6 Alternatives Compared

(1) Alternative C-1

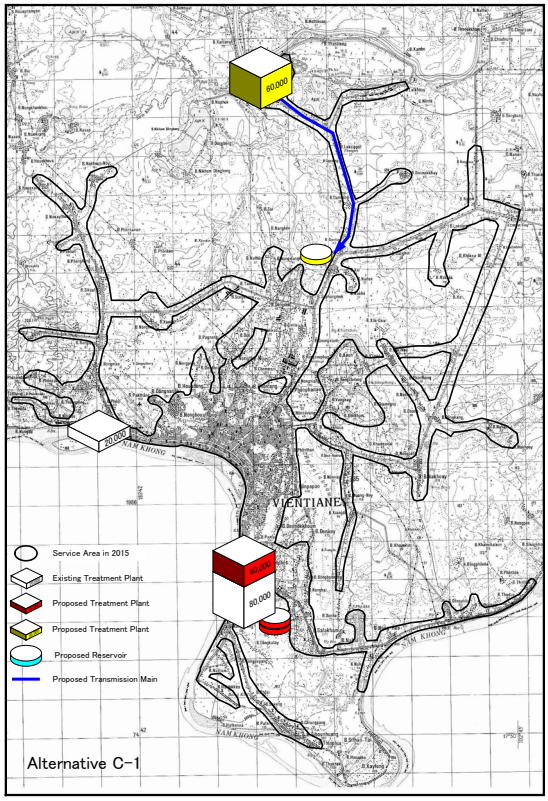
1) Intake and Treatment Plant

1st Stage (Expansion of the existing Chinaimo Water Treatment Plant, see Figure 4)

- Intake Facilities: Use of the existing intake structure, replacement of 4 of 6 existing pumps
- Treatment Plant: Expansion of 40,000 m3/day

2nd Stage (Construction of New Thangone Water Treatment Plant, see Figure 8)

- Intake Facilities: Construction of new intake facilities on the Nam Ngum River
- Treatment Plant: Construction of 60,000 m3/day



Expansion of 40,000 m3/day at the existing Chinaimo Treatment Plant for the 1st Stage and a new treatment plant of 60,000 m3/day at Thangone for the 2nd Stage are considerations for Alternative C-1. Treatment processes are planned to be the same as those at the existing Chinaimo Treatment Plant. For the expansion of the existing Chinaimo Treatment Plant during the 1st Stage, additional intake structures will not be required and only the replacement of intake pumps will be required. Figure 11 and Figure 12 show a plan of the treatment facilities, and a flow diagram for the expansion of 40,000 m3/day at the Chinaimo Treatment Plant for the 1st Stage. Figure 13 and Figure 14 show a plan of treatment facilities and a flow diagram for the expansion of 60,000 m3/day at Thangone Treatment Plant for the 2nd Stage. Detailed specifications of treatment facilities for Alternative C-1 are attached to Annex 14.

2) Pipelines

1st Stage

- Clear Water Transmission Pipelines: Installation of 2.2 km of pipelines
- Booster Pumping Stations: Improvement of the Km6 Booster Pumping Station
- Distribution Trunk Mains: Installation of 30.8 km of pipelines

2nd Stage

- Clear Water Transmission: Installation of 10.6 km of pipelines
- Distribution Centre: Construction of a new distribution centre for 60,000 m3/day
- Booster Pumping Stations: Improvement of the Km12 Booster Pumping Station
- Distribution Trunk Mains: Installation of 74.1 km of pipelines

Improvement of the Km6 booster pumping station (BPS) in the 1st Stage will be for securing the water supply to the northern part of Vientiane, especially the Dongdok area. The improvement will include replacement of the existing pumps with new larger capacity and higher head pumps and construction of a pump house. Improvement of Km12 BPS in the 2nd Stage will be mainly for the water supply to the new industrial area in the eastern part of the City.

For the 2nd Stage, clear water is to be transmitted from the new Thangone Treatment Plant to a distribution centre and from there, to consumers. The distribution centre is proposed to be constructed near the junction of National Roads 10 and 13 in the northern part of the city, near the Dongdok area.

