

添付資料

## 1. 調査団員・氏名

### (1) 概略設計調査時

No.	氏名	分野	所属
1	松本 重行	総括	JICA 地球環境部 水資源・防災グループ 水資源第一課 企画役
2	丸尾 祐治	技術アドバイザー (地下水開発)	JICA 地球環境部課題アドバイザー 国際協力専門員
3	遠藤 昭雄	計画管理	JICA 地球環境部 水資源・防災グループ 水資源第一課
4	松本 良治	業務主任	株式会社建設技研インターナショナル
5	石井 昌樹	副業務主任/施設計画・設計 1	株式会社建設技研インターナショナル
6	田原 輝男	地下水開発計画/試掘調査	株式会社建設技研インターナショナル
7	厚地 学	水道計画/機械・電気設備	株式会社ダイワコンサルタント
8	井手 佳季子	環境社会配慮	株式会社ポリテック・エイディディ
9	石塚 良昭	水道事業運営	株式会社プロジェクト経済研究所
10	小坂 文夫	施工計画/積算	株式会社建設技研インターナショナル
11	今野 秀紀	施設計画・設計 2/業務調整	株式会社建設技研インターナショナル
12	高木 豊博	現地調査補強員 (施設計画・設計)	株式会社建設技研インターナショナル

### (2) 概略設計概要説明調査時

No.	氏名	分野	所属
1	石田 幸男	総括	JICA モンゴル事務所 所長
2	遠藤 昭雄	計画管理	JICA 地球環境部 水資源・防災グループ 水資源第一課
3	松本 良治	業務主任	株式会社建設技研インターナショナル
4	石井 昌樹	副業務主任/施設計画・設計 1	株式会社建設技研インターナショナル
5	田原 輝男	地下水開発計画/試掘調査	株式会社建設技研インターナショナル
6	今野 秀紀	施設計画・設計 2/業務調整	株式会社建設技研インターナショナル

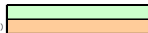
## 2. 調査行程

### (1) 概略設計調査時

工程表			総括	技術アドバイザー(地下水開発)	計画管理	業務主任	副業務主任／施設計画・設計1	地下水開発計画／試掘調査	水道計画/機械・電気設備	環境社会配慮	水道事業運営	施工計画/積算	施設計画・設計2/業務調整	現地調査補強/施設計画・設計
日曜	日付	曜日	松本 重行	丸尾 祐治	遠藤 昭雄	松本 良治	石井 昌樹	田原 輝男	厚地 学	井手 佳季子	石塚 良昭	小坂 文夫	今野 秀紀	高木 豊博
1	3	月	東京(OM502/13:25発)→ウランバートル(17:35着)					東京(OM502/13:25発)→ウランバートル(17:35着)	宮崎(JL3626/12:55発)→ウランバートル(22:40着)		東京(KE704/13:55発)→ウランバートル(22:40着)		東京(OM502/13:25発)→ウランバートル(17:35着)	東京(KE704/13:55発)→ウランバートル(22:40着)
2	4	火	表敬訪問(JICA、EOF、USUG、MRTUUD、MNET)、IC/R説明・協議					表敬訪問(JICA、EOF、USUG、MRTUUD、MNET)、IC/R説明・協議			表敬訪問(JICA、EOF、USUG、MRTUUD、MNET)、IC/R説明・協議		表敬訪問(JICA、EOF、USUG、MRTUUD、MNET)、IC/R説明・協議	
3	5	水	現地調査(ガチョルト地区、上流水源、中央水源)					現地調査(ガチョルト地区、上流水源、中央水源)			現地調査(ガチョルト地区、上流水源、中央水源)		現地調査(ガチョルト地区、上流水源、中央水源)	
4	6	木	USUGとのM/D協議、表敬訪問(ウランバートル市、OSNAUG)					USUGとのM/D協議、表敬訪問(ウランバートル市、OSNAUG)			USUGとのM/D協議、表敬訪問(ウランバートル市、OSNAUG)		USUGとのM/D協議、表敬訪問(ウランバートル市、OSNAUG)	現地調査/技術協議(USUG)
5	7	金	M/D署名、JICA事務所報告					技術協議(USUG)			現地調査/技術協議(USUG)		M/D署名、JICA事務所報告	同上
6	8	土	ウランバートル(OM501/6:55発)→東京(12:30着)					現地調査/再委託業務	データ収集		同上		現地調査/再委託業務	同上
7	9	日						資料整理			資料整理		資料整理	資料整理
8	10	月						現地調査/再委託業務	現地調査/技術協議(USUG)		現地調査/技術協議(USUG)		現地調査/再委託業務	現地調査/技術協議(USUG)
9	11	火						同上	同上		同上		同上	同上
10	12	水						同上	同上		同上		同上	同上
11	13	木						同上	同上		同上		同上	ウランバートル(KE888/0:20発)→東京(11:30着)
12	14	金						同上	同上		同上		同上	
13	15	土						同上	同上		同上		同上	
14	16	日						資料整理			資料整理		資料整理	
15	17	月						現地調査/電気探査	現地調査/技術協議(USUG)		現地調査/技術協議(関連機関)		現地調査/技術協議(USUG)	
16	18	火						同上	同上		同上		同上	
17	19	水					東京(OM502/13:25発)→ウランバートル(17:35着)	データ収集	水道計画		同上		同上	
18	20	木					現地調査/技術協議(USUG)	現地調査	同上		同上		同上	
19	21	金					同上	同上	同上		同上		同上	
20	22	土					同上	同上	同上		同上		同上	
21	23	日						水道計画			資料整理		資料整理	
22	24	月					現地調査/技術協議(USUG)	現地調査/試掘	水道計画		現地調査/技術協議(USUG)		現地調査/技術協議(USUG)	
23	25	火					同上	同上	施設計画・設計(管路)		同上		同上	
24	26	水					同上	現地調査	同上		ウランバートル(KE888/0:20発)→東京(11:30着)		同上	
25	27	木					同上	同上	施設計画・設計(機械)				同上	
26	28	金					同上	現地調査/試掘	同上				同上	
27	29	土					同上	電気探査結果解析	施設計画・設計(電気)	東京(KE704/Dep 13:55)→ウランバートル(Arr 22:40)			同上	
28	30	日						資料整理					資料整理	
29	31	月					現地調査/技術協議(USUG)	現地調査/試掘	施設計画・設計(電気)	現地調査/技術協議(USUG)			現地調査/技術協議(USUG)	
30	1	火					同上	同上	ウランバートル(KE888/0:20発)→宮崎(14:55着)	同上			同上	
31	2	水					同上	同上	同上				同上	
32	3	木					同上	同上	同上				同上	
33	4	金					同上	同上	同上				同上	
34	5	土					同上	同上	同上				同上	
35	6	日					資料整理				資料整理		資料整理	
36	7	月					データ収集	現地調査/試掘		現地調査/技術協議(MNET)			データ収集	
37	8	火					同上	同上		同上			同上	
38	9	水					同上	データ収集		第一回公聴会準備		東京(OM502/13:25発)→ウランバートル(17:35着)	第一回公聴会準備	
39	10	木					第一回公聴会(ガチョルト地区)			第一回公聴会(ガチョルト地区)		現地調査/技術協議(USUG)	第一回公聴会(ガチョルト地区)	
40	11	金					データ収集	現地調査/試掘		現地調査/技術協議(USUG)		同上	データ収集	
41	12	土					同上	同上		同上		同上	同上	
42	13	日					資料整理			資料整理		資料整理	資料整理	
43	14	月					施設計画・設計	現地調査/試掘		現地調査/技術協議(MNET)		現地調査/技術協議(USUG)	施設計画・設計	
44	15	火					同上	同上		第二回公聴会準備		同上	第二回公聴会準備	
45	16	水					第二回公聴会(ウランバートル地区)			第二回公聴会(ウランバートル地区)		同上	第二回公聴会(ウランバートル地区)	
46	17	木					施設計画・設計	現地調査/試掘		現地調査		同上	施設計画・設計	
47	18	金					同上	同上		同上		同上	同上	
48	19	土					同上	同上		同上		同上	同上	
49	20	日					資料整理			資料整理		資料整理	資料整理	
50	21	月					施設計画・設計	現地調査/試掘		現地調査		現地調査/技術協議(USUG)	施設計画・設計	
51	22	火					同上	同上		同上		同上	同上	
52	23	水					ステークホルダー会議準備			ステークホルダー会議準備		同上	ステークホルダー会議準備	
53	24	木					ステークホルダー会議、協議結果整理			ステークホルダー会議、協議結果整理		ステークホルダー会議、協議結果整理	ステークホルダー会議、協議結果整理	
54	25	金					施設計画・設計	現地調査/試掘		現地調査		現地調査/技術協議(USUG)	報告書作成	
55	26	土					同上	同上		同上		同上	同上	

工程表			総括	技術アドバイザー(地下水開発)	計画管理	業務主任	副業務主任/施設計画・設計1	地下水開発計画/試掘調査	水道計画/機械・電気設備	環境社会配慮	水道事業運営	施工計画/積算	施設計画・設計2/業務調整	現地調査補強/施設計画・設計
日曜	日付	曜日	松本 重行	丸尾 祐治	通藤 昭雄	松本 良治	石井 昌樹	田原 輝男	厚地 学	井手 佳幸子	石塚 良昭	小坂 文夫	今野 秀紀	高木 豊博
56	27	日					資料整理			ウランバートル(KE868/0:20発)→東京(11:30着)		資料整理		
57	28	月					施設計画・設計	現地調査・試掘				現地調査/技術協議(USUG)	テクニカル・ノート作成	
58	29	火					同上	同上				同上	同上	
59	30	水					同上	同上				同上	同上	
60	1	木					同上	同上				同上	同上	
61	2	金					同上	同上				同上	同上	
62	3	土					同上	同上				同上	同上	
63	4	日					資料整理					資料整理		
64	5	月				東京(OM502/13:25発)→ウランバートル(17:35着)	報告書作成	現地調査・試掘	宮崎(JL3626/12:55発)→ウランバートル(22:40着)			現地調査/技術協議(USUG)	テクニカル・ノート作成	
65	6	火				技術協議(USUG)	同上	同上	中央水源現地調査			同上	同上	
66	7	水				同上	同上	同上				同上	同上	
67	8	木				同上	同上	同上				同上	同上	
68	9	金					テクニカル・ノート協議					テクニカル・ノート協議		
69	10	土				技術協議(USUG)	報告書作成	同上	上流水源現地調査			現地調査/技術協議(USUG)	報告書作成	
70	11	日					資料整理					資料整理		
71	12	月				技術協議(USUG)	報告書作成		技術協議(USUG)			現地調査/技術協議(USUG)	報告書作成	
72	13	火				ステアリングコミュニティ・ミーティング準備			同上			同上	ステアリングコミュニティ・ミーティング準備	
73	14	水				ステアリングコミュニティ・ミーティング						同上	ステアリングコミュニティ・ミーティング	
74	15	木				帰国報告(JICA, EOF)						同上	帰国報告(JICA, EOF)	
75	16	金				ウランバートル(KE868/0:20発)→東京(11:30着)	施設計画・設計	現地調査・試掘	技術協議(USUG)			同上	報告書作成	
76	17	土					同上	同上	同上			ウランバートル(OM501/6:55発)→東京(12:30着)	同上	
77	18	日					資料整理		ウランバートル(KE868/0:20発)→宮崎(14:55着)				資料整理	
78	19	月					施設計画・設計	現地調査・試掘					報告書作成	
79	20	火					同上	同上					同上	
80	21	水					同上	同上					同上	
81	22	木					同上	同上					同上	
82	23	金					同上	同上					同上	
83	24	土					同上	ウランバートル(OM501/6:55発)→東京(12:30着)					同上	
84	25	日					資料整理						資料整理	
85	26	月					施設計画・設計						ウランバートル(OM501/6:55発)→東京(12:30着)	
86	27	火					同上							
87	28	水					同上							
88	29	木					同上							
89	30	金					同上							
90	31	土					同上							
91	1	日					資料整理							
92	2	月					ウランバートル(OM501/6:55発)→東京(12:30着)							

ウランバートル  
移動(東京⇄ウランバートル)



JICA: 国際協力機構  
USUG: ウランバートル市上下水道公社  
OSNAAUG: 住宅公共事業公社  
MRTUUD: 道路・運輸・建設・都市開発省  
MNET: 自然環境・観光省

EOJ: 在モンゴル日本大使館  
IC/R: インセプション・レポート  
M/D: 協議議事録

## (2) 概略設計概要説明調査時

工程表				総括	計画管理	業務主任	副業務主任／施設計画・設計1	地下水開発計画／試掘調査	施設計画・設計2／業務調整
日順	日付	曜日		石田 幸男	遠藤 昭雄	松本 良治	石井 昌樹	田原 輝男	今野 秀紀
1	2月	21	日		東京(JL951/9:50発)→ウランバートル(16:25着)				
2		22	月	表敬訪問(JICA)、ステアリング・コミティーに関する事前打合せ、現地調査(ガチョルト水源、送配水管布設予定ルート)					
3		23	火	表敬訪問及び協議(EOF, MNET)、現地調査(送配水管布設予定ルート)					
4		24	水	ステアリングコミティ・ミーティング(USUG, ウランバートル市, MRTCUD, Water Authority, MNETとの協議・M/D案説明)					
5		25	木	他ドナープロジェクトとの協議(世銀プロジェクト、オランダ技協)、表敬訪問及び協議(EOF)、USUGとのミニッツ協議、ミニッツ文案作成					
6		26	金	ウランバートル市にてM/D内容確認、M/D署名、EOF報告					
7		27	土		ウランバートル(OM301/8:40発)→東京(20:15着)				

ウランバートル  
移動(東京⇄ウランバートル)


