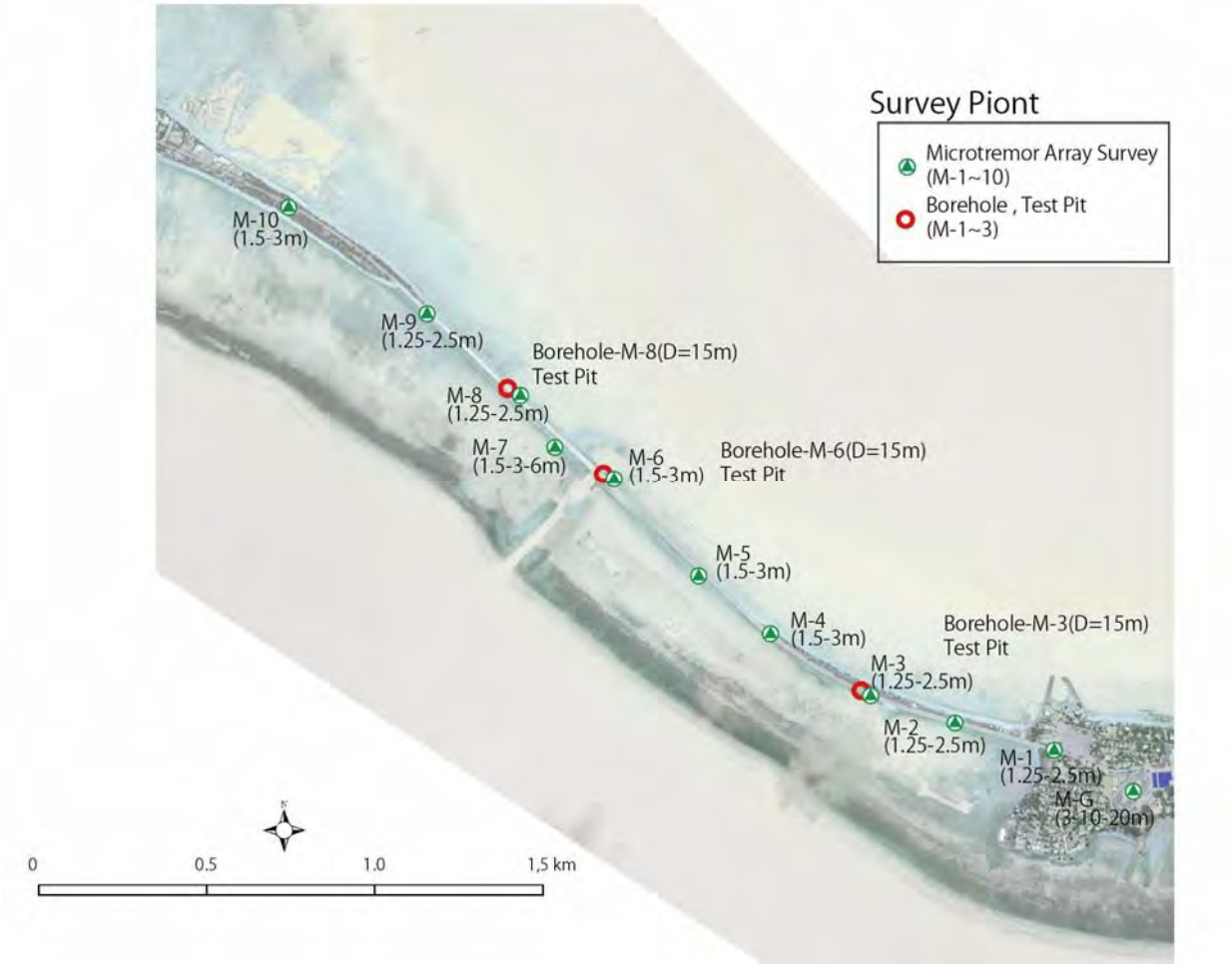
Initial Cost

Asphalt Cocrete 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 Cource (t=150mm)	7,000	10	1,570	14,915	104,405,000
	7,000	11	1,660	18,260	127,820,000
Lower Base Cource (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 Cocrete 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 Cource (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 Cource (150mm)	7,000	10	1,570	14,915	104,405,000
	7,000	11	1,660	18,260	127,820,000
Lower Base Cource (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: Geotechnical Survey Result



