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1. 調査団員・氏名

官団員

1. 総括：植木 雅浩（第1次、第2次現地調査）
Leader: Mr. Masahiro UEKI (for First and Second Works in Cambodia)
JICA 地球環境部 水資源・防災グループ 水資源第一課 企画役
Advisor, Water Resources Management Division 1, Water Resources and Disaster Management Group, Global and Environment Department, JICA
2. 総括：池上 宇啓（第3次現地調査）
Leader: Mr. Takahiro IKENOUE (for Third Work in Cambodia)
JICA 資金協力支援部 実施監理第三課 企画役
Advisor, Grant Aid Project Management Division 3, Financing Facilitation and Procurement Supervision Department, JICA
3. 協力企画：中村 元哉
Cooperation Planning: Mr. Genya NAKAMURA
JICA 地球環境部 水資源・防災グループ 水資源第一課
Water Resources Management Division 1, Water Resources and Disaster Management Group, Global and Environment Department, JICA

コンサルタント団員

4. 業務主任／上水道計画：男鹿 剛彦
Chief Consultant/ Water Supply Planning Specialist: Mr. Takehiko OGA
株式会社日水コン・海外事業部
Director, Overseas Services Department, Nihon Suido Consultants
5. 水道水源：古川 隆司
Water Sources Specialist: Mr. Takashi FURUKAWA
株式会社建設技研インターナショナル・水資源部
Senior Chief Engineer, Water Resources Management Division, CTI Engineering International
6. 上水道施設・設備設計（取水・導水施設）：今野 秀紀
Water Supply Facilities Designer (Intake/Raw Water Conveyance): Mr. Hideki KONNO
株式会社建設技研インターナショナル・水資源部
Water Resources Management Division, CTI Engineering International
7. 上水道施設・設備設計（浄水施設）：菊池 秀治
Water Supply Facilities Designer (Water Treatment Plant): Mr. Hideharu KIKUCHI
株式会社日水コン・海外事業部・技術部
Overseas Services Department, Nihon Suido Consultants
8. 上水道施設・設備設計（送配水施設）：石井 秀雄
Water Supply Facilities Designer (Transmission/Distribution): Mr. Hideo ISHII
北九州市上下水道局海外事業部海外事業課
Manager, International Project Division, International Project Department, Water and Sewer Bureau, City of Kitakyushu

9. 施工・調達計画／積算：高樋 直人
Construction Plan / Cost Estimation Specialist: Mr. Naoto TAKATOI
株式会社日水コン・海外事業部・技術部
Overseas Services Department, Nihon Suido Consultants
10. 環境社会配慮：清田 大作
Environmental & Social Considerations Specialist: Mr. Daisaku KIYOTA
株式会社建設技研インターナショナル・水資源部
Water Resources Management Division, CTI Engineering International
11. 運転・維持管理計画：矢山 将志
O&M Organization Specialist: Mr. Masashi YAYAMA
北九州市上下水道局海外事業部海外事業課
International Project Division, International Project Department
Water and Sewer Bureau, City of Kitakyushu,
12. 水道水源：後藤 俊宏
Water Sources Specialist: Mr. Toshihiro GOTO
株式会社建設技研インターナショナル・水資源部
Water Resources Management Division, CTI Engineering International
13. 業務調整：中嶋 宜信
Coordinator: Mr. Yoshinobu NAKAJIMA
株式会社日水コン・海外事業部・技術部
Overseas Services Department, Nihon Suido Consultants,

2. 調査行程

(1) 第1次現地調査スケジュール

年月日	査問員				コンサルタント団員							業務調整
	総括	協力企画	業務主任 上水道計画	水道水源	上水道施設・ 設備設計 (取水・排水施設)	上水道施設・ 設備設計 (浄水施設)	上水道施設・ 設備設計 (送配水施設)	施工・調達計画 積算	環境社会配慮	運転・ 維持管理計画	水道水源	
1 2012/6/3	植本 雅浩	中村 元哉	男鹿 剛彦 1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	志川 隆司	今野 秀紀 1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	菊池 秀治	石井 秀雄 1155 FUK → 1455 BKK (TG649) 1815 BKK → 1925 PNH (TG584)	高橋 直人 1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	清田 大作	矢山 将志	後藤 俊宏	中嶋 直信
2 2012/6/4	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:DIMEと協 議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:MIMEとIC協 議	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	
3 2012/6/5	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:DIMEと協 議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:MIMEとIC協 議	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	
4 2012/6/6	午前:PPWSAとの打合せ(フェーズ3) 午後:MIMEとのIC協 議	午前:PPWSAとの打合せ(フェーズ3) 午後:MIMEとのIC協 議	1305 MNL → 1520 BKK (TG651) 1815 BKK → 1925 PNH (TG584)	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSとの協議 午後:DIMEとの協議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:DIMEと協 議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:MIMEとIC協 議	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	
5 2012/6/7	午前:MIMEとの打合せ(IC/R)	午前:MIMEとの打合せ(IC/R)	午前:WWSとの協議 午後:資料整理	午前:WWSとの協議 午後:資料整理	午前:WWSとの協議 午後:資料整理	午前:WWSとの協議 午後:資料整理	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:DIMEと協 議	午前:WWSと協 議 午後:MIMEとIC協 議、再委託業者訪 問	午前:WWSと協 議 午後:MIMEとIC協 議	午前:MIMEとレベ7 の協議 午後:MOVRAMとの 協議	
6 2012/6/8	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	
7 2012/6/9	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	現地視察	
8 2012/6/10	内業(資料整理・解析)	内業(資料整理・解析)	1305 MNL → 1520 BKK (TG651) 1815 BKK → 1925 PNH (TG584)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
9 2012/6/11	MIMEにてミニミーティング	MIMEにてミニミーティング	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:WWSとの協議、現地視察	午前:WWSとの協議、現地視察	午前:WWSとの協議、現地視察	午前:WWSとの協議、現地視察	1155 FUK → 1455 BKK (TG649) 1815 BKK → 1925 PNH (TG584)	
10 2012/6/12	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	
11 2012/6/13	Tokyo	Tokyo	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:大塚前への説明 午後:JICA現地事務所へ報告	午前:WWSとの協議、現地視察	午前:WWSとの協議、現地視察	午前:WWSとの協議、現地視察	午前:WWSとの協議、現地視察	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
12 2012/6/14	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
13 2012/6/15	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
14 2012/6/16	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	現地調査	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
15 2012/6/17	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
16 2012/6/18	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
17 2012/6/19	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
18 2012/6/20	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
19 2012/6/21	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
20 2012/6/22	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
21 2012/6/23	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
22 2012/6/24	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	
23 2012/6/25	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	内業(資料整理・解析)	1200 NRT → 1630 BKK (TG643) 1815 BKK → 1925 PNH (TG584)	

年月日	管理員				コンサルタント				業務調整			
	主 査 調査箇所	協力企画	業務主任 上水道計画	水道水源	上水道施設・ 設備設計 (浄水施設)	上水道施設・ 設備設計 (取水・排水施設)	施工・調査計画 積算	環境社会配慮		運転・ 維持管理計画	水道水源	
24 2012/6/26	PNH	中村 元哉	男鹿 剛彦	古川 陸司	今野 秀紀	菊池 秀治	石井 秀雄	高橋 直人	清田 水作	矢山 将志	後藤 俊宏	同左
25 2012/6/27	BTB											<PNH> 現地資料収集
26 2012/6/28	BTB											同左
27 2012/6/29	KMC											同左
28 2012/6/30	PNH											同左
29 2012/7/1	PNH											同左
30 2012/7/2	PNH											同左
31 2012/7/3	PNH											同左
32 2012/7/4	BTB											<BTB>現地調査
33 2012/7/5	BTB											同左
34 2012/7/6	PNH											同左
35 2012/7/7	PNH											同左
36 2012/7/8	PNH											同左
37 2012/7/10	PNH											同左
38 2012/7/11	PNH											同左
39 2012/7/12	PNH											同左
40 2012/7/13	PNH											同左
41 2012/7/14	PNH											同左
42 2012/7/15	PNH											同左
43 2012/7/16	PNH											同左
44 2012/7/17	PNH											同左
45 2012/7/18	PNH											同左
46 2012/7/19	PNH											同左
47 2012/7/20	PNH											同左
48 2012/7/21	PNH											同左
49 2012/7/22	PNH											同左

(2) 第2次現地調査スケジュール

(主な活動箇所 PNH:プンペン、KMC:コンボンチャム、BTB:バットンバン。他地点での調査は<>表記)

年月日	主な調査箇所	官団員			コンサルタント団員						
		総括	協力企画	業務主任 上水道計画	上水道施設・ 設備設計 (取水・導水施設)	上水道施設・ 設備設計 (送配水施設)	施工・調達計画 積算	上水道施設・ 設備設計 (浄水施設)	業務調整		
		植木 雅浩	中村 元哉	男鹿 剛彦	今野 秀紀	石井 秀雄	高橋 直人	菊池 秀治	中嶋 宜信		
1	2012/8/21	火	PNH						12:00 NRT-> 16:30 BKK (TG643) 18:15 BKK-> 19:25 PNH (TG584)		
2	2012/8/22	水	PNH						内業 (資料整理・解析) 現地再委託先協議		
3	2012/8/23	木	PNH						内業 (資料整理・解析)		
4	2012/8/24	金	PNH						内業 (資料整理・解析) 現地再委託先協議		
5	2012/8/25	土	PNH						内業 (資料整理・解析)		
6	2012/8/26	日	PNH	12:00 NRT-> 16:30 BKK (TG643) 18:15 BKK-> 19:25 PNH (TG584)	12:00 NRT-> 16:30 BKK (TG643) 18:15 BKK-> 19:25 PNH (TG584)	12:00 NRT-> 16:30 BKK (TG643) 18:15 BKK-> 19:25 PNH (TG584)	12:00 NRT-> 16:30 BKK (TG643) 18:15 BKK-> 19:25 PNH (TG584)	11:35 FUK-> 14:55 BKK (TG649) 18:15 BKK-> 19:25 PNH (TG584)	内業 (資料整理・解析)		12:00 NRT-> 16:30 BKK (TG643) 18:15 BKK-> 19:25 PNH (TG584)
7	2012/8/27	月	PNH	JICA現地事務所協議、MIMEとの協議、			JICA現地事務所協議、MIMEとの協議、団内協議				
8	2012/8/28	火	PNH	別件公務		MIMEとの協議 MEF協議		MIMEとの協議	内業 (資料整理・解析)		同左
				日本大使館報告 JICA現地事務所報告			<KMC> WwS協議 現地調査		内業 (資料整理・解析)		<KMC> WwS協議
9	2012/8/29	水	PNH	20:25 PNH-> 21:30 BKK (TG585) 23:50 BKK -->	20:25 PNH-> 21:30 BKK (TG585) 23:50 BKK -->				内業 (資料整理・解析)		現地調査
10	2012/8/30	木	KMC	--> 08:10 NRT (TG642)	--> 08:10 NRT (TG642)	WwS協議 現地調査					WwS協議 現地調査
11	2012/8/31	金	PNH			内業 (資料整理・解析)	<KMC> 現地調査	内業 (資料整理・解析)	内業 (資料整理・解析)		<KMC> 現地調査
12	2012/9/1	土	PNH			内業(資料整理・解析)					
13	2012/9/2	日	PNH			内業(資料整理・解析)					
14	2012/9/3	月	PNH			内業 (資料整理・解析)	<BTB> 現地調査	<BTB> 現地調査	20:25 PNH-> 21:30 BKK (TG585) 23:50 BKK -->		<KMC> 現地調査
15	2012/9/4	火	PNH			<BTB> 現地調査	<BTB> 現地調査	<BTB> 現地調査	--> 08:10 NRT (TG642)		<KMC> 現地調査
16	2012/9/5	水	PNH			<BTB> DIME、WwS協議	<BTB> 現地調査	<BTB> 現地調査			<BTB> 現地調査
17	2012/9/6	木	PNH			MIMEとの協議					<BTB> 現地調査
18	2012/9/7	金	PNH			MOWRAMとの協議 資料整理 現地再委託先協議					浄水施設概略検討 資料整理 現地再委託先協議
19	2012/9/8	土	PNH			内業 (資料整理・解析)	<BTB> 現地調査	内業 (資料整理・解析)			20:25 PNH-> 21:30 BKK (TG585) 23:50 BKK -->
20	2012/9/9	日	PNH			内業 (資料整理・解析)	<BTB> 現地調査	内業 (資料整理・解析)			--> 08:10 NRT (TG642)
21	2012/9/10	月	PNH			MIMEとの協議 (TN署名)	<KMC> 現地調査	<KMC> 現地調査			--> 08:10 NRT (TG642)
22	2012/9/11	火	PNH			内業 (資料整理・解析)	<KMC> 現地調査	<KMC> 現地調査			
23	2012/9/12	水	PNH			JICA現地事務所報告 20:25 PNH-> 21:30 BKK (TG585) 23:50 BKK -->	<BTB> 現地調査	JICA現地事務所報告 内業 (資料整理・解析)			
24	2012/9/13	木	PNH			--> 08:10 NRT (TG642)	20:25 PNH-> 21:30 BKK (TG585) 23:50 BKK -->	内業 (資料整理・解析)			
25	2012/9/14	金	PNH				--> 08:10 NRT (TG642)	内業(資料整理) MIMEとの協議			
26	2012/9/15	土	PNH					内業 (資料整理・解析)			
27	2012/9/16	日	PNH					20:25 PNH-> 21:30 BKK (TG585)			
28	2012/9/17	月	PNH					00:50 BKK-> 08:00 FUK (TG648)			

(3) 第3次現地調査スケジュール

日順	日付		官団員		コンサルタント団員				
			総括	協力企画	業務主任 ／上水道 計画	上水道施 設・設備設 計（取水・ 導水施設）	施工・調達 計画／積 算	上水道施 設・設備設 計（送配水 施設）	運転・維持 管理計画
			池上宇啓	中村元哉	男鹿剛彦	今野秀紀	高樋直人	石井秀雄	矢山将志
1	2013/2/10	日	NRT→BKK→PNH				FUK→BKK→PNH		
2	2013/2/11	月	MIME との協議						
			MOWRAM との協議				内業（資料整理）		
3	2013/2/12	火	バタンバン及びコンボンチャムとの協議						
4	2013/2/13	水	MIME、バタンバン及びコンボンチャムとの全体協議						
			MOWRAM との協議				内業（資料整理）		
5	2013/2/14	木	議事録内容協議・署名、JICA 事務所						
			大使館			内業（資料整理）			
6	2013/2/15	金	PNH→BKK						
			BKK→NRT				BKK→FUK		

3. 関係者（面会者）リスト

Ministry of Industry, Mines and Energy(MIME)

- H.E. Mr. Phork SOVANRITH Secretary of State
- H.E. Mr. Meng Saktheara Director General, General Department of Industry
- Mr. Som SETHY Vice Chief of Regulation Office
- Mr. Tan SOKCHEA Director, Department of Portable Water Supply
- Mr. Heng Kunleang Director, Energy Development Department
General Department of Energy

Ministry of Water Resources and Meteorology (MOWRAM)

- H.E. Mr. Veng SAKHON Secretary of State
- Mr. Mao HAK DDG of Technical Affair and Director, Department of Hydrology and River Works
- Mr. Uch HING Deputy Director Technical Service Center for Irrigation System and Meteorology
- Mr. Theng Tara Director Department Water Resource Management

Ministry of Water Resources and Meteorology Tonle Sap Authority

- H.E. Mr. Pich VEASNA Deputy Secretary General of Tonle Sap Authority
Deputy Director General of Administration Affairs
Director of Technical Service Center for Irrigation and Meteorology

Ministry of Public Works and Transport

- Mr. Chim PHALLA Director, International Cooperation Department
- Mr. Kong SOPHAL Deputy Director, International Cooperation Department

Ministry of Economy and Finance

- Mr. Sim SAMNANG Deputy Director of Resettlement Department
- Mr. Im SETHYRA Director of Resettlement Department

Ministry of Environment Environmental Impact Assessment Department

- Mr. Duong SAMKEAT Deputy Director

Kampong Cham Department of Industry, Mines & Energy

- Mr. Sudndy Director

Department of Land management, urban planning and construction of Kampong Cham Province

- Mr. Thoun CHETHA Dupty Director

Kampong Cham Waterworks

- Mr. Preap Somala Director
- Mr. Va Sam Aok Deputy Director
- Mr. Teng Savoeun Acting deputy director

Department of Industry, Mines & Energy of Battambang Province

- Mr.Chui CHHEANG Director

Department of Public Works and Transport of Battambang Province

- Mr. Chan Sambo Deputy Director of Public Works and Transport

BATTAMBANG Waterworks

- Mr. Touch CHHOUN SAORITH Director
- Ms. Tith LINDA Deputy Director
- Ms. Ith Kloeng Deputy Director
- Mr. Kai SO DA Deputy Director

OF THE PREPARATORY SURVEY

ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG
CHAM AND BATTAMBANG WATERWORKS

In response to the request from the Government of the Kingdom of Cambodia (hereinafter referred to as "Cambodia", the Government of Japan decided to conduct a Project on Additional New Water Treatment Plants for Kampong Cham and Battambang Water Works (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Cambodia the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Masahiro Ueki, Advisor, Water Resources Management 1, Water Resources and Disaster Management Group, Global Environment Department, JICA, and is scheduled to stay in the country from June 3 to 13, 2012.