JICA : 国際協力機構  
USUG : ウランバートル市上下水道公社  
MRTCUD : 道路・運輸・建設・都市開発省

MNET : 自然環境・観光省  
EOJ : 在モンゴル日本大使館  
M/D : 協議議事録

### 3. 関係者（面会者）リスト

Name	Position	Description
<b>ウランバートル市役所 (Municipality of Ulaanbaatar)</b>		
G. Munkhbayar	Mayor of Ulaanbaatar City	
Munkhbaatar Begzjav	Vice Mayor (In charge of construction, Urban Development and Infrastructure )	
Gankhuu Tsevelsodnom	Chief Engineer and Head of Engineering Facilities Division	
D. Ganbat	Officer of the Urban Development Policy Department	
Jargal Tsambajav	Consulting Engineer Engineering Facilities Division	
L. Altangerel	Urban Development Policy Department	
E. Jargalsaikhan	Officer of Environmental Protection Section	
L. Dashdorj	Specialized Inception Agency of the Ulaanbaatar City	
T. Soyolkhuu	Land Administration of UB city Municipality	
M. Nyamdorj	SSIA of UB city Municipality	
S. Bayarsaikhan	Power distribution Station of UB	
Ts. Regzmaa	UB city, Municipality	
B. Bayanjargal	UB city, Municipality	
Ch. Regzmaa	UB city, Municipality	
<b>ウランバートル市上下水道公社 (Water Supply &amp; Sewerage authority of Ulaanbaatar city (USUG))</b>		
B. Purevjav Msc	Director	
Baatarkhuyag Buyantogtokh	Deputy Director-Chief Engineer	
Yanjindulam Zagdaa	Officer of PIU of USUG	
SH. Ganzorig	Chief of the Industrial and Technology Sector	
N. Bayaraa	Chief of the Water Supply Office	
Ya. Erdenebat	Chief of the United office of the Branches	
P. Boldbaatar	Chief of the Central Cleaning Structure Office	
D. Tuyaa	Chief of the Customer's Sector	
S. Naran-Ochir	Chief of the Apartment Utilization Office	
U. Lkhamsuren	Chief of the Quick Coordination Office	
B. Bazargarid	Chief of the Monitoring and Appraisal Sector	
L. Lkhamaasuren	Chief Accountant Department	
G. Bazkhishig	Chief Electric Engineer	
N. Batsaikhan	Chief Engineer	
TS. Uranchimeg	Manager	
Falkert de Jaga	USUG, VEI	
Ch. Baasandorj	Engineer of the Investment, Supply and Service Sector	
Kh. Chimgee	Engineer of the Industrial and Technology Sector	
N. Narantuya	Engineer of the Industrial and Technology Sector	
B. Oyuun	Engineer of the Project Implementing Sector	
B. Urnaa	Engineer of the Project Implementing Sector	
A. Terbish	Electric Engineer	
M. Suren	Engineer of Estimation and Building	
T. Dagrasuren	Engineer of Pipeline	
G. Batkhishig	General Electrician	
B. Enkhtsetseg	Ecological Officer of the project of USUG	
S. Chuluunbat	GIS Engineer	
Odrhuu	Engineer	
Otgonsuren	Electric Engineer	
Orgilt	Engineer	
Byonbadran	Engineer	
Badran	Engineer	

Name	Position	Description
<b>ウランバートル市統計局 (Ulaanbaatar City Government, Department of Statistics)</b>		
Batbayar Baasankhuu	Senior Statistician	
<b>道路・運輸・建設・都市開発省 (Ministry of Roads, Transport, Construction and Urban Development)</b>		
G. Myagmar	Deputy Director of Urban Development and Public Utilities Department	
Dashbaljir Nemekhbayar	Director, Finance and Investment Department	
Oyunchimeg	建設住宅公共事業政策局職員	
<b>自然環境・観光省 (Ministry of Nature, Environment and Tourism)</b>		
D. Enkhbat	Director, Department of Environment and Natural Resource	
S. Bayartsetsgg	Expert of Environment	
D. Gantumur	Ministry of Environment and Tourism	
<b>大蔵省 (Ministry of Finance)</b>		
Dorjkhand Togmid	Deputy Director-General, Department of Development Financing and Cooperation	
Baajiiikhuu Tuguldur	Department of Development Financing and Cooperation	
E. Purevjav	Department of Development Financing and Cooperation	
<b>水庁 (Water Authority)</b>		
P. Badamdorj	Head of the department, Water Authority	
Badamdorj Purev	Director, Water Utilization Department	
Tsedenbaljir Yadamtsoo	Head of Department Water Resources	
G. Batbayar	Water Authority	
<b>ウランバートル市住宅公共サービス局 (OSNAAUG)</b>		
Dashzeveg	Director	
<b>世界銀行 (World Bank)</b>		
L. Badamkhorloo	Director, Funded Second Ulaanbaatar Services Improvement, Project Management Unit	
Enkhivvshin	Engineer	
Nyamdorj		
<b>バヤンズルフ区 (Bayanzurkh District)</b>		
D. Myagmar	Head of Land Administration of Bayanzurkh District	
A. Enkhmanlai	Land Administration of Bayanzurkh District	
N. Altansukh	Advisor of Bayanzurkh District Governor	
<b>ホロ等 (Governors of Khoroo)</b>		
C. Davaakhuu	Bayanzurkh District, 2 <sup>nd</sup> Khoroo	
D. Batchimeg	Bayanzurkh District, 4 <sup>th</sup> Khoroo	
Chimeddorj	Bayanzurkh District, 4 <sup>th</sup> Khoroo	
G. Myadagmaa	Bayanzurkh District, 5 <sup>th</sup> Khoroo	
Kh. Myadagmaa	Bayanzurkh District, 5 <sup>th</sup> Khoroo	
Jargalsaikhan	Bayanzurkh District, 10 <sup>th</sup> Khoroo	
Sh. Tsetseg	Bayanzurkh District, 17 <sup>th</sup> Khoroo	
R. Zina	Bayanzurkh District, 17 <sup>th</sup> Khoroo	
O. Munkherdene	Bayanzurkh District, 19 <sup>th</sup> Khoroo	
G. Ganbold	Bayanzurkh District, 20 <sup>th</sup> Khoroo	
U. Davaajav	Bayanzurkh District, 22 <sup>th</sup> Khoroo	
Ts. Ouyn	Bayanzurkh District, 23 <sup>th</sup> Khoroo	
B. Dagiikhuu	Bayanzurkh District, 24 <sup>th</sup> Khoroo	
D. Otgonbaatar	Head of 124 Military Unit	
B. Idersaikhan	124 <sup>th</sup> Military Unit	
Myagmartsooj	Deputy of 084 Military Unit	

Name	Position	Description
Battumur	Head of Peoples' Meeting of Gachuurt	
<b>日本大使館 (Embassy of Japan)</b>		
Takahiro ISHIZAKI	First Secretary	
Yoichi OKAWA	Second Secretary	
<b>JICAモンゴル事務所 (JICA Mongolia Office)</b>		
Yukio ISHIDA	Resident Representative	
Kazutoshi ONUKI	Senior Representative	
Toru OGURA	Project Formulation Adviser	
Ryuko HIRANO	Project Formulation Adviser	
E. Ankhtsetseg	Program Administrative Officer	
<b>その他 (Other)</b>		
U. Tsedendamba	Land Relation, Construction and Geodesy Cartography Authority	
Folkert de Jager	VEI, Netherlands	
S. Rosenthar	The Asia Foundation	
Chimedochir		
S. Amarbayasgalan	Nature Friendly LLC	
T. Gantumur	Nature Friendly LLC	
G. Buyandelger	Nature Friendly LLC	
G. Myanganbayar	UBS TV-journalist	



4. 討議議事録

(1) M/D (概略設計調査時)

MINUTES OF DISCUSSIONS  
ON THE PREPARATORY SURVEY (BASIC DESIGN)  
ON THE ULAANBAATAR WATER SUPPLY DEVELOPMENT PROJECT IN GACHUURT  
IN MONGOLIA

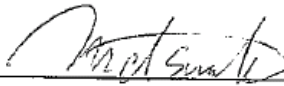
In response to the request from the Government of Mongolia (hereinafter referred to as "Mongolia"), the Government of Japan decided to conduct a Preparatory Survey on the Ulaanbaatar Water Supply Development Project in Gachuurt (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Mongolia the Preparatory Survey Team ( hereinafter referred to as "the Team" ), which is headed by Mr. Shigeyuki Matsumoto, Advisor, Water Resources Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, JICA, and is scheduled to stay in the country from July 29 to October 17, 2009.

The Team held discussions with the officials concerned of the Government of Mongolia and conducted a field survey at the survey 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 Basic Design Study Report.

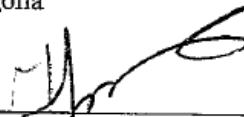
Ulaanbaatar, August 7, 2009



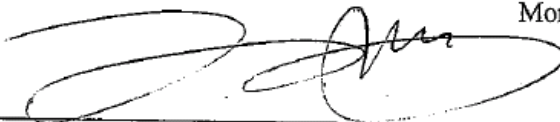
Shigeyuki Matsumoto  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency  
Japan



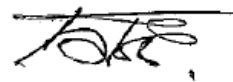
Nemekhbayar Dashbaljir  
Director  
Finance and Investment Department  
Ministry of Road, Transportation, Construction and  
Urban Development  
Mongolia



Munkhbaatar Begzjav  
Vice Mayor  
Municipality of Ulaanbaatar  
Mongolia



Dorjkhand Togmid  
Deputy Director-General  
Department of Development Financing and  
Cooperation  
Ministry of Finance  
Mongolia  
(Witness)



Purevjav Bat-Ochir  
Director  
Water Supply and Sewerage Authority of  
Ulaanbaatar City (USUG) Co., Ltd.  
Mongolia

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to improve the water supply services for citizen in Ulaanbaatar City including the Ger areas through development of the new water source in Gachuurt.

### 2. Project Site

The site of the Project is Ulaanbaatar City and the new water source in Gachuurt as shown in Annex-1.

### 3. Responsible and Implementing Agency

3-1. The Responsible Agency is the Ministry of Road, Transportation, Construction and Urban Development and the Municipality of Ulaanbaatar.

3-2. The Implementing Agency is the Water Supply and Sewerage Authority of Ulaanbaatar City (USUG) Co., Ltd. (hereinafter referred to as "USUG"). The organization chart of the USUG is shown in Annex-2.

### 4. Items Requested by the Government of Mongolia

After discussions between the Mongolian side and the Team (hereinafter referred to as "the both sides"), the items described in Annex-3 were finally requested by the Mongolian 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 the Japanese side.

### 5. Japan's Grant Aid Scheme

5-1. The Mongolian side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-4.

5-2. The Mongolian side will take the necessary measures, as described in Annex-5, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

### 6. Schedule of the Survey

6-1. The consultant members of the Team will proceed to further studies in Mongolia until October 17, 2009.

6-2. JICA will prepare the draft preparatory survey report in English and dispatch a mission in order to explain its contents to the Mongolian side around February 2010.

6-3. In case that the contents of the report are accepted in principle by the Mongolian side, JICA will finalize the report and send it to the Mongolian side around April 2010.

6-4. The Mongolian side understands that execution of the Preparatory Survey (hereinafter referred to as "the Survey") does not necessarily imply the Japanese Government's commitment of the

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project implementation.

## **7. Other Relevant Issues**

The following issues were discussed and confirmed by both sides.

### **7-1. Steering Committee**

Both sides agreed to set up a steering committee for smooth planning and implementation of the Project through coordination among organizations concerned. The member of the steering committee shall be representatives of the following authorities:

- (a) Municipality of Ulaanbaatar,
- (b) Ministry of Road, Transportation, Construction and Urban Development,
- (c) Ministry of Mineral Resources and Energy,
- (d) Ministry of Natural Environment and Tourism,
- (e) Water Authority, and
- (f) USUG.

The representative of each authority will be decided by the Mongolian side and be informed to JICA within two weeks.

### **7-2. Planning Framework**

- 1) The Team explained and the Mongolian side understood that the target year should be set at a few years after the expected timing of completion of the Project, because the Japanese Grant Aid is deemed to be provided to meet urgent and short-term needs of the recipient country.
- 2) The water demand projection should be carefully investigated mainly based on the table attached to the Application Form and the forecast in "The Study on City Master Plan and Urban Development Program of Ulaanbaatar City", which has been prepared in March 2009 under the support of JICA.
- 3) The Team pointed out that water demand projection would be subject to the effort by the Mongolian side to improve water supply service to the Ger area and to promote efficient water use in the apartment area by installing customer meters, encouraging water saving, setting appropriate water tariff, and reducing water leakage. The Team also explained their recognition that the above effort by the Mongolian side would be critically important for the Project to produce intended lasting effect. Those factors shall be further studied through the Survey.

### **7-3. Planning of Water Sources**

- 1) Both sides confirmed that the requested development of new water sources in Gachuurt was in accordance with the priority project proposed in the Study on Water Supply System in Ulaanbaatar conducted from 1993 to 1995 under the support of JICA.
- 2) The Team explained its intention to study present situation of the water sources area including river environment, river bed and groundwater in order to update information and data to verify

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appropriateness of the Project.

- 3) The Team expressed concern about future possible effect of the dam construction projects in the upstream of Tuul River, because they would affect flow of Tuul River which recharged groundwater not only in the Gachuurt area but also in the existing upper water source. The Team requested information on the dam projects.

#### 7-4. Environmental and Social Considerations

- 1) The Team explained and the Mongolian side understood the JICA's Guidelines for Environmental and Social Considerations and the procedures to be followed by the Japanese side based on the guidelines:
  - (a) Categorization by JICA: JICA had categorized the Project as "Category A", which meant that there would be likely to have significant adverse impacts on the environment and society because the Project scope included exploitation of large amount of groundwater.
  - (b) Scoping: JICA would conduct scoping and prepare drafts of the Terms of Reference (TOR) for environmental and social considerations studies upon inquiry to "The JICA Advisory Council of Environmental and Social Considerations Review", which consists of academic experts, NGOs, private sector and other external experts with the necessary knowledge, and advises on the support for and examination of environmental and social considerations about JICA's cooperation projects.
  - (c) Environmental and social considerations studies: JICA would conduct studies including baseline surveys, predicting and evaluating adverse impacts and likely impacts that the Project would have on the environment and local society, and mitigation measures to avoid and minimize them.
  - (d) Information disclosure: JICA would disclose information on scoping and results of the environmental and social considerations studies.
  - (e) Monitoring: JICA would conduct monitoring during the implementation stage.
- 2) The Team requested and the Mongolian side agreed to the followings:
  - (a) To fill in the Environmental Checklist and submit it to JICA by the end of December, 2009. The format of the Environmental Checklist will be provided later to USUG.
  - (b) To clear the requirements stipulated by the laws and regulation in Mongolia related to environmental and social considerations before the decision-making by the Japanese side.
- 3) The Team explained and the Mongolian side understood that the following items should be carefully investigated in the Survey for proper consideration of social and environmental aspects:
  - (a) Relationship between the project area and reserved areas designated by laws and regulations of the Mongolian Government, ND
  - (b) Impact of groundwater development on nearby existing groundwater usage and surrounding



- natural environment,
- (c) Land acquisition for the construction of facilities,
  - (d) Vibration, noise, traffic accident and other nuisance during construction and operation, and
  - (e) Increase of wastewater volume.

#### **7-5. Improvement of Water Supply Service and Management**

- 1) The Team explained and the Mongolian side understood that the following improvement of water supply service and management would be important to enhance effectiveness and ensure sustainability of the Project:
  - (a) Improvement of water supply service for the Ger area using the new water source to be developed by the Project,
  - (b) Demand side management to reduce water consumption especially in the apartment area,
  - (c) Installation of customer meters,
  - (d) Improvement of financial management to generate fiscal resources for future maintenance, rehabilitation and expansion of the water supply facilities, and
  - (e) Appropriate water tariff setting.
- 2) The Mongolian side explained that the Second Ulaanbaatar Services Project supported by the World Bank would cover the above issues and was moving ahead on schedule.

#### **7-6. Undertakings of the Mongolian Side**

The Team requested and the Mongolian side understood the following undertakings by the Mongolian side:

- (a) To secure land for construction of the intake wells and the distribution reservoir,
- (b) To install electricity to the intake wells and the distribution reservoir to be constructed by the Project,
- (c) To obtain necessary permission from competent authorities for facility construction and groundwater development including building certificate, permission on electrical work from the Ministry of Mineral Resources and Energy, and permission on water resources development from Water Authority.
- (d) To clear necessary procedures for social and environmental considerations including Environmental Impact Assessment (EIA),
- (e) To allocate necessary staff and budget for operation and maintenance of the facilities to be constructed by the Project, and
- (f) To improve water supply service and management as mentioned above.