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 micretremor array survey

Bairiki Side

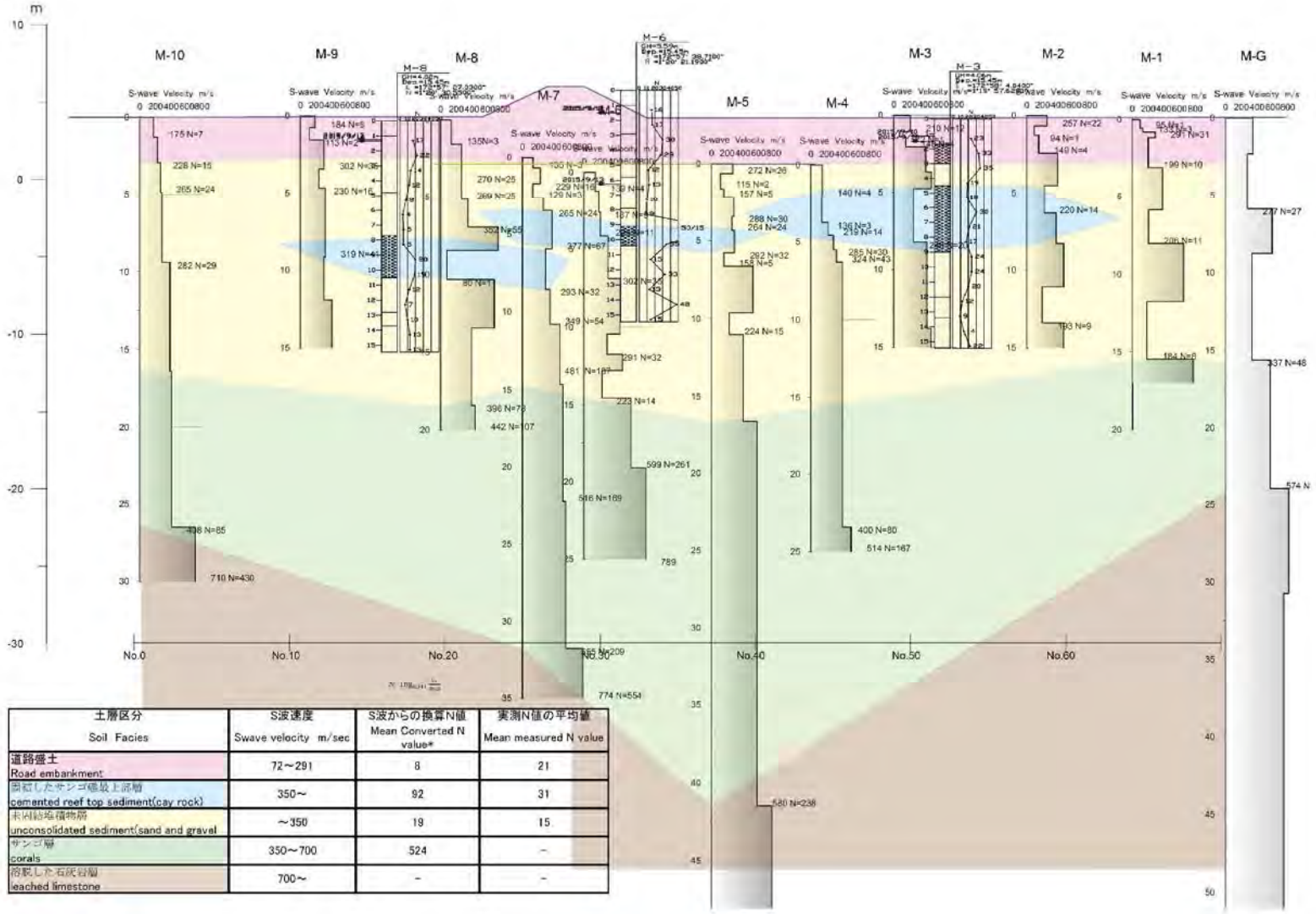
M-01			M-02			M-03			M-04			M-05			M-06		
S-wave Velocity (m/s)	Thickness m	Depth m	S-wave Velocity (m/s)	Thickness m	Depth m	S-wave Velocity (m/s)	Thickness m	Depth m	S-wave Velocity (m/s)	Thickness m	Depth m	S-wave Velocity (m/s)	Thickness m	Depth m	S-wave Velocity (m/s)	Thickness m	Depth m
95	0.6	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

AP10-3



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
固結したサンゴ礁上部層 cemented reef top sediment(cay rock)	350～	92	31
未固結堆積物層 unconsolidated sediment(sand and gravel	～350	19	15
サンゴ層 corals	350～700	524	–
溶脱した石灰岩層 leached limestone	700～	–	–

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

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"
Serveyer	CTI Engineering International Co., Ltd. Contact	Chief Engineer	Gose Shingo	Charge Engineer	Tamura Masaharu	Core Appraiser	Tamura Masaharu			Driller	Uwano Tomohisa
Elevation	GH=4.06m	Dip	0°	Direction	North 0° / 90° E / 180° South / 270° W	Angle	Level 0° / Vertical 90° / 0°	Equipment	Drilling Machine	YBM O5DA2	Hummer Dropper	Hook
Depth	15.45m								Engine	YANMAR NFD9	Pump	YBM GP-5

