

Chapter 2

Contents of the Project

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2-1 Outline of the Project

The Project aims to achieve the following three points.

1. To reduce the amount of rainwater flowing onto the site of the temple by constructing drains on mountainside and at the foot of the mountain.
2. To prepare the start of restoration by procuring equipment and materials, once the impact of the rainwater on the structures has been reduced.
3. To store safely and display artefacts, which currently have not been inventoried and are stored away in a warehouse, by constructing a repository in the site.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

The design was conducted in accordance with the following policy.

The design should be conducted in conformity with past study results

The plan should be formulated in conformity with the results of past studies conducted by experts from UNESCO, France, Italy and Japan, and the national plan adopted officially by the government of Lao PDR.

Adverse impact on cultural relics should be avoided during construction.

In order to select a route for the drainage system, a field investigation and test excavation should be carried out to identify the sites where cultural relics are possibly buried under the ground. Such areas should be kept out of. Furthermore, archaeological experts should be requested to keep watch over excavation for the drainage system and the repository to ensure that buried relics are not damaged.

Conservation of landscape should be taken into account.

As the site where the drainage system is to be constructed is sacred, the present landscape needs to be conserved. Therefore, the construction of structures that may damage the landscape should be avoided.

Environmental impact should be minimized.

Impact on the natural environment around Vat Phou should be reduced as much as possible.

The facilities and equipment to be used should be easy to operate and maintain.

Facilities and equipment should be designed in conformity with the management capacity of the persons concerned, taking personnel, technological ability and management costs into consideration.

Equipment to be procured should be planned according to the concerned persons technological ability.

Equipment should be selected in conformity with the technological ability of the concerned persons to ensure its continued use.

The project should be easy to set up.

Minimal technical support should be needed from Japanese consultants to begin operation and maintenance.

The components of the project and the course of action to be taken are as follows.

2-2-1-1 Drainage system

(1) Present Situation

There is a steep cliff (with a relative height of approx. 30m) immediately behind the main temple at Vat Phou Temple Complex, and in the rainy season the water running off the mountain forms several mountain streams, one of which has become a steep gully, damaging the temple buildings and terraces.

The catchment area, from where the rainwater runs off directly onto the temple site, covers a small area of 1.5ha-2.0ha, and in the rainy season, the intense rain saturates the mountainside and has been causing damage to the stone architecture over the years. Moreover, the rain, which permeates the mountainside, forms underground water to become the temple's holy water (spring), as well as providing a source of water for the baray (reservoir) downstream.

Neither the holy water nor baray dries up in the dry season, demonstrating how great the quantity of water is.

The mountainside has a gradient of 15-30° and the land is classified as mainly bamboo groves, with some high trees growing to a diameter of 50-100cm growing here and there. Enormous rocks (with a diameter of 3m-5m) are also scattered about the slope, especially in the gully.

Stone structures, which are thought to have channeled the holy water to the temple, have also been found between the bottom of the cliff and the temple.

Based on the field study, the presumed causes of the collapse of Vat Phou are as follows.

1) Water running down directly from the mountainside.

Mountain streams have been cut into the mountainside due to erosion, creating a steep gully. When it rains, water rushes down the gully and damages the stone walls and the temple building.

2) Seepage of water into the ground.

Some of the rain that falls on the mountainside and on the ground seeps down into the ground, and as it flows along, it sucks out small grains of soil, causing the ground to slide and gradually weakening the foundation of the structures.

3) Destruction by falling rocks.

Rocks carried down the mountainside by the rain fall over the cliff, and rocks broken off the sheer cliff by the effects of plant roots and rainwater fall directly on the cultural structures.

(2) Design Policy

1) Examination of past study reports.

The water management system recommended by the Italian Study Team for the Vat Phou Temple site is as shown in Table 2-1 and Figure 2-1.

Table 2-1 Water Management System Recommended by UNESCO

Location	Water Management System
Upstream from the sanctuary	<ul style="list-style-type: none">• The ancient drain buried outside the bordering wall behind the temple should be restored and used to drain the rainwater flowing from the mountain area behind the temple into the Hong Ikam River.• Therefore the drain should be excavated together with the buried part of the wall.
Temple square	<ul style="list-style-type: none">• The center ground of the square should be raised with cross gradients to the north and south.• Traverse concave shaping of the last (lowest) ledge of the square, building up the sides so as to form a kind of culvert
Terraces	<ul style="list-style-type: none">• Rebuilding or fresh construction of channels guiding the water to flow alongside the north and south sides of the archaeological site.• The laterite blocks should be placed back into the gaps in the upper part of the wall to prevent water from flowing in.• The canal that runs around the N-W corner of the north palace must be repaired and moved away from the foundations.• The canal must be dredged and reshaped in order to obtain a more regular slope leading down towards the river so that it will drain water from the courtyard inside the northern palace into the river.
Central path	<ul style="list-style-type: none">• Concerning the damaged walls on the right bank, a sandstone curb could be built at right angles to the pathway upstream.

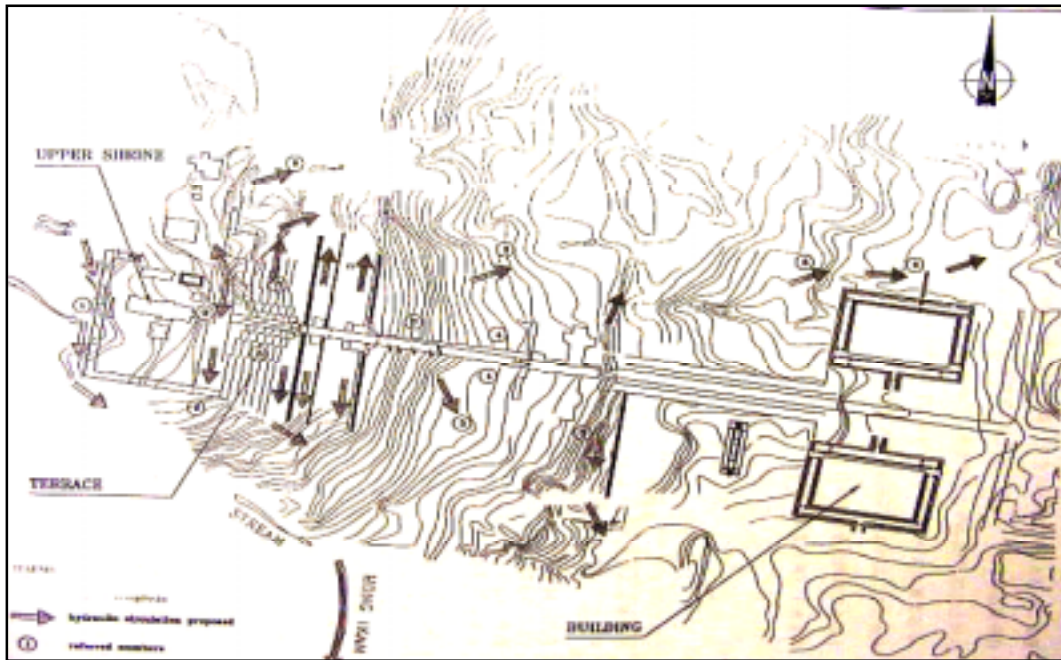


Figure 2-1 Present Rainwater Flowing Routes

On the base of above idea, the Japanese Study Team planned a separate drainage system for rainwater flowing from the outside and within the site.

Based on UNESCO's drainage plan, examination was divided into the following two points.

Point 1. Management system for rainwater from the outside

Point 2. Management system for rainwater in the site

2) Management system for rainwater from the outside of the site

The following table shows the three drainage measures to be considered for this condition.

Table 2-2 Comparison of Drainage Measures

Drainage Measures	Type of drainage system	Remarks
Plan 1: Restoration of old drains	Type of waterway (triangle, trapezoid) and material for construction should properly be selected, with due consideration of the surrounding landscape.	(1) Necessary to construct a waterway along the old bordering wall; this is may be costly because work may be halted due to the discovery of new archeological relics. (2) Construction period cannot be estimated and may be very long because of existence of archaeological remains. (3) Archaeological studies should be finished before construction starts.

