Attachment

Field Findings and Subjects of Construction

(1) Pak Ngum Station (Vientiane Province) / Lower reach of Nam Ngum River

Nam Ngum River at Pak Ngum Station

Slope Staff Gauge Site proposed by DMH

a) Construction of slope gauge station is proposed to upgrade flood-forecast activities in lower reach of the Nam Ngum River. Floods and/or inundation in agriculture land of lower reach have been caused by backwater of Mekong River. DMH needs to obtain critical high water level of Nam Ngum River near confluence point with Mekong River to make timely flood forecast. Existing staff gauge station is located near confluence point with Mekong River and its' river section is more than 200 m. Both riverbanks have been eroded severely. Access roads are paved and well maintained.

b) Concrete bridge of national highway-No.13 is located at Hai village located approximately 7-km upper stream from the existing staff gauge station. The bridge site has more stable river sections for measurement of river discharge.

c) Gradient of river course is very gentle in lower reach, and there is not much difference of water levels between the existing staff gauge station and the bridge site. It is recommended to select new station at the bridge site, taking into consideration convenient and easy operation and further upgrading observation such as measurement of river discharge, sampling of suspended and bed loads, etc using the bridge.

d) As for construction of slope gauge station at the bridge site, DMH should take more coordination and make mutual agreement/understandings with MCTCP and other agencies concerned before commencement of construction. Because these agencies have right of way concerned road and responsibility of maintenance works.

(2) Hat Pha Ot (Sopechek) Station (Luang Prabang Province) / Nam Xuang River

Upstream view from Nam Xuang slope G.S

Proposed site of rain gauge station at Sopechek village school

a) DMH has already selected Sopechek village site for new slope gauge station, but Nam Xuang River has a lot of bend and wide sections of the river. There are no suitable conditions of measurement of river discharge at the proposed section.

b) New section of slope staff gauge station has been selected near Hat Pha Ot village, which is located approximately 10-km upper stream from Sopechek village. Access road to Hat Pha Ot village has been maintained well.

c) Rain gauge station is selected at open space of Sopechek village school.

(3) Pak Ben Station (Oudomxay Province) / Mekong River

Mekong River at Ferry Port

Upstream View of Mekong River

Centerline of Slope Staff Gauge

Ladder of Ferry Port

a) Main current of Mekong River has run near ferry port area even during dry season. The proposed section of slope gauge station is located in down stream of the ferry port and within affection area of main current of river. It is better to change the proposed section to the weathered rock area located behind the ferry port.

b) New slope staff gauge station should be constructed using natural rock area taking into consideration strong water current of Mekong River in rainy season.

c) Rain gauge station was selected at open space near hilltop of the ferry port. District Governor also agreed the proposed site. DMH should take formal administration procedure through PAFSO of Oudomxay Province.

(4) Hongluay (Nam Tha) Station (Luang Nam Tha Province) / Nam Tha River

Upstream View of Nam Tha River

Downstream View of Nam Tha River

a) The originally proposed section of Hongluay slope gauge station is located in downstream of dam of the Luang Nam Tha irrigation and mini hydropower development project. However, taking into dam reservoir operation, it is better to strengthen hydrological data collection in upstream.

b) After field investigation of middle reach of the Nam Tha River, suitable sections were identified around Hongluay village.

(5) Xiengkok Station (Luang Nam Tha Province) / Mekong River

Downstream View of Mekong River at Ferry Port

Upstream View of Mekong River

Confluence Point with Nam Ma River

a) Site of slope gauge station was changed from originally proposed site to approximately 50-m upstream of Nam Ma River from confluence point with Mekong River. Because the originally proposed site is located near the ferry port, and main water current of river directly attacks the site. Main purpose of the slope gauge station is to observe water level of Mekong River for flood forecast. At newly selected site, water level has been always dominated by water level of Mekong River, but the selected site is not attacked by direct disturbance/influence/attacking of big river discharge during high water level. Furthermore, river sections of the selected site are covered weathered rocks.

b) On the other hand, the selected site has been covered by timber company project. However, Provincial and Central DMH have already negotiated land space for slope staff gauge station and obtained verbal agreement of the company project temporarily. DMH should make an arrangement of formal confirmation of land space as soon as possible through District Governor Office and PAFSO.

c) In line with arrangement of land space for construction of slope staff gauge station, DMH should make other arrangement on land space for construction of rain gauge station near ferry port together with District Governor Office and PAFSO.

(6) Phieng Luang Station (Xieng Khuang Province) / Nam Ngum River

Near Axis of Slope Staff Gauge

River Slope Conditions

Intake structure of water supply facility

Inside View of Water Supply Tower

a) Existing staff gauge has constructed near existing water supply facilities, which has not been used for long period but is still fine. The river has suitable sections to construct slope staff gauge in view points from river flow course and soils

characteristics of riverbank. It can be pointed out the possibility to utilize the existing water supply tower as some part of slope staff gauge station, but subjects to acceptance/approval of local Government.

b) Rain gauge station is located near the proposed site of slope staff gauge, and renewal of rain gauge equipment has been constructed under the grass root project of GOJ in 1998.

(7) Naluang Station (Xai Sonboung Special Zone) / Nam Ngum River

Upstream View of Slope Staff Gauge Station

View of Nam Ngum River at the Site

a) They have existing staff gauge station, which measures river discharge. PAFSO has prepared wire cable system for measuring of river discharge. Observation of river discharge has been carried out for more than 14 years at the same site. Therefore, it is recommended that new slope staff gauge station should be constructed to justify previous/past data on river discharge.

b) Alternative site of rain gauge station has been tentatively selected in village area, and DMH should take formal administration procedure of land space to village people.

(8) Attapeu Station (Attapeu Province) / Xe Kong River

View of Xe Kong River at Existing Staff Gauge

View of Slope Staff Gauge Station

a) Existing staff gauge station has wire-cable system to measure river discharge. But, river section to measure water discharge has not been technically confirmed yet on topographical maps.

b) Constraints and/or technical problems of construction of slope-staff gauge are not identified in the selected site.

c) It may be accepted to carry out renewal of rain gauge equipment at Attapeu meteo station.

(9) Kaluem Station (Xekong Province) / Xe Kong River

Upstream View at the Selected Site

Downstream View of the Selected Site

a) Technical constraints and problems on construction of slope gauge can not be identified at the selected site.

b) However, access is very difficult from Xe Kong town to Kaluem village because of roughly constructed roads. It will be hard to carry out smooth operation by inland transportation to Kaluem village in rainy season. The selected site is located approximately 3-km far from Kaluem village, and provincial staff needs motorcycle for daily measurement of staff gauge. It can be pointed out that constraints on future observation activities are transportation on daily operation around Kaluem village area and transportation / communication between Kaluem village and Xe Kong town.

c) Topo-survey has been carried out at the selected site based on understandings and verbal agreement of future operation on slope staff gauge between DMH and PAFSO. But, formal agreement on construction of slope staff gauge station should be

confirmed between DMH and PAFSO, subjects to budget preparation of Xe Kong PAFSO.

c) Kaluem village school has sufficient open-space to provide rain gauge station. Subject of future operation of rain gauge is only transportation / communication between Kaluem village and Xe Kong town.

(10) Kengkok Station (Savan Nakhet Province) / Xe Champong

Proposed Site of Slope Staff Gauge Station

Cliff Sections of Xe Champong River

a) Riverbanks of Champong River are generally formed by mixed soil layers, which consist of soil layers of sand, gravel, silt and clayey soils. Cliff and/or sharp slopes are developed at all sections of the river because of erosive soils layer under flood.

b) Outcrops of weathered rock such as clay rocks and sand rocks are identified at some river sections, but the rocks have not been covered up to top of river banks.

c) Overtopping of river water is always occurred in upper stream and down stream of the proposed site of slope staff gauge station during flood, and inundation is widely expanded along middle reach of the river. The proposed site is not suitable to construct slope staff gauge due to the reasons mentioned above.

d) As a result of field investigation of river slopes, all river sections are not suitable to construct slope type of staff gauge because of cliff and sharp slope. It is recommended to construct vertical type of staff gauge station and/or floating type of water level recorder.

e) Renewal of rain gauge equipment will be accepted at Kengkok meteo-station.

(11) Thakhek Station (Kham Mouan Province) / Mekong

View of Mekong River at Slope Staff Gauge

Existing Slope Staff Gauge

a) Coordination on management of future operation has not been discussed and agreed among DMH, MCTPC and provincial AFSO. At present, operation/observation on water level of Mekong River have been carried out at the station by central and provincial MCTPC, and report of water level data is always sent to MRC, Phnom Penh as well as DMH through Central MCTPC. DMH has intended to joint with the operation and reading activities of water level using new slope staff gauge station, but reporting systems on water level data to MRC, Phnom Penh have not been discussed and confirmed yet between DMH and MCTPC.

b) It is recommended to establish the integrated operation and reporting system on water level based on mutual agreement between DMH and MCTPC before commencement of construction of new slope staff gauge station.

c) It can be accepted to carry out renewal of rain gauge equipment at Thakhek meteo-station.