Scale (m)	Elevation (m)	Thickness (m)	Depth (m)	Colume	Classification	Color	Relative Density	Relative Consistency	Note	Water Table (m) / Date	Standard Penetration Test: Depth (m)	Blow /10cm: 0～10	10～20	20～30	Blow Count/Pene (cm)	N Value	Insite Test: Depth (m)	Test Name Result	Sampling: Depth (m)	No.	Method	Lab Test Name	Drilling Date
1	2.36	1.70	1.70		Sand	White	Medium		Medium sand with Pebble Gravel content <5% Low water content	9/10	1.15	6	7	10	23/30	23							
2	1.06	1.30	3.00		Gravel	White	Hard		Coral rock(Pebble) with sand Medium～Very Coarse sand Rock is hard Low water content		2.65	7	12	14	33/30	33							
3	-0.44	1.50	4.50		Sand	Brown	Medium		Very Coarse main size Fine～Medium sand content Common water content		3.15 3.45	10	11	14	35/30	35							
4											4.15	5	6	8	19/30	19							
5											4.45	4	5	9	18/30	18							
6											5.45	16	6	8	30/30	30							
7					Gravel	White	Medium		Weathring Coral rock Broken by hammer. Matrix is Very Coarse～Very Fine sand		6.65 7.15	7	7	7	21/30	21							
8											7.40	4	7	6	17/30	17							
9	-4.94	4.50	9.00								8.45 9.15	7	8	9	24/30	24							
10											9.45	7	8	9	24/30	24							
11					Sand	Brown	Medium		Very Coarse～Medium sand Massive Depth9.8～10.0m:Pebble		10.15 10.45	8	7	5	20/30	20							
12	-7.91	3.00	12.00								11.15 11.45	4	4	4	12/30	12							
13	-9.34	1.40	13.40		Sand	White	Soft		Fine～Medium grain size sand With Pebble content <5% High water content		12.15 13.15	3	3	3	9/30	9							9/10
14											13.45 14.15	3	4	7	14/30	14							
15	-11.39	2.05	15.45		Sand	White	Medium		Very Coarse～Coarse grain size sand Fine～Medium sand content High water content		14.45 15.15	8	4	12	22/30	22							9/11


Hole No. : M-3
Location : No.49+32.6m L5.0m
Elevation: GH=4.06m
M-3 5m~10m
M-3 10~15m

DRILLING LOG

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

PROJECT NAME:

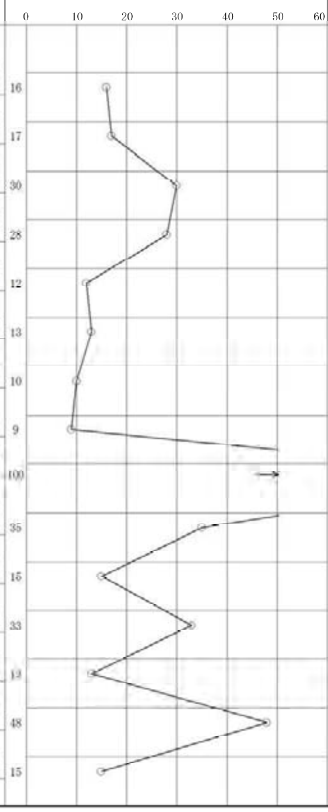
Hole No.	M-6	Location	No.28+33.0m L5.1m	Latitude	1° 20’ 21.19”
Cliant	Japan International Cooperation Agency(JICA)	Period	11/Sep/2015 ～ 13/Sep/2015	Longitude	172° 57’ 38.71”
Serveyer	CTI Engineering International Co., Ltd. Contact	Chief Engineer	Gose Shingo	Charge Engineer	Tamura Masaharu
Core Appraiser	Tamura Masaharu	Driller	Uwano Tomohisa		
Elevation	GH=5.59m	Dip	0°	Direction / Angle	Vertical 90°, 0°
Drilling Machine	YBM 05DA2	Hummer Dropper	Hook		
Depth	15.45m	Engine	YANMAR NFD9	Pump	YBM GP-5

Elevation (m)	Thickness (m)	Depth (m)	Classification	Color	Relative Density	Relative Consistency	Note
4.59	1.00	1.00	Sand	Grey			Coarse sand with Pebble Gravel content <5% Low water content
2.69	1.90	2.90	Sand	Brown	Medium		Very Coarse～Coarse grain sand Pebble content <5% Massive Low water content
-0.21	2.90	5.80	Sand	White	Medium		Medium～Very Coarse sand With Granule～Pebble(Coral rock) Rock is hard Gravel content <30% Common water content
-2.31	2.10	7.90	Sand	Brown	Soft		Medium sand with Pebble Massive Gravel content <5% Low water content Depth7.7～7.9m:Very Coarse sand High water content
-3.51	1.20	9.10	Sand	White	Soft		Fine sand Massive Common water content
-4.81	1.30	10.40	Gravel	White	Hard		Weathring Coral rock Broken by hammer Matrix is Very Coarse～Very Fine sand
-9.86	5.05	15.45	Sand	Grey White/White	Medium/Hard		Fine～Very Coarse grain size sand With Pebble content 5～10% Heterogeneity Common～High water content