Drainage Measures	Type of drainage system	Remarks
Plan 2: Construction of waterway at the foot of cliff	Type of drainage waterway (triangle, trapezoid) and material for construction should be properly selected, with due consideration of the surrounding landscape.	(1) Necessary to contrive a way to construct a drain because there are many big falling stones and the space is very narrow. (2) Necessary to contrive a way of protecting the drain from the fast-flowing runoff of water from the high cliff, rolling and falling stones, and earth and sand.
Plan 3: Drainage of rainwater out of the catchment area on the mountainside	Suitable measures should be adopted for the gully (small scale sabo dam, erosion prevention). The type of waterway should also be determined according to the topographic features (impermeable wall, trapezoid). Appropriate construction materials should also be selected.	(1) Necessary to contrive many ways of constructing secure access to construction site and conserving the flora on the mountainside (2) Necessary to propose a way of maintaining the drainage waterway (3) Necessary to contrive ways of conducting a topographic survey to make a map required to plan the drain.

After careful consideration, Plan 3 was considered to be most appropriate of the alternatives mentioned above based on the results of the topographic survey and meteorological data. The reasons are as follows:

Since the construction of Plan 1 will take time, it is not suitable for implementation under the grant aid scheme which strictly limits the term of the construction work. The original waterway constructed by the Khmer should be gradually restored together with the reconstruction of the remains of the wall to create a boundary after finishing the construction of the rainwater management system and counter-acting erosion due to rainwater.

The adoption of Plan 2 would be advantageous as it is easy to construct and maintain. Nonetheless, this plan has the following disadvantages.

- i. It is difficult to prevent the erosion of the streams, the falling of rocks, and earth and sand runoff from the cliff at the back of the temple originating from the hinterland (Kao Mountain).
- ii. As flood water contains earth and sand, a waterway with a large cross section should be constructed.
- iii. The construction of a waterway with a large cross section at the back of the temple may have an adverse impact the landscape of the Vat Phou site.

Although the construction and maintenance involved in Plan 3 is difficult as opposed to Plan 2, it has the following advantages. That is, it will reduce the volume of water flowing onto the Site

from the hinterland to a minimum, which will make it is possible to prevent the erosion of streams, falling rocks due to erosion, and earth and sand runoff from the cliff at the back of shrine.

3) Water Management System for Rainwater on the Site

The water management facility construction project for rainwater on the site is not suitable for implementation under the Japan's grant aid scheme due to the following reasons.

The length of the construction period cannot be estimated as the work may be delayed when buried ruins are encountered during construction.

Although it is important to finish all kinds of archaeological studies before the grant aid cooperation is carried out, none of these studies have been conducted yet.

Even if all kinds of archaeological studies are completed, the construction period will be longer than usual because it will be simultaneously carried out with restoration activities.

Basically, the management of rainwater on the site should be conducted slowly and carefully by the Laos side.

4) Conclusion

Based on the above examination of the three plans, the Project was designed as follows.

Due to the existence of many relics along the route, it is impossible to construct a drain near the exit of the gully, which can collect most of the rainwater in the catchment area and drain it into the Huay Kok river to the north or the Hong Ikam river to the south.

Before the rain falling on the mountainside collects in the steep gully, it should be collected in an open drain built along the contour of the mountainside and channeled to the Hong Ikam river to the south where it will not directly affect the cultural structures.

As the catchment area of the rainwater downstream from the mountainside drain is small, the water can disperse naturally along the contours of the land. Part of this water will be dealt with by constructing a pipe culvert at the foot of the cliff. Furthermore, the pipe will be made of a flexible chemical material with holes on it, so the drainage route can be easily changed if there are cultural ruins along the planned route of the pipe that will obstruct work.

2-2-1-2 Equipment for Restoration

(1) Plan of the Ministry of Information and Culture

MIC has, until now, concentrated on gaining recognition of Vat Phou as a World Heritage Site and concrete restoration plans have not been drawn up. For this reason, a restoration plan has now been drawn up. The following is an outline of the plan.

Areas to be restored:	Three locations, near the entrance to the north and south palaces and at the southeast corner of the north palace. Restoration is considered possible with relatively basic techniques.
Restoration work:	As shown in Table 2-3.
Organization:	MIC will employ five new experts (in archaeology, civil engineering, architecture, history and drafting) and dispatch them to the site. In addition, the local Vat Phou Management Office will employ an engineer.
Expenses:	Restoration activities (US\$19,780 per year). Personnel expenses (US\$22,700 per year). Total: US\$42,480 per year (However, this does not include personnel expenses for the locally employed engineer or O/M costs for the restoration equipment)

Table 2-3 Restoration Work

NO	Restoration Activities	Necessary equipment
1	Measurement and Recording	Digital camera, digital video camera, level, total station, scaffolding, telescopic ladders
2	Archaeological excavation Check of foundation of the buildings	Not mentioned in the Ministry of Information and Culture's Plan.
3	Support of endangered locations before dismantling	Metallic scaffolding
4	Numbering Inventorying	Mobile crane (boom 15m、 lifting capacity 2-3t) , tractor, dump truck, chain blocks, tool kit for lifting up stones
5	Repair of broken blocks or archaeological elements Replacement of new sandstone or laterite blocks	Stainless steel tube, epoxy glue, air compressor, pneumatic hammers
6	Strengthening with concrete	Geotextile, concrete mixer, concrete vibrators, electric pump, water containers, wheelbarrows, shovels, pickaxes

(2) Direction of plan

This project is designed to support the first stage of a long-term restoration plan, and the equipment will be selected with emphasis on measuring and recording activities on the basis of the following premises regarding organisation, the restoration plan and the budget.

Preconditions for donation of restoration equipment

The Vat Phou Management Office will take on only one new engineer, but as only three of the present staff are capable of undertaking restoration work, the Champasak PDIC shall employ at least two more engineers.

As actual measuring, recording and restoration cannot start under the present restoration plan, technical training shall be received in measuring, data processing and recording, and restoration work procedures shall be drawn up.

Of the budgetary measures mentioned in the restoration plan, MIC shall secure the necessary expenses for dispatching a supervisor, building engineer and civil engineer to the site, and Champasak PDIC shall secure the expenses for the activities of the Vat Phou Management Office personnel and O/M costs of the donated equipment.

2-2-1-3 Repository for Archaeological Artefacts

(1) Details of Site Selection

The five candidate sites for the repository, shown below, were proposed by the Laos side and among them NO.4, “In front of Baray”, was recommended as the best choice. However, based on the result of a field survey, candidate site NO. 4 was found to be depressed and a stable ground cannot be maintained after the foundation is raised. Candidate sites NO.1, NO.2 and NO.3 were found to be submerged due to the flooding of the Mekong River. Site NO.5 might have a negative impact on the Vat Phou because it is near the site. However, as the Laos side wants to construct the repository close to Vat Phou in order to attract tourists, site NO.5 was decided as the site of the repository on condition that an archaeological expert keeps watch on excavation during construction.

(2) Design Policy

The main purpose of the repository is to provide the appropriate storage of artefacts, which are presently kept in the UNESCO House, as well as newly discovered artefacts. At the present time, the cultural properties that have been collected include many important items that should not be simply stored away but widely exhibited to residents and tourists. Although the facility is called a repository, it has more display space than storage space. Office space is also secured to enable staff of the Vat Phou Management Office to perform their duties.