Figure 15 shows the clear water transmission pipelines and distribution trunk mains required for Alternative C-1. These required pipelines are obtained from a hydraulic network analysis. The required pipeline length by pipeline diameter by stages are summarized in Figure 10.

Figure 10 Required Pipelines by Diameters for Alternative C-1

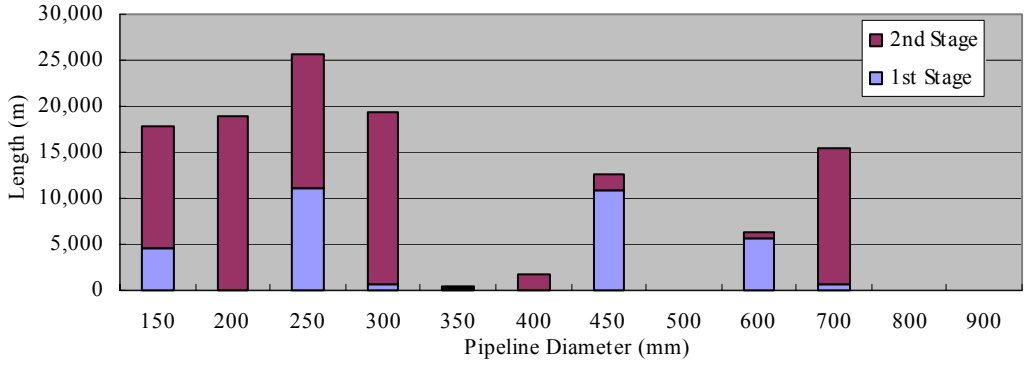


Figure 11 Plan of Treatment Facilities for Expansion of 40,000 m3/day at Chinaimo Treatment Plant