(12) Pakxan Station (Kham Mouan Province) / Mekong

Existing Slope Staff Gauge

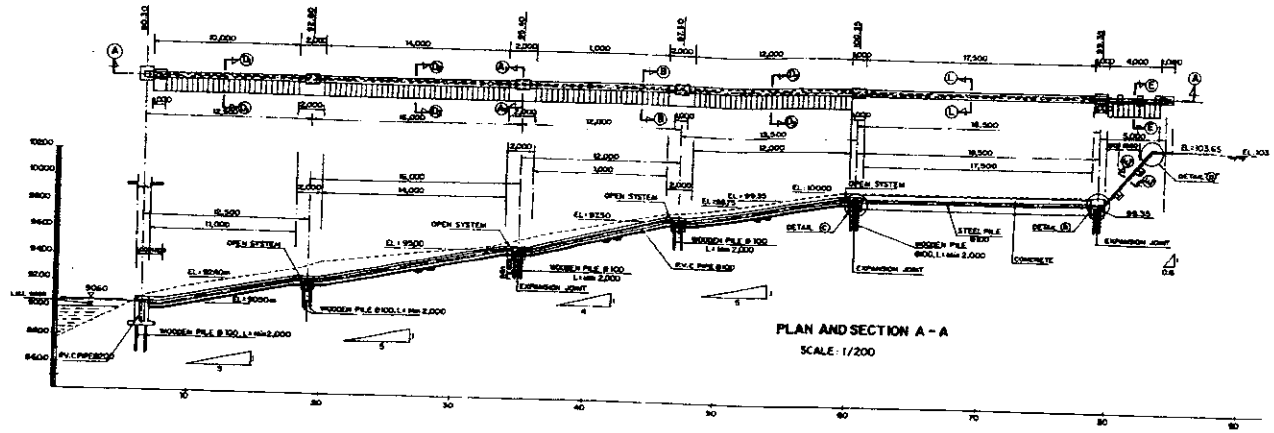
View of Mekong River at Existing Slope Staff Gauge

a) Existing slope staff gauge has been well sustained.

b) It is possible to install censer of water level at edge portion of concrete steps using steel pipe.

c) New rain gauge equipment will be replaced with existing equipment at Pakxan meteo-station.

AP4AT-9



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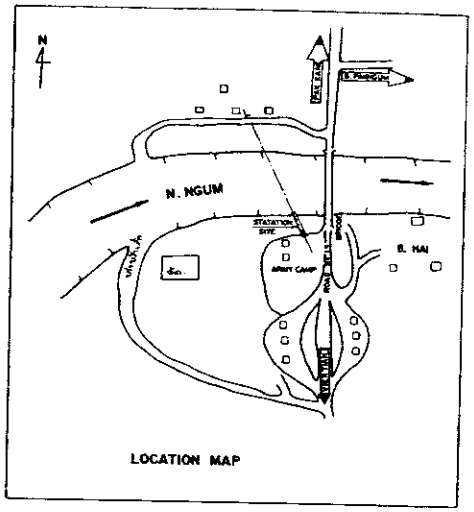

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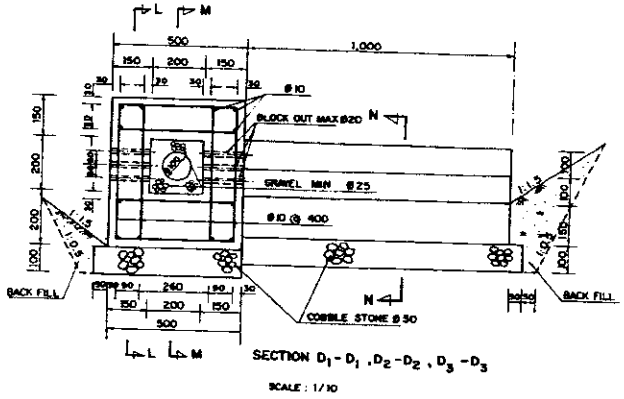

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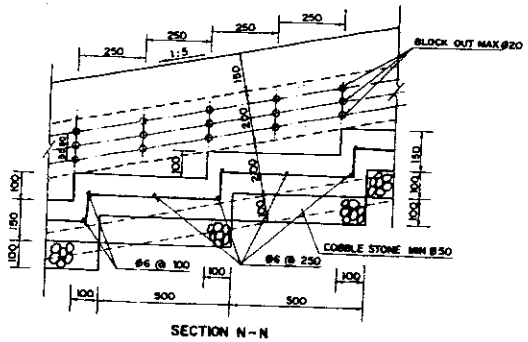

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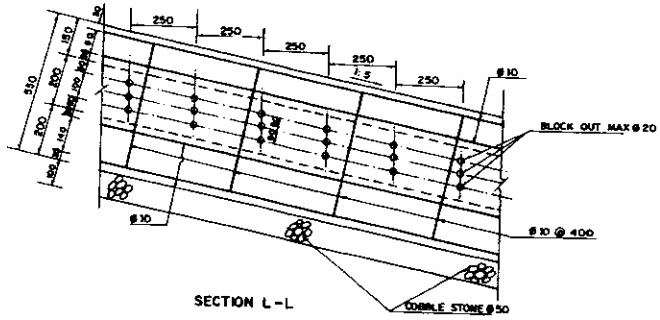

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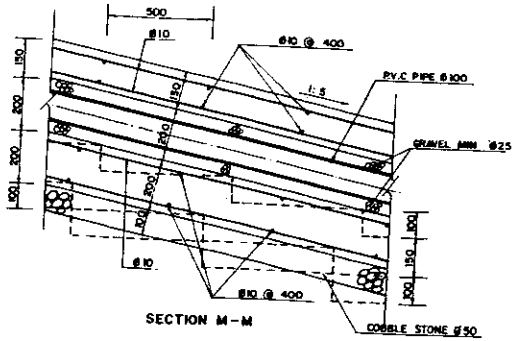

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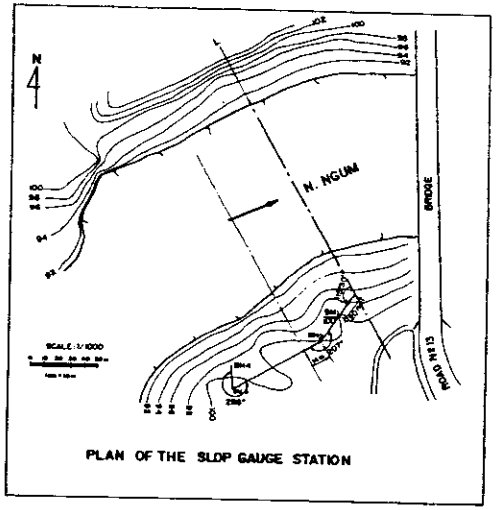

PLAN OF THE SLOP GAUGE STATION

JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFIC			
PROJECT NAME:	CONSTRUCTION PROJECT OF IS METEO-HYDROLOGICAL STATIONS, BAN HAI STATION FOR NAM NGUM RIVER, VIENTIANE MUNICIPALITY		DRAW. No.
DETAILS OF	GENERAL PLAN AND SECTIONS DETAILS		007-
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phany PHENGPANYA		
DRAWN	Mr. Vilaybah		
CHECKED	Mr. Boutbieng		
APPROVED	Sakio NISHIYAMA		

AP4AT-10

SECTION A_1 – A_1

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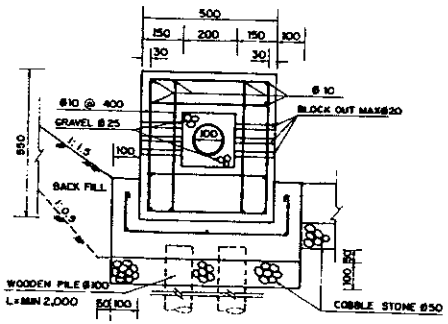

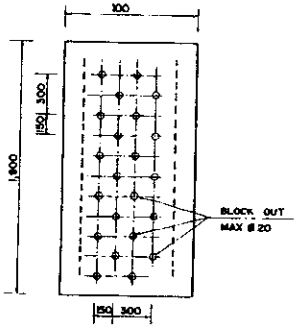

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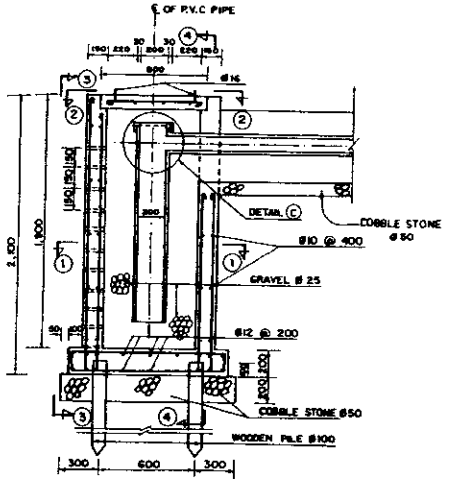