Table 2-4 Comparison of Candidate Sites

NO	Candidate	Distance to Vat Phou Temple	Relocation of houses and lands	Protection Zone	Configuration of ground	Flood
1	Site of Vat Phou Management Office	Far	None	1	Flat	Every year
2	Site of UNESCO House	Far	None	1	Flat	Every year
3	Site of Former military installation	Not near	None	1	Flat	Every year
4	In front of Baray	Near	Houses and lands	3	Depression	None
5	In front of Festival Plaza	Near	A house and two lands	3	Flat	None

Significance of Protection Zone: $3 > 1$

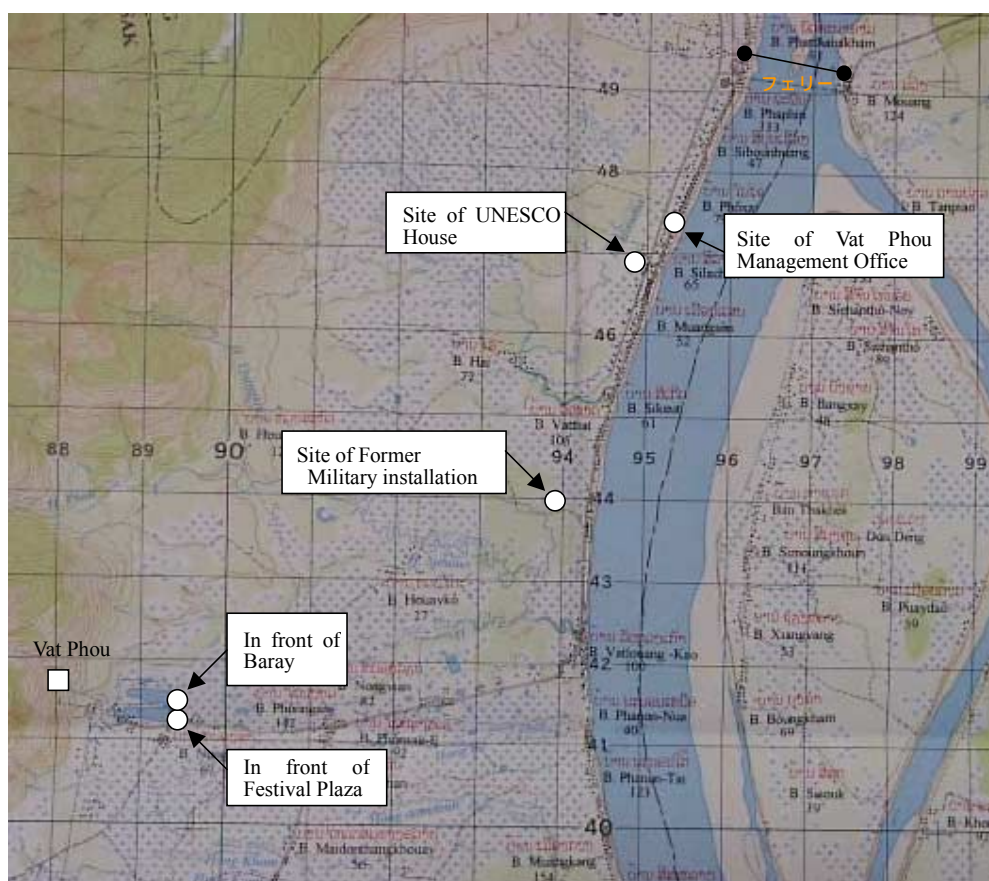


Figure 2-2 Location Map of Candidate Sites for Repository

2-2-2 Basic Plan (Construction Plan / Equipment Plan)

2-2-2-1 Drainage System

(1) Design of the drain on the mountainside

1) Route of the drain

As shown in Figure 2-6, the drain will more or less follow a straight line along the contour of the mountain. The route is designed so as not to intersect the gully or involve major cutting or banking and to avoid large boulders. Cultural ruins have also been found on the cliff side of the mountain, but they are not near the present route and do not present a problem.

2) Rainfall Data

According to the rainfall data collected and shown below, the figures from Champasak monitoring station are greater than those from the other two stations. Moreover, compared with Pakse and Soukhoumma monitoring stations, which are 30-40km away from Vat Phou, Champasak monitoring station is only 10km away. Therefore, Champasak station was adopted in consideration of the safety of the design.

Table 2-5 Rainfall for Return Period

(Maximum daily rainfall during year/mm)

Station	Pakse	Champasak	Soukhoumma
Period	1991-2000	1991-2000	1993-2000
Data	Daily	Daily	Daily
Gauge Type	Standard rain gauge	Standard rain gauge	Standard rain gauge
2 years	106	162	101
10 years	163	249	142
20 years	190	282	155
50 years	228	323	171
100 years	260	354	183
200 years	295	385	194

A return period of 100 years was adopted for the following reasons:

Since there are three monitoring stations for rainfall around the Vat Phou complex and there are differences among their data, it is supposed that none of data has sufficient reliability.

As the duration of the monitoring data is short (10 years), precipitation at the return periods differs much depending on statistic method as shown below.

The Italian study team mentioned the return period of 100 years in the report ‘ Water Management : Restoration of Vat Phou Monument Site 1998’.

Because the catchment area is small, water discharge does not differ in correlation with the

return period. For example, water discharge is 0.59 m³/s at the return period of 100 years compared with 0.52 m³/s at 50 years.

In Japan, a return period of 50 years is used for soil erosion facilities and 100 years is used in the case of important facilities.

Table 2-6 Precipitation at Return Period according to Statistical Method

Statistical method Return period	Iwai	Thomas	Hazen	Ishihara /Takase	Gumbel
50	323.3	362.0	317.4	288.6	349.1
100	354.3	402.7	347.1	306.2	385.8

3) Design water discharge

Water discharge was designed by rational method.

$$Q = 1/3.6 \times f \times r_t \times A = 1/3.6 \times r_e \times A$$

Q: designed discharge(m³/s)

f: runoff ratio(=0.7 for mountain area)

r_t: mean rainfall intensity(mm/hr)

r_e: effective rainfall intensity(mm/hr)=f×r_t

A: catchment area(=0.016km²)

Effective rainfall intensity is calculated by Kadoya Formula and Mononobe Formula

Kadoya Formula $tp = 120 \cdot A^{0.22} \cdot r_e^{-0.26}$

Mononobe Formula $r_t = \left(\frac{r_{24}}{24} \right) \times \left(\frac{tp}{24} \right)^{-1/2}$

$Re = f \cdot r_t$,

$$r_e = \left(\frac{r_{24}}{24} \right)^{1.21} \times \left(\frac{24f^2}{2 \times A^{0.22}} \right)^{0.606}$$

r₂₄: design 24 hours' rainfall design daily rainfall(mm/day)

tp: time for flood arrival(min)

$$r_e = \left(\frac{354.3}{24} \right)^{1.21} \times \left(\frac{24 \cdot 0.7^2}{2 \times 0.016^{0.22}} \right)^{0.606} = 131.9 \text{ mm/hr}$$

Therefore, design water discharge Q is as follows.

$$Q = 1/3.6 \times r_e \times A = 1/3.6 \times 131.9 \times 0.016 = 0.59 \text{ } 0.6 \text{ m}^3/\text{s}$$

4) Section of the drain

Depth of water is calculated by Manning's uniform flow formula.

$$Q=A \times V$$

$$V=(1/n) \times R^{\frac{2}{3}} \times I^{\frac{1}{2}}$$

V: velocity (m/s)

A: area (m²)

n: roughness coefficient (0.045: drain with pitching stone)

R: hydraulic radius (m)=A/P

P: wet perimeter (m)

I: design gradient of drain

Table 2-7 The Result of Calculation for Section of Drain (Manning's Formula)

Width of bottom	Height	Depth	Gradient of slope	Gradient of slope	Cross-sectional area	Wet perimeter	Hydraulic radius	Roughness coefficient	Bed slope	Velocity	Flow capacity	Design discharge	Adoption
(m) B	(m) H	(m) h	(left) 1:n(L)	(right) 1:n(R)	(m ²) A	(m) P	(m) R	n	1/I	(m/s) V	(m ³ /s) Q	(m ³ /s)	
1.00	0.80	0.20	0.5	0.5	0.22	1.447	0.152	0.045	10	2.002	0.440	0.6	×
1.00	0.90	0.30	0.5	0.5	0.35	1.671	0.206	0.045	10	2.455	0.847	0.6	
1.00	0.80	0.20	0.5	0.5	0.22	1.447	0.152	0.045	6	2.584	0.568	0.6	×
1.00	0.90	0.30	0.5	0.5	0.35	1.671	0.206	0.045	6	3.169	1.093	0.6	

Although the depth of water in the drain is small, a freeboard of 0.6m was adopted in accordance with technical guideline because there is a significant cultural site in the downstream area of the construction site and sand and stones may frequently flow into the drain.