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

In the course of discussions and field survey, both parties confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Outline Design Study Report.

Phnom Penh, June 11th, 2012

榎本 雅浩

Mr. Ueki Masahiro
Team Leader
Japan International Cooperation Agency



H.E. Phork Sovanrith
Secretary of State
Ministry of Industry, Mines and Energy

ATTACHMENT

1. Title of the Project

The title of the Project is "The Project on additional new water treatment plants for Kampong Cham and Battambang Waterworks."

2. Objective of the Project

The objective of the Project is to improve the water supply services in the cities of Kampong Cham and Battambang through the construction of new water treatment plants and water distribution system.

3. Project site

The sites of the Project are the cities of Kampong Cham and Battambang as shown in Annex-1.

4. Responsible and Implementing Agency

4-1. The Responsible Agency is Ministry of Industry, Mines and Energy (hereinafter referred to as "MIME").

4-2. The Implementing Agencies are Provincial Departments of Industry, Mines and Energy (hereinafter referred to as "DIME") in respective Provinces of Kampong Cham and Battambang.

5. Items requested by the Government of Cambodia

After discussions between the Cambodian side and the Team (hereinafter referred to as "the both sides"), the items described in Annex-2 were finally requested by the Cambodian side.

The both sides confirmed that the appropriateness of the request would be examined in accordance with the further studies and analysis, and the final components of the Project would be decided by both sides.

6. Japan's Grant Aid Scheme

6-1 The Cambodian side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-3.

6-2 The Cambodian side will take the necessary measures, as described in Annex-4, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

7. Schedule of the Survey

7-1 The consultant members of the Team will proceed with further studies in Cambodia until September, 2012.

7-2 JICA will prepare the draft outline design report in English and dispatch a mission in order to explain its contents to the Cambodian side around February 2013.

7-3 In case that the contents of the report are accepted in principle by the Cambodian side, JICA will finalize the report and send it to the Cambodian side around April 2013.



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7-4 The Cambodian side understands that execution of the Preparatory Survey (hereinafter referred to as “the Survey”) does not necessarily imply the Japanese Government’s commitment to the project implementation.

8. Other relevant issues

The following issues were discussed and confirmed by both sides.

8-1. Phasing of Field Survey

The Team explained that the field survey in Cambodia will be divided into the following two phases, especially to decide the scope of the Project in Battambang based on the availability of new water sources.

1) Field Survey I (from Early June to Mid-July, 2012)

- Confirmation of the necessity and appropriateness of the project requested by the Cambodian side
- Collection and analysis of the necessary information and data, especially the availability of new water sources in Battambang.
- Examination of the existing/planned water supply facilities and appropriate scale of the Project as a grant aid
- Explanation of the proposed scope of the Project

2) Homework in Japan (from Mid-July to Mid-August 2012)

- Examination of the scope of the Project

3) Field Survey II (from Mid-August to Early September, 2012)

- Explanation of the scope of the Project
- Implementation of the additional survey necessary for the design of facilities and cost estimation

8-2. Planning of the facilities

- 1) The Team explained that the maximum utilization of existing facilities such as water treatment plant and production wells should be reasonably considered. Therefore, both sides confirmed that the capacity of new water treatment plants will be planned considering the capacity of existing water supply facilities.
- 2) Both sides agreed that the target year should be set at a few years after the expected timing of completion the Project, because the Japanese Grant Aid is deemed to be provided to meet urgent and short-term needs of the recipient country.
- 3) As for individual house connections, both sides agreed that necessity of provision of the materials such as water meters, pipes and necessary accessories will be considered in the Survey in order to assist the expansion of water supply to poor communities. Both sides also confirmed that Cambodian side will bear the cost for installation works thereof.

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8-3 Ensuring the land for construction of new water supply facilities

-Both sides agreed that the Cambodian side will clear the site completely including removing any remaining underground structures for ensuring the land to construct new water supply facilities, by the beginning of 2013.

-The Team explained that abbreviated resettlement plan will be prepared through the survey based on "Guideline for Environmental and Social Consideration". Then Cambodia side agreed to implement resettlement of residents in accordance with the abbreviated resettlement plan.

8-4. Social and Environmental Considerations

- 1) Both sides confirmed that the Team will assist the GOC to carry out the IEE according to the law and regulation related to the Environmental impact assessment in Cambodia.
- 2) The team explained that the environmental and social considerations studies would be conducted according to the JICA's Guidelines for Environmental and Social Considerations in order to examine the mitigation measures of impacts and monitoring plan during/after the implementation.

8-5. Tax exemption

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes in Cambodia which is to be arisen from the Project activities will be ensured by MIME. MIME will take any procedures necessary for tax exemption with the Ministry of Economy and Finance of Cambodia at its responsibility.

8-6. Overlapping with other projects

Both side confirmed that the on-going / proposed projects in 2 cities supported by other donor agencies, NGO, Cambodian official organization(s) and private sector should be carefully investigated to avoid overlapping with the Project. The Cambodian side agreed to provide necessary information on related projects.

8-7. Hydrological and meteorological data necessary for the Survey

Both sides confirmed that MIME will assist the Team to obtain hydrological and meteorological data which have been recorded by Ministry of Water Resources and Meteorology upon request from the Team.

Annex-1 Project Sites Map

Annex-2 Items Requested by the Cambodian Side

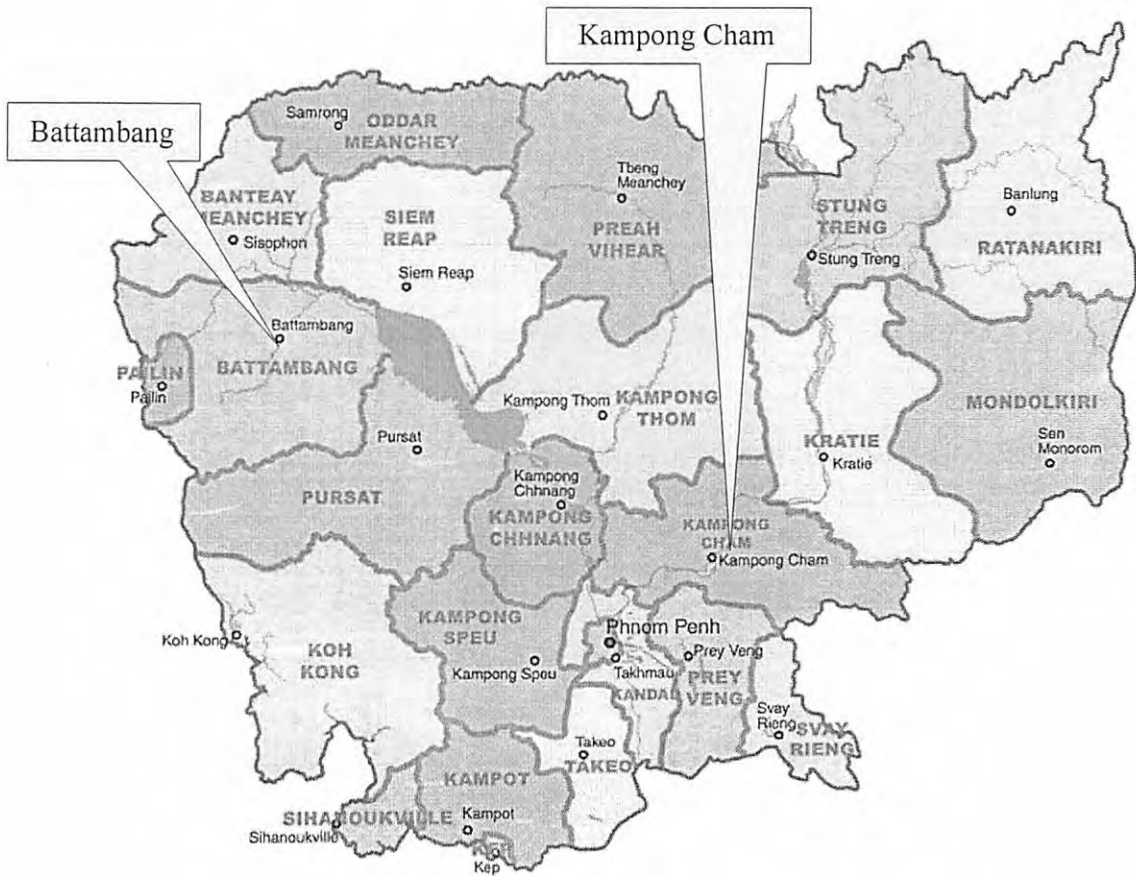
Annex-3 Japan's Grant Aid Scheme

Annex-4 Major Undertakings to be taken by Each Government

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Annex-1: Project Sites Map



Handwritten marks: a signature and the number 3 in a circle.

Annex-2: Items Requested by the Cambodian Side

Item		Contents of Request	
		Kampong Cham City	Battambang City
Facility	Intake Pump Station and Pipe Line	No. of intake pumps: 3	No. of intake pumps: 3
		Area: 4,200 m ²	Area: 20,000 m ²
		Capacity: 20,000 m ³ /d	Capacity: 30,000 m ³ /d
	Water treatment plant	Treatment Process: flocculation, coagulation, sedimentation, rapid sand filtration	Treatment Process: flocculation, coagulation, sedimentation, rapid sand filtration
	Clear water transmission	WTP to elevated tank	WTP to elevated tank
	Expansion of Distribution Network	Length: approx. 60 km	Length: approx. 80 km
	Elevated tank	1 unit	1 unit
Equipment	Water quality analysis	Optical analyzer Distillation apparatus Reagents Glassware pH meter Turbidity meter UPS Others	Atomic absorption spectrophotometer Distillation apparatus Cultivator Microscope Reagents Glassware pH meter Turbidity meter UPS Others
	Maintenance Tools of Electrical and Mechanical	Electroscope Vibration checker Torque wrench Earth checker Insulation checker Database system for maintenance Other tools	Electroscope Power tester Digital recorder Vibration checker Torque wrench Handy flow meter Earth checker Insulation checker Filtration sand tester Database system for maintenance Other tools
	Accountant system	Hardware	Hardware, software
	Distribution Management tools	Leakage locating equipment Pipe locator Pipe laying Pipe network information system	Leakage locating equipment Pipe locator Pipe laying Pipe network information system
Others		Detailed design Construction supervision Soft component	Detailed design Construction supervision Soft component

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Annex-3: JAPAN'S GRANT AID SCHEME

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, 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

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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 aoutline 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 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 to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement

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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. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. 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) "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

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

b) The payments will be made when payment requests are presented by the Bank to 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.

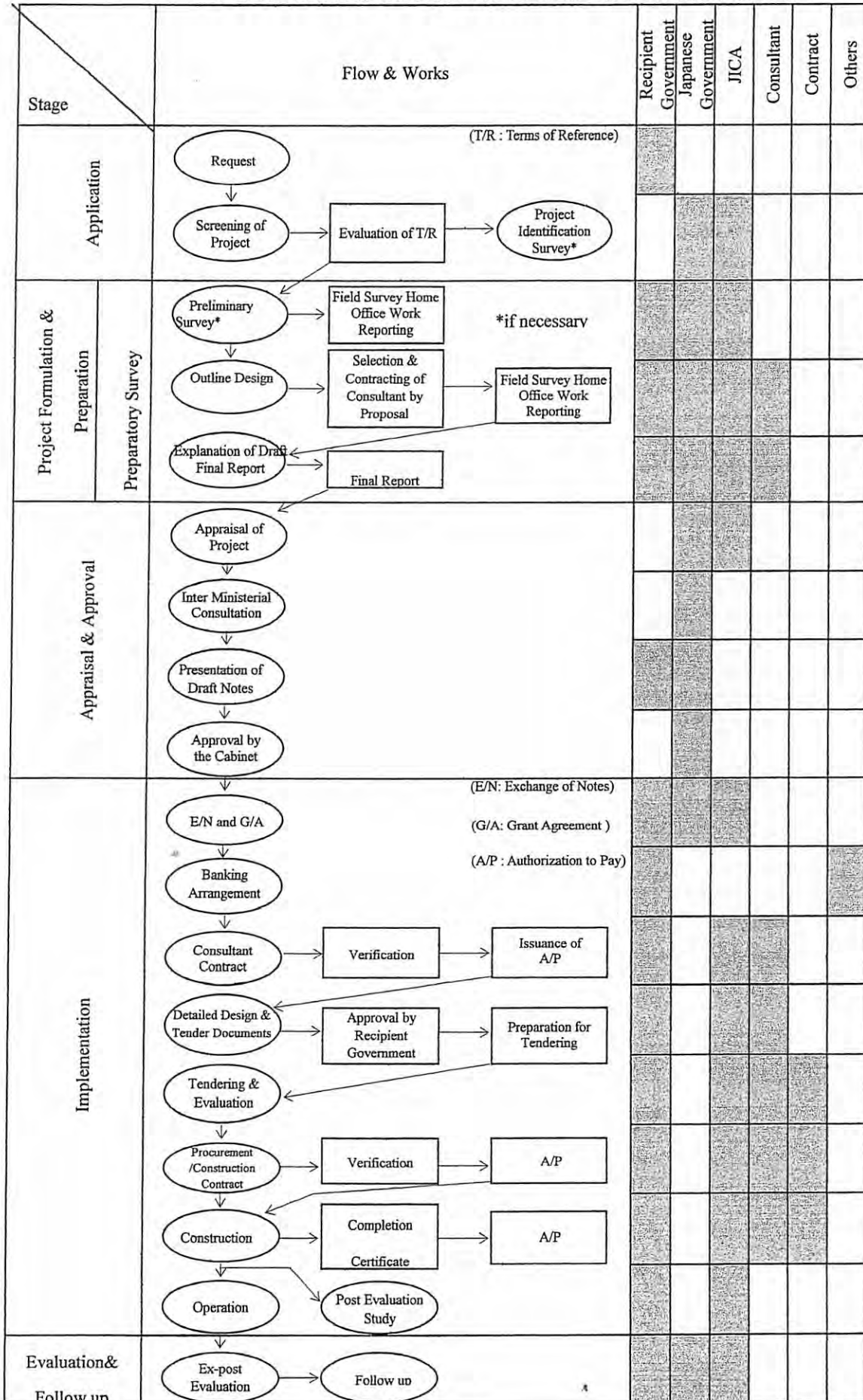
(10) Social and Environmental Considerations

A 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.

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FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



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Annex-4: Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	to secure land necessary for the implementation of the Project and to clear the sites;		●
2	To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country		
	Marine (Air) transportation of the Products from Japan to the		
	1) recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
3	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
4	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
5	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
7	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
8	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

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MINUTES OF DISCUSSIONS
OF THE PREPARATORY SURVEY (2ND FIELD SURVEY)
ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS
FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS
IN THE KINGDOM OF CAMBODIA
AGREED UPON BETWEEN
MINISTRY OF INDUSTRY, MINES AND ENERGY
AND
JICA PREPARATORY SURVEY TEAM

Phnom Penh, August 29, 2012

榎本雅浩

Mr. Ueki Masahiro
Team Leader, Preparatory Survey Team
Japan International Cooperation Agency
(JICA)
Japan



H.E. Meng Saktheara
Director General
General Department of Industry
Ministry of Industry, Mines and Energy
The Kingdom of Cambodia



JICA Preparatory Survey Team (hereinafter referred to as “the Team”) for the Project on Additional New Water Treatment Plants for Kampong Cham And Battambang Waterworks (hereinafter referred to as “the Project”) was dispatched to Cambodia from 26th August to 15th September, 2012. The Team held a series of discussions with the Ministry of Industry, Mines and Energy (hereinafter referred to as “MIME”) with the reports and presentation materials. MIME basically agreed on the contents of the report. The following items were also confirmed between both parties as the result of discussions.