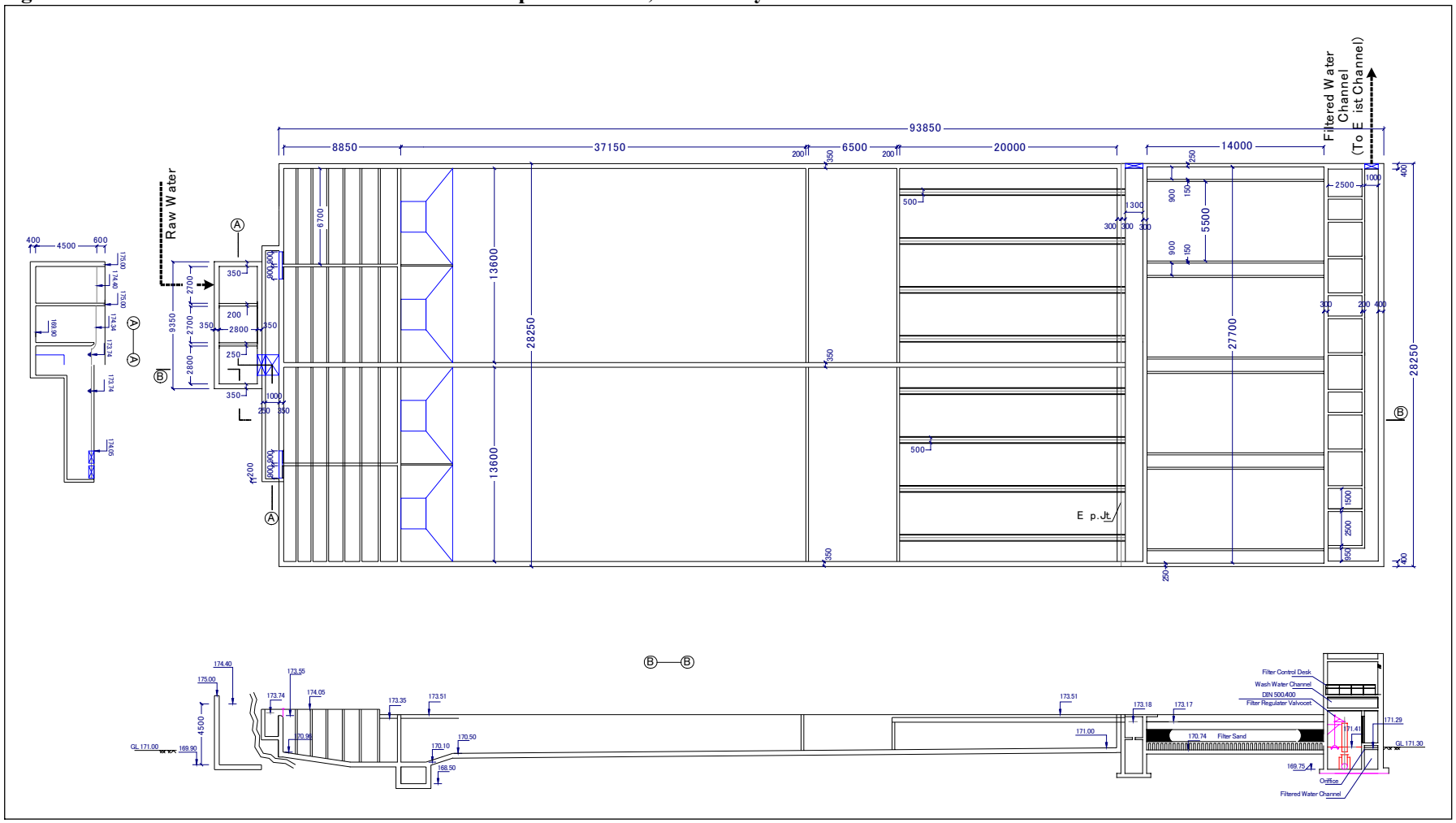


Figure 12 **Flow Diagram for Expansion of 40,000 m3/day at Chinaimo Treatment Plant**