Freeboards of drain shown in Table 2-8 are used in Japan.

Table 2-8 High Water Discharge and Freeboard

High water discharge (m ³ /s)	Freeboard (m)
<200	0.6
200-500	0.8
500-2,000	1.0
2,000<	1.2

(Technical guideline of River/Sabo, Ministry of Land, Infrastructure and Transport of Japan)

5) Impact on the present waterway

Gabions are placed at the outlet of the drain to prevent water from washing away the ground soil. The area to be covered with the gabions is as shown below.

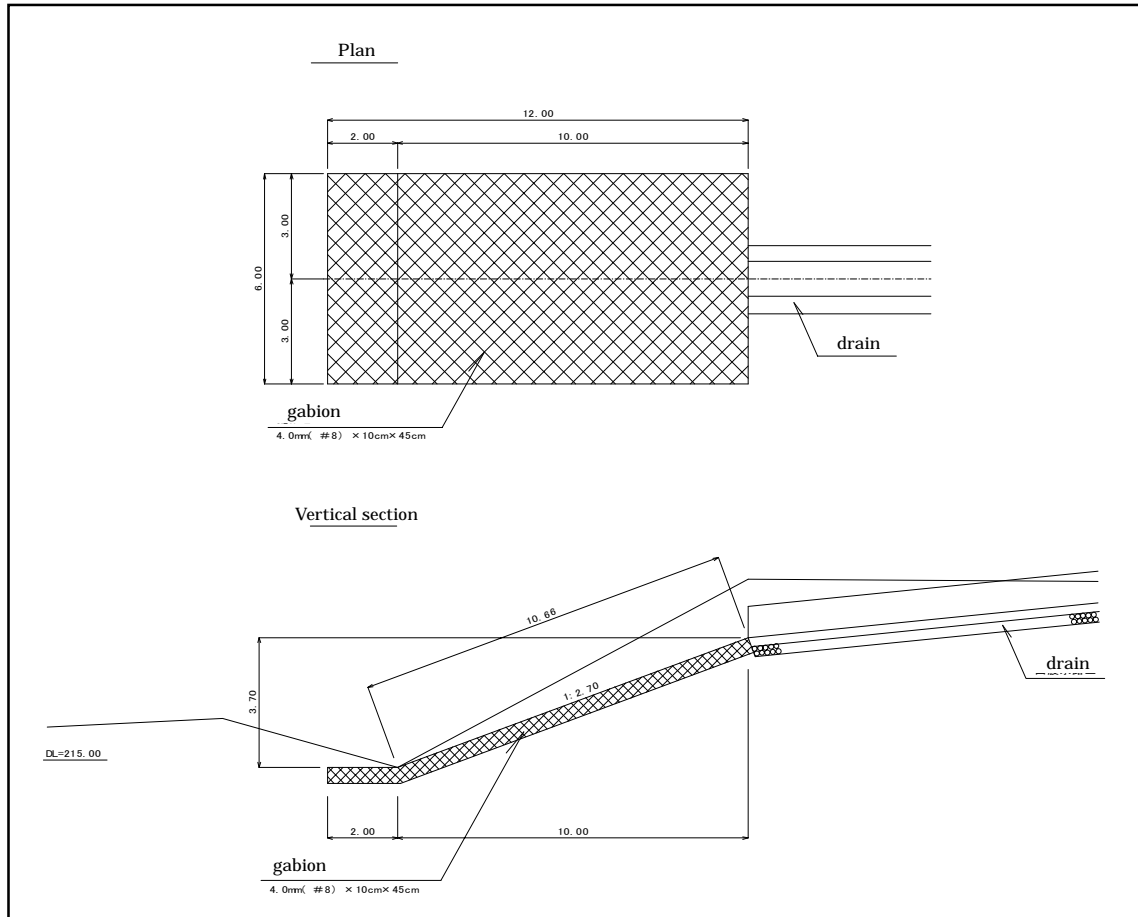


Figure 2-3 Design of Gabion

Since the catchment area of Vat Phou is much smaller than that of Hong Ikam, water discharged from the drain will not have a significant impact on the present waterway.

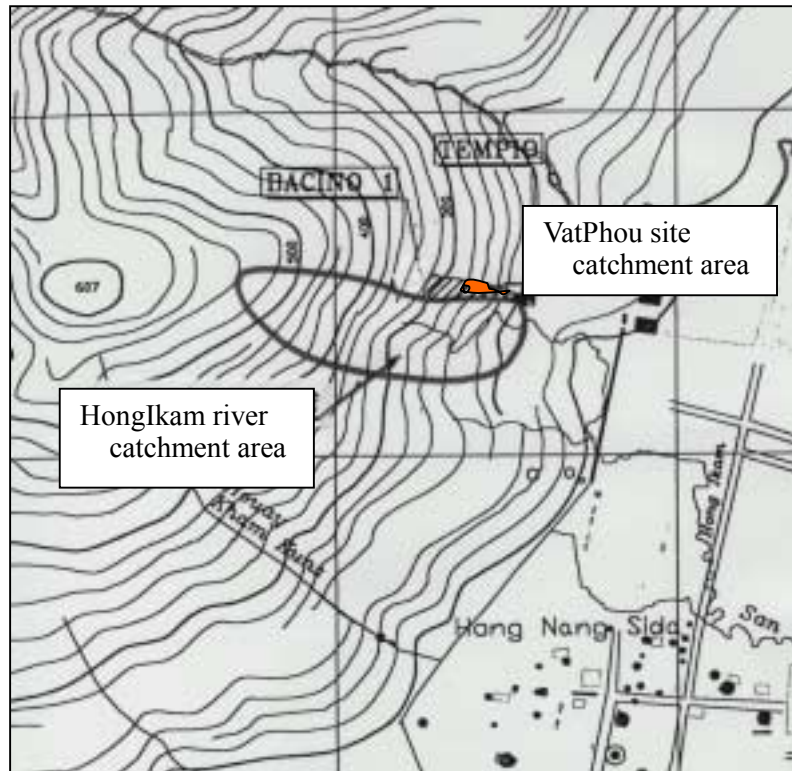


Figure 2-4 Location Map of The Catchment Areas

(2) Design of pipe culvert

1) Route of pipe culvert

The pipe culvert is to be constructed in the area between the cliff and the temple as shown in Figure 2-6. Since excavation for study was performed in the past and the location and depth of significant ancient structures are known, a route and depth (gradient) which can avoid damaging the buried structures should be designed. Especially with regard to the gradient of the pipe culvert, due care should be taken because the ancient structures are buried only 1m deep under the ground's surface.

2) Capacity of pipe culvert

The pipe culvert is planned to collect the groundwater and the surface water which flows out from the residual area downstream from the mountainside drain.

It is necessary to prepare a pipe of as large a diameter as possible in consideration of a reduction in capacity due to clogging with sand and gravel. At the same time the pipe should be flexible because the direction of the route may have to be changed in order to avoid disturbing buried structures if they are found in the way of the designed route. The diameter of the pipe is 300mm and gabions are set at the outlet of the pipe culvert to prevent the water from washing away the ground soil.

As shown in Figure 2-6, the catchment area downstream from the mountainside drain, from where the rainwater concentrates to the waterway at the back of the temple, is 0.004 km² and it is equivalent to one fourth of the catchment area upstream from the drain. If the volume of discharged water is assumed to be in proportion to the area of the catchment basin, it is approximately 0.15m³/s (0.6 / 4 = 0.15).

The capacity of the pipe culvert is calculated by Manning's formula as follows.

$$Q=AV=A \times 1/n \times R^{2/3} \times I^{1/2}$$

diameter of pipe:	Φ300mm
gradient:	I=1/30
roughness coefficient:	n=0.013(standard value by manufacturer)
hydraulic radius:	R=A/P=0.075(m)
area:	A=0.071(m ²)
wet perimeter:	P=0.942(m)

and

$$Q=0.071 \times 1/0.013 \times 0.075^{2/3} \times (1/30)^{1/2}$$

$$=0.177\text{m}^3/\text{s} > 0.15\text{m}^3/\text{s}$$

The capacity of the pipe culvert, 0.177m³/s, exceeds 0.15m³/s by 0.027m³/s and, therefore, the culvert can receive part of the rainwater discharged from the area downstream from the drain.