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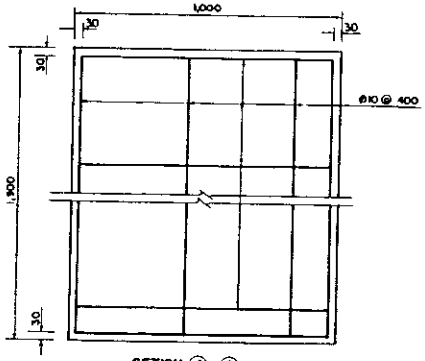

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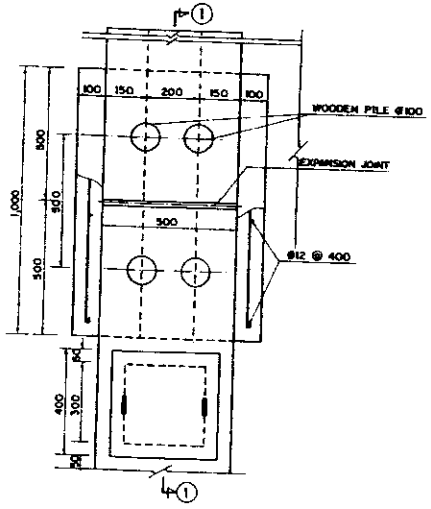

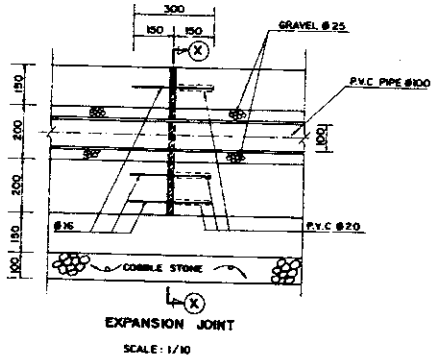

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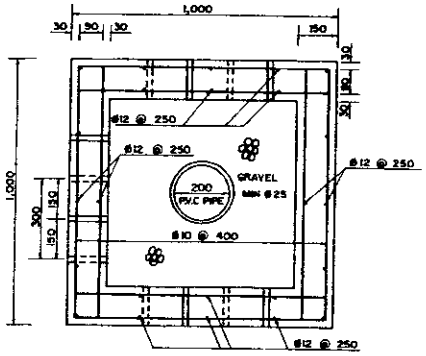

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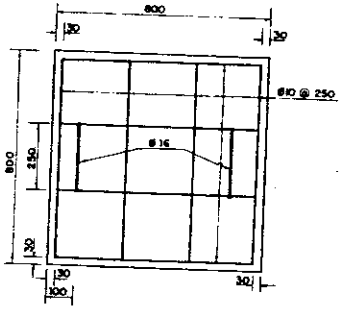

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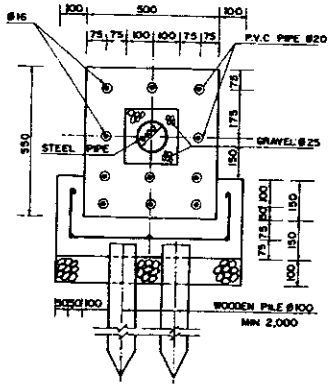

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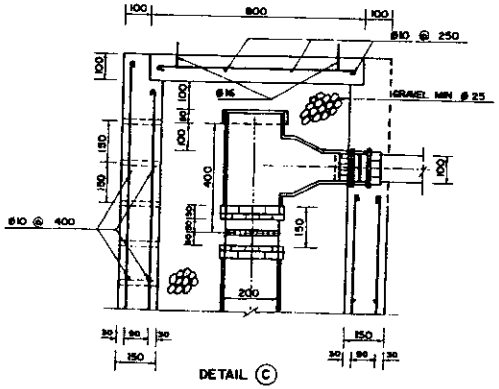

DETAIL Ⓒ

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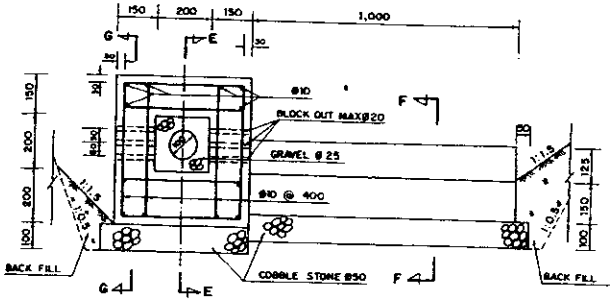
JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME:	CONSTRUCTION PROJECT OF IS METEO-HYDROLOGICAL STATIONS, BAN HAI STATION FOR NAM NGUM RIVER, VIENTIANE MUNICIPALITY.		DRAWING No.
DETAILS OF	SECTIONS AND DETAILS		007-2
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phing PHENGPANYA		
DRAWN	Mr. Vilaykeo		
CHECKED	Mr. Bounhieng		
APPROVED	Soko NISHIYAMA		

AP4AT-11



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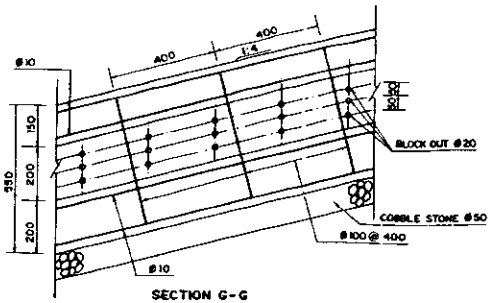

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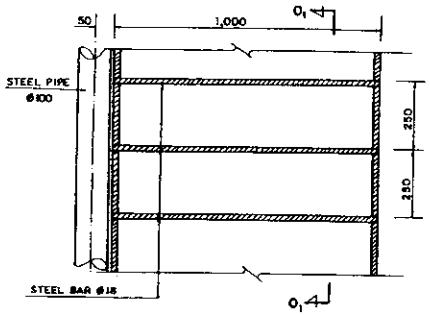

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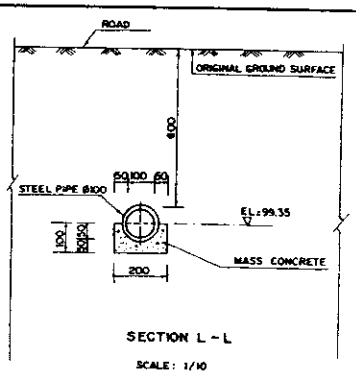

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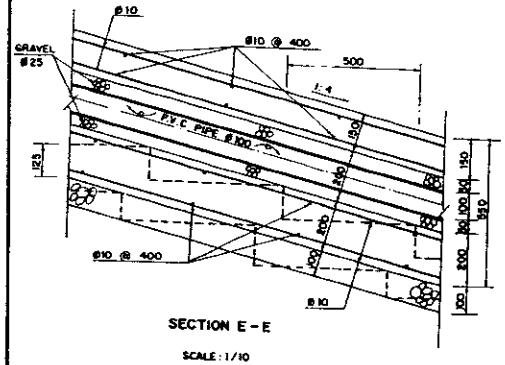

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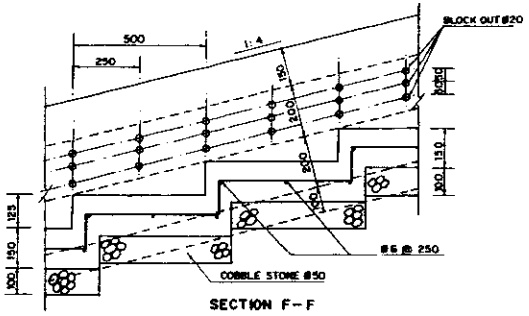

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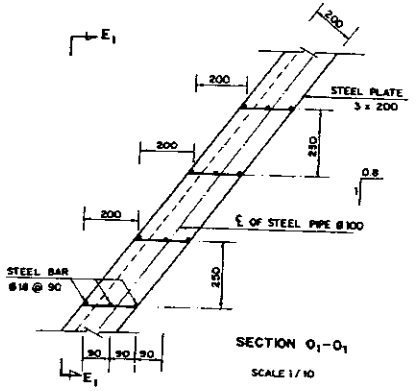

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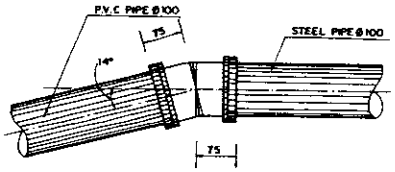

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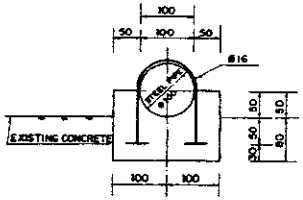