The Team will proceed to further works and prepare the Outline Design Study Report.

1. Target Site of the Study

- 1-1. The Team reported that the Japanese Government decided to continue the Study in both Kampong Cham and Battambang as the availability of new water sources in both cities are confirmed in the 1st field survey.
- 1-2. The Team explained the design capacity of new water treatment plant (hereinafter referred to as “WTP”) in both cities as shown in the report based on the preliminary estimation of future demand projection, design capacity of existing facilities and availability of new water sources. The Team emphasized and MIME understood that these estimations are subject to change based on the results for further works.

2. Demand Projection

2.1. Target Year

Both sides reconfirmed that the target year of the Project will be 2019, which is 3 years after the expected timing of completion of the Project.

2.2. Service Coverage Ratio

MIME explained during the 1st field survey that the target service coverage ratio of the Project should be 84.8% in 2019, considering 1.2% annual increase (80% in 2015 based on the “National Strategic Development Plan” plus 4.8% for 4 years). In addition, MIME explained that, although the target service coverage ratio in 2019 is not decided by the Royal Government of Cambodia (RGC) yet, the discussion has been started in MIME to set it on 84.8% and it will be reflected in the Technical Assistance on update of current urban water supply policy funded by ADB. The Team understood the situation and agreed to set it on 84.8%

2.3. Leakage Ratio

During the 1st field survey, MIME requested the Team to accept 2% allowance from the current leakage ratio (13%) in Kampong Cham in the target year. The Team explained that the leakage ratio in the additional service area covered by the Project is expected to be lower than current ratio. In addition, Kampong Cham waterworks is expected to repair the leakage

in order to maintain the current leakage ratio utilizing the know-how and experiences gained through the Capacity Building Project Phase 2. As a conclusion, both sides agreed to estimate the leakage ratio at 13% in the target year.

3. Availability of Water Sources in Battambang

The Team explained to MIME the necessary raw water volume for water supply in Battambang (both existing and new WTP), estimated available water volume from Sangkae River in dry season, and actual available water volume from the river during most serious drought for past 11 years (occurred in 2005) as shown in the report prepared by the Team. Based on the actual water volume of the river in 2005, it is assumed that, during 10-year-or-more drought, raw water shortage would be occurred for 7 days in dry season when extracting raw water for both existing and new WTP. In addition, The Team explained that if another water extraction project is implemented in upper stream of Sangkae river, enough volume of raw water cannot be provided to WTPs. The Team also mentioned that some countermeasures such as a limitation of water supply and/or a negotiation with other river water users would be necessary when the raw water shortage occurs.

MIME understood the availability of water sources for water supply, and agreed on above explanation made by the Team.

4. Facilities Design

4.1. Water Conveyance in Battambang

During 1st field survey, MIME requested the further study on new conveyance pipeline from the new water intake facility to the existing WTP. The Team replied that the diameter of conveyance pipeline must be larger to convey the raw water to both existing and new WTP, and it will raise the construction cost higher. So the Team explained and MIME agreed that the further study is not included in the Survey.

4.2. Site for New WTP

Both sides confirmed MIME's plan and progress to clear the site as follows:

- Battambang

Site clearance works will be carried out by Battambang DIME by June 2013.

- Kampong Cham

The small office for business section in existing elevated tank site will be demolished by Kampong Cham DIME by June 2013, and will be secured in the new administration building.

4.3. Emergency Generator and Transformer

MIME requested during 1st field survey to include emergency generator and transformer in the Project. MIME explained that according to the information from Electric Authority of

Cambodia, the substation of power supply in Kampong Cham is under construction and will start its services in the first quarter of year 2013 so that Kampong Cham will receive stable power supply. The Team replied that it would be included in the Project after the confirmation of future situation of power supply in both cities.

4.4. Distribution System

MIME requested to consider constructing elevated tank at the fringe of future service area instead of direct pump supply system. The Team pointed out that the acquisition of candidate site by the Cambodian side is not completed yet, and social and environmental consideration as well as topographic survey must be conducted after the land acquisition. The Team expressed that it is impossible to consider this request due to time constraint. MIME understood it and agreed to adopt direct pump supply system.

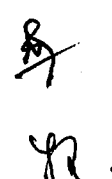
MIME requested the Team to conduct further study on the pro and con of integrated system and isolated system of new and existing distribution system. The Team will report the result of further study. For the purpose of leakage management, both sides agreed to adopt block system.

5. Individual House Connections for Poor Family

The Team requested MIME to provide the criteria used for the identification of poor family. MIME suggested that the criteria prepared under UN-Habitat project is applied in Kampong Cham while the criteria prepared in the on-going Grant Aid project is applied in Battambang. MIME promised to provide these criteria.

6. Social and Environmental Consideration

Both sides agreed to conduct further study on the proposed WTP site in Battambang to minimize the impact on social and environmental aspects. Both sides confirmed that if resettlement is required, JICA Guideline for Environmental and Social Considerations will be applied.



MINUTES OF DISCUSSIONS
OF THE PREPARATORY SURVEY (OUTLINE DESIGN)
ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR
KAMPONG CHAM AND BATTAMBANG WATERWORKS
(EXPLANATION OF DRAFT REPORT)

In June and August 2012, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey for the Outline Design on the Project on Additional New Water Treatment Plants for Kampong Cham and Battambang Waterworks (hereinafter referred to as "the Project") to the Kingdom of Cambodia (hereinafter referred to as "Cambodia") and through discussion, field survey and technical examination of the results in Japan, JICA prepared a draft outline design report (hereinafter referred to as "the Draft Report").

In order to explain and to consult with the officials concerned of the Government of Cambodia on the components of the Draft Report, JICA sent the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Ikenoue Takahiro, Advisor, Grant Aid Project Management Division 3, Financing Facilitation and Procurement Supervision Dept., JICA, from February 11 to 14, 2013.

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

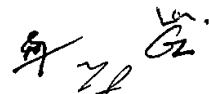
Phnom Penh, February 14, 2013

池上 宇啓

Mr. Ikenoue Takahiro
Team Leader,
Draft Report Explanation Team
Japan International Cooperation Agency



Mr. Meng Saktheara
Director General
General Department of Industry
Ministry of Industry, Mines and Energy
The Kingdom of Cambodia



ATTACHMENT

1. Components of the Draft Report

The Cambodian side agreed and accepted in principle the components of the Draft Report explained by the Team. The components of the Project are shown in Annex-1.

2. Japan's Grant Aid Scheme

The Cambodian side understood the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Cambodia as explained by the Team and described in Annex-2.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the Government of Cambodia by March 2013.

4. Responsible and Implementing Agency

4-1) The Responsible Agency is Ministry of Industry, Mines and Energy (hereinafter referred to as "MIME").

4-2) The Implementing Agencies are Provincial Departments of Industry, Mines and Energy (hereinafter referred to as "DIME"), and the Waterworks in respective Provinces of Kampong Cham and Battambang.

5. Precondition of the Project (Permission for water extraction from Rivers)

The Cambodian side explained that currently Ministry of Water Resources and Meteorology (hereinafter referred as "MOWRAM") is still working on draft of sub-decree on water resources licensing, therefore MIME will just inform and obtain endorsement from MOWRAM for water extraction to secure agreement with MOWRAM on water utilization along the river. When MOWRAM adopted sub-decree on water resources licensing, MIME will coordinate to obtain required water extraction license accordingly.

The Team requested the Cambodian side to speed up process to obtain the endorsement letter and submit to JICA by the end of February since this procedure is precondition for authorizing the Project and the document to prove official permission of water intake is urgently needed to progress required procedure leading to approval of the Project by the cabinet meeting of Japanese Government which will be held in April, at the earliest.

The Cambodian side understood and agreed to submit the official letter from MOWRAM which assures MIME can extract necessary volume of raw water for the Project without restriction by the end of February 2013.

6. Other Relevant Issues

6-1) Major Undertakings of the Project

The Team explained to the Cambodian side its major undertakings as listed in Annex 3 and the Cambodian side understood and promised to execute them.

6-2) Project Cost Estimation

The Team explained to the Cambodian side the tentative Project Cost Estimation as described in Annex-4. Both sides agreed that the Project Cost Estimation should never be duplicated or released to any outside parties until signing of all the contract(s) for the Project. The Cambodian side understood that the Project Cost Estimation is still tentative and subject to be modified.

6-3) Necessary budget to be covered by the Cambodian Side

The Team explained necessary project cost and operation and maintenance cost to be covered by the Cambodian side as attached in Annex-4. The Cambodian side agreed to secure them.

6-4) Allocations of the staffs

The Cambodian side agreed to assign the staffs necessary for waterworks to operate with facilities enhanced with the Project as proposed on the table 4.2-1 and 4.2-2 of the Draft Report as shown in Annex-5.

6-5) Soft Components (Technical Assistance) of the Project

Both sides confirmed that soft components on the following three topics will be implemented in the Project for proper operation and maintenance of the new facilities which are provided in the Project.

- Operation and maintenance of water treatment facilities
- Operation and maintenance of water transmission and distribution facilities
- Production Management

Furthermore, the Team explained and the Cambodian side understood that since these soft components is scheduled to start one year before the completion of construction of the facilities as shown in the Table 2.4.8 -1 of the Draft Report, the staffs to operate the new facilities should be allocated one year before the completion of the construction of the facilities so that they can participate in soft component.

6-6) Water Tariff

The operation and maintenance cost in Kampong Cham will increase after construction of the new water treatment plant which abstracts the water from Mekong River and adopts sedimentation method with rapid filtration. Therefore the Team explained two cases of new water tariff estimation in Kampong Cham which will contribute to maintain good balance as stated on page 5-4 of the Draft Report.

The Cambodian side agreed to consider the revision of water tariff in order to cover the necessary cost.

6-7) Environmental and Social Considerations



Both sides confirmed Environmental and Social considerations issues as follows:

6-7-1) IEE/IEIA

The Cambodian side will prepare and submit IEE/IEIA report and a pre-feasibility study report to Ministry of Environment (MOE) immediately and obtain their approval by the end of June 2013.

6-7-2) Environmental Checklist

Environmental and Social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex-6.

6-7-3) Monitoring for Environmental and Social Considerations

Results of environmental monitoring will be provided to JICA as a part of Project Progress Report by filing in the Monitoring Form attached as Annex-7 on a quarterly basis during construction in accordance with the Monitoring Plan for the Project described in the Draft Report. After the completion the Project, the Cambodian side will continuously implement monitoring for Environmental and Social considerations until target year and submit Monitoring Form to JICA on semi-annual basis by filling in the Monitoring Form.

In case JICA finds that there is a need for improvement in a situation with respect to environmental considerations after the agreed monitoring period; JICA may request to extend the period of monitoring and reporting.

6-7-4) Disclosure of Monitoring Result

JICA may disclose the part of the monitoring results as shown in Annex-6 conducted by MIME on its web site. The Team explained that JICA will disclose further information, when third parties request, with permission of MIME.

The Cambodian side confirmed that it will take stipulated procedures for information disclosure in accordance with Cambodian relevant laws. In addition, the JICA Mission requested and the Cambodian side agreed to disclose the monitoring results to local project stakeholders.

6-8) Demolition of Existing Buildings

Both sides confirmed MIME's plan and progress to clear the sites as follows:

- Kampong Cham

Kampong Cham DIME already allocated the budget for demolition of the small office for business section in existing elevated tank site and will demolish them by June 2013.

- Battambang

Battambang DIME already allocated the budget for site clearance works and it will be carried out by Battambang DIME by June 2013.

6-9) Power Supply in Kampong Cham

The Cambodian side reconfirmed that the substation of power supply in Kampong Cham had been

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already constructed and distribution line will be constructed in June 2013, so that Kampong Cham waterworks would receive sufficient power supply from July 2013.

6-10) Land Use Permission for Intake Facilities and Pipeline

The Cambodian side agreed to submit application for land acquisition of Intake location and obtain approval by the end of March 2013 and application and approval for pipeline route will be submitted and obtained immediately after detailed route is decided.

6-11) Individual Service Connections

The Cambodian side agreed to promote to increase service connections through announcement to local people and implementation of installation work.

6-12) Intake Water from River

The Team explained that regarding Sangkae River, the total volume of environmental flow (0.60m³/s) and proposed intake water quantity (0.42m³/s) for the existing and the new water treatment plants is 1.02m³/s and the duration for which the river discharge is smaller than 1.02m³/s is estimated for around 9 days in the year of 10-year return period of drought, which means raw water shortage may occur once in a long while. In addition, the Team also explained that if another water extraction project is implemented in upper stream of Sangkae river, enough volume of raw water cannot be provided for water treatment plants. The Team also mentioned that some countermeasures such as a limitation of water supply or a negotiation with other river water users to use water preferentially for water supply would be necessary when the raw water shortage occurs. The Cambodian side understood that there could be potential problem of water shortage during dry season and agreed that there will be necessity to take countermeasures on the issue.

6-13) Resettlement in Battambang

Both sides reconfirmed that new water supply facilities in Battambang will be constructed in the area where the resettlement would not occur.

6-14) Considering about Autonomy

Both sides shared common understandings which are;

- As stated in the Royal Government National Policy on Urban Water Supply, autonomy is important to enhance provincial waterworks to ensure sustainability, quality of safe water supply service, financial credibility and effective management.
- Japan has been providing assistance to the Cambodian provincial waterworks both in soft and hard aspects through Grant aid, Yen Loan and technical cooperation projects, which have contributed to the enhancement of their potential to be autonomous. And the Project will also contribute to strengthening their potential.
- Through on going technical cooperation project "the Project on Capacity Building for Urban Water Supply System (Phase 3), future institutional arrangement of provincial waterworks including an option to be autonomy will be discussed.

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6-15) Participation to the Technical Cooperation Project

Both sides agreed that since “the Project on Capacity Building for Urban Water Supply System (Phase 3)” is important for Kampong Cham and Battambang waterworks to develop their capacity to operate the facilities constructed by the Project with proper management and administration, both waterworks will assign a sufficient number of counterpart staffs who can proactively and fully participate in the technical cooperation project.

Annex 1 Components of the Project

Annex 2 JAPAN'S GRANT AID SCHEME

Annex 3 Major Undertakings

Annex 4 Project Cost Estimation (Confidential)

Annex 5 Number of Staff

Annex 6 Check List (Environmental and Social Considerations)

Annex 7 Monitoring Form for Environmental and Social Considerations

Annex 1 Components of the Project

Project Summary

	By Japan Grant Aid	By Cambodia Side
1. Constructions		
Kampong Cham		
(1) Water Intake Facilities	- Intake Facility: 12,650 m3/day - 4 intake pumps (vertical shaft type mixed flow pump)	- Electricity Supply Line (100 kVA)
(2) Raw Water Transmission Pipeline	- Intake to WTP (DIP Φ 400 mm, L=920m)	
(3) Water Treatment Plant	- Treatment Facility: 11,500 m3/day - Mixing Basin - Flocculation Basin - Sedimentation Basin - Rapid Filtration Basin - Ground Reservoir - Transmission Pump - Distribution Pump - Electrical Equipment - Chemical Equipment - Administration Building	- Electricity Supply Line (600 kVA)
(4) Treated Water Transmission Pipeline	- Shallow Well No.2 to Reservoir at WTP (HDPE Φ 200 L=900m) - WTP to Existing Elevated Tank (within WTP site)	
(5) Distribution Main Pipeline	- WTP to Service Areas (L=57.8km) (DIP Φ 400 L= 1,060m) (DIP Φ 350 L= 1,617m) (DIP Φ 300 L= 2,263m) (DIP Φ 250 L= 4,237m) (HDPE Φ 200 L= 5,173m) (HDPE Φ 150 L= 5,125m) (HDPE Φ 100 L=27,098m) (HDPE Φ 50 L=11,223m)	
(6) Service Connections		- Service Connection (7,448 households from 2013 to 2019)
Battambang		
(1) Water Intake Facilities	- Intake Facility: 24,200 m3/day - 3 intake pumps (vertical shaft type mixed flow pump)	- Electricity Supply Line (200 kVA)
(2) Raw Water Transmission Pipeline	- Intake to WTP (DIP Φ 600 mm, L=4,400m)	
(3) Water Treatment Plant	- Treatment Facility: 22,000 m3/day - Mixing Basin - Flocculation Basin - Sedimentation Basin - Rapid Filtration Basin - Ground Reservoir - Transmission Pump - Distribution Pump - Electrical Equipment - Chemical Equipment - Administration Building	- Electricity Supply Line (700 kVA)
(4) Distribution Main Pipeline	- WTP to Service Areas (L=65.5km) (DIP Φ 400 L= 1,323m) (DIP Φ 350 L= 811m) (DIP Φ 300 L= 254m)	- Contracting of GMS Network connection for the distribution flow monitoring system

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	(DIP Φ 250 L= 5,794m) (HDPE Φ 200 L= 6,593m) (HDPE Φ 150 L=16,883m) (HDPE Φ 100 L=20,122m) (HDPE Φ 50 L=13,719m) - Distribution Flow Monitoring System	
(5) Service Connections		- Service Connection (15,645 households from 2013 to 2019)
2. Procurements		
<u>Kampong Cham</u>		
(1) Procurement of the Equipment	- Water quality analysis equipment (Jar Tester, Turbidity Continuous Measurement Equipment, Residual Chlorine Analyzer, Reagents, Glassware) - Tools for Mechanical Equipment (Vibration Checker) - Equipment and Materials for Service Connections (Socket Fusion Equipment, Materials for Service Connections, 2,529 sets)	
(2) Removal of Existing Facility		- Existing office building at the site where there are the existing elevated tanks.
<u>Battambang</u>		
(1) Procurement of the Equipment	- Water quality analysis equipment (Jar Tester, Distillation Apparatus, Turbidity Meter, Turbidity Continuous Measurement Equipment, Laboratory Table, Residual Chlorine Analyzer, Chlorine continuous measurement equipment, Uninterruptible Power System (UPS), pH Meter (glass electrode), pH Meter (BTB), Reagents, Glassware) - Tools for Mechanical Equipment (Vibration Checker) - Equipment and Materials for Service Connections (Socket Fusion Equipment, Materials for Service Connections, 5,446 sets)	
(2) Removal of Existing Facility		- Abandoned factory at the proposed WTP site
3. Soft Components		
(1) Technical Assistance	- Operation and maintenance of water treatment facilities - Operation and maintenance of water transmission and distribution facilities - Production Management	

Annex 2 JAPAN'S GRANT AID SCHEME

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. Based on the law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Project, for Fisheries and for Cultural Cooperation, etc.