3) Stormwater inlet

The structure of stormwater inlet is as follows:

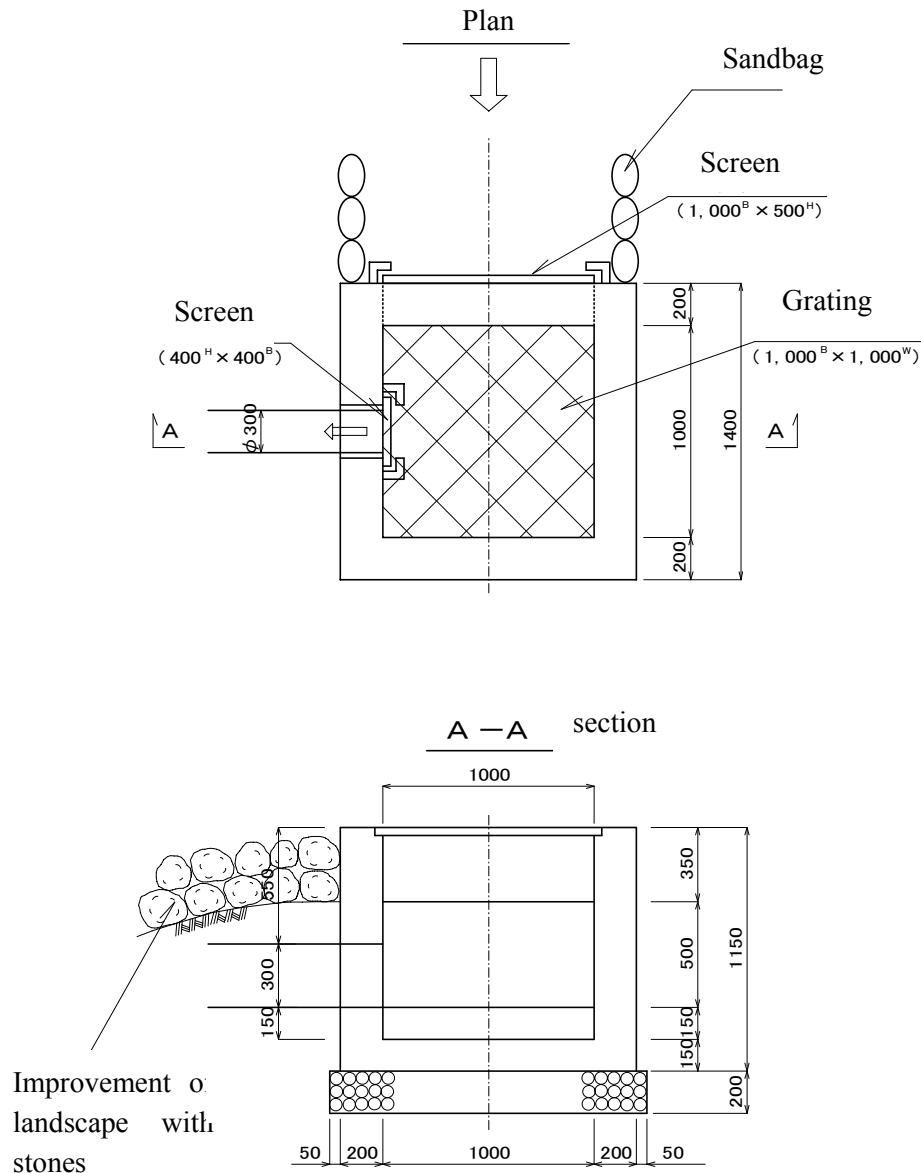


Figure 2-5 Structure of Stormwater Inlet

The screen should be prepared where the water enters and exits the storm water inlet in order to prevent solid waste and drift wood from flowing into the inlet and drain pipe. A sediment trap with a depth of 15cm should also be constructed. Grating is set on the top of the inlet so that visitors do not fall in it. Moreover, the storm water inlet will be surrounded by stones and soil to reduce the impact on the landscape.

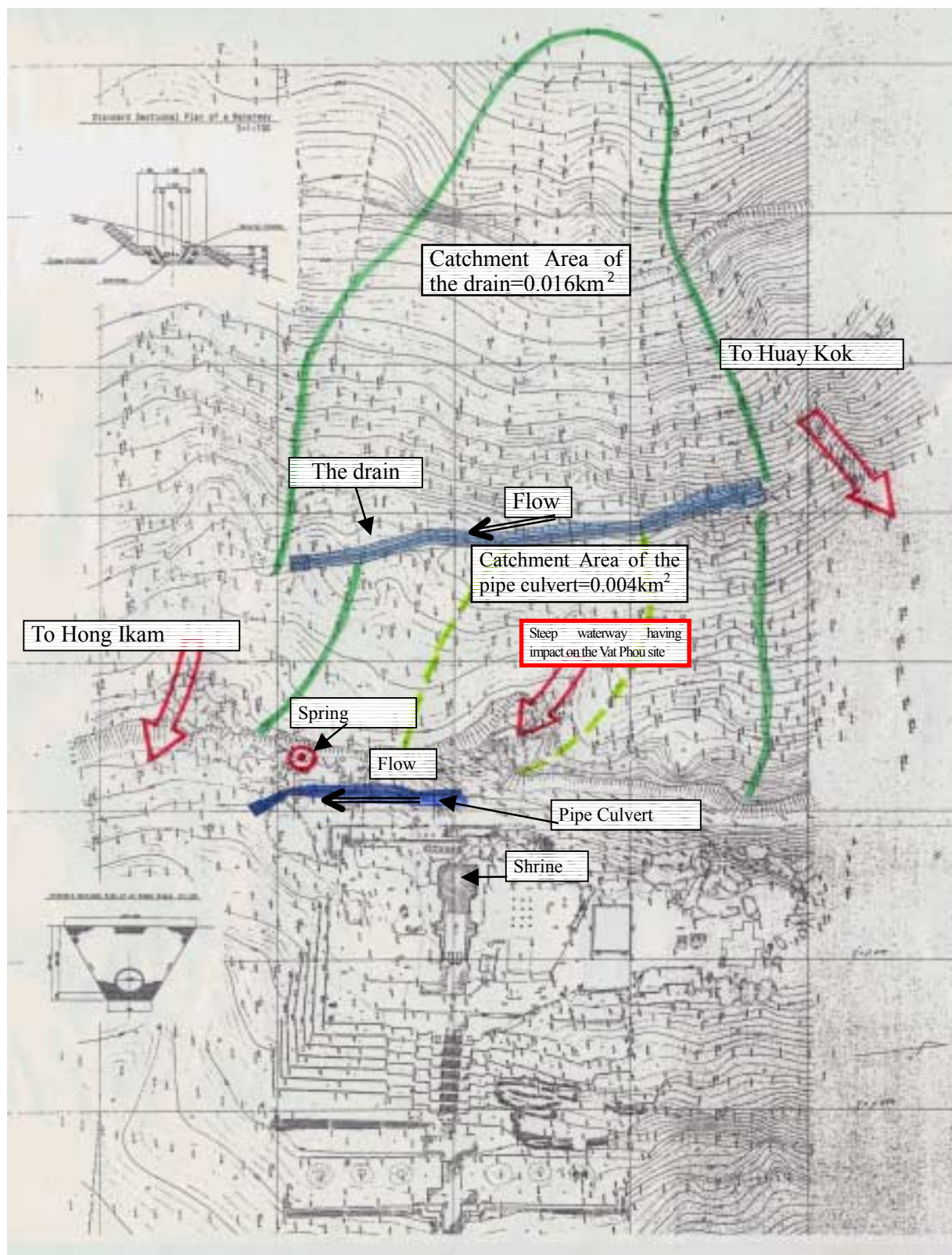


Figure 2-6 Location Map of Mountainside Drain and Pipe Culvert

2-2-2-2 Equipment for Restoration

(1) Equipment for measurement

Before starting restoration activities and moving stone structures, the position, shape and size of each stone structure must be accurately measured. Moreover, some relics have to be temporarily dismantled and then restored to their original form after reinforcement of the foundations. In order to do so, their present form will have to be recorded. Surveying instruments, measuring tape, telescopic ladders, etc. were selected as part of the restoration equipment for this purpose. Details concerning the equipment are as follows.