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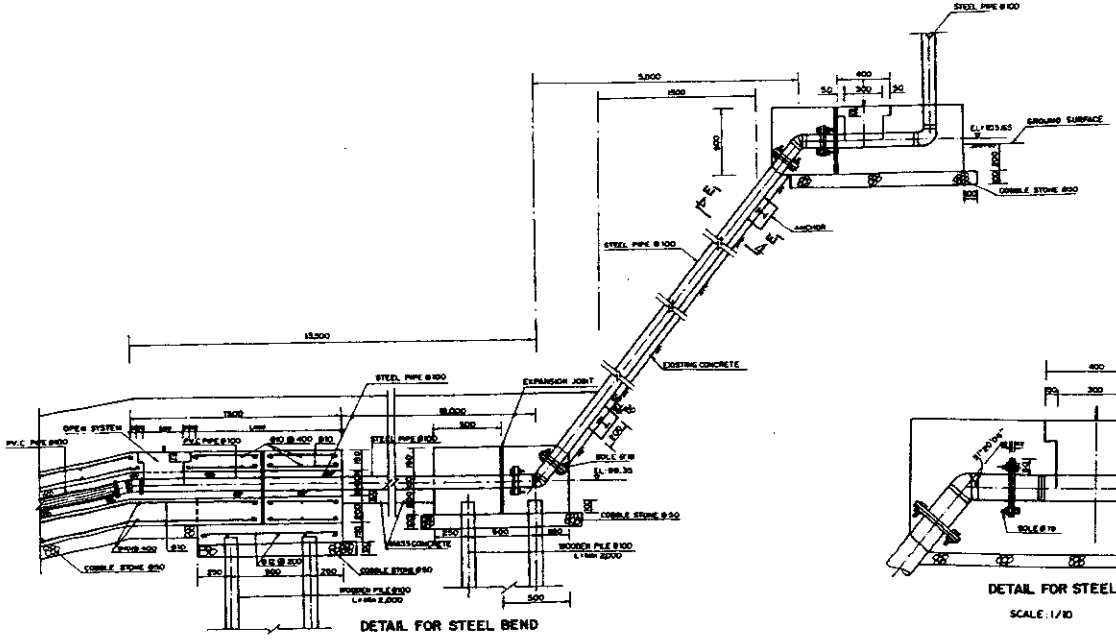

DETAIL FOR STEEL BEND

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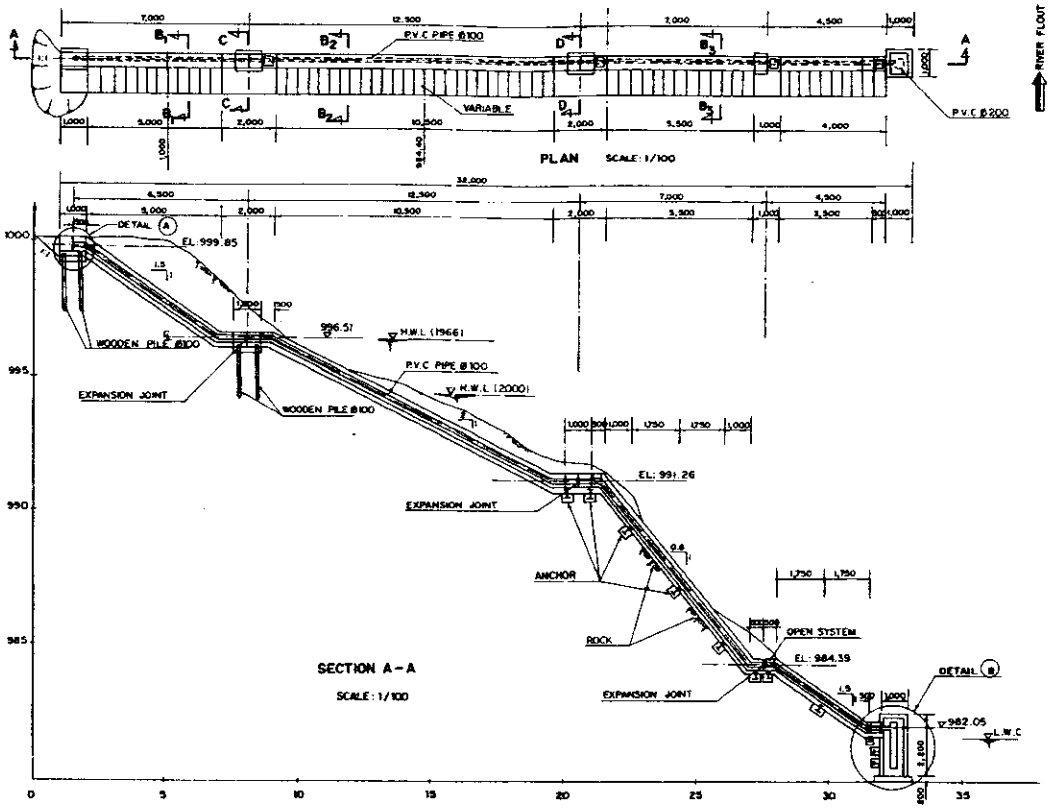
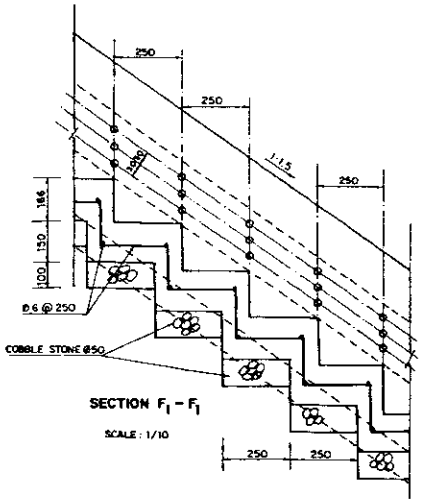
DETAIL FOR STEEL BEND

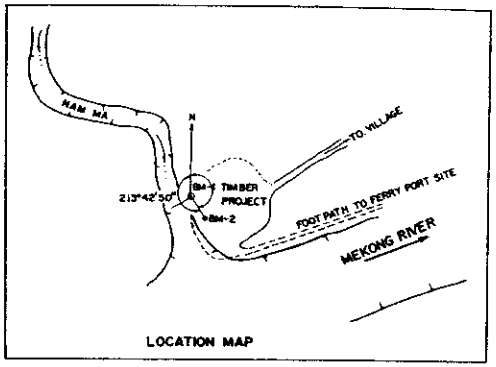
SCALE: 1/10

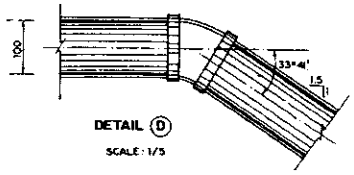
JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME:	CONSTRUCTION PROJECT OF IS METEO-HYDROLOGICAL STATIONS, BAN HAI STATION FOR NAM NGUM RIVER, VIENTIANE MUNICIPALITY.		DRAWING No.
DETAILS OF	SECTIONS AND DETAILS		007-3
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phong PHONGPANYA		
DRAWN	Mr. Viloythok		
CHECKED	Mr. Bounhieng		
APPROVED	Sakio NISHIYAMA		