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

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation by Exchange of Notes (hereinafter referred to as "the E/N")
 - The Notes exchanged between the GOJ and a Government of 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 Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the 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 on by 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 considering the guidelines of the Japan's Grant Aid scheme.

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

(2) Selection of Consultants

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

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation 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 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 to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(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. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to secure 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 Attachment 1.

(6) Proper Use

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

(7) 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 in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the

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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 to the Bank.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA environmental and social considerations guideline.

Attachment for Annex-2 FLOW CHART OF JAPAN'S GRANT AID PROCEDURES

Stage	Flow & Works	Recipient Government	Japanese Government	JICA	Consultant	Contractor	Others	
Application	Request (T/R : Terms of Reference)	✓						
	Screening of Project → Evaluation of T/R → Project Identification Survey		✓	✓				
Project Formulation & Preparation	Preparatory Survey → Field Survey Home Office Work Reporting	✓	✓	✓				
	Preparatory Survey 2 (Outline Design) → Selection & Contracting of Consultant by Proposal → Field Survey Home Office Work Reporting	✓	✓	✓	✓			
	Explanation of Draft Final Report → Final Report	✓	✓	✓	✓			
Appraisal & Approval	Appraisal of Project		✓					
	Inter Ministerial Consultation		✓					
	Presentation of Draft Notes	✓	✓					
	Approval by the Cabinet		✓					
Implementation	E/N & G/A (E/N : Exchange of Notes, G/A : Grant Agreement)	✓	✓	✓				
	Banking Arrangement	✓					✓	
	Consultant Contract → Verification → Issuance of A/P	✓		✓	✓			
	Detailed Design & Tender Documents → Approval by Recipient Government → Preparation for Tendering	✓		✓	✓			
	Tendering & Evaluation	✓		✓	✓	✓		
	Procurement /Construction Contract → Verification → A/P	✓		✓	✓	✓		
	Construction → Completion Certificate by Recipient Government → A/P	✓		✓	✓	✓		
	Operation → Post Evaluation Study (A/P : Authorization to Pay)	✓		✓				
	Evaluation & Follow up	Ex-post Evaluation → Follow up	✓		✓			

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Annex 3 Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	to secure land necessary for the implementation of the Project and to clear the sites;		●
2	To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country		
	Marine (Air) transportation of the Products from Japan to the		
	1) recipient country	●	
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
3	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
4	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
5	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
7	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
8	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

Annex 4 Project Cost Estimation

Confidential

Cost Estimations

1. Project Components by Japan Grant Aid

This part is closed due to the confidentiality.

2. Project Components by Cambodia Government

Total Project Cost borne by Cambodia Government: approximately 1,760 Million Riel.

Items	Contents	Estimated Cost					
		For KMC System		For BTB System		Total	
		KHR (million)	Yen (1,000)	KHR (million)	Yen (1,000)	KHR (million)	Yen (1,000)
Land Preparation for WTP	Demolishment of existing structures and land leveling	42.7	811.8	1,328.6	25,242.8	1,371.3	26,054.6
Environmental Consideration	Environmental Monitoring for Air, Water, Noise and Vibration (2016-2019)	59.2	1,124.2	85.2	1,619.6	144.4	2,743.7
Information System	Contracting process of broadband LAN connection for the distribution information system.	6.9	131.0	6.9	131.0	13.8	262.0
Electricity Supply	Transmission of electricity to the new intake facilities and WTPs	64.4	1,224.3	79.3	1,506.8	143.7	2,731.1
Bank Charge	Bank arrangement for the project	-	-	-	-	86.4	1,641.5
Total						1,759.6	33,432.9

KHR (Cambodia Riel) 1 = 0.019 yen

3. Operation and Maintenance

Annual O&M Cost Estimation of Water Supply Facilities in Battambang and Kampong Cham Waterworks in the target year of 2019

(Unit: million KHR)

Item	O&M cost	
	Battambang	Kampong Cham
Personal Expense	919	465
Chemical Cost	2,976	339
Power Cost	4,558	2,538
Fuel Cost	564	261
Repair Cost	2,333	932
Sludge Conveyance Cost	113	17
Flow Monitoring Cost	18	18
Office Supplies	184	93
Total	11,665	4,663

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Annex 5 Number of Staffs

Proposed Staff Number: Battambang WWs

	2012	2013	2014	2015	2016	2017	2018	2019
	Actual							Target
Director	1	1	1	1	1	1	1	1
Deputy Director	2	2	2	2	2	2	2	2
Administration	4	4	4	4	4	4	4	4
Planning & Accounting	6	6	7	7	8	9	10	11
Business & Small network	10	13	14	15	17	20	21	23
Distribution & Main network	8	8	8	11	11	11	11	11
Water Production	9	9	9	23	23	23	23	23
T o t a l	40	43	45	63	66	70	72	75
Service Connections	9,665	10,265	11,365	12,910	15,110	18,510	21,910	25,310
Annual Connections	600	600	1,100	1,545	2,200	3,400	3,400	3,400

Proposed Staff Number: Kampong Cham WWs

	2012	2013	2014	2015	2016	2017	2018	2019
	Actual							Target
Director	1	1	1	1	1	1	1	1
Deputy Director	2	2	2	2	2	2	2	2
Administration	2	2	2	4	4	4	4	4
Planning & Accounting	4	4	4	5	6	7	8	8
Business & Small network	8	9	9	9	10	10	11	12
Distribution & Main network	5	5	5	8	8	8	8	8
Water Production	6	6	6	17	17	17	17	17
T o t a l	28	29	29	46	48	49	51	52
Service Connections	4,799	5,099	5,399	6,047	7,447	9,047	10,647	12,247
Annual Connections	300	300	300	648	1,400	1,600	1,600	1,600

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Annex 6 Checklist (Environmental and Social Consideration (1))

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) Y (b) N (c) N (d) N	(a) IEE instead of EIA is required for the Project. IEE has been prepared. (b) IEE has been prepared and expected to be approved by April 2013. (c) No condition is imposed for the approval of IEE. (d) Permission of intake from Mekong and Sangkhae river will be requested to MOWRAM by MIME and expected to be approved by May 2013.
	(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 hearings for local residents were held on Aug. 14th, 2012 in Kampong Cham and on Aug. 7th 2012 in Battambang. (b) The comments of the residents are reflected as taking counter measures for noise & vibration, minimization of the expected traffic disturbances by securing access during construction and setting poverty considered water prices on the Project.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Alternative plans for intake positions/ facilities and distribution networks were examined. As the results, the plans in which least adverse effects are expected are selected.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution? Are any mitigating measures taken? (b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	(a) N (b) Y	(a) By taking preventive measure such as conduction of treatment trainings, occurrence of pollution or leakage can be prevented. (b) Trainings have been conducted as designated and this complies the condition.
	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	(a) Y	(a) With proper conduction of mitigation measures, water quality standard can be attained.
	(3) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	(a) Y	(a) With proper conduction of mitigation measures, proper procedures of planned waste management can be secured.
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country's standards?	(a) Y	(a) With proper conduction of mitigation measures, the standard of noise and vibration can be attained
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) No intake of ground water is required for the Project.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area 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) No protected area exists within the Project area.

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Annex6 Checklist (Environmental and Social Consideration (2))

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(2) Ecosystem	(a) Does the project site encompass primeval forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site or discharge area 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) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) Y (c) Y (d) Y	(a) The Project area consists of urban & residential area and thus, no precious fauna and flora exit. (b) Although, Mekong giant catfish and the Irrawaddy dolphin inhabit in Mekong River near the Cambodia-Laos border but there is no report that they exist near the project area. (c) Mitigation methods such as minimizing the dredging areas and setting pollution prevention fence are planned to be applied for minimizing the scale of stirring bottom sediments. (d) No serious adverse effect is expected while mitigation measures are planned to be conducted.
	(3) Hydrology	(a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	(a) Y	(a) No serious adverse effect is expected. In Mekong river; the intake amount is very low comparing to the flow rate of the river, therefore, the effects of the intake is very small. In Sangkhae river; although the flow rate during dry season is very small, the effects of the intake can be minimized by controlling the intake amount during the term.
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) Is the compensations going to be paid prior to the resettlement? (e) Is 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) Y (b) Y (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -	(a) Alternative plan is selected in which no resettlement nor land acquisition is required. (b) Public consultation meeting was held for explaining the plan of the Project selected and thus, resettlement plan is not required. (c) Alternative plan in which no resettlement nor land acquisition is required is selected and thus, resettlement plan is not required. (d) No compensation is required. (e) No compensation is required. (f) No adverse impact on vulnerable is expected. (g) No resettlement is required. (h) No resettlement is required. (i) No resettlement is required. (j) No resettlement is required.

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Annex6 Checklist (Environmental and Social Consideration (3)

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) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water areas? (c) 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? (d) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) Y (b) Y	(a) Construction works may affect on commercial activity by disturbing the access to commercial facilities and therefore, mitigation measures such as securing traffics are planned to be applied for minimizing the impacts. (b) Limitation of intake amount will be applied as the river follow goes lower than certain level. (a) No precious heritage or historical site exists within the Project area. (a) No precious landscape exists within the Project area.
	(3) Heritage	(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) No Project component gives adverse effects on minority and native inhabitants. (b) No Project component gives adverse effects on poor.
	(4) Landscape	(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) - (b) - (c) - (d) -	(a) The project owner plans to request the contractor to take necessary measures such as holding morning assembly and training sessions for securing proper working conditions defined in laws and regulations in Cambodia. (b) The project owner plans to request the contractor to take necessary measures such as holding morning assembly and training sessions which help promote taking necessary safety procedures such as wearing gears. (c) The project owner plans to request the contractor to take necessary measures. (d) The project owner plans to request the contractor to take necessary measures for preventing any violations of safety measures.
	(5) Ethnic Minorities and Indigenous Peoples	(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? (d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	(a) Y (b) Y (c) Y (d) Y	(a) Mitigation measures such as selection of proper construction method and equipment are planned to be applied for reduce the impacts. (b) Mitigation measures such as selection of proper construction method and equipment can reduce the adverse impacts. (c) Mitigation measures such as selection of proper construction method and equipment can reduce the adverse impacts. (d) Mitigation measures such as selection of proper construction method and equipment can reduce the adverse impacts.
	(6) Working Conditions	(1) Impacts during Construction		
5 Others				

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Annex6 Checklist (Environmental and Social Consideration (4)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(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? (e) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.	(a) Y (b) Y (c) Y (d) Y	(a) Conduction of monitoring activities will be requested according to proposed monitoring plan. (b) By Cambodian standards for air and water quality. (c) GOC will secure the budget for the monitoring activities and request the contractor to conduct properly. (d) Those should be stipulated in Monitoring plan.
6 Note	Reference to Checklist of Other Sectors Note on Using Environmental Checklist	(a) If necessary, the impacts to Transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as Transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) - (a) N	No serious adverse impact is expected.

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 the project is located.

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Annex 7 Monitoring Form for Environmental and Social Considerations

a. Air Quality : Ambient Air (For both Construction & In-service period)

Item	Measured Value (Mean)	Measured Value (Max.)	Cambodian STD 1-hour mean	Japanese STD 1-hour Value	WHO Guideline	Remarks (Measurement Point, Frequency, Method, etc.)
CO			<40mg/m ³	<10ppm	-	1 site including sensitive receptors near the project site or others Frequency: Monthly Method: Authorized methods in Cambodia, WHO.
NO ₂			<0.3mg/m ³	< 0.04ppm	<0.2mg/m ³ 1-hour mean	
SO ₂			<0.5mg/m ³	< 0.04ppm	<0.5mg/m ³ 1-hour mean	
O ₃			<0.2 mg/m ³	<0.06ppm As Ox	<0.1mg/m ³ 8-hour mean	
Pb			<0.005 mg/m ³ 8-hour mean	-	-	
TSP			<0.33 mg/m ³	<0.2mg/m ³ as SPM	<0.05mg/m ³ as PM ₁₀ 24-hour mean	

b. Water Quality

b-1) Construction Period: Ambient Water Quality

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Cambodian STD	Japanese STD Class AA	WHO Drinking Water Guideline	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-			6.5 – 8.5	6.5 – 8.5	-	Each up & downstream of the center of construction (2 points in total) Frequency: Monthly during construction. Biannual in use. In use, Drinking items shall be monitored. Method: Authorized methods in Cambodia, WHO.
TSS	mg/l			25 - 100	< 25	-	
BOD	mg/l			1.0 – 10	< 1.0	-	
DO	mg/l			2.0-7.5	> 7.5	-	
Coliform	MPN /100 ml			< 100ml	< 50 MPN/100ml	< 0	

b-1) In-service period: Ambient Water Quality (pH to DO) and Drinking Water Quality

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Cambodian STD	Japanese STD	WHO Guideline	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-			6.5 – 8.5	6.5 – 8.5	-	Each up & downstream of the center of construction (2 points in total) Frequency: Monthly during construction. Biannual in use. In use, Drinking items shall be monitored. Method: Authorized methods in Cambodia, WHO.
TSS	mg/l			25 - 100	-	-	
BOD	mg/l			1.0 – 10	< 1.0	-	
DO	mg/l			2.0-7.5	> 7.5	-	
Coliform	MPN /100ml			< 0	< 0	< 0	
TDS	mg/l			< 800	< 500	<1000	
Turbidity	NTU			< 5	0.1(degree)	< 5	
T. Hardness	mg/l			< 300	< 300	-	
NO ₂	mg/l			< 3.0	-	< 0.2	
NO ₃	mg/l			< 50.0	< 10 as nitrate -nitrogen & nitrite -nitrogen	< 50	
SO ₄	mg/l			< 250	-	< 250	
F	mg/l			< 1.5	< 0.8	< 1.5	
Cl	mg/l			< 250.0	< 200	< 250	
NH ₄	mg/l			< 1.5	-	< 1.5	
Color	TCU			< 5.0	5(degree)	15	
CN	mg/l			< 0.07	< 0.01	< 0.07	
Al	mg/l			< 0.2	-	< 0.2	
As	mg/l			< 0.05	< 0.01	< 0.01 provisional	

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Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Cambodian STD	Japanese STD	WHO Guideline value	Remarks (Measurement Point, Frequency, Method, etc.)
Cd	mg/l			< 0.003	< 0.01	< 0.003	
Cr	mg/l			< 0.05	< 0.05 as Hexavalent chromium	< 0.05 provisional value	
Cu	mg/l			< 1	< 1	< 2 provisional value	
Fe	mg/l			< 0.3	< 0.3	< 0.3	
Pb	mg/l			< 0.01	< 0.01	< 0.01	
Mn	mg/l			< 0.1	< 0.05	< 0.5 provisional value	
Hg	mg/l			< 0.001	< 0.0005	< 0.001	
Se	mg/l			< 0.01	< 0.01	< 0.01	
Zn	mg/l			< 3.0	< 1	< 3	

c. Wastes

c-1) Construction Period

Basic Information	Monitoring Item	Remarks
Date/Time	Check whether the procedures for dumping the sludge/waste soils and general wastes generated by construction works are conducted properly or not.	Note: If the procedures are not conducted as designated, additional training session or morning session shall be hold to remind proper procedures.
Surveyor's Name		
Description of the general condition		
Map		

c-1) In-service period

Basic Information	Monitoring Item	Remarks
Date/Time	Check whether the procedures for dumping the sludge generated by drying bed are conducted right or not.	Note: If the procedures are not conducted as designated, additional training session or morning session shall be hold to remind proper procedures.
Surveyor's Name		
Description of the general condition		
Map		

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d. Noise & Vibration (For both Construction and In-service period)

Basic Information	Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Remarks (Measurement Point, Frequency, Method, etc.)
Date/Time Surveyor's Name	Noise level (Lmax)	dB(A)			60dB(A) (depend on the time)	1 sites including sensitive receptors near the project site or others Frequency: See #1
Description of the general condition	Vibration level (Lmax)	dB			-	

e. Offensive Odor(Construction Period)

Basic Information	Monitoring Item	Remarks
Date/Time	Floating substances such as dead body of living organism.	Note: Visual observation for checking of existing floating materials like dead body or any organisms, suspended substances with confirmation of any occurrence of offensive odor shall be conducted.
Surveyor's Name		
Description of the general condition		
Map	Occurrence of offensive odor.	

f. Bottom Sediment (Construction Period)

Basic Information	Monitoring Item	Remarks
Date/Time	Floating substances such as dead body of living organism.	Note: Visual observation for checking of existing floating materials like dead body or any organisms, suspended substances shall be conducted.
Surveyor's Name		
Description of the general condition	Rapid increase of Turbidity	
Map	Rapid increase/decrease of current speed, flow rate.	