1) 1 total station, 2 reflecting mirrors and 2 small reflecting mirrors

Surveying instruments are required for measuring the shape of the relics and noting the coordinates. If a conventional theodolite is used, steel tape or a range finder will be needed to measure the distances, but as the oblique distance to heights must be measured in the case of stone relics, steel tape is not appropriate. The coordinates can be obtained by using both a theodolite and range finder, but there is the chance of error at each stage such as the reinstallation of the equipment, readout, recording and input of data. In this regard, the total station reduces the risk of human error and in particular, it is extremely useful for preparing detailed layout drawings of stone relics. It is as easy to operate as a theodolite and requires no particular skill. The small reflecting mirrors have been introduced for the purpose of taking the detailed coordinates of the stone structures.

2) 1 auto level and 4 levelling rods (length 5m)

A standard team for measuring work of a line requires 2 rods and 2 persons in charge of leveling rods. However, as the surface area of the relics needs to be measured, the number of people in charge of leveling rods will be raised from 2 to 4.

3) 5 measuring tapes (5m) and 3 measuring tapes (50m)

The five engineers from the Vat Phou Management Office shall each have one 5m measuring tape, and the 50m measuring tapes will be needed if the three two-man teams, including experts sent from the central MIC, are measuring at the same time.

4) 4 telescopic ladders (length 10m)

The ladders will be needed when the engineers and workers are measuring the height of the structures. Measuring the height in two places at the same time will require two ladders in each place, making a total of four ladders.

5) Scaffolding

This is used as temporary scaffolding when measuring the high points of the structures and as supports to prevent the collapse of the structures. According to experts with experience at Angkor Wat, pipe scaffolding has a wider range of uses than bitty scaffolding and is said to be particularly effective in preventing the collapse of stone structures which are in danger of collapse.

(2) Stones-moving equipment

To measure the position of stones piled up on the ground and make a flat distribution drawing, it is necessary to move the heavy stones which are on the top.

1) 1 chain block (hoisting load 2 tons, lifting height 3m), 1 chain block trolley type(hoisting load 1 tons, lifting height 3m), 4 round slings for hoisting stones and 2 clamps

This equipment is required to move the stones by manpower and store them in an appropriate place. It is possible for the work to be conducted simultaneously by two groups. Two round slings and one clamp are needed for each chain block. The clamps clamp the stone on both sides for hoisting, and are mostly used to lift one side of a stone that is on the ground in order to put the round sling around it.

(3) Equipment for recording

Hardware with a relatively large capacity, approximate CPU: 1.0GHz and editing software will be needed to input and process the measuring data. A desktop computer, printer, etc. have been selected for recording, saving and processing.

1) 1 desktop computer (Pentium III CPU1.0GHz, RAM 512MB, HDD 60GB, CD-RW, 17" CRT including Windows2000, Microsoft Office, Power Point and Photo Shop, Auto CAD Lt English)

2) A3 printer (color)

3) A1 plotter (mono-color)

4) 1 digital camera (more than 2 million pixels, zoom)

To take pictures of stone structures and record them, and prepare educational documents for local people and tourists by taking pictures of recording and restoration activities

5) 1 digital video camera(DV, CCD, 0.8 million pixels)

To record the stone structures on video, and prepare educational documents for local people and tourists by making videos of recording and restoration activities

(4) Equipment for enlightenment

It is difficult to continue preservation activities of Vat Phou for a long time without local people understanding. Therefore, the enlightenment and education of local people and high school students concerning Vat Phou heritage are indispensable. Enlightening activities for people should be implemented on occasions when local residents gather, such as the Vat Phou Festival and National Day.

Educational activities for tourist concerning the history of Vat Phou have been lacking in the past. Therefore, presentations on the historical significance of Vat Phou should be given at the site more

frequently for tourists. At the new repository it is possible to prepare some programs for explanation performed by request of tourists.

In consideration of the present state above mentioned, Laptop PC, Video Projector and so forth were selected as educational and enlightening equipment

1) 1 Laptop computer (Pentium III CPU800MHz RAM 256MB expansion, HDD 30GB, CD-RW including Windows2000)

2) 1 video projector(100inch screen with tripod)

(5) Vehicles

1) 1 pickup (4WD, double cabin, diesel, 2500cc)

The old pickup, which was provided by UNESCO's Japan and Italy Fund, has been utilized effectively, but the field to be patrolled is so vast that workers at Vat Phou Management Office have not been able to thoroughly carry out their daily duties, such as patrolling the site. Another vehicle needs to be provided because the shortage of vehicles would be even greater when restoration activities start.

2) 1 truck loaded with crane (4WD, loading capacity 4 t, hoisting load 3 t)

The main function of chain block is only to hoist stones up and down, but this truck can work as a mobile crane and transport the stones after hoisting and loading them on the bed of the truck. This truck can transfer stones of cultural importance from the Vat Phou site to the new repository and also can transport scaffolding and materials necessary for restoration.

(6) Equipment for excavation

1) 3 wheelbarrows, 10 shovels, 5 pickaxes

Wheelbarrows, shovels and pickaxes are used for excavation by hand when the necessity of excavation occurs in the process of surveying and measuring the stone structures. Shovels are prepared for 10 workers, and one pickaxe is for every two workers, and one wheel barrow is for every 3 workers. These are provided especially in this project because shovels and pickaxes made in Laos are poor in quality and not available for the excavation of stone structures.

(7) Operation Plan of Vehicles

The vehicles planned to be procured in the Project are used according to the following operation plan.

1) Pickup

Parking lot : Parking area for archaeological repository

Manager : Director of Vat Phou Management Office

Operation plan:

The staff at Vat Phou Management Office should patrol many sites and report the situation of every site to some organizations as shown in the table below. As Saturday and Sunday are fixed days off and people are working 20 days per one month in Lao PDR, the Office may have to procure another vehicle for transportation for the extra 6 days, and they can use the old pickup or the motorcycles provided through UNESCO many years ago.

Table 2-9 Operation Plan of Pickup Truck

NO	Sites and Institution to be accessed	Distance from new Vat Phou Management Office (round trip:km)	Frequency
1	Vat Phou Temple	1.4	Several times a day for contact Transport of equipment for measurement and team of 5-8 engineers 0.5x20days=10days 10days/month
2	Hong Sida Temple	2.4	1 day / week 4days /month
3	Thao Tao Temple	4.8	
4	Tomo Temple	66	
5	Ancient City	10	(area =2kmx1.8km)1 day /month
6	UNESCO house	20	Every day when Teams of French, Italian and Japanese are staying In other case 1time/week 4 days /month
7	PDIC(in Pakse)	92	1 day/week reporting 4 days /month
8	MIC(in Vientian)	1,200	Reporting 3 days /month
			Total 26 days /month

2) Truck loaded with crane

Parking lot : Warehouse of restoration equipment

Manager : Director of Vat Phou Management Office

Operation Plan: Whenever the lifting or moving of stones is required, the truck loaded with crane is operated together with chain blocks. Working days of this vehicle will be 200 days per year and three hours per day.

(8) List of equipment

Equipment to be procured are as shown in Table 2-10.