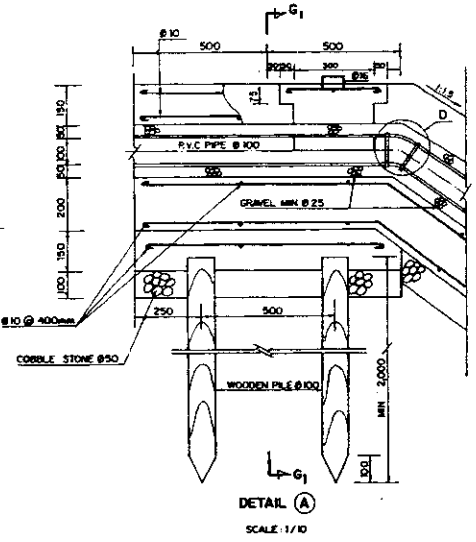
AP4AT-12

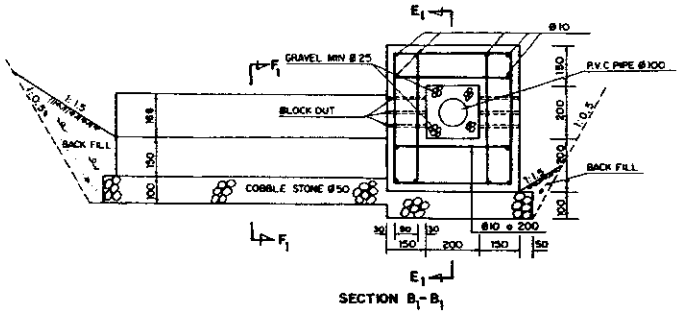


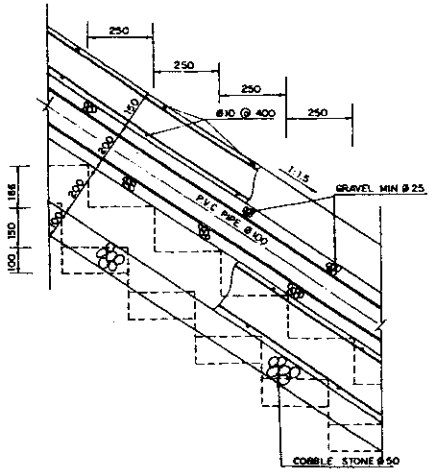


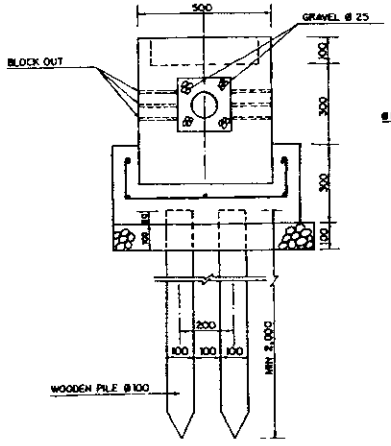




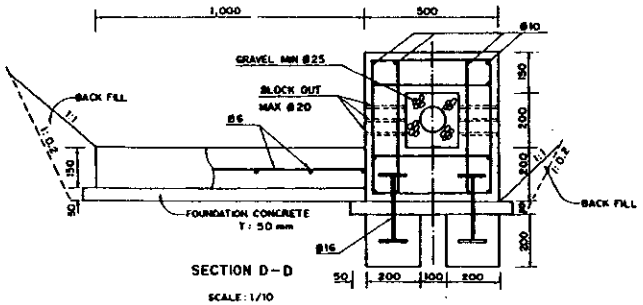






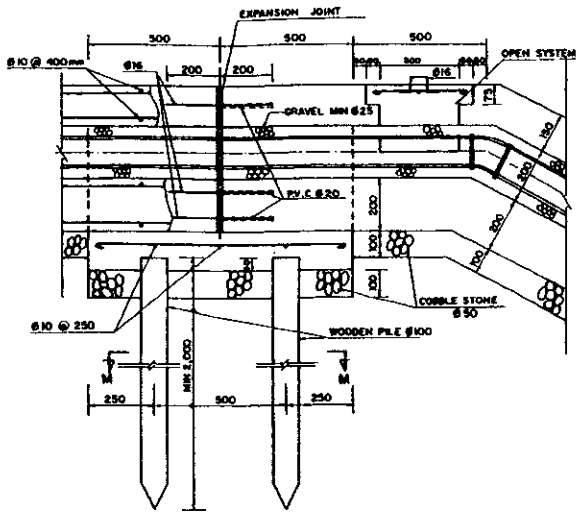


JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME:	CONSTRUCTION PROJECT OF 15 METEO-HYDROLOGICAL STATIONS, XIENGKOK STATION FOR MEKONG RIVER, LUANGNAMTHA PROVINCE.		DRAWING No.
DETAILS OF	GENERAL PLAN, SECTIONS AND DETAILS		001 - 1
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phong PHENGPHANH		
DRAWN	Mr. Khamthong		
CHECKED	Mr. Bounmak		
APPROVED	Seiki NISHIYAMA		



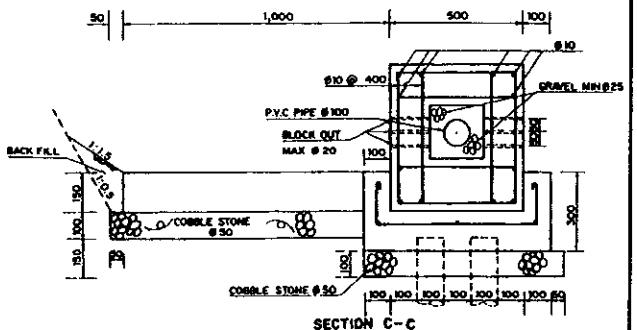
SECTION D-D

SCALE: 1/10



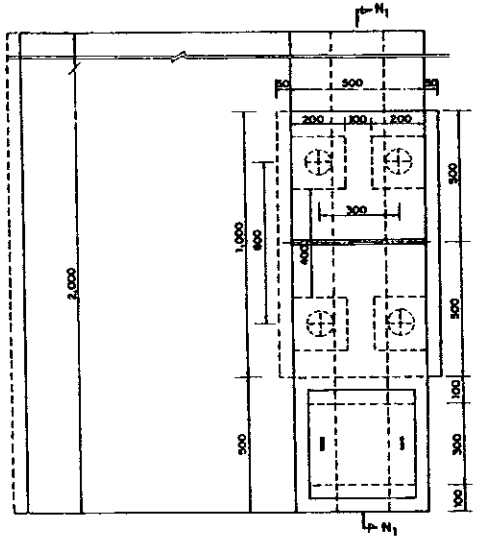
SECTION N-N

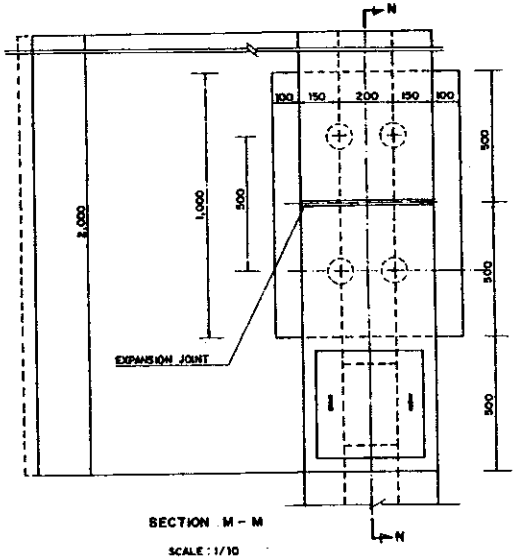
SCALE: 1/10



SECTION C-C

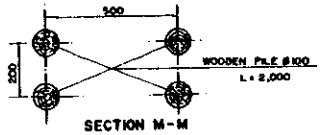
SCALE: 1/10





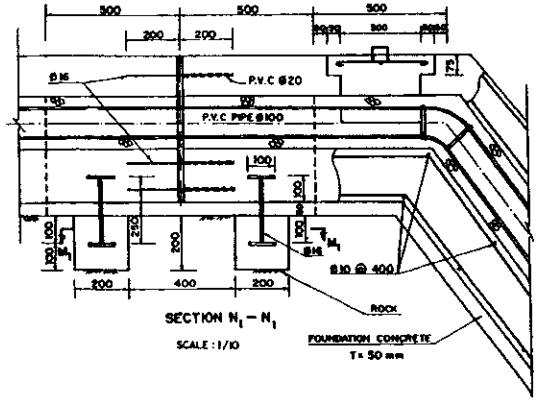
SECTION M-M

SCALE: 1/10



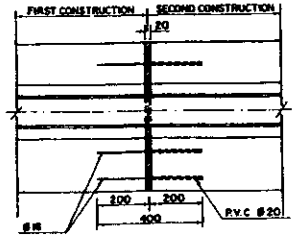
SECTION M-M

SCALE: 1/10



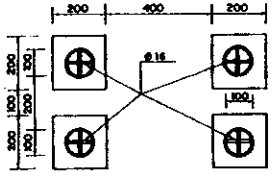
SECTION N_1 - N_1

SCALE: 1/10



EXPANSION JOINT

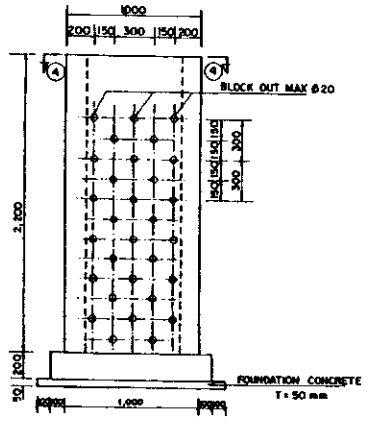
SCALE: 1/10



SECTION M_1 - M_1

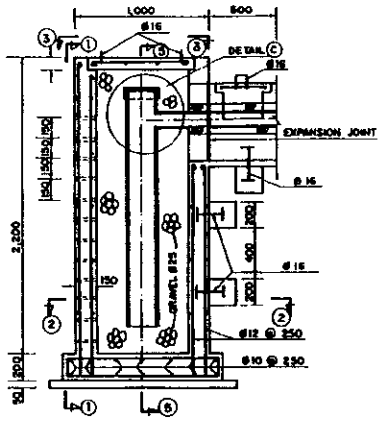
SCALE: 1/10

JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME:	CONSTRUCTION PROJECT OF 15 METEO-HYDROLOGICAL STATIONS, XIENGKOK STATION FOR MEKONG RIVER, LUANGNAMTHA PROVINCE		DRAWING No.
DETAILS OF	SECTIONS AND DETAILS		001-2
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phong PHENPHAYA		
DRAWN	Mr. Khamfeng		
CHECKED	Mr. Soutsayli		
APPROVED	Sakio HIGHIYAMA		