#### **7-7. Technical Assistance**

- 1) The Team explained that the soft component and initial guidance for operation of the equipment and facilities could be included in the Project to support smooth operation. Necessity and contents of the support will be examined during the Survey.

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- 2) The Team explained that the technical cooperation and JOCV mentioned in the Application Form such as technical cooperation project, dispatch of long-term and short-term experts, acceptance of trainees required another official request to be submitted to the Japanese Government based on close consultation with JICA Mongolia Office.

#### **7-8. Tax Exemption**

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in Mongolia which is to be arisen from the Project activities will be ensured by the Ministry of Road, Transportation, Construction and Urban Development. The ministry will take any procedures necessary for tax exemption with the Ministry of Finance of Mongolia at its responsibility.

The Team raised concerns about recent taxation by the Government of Mongolia to other Japanese Grant Aid project on diesel fuel and requested to take necessary action to solve this issue through mutual consultation with the Japanese side.

#### **7-9. Overlapping with Other Projects**

The Mongolian side explained that the Project would not be overlapped with any other project supported by other donor agencies, NGO, and Mongolian official organization(s).

#### **7-10. Visibility of the Project**

The Team explained and the Mongolian side understood that the visibility of the Project should be ensured as a token of cooperation from the Japanese people if the Project was realized. The following ideas could be considered to enhance publicity of the Project:

- (a) To display commemoration panels at water supply facilities,
- (b) To organize visits to water supply facilities by students and citizens periodically,
- (c) To prepare brochures, and
- (d) To publicize the Project in the mass media.

#### **7-11. Confidentiality of the Survey Report**

The Team explained and the Mongolian side understood that the preparatory survey report to be prepared at the end of the Survey would be disclosed to the public in principle. However the Team also explained that a confidential part which might affect bidding process such as cost estimation should be kept undisclosed until the bidding has completed.

Annex-1      Project Sites Map

Annex-2      Organization Charts

(Water Supply and Sewerage Authority of Ulaanbaatar City (USUG) Co., Ltd.)

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- Annex-3 Items Requested by the Mongolian Side  
Annex-4 Japan's Grant Aid Scheme  
Annex-5 Major Undertakings to be taken by Each Government

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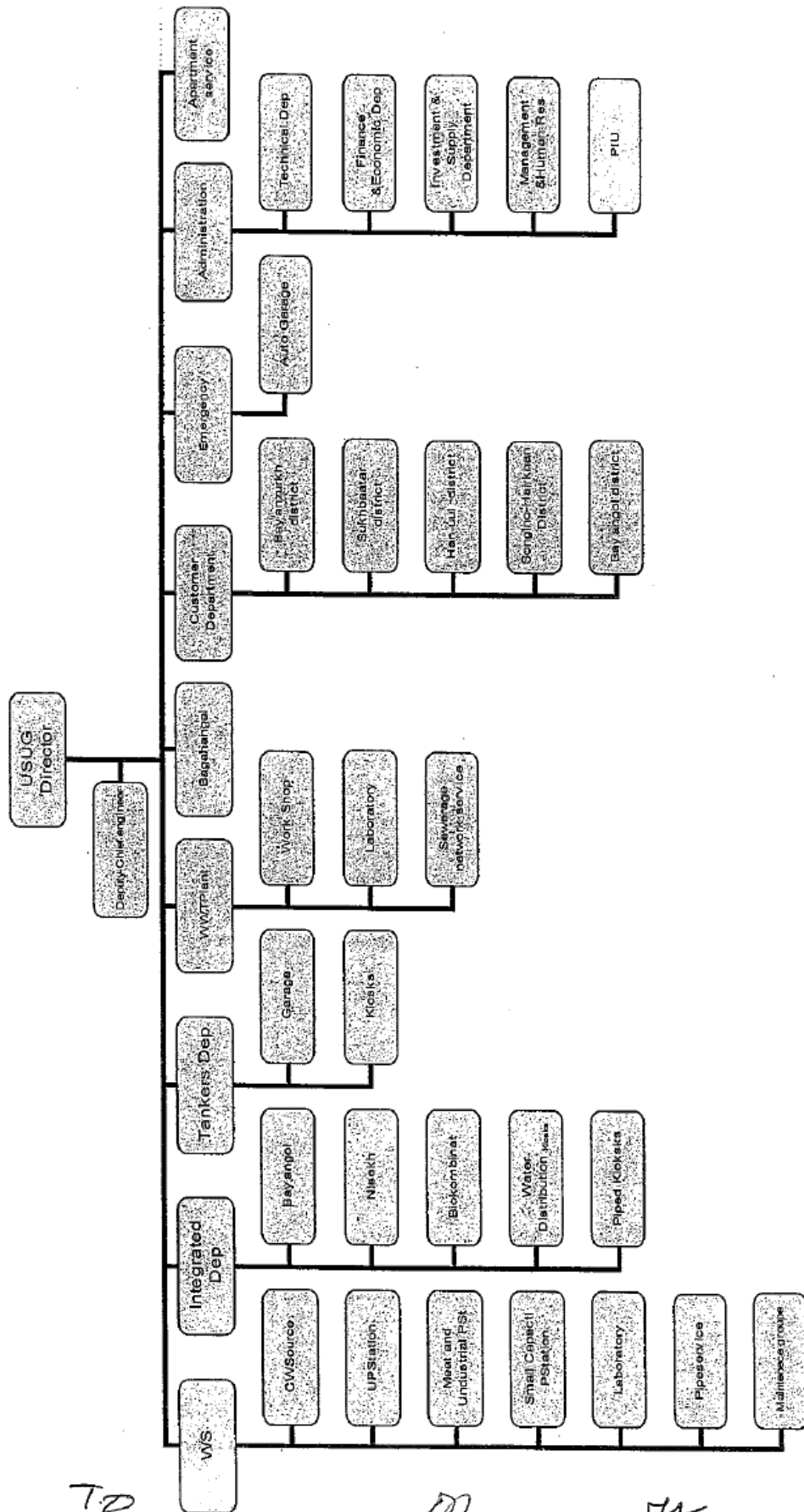
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Annex-2: Organization Charts  
(Water Supply and Sewerage Authority of Ulaanbaatar City (USUG) Co., Ltd.)



Annex-3: Items Requested by the Mongolian Side

**1. Intake Facilities**

(1) Well	21 sets
(2) Well pump house	21 sets
(3) Equipment for well house	21 sets
(4) Collection pipeline	4,800 m
(5) Mechanical equipment	21 sets
(6) Electrical equipment	21 sets

**2. Distribution Facilities**

(1) Distribution reservoir	8,000 m <sup>3</sup>
(2) Chlorination equipment	1 set
(3) Distribution main pipeline	19,500 m, $\phi$ 600

#### Annex-4: 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. Following the decision of the GOJ, Grant Aid for General Project is extended by JICA.

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
  - 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 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 basic 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 Basic 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.

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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 plea 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

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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 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)

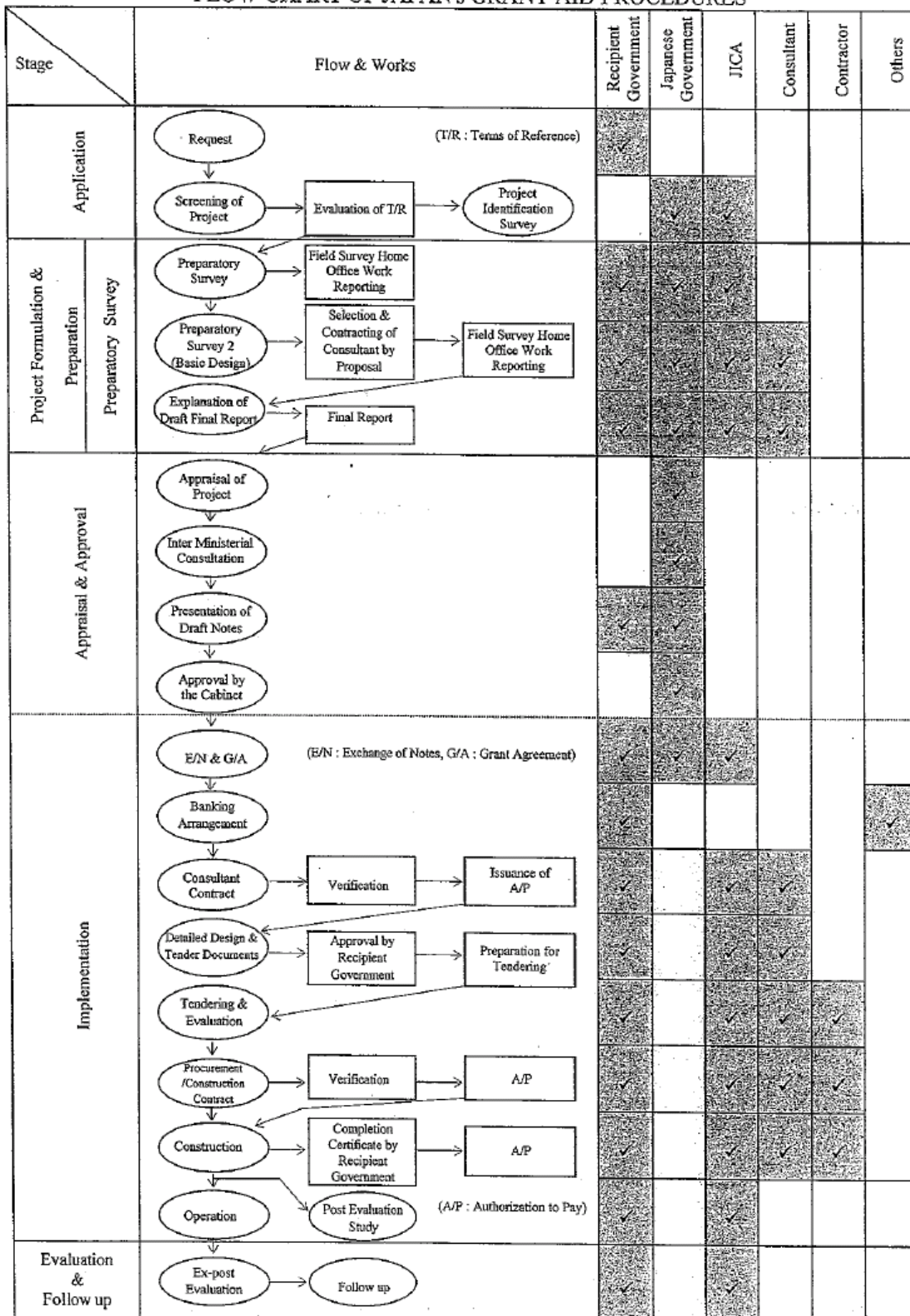
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(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.



## FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



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Annex-5: Major Undertakings to be taken by Each Government

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

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

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(2) ステークホルダー会議（概略設計調査時）

**MINUTES OF THE STAKEHOLDERS MEETING**  
**FOR**  
**THE PREPARATORY SURVEY (BASIC DESIGN) ON THE ULAANBAATAR WATER SUPPLY**  
**DEVELOPMENT PROJECT IN GACHUURT IN MONGOLIA**  
**HELD IN SEPTEMBER 24, 2009, 11:15 AM – 13:00 PM**  
**AT CONFERENCE HALL, PUMA IMPERIAL HOTEL,**  
**SUKHBAATAR DISTRICT, ULAANBAATAR, MONGOLIA**

*Present: (Please, see attached attendance sheet)*

*Total number of participants/stakeholders: Male-36, Female-14, Total-50*

Meeting formally starts at 11:15 am.

Opening speech held by Mr. Baatarkhuyag, Deputy Director and Chief Engineer of USUG.

He introduced the project outline and the cooperation by Japan Grant Aid Project on the water supply development of Ulaanbaatar city. Since 1992, JICA has provided technical assistance with followed three phases. First phase is to improve the Central water source facilities of Ulaanbaatar city, second stage is to improve and expanding the Upper water source pumping station and last one is the Water supply development project in Gachuurt, which is ongoing.

JICA Survey Team has commenced the Preparatory Survey on the Ulaanbaatar water supply development project since 3<sup>rd</sup> of August, 2009.

Today we introduce the preliminary results of the Preparatory Survey.

Mr. Ganzorig, Project coordinator of USUG, introduced JICA Survey Team members.

**Explanation of the Preparatory Survey on the Ulaanbaatar Water Supply Development Project (Mr. Ishii)**

Mr. Ishii expressed his appreciation for participating and delivered his presentation with the location map shown on the wall.

His speech continued about 30 minutes and described the basic design of the facilities, route of transmission main, collection pipes, and production wells, pump houses and the results of conducted survey. (Please see distributed handout.)

When he completed his speech, he appreciated attendant's attention.

**Question 1. Mr. Badamdorj, Head of the Department, Water Authority**

We understand the project purpose is to increase water resource of Ulaanbaatar city.

According to our survey, ground water level of Gachuurt area is very changeable.

Before you referred, if water level decreases more than 2 meters, you shall interrupt to intake water.

We estimate that water level would decrease more than 2 meters.

Why do you use only ground water? How about surface water?

**Answer (by Mr. Baatarkhuyag, Deputy Director and Chief Engineer of USUG):**

We have conducted the survey in the surrounding area of 60 km in diameter and selected several areas: Altanbulag, Gachuurt and other areas which flow into the Tuul River.

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According to survey, about 40,000 m<sup>3</sup>/day water resource is estimated around Gachuurt & Nalaikh area.

We have participated in several hydrologic surveys in search of water.

For the surface water, we have negotiated with Russian Government and conducted 2-3 surveys in recent years. UB government pursues a policy using both ground and surface water resources.

Housing, urban development projects like 100,000 housing will be able to be developed successfully based on new water supply development project in the future.

We want your utmost support and cooperation.

*Answer (by Mr. Tahara)*

The water level lowers during dry seasons and all our efforts are addressed to not lower ground water level.

Upper water resource is estimated a potential of more than 40,000m<sup>3</sup>/day, we have the plan to pump up the groundwater about 25,000m<sup>3</sup>/day. We will manage the pumping rate of groundwater not affecting to water level lower than 2 meters.

Surface water issue is out of our Scope of Work in the project. It should be a considered the Integrated Water Resources Management of Tuul River Basin, it will provide reasonable use for the surface water.

*Comment 1. (By Mr. Batbayar, Water Authority)*

I would like to express my sincere gratitude for organizing meeting, receiving our comments and especially for JICA Survey Team, spending many years' works and moneys for water supply development projects.

I think initial survey should be conducted to avoid negative impacts on ground water level. First the survey should estimate possible total amount of water intake, which considers not to have negative impact on ground water level. It is necessary to implement the project with least negative impact on ground water level.

*Comment 2 (by U. Tsedendamba, Land relation, construction and geodesy cartography authority):*

First of all I want to deliver my thanks to implementation of water supply resource project.

JICA has implemented many projects of developing Ulaanbaatar city. I believe that JICA Survey Team will find way to solve threatening issues positively.