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g. Ecosystem (For Pre-construction/Construction Period/In-service period)

Date/Time	Place	Fauna						Flora				
		Mamal	Bird	Reptile	Amphibian	Fish	Insect /Others	tree Coniofer	Deciduous	Evergreen	herbaceous plant	
Habitat Condition		Sp. Name/Num										
Description; eg gregarious/ solita												
Picture												
Map												

h. Hydrological Situation (For both Construction and In-service period)

Basic Information	Monitoring Item	Remarks
Date/Time	Rapid increase of Turbidity	Note: Visual observation for checking of existing river conditions, such as flow rate, flow amount and floating materials like dead body or any organisms, suspended substances shall be conducted.
Surveyor's Name		
Description of the general condition	Rapid increase/decrease of current speed, flow rate.	
Map	Floating substances such as dead body of living organism.	

i. Local Economy such as Employment and Livelihood, etc.

i-1) Construction Period

Basic Information	Monitoring Item	Remarks
Date/Time	Occurrence of any disturbances to access to commercial facilities near by the construction site.	Note: Visual observation for checking of occurrence of any disturbance while checking whether any complains has been arisen.
Surveyor's Name		
Description of the general condition	Occurrence of any complaints from the owner/shop keeper of commercial facilities near by the construction site.	
Map	Floating substances such as dead body of living organism in the river which may disturb the local fishery.	

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i-2) In-service period

Basic Information	Monitoring Item	Remarks
Date/Time	Occurrence of any disturbances on the business of existing private water supply companies and checking their responses to the condition.	Note: checking whether any complains has been arisen and conduct hearing if necessary.
Surveyor's Name		
Description of the general condition		

j. Water Usage or Water Rights and Rights of Common

(For both Construction and In-service period)

Basic Information	Monitoring Item	Remarks
Date/Time	Rapid decrease of current speed, flow rate.	Note: Visual observation for checking of existing river conditions, such as flow rate, flow amount and floating materials, turbidity and existence of any complains regarding water utilization.
Surveyor's Name	Rapid increase of Turbidity	
Description of the general condition	Floating substances such as dead body of living organism.	
Map	Occurrence of any complaints from the residents/officer of other supply area.	

k. Existing Social Infrastructures and Services (Construction Period)

Basic Information	Monitoring Item	Remarks
Date/Time	Occurrence of any disturbances to access roads close to the construction site.	Note: Visual observation for checking of occurrence of any disturbance while checking whether any complains has been arisen.
Surveyor's Name		
Description of the general condition	Occurrence of any complaints from the driver/ residents	
Map		

l. Infectious Diseases such as HIV/AIDS(Construction Period)

Basic Information	Monitoring Item	Remarks
Date/Time	Checking whether holding morning session or any training sessions for reminding the risk of infectious diseases and preventive measures.	Note: number of holding sessions, and participants shall be monitored.
Surveyor's Name		
Description of the general condition		

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m. Working Environment (Construction Period)

Basic Information	Monitoring Item	Remarks
Date/Time	Checking whether morning session or any training sessions for reminding the risk of occurrence of accidents and preventive measures are properly conducted. Checking whether proper rest is provide.	Note: number of holding sessions, and participants shall be monitored.
Surveyor's Name		
Description of the general condition		
Map		

m. Accident

m-1) Construction Period

Basic Information	Monitoring Item	Remarks
Date/Time	Checking whether holding morning session and any training sessions for reminding the risk of occurrence of accidents and preventive measures.	Note: number of holding sessions, and participants as well as proper treatment such as allocation of traffic signage shall be monitored.
Surveyor's Name		
Description of the general condition	Checking whether necessary traffic signs and traffic control personnel are properly allocated.	
Map		

m-2) In-service period

Basic Information	Monitoring Item	Remarks
Date/Time	Checking whether proper treatment of chlorine is conducted as defined in the treatment manual.	Note: number of holding sessions, and participants shall be monitored.
Surveyor's Name		
Description of the general condition		
Map		

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5. ソフトコンポーネント計画書

5.1 ソフトコンポーネントを計画する背景

5.1.1 プロジェクトの背景

本プロジェクトは、カンボジアの地方都市の中でも今後重要な位置を占めると見込まれている「バタンバン市」及び「コンポンチャム市」の給水サービスの拡充を目的とし、既存の浄水場を有効活用しつつ新たな水源を開発し、上水道施設の拡張整備計画に取り組むものである。

カンボジア政府は国家開発戦略計画（NSDP）の中で、都市部における安全な水へのアクセス率を2015年までに80%まで引き上げることを目標として掲げている。しかしながら、バタンバン市及びコンポンチャム市においては浄水場の供給能力不足が依然として改善されていないため、地方都市の中でもそれぞれ第1、第3の重要都市（市内人口ベース）であるにも関わらず、両都市における給水率はバタンバン市で26%程度、コンポンチャム市で30%程度の低い水準に留まっている。

このような状況の下、カンボジア政府は我が国政府に対して2010年8月及び2011年8月にバタンバン市及びコンポンチャム市の給水サービス向上を目的とした上水道施設拡張に係る無償資金協力事業の要請を行った。

5.1.2 技術水準

両市は、JICAで実施された技術協力プロジェクト（「カンボジア水道事業人材育成プロジェクト・フェーズ2」、2007年から2012年まで）の対象都市であり、5年間で浄水場の運転維持管理に関する技術移転が十分に行われ、また、給水管接続技能においても、布設技術や施工管理方法などの研修が実施された。その結果、浄水場職員の技術水準は飛躍的に向上し、最近の報告では水質基準を満足した水が市民に供給されている。これまでの研修を受講した浄水場職員が現在もその職に従事しており、既存浄水場の運転・維持管理は水道局職員自身によって適切に運営されている。

5.1.3 実施上の解決すべき課題

新規浄水場では従来の設備に加え、新たな設備に関する維持管理が必要となる。両水道局が持つ技術水準を考慮し、現時点で考えられる運転・維持管理上の課題は以下のとおり。

- ① コンポンチャム市では、これまで地下水を水源とした塩素注入方式のみで運転維持管理

してきた。現在の水道局職員は、急速ろ過方式の浄水場に関する運転維持管理の経験がないため、別途研修が必要である。

- ② 配水流量監視システムが導入されるため、そのシステムを活用するための技術移転が必要である。
- ③ 送配水システムに係るポンプの運転維持管理のための技術指導が必要である。特にポンプ直圧方式を採用する場合、配水ポンプの運転管理に対する技術指導が必要である。
- ④ 給水量が大幅に増加するため、浄水計画の作成や薬品の在庫管理など、より徹底した生産管理が必要である。

5.1.4 ソフトコンポーネント導入の必要性

前述のように技術協力プロジェクト「水道人材育成プロジェクト・フェーズ2」の実施により、水道局職員の技術水準は飛躍的に向上し、既存浄水場の運転・維持管理は水道局職員自身によって十分に運営されている。しかし、本プロジェクトの実施後には従来の設備に加え、新たな設備に対する運転維持管理が必要となる。特にこれまで良質の地下水を水源としてきたコンポンチャムでは、本プロジェクトで導入される高濁度の表流水を水源とする浄水施設に必ずしも習熟していない。また、バタンバンでは、2つの浄水場を同時に適切に稼働させることが求められ、コンポンチャムでは地下水・表流水と異なる水源からの浄水が適切に送配水されることが求められる。このように両水道局が、新規上水道施設を適切に運転・維持管理を行うための技術指導が必要不可欠である。

そのため、上記課題も踏まえ、本プロジェクトの実施にあたっては、①浄水施設運転維持管理研修、②送配水施設運転維持管理研修、③生産管理研修の3点に係るソフトコンポーネントの導入が必要である。

① 浄水施設運転維持管理研修

急速ろ過方式を採用する浄水場の能力を十分に発揮し、カンボジア水質基準を遵守した浄水を生産するために必要な、薬品注入量の設定やろ過池の洗浄方法等の浄水技術に関する研修を実施する。

コンポンチャム水道局の既存浄水場は塩素注入方式であるため、既存職員及び新規採用職員に対して本研修が必要である。一方のバタンバン水道局における既存職員の浄水技術は、一定のレベルに達しており、それに係る研修は不要であるが、新規採用職員に対しては研修が必要である。新規浄水場においては、新たな設備も導入されることから、既存職員から新規職員への技術移転は困難であり、日本人コンサルタントによる研修が必要である。

② 送配水施設運転維持管理研修

今回新たに導入される配水流量監視システムを適切に運用するための研修も実施する。配水流量監視システムとは、配水主管地点の流量のデータを収集し分析することで、効率的な漏水防止や管路事故の早期発見を促進するシステムであり、導入するだけで無収水量が削減されるものではない。適切な運用を行うためには収集した流量のデータの解析方法及び活用方法に関する技術が必要である。また、同システムより得られる情報を基に新設の直圧方式の配水ポンプの二次圧に応じた適切な運転管理を行うための研修を実施する。

③ 生産管理研修

薬品などの消耗品の在庫管理、汚泥処理計画など、水道事業を継続的に運営していくために必要な研修を実施する。両市ともプロジェクト実施後において、給水量の大幅な増加が見込まれ、加えて2カ所の浄水場の運転維持管理が必要となるため、より徹底した生産管理が重要である。

特にコンポンチャムは、プロジェクト実施後において井戸水と河川水の2種類の異なる水源を利用するため、浄化費用の安価な井戸水からの取水を出来るだけ多く利用し、維持管理費用を抑えた運転計画を策定する必要がある。

5.2 ソフトコンポーネントの目標

本プロジェクトにおけるソフトコンポーネントの目標は、「両水道局の職員が、既施設を有効に活用しながら、新規上水道施設の運転・維持管理を適切に行い、水質基準を満たす水が市民に供給される」ことである。

5.3 ソフトコンポーネントの成果

本プロジェクトのソフトコンポーネントによる成果は以下の通りである。

① 浄水施設運転維持管理

- 1) 水道局において、水質試験に係る能力が向上する。
- 2) 水道局において、浄水処理に係る能力が向上する。
- 3) 水道局において、機械・電気設備の日常保守点検に係る能力が向上する。

② 送配水施設運転維持管理

- 1) 水道局において、送配水ポンプ運転に係る能力が向上する。
- 2) 水道局において、配水流量監視システム活用に係る能力が向上する。

③生産管理研修

- 1) 水道局において、2つの浄水場が効率的に運営される為の能力が向上する。
- 2) 水道局において、施設の維持管理に係る能力が向上する。

5.4 成果達成度の確認方法

本ソフトコンポーネントの各分野・成果ごとの確認方法を表 5.4-1 に示す。

表 5.4-1 ソフトコンポーネント各分野・成果ごとの達成度の確認方法

分野	成果	達成度の確認項目	達成度の確認方法
①浄水施設運転維持管理	水道局において、水質試験に係る能力が向上する。	<ol style="list-style-type: none"> 1. 水質試験に従事する職員が、マニュアルに基づき水質検査を行うことができる。 2. 必要な水質試験項目が、マニュアルに基づき、定められた頻度で分析され・記録される。 3. MIME に対する水質試験結果の年間報告書が作成される。 	<ol style="list-style-type: none"> 1. 水質試験記録の有無 2. 年間報告書の有無 3. 理解度に関する小テスト
	水道局において、浄水処理に係る能力が向上する。	<ol style="list-style-type: none"> 1. 毎日、運転日誌がフォーマットに従って記録される。 2. 原水の水質に応じた薬品投入量を決めることができる。 3. 沈殿処理水の濁度が常に各浄水場の目標値を満足する。 4. 浄水の残留塩素が常に各浄水場の目標値を満足する。 5. ろ過池洗浄工程管理が正しく行える。 	<ol style="list-style-type: none"> 1. 運転日誌の記録の有無 2. 薬品注入量の記録の結果 3. 浄水残塩の記録の結果 4. ろ過池洗浄記録の確認 5. 送水ポンプ運転記録の確認 6. 理解度に関する小テスト
	浄水場において、機械・電気設備の日常保守点検に係る能力が向上する。	<ol style="list-style-type: none"> 1. 毎日、設備の保守マニュアルに従って点検日誌が記録される。 2. マニュアルに基づいた設備の操作が行われる。 3. 維持管理に関して関連メーカーとの連絡体制が確立される。 	<ol style="list-style-type: none"> 1. 点検日誌の記録の有無 2. 各設備のマニュアルの活用の有無 3. 故障連絡票の有無 4. 関連メーカー連絡リストの有無 5. 有事の際対応状況 6. 理解度に関する小テスト
②送配水施設運転維持管理	浄水場において、配水ポンプ運転に係る能力が向上する。	<ol style="list-style-type: none"> 1. 毎日、配水量及び配水圧力のデータが記録される。 2. 配水ポンプ運転スケジュールに従って、流量制御ができる。 3. 適切な圧力で市民に水が供給される。 	<ol style="list-style-type: none"> 1. 配水記録の有無 2. 運転スケジュールの有無 3. 実態に合わせた見直し状況
	浄水場において、配水流	<ol style="list-style-type: none"> 1. 流量の時間毎のデータを毎日記録できる。 	<ol style="list-style-type: none"> 1. 流量データ記録の有無 2. 流量データ解析記録

	量監視システム活用に係る能力が向上する。	2. 上記データを解析し、夜間最小流量などから、漏水多発地区や管路事故を選別できる。	3. 理解度に関する小テスト
③生産管理	水道局において、施設の維持管理に係る能力が向上する。	1. 薬品や備消耗品等に対する在庫管理が行える。 2. 汚泥処理が適切に実施される。 3. 事故又は異常時に適切な処置が行える。	1. 在庫管理リストの確認 2. 汚泥処理計画の有無 3. 理解度に関する小テスト
	水道局において、2つの浄水場が効率的に運転される。	1. 各種運転記録が集約され、年間記録として整理される。 2. 上記記録に基づき総合運転管理計画が作成され、2つの浄水場が効率的に運転される。	1. 運転記録の有無 2. 総合運転管理計画の有無 3. 1.2の活用の有無 4. 総合運転管理計画の実態に合わせた見直しの実施状況 5. コンポンチャムにおける既存井戸との併用実績

5.5 ソフトコンポーネントの活動（投入計画）

本ソフトコンポーネントの活動（投入計画）の詳細を表 5.5-1 に示す。①浄水施設運転維持管理研修は主に浄水処理を担当する職員を対象とし、②配水施設運転維持管理研修は配水管理を担当する職員を対象とする。③生産管理研修については、浄水場の運転維持管理を担当する職員の中でも責任と権限を持つチーフ及び副チーフを対象として実施する。