Table 2-10 List of Equipment for Restoration

Item	Equipment	Specification	unit	Qty
Measurement	1.Total station	Angle accuracy: more than 5", Distance: more than 1,200m,including data collector and software for calculation	Set	1
	2.Reflecting mirror	1element prism	Set	2
	3..Small reflecting mirror	With pole and tripod	set	2
	4.Tripod	Aluminum	Set	
	5.Auto level	With tripod	set	1
	6.Leveling rod	5m aluminum	Set	4
	7.Reflecting sheet	20 mm x 20 mm	piece	1000
	8.Measuring tape 5m		Set	5
	9.Measuring tape 50m	Glass fiber	Set	3
	10.Telescopic ladder	Length 10m, Aluminum	Set	4
	11.Scaffolding	Pipe 48.6 mm, L=6m, cramp, straight joint, jack base, fframe, etc.	Lump sum	1
Stone-moving equipment	1.Equipment for hoisting	Chain block (2t, height3m) 1set, chain block trolley type (1t, height3m) 1set, cramp (400kg) 2sets, round sling (2t, L =3m) 2sets, round sling (3t, L=4m) 2sets	Lump sum	1
Equipment for recording	1.Desktop computer	Pentium III, CPU1.0GHz, RAM 512MB , HDD60GB, CD-RW, 17"CRT, including Windows2000, Microsoft Office, Power point, Photo shop, AutoCAD Lt Eng	Set	1
	2.A3 printer	Inkjet color, connector cable, English manual	Set	1
	3.A1 plotter	Mono-color, connector cable, English manual, spare ink 10sets, paper 10 sets	Set	1
	4.Digital camera	2 million pixels, zoom	Set	1
	5.Digital video camera	DV system, CCD element; 800 thousand pixels	Set	1
Equipment for enlightenment	1.Laptop computer	Pentium III, CPU800MHz, RAM 256MB, HDD30GB, CD-RW, Windows2000	Set	1
	2.Video projector	1500 ANSI LM, 100 inch screen with tripod	Set	1
Vehicles	1.Pickup	4 WD, double cabin, diesel, 2500cc	Set	1
	2.Truck loaded with crane	4 WD, loading capacity :4t, hoisting load 3t, 4step boom (rotary diameter of crane: 10m)	Set	1
Equipment for excavation	1.Wheelbarrow	Capacity 2 feet ³	Set	3
	2.Shovel	Round type	Set	10
	3.Pckaxe		Set	5

2-2-2-3 Repository for Archaeological artefacts

The rooms and area of the repository are as follows.

(1) Repository storage room

The purpose of the repository is to store artefacts collected in future surveys, in addition to the artefacts currently stored in the UNESCO House. Artefacts can be brought in from outside directly by a truck with crane from the shuttered entrance of the south wall. The capacity of the repository is a maximum of about 300 items.

(2) Data room

The data room is for recording the characteristics and size of the stored artefacts and filing the research data. A computer is installed to input, process and output the data relating to the measurement of the cultural structures.

(3) Exhibition room

The exhibition room is for displaying artefacts excavated in future surveys in addition to the artefacts currently stored in the UNESCO House. The capacity of the exhibition room will be a maximum of about 300 items. The exhibition room also serves as a repository.

(4) Reception and administration office

This is where the staff carry out maintenance of the repository and Vat Phou Temple Complex. They sell tickets to tourists visiting the exhibition room and act as guides.

(5) Common space

This includes the entrance hall, toilets and kitchen space.

Table 2-11 Facilities of Repository

Facilities	Content	Basis	Area(m ²)
Repository Storage room	Approx.300 pieces	$300p \times 0.5(m^2/p)=150m^2$ +	180.0
Data room	Data storage space / Recording /Documentation	Data storage space= $30m^2$ Recording/Document= $30m^2$ Total= $60m^2$	60.0
Exhibition room	Approx.300pieces	$300p \times 1.5(m^2/p)= 450m^2$	480.0
Reception /Administration	Director(1) • Deputy(2) Engineer + Admin(12)	Direct • Deputy(1+2) $\times 10(m^2/pers)$ + $12p \times 5(m^2/pers)=90m^2$	90.0
Common space	Toilet/entrance hall etc.	-	150.0
Total			960.0

Space for two members of staff can be obtained in the data room

(6) Parking space

In the past, few tourists visited Vat Phou by car, but with the construction of a bridge over the Mekong river enabling access overland from Thailand to Laos, in recent years the number of tourists coming by car has increased. As there is no detailed data showing the use of vehicles, , the number of cars was calculated on the basis that 80% of tourists come by car with five passengers per car. By this calculation, the number of cars visiting Vat Phou in 1999 and 2000 was 10 and 16 per day respectively. Future estimations reckon a 24% increase per year, based on the growth rate of tourists arriving at Vat Phou over the eight years from 1992 to 2000. The results are shown in Table 2-12.

As 50% of the tourists come in the morning and 50% in the afternoon, a total of 34 parking spaces are secured. This will be sufficient parking from 2003, when the exhibition room opens, until 2006, but will likely not suffice from 2007 onwards. However, according to development plans for Champasak Province, the land around the repository will be cleared and a large area secured on the south side of the repository, so it should be easy to provide parking space after 2007.

Table 2-12 The Estimated Number of Visitors in the Past and Future

Year	National Visitors	Foreign Visitors	Total Visitors	Growth Rate	Persons A day	Number of Vehicles
1992	2,717	1,195	3,912	28.43	11	3
1993	2,159	1,812	3,971	1.51	11	3
1994	2,550	2,207	4,757	19.79	13	4
1995	3,092	3,513	6,605	38.85	18	5
1996	2,635	3,723	6,358	-3.74	17	5
1997	2,282	4,150	6,432	1.16	18	5
1998	3,662	3,970	7,632	18.66	21	6
1999	6,673	7,322	13,995	83.37	38	10
2000	14,251	8,634	22,885	63.52	63	16
2001	17,671	10,706	28,377	24.00	78	20
2002	21,912	13,276	35,188	24.00	96	24
2003	27,171	16,462	43,633	24.00	120	30
2004	33,692	20,413	54,105	24.00	148	37
2005	41,779	25,312	67,090	24.00	184	46
2006	51,805	31,386	83,192	24.00	228	57
2007	64,239	38,919	103,158	24.00	283	71

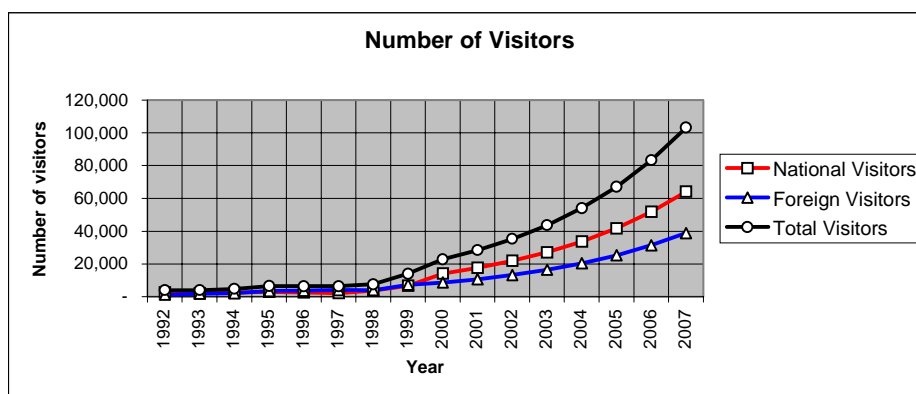


Figure 2-7 The Estimated Number of Visitors

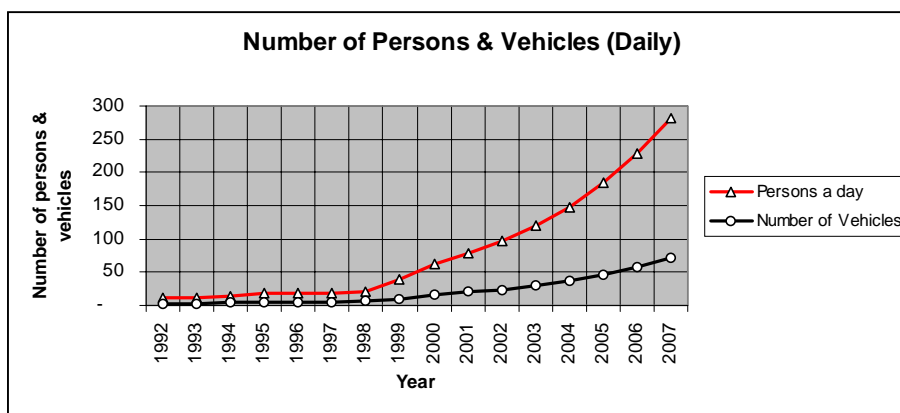


Figure 2-8 The Estimated Number of Visitors and Vehicles

(7) Ventilation

1) Exhibition room

Judging from the number of estimated visitors in future, it is not expected that there will always be visitors in the exhibition room during opening hours, and air-conditioning would not be economical. Therefore, the room will be air conditioned by a fan, ventilating openings in the top and bottom of the wall, as well as a mechanical exhaust. These are turned on when there are visitors and the fan and mechanical exhaust turned off when there is no one in the hall to save running costs.