I have several comments.

First, we need to discontinue chlorination equipment for water treatment furthermore, you can solve this issue.

Second, I think crossing through ger areas is right solution.

Also we have to discuss clearly future development plan and housing program of khoroo areas, which are included in the project area.

I want to recommend here about access road to Gachuurt village.

Here problem may occur by widening this road to Gachuurt, then you should discuss about UB city future plan.

Finally, we can disseminate the experience of construction pipelines to cross through Uliastai River.

Our organization will cooperate with you to solve land related issues such as negotiations with

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landowners.

*Answer (by Mr. Ishii)*

Mr. Ishii thanked his comments and promised to deliver his comments to Japan Government. If required sheet piles will not be removed in the place even when earth work finish.

*Question 2. (By Mr. Gankhuu, Construction department of UB city, Municipality)*

Do you have any proposed off-take from the transmission main line?

It will be connected without sub pipelines?

Is not it a great challenge to connect Gachuurt and Sharkhad ger areas to the transmission main line?

*Answer: (by Mr. Tahara)*

Transmission main pipeline will connect directly to North-East reservoir.

*Answer: (by Mr. Ganzorig)*

Mr. Ganzorig mentioned that USUG already had forwarded an idea to supply water to ger areas. When entire water supply facilities completed, USUG will be obligated to manage further activities.

*Question 3. (By Mr. Jargalsaikhan, Governor of 10<sup>th</sup> khoroo)*

How did you decide the route of the transmission main pipeline crossing through houses/fences/plots?

If a household is growing vegetables already in one's plot, what should you do?

*Answer: (by Mr. Ishii)*

I have walked through ger areas along transmission main pipeline.

If the construction affects one's plot/parts of the house/fence will need to be removed temporarily until the completion of the work.

The construction work will not relocate households permanently.

**Explanation of the Draft Scoping of Possible Negative Impacts and the Draft Mitigation and Monitoring Plan (Ms. Ide)**

Thank you for waiting till last thirty minutes of the meeting.

At present environmental and social impact assessment is ongoing.

Unfortunately, we do not have scientific data to determine the safe amount of the water intake.

Mongolian consultants are conducting the necessary surveys.

The JICA Team will be pleased to share the information with you when the survey results are obtained.

Then she presented her prepared presentation on the screen about 20 minutes. (Please see distributed handout.)

*Question 4. (By U. Tsedendamba, Land relation, construction and geodesy cartography authority)*

My first comment is that the mitigation plan must be authorized and monitored by the Ministry of Nature, Environment and Tourism. The presentation explained that the Steering committee will do the task. Higher authority is responsible, not only the Steering committee.

Secondly, you mentioned to move some few fences and gers. How does the city municipality solve this problem? I advise that land related development should be determined according to UB city cadastral map.

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Answer: (by Ms. Ide)

Thank you for your comment. USUG and JICA Survey Team cooperate on this issue. We follow Mongolian law, legislation and procedures. USUG has already started the procedure of IEE with the Ministry of Nature, Environment and Tourism. Mitigation plan will be prepared under Environmental Impact Assessment Law of Mongolia.

Answer: (by Mr. Ishii)

Mr. Ishii continued to answer the above question.

He kindly requested all stakeholders to understand, support, participate and cooperate during the implementation of the project.

For the last few minutes, stakeholders shared their opinions openly.

Mr. Tahara mentioned drawing of detailed topography is ongoing.

Mr. Baatarkhuyag refer that our ultimate objective is house connection.

Mr. Myagmar, Head of Land Administration of Bayanzurkh district, recommended to prepare and submit final design, then according to the design, the compensation amount will be discussed.


At the end of the meeting Mr. Baatarkhuyag held closing speech of the stakeholders meeting;

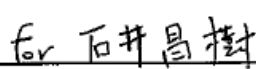
All of us are very pleased for your comments and suggestions. JICA Survey Team continues to work at the USUG office.


If you have any comments or questions, don't hesitate to come to our office. If you request to visit and introduce about implementation of the project, please call us. We will be ready to present our project at any time. Thank you for your consideration.

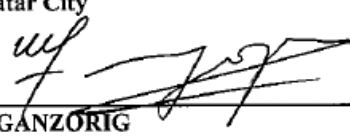
Meeting ends 13:10 pm.

I HEREBY CERTIFY to the correctness of the aforementioned minutes of the meeting

  
Mr. B. PUREVJAV Msc  
Director  
Water Supply and Sewerage Authority of  
Ulaanbaatar City

 Masaki  
ISHII  
Mr. Yoshiharu Matsumoto  
Chief Engineer  
JICA Survey Team


  
Mr. B. BAATARKHUYAG  
Deputy Director – Chief Engineer  
Water Supply and Sewerage Authority of  
Ulaanbaatar City

  
Mr. SH. GANZORIG  
Chief of the Industrial and Technology sector  
Water Supply and Sewerage Authority of  
Ulaanbaatar City

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**1<sup>st</sup> STAKEHOLDER CONSULTATION MEETING**  
**"The Preparatory Survey (Basic Design) on the Ulaanbaatar Water Supply Development Project in Gachuur in Mongolia"**  
**ATTENDANCE SHEET**

September 24, 2009 – Thursday

11:00am. At Conference Hall, Puma Imperial Hotel, Sukhbaatar District, Ulaanbaatar, Mongolia

No.	Name	Representing organization	Male/ Female
1	B.Purevjav	General Director of Water and Sewerage Authority (USUG)	M
2	Ganzorig	Project Coordinator of USUG	M
3	B.Baatarkhuyag	Deputy Director and Chief Engineer of USUG	M
4	Falkert de Jaga	USUG, VEI	M
5	N.Bayaraa	USUG,	M
6	B.Bazargarid	USUG,	M
7	Enkhtsetseg	Ecological Officer of the Project of USUG	F
8	Z.Yanjindulam	Officer of Project of USUG	F
9	B.Oyun	Project engineer	F
10	Ishii	JICA survey team	M
11	Tahara	JICA survey team	M
12	Ide	JICA survey team	F
13	Konno	JICA survey team	M
14	Kosaka	JICA survey team	M
15	Ama	JICA survey team translator	M
16	Demulen	JICA survey team translator	M
17	G.Batbayar	Water Authority	M
18	P.Badamdorj	Head of the department, Water Authority	M
19	T.Soyolkhuu	Land Administration of UB city Municipality	M
20	M.Nyamdorj	SSIA of UB city Municipality	M
21	Jargal	Officer of Engineering Utilities Section, UB City Municipality	M
22	Ts.Gankhuu	UB city, Municipality	M
23	B.Bayanjargal	UB city, Municipality	M
24	Ch.Regzmaa	UB city, Municipality	F
25	U.Tsedendamba	Land relation, construction and geodesy cartography authority	M
26	S.Rosenthar	The Asia Foundation	M
27	A.Enkhmanlai	Land Administration of Bayanzurkh district	M
28	N.Altansukh	Advisor of Bayanzurkh district Governor	M
29	G.Myagmar	Deputy Director of Urban Development and Public Utilities Department, Ministry of Road, Transport, Construction and Urban Development	M
30	Chimedochir		M
31	S.Bayarsaikhan	Power distribution Station of UB	M
32	D.Myagmar	Head of Land Administration of Bayanzurkh district	M
33	E.Ankhtsetseg	JICA	F
34	Altangerel	Specialist of UDP Department	M
35	D.Gantumur	Ministry of Environment and Tourism	M
36	U.Davaajav	Governor of 22 khoroo, Bayanzurkh district	M
37	Jargalsaikhan	Governor of 10 khoroo, Bayanzurkh district	M
38	G.Ganbold	Governor of Gachuur 20 khoroo	M
39	Ts.Oyun	Governor of 23 khoroo	F
40	Kh.Myadagmaa	Governor of 5 khoroo	F
41	O.Munkherdene	Governor of 19 khoroo	M
42	D.Batchimeg	Governor of 4 khoroo	F
43	B.Dagjikhuu	Governor of 24 khoroo	F
44	Sh.Tsetseg	Governor of 17 khoroo	F
45	C.Davaakhuu	Governor of 2 khoroo	F
46	D.Otgonbaatar	Head of 124 Military unit	M
47	Myagmartsooj	Deputy of 084 Military unit	M
48	S.Amarbayasgalan	Director, Nature Friendly LLC	M
49	P.Bold	Nature Friendly LLC	M
50	Buyandelger	Nature Friendly LLC	F

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(3) テクニカルメモランダム (概略設計調査時)

**MINUTES OF MEETING  
ON  
THE TECHNICAL MEETING  
OF  
THE PREPARATORY SURVEY (BASIC DESIGN)  
ON  
THE ULAANBAATAR WATER SUPPLY DEVELOPMENT PROJECT  
IN  
GACHUURT IN MONGOLIA**

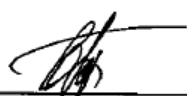
ULAANBAATAR, October 9, 2009



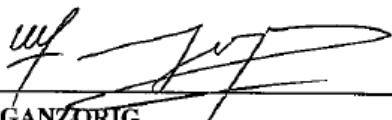
Mr. B. PUREVJAV Msc  
Director  
Water Supply and Sewerage Authority of  
Ulaanbaatar City



Mr. Yoshiharu Matsumoto  
Chief Engineer  
JICA Survey Team



Mr. B. BAATARKHUYAG  
Deputy Director – Chief Engineer  
Water Supply and Sewerage Authority of  
Ulaanbaatar City



Mr. SH. GANZORIG  
Chief of the Industrial and Technology sector  
Water Supply and Sewerage Authority of  
Ulaanbaatar City





## **I. General**

The meeting on the Technical Note for the Preparatory Survey (Basic Design) on the Ulaanbaatar Water Supply Development Project in Gachuurt in Mongolia (hereinafter referred to as “the Survey”) was held on October 9, 2009 at the Conference Room, 2<sup>nd</sup> Floor of USUG Central Office, Ulaanbaatar.

The list of attendance is shown in the Attachment.

## **II. Discussions**

First, Mr. Yoshiharu Matsumoto, the Chief Engineer and Mr. Masaki Ishii, the Deputy Chief Engineer/Facility Designer<sup>1</sup> of the Survey Team explained the contents of the Technical Note on each expertise field for the Survey.

The contents explained by Survey Team were accepted in principle by the Mongolian side. While it is agreed that some items, which are required further confirmation among Mongolian side, will be submitted by the next Monday (October 12<sup>th</sup>, 2009).

The major items confirmed in the meeting are as follows:

### **1. The Basic Design Features for Water Supply**

As the basic design features, the following items are confirmed:

- The target year of 2014
- The target unit water consumption of apartment areas of 230L/day and ger areas of 25L/day in 2014.
- The water supply amount of 25,200 m<sup>3</sup>/day newly developed in this project

In this meeting, it is also confirmed that the data newly collected in this study should be applied for calculation of projected water supply amount, though the difference in the figures applied between in the previous Master Plan (“The study on City Master Plan and Urban Development Program of Ulaanbaatar City”) in 2009 and this survey are observed.

### **2. Water Supply Network connected form the North-East Reservoir**

The Survey Team explained, showing the table in the technical note, the water supply network connected from the North-East Reservoir, which is the planned water supply reservoir supplied with water from the Gachuurt regulation reservoir in this project.

The contents of the network are confirmed except some corrections for the on-going project components conducted by the World Bank as the completed ones.

In this meeting, it is confirmed that the detailed number of beneficiaries in khoroo level will be provided later from Mongolian side.



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### 3. Explanation of Proposed Facility Design

The following confirmation was made regarding the design of the proposed facilities:

- Design standards, manual etc. applied for proposed facility design
- Route of pipeline from Gachuurt regulation reservoir to North-East reservoir
- Design of regulation reservoir with the location and design features
- Type of disinfection facilities
- Design of Chlorination and Operation House

Among these items, it is confirmed that further comments on the type of disinfection facilities is necessary considering recent constraint of the imported materials on disinfectant chlorine.

### 4. Undertaking of the Mongolian side

As for the undertaking of the Mongolian side, general items once were explained and agreed in the meeting on the Inception Report on August 7, 2009. The Survey Team further explained the detailed items undertaken by Mongolian side in the technical note, and Mongolian side agreed:

### 5. Others

As the other matters, the following information was provided from Mongolian side

- One of the most significant issues in Ulaanbaatar is air pollution, which is mainly emitted from the Ger Areas. Therefore, the improvement of Ger Areas is keen to Mongolian Government.
- In this context, housing development project in a manner of apartment has been promoted and the new government has a plan to provide 100,000 houses, which was replaced the development plan of 40,000 houses in the previous government.
- Such development will result in the increase of water supply amount in apartment areas. The projected unit water consumption for apartment areas is 230L/day.
- Excess water in North-East reservoir from Gachuurt will be used for such newly developed apartment areas through Tasgan reservoir and 3/4 reservoir.
- Water supply network will also be developed, and water from upper source will be used for the new urban development area of Bayangol located in north-western side of Ulaanbaatar City.

The technical note used in the meeting is attached hereto.

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**ATTACHMENT****THE PREPARATORY SURVEY (BASIC DESIGN) ON THE ULAANBAATAR WATER  
SUPPLY DEVELOPMENT PROJECT IN GACHUURT IN MONGOLIA**

**The Technical Meeting**  
**CONFERENCE Room, 2<sup>ND</sup> FLOOR, USUG Central office, Ulaanbaatar**  
**October 9, 2009 (9:30 AM-12:30 PM)**

**ATTENDANCE LIST****A. Local Counterpart Team**





<b>Name</b>	<b>Position</b>	<b>Dept. / Section</b>
B. Baatarkhuyag	Deputy Director of the Water Supply and Sewerage Authority	USUG, Water Supply and Sewerage Authority
Sh. Ganzorig	Chief of the Industrial and Technology sector	USUG, Industrial and Technology sector
N. Bayaraa	Chief of the Water Supply office	USUG, Water Supply office
Ya. Erdenebat	Chief of the United office of the Branches	USUG, United office of the Branches
P. Boldbaatar	Chief of the Central Cleaning Structure office	USUG, Office of the Central Cleaning Structure
D. Tuyaa	Chief of the Customer's sector	USUG, Customer's sector
S. Naran-Ochir	Chief of the Apartment Utilization office	USUG, Office of the Apartment Utilization
U. Lkhamsuren	Chief of the Quick Coordination office	USUG, Office of the Quick Coordination
Bazargarid	Chief of the Monitoring and Appraisal sector	USUG, Monitoring and Appraisal sector
G. Batkhishig	General Electrician	USUG, Industrial and Technology sector
Ch. Baasandorj	Engineer of the Investment, Supply and Service sector	USUG, Investment, Supply and Service sector
Kh. Chimgee	Engineer of the Industrial and Technology sector	USUG, Industrial and Technology sector
N. Narantuya	Engineer of the Industrial and Technology sector	USUG, Industrial and Technology sector
B. Oyuun	Engineer of the Project Implementing sector	USUG, Project Implementing sector
B. Urnaa	Engineer of the Project Implementing sector	USUG, Project Implementing sector

**B. JICA Survey Team**

Yoshiharu Matsumoto	Chief Engineer	JICA Survey Team
Masaki Ishii	Deputy Chief Engineer/ Facility Designer I	JICA Survey Team
Teruo Tahara	Groundwater Development Engineer	JICA Survey Team
Manabu Atsuchi	Water Supply Planner/ Mechanical and Electrical Engineer	JICA Survey Team
Fumio Kosaka	Construction Planner/	JICA Survey Team



	Cost Estimator	
Hideki Konno	Facility Designer 2/ Coordinator	JICA Survey Team
Bat-Angalan	Translator	JICA Survey Team



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**THE PREPARATORY SURVEY (BASIC DESIGN) ON THE ULAANBAATAR  
WATER SUPPLY DEVELOPMENT PROJECT IN GACHUURT IN MONGOLIA**

**TECHNICAL NOTE**

In the technical meetings held on 9th October attended by Water Supply and Sewerage Authority of Ulaanbaatar City (USUG) and the Preparatory Survey Team (the Team), the basic conditions for the planning and design of Regulation Reservoir, Transmission Main Pipe, Collection Pipes, Production Well, Chlorination house and Control House were discussed. A list of attendance is shown in Attached 1. The following design conditions were agreed on the basis of the said meeting. The Team stated that the agreed design conditions are tentative and that the final decision will be made after further analysis in Japan in consultation with JICA headquarters and concerned parties. USUG members reached to understand it.