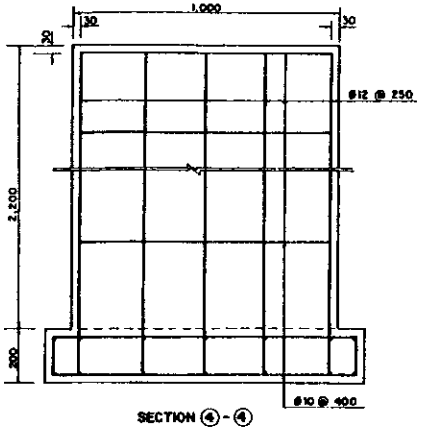
SECTION ①-①

SCALE : 1/20



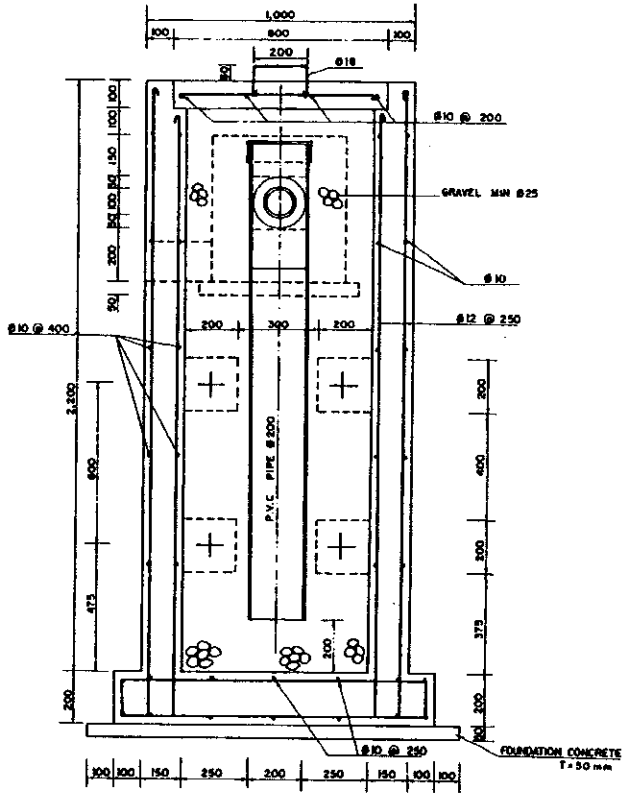
DETAIL B

SCALE : 1/20



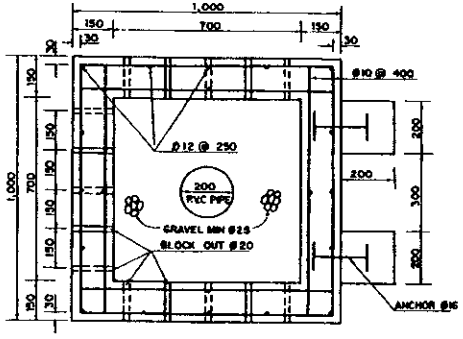
SECTION ④-④

SCALE : 1/10



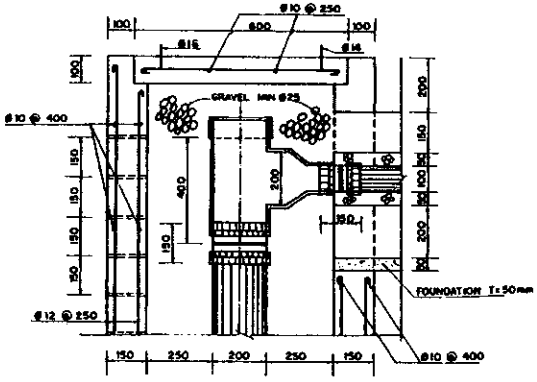
SECTION ⑤-⑤

SCALE : 1/10



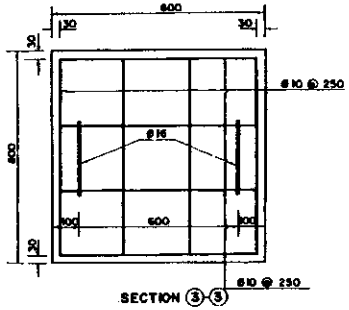
SECTION ②-②

SCALE : 1/10



DETAIL C

SCALE : 1/10

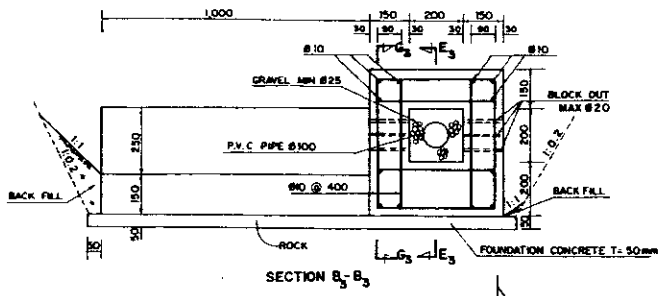


SECTION ③-③

SCALE : 1/10

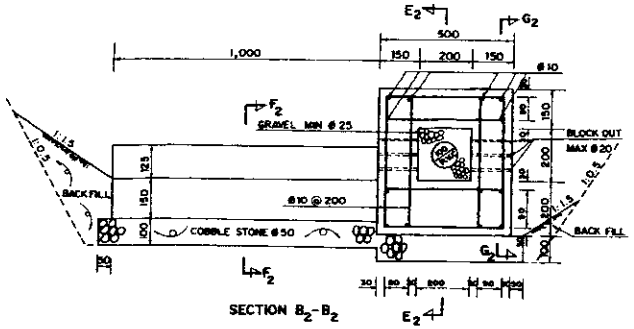
JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME:	CONSTRUCTION PROJECT OF 15 METEO-HYDROLOGICAL STATIONS, XIENGKOK STATION FOR MEKONG RIVER, LUANGNAMTHA PROVINCE.		DRAWING No.
DETAILS OF	SECTIONS AND DETAILS		001-3
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phang PHENGMANYA		
DRAWN	Mr. Khamthong		
CHECKED	Mr. Bounsak		
APPROVED	Seiki NISHIYAMA		