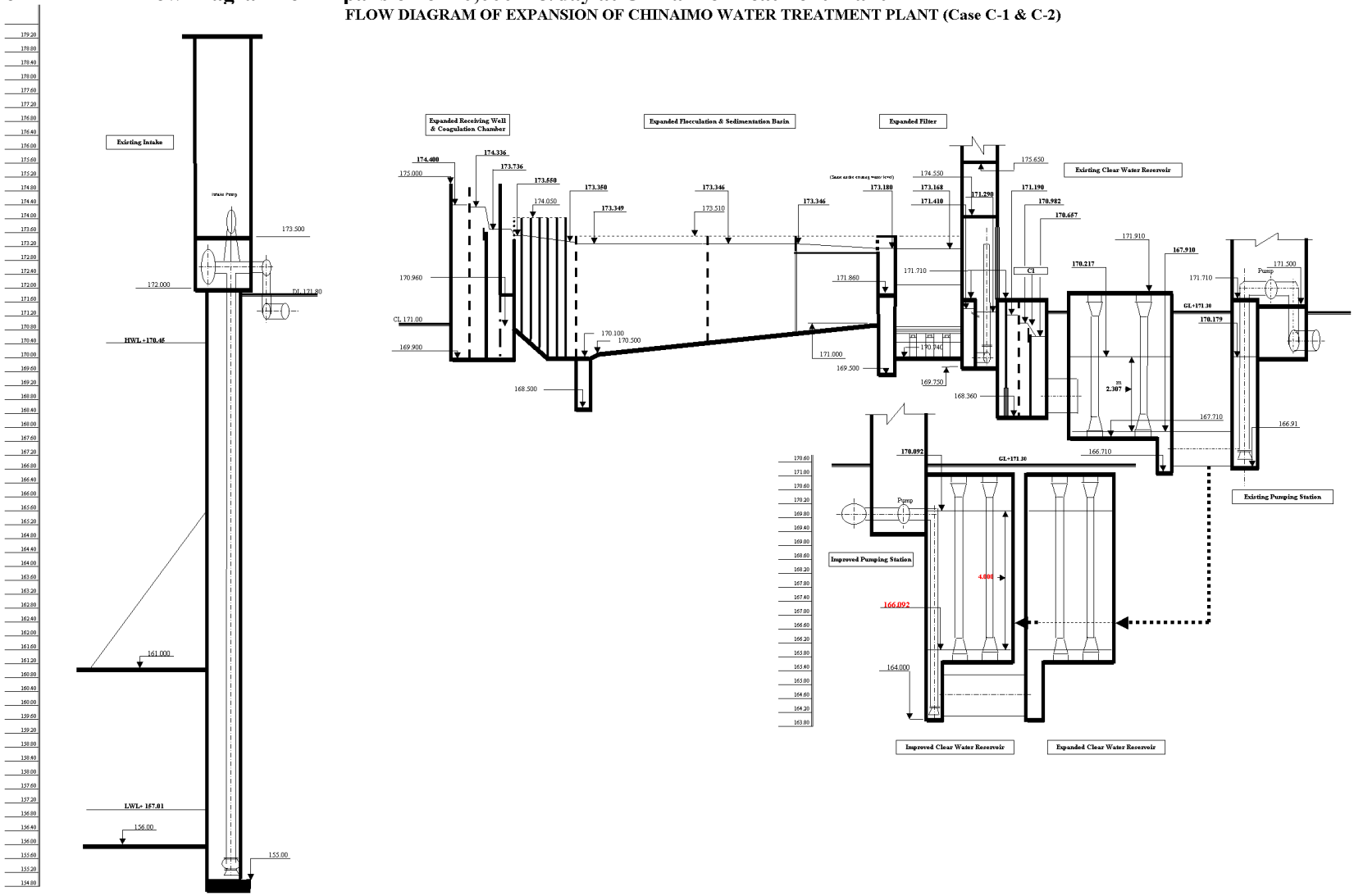


Figure 13 Plan of Treatment Facilities for the proposed Thangone Treatment Plant, 60,000 m3/day