**DESIGN FEATURES AND CONDITIONS AGREED BETWEEN USUG AND THE TEAM**

**1. The Basic Design Features for Water Supply**

As for the water supply, the following items are set as the design features:

- Target Year
- Target Water Supply Areas
- Target Unit Water Consumption for Apartment and Ger Areas
- Water Supply Amount

**1-1. Target Year**

**1) Expected Correspond Year for Present Water Supply Capacity and Water Demand**

As pointed out in the request form for JICA Grant Aid, the present water supply capacity of USUG is 240,000m<sup>3</sup>/day. On the other hand, water demand in Ulaanbaatar City has been increasing and expected to reach the water supply capacity in 2011. (Refer to Table 1 and Fig. 3)

**2) Target Year**

The target year is set in 2014 considering the following conditions.

The grant aid project, in principle, is conducted to cope with the emergency condition for water supply in Ulaanbaatar. The requested water development amount is 25,200m<sup>3</sup>/day, which will meet the increase of the water demand for around three years, considering the population increase of about 40,000 person/year and unit water consumption of about 200L/person/day (200 L/day x 40,000 person x 3 years = 24,000 m<sup>3</sup>/day).

**1-2. Target Water Supply Areas**

The target areas for water supply covers the following 7 districts: Bayngol, Bayanzurkh, Nalaikha, Songino Khairhan, Suhbaatar, Chingeltei, and Khan uul. Baganuur and Bagakhangai, which are located far from the core of Ulaanbaatar City more than 90km, are excluded from the target water supply areas in this project.

**1-3. Target Unit Water Consumption**

As the target unit water consumption for apartment areas, which are largely related to water supply demand in Ulaanbaatar City, the following amount is set together with that of Ger areas:

**1) Unit Water Consumption for Apartment Areas**

The unit water consumption for these several years is shown in Fig. 1. As noticed from the figure, unit water consumption for apartment areas tends to decrease from 1999 until 2006. However, the



tendency seems to be changed for these two years as identified from the values of 234L/day in 2007 and 232L/day in 2008. Since it may difficult to prospect the remarkable change for a while until the target year, the amount of 230L/day is applied in this project.

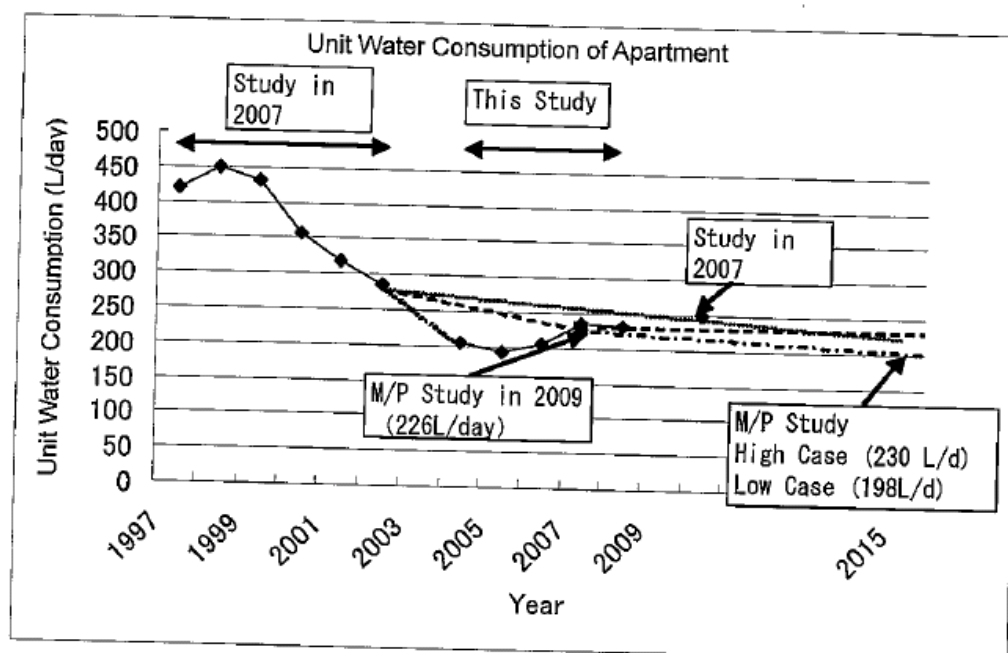


Fig.1 Unit Water Consumption of Apartment

## 2) Unit Water Consumption for Ger Areas

In case of the Ger areas, the unit water consumption has been fluctuating between 6L/day and 8L/day for these five years (2004-2008). However, the water supply system improvement project in Ger areas has been promoted by financing of World Bank and the effect can be expected to gradually emerge soon. In this study, it is assumed that the value of unit water consumption will gradually increase by linear up to 25L/day in 2014, which is adopted as the target value for the Ger areas.

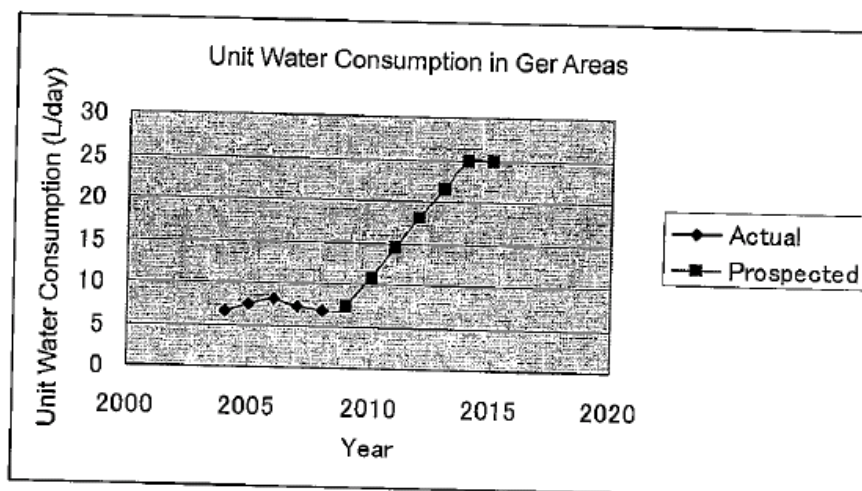


Fig.2 Unit Water Consumption in Ger Areas

## 1-4. Water Supply Amount

Water supply amount until the target year of 2014 is calculated applying the future population in the target water supply areas and the above unit water consumption as well as the other water demand for

private enterprise, public utilities and industrial factories.  
The water supply amount is shown in Table 1 and Fig. 3.

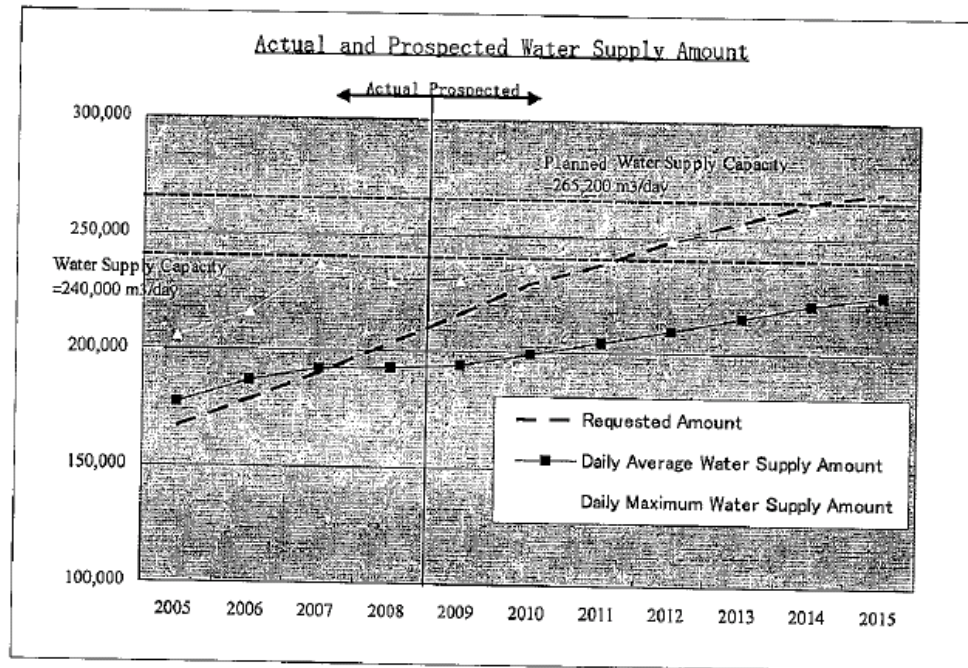


Fig. 3 Actual and Prospected Water Supply Amount

#### 1-5. Newly Developed Water Amount in this Project

The newly developed water amount in this project is 25,200m³/day, which is the difference between the present water supply capacity of 240,000m³/day and planned water supply capacity of 265,200m³/day.

$$: (262,861 - 240,000) \times 110\% = 25,147 \approx 25,200$$

#### 1-6. Confirmation of Data provided by USUG

We received several data on water supply in Ulaanbaatar city by USUG. There are some difference in the figures on the data from the previous study; Master Plan Study in 2009 (Refer to Table 2) Regarding this, we would like to utilize the data given from USUG in this study period as the renewal ones. If there is any comment on the figure, please provide us.

#### 2. Confirmation of the Relation between This Project and World Bank Project

It is understood that this project is duly related to the on-going World Bank Project for improvement of Ulaanbaatar living conditions. In this connection, the confirmation of the following conditions is needed (refer to Table 3):

- The water supply network connected from the North-East Reservoir
- The target areas for water supply by world bank network
- The beneficiaries of the target areas
- Utilization of Excess Water in the North-East Reservoir
- Other related water supply system improvement by World Bank Project
- Future Water Supply Plan from the North-East Reservoir



**Table 3 Network connected from North-East Reservoir**

	Connected Reservoir	Installation		Beneficial Area	Population of Ger Areas	Financing Source
		Reservoir	Pipeline			
North-East Reservoir	Tasgan	Existing	Existing	Hailast	-	-
	Chingeltei	Completed	Completed	Chingeltei	-	World Bank
	Dambadarjaa	Future Plan	On-going	Dambadarjaa	-	Pipeline by W/B
	-	-	On-going	Dai Ekh	-	Pipeline by W/B
	-	-	-	Tsaiz, Sharhad*	-	Not confirmed
*: Future Plan						

**2-1. Water Supply Network connected from the North-East Reservoir**

In principle, the water supply network connected from the North-East Reservoir is the main concern on this grant aid project. In this connection, to which reservoir and pipelines does the North-East Reservoirs are connected? And among the network, which parts are implemented by the World Bank Project?

According to Master Plan report prepared by World Bank in 2006, it is proposed that connection pipe would be newly installed between North-East Reservoir and 3/4 Reservoir. Was this plan canceled or not?

**2-2. The target areas for water supply by World Bank network**

How are the target areas for water supply by the network and among them which are undertaken by World Bank Project?

**2-3. The beneficiaries of the target areas**

It is understood that the major beneficiaries for the target areas are people living in Ger Areas. Is it correct?

If so, how is the number of beneficiaries (population of the Ger Areas)?

According to the water supply network from the North-East Reservoir, the beneficial districts are Sukhbaatar and Chingeltei. The population of these districts are shown in the following table. Can we regard people living in these districts as the beneficiaries or can you provide us more detailed information?

Table 4 Number of Beneficiaries			
Name of District	Population		
	Apartment	Ger Area	Total
Sukhbaatar	59,900	73,208	133,108
Chingeltei	28,984	111,035	140,019
Total	88,884	184,243	273,127
Source: Statistical Handbook 2006 and 2007			

**2-4. Utilization of Excess Water in the North-East Reservoir**

It is considered that 25,200 m<sup>3</sup>/day may be more than enough to cover the population of the target Ger Areas. In that case, the excess water will be used to apartment areas through Tasgan reservoir. Is it correct?

**2-5. Other related water supply system improvement by World Bank Project**

Originally, the World Bank Project expects to use the water in the North-East Reservoir supplied from the upper source, but it was changed to use the water from the new water source of Nalaikh. Then the water from the upper source will be supplied to Bayangol Areas. Is it correct?

## 2-6. Future Water Supply Plan from the North-East Reservoir

As the future water supply plan, it is informed that the water of the North-East will be supplied to the Ger Areas of Tsaiz and Sharhad, although the financing source is not confirmed. Is it correct?

## 3. Codes, Standards, Guidelines and Manuals for Proposed Facility Design

The following codes, standards, guidelines and manuals are principally used in establishing design conditions of structures:

### 1) Japanese publications

- Design criteria for waterworks facilities, Japan Water Works Association, 2000
- Water supply pump manual, Japan Water Works Association, 1992
- Land improvement project planning and design standard "Pipeline", Ministry of Agriculture, Forestry and Fisheries, 1997
- Specification for highway bridges "Concrete bridges", "Substructures", Japan Road Association, 2002
- Guideline for pavement design and construction, Japan Road Association, 2006
- Standard specifications for concrete structures, Japan Society of Civil Engineers, 2007
- Standard for structural calculation of reinforced concrete structures, Architectural Institute of Japan, 1999
- Technical guideline for water management and control system "Planning and design", Ministry of Agriculture, Forestry and Fisheries, 2002

### 2) Mongolian publications

- Urban cadastre of Mongolia, Ministry of Roads, Transportation, Construction and Urban Development, 2007
- Design and installation of polymeric pipelines for water supply and sewage systems, National Center of Construction, Urban Development and Public Utilities, 2006
- Water supply outside network and facilities, Ministry of Roads, Transportation, Construction and Urban Development, 2006
- Norms on construction drawing at seismic zones of Mongolia, 2006, 2007
- Heating, ventilation and conditioning, Ministry of Infrastructure, 2002
- Public and civil building, Ministry of Infrastructure, 2003
- Reinforced concrete pre cast structured, Ministry of Roads, Transportation, Construction and Urban Development, 2005
- Fire precaution norm of construction designs drawings, Ministry of Roads, Transportation, Construction and Urban Development, 2002
- Building for administration and utility premises, Ministry of infrastructure, 2003

## 4. Planning and Design of Gachuurt Regulation Reservoir

### 4-1. Location

The Gachuurt Regulation Reservoir is proposed to store, regulate and disinfect the ground water extracted from the proposed production wells. Its location is proposed at the hillside owned by the Ulaanbaatar City to about 300m east from the edge of Gachuurt residential area, whose altitude is about 1415m, in consequence of the field survey regarding the circumference geographical feature, the geological feature for the structural foundation and the hydraulic condition of the transmission main pipe in order to secure the required volume of water to be conveyed by gravity to the North-East Regulation Reservoir located in the northern hillside of downtown Ulaanbaatar City.