AP4AT-14



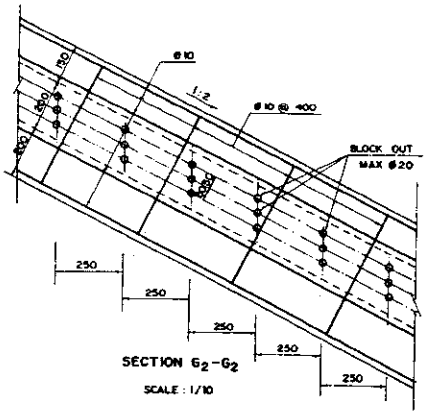
SECTION B_3-B_3

SCALE : 1/10



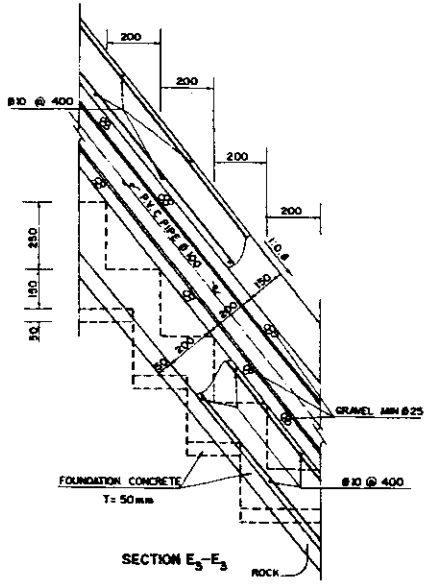
SECTION B_2-B_2

SCALE : 1/10



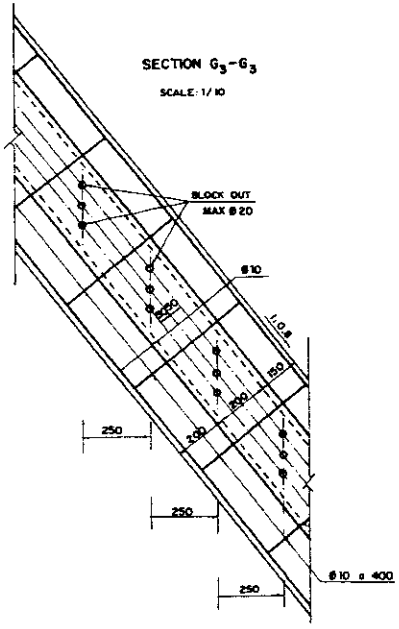
SECTION G_2-G_2

SCALE : 1/10



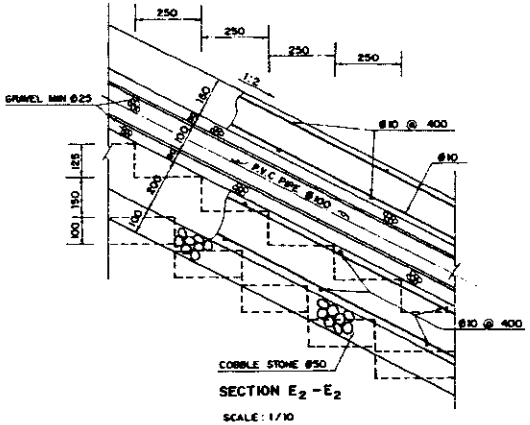
SECTION E_3-E_3

SCALE : 1/10



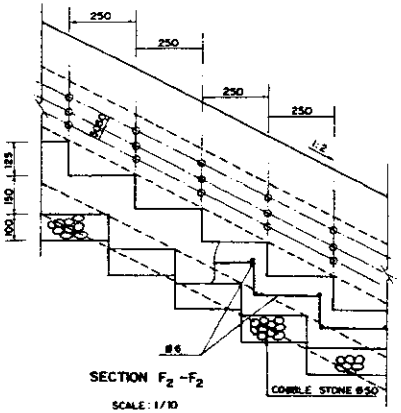
SECTION G_3-G_3

SCALE : 1/10



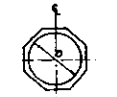
SECTION E_2-E_2

SCALE : 1/10



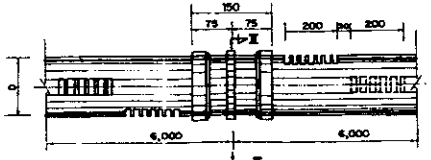
SECTION F_2-F_2

SCALE : 1/10



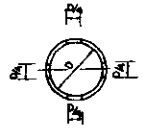
SECTION II-II

SCALE : 1/5



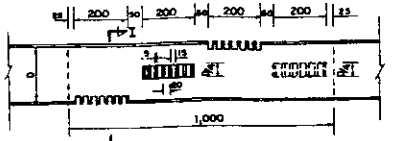
P.V.C PIPE JOINT

SCALE : 1/5



SECTION I-I

SCALE : 1/10



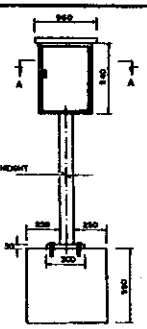
P.V.C PIPE SCREEN FOR DIA 100 @ 200

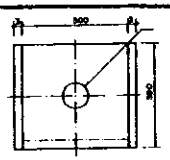
SCALE : 1/10

JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME:	CONSTRUCTION PROJECT OF 15 METEO-HYDROLOGICAL STATIONS, XIENGKOK STATION FOR MEKONG RIVER, LUANGNAMTHA PROVINCE.		DRAWING No.
DETAILS OF	SECTIONS AND DETAILS		001-4
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phong PHOMPANYA		
DRAWN	Mr. Khamthong		
CHECKED	Mr. Boumsak		
APPROVED	Sakio NISHIYAMA		

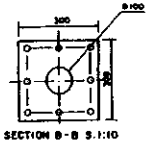
AP4AT-15

1:10

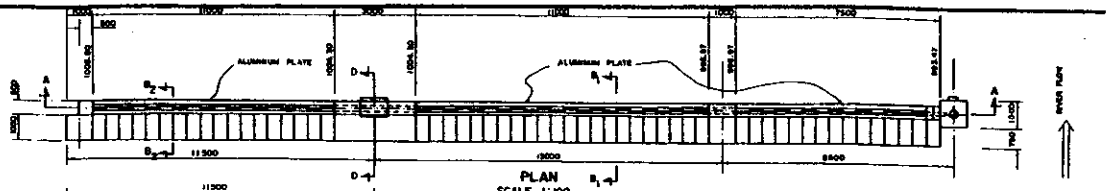




SECTION A - A S:1:10

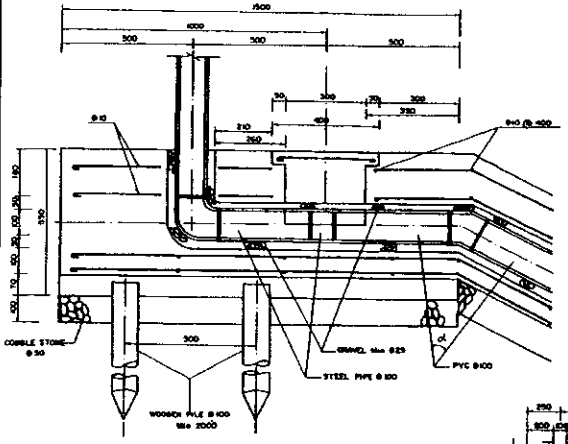


SECTION B - B S:1:10

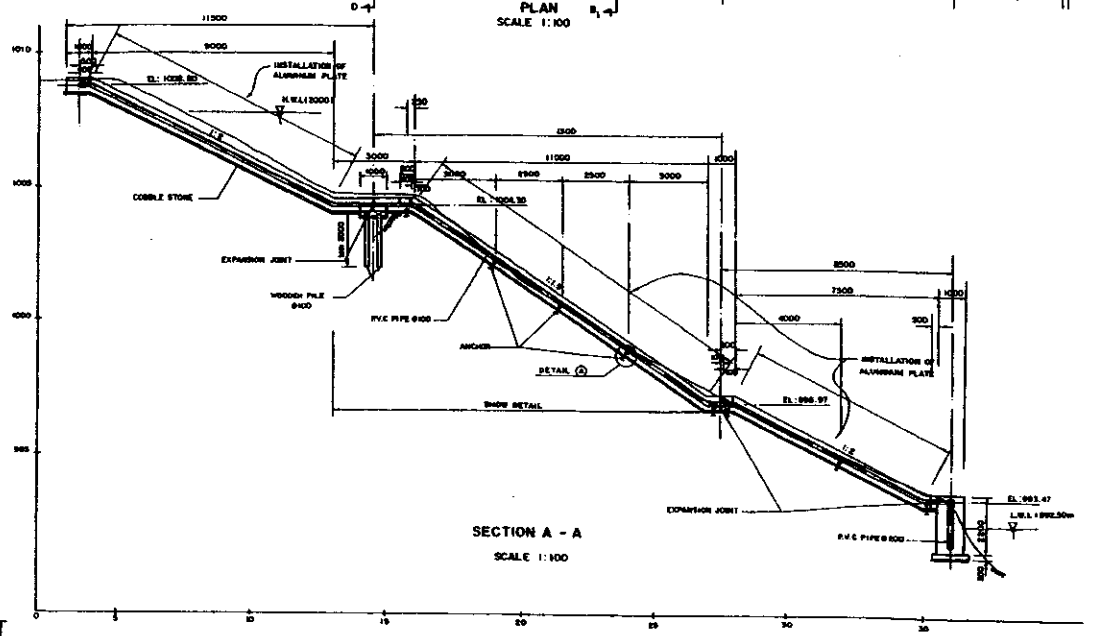


PLAN
SCALE 1:100

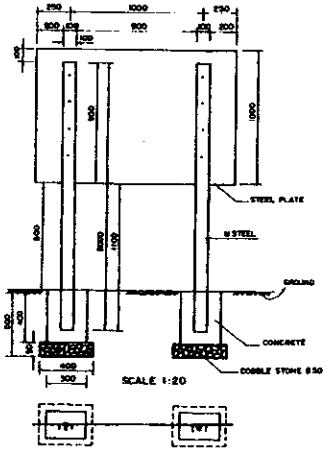
DETAIL A
SCALE 1:10



No.	STATIONS NAME	LENGHT	m
1	MEKONG AT XIENGKOK	1500	34
2	NAM THA AT B. HONGLUAY	1500	19
3	MEKONG AT PAKBENG	2000	26
4	NAM XUANG AT B. HATPHAOTH	1500	24
5	NAM NGUM AT B. PHIENGLUANG	1000	34
6	NAM NGUM AT B. NALIANG	1500	21
7	NAM NGUM AT B. HAI	1500	43
8	MEKONG AT PAKSANE	2000	25
9	MEKONG AT THAKHEK	1500	27
10	SEKONG AT ATTAPEU	2000	27
11	NAM LIK AT B.VIENGTHONG (THAKHEUP)	1500	27