Water Table (m) / Date: 9/12 1.50; 9/13 6.25

Standard Penetration Test

Depth (m)	Blow 0～10	Blow 10～20	Blow 20～30	Blow Count/Pene (cm)	N Value
1.15～1.45	3	6	7	16/30	16
2.15～2.45	7	2	8	17/30	17
3.15～3.45	14	8	8	30/30	30
4.15～4.45	7	9	12	28/30	28
5.15～5.45	3	4	5	12/30	12
6.15～6.45	3	6	4	13/30	13
7.15～7.45	3	3	4	10/30	10
8.15～8.45	2	3	4	9/30	9
9.15～9.30	27	23/5		50/15	100
10.15～10.45	10	12	13	35/30	35
11.15～11.45	3	6	6	15/30	15
12.15～12.45	9	10	14	33/30	33
13.15～13.45	4	5	4	13/30	13
14.15～14.45	7	22	19	48/30	48
15.15～15.45	15/30			15/30	15



Insite Test: Depth (m), Test Name Result

Sampling: Depth (m), No., Method

Lab Test Name

Drilling Date: 9/11 (4m), 9/12 (12m), 9/13 (15m)


Hole No. : M-6
Location : No.28+33.0m L5.1m
Elevation: GH=5.59m
KODAK Color Control Patches
M-6 0m~5m
M-6 5m~10m
M-6 10-15m

DRILLING LOG

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

PROJECT NAME

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"
Serveyer	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	Dip 0°	Direction	Angle 0°	Equipment	Drilling Machine	YBM O5DA2	Hummer Dropper	Hook
Depth	15.45m					Engine	YANMAR NFD9	Pump	YBM GP-5

Scale (m)	Elevation (m)	Thickness (m)	Depth (m)	Colume	Classification	Color	Relative Density	Relative Consistency	Note	Water Table (m) / Date	Standard Penetration Test: Depth (m)	Blow /10cm (0～10 / 10～20 / 20～30)	Blow Count/Pene (cm)	N Value	Insite Test: Depth (m)	Test Name Result	Sampling: Depth (m)	No.	Method	Lab Test Name	Drilling Date
1	3.02	1.00	1.00		Sand	Grey ~Brown			Fine~Medium sand with Pebble Gravel content 5~10% Poor water content		1.15	4 6 8	17/30	17							
2					Sand	White~Grey	Medium		Fine~Very Coarse sand with Pebble Gravel content 15% Many blue colored gravel Heterogeneity High water content		1.45 2.15	6 7 9	22/30	22							
3											2.45 3.15	4 5 5	14/30	14							
4	-0.78	3.80	4.80								3.45 4.15	3 6 3	12/30	12							
5					Sand	Brown	Silty		Fine~Very Coarse grain sand with Pebble Gravel content 15~20% High water content Depth4.8~5.0m:Fine sand		4.45 5.15	2 3 3	8/30	8							
6											5.45 6.15	1 2 1	4/30	4							
7	-3.68	2.90	7.70								6.45 7.15	1 1 3	5/30	5							
8					Gravel	Brown	Soft~Medium		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		7.45 8.15	1 2 2	5/30	6							
9											8.45 9.15	3 12 5	20/30	20							
10	-6.48	2.80	10.50								9.45 10.15	5 6 8	19/30	19							9/14
11					Sand	White	Soft		Fine~Medium sand with Pebble Gravel content <5% High water content		10.45 11.15	3 4 5	12/30	12							
12	-8.78	2.30	12.80								11.45 12.15	2 3 2	7/30	7							
13	-9.68	0.90	13.70		Sand	White	Soft		Medium grain sand with Pebble Gravel content <5% Low water content		12.45 13.15	3 3 4	10/30	10							
14											13.45 14.15	3 4 6	13/30	13							
15	-11.43	1.75	15.45		Sand	White	Medium		Coarse~Very Coarse grain sand with Pebble Gravel content <5% Low water content		14.45 15.15	7 7 6	13/30	13							9/15


Hole No. : M-8
Location : No.19+4.4m L5.0m
Elevation: GH=4.02m
KODAK Color Control Patches
M-8 0m~5m
M-8 5m~10m
M-8 10m~15m