#### 4-2. Proposed Design

##### 1) Capacity

The capacity of the Gachuurt Regulation Reservoir is set to 8,000m<sup>3</sup> (4,000m<sup>3</sup> x 2 tanks), which deducts 6,000m<sup>3</sup> of the capacity of the North-East Regulation Reservoir from 14,000m<sup>3</sup> as 12 hour regulating capacity of the design daily supply, in consideration of 10% margin for the future expansion.

##### 2) Effective Water Depth and Water Level

Effective water depth is set to 4.0m in consideration of the precedence of the other regulation reservoirs built by the USUG.

LWL: 1415.0m (15cm is raised from the invert level of 1414.85m considering sedimentation volume)

HWL: 1419.0m (1415.0m + 4.0m =1419.0m)

##### 3) Structure

Flat slab reinforced concrete structure is proposed.

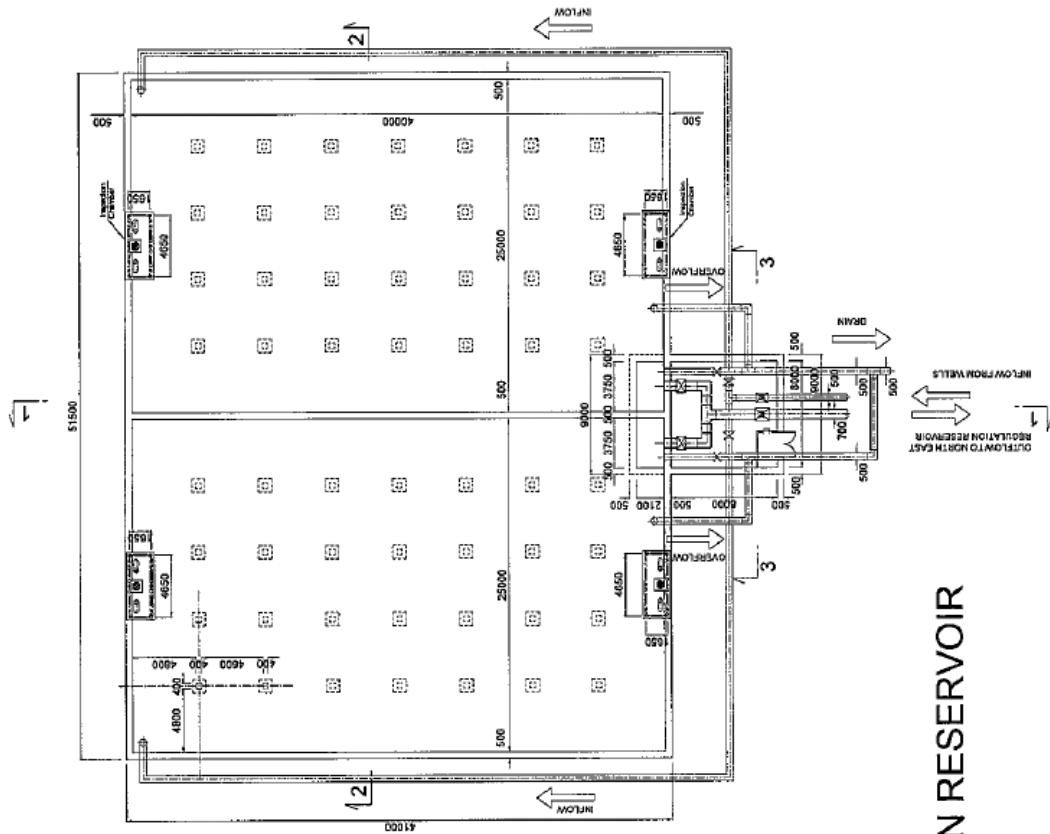
##### 4) Design Features

The preliminary design features of Regulation Reservoir are given as follows:

**Table 5 Design Features of the Gachuurt Regulation Reservoir**

Item		Design Features
Outer Size	Reservoir tank	L*W*H=41.0m*51.5m*5.25m
	Valve room	L*W*H=8.5m*9.0m*8.0m
Inlet pipe		φ500mm is connected at HWL
Outlet pipe		φ700mm is discharged out from the pits.
Drain pipe		φ500mm is drained into Tuul river.
Overflow pipe		φ500mm is installed at HWL.
Inspection chambers		φ600mm of manhole ×4 are provided for the entrance to the tanks.
Ventilators		φ350mm×8 are provided in the inspection chambers
Valves		Gate valves are provided at the inlet pipes and drain pipes. Butterfly valves are provided at the outlet pipes.
Water level gauge and flow meters		Water level gauges are provided in each tanks. Electromagnetic flow meters are provided at both pipes of the inlet and the outlet.
Freezing prevention and waterproof works		Embankment of 1:2 slope covers the side walls. Asphalt roofing and thermal insulation are provided at the top slab.

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PLAN OF  
GACHUURT REGULATION RESERVOIR  
 $V=4000 \times 2=8000 \text{m}^3$

Fig.4 Plan of Gachuurt Regulation Reservoir





## 5. Planning and Design of Transmission Main Pipe

### 5-1. Route

The Transmission Main Pipe is selected with the route minimizing the negative impacts to the social environment such as traffic jam, land acquisition and house relocation, etc. The pipe starts from the proposed Gachuurt Regulation Reservoir. The pipe comes behind Hotel Mongolia through the floodplain confined by the bifurcation of the Tuul River, and then runs parallel with the sewage pipe alongside the Gachuurt road toward the west, and finally crosses the said road toward the north at the pylons. The pipe crosses the swamp area of the Uliastay River after passing through the ger area, and climbs up and downs the residential area to the B.Dori Street. After crossing the B.Dori Street, the pipe runs through the residential area and two army bases, and finally reaches the North-East Regulation Reservoir.

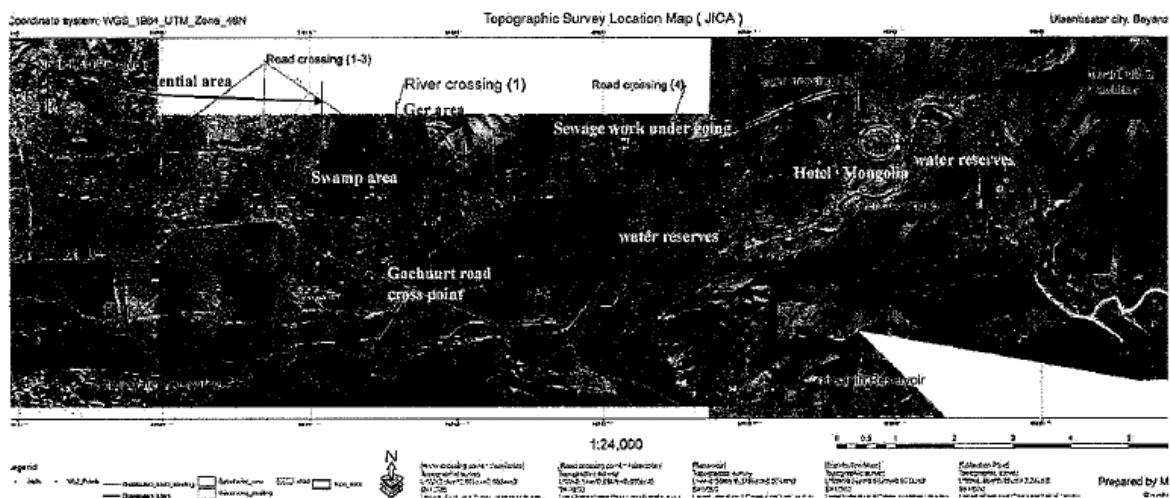


Fig.6 Route of Transmission Main Pipe

### 5-2. Proposed Design

#### 1) Laying location of pipes

The pipes are fundamentally laid at the center of the road. In case that an open cut width is securable, the open cut method will be applied. On the other hand, in case that open cut width is not securable, a sheet pile method will be applied. The distance between the sewage pipe alongside the Gachuurt road and the proposed Transmission Main Pipes is secured to be 10m. However, in case that such a distance is not available, the distance will be allowed to minimally 5m. The temporally demolished fences during the construction shall be recovered.

#### 2) Laying depth of pipes

The laying depth of the pipes is more than freezing depth, and secures 3.5m of overburden from the pipe center.

#### 3) Pipe material

At the sections of higher water pressure than  $13.0\text{kg/cm}^2$  (130m), ductile cast iron pipes: DCI (ISO K-9 or equivalent) are employed. At the other sections, fiber reinforced plastic mortar pipes: FRPM (JIS A 5350 Type1 or equivalent) are employed.

#### 4) Pipe diameter

From the hydraulic calculation, the pipe diameter from the Gachuurt Regulation Reservoir to the

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North-East Regulation Reservoir is all the way  $\phi 700\text{mm}$ .

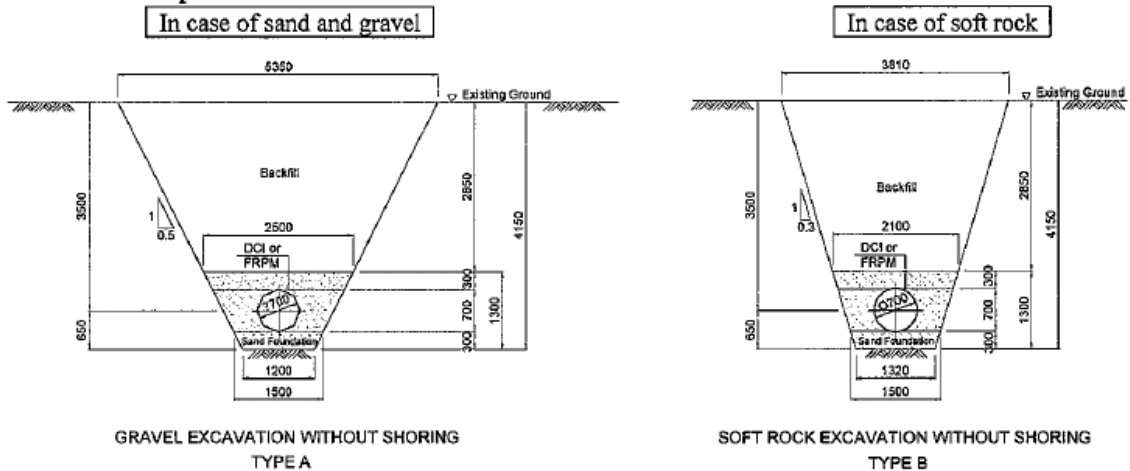
##### 5) Foundation work of pipes

The 30cm-thick foundation is provided with sand or good-quality soil in the lower and upper side of the pipes for the protection from larger boulder mixing in the original ground. The other portion is backfilled with the original ground materials.

##### 6) Trench excavation width

Open cut method is applied in case the present road width is more than that required for open cut. The excavation gradient and excavation width will change depends on soil material. The excavation width at the bottom is set to 1.5m.

##### < In case of open cut method >



In case it is impossible to secure the excavation width for the open cut method because of the existence of houses or other structures, a sheet pile method is applied. The excavation width is set to 1.8m.

##### < In case of sheet pile method >

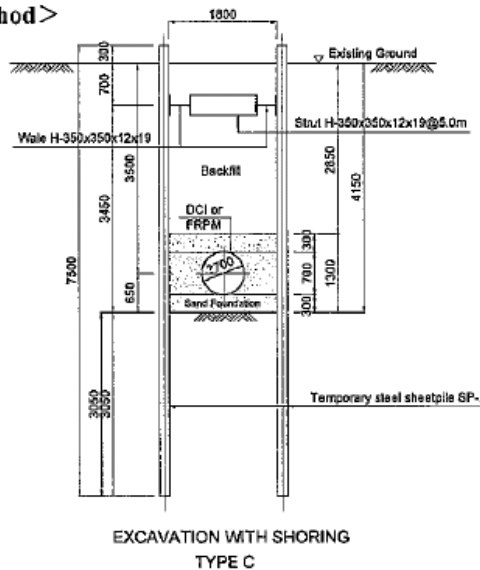


Fig.7 Typical cross section of Transmission Main Pipe laying

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### 7) Attached installation

The following appurtenant facilities are provided.

Gate valves: about every 2km

Air valves: at convex points of the geographical feature.

Blowoffs: at concave points of the geographical feature.

Thrust blocks: at bends where the thrust is greater than the resistance acting on the pipes

## 6. Planning and Design of Collection Pipes

### 6-1. Purpose

The Collection Pipes are provided to connect the proposed 21 units of the production wells with one another and convey the extracted ground water to the Gachuurt Regulation Reservoir.

### 6-2. Alignment

The Collection Pipes are composed of the parallel pipes connecting the production wells.

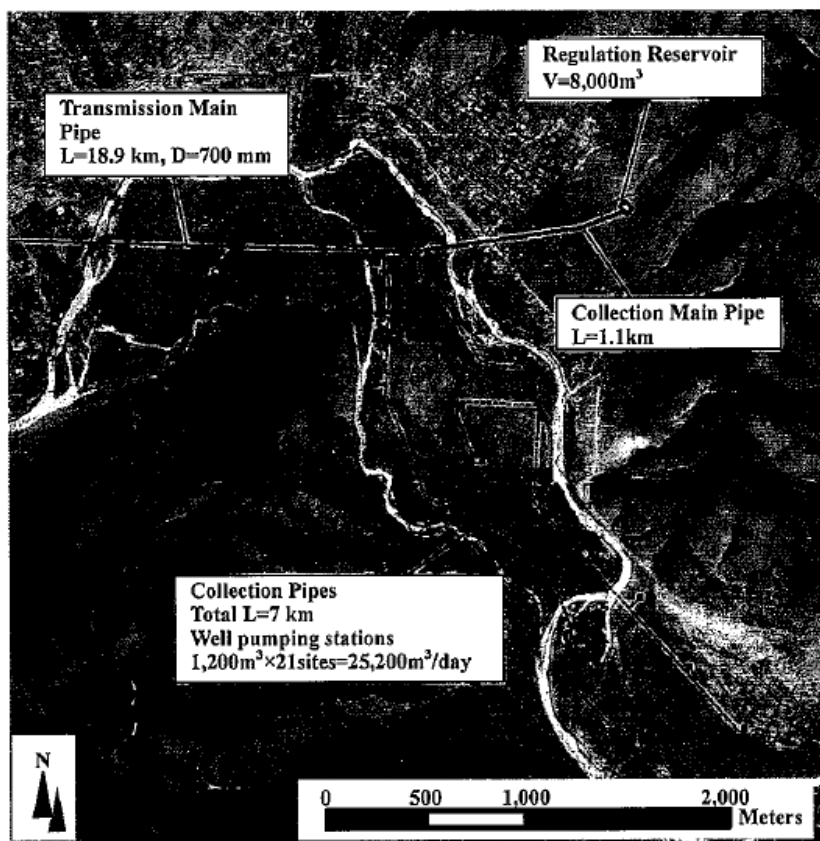


Fig.8 Plain alignment of collection pipes

### 6-3. Basic Design

#### 1) Laying location of pipes

The laying depth of the pipes is more than freezing depth, and secures 3.5m of overburden from the pipe center even including the embankment over the pipes. In principle, 2.0m high service road is proposed over the pipes in order to avoid probable flood damage of the Tuul River.