また、JICA は本プロジェクトと平行して、2012年11月から2017年11月にかけてバットアンバン水道局及びコンポンチャム水道局を含む地方8都市の水道局を対象に、水道分野における経営に関する人材育成を実施する。従って、本ソフトコンポーネントでは、新規上水道施設を適切に運転・維持管理を行うための技術指導を行い、会計など経営に係る分野については、技術協力プロジェクトを通じてサポートしていくものとする。

表 5.5-1 ソフトコンポーネントの活動（投入計画）

分野	成果	活動内容	必要な投入量
①浄水施設運転維持管理	浄水場において、水質試験に係る能力が向上する。	1. 水の必須項目（pH、電導度、濁度、色度、アルカリ度）の測定研修 2. 上記マニュアルの作成（既存 SOP の更新） 3. 水質記録フォーマットの作成 4. 小テストの実施・評価 5. 理解度の不足している職員への追加指導	浄水施設運転維持管理専門家:日本人コンサルタント 1名×4.00M/M (乾季・雨季・運用開始前の3回に分けて実施) 通訳・支援（現地スタッ
	浄水場において、浄水処理に	1. 薬品注入（硫酸バンド及び消石灰）研修 2. 塩素注入研修	

	係る能力が向上する。	<ul style="list-style-type: none"> 3. ろ過池運転維持管理研修 4. 沈殿池及び浄水池維持管理研修 5. 上記マニュアルの作成 (既存 SOP の更新) 6. 運転記録フォーマットの作成 7. 小テストの実施・評価 8. 理解度の不足している職員への追加指導 	フ) : 1名×7.00M/M
	浄水場において、機械・電気設備の日常保守点検に係る能力が向上する。	<ul style="list-style-type: none"> 1. 機械設備保守点検研修 2. 電気設備保守点検研修 3. 上記マニュアルの作成 (既存 SOP の更新) 4. 日常保守点検記録フォーマットの作成 5. 小テストの実施・評価 6. 理解度の不足している職員への追加指導 	
②配水施設運転維持管理	浄水場において、配水ポンプ運転に係る能力が向上する。	<ul style="list-style-type: none"> 1. 配水ポンプ運転研修 2. 上記マニュアルの作成 3. 運転記録フォーマットの作成 4. 小テストの実施・評価 5. 理解度の不足している職員への追加指導 	配水施設運転維持管理専門家 : 1名×3.00M/M (雨季・運用開始前の 2 回に分けて実施)
	浄水場において、配水流量監視システムに係る能力が向上する。	<ul style="list-style-type: none"> 1. 配水流量監視システム研修 2. 上記マニュアルの作成 3. 流量記録フォーマットの作成 4. 1.~3.に基づく漏水、事故の分析手法 5. 小テストの実施・評価 6. 理解度の不足している職員への追加指導 	通訳・支援 (現地スタッフ) : 1名×5.00M/M
③生産管理	水道局において、施設の運営維持管理に係る能力が向上する。	<ul style="list-style-type: none"> 1. 総合運転管理計画の作成 2. 在庫管理リストの作成 3. 汚泥処理計画の作成 4. 1.~3.の更新手法 	生産管理専門家 : 1名×3.00M/M (雨季・運用開始前の 2 回に分けて実施) 通訳・支援 (現地スタッフ) : 1名×5.00M/M

本ソフトコンポーネントの要員配置計画を図 5.5-1 に示す。

	月数	23	24	25	26	27	28	29	30	31	32	33	34	35	36	小計		
																	現地	国内
日本人専門家	浄水施設 運転維持管理 専門家		1.0					1.0							2.0		4.00	0.00
	配水施設 運転維持管理 専門家							1.0							2.0		3.00	0.00
	生産管理 専門家							1.0							2.0		3.00	0.00
																	10.00	0.00
PPWSA職員	配水施設 運転維持管理 (ポンプ)														0.5		0.50	0.00
	配水施設 運転維持管理 (配水流量監視)														0.5		0.50	0.00
																	1.00	0.00
現地スタッフ	通訳／支援 (浄水施設)		2.0					2.0							3.0		7.00	0.00
	通訳／支援 (配水施設)							2.0							3.0		5.00	0.00
	通訳／支援 (生産管理)							2.0							3.0		5.00	0.00
																	17.00	0.00
報告書		△ 実施状況 報告書					△ 実施状況 報告書							△ 完了報 告書				

図 5.5-1 フトコンポーネントの要員配置計画

5.6 ソフトコンポーネントの実施リソースの調達方法

本ソフトコンポーネントでは、3名の日本人技術者を現地に派遣する。ソフトコンポーネントの目標が、「既施設を有効に活用しながら、新規上水道施設の運転・維持管理を適切に行い、水質基準を満たす水が市民に供給される」ことであり、技術協力プロジェクト「水道人材育成プロジェクト・フェーズ2」の実施により、水道局職員の技術水準は向上しているとはいえ、本プロジェクトの実施後には従来の設備に加え、新規上水道施設を適切に運転・維持管理を行う必要がある。そのためには、PPWSA職員以外のローカルリソースでは対応が困難であることから、本邦コンサルタントを中心としたソフトコンポーネントの実施が望ましい。そこで、本ソフトコンポーネントは、本邦コンサルタント直接支援型とする。

本ソフトコンポーネント実施にあたり配置が想定される実施リソースを以下に示す。

①日本人コンサルタント

日本の自治体は、水道事業運営や浄水場の運転維持管理に精通していることから、ソフトコンポーネント導入において実施される①浄水施設運転維持管理研修、②送配水施設運転維持管理研修、③生産管理研修の3つの分野の専門家として各分野1名ずつ、計3名を現地に派遣する。

なお、①浄水場運転維持管理研修については雨季、乾季、運用開始前の3回派遣とし、②総配水施設運転維持管理研修及び③生産管理研修については乾季、運用開始前の2回派遣する。開始当初は新規浄水場が工事中であることが想定されるため、既存のバタンバン浄水場において実施研修を行う。

②PPWSA 職員

プノンペン水道公社はプンプレック浄水場において、直送式の送水ポンプを使って供給していることに加え、配水流量監視システムも導入しており、その技術力も高いことから、同社職員を配水施設運転管理研修において活用する。PPWSA 職員の活用にあたっては、日本人コンサルタントのもとで、彼らの知識を活用した研修とすることで、現地再委託ではなく現地傭人とする。

5.7 ソフトコンポーネント実施工程

実施工程計画を図 5.7-1 に示す。

図 5.7-1 実施工程表

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36			
政府	本事業の閣議決定	▽																																						
	二国間の交換公文締結	▽																																						
会社 工程	実施設計	現地調査(ワゴンカルタル契約)																																						
		国内概術・詳細設計																																						
		入札図書作成/入札図書承認																																						
		入札/契約準備期間(▽業者契約)																																						
	工事工程	施工																																						
		検収・引渡																																						
		水質試験に係る能力	水の必須項目の測定研修																																					
			上記マニュアルの作成・翻訳																																					
		浄水施設 運転維持 管理	水質記録フォーマットの作成・翻訳																																					
			薬品注入研修																																					
塩素注入研修																																								
ろ過池運転維持管理研修																																								
沈殿池及び浄水池維持管理研修																																								
上記マニュアルの作成・翻訳																																								
ソフト コンポ ネント	設備保全に係る能力	運転記録フォーマットの作成・翻訳																																						
		機検整備保守点検研修																																						
		電気設備保守点検研修																																						
		上記マニュアルの作成・翻訳																																						
	配水ポンプ運転に係る能力	日帯保守点検記録フォーマットの作成・翻訳																																						
		配水ポンプ運転研修																																						
	配水流量監視システムに係る能力	上記マニュアルの作成・翻訳																																						
		運転記録フォーマットの作成・翻訳																																						
	生産管理	配水流量監視システムに係る能力																																						
		流量記録フォーマットの作成・翻訳																																						
運転管理	浄水計画研修																																							
	浄水計画リストの作成・翻訳																																							
小売店の 実施・評価	在庫管理リストの作成・翻訳																																							
	汚泥処理計画の作成・翻訳																																							
ソフト コンポ ネント	理解度の不足している職員への追加指導																																							
	ソフトコンポーネント実施状況報告書の提出																																							
	ソフトコンポーネント完了報告書の提出																																							

5.8 ソフトコンポーネントの成果品

ソフトコンポーネントの成果品は、以下の通りである。

表 5.8-1 ソフトコンポーネント成果品

提出時期	成果品
途中年次	ソフトコンポーネント進捗状況報告書 研修資料（実施分） その他活動と関連する資料
最終年次	ソフトコンポーネント完了報告書 研修資料 各種マニュアル（浄水施設・配水施設・生産管理） 各種記録フォーマット（運転記録簿） 成果の達成度・評価（小テスト結果・モニタリングシート）

報告書の記載要領は「ソフトコンポーネントガイドライン（第3版）」（2010年10月）に準じるものとする。

5.9 相手国側の責務

本ソフトコンポーネントの目標達成のためには、新規浄水場の運転維持管理に必要な浄水課及び配水管理課の適正人数の職員配置が必要である。この人員確保及び配置はカンボジア国側で実施されるべき事項である。これらソフトコンポーネントの対象となる人材の配置は、新入職員に対する基礎的な職員教育も含めて、ソフトコンポーネント実施前の2015年3月までに完了していることが必要である。万一それまでに新規職員の配置が難しい場合は、新規浄水場の運転に携わる既存職員を対象としたソフトコンポーネントを実施することとし、新規職員が配置された時点で、既存職員より研修を実施することとする。

また、運用開始前には新規浄水場での実地研修を計画しているため、2か月前には浄水処理に必要な施設の整備が完了していなければならない。施工の遅れは本ソフトコンポーネント実施の阻害要因となるため、工事工程を十分に把握すると共に、円滑な施工が行えるような支援体制を作ることが望ましい。

仮に避けがたい事由により十分な設備が整っていない場合には、施設規模や設備が本プロジェクトに類似している PPWSA 所管の浄水場を活用しての研修が対処法として想定される。

6. 参考資料（収集資料リスト）

調査名：カンボジア国地方上水道拡張整備計画準備調査

番号	名称	形態 図書・ビデオ 地図・写真等	オリジナル ・コピー	発行機関	発行年
1	Feasibility Study for The Development of Battambang Multipurpose Dam (レポートの抜粋)	図書	オリジナル	Ministry of Water Resources and Meteorology (MoWRAM)	-
2	Feasibility Study Report of Kanghot Irrigation Development Project Battambang Province	図書	オリジナル	MoWRAM	2009
3	Feasibility Study Report of Kanghot Irrigation Development Project-Phase II in Battambang Province	図書	オリジナル	MoWRAM	2010
4	Scheme Design for Kanghot Irrigation Development Project-Phase II in Battambang Province	図書	オリジナル	MoWRAM	2010
5	Kampong Cham におけるメコン川の水位、流量データ (1990-2011)	データ	オリジナル	MoWRAM	-
6	Battambang における Sangke River の水位、流量データ (1997-2010)	データ	オリジナル	MoWRAM	-
7	Kampong Cham におけるメコン川の水質データ (2000-2011)	データ	オリジナル	MoWRAM	-
8	Battambang における Sangke River の水位、流量データ (2001-2003)	データ	オリジナル	MoWRAM	-
9	Battambang 浄水場の原水および処理水の水質(2010/1-2012/5)	データ	オリジナル	Battambang Water Supply	
10	Kampong Cham 浄水場の原水および処理水の水質 (2010/6-2011/12)	データ	オリジナル	Kampong Cham Water Works	
11	Battambang 浄水場の処理水量および原水取水量 (推定値) (2008/1-2011/12)	データ	オリジナル	Battambang Water Supply	
12	Kampong Cham 浄水場の原水取水量 (2007/8-2011/12)	データ	オリジナル	Kampong Cham Water Works	
13	Kampong Cham 浄水場の地下水水深 (2007/1-2012/6)	データ	オリジナル	Kampong Cham Water Works	

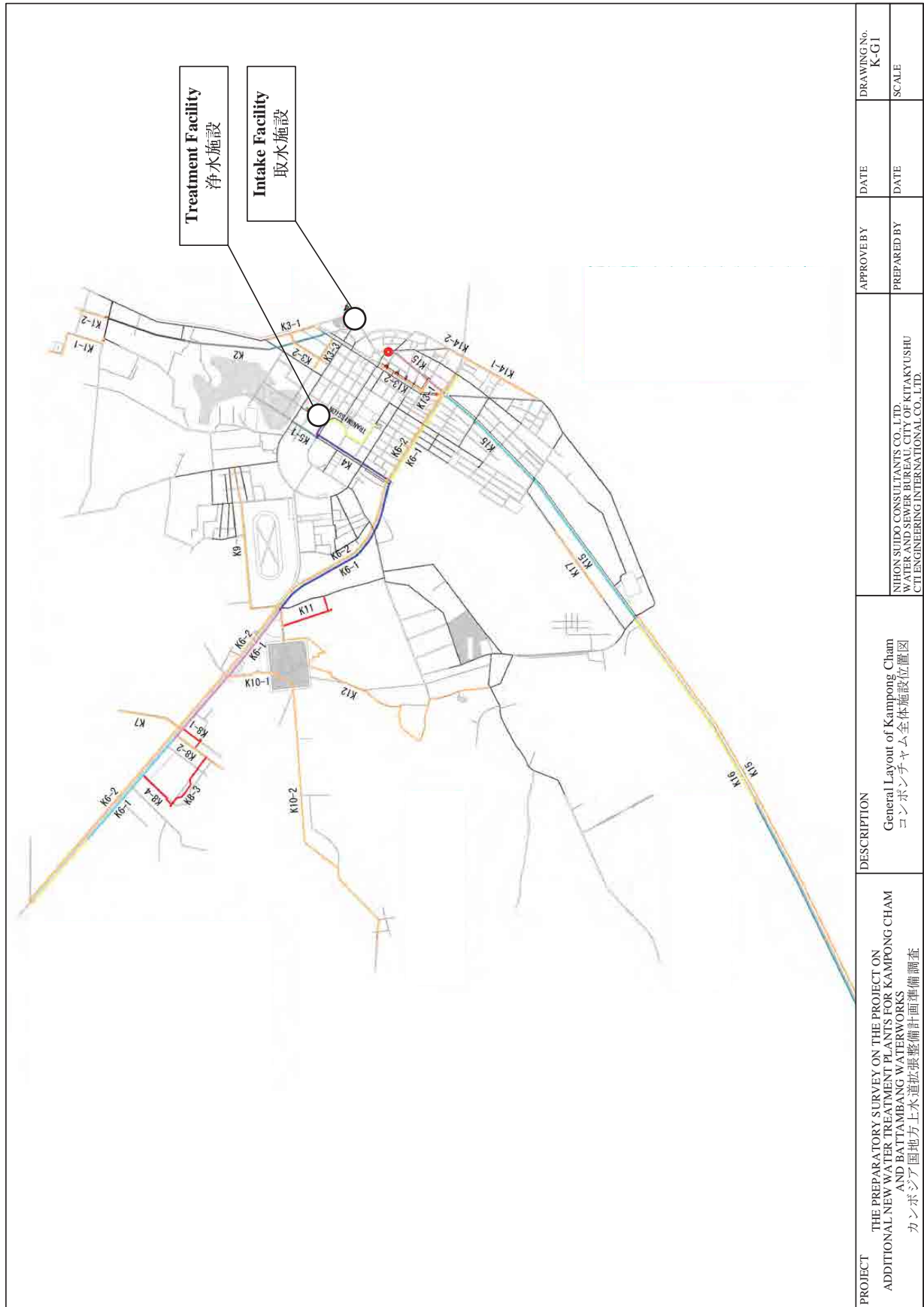
番号	名称	形態 図書・ビデオ 地図・写真等	オリジナル ・コピー	発行機関	発行年
14	「カンボジア労働法」日本語版	Word ファイル	コピー	CDC (カンボジア開発評議会)	不明
15	カンボジア王国憲法 (1993)	Text File	無	Royal Government of Cambodia	1993
16	Law on environmental Protection and Natural Resource Management (1996)	PDF File	無	Ministry of Environment	1996
17	Sub-Decree on Environmental Impact Assessment Process (1999)	PDF File	無	Ministry of Environment	1999
18	Sub-Decree on Water Pollution Control (1999)	PDF File	無	Ministry of Environment	1999
19	Sub-Decree on Solid Waste Management (1999)	PDF File	無	Ministry of Environment	1999
20	Sub-Decree on Air Pollution Control and Noise Disturbance (2000)	PDF File	無	Ministry of Environment	2000
21	Law on Water Resource Management(2004)	PDF File	無	Ministry of Environment	2004
22	General Guideline for Conducting Initial and Full Environmental Impact Assessment Report (2009)	Paper Copy	無	Ministry of Environment	2009
23	PROTECTED AREA LAW (2008)	PDF File	無	Ministry of Environment	2008
24	Land Law	PDF File	無		2001
25	Land Expropriation Law	PDF File	無		2009
26	The Project for Replacement and Expansion of Water Distribution Systems in Provincial Capitals Tender Documents volume I - III	紙	コピー	NJS CONSULTANTS CO., LTD.	2011
27	Provincial Towns Improvement Project, Part B Contract No. ICB/PTIP/AB/002 For Construction of Water Supply Systems in BATTANBANG, PURSAT, KOMPON CHAM, KOMPONG THOM, KAMPOT and SVAY RIENG AS-BUILT DRAWING for BATTAMBANG and KOMPONG CHAM	紙	コピー	NIPPON JOGESUIDO SEKKEI CO. LTD. IN ASSOCIATION WITH SAWAC, CHINA GEO-ENGINEERING CORPORATION AND CAMBODIA CONSTRUCTION & ENGINEERING CO., LTD JOINT VENTURE	2007