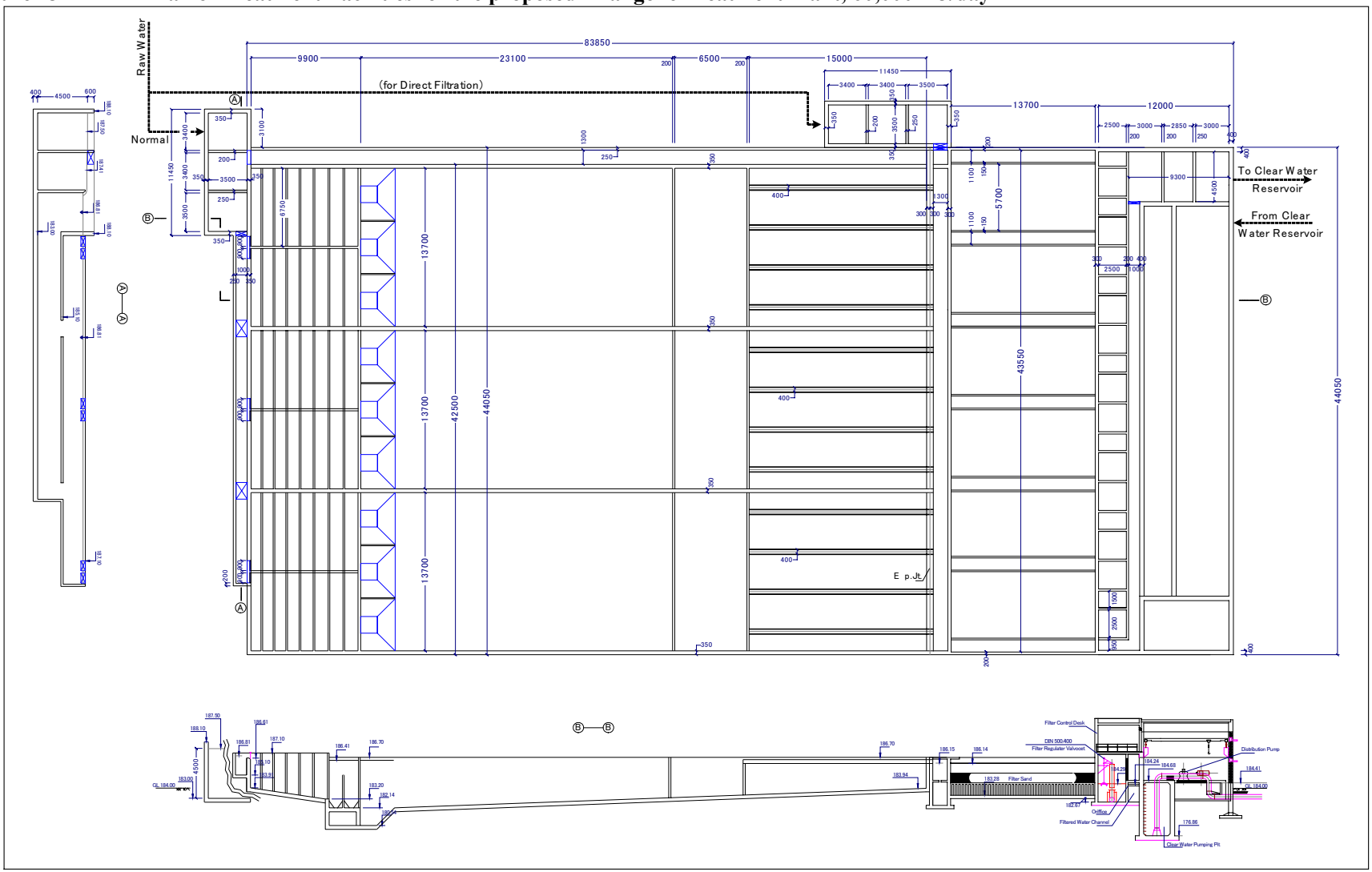


Figure 14 **Flow Diagram for the proposed Thangone Treatment Plant, 60,000 m3/day**