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## **2) Pipe material**

Ductile cast iron pipe (DCI ISO K-9 or equivalent) will be employed in order to tolerate higher dynamic water pressure and water-hammer pressure generated inside the pipes.

## **3) Pipe diameter**

Pipe diameter will be determined in order to be a cost-effective velocity. The diameter of collection pipes will be  $\phi 150$  to  $\phi 400$ mm and that of the collection main pipe will be about  $\phi 500$ mm.

## **4) Foundation work**

The 30cm-thick foundation is provided with sand or good-quality soil in the lower and upper side of the pipes. The other portion is backfilled with the original ground materials.

# **7. Design of Chlorination and Operation House**

## **7-1. Purpose**

The Chlorination and Operation House is proposed to accommodate the chlorination equipment, which is provided to disinfect the extracted raw ground water, and the integrated tele-metric & control equipment, which is to manage on-off of the well pumps and the dose of the disinfectant chlorine in accordance with the water levels or inflow discharge of the Regulation Reservoirs of Gachuurt and North-East.

## **7-2. Location**

The Chlorination and Operation house will be located in the proximity of the Gachuurt Regulation Reservoir.

## **7-3. Proposed Design**

### **1) Disinfectant chlorine to be applied**

Disinfectant for the raw ground water is composed of liquid chlorine ( $\text{Cl}_2$ ), calcium hypochlorite ( $\text{CaCl}_2\text{O}$ ) and sodium hypochlorite ( $\text{NaClO}$ ).

Although liquid chlorine is principally used for disinfecting the raw ground water even in Ulaanbaatar, the import of liquid chlorine and calcium hypochlorite from China is rumored to discontinue.

### **2) Dose to be injected**

0.2~0.3mg/l. is proposed according to the current USUG's disinfection rule.

### **3) Tele-metric & control system**

In principle, USUG suggested system will be employed.



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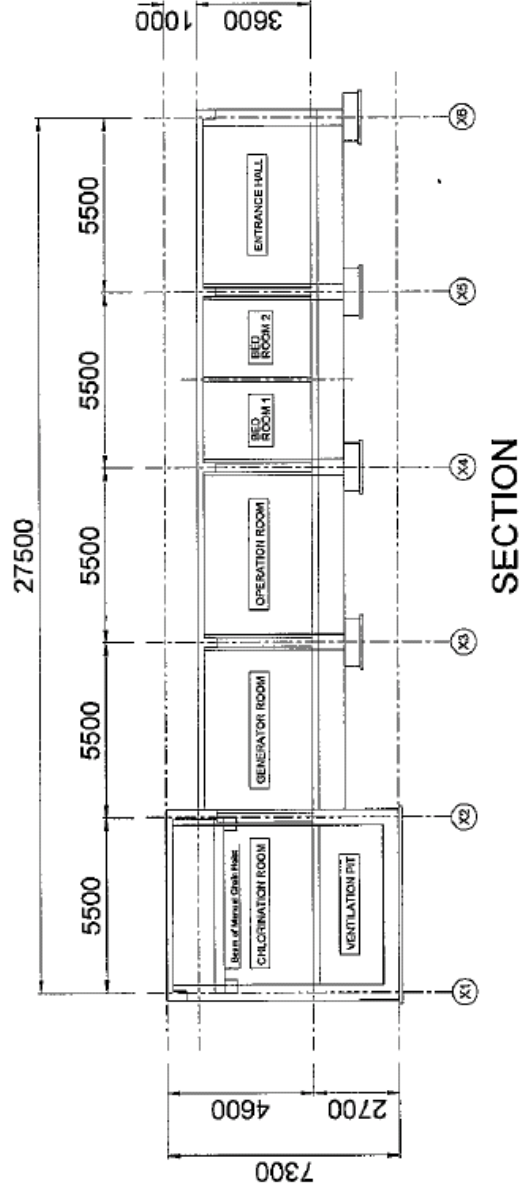
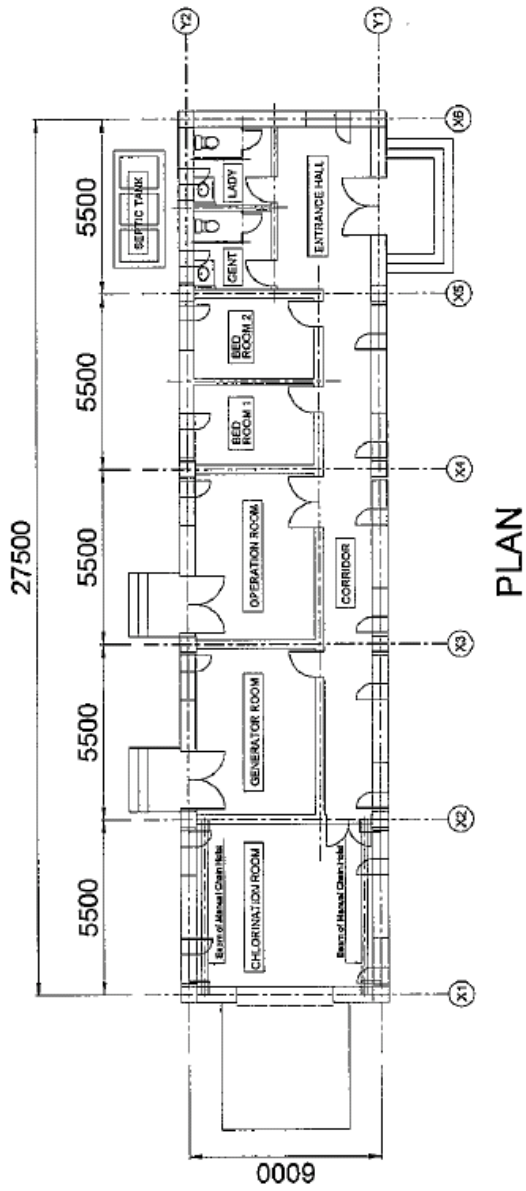


Fig.9 Chlorination and Operation house

## 8. Design of Production Well

### 8-1. Locations

Production Wells are provided at the floodplain in Gachuurt since the groundwater is abundant and the water quality is good, and it is suitable for construction of the Production Wells since the land development activities are prohibited as a water source area.

### 8-2. Proposed Design

#### 1) Well Depth

Well depth is assumed to be about 15m~30m.

#### 2) Well Interval

Well interval is assumed to be about 250m (to moderate the interference of the groundwater fall among the wells by keeping this interval).

#### 3) Well pump capacity

Well pump discharge quantity and output capacity is assumed as follows.

① Discharge quantity:  $0.83\text{m}^3/\text{min}$  ( $1,200\text{m}^3/\text{day}$ )

② Output capacity: 22kw~30kw

#### 4) The scale of pump house

Total 21 sites, Size of the house:  $L*W*H=8\text{m}*7\text{m}*8\text{m}$

#### 5) Casing diameter and drilling diameter

Casing diameter and drilling diameter is assumed to be 250mm and 400mm.

#### 6) Material of casing and type of screen

Material of casing is assumed to be stainless steel, and type of screen is wire winding V-slot screen (crevice spacing 1.0mm) .

#### 7) Screen length

Screen length is determined that the inflow velocity shall be less than 1.0cm/s.

#### 8) Other

A temporary access road, with drain pipes, across the river shall be provided during construction of the Production Wells. The river width will be coffered half with a cofferdam for a two stage construction.

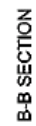
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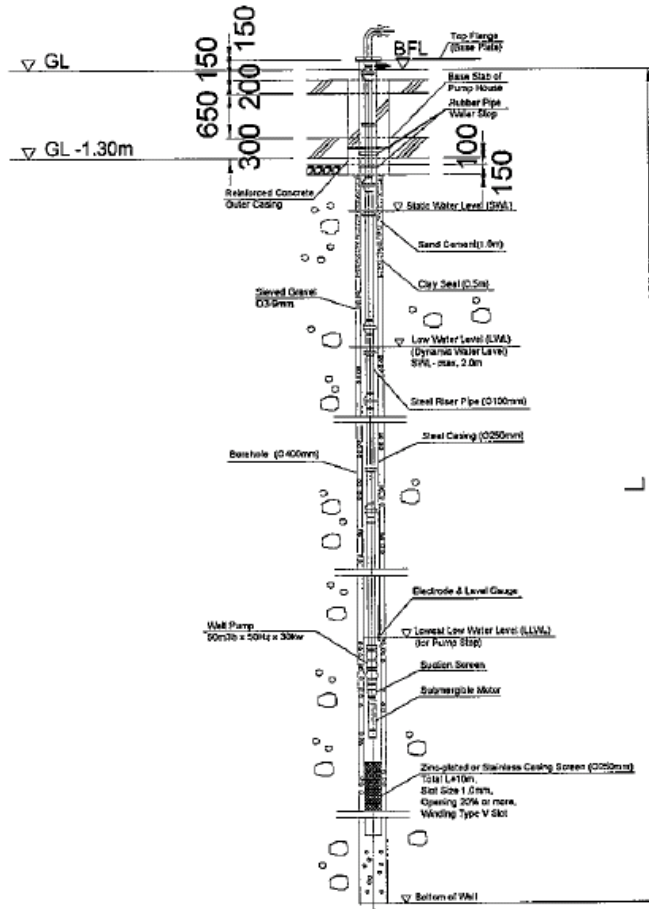
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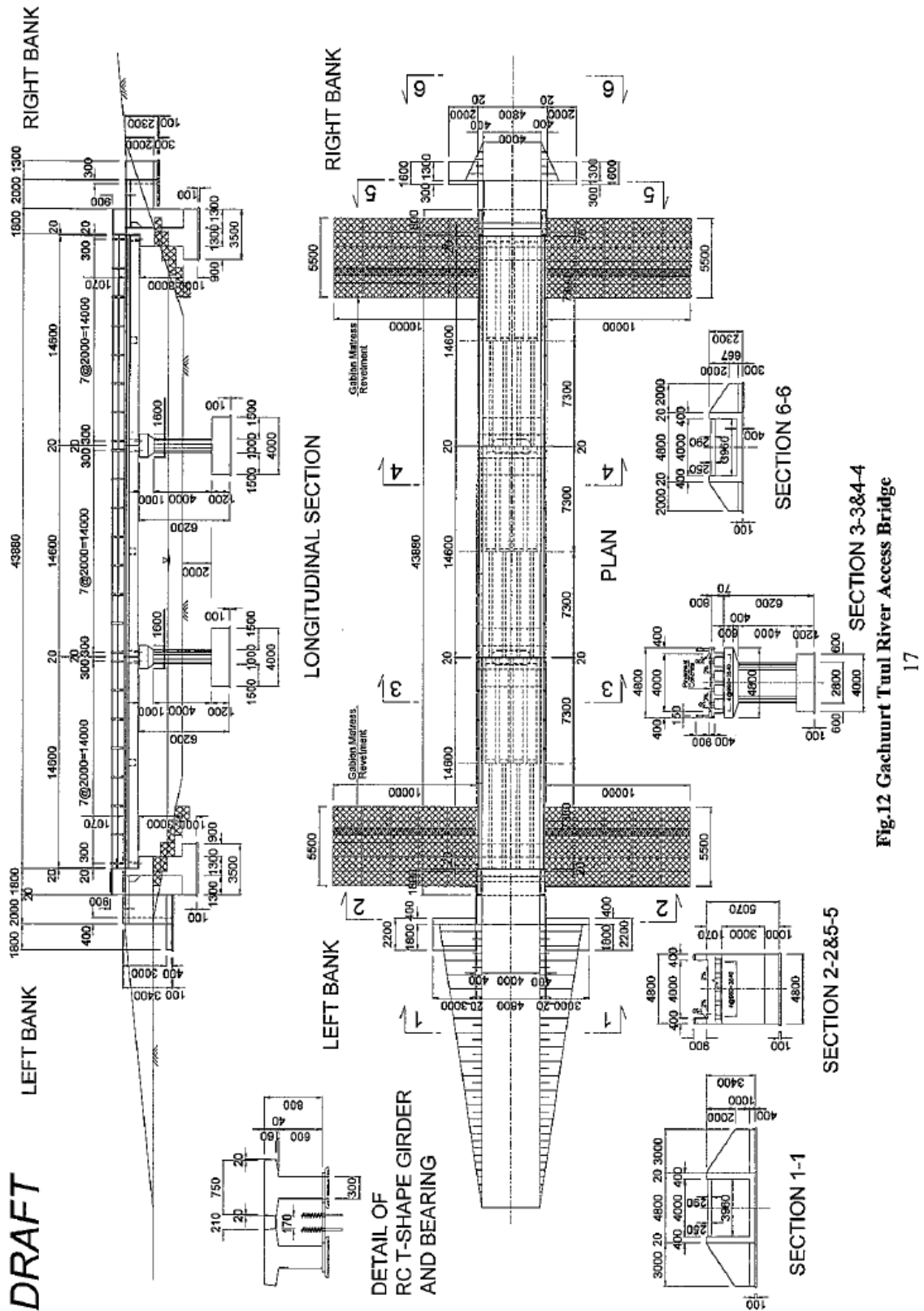
Type A: L=15m  
Type B: L=25m  
Type C: L=30m

**Fig.11 Typical Drawing of Production Well**

### 9. Other Structure

The access bridge across the Tuul River will be provided to access the well pump houses.

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## 10. Undertakings of the Mongolian Side

The following matters shall be burdened by the Mongolian side

- To regulate the activity of development and the necessary negotiation with the landowners in the involved lands of the Project in order to secure the lands for the facility construction related to the Project.
- To improve the existing inflow pipes to the North-East Regulation Reservoir in the event the said pipes result in any defect even by the proposed adequate use, since the Transmission Main Pipe is proposed to connect to the North-East Reservoir via the existing inflow pipe of  $\phi 600\text{mm}$ .
- To draw the electric power line with the required capacity to the proposed locations of the Well Pumps, the Regulation Reservoirs and the temporary construction yards. To enhance the power distribution capacity upto the required in the event the capacity is insufficient.
- To apply for a license of the frequency band of the radio for the proposed tele-metric & control facilities.
- To provide and maintain any exterior facilities such as fences and gates related to the Project.
- To provide free of cost a disposal area for the surplus soil and temporary construction yards for the storage of the construction materials and machineries during the construction period adjacent to the proposed facilities. Ulaan-Chuluut waste disposal site is so far requested.
- To issue permissions for the construction of the proposed facilities.
- To conduct immediately the necessary procedure in conformity with applicable laws in Mongolia in the event the environmental impact assessment is required in consequence of the initial environment examination.
- To take necessary measures to exempt the Contractor and the Consultant from customs duties, internal taxes and other fiscal levies which may be imposed in Mongolia with respect to the supply of the products, services, and equipment necessary for the Project.
- To take necessary measures to ensure prompt unloading and customs clearance at the points of disembarkation in Mongolia and internal transportation therein of the products purchased for the execution of the Project.