7. その他の資料・情報

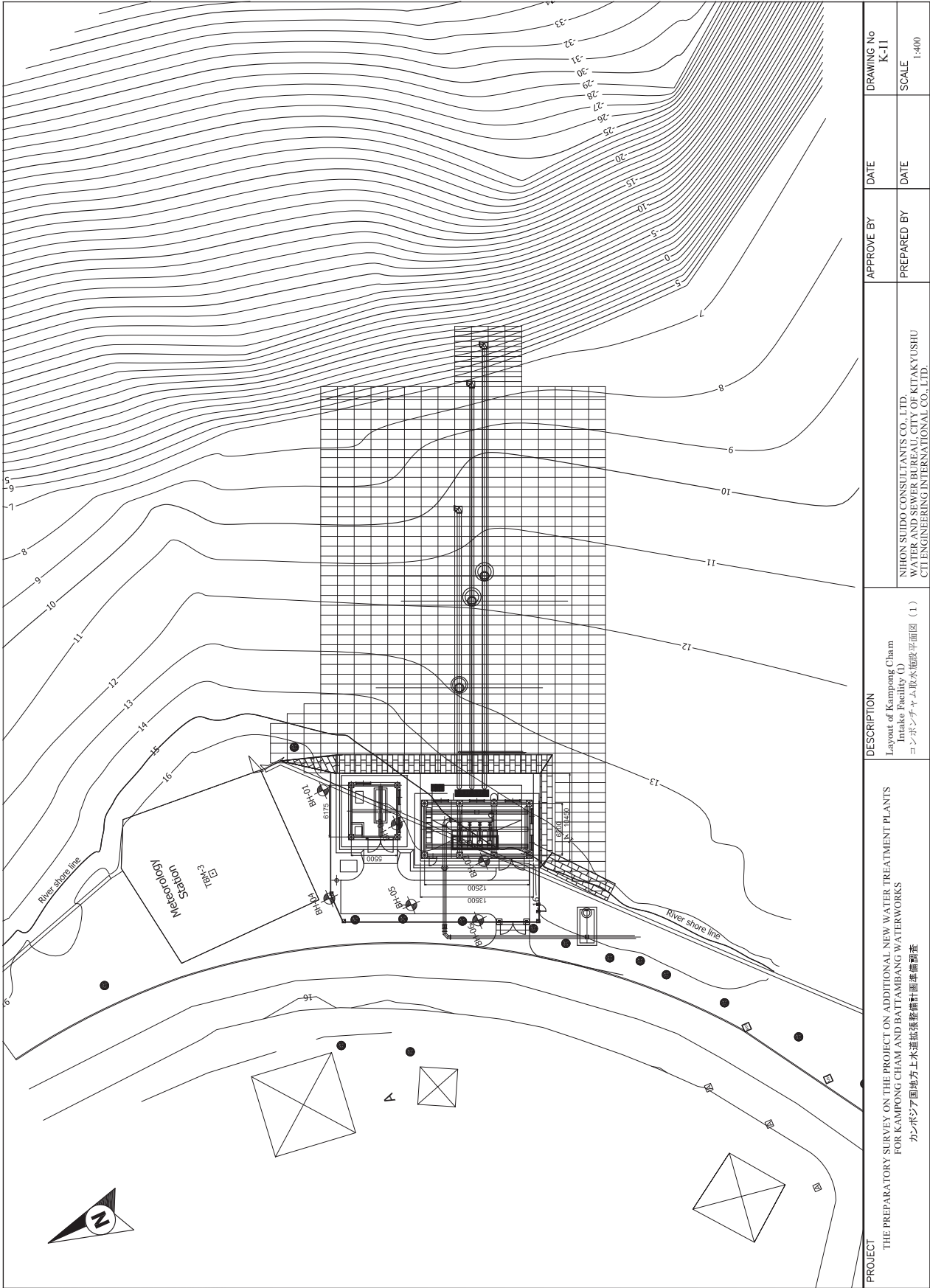
7.1 概略設計図

概略設計図面リスト

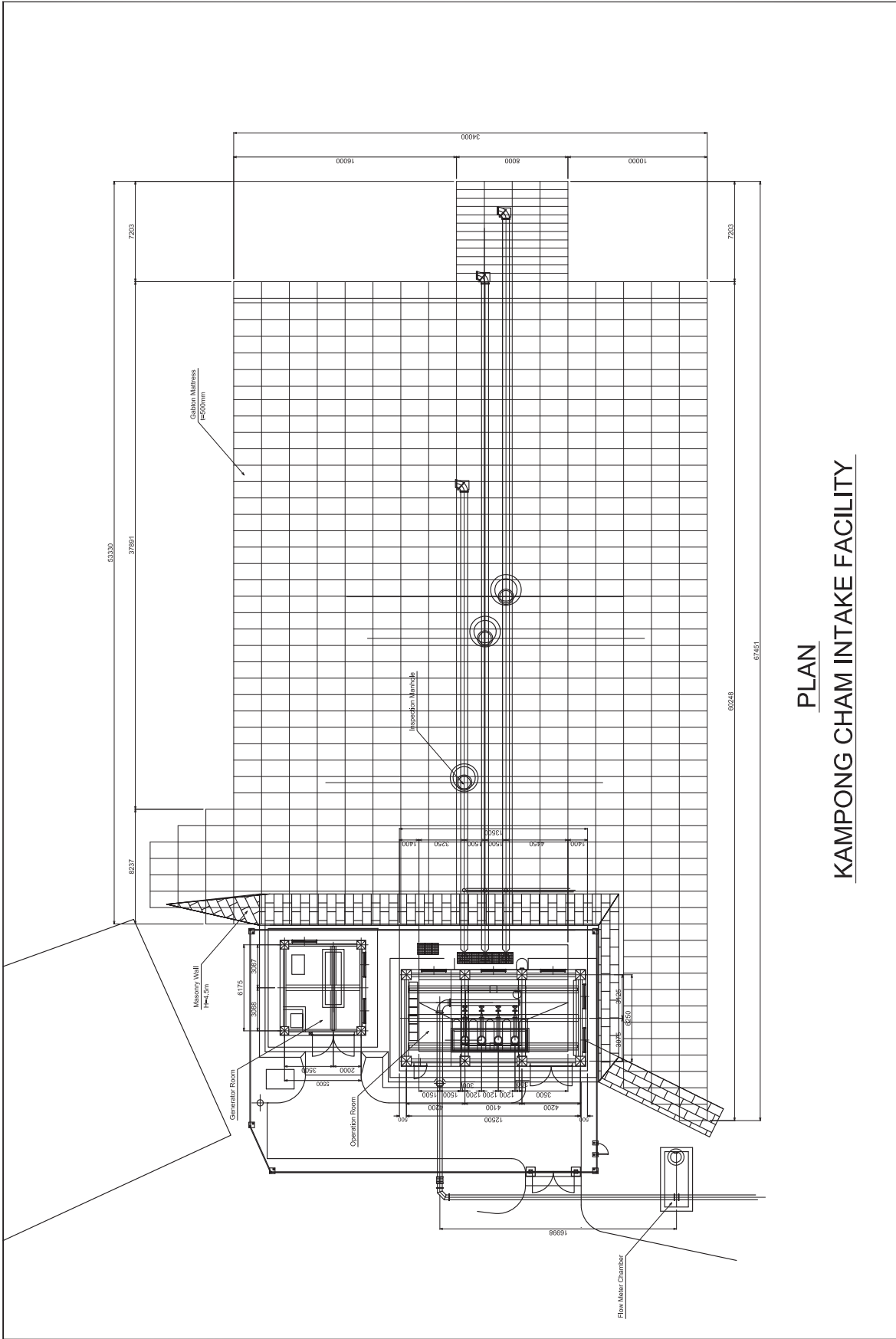
番号	施設区分	図面標題	図番号	
			KMC	BTB
1.	全体(G)	全体施設位置図	K-G1	B-G1
2.	取水施設(I)	取水施設平面図(1)	K-I1	B-I1
		取水施設平面図(2)	K-I2	B-I2
		取水施設構造図(1)	K-I3	B-I3
		取水施設構造図(2)	K-I4	B-I4
3.	導水施設(R)	導水管路敷設概要図	K-R1	B-R1
		導水管路敷設標準図(掘削断面)	K-R2	B-R2
		導水管路敷設標準図(各種弁室)	K-R3	B-R3
4.	浄水施設(T)	浄水施設全体平面図	K-T1	B-T1
		浄水施設水位高低図	K-T2	B-T2
		着水井/ブロック形成/沈澱池/ろ過池構造図	K-T3	B-T3
		断面図(1)	K-T3	B-T4
		断面図(2)	K-T5	B-T5
		断面図(3)	K-T6	B-T6
		断面図(4)	K-T7	B-T7
		配水池構造図(1)	K-T8	B-T8
		配水池構造図(2)	K-T9	B-T9
		排水池構造図	K-T10	B-T10
		ラグーン構造図(1)	K-T11	B-T11
		ラグーン構造図(2)	K-T12	-
5.	送配水施設(D)	送配水管路敷設概要図	K-D1	B-D1
		送配水管路敷設詳細図(1)	K-D2	B-D2
		送配水管路敷設詳細図(2)	K-D3	B-D3
		送配水管路敷設詳細図(3)	K-D4	B-D4
		送配水管路敷設詳細図(4)	K-D5	B-D5
		送配水管路敷設詳細図(5)	K-D6	B-D6
		送配水管路敷設詳細図(6)	K-D7	B-D7
		送配水管路敷設詳細図(7)	K-D8	B-D8
		送配水管路敷設詳細図(8)	K-D9	B-D9
		送配水管路敷設詳細図(9)	K-D10	B-D10
		送配水管路敷設詳細図(10)	-	B-D11
		送配水管路敷設詳細図(11)	-	B-D12
		送配水管路敷設詳細図(12)	-	B-D13
		送配水管路敷設詳細図(13)	-	B-D14
		送配水管路敷設標準図(掘削断面)	K-D11	-
		送配水管路敷設標準図(仕切弁)	K-D12	-
		送配水管路敷設標準図(空気弁・排水弁)	K-D13	-
		送配水管路敷設標準図(給水管分岐)	K-D14	-
		送配水管路敷設標準図(地下埋設物横断)	K-D15	-
		送配水管路敷設標準図(既設管接続1)	K-D16	-
		送配水管路敷設標準図(既設管接続2)	K-D17	-
		送配水管路敷設標準図(消火栓1)	K-D18	-
送配水管路敷設標準図(消火栓2)	K-D19	-		
送配水管路敷設標準図(水管橋1)	K-D20	-		
送配水管路敷設標準図(水管橋2)	K-D21	-		
送配水管路敷設概要図(流量計室)	K-D22	-		



PROJECT	DESCRIPTION	APPROVE BY	DATE	DRAWING No.
THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア 国地方上水道拡張整備計画準備調査	General Layout of Kampong Cham コンボーンチャム全体施設位置図	APPROVED BY	DATE	K-G1
		PREPARED BY	DATE	SCALE
		NIHON SUDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF MIYAKUSHU CIT ENGINEERING INTERNATIONAL CO., LTD.		

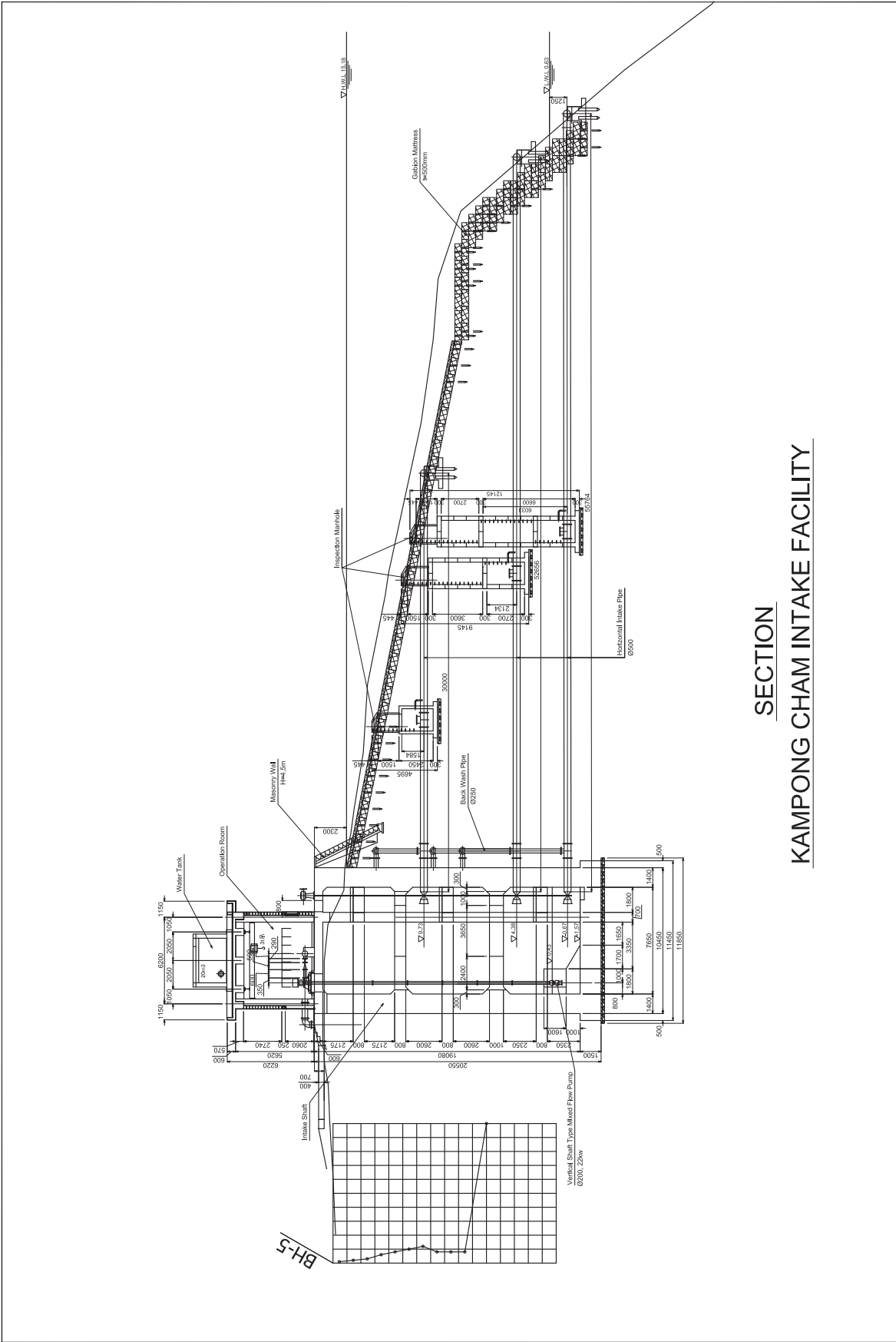


PROJECT	DESCRIPTION	APPROVE BY	DATE	DRAWING No
		THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア地方上水道拡張整備計画準備調査		Layout of Kampong Cham Intake Facility (O) コンボンチャンダム取水施設平面図 (1)