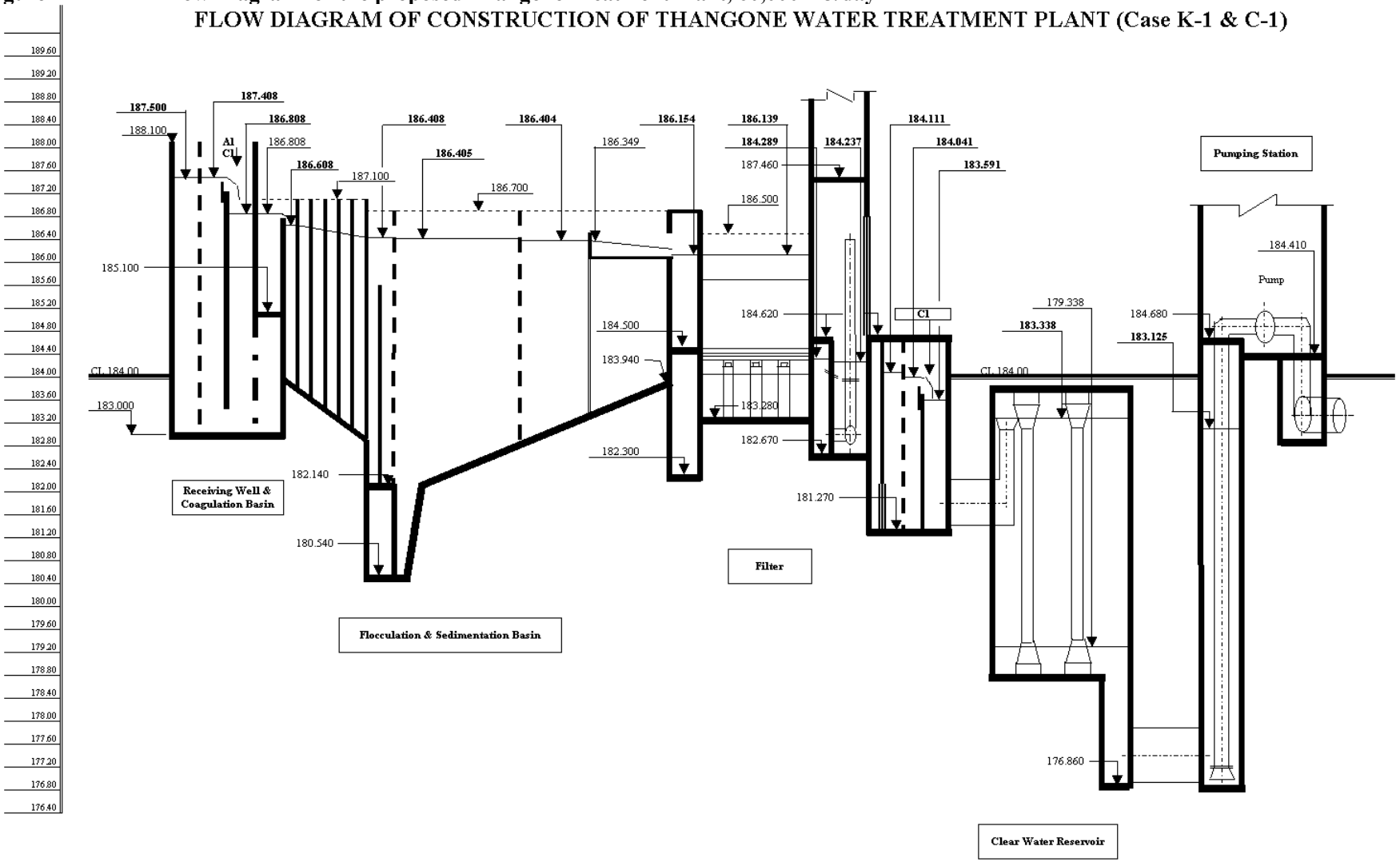
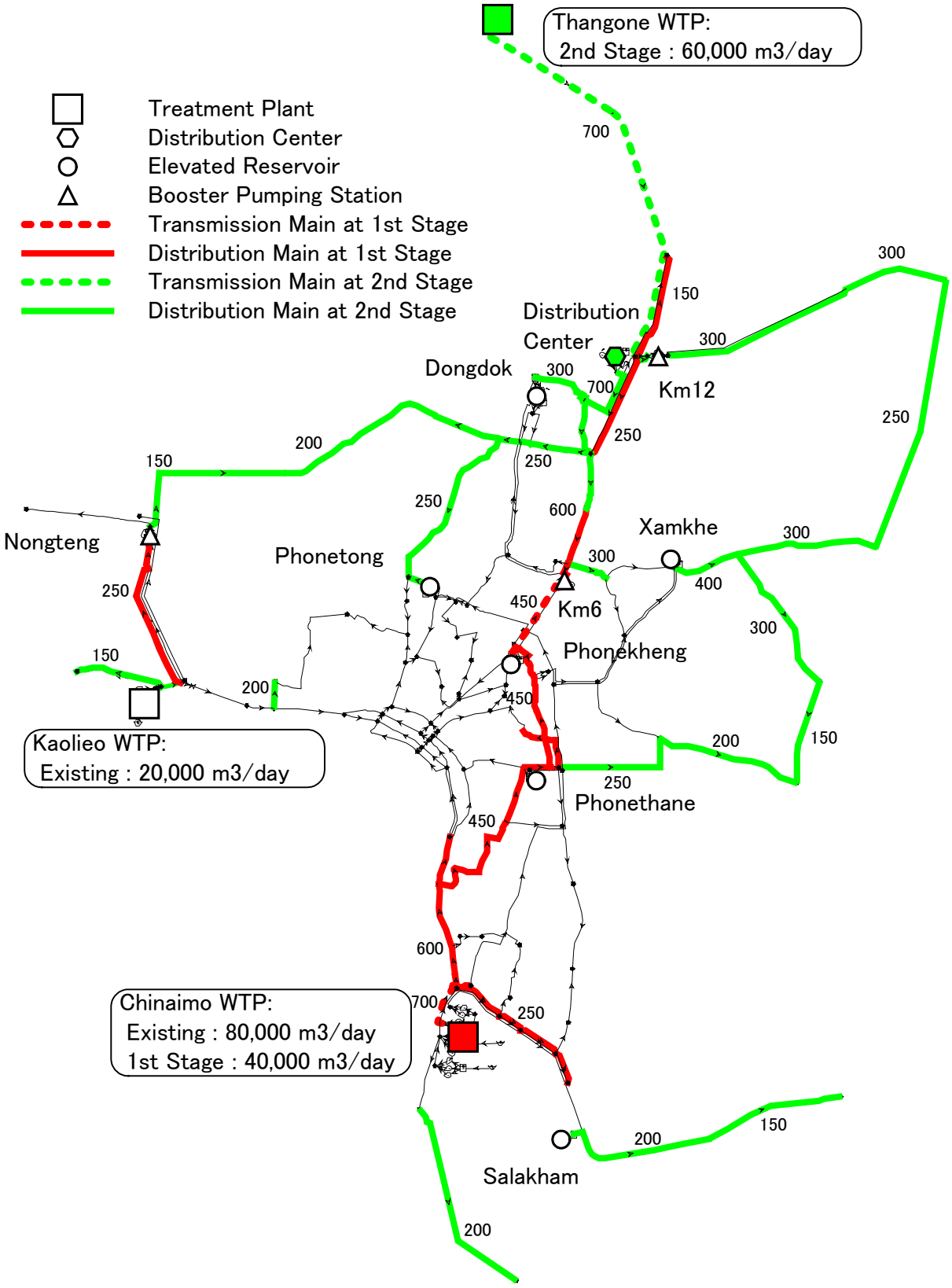