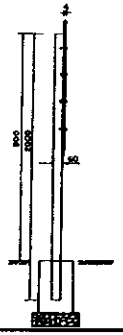


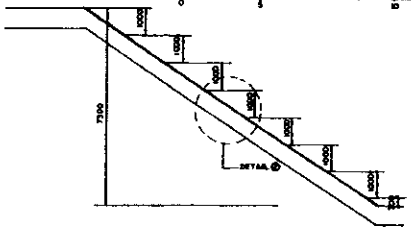
SECTION A - A
SCALE 1:100



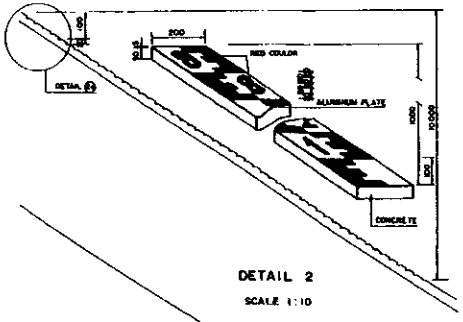
SCALE 1:20

SCALE 1:20

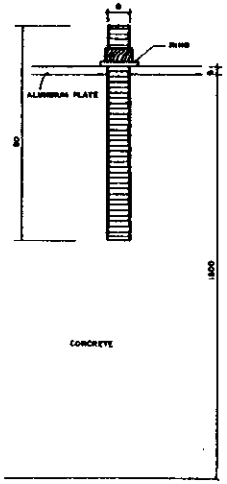




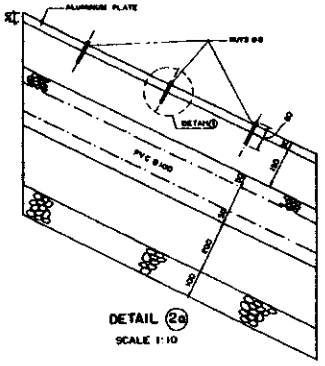
STAFF SLOP GAUGE
SCALE 1:10



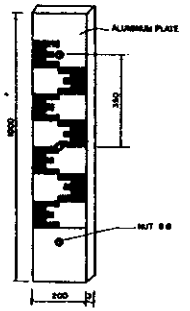
DETAIL 2
SCALE 1:10



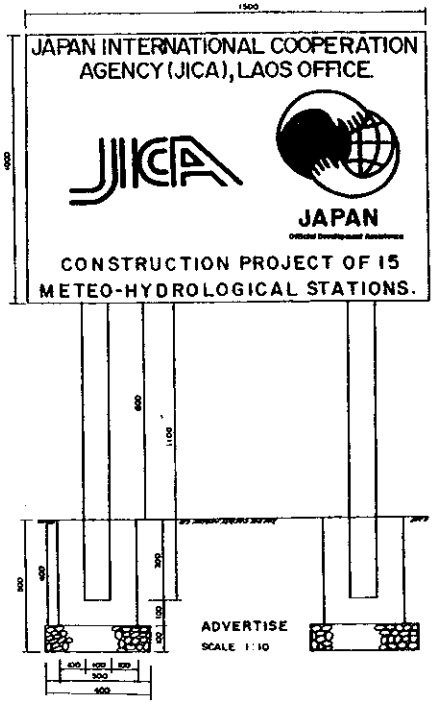
DETAIL ①
SCALE 1:1



DETAIL 2a
SCALE 1:10



STAFF
SCALE 1:10



ADVERTISE
SCALE 1:10

JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE		
PROJECT NAME:	CONSTRUCTION PROJECT OF 15 METEO-HYDROLOGICAL STATION	DRAWING No.
DETAILS OF	STAFF GAUGE STATION AND MISCELLANEUS	012 - 1

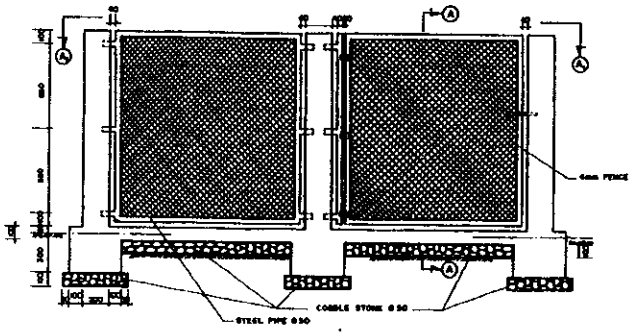
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phong PHONPANYA		
DRAWN	Mr. Bounsay		
CHECKED	Mr. Monorith		
APPROVED	Sakio NISHIYAMA		

AP4AT-16

AP4AT-17

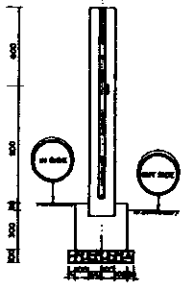
THE PLAN OF MAKING THE FENCE FOR RAIN GAUGE STATION

SCALE 1:20



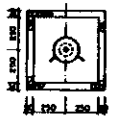
SECTION Ⓐ-Ⓐ

SCALE 1:20



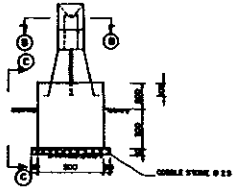
SECTION Ⓑ - Ⓑ

SCALE 1:20



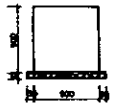
THE SECOND ONE IS THE RAIN GAUGE

SCALE 1:20



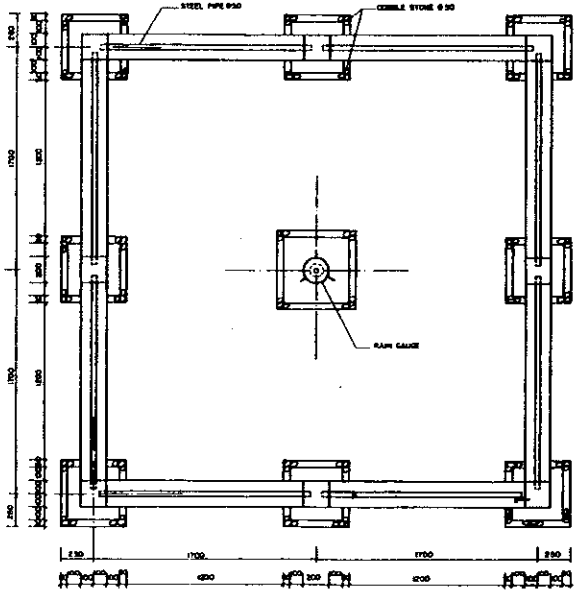
SECTION Ⓒ- Ⓒ

SCALE 1:20



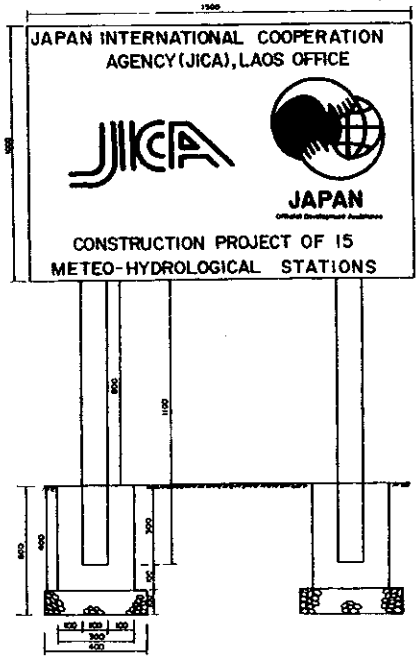
SECTION (A_1)-(A_1)

SCALE 1:20

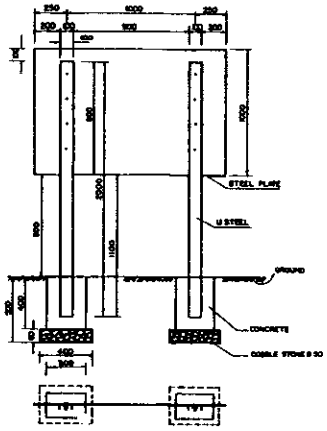


ADVERTISE

SCALE 1:10



SCALE 1:20



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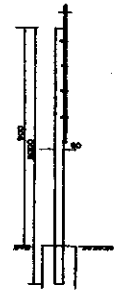

JAPAN INTERNATIONAL COOPERATION AGENCY, LAOS OFFICE			
PROJECT NAME	CONSTRUCTION PROJECT OF 15 METEO-HYDROLOGICAL STATIONS		DRAWING No.
DETAILS OF	RAIN GAUGE STATIONS, ADVERTISE		012 - 2
RESPONSABILITIES	NAME AND SURNAME	SIGNATURE	DATE
DESIGNED	Mr. Phong PHOMPANYA		
DRAWN	Mr. Bounthon		
CHECKED	Mr. Bounsouk		
APPROVED	Sohlo NISHIYAMA		

Supervision Works on Construction of Slope Gauge and Rain Gauge Stations

Xeingkok slope gauge station (Luang Namtha Province)

Chunla rain gauge station (Xekong Province) and Kensay rain gauge station (Attapue Province)

Thakhek slope gauge station (Khammuan Province)

Pakxang slope gauge station (Bolikhamsai Province)

Ban Hai slope gauge station (Vientiane Province)

Vieng Thong slope gauge station (Vientiane Province)

Naluang slope gauge station (Xai Songbung Special Zone)