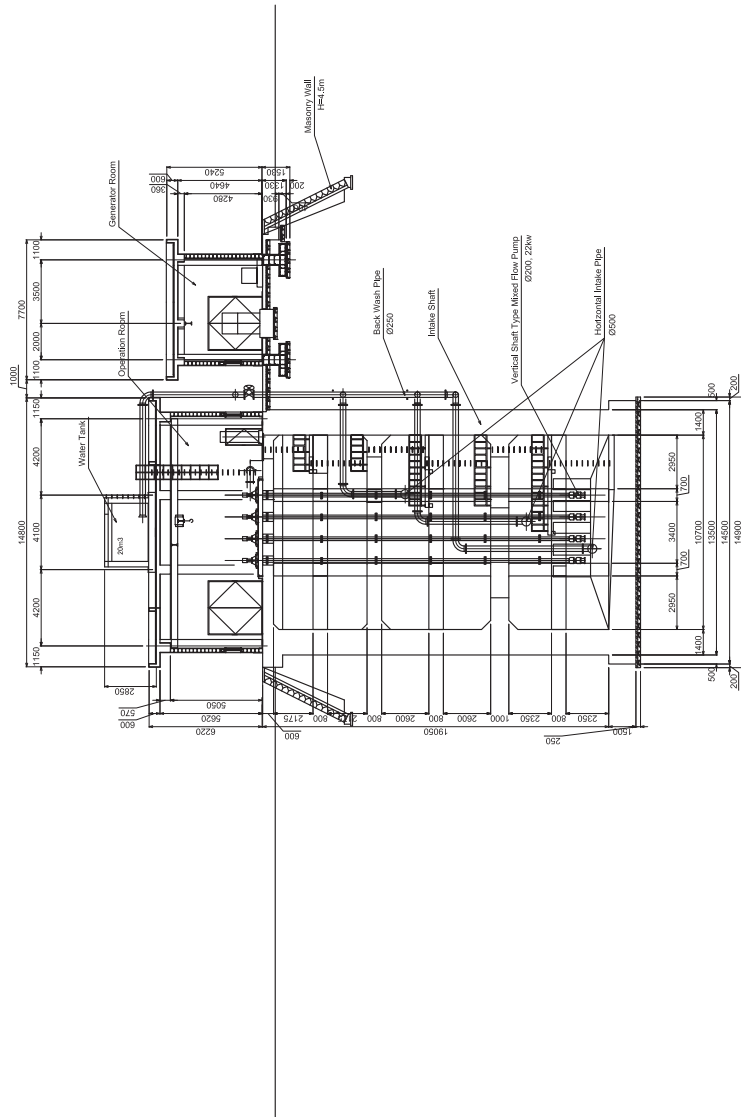
PLAN
KAMPONG CHAM INTAKE FACILITY

PROJECT THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア地方上水道拡張整備計画準備調査	DESCRIPTION Layout of Kampong Cham Intake Facility (2) コンポンチャム取水施設平面図 (2)	APPROVE BY DATE	DRAWING No K-12
		PREPARED BY	SCALE 1:250
		DATE	DATE



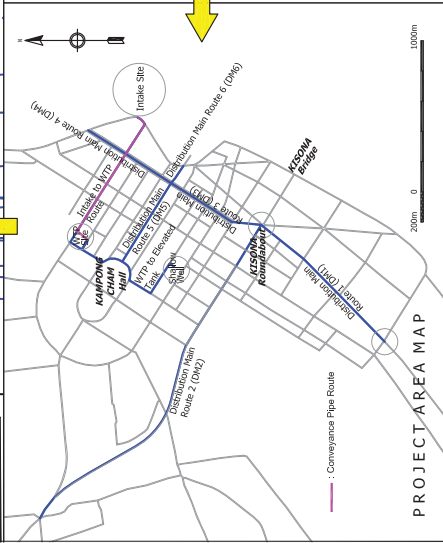
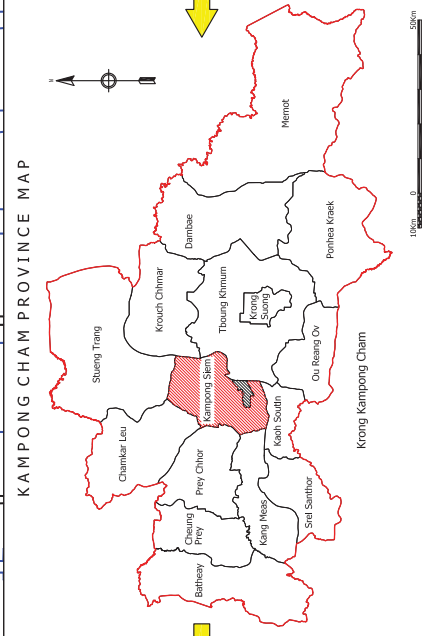
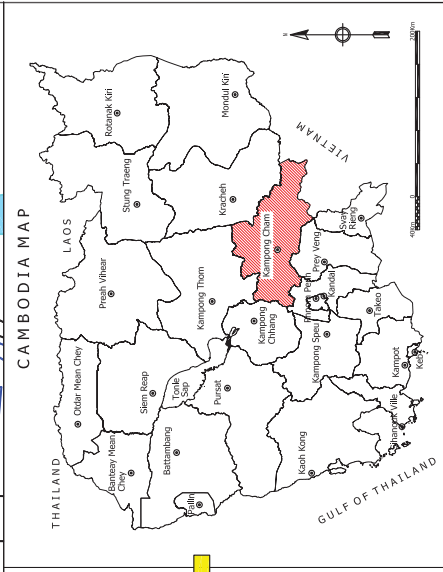
SECTION
KAMPONG CHAM INTAKE FACILITY

<p>PROJECT</p> <p>THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア即地方上水道拡張整備計画準備調査</p>	<p>DESCRIPTION</p> <p>Section View of Kampong Cham Intake Facility コンボーンチャン取水施設構造図 (1)</p>	<p>APPROVE BY</p> <p>DATE</p>	<p>DRAWING No</p> <p>K-13</p>
		<p>PREPARED BY</p> <p>DATE</p>	<p>SCALE</p> <p>1:250</p>

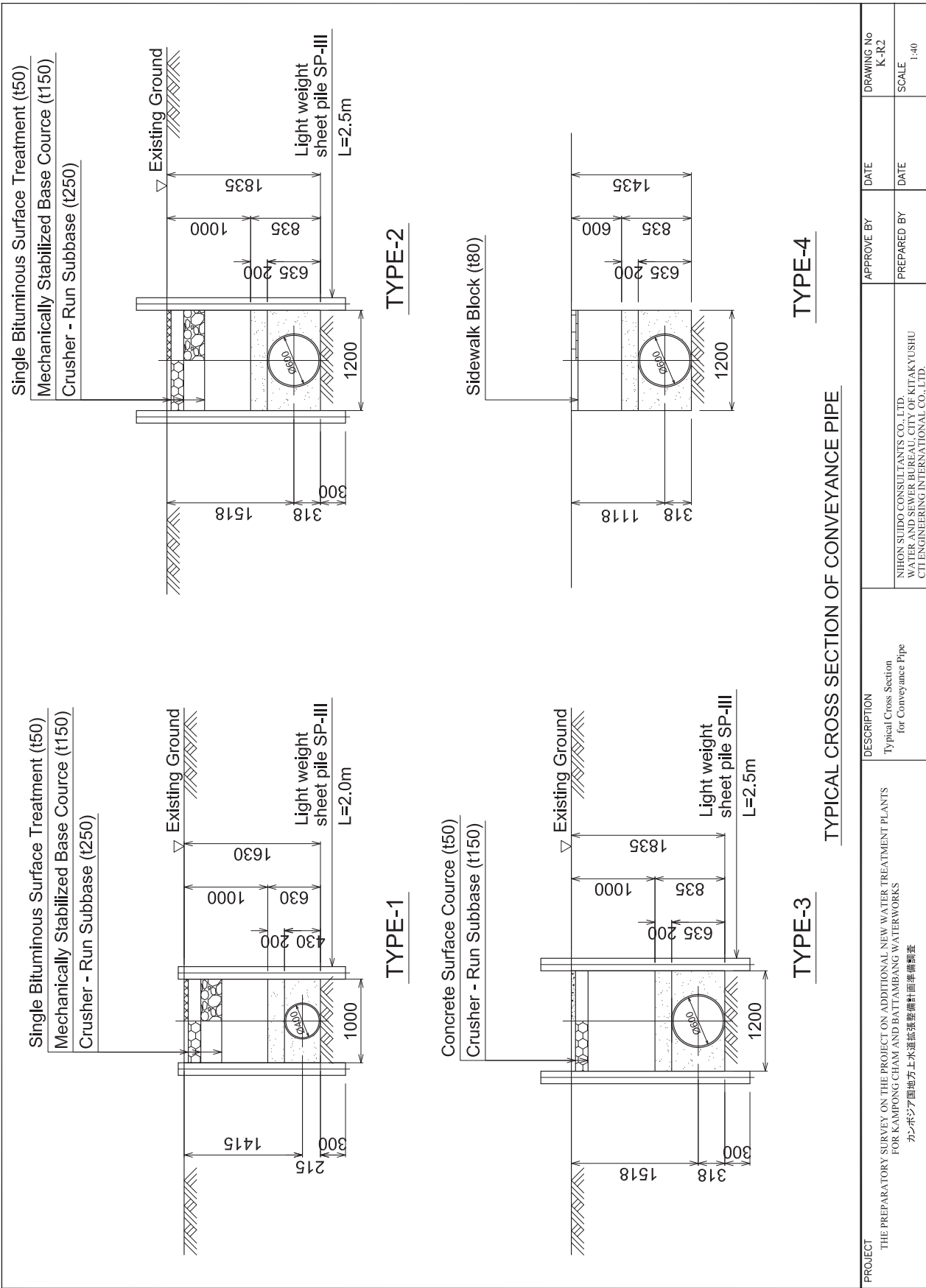


FRONT
KAMPONG CHAM INTAKE FACILITY

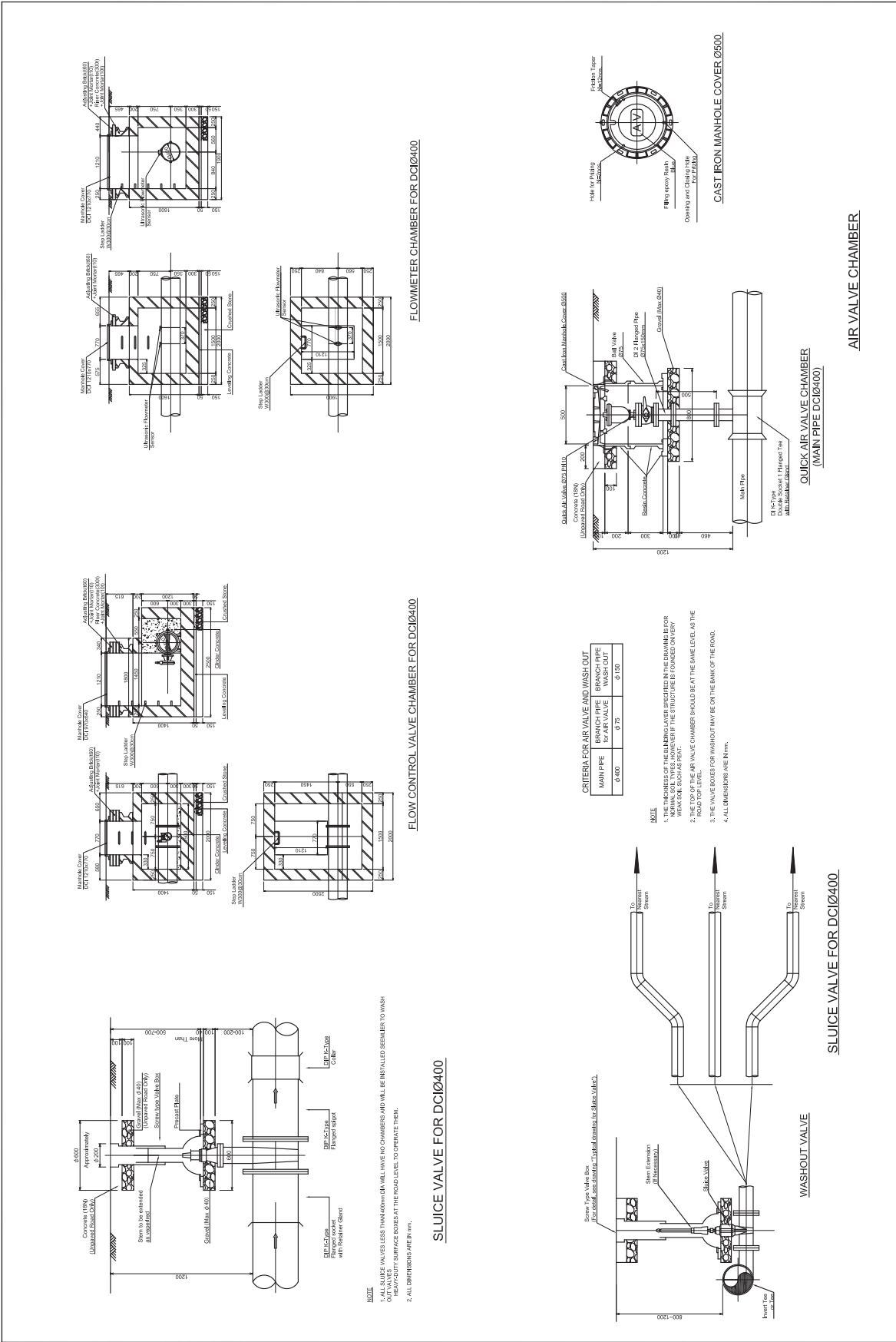
<p>PROJECT</p> <p>THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア即地方上水道拡張整備計画準備調査</p>	<p>DESCRIPTION</p> <p>Front View of Kampong Cham Intake Facility カンボジア即地方上水道取水施設構造図 (2)</p>	<p>APPROVE BY</p> <p>DATE</p>	<p>DRAWING No</p> <p>K-14</p>
<p>APPROVE BY</p> <p>DATE</p>	<p>PREPARED BY</p> <p>NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU CTI ENGINEERING INTERNATIONAL CO., LTD.</p>	<p>DATE</p> <p>SCALE</p>	<p>1:250</p>



PROJECT	DESCRIPTION	APPROVE BY		DRAWING No	
		DATE	DATE	K-R1	SCALE
THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア州地方上水道拡張整備計画準備調査	Routes of Kampong Cham Crawfish Pits コンボリア州地方上水道拡張整備調査				



PROJECT	THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア国地方上水道拡張整備計画準備調査	DESCRIPTION Typical Cross Section for Conveyance Pipe	APPROVE BY	DATE	DRAWING No
			PREPARED BY	DATE	SCALE
			NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU CTI ENGINEERING INTERNATIONAL CO., LTD.		
			K-R2 1:40		



NOTE
 1. ALL SLUICE VALVES LESS THAN 400mm OR SMALLER SHALL BE INSTALLED SEWERER TO WASH
 ON HEAVY DUTY SURFACE BOXES AT THE ROAD LEVEL TO OPERATE THEM.
 2. ALL DIMENSIONS ARE IN mm.

SLUICE VALVE FOR DCIØ400

FLOW CONTROL VALVE CHAMBER FOR DCIØ400

FLOWMETER CHAMBER FOR DCIØ400

CRITERIA FOR AIR VALVE AND WASHOUT BRANCH PIPE

MAIN PIPE	BRANCH PIPE
Ø 400	Ø 75
Ø 400	Ø 150

- NOTE**
1. THE THICKNESS OF THE BURIED LAYER SPECIFIED IN THE DRAWING IS FOR NORMAL SOIL TYPES. HOWEVER IF THE STRUCTURE IS FOUND ON VERY HARD SOIL, SUCH AS HIGH.
 2. THE THICKNESS OF THE BURIED LAYER SPECIFIED IN THE DRAWING IS FOR ROAD TOP LEVEL.
 3. THE VALVE BOXES FOR WASHOUT MAY BE ON THE BANK OF THE ROAD.
 4. ALL DIMENSIONS ARE IN mm.

SLUICE VALVE FOR DCIØ400

AIR VALVE CHAMBER

PROJECT THE PREPARATORY SURVEY ON THE PROJECT ON ADDITIONAL NEW WATER TREATMENT PLANTS FOR KAMPONG CHAM AND BATTAMBANG WATERWORKS カンボジア地方上水道拡張整備計画準備調査	DESCRIPTION Valve Chamber for Kampong Cham Conveyance Pipe	APPROVE BY	DATE	DRAWING No K-R3
		PREPARED BY	DATE	SCALE