Figure 15 **Clear Water Transmission and Distribution Trunk Mains Required for Alternative C-1**



3) Costs (Construction, O/M)

Based on the results of facility planning as mentioned above for Alternative C-1, preliminary cost estimates have been conducted for the alternative comparison, and the results of these cost estimates are as shown in Table 4 in US Dollars. It should be noted that common costs for the following works are excluded from the costs of the alternative comparison.

- Rehabilitation of the existing Kaolieo Treatment Plant
- Separation of distribution and transmission systems of the existing Chinaimo Treatment Plant
- Installation costs of small diameter distribution pipelines, house connections
- Engineering costs, contingencies, administrative costs
- Annual operation and maintenance costs for the existing system

Table 4 Preliminary Cost Estimates for Alternative C-1

(x 1,000 US$)

Alternative C-1	Total	Foreign	Local
1. Construction Cost	56,514	39,297	17,217
1.1 Treatment Plants	22,209	14,257	7,952
Expansion of Chinaimo T.P.	8,782	5,564	3,218
Construction of Thangone T.P.	13,427	8,693	4,734
1.2 Clear Water Transmission Pipelines	7,930	6,535	1,395
For the 1st Stage	409	337	72
For the 2nd Stage	7,521	6,198	1,323
1.3 Distribution Center	4,376	2,984	1,392
For the 1st Stage	-	-	-
For the 2nd Stage	4,376	2,984	1,392
1.4 Booster Pump Station	1,103	901	202
For the 1st Stage	737	607	130
For the 2nd Stage	366	294	72
1.5 Distribution Trunk Mains	20,896	14,620	6,276
For the 1st Stage	8,802	6,490	2,312
For the 2nd Stage	12,094	8,130	3,964
2. Operation and Maintenance Cost	6,407	1,208	5,199
2.1 Electricity	5,067	-	5,067
Expanded Chinaimo T.P.	2,194	-	2,194
Thangone T.P.	1,030	-	1,030
Distribution Center	809	-	809
Booster Pump Station	1,034	-	1,034
2.2 Chemical Cost	1,208	1,208	-
Expanded Chinaimo T.P.	895	895	-
Alum	620	620	-
Polymer	18	18	-
Chlorine	257	257	-
Thangone T.P.	313	313	-
Alum	154	154	-
Chlorine	159	159	-
2.3 Salary	132	-	132
Treatment Plant	132	-	132
Expanded Chinaimo T.P.	36	-	36
Thangone T.P.	96	-	96
Total Costs	62,921	40,505	22,416