## 11. General item of design

### 11-1. Physical constant used for design calculation

#### 1) Unit weight of materials

Table 6 Unit weight of materials ( $\text{KN/m}^3$ ) { $\text{kgf/m}^3$ }

Material	Unit weight
Steel • Cast steel	77.0 {7,850}
Reinforced concrete	24.5 {2,500}
Ductile cast iron	70.1 {7,150}
Fiberglass reinforced plastic	19.6 {2,000}

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Plain concrete	23.0 {2,350}
Bituminous materials (for water proofing)	11.0 {1,100}
Asphalt pavement	22.5 {2,300}
Sand · Gravel · Crushed stone	18.6 {1,900}

## 2) Steel materials

**Table 7 Physical constant of steel materials ( $N/mm^2$ ){ $kgf/cm^2$ }**

Material	Unit weight
Young's modulus of steel and cast steel	$2.0 \times 10^5$ { $2.1 \times 10^6$ }
Linear expansion coefficient of steel	$12 \times 10^{-6}$
Poisson's ratio of steel and cast steel	0.30

## 3) Concrete

**Table 8 Young's modulus of concrete ( $N/mm^2$ ){ $kgf/cm^2$ }**

Design strength	21 {210}	24 {240}
Young's modulus	$2.35 \times 10^4$ { $2.35 \times 10^5$ }	$2.5 \times 10^4$ { $2.5 \times 10^5$ }

The linear expansion coefficient of the steel and concrete materials in a concrete structure is set to  $10 \times 10^{-6}$ . The Poisson's ratio of concrete is set to 0.2 within the elastic limits.

## 11-2. Seismic design

The inertia force during earthquake will be taken into consideration horizontally and the design horizontal seismic coefficient is set to  $K_h=0.1$ .

## 11-3. Allowable stress

### 1) Concrete

#### ① Design strength of concrete

**Table 9 The minimum design strength of concrete ( $N/mm^2$ ){ $kgf/cm^2$ }**

The kind of component	Minimum design strength
Plain concrete component	18 {180}
Reinforced concrete component	21 {210}

#### ② Allowable stress of concrete

**Table 10 Allowable stress of reinforced concrete ( $N/mm^2$ ){ $kgf/cm^2$ }**

Design strength of concrete ( $\sigma_{ck}$ )		21 {210}	24 {240}
The kind of stress			
Compressive stress	Bending compressive unit stress	7.0 {70}	8.0 {80}
	Axis compressive unit stress	5.5 {55}	6.5 {65}
Shearing stress	In case shearing stress is charged only with concrete. ( $\tau_{a1}$ )	0.22 {2.2}	0.23 {2.3}
	In case shearing stress is charged in collaboration with diagonal tension bar. ( $\tau_{a2}$ )	1.6 {16}	1.7 {17}
Adhesive stress	Deformed bar	1.4 {14}	1.6 {16}

**Table 11 Allowable stress of plain concrete ( $N/mm^2$ ) { $kgf/cm^2$ }**

The kind of stress	Allowable stress	Comment
Compressive stress	$\sigma_{ck}/4 \leq 5.5$ {55}	$\sigma_{ck}$ : Design strength of concrete
Shear failure	$\sigma_{ck}/80 \leq 0.3$ {3}	
Shearing stress	$\sigma_{ck}/100 + 0.15$ {1.5}	
Bearing stress	$0.3\sigma_{ck} \leq 6.0$ {60}	

**2) Used steel materials**

**① Standard steel materials etc.**

**Table 12 Standard steel materials (JIS)**

The kind of steel materials	Specification		Code of steel materials
Structural steel materials	JIS G 3101	Rolled steel materials for general structure	SS400
Steel sheet pile	JIS A 5523	Hot rolled steel sheet pile	SYW295, SYW390
Ductile cast iron pipe	JIS G 5526	Ductile cast iron pipe	FCD420
	JIS G 3527	Ductile cast iron deformed pipe	FCD420
Fiberglass reinforced plastic mortar pipe	JIS A 5350	Fiberglass reinforced plastic mortar pipe	-
Bar steel	JIS G 3112	Bar steel for reinforced concrete	SD295A

**② Allowable stress of structural steel materials and steel sheet pile**

**Table 13 Allowable stress of structural steel materials and steel sheet pile ( $N/mm^2$ ) { $kgf/cm^2$ }**

The kind of stress	Code of steel materials	Structural steel materials : SS400	Steel sheet pile : SY295
Tensile stress		140 {1,400}	180 {1,800}
Compressive stress		140 {1,400}	180 {1,800}
Shearing stress		80 {800}	100 {1,000}

**③ Bar steel for reinforced concrete**

**Table 14 Allowable stress of bar steel ( $N/mm^2$ ) { $kgf/cm^2$ }**

The kind of stress and component			The kind of bar steel	SD295A
Tensile stress	In case influence of impact load or an earthquake is not included in the combination of load	General component	180{1,800}	
		The component prepared in underwater or below the groundwater level	160{1,600}	
	The basic value in the case of including the influence of impact load or an earthquake in the combination of load		180{1,800}	
Compressive stress			180{1,800}	

**3) The premium of allowable stress**

**Table 15 The premium coefficient of allowable stress**

The combination of load		Premium coefficient
Primary load except live load and impact load + Influence of an earthquake (EQ)		1.5
Combination of	In case the stress at the time of completion becomes	1.5

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execution load (ER)	remarkably low	1.25
	In case the stress at the time of completion becomes comparable as allowable stress	

#### 11-4. Soil constant

##### 1) Unit weight of soil

Table 16 Unit weight of soil (wet state) (KN/m<sup>3</sup>) {tf/m<sup>3</sup>}

Kind of Soil	Unit weight
Sand and gravel	20 {2.0}
Sandy soil	19 {1.9}
Cohesive soil	18 {1.8}

##### 2) Cohesion and internal friction angle

###### ① Cohesion : c

- i) The cohesion of sandy soil and gravel soil is set to c=0 in a design.
- ii) In a soft cohesive soil, cohesion is set to  $c=q_u/2$  using the unconfined compression strength:  $q_u$  of undisturbed sample, or it is calculated using the following formula from N-value of a standard penetration test.  
 $c=(6\sim10)N \text{ (KN/m}^2\text{)} \quad [= (0.6\sim1.0)N \text{ {tf/m}^2\text{}}]$

###### ② Internal friction angle: $\phi$

- i) Internal friction angle of sandy soil and gravel soil is calculated from N-value of a standard penetration test using the following formula.  
 $\phi=15+\sqrt{15N} \leq 45^\circ, N>5$
- ii) The internal friction angle of cohesive soil is set to  $\phi=0$  in a design.

###### ③ Internal friction angle of backfill soil

Table 17 The soil constant used for earth pressure calculation

The kind of backfill soil	Internal friction angle ( $\phi$ )	Cohesion (c)* <sup>2</sup>
Gravel soil * <sup>1</sup>	35°	-
Sandy soil	30°	-
Cohesive soil ( $w_L < 50\%$ )	25°	-

\*1 : It is applied the value of gravel soil in case of pure sand.

\*2 : In case of presuming a soil constant from this table, the cohesion: c is disregarded.


##### 3) Horizontal foundation modulus

The relation between horizontal foundation modulus and N-value is expressed by the following formula.

$$K_H = 0.691N^{0.406} \text{ (kgf/cm}^3\text{)}$$

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Ulaanbaatar, October 9, 2009




**Mr. B. PUREVJAV Msc**  
**Director**  
**Water Supply and Sewerage Authority of**  
**Ulaanbaatar City**



**Mr. Yoshiharu Matsumoto**  
**Chief Engineer**  
**JICA Survey Team**



**Mr. B. BAATARKHUYAG**  
**Deputy Director – Chief Engineer**  
**Water Supply and Sewerage Authority of**  
**Ulaanbaatar City**



**Mr. SH. GANZORIG**  
**Chief of the Industrial and Technology sector**  
**Water Supply and Sewerage Authority of**  
**Ulaanbaatar City**





Table 1 Actual and Prospected Water Supply Amount

Item	Year	Unit	Actual												Prospected			
			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2020	2020	2020	2020
Population in Ulaanbaatar		Person	915,531	952,410	987,192	1,025,174	1,067,472	1,120,336	1,173,200	1,203,580	1,233,960	1,264,340	1,294,720	1,325,100	1,537,800			
Population in Water Supplied Areas		Person	887,204	923,373	957,634	995,341	1,037,853	1,072,261	1,109,587	1,146,914	1,184,241	1,221,567	1,258,894	1,296,220	1,482,853			
Population in Water Supplied Areas																		
[Apartment Areas]																		
Apartment(High, Middle and Low class)		Person	465,571	476,173	487,760	489,429	504,674	512,160	521,306	530,452	539,599	548,745	557,891	567,037	612,768			
[Ger Areas]																		
Detached with infra		Person	7,570	7,743	7,931	7,958	8,206	8,328	8,476	8,625	8,774	8,923	9,071	9,220	9,963			
Simple House w/o infra		Person	327,700	364,200	387,364	427,379	454,486	279,195	297,345	315,494	333,644	351,794	369,944	388,094	478,843			
Ger & Simple house w/o infra		Person						208,056	221,581	235,107	248,632	262,158	275,683	289,208	356,834			
Total		Person	800,841	848,116	883,055	924,766	967,366	1,007,739	1,048,708	1,089,678	1,130,649	1,171,620	1,212,589	1,253,559	1,458,408			
No. of House Hold	(4.3~4.5Person/house)	house	177,965	192,754	200,694	210,174	224,969	234,358	243,886	253,413	262,942	272,470	281,997	291,525	339,165			
Water Supply Unit	Apartment	L/Pers./day	204	190	206	234	232	230	230	230	230	230	230	230	230			
	Detached with infra	L/Pers./day																
	Simple House w/o infra	L/Pers./day	6.6	7.4	8.1	7.2	6.8	7.4	10.9	14.4	18.0	21.5	25.0	25.0	25.0			
	Ger & Simple house w/o infra	L/Pers./day																
Rate of Water Supply			90.3%	91.8%	92.2%	92.9%	93.2%	94.0%	94.5%	95.0%	95.5%	95.9%	96.3%	96.7%	98.4%			
(Water Consumption)																		
[Apartment Areas]																		
Apartment		m <sup>3</sup> /day	94,920	90,506	100,578	114,743	116,884	117,797	119,900	122,004	124,108	126,211	128,315	130,419	140,937			
[Ger Areas]																		
Detached with infra		m <sup>3</sup> /day	1,543	1,472	1,635	1,866	1,901	1,915	1,949	1,984	2,018	2,052	2,086	2,121	2,291			
Simple House w/o infra		m <sup>3</sup> /day	2,175	2,686	3,140	3,076	3,112	3,606	3,241	4,543	6,006	7,564	9,249	9,702	11,971			
Ger & Simple house w/o infra		m <sup>3</sup> /day							2,415	3,386	4,475	5,636	6,892	7,230	8,921			
Sub-total		m <sup>3</sup> /day	98,638	94,664	105,353	119,685	121,897	123,318	127,505	131,917	136,607	141,463	146,542	149,472	164,120			
Private Enterprises		m <sup>3</sup> /day	—	18,147	14,508	15,663	18,697	17,455	17,736	18,016	18,297	18,577	18,858	19,138	20,541			
Public Institutions		m <sup>3</sup> /day	—	14,523	10,616	10,759	11,477	11,730	11,730	11,730	11,730	11,730	11,730	11,730	11,730			
Industrial Factories		m <sup>3</sup> /day	—	11,811	11,681	9,211	9,617	10,580	10,580	10,580	10,580	10,580	10,580	10,580	10,580			
Sub-total		m <sup>3</sup> /day	—	44,481	36,805	35,633	39,791	39,765	40,046	40,326	40,607	40,887	41,168	41,448	42,851			
Total		m <sup>3</sup> /day	—	139,145	142,158	155,318	161,688	163,083	167,551	172,243	177,214	182,350	187,710	190,920	206,971			
Leak (Ineffective Water)		m <sup>3</sup> /day	41,096	38,082	44,658	36,849	30,932	31,272	31,772	32,273	32,805	33,372	33,934	34,115	36,524			
Daily Average Water Supply Amount		m <sup>3</sup> /day	—	177,227	186,816	192,167	192,620	194,355	199,323	204,516	210,019	215,722	221,644	225,035	243,495			
Daily Maximum Water Supply Amount		m <sup>3</sup> /day	—	206,006	215,922	236,834	229,994	230,497	236,389	242,547	249,074	255,837	262,861	266,882	288,775			
Rate of Water Consumption		%	—	78.51	76.10	80.82	83.94	83.91	84.06	84.22	84.38	84.53	84.69	84.84	85.00			
Rate of Loading		%	84.15	86.03	86.52	81.14	83.75	84.32	84.32	84.32	84.32	84.32	84.32	84.32	84.32			

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Table 2 Comparison of Basic Data among Previous Studies and This Study

Item	Details	PhaseII 2002	This Study 2002	M/P 2007	This Study 2007		
					USUG	OSNAAG	Total
Population of Ulaanbaatar							1,025,174
Population of Water Supply Area							995,341
Population	Apartment	(255,749)	280,594	(379,887)	265,256	224,173	489,429
	Detached with infra	(324,561)	327,700	(427,222)	7,958		435,337
	Simple House w/o infra				427,379		
	Ger & Simple house w/o infra	(580,310)	608,294	0			924,766
Water Supply Unit	Apartment Areas	287		230	(250)	(216)	(234)
	Ger Areas	5.7		7.2	(7.2)		(7.2)
Accounted-for Water:	Apartment	73,400	68,900	87,374	66,268	48,475	114,743
Domestic Water	Detached with infra				1,866		4,942
	Simple House w/o infra	1,850	1,784	3,076	3,076		
	Ger & Simple house w/o infra	75,250	70,684	90,450	71,210	48,475	119,685
Accounted-for Water:	Private Enterprise	15,700	11,474	11,178	11,178	4,485	15,663
Other purpose	Public Institutions	12,300	6,699	7,388	7,388	3,371	10,759
	Industrial Factories	9,170	9,025	6,364	6,364	2,847	9,211
	Sub-total	37,170	27,198	24,930	24,930	10,703	35,633
	Total	112,420	97,882	115,380	96,140	59,178	155,318
Leak (Ineffective Water)		41,135	54,521	38,937			36,849
Daily Average Water Supply		153,555	152,403	154,317			192,167
Daily Maximum Water Supply		(184,119)					236,834
Accounted-for water as percent of total			65.0				80.82
Rate of Loading		83.4	84.15				81.14

Figures in ( ) shows the estimated value by calculation

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