2) Administration office and data room

Air conditioning equipment will be installed as the staff will be working during opening hours.

3) Repository storage room and common space

Air conditioning equipment will not be installed.

(8) Display Plan

The floor area of the exhibition room was calculated based on the room being used to its maximum capacity (considering the required number of tables and partitions) and the number and shape of the tables was decided, taking into consideration the number and size of the artefacts, which have been selected for display among those stored in the warehouse. At the same time material for tables and partitions was restricted to just one that can be provided in Laos PDR because renovation of display in the future must be done by the Laos side. The size and number of tables and partition are shown in Table 2-13.

Table 2-13 Number of Tables and Partitions

Type	Size (unit: mm)	Number
A	300x300x100	28
B	1000x500x(300 & 100)	2
C	500x500x(300 & 100)	1
D	1000x200x100	1
E	300x500x(150 & 50)	5
F	1000x1000x1000	120
G	1000x1000x1100	11
H	1200x600x(900+500)	2
I	1200x600x(900+300 & 900+200)	2
J	1200x600x(900+700)	3
K	1200x600x(1100+500)	5
L	1000x1000x(1100+500)	3
M	1500x1500x600	10
N	1000x500x(1200 & 300)	20
		Total 213
	Partition 2000x2000x250	22
	Partition 3000x2000x250	23

An ad hoc committee set up newly on the Laos side will plan the display of the artefacts and a Japanese consultant will support the activities. The layout of the display in the exhibition room will be planned according to the themes shown below.

Introduction to the History of the Preservation Project in Vat Phou

History of Vat Phou and the Champasak Area

i) Pre-Angkorian Period

ii) Angkorian Period

iii) Post-Angkorian Period(Lan Xang Period)

Hinduism and Its Art

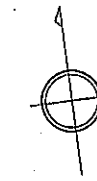
Buddhism- The National Religion

2-2-3 Basic Design Drawing

The plan and the structure of drain and pipe culverts are as follows:

1:500

VAT PHOU MONUMENT SITE



LEGEND

- House
- Standard Point
- Spot height
- Fence
- Prominent tree
- Rice field
- Broadleaved tree
- Uncultivated land
- Bamboo
- Stone steps
- Stonewall
- Stone masonry
- Index contour
- Intermediate contour
- Supplementary contour
- Bare rock
- Cliff

Index Contours at 8m Vertical Interval
Intermediate Contours at 1m Vertical Interval
Supplementary Contours 0.8m Vertical Interval
Field Survey 2001, June

The maps were prepared by Japan International
Cooperation Agency (JICA) in 2001 for Ministry of
Information and Culture, Lao People's Democratic Republic.

This topographical map was created based on the arbitrary
local coordinate system and the altitude system

SP. 3 X=1965.330 Y=1615.202
SP. 4 X=2030.691 Y=1611.603

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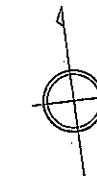
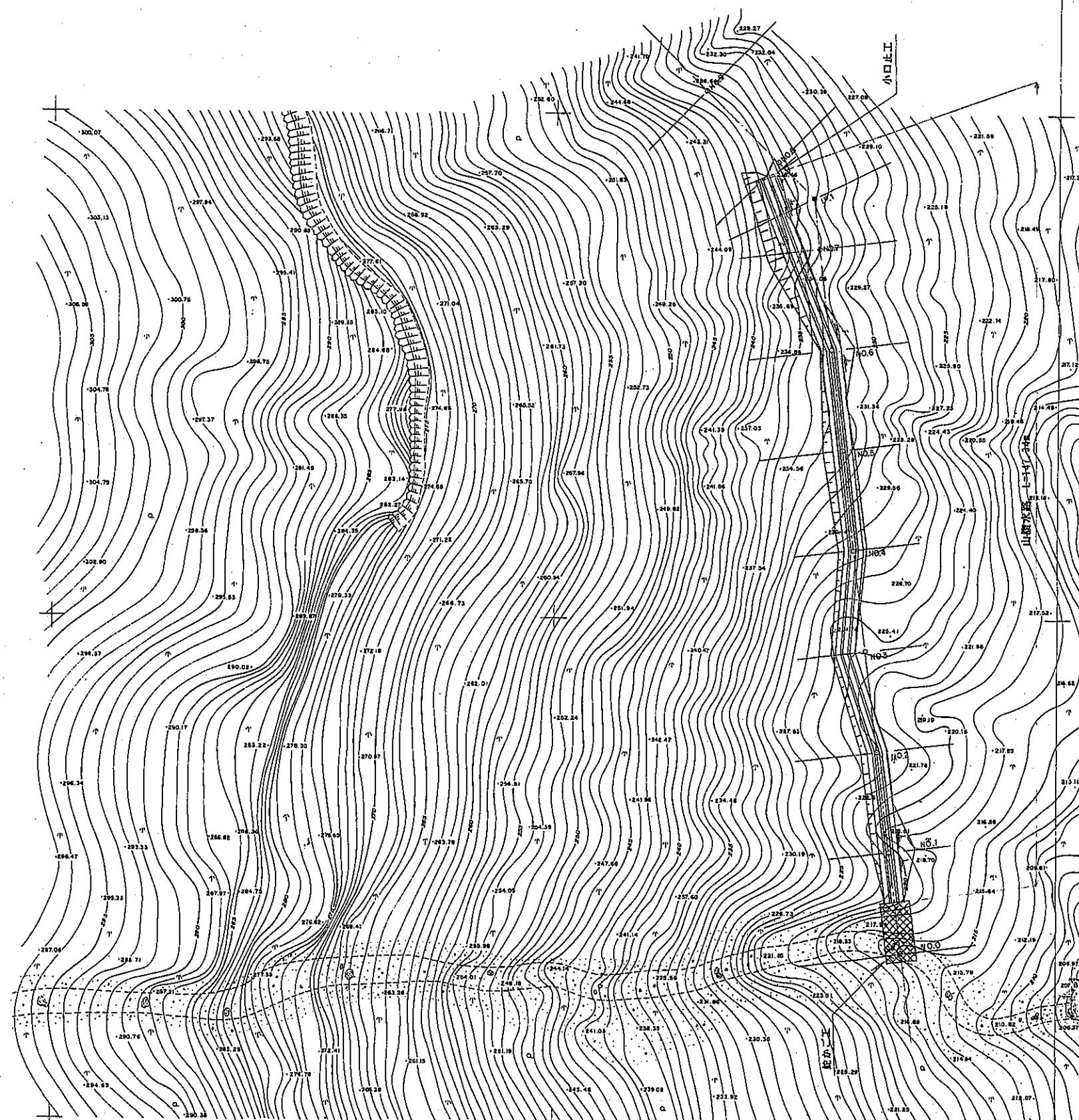
Plan of Pipe Culvert



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1:500

VAT PHOU MONUMENT SITE



LEGEND

- House
- Standard Point SP 101.485
- Spot height 125.32
- Fence
- Prominent tree
- Rice field
- Brook/leaved tree
- Uncultivated land
- Bamboo
- Stone steps
- Stonewall
- Stone masonry
- Index contour
- Intermediate contour
- Supplementary contour
- Bare rock
- Cliff

Index Contours at 5m Vertical Interval
Intermediate Contours at 1m Vertical Interval
Supplementary Contours 0.5m Vertical Interval
Field Survey 2001, June

The maps were prepared by Japan International
Cooperation Agency (JICA) in 2001 for Ministry of
Information and Culture, Lao People's Democratic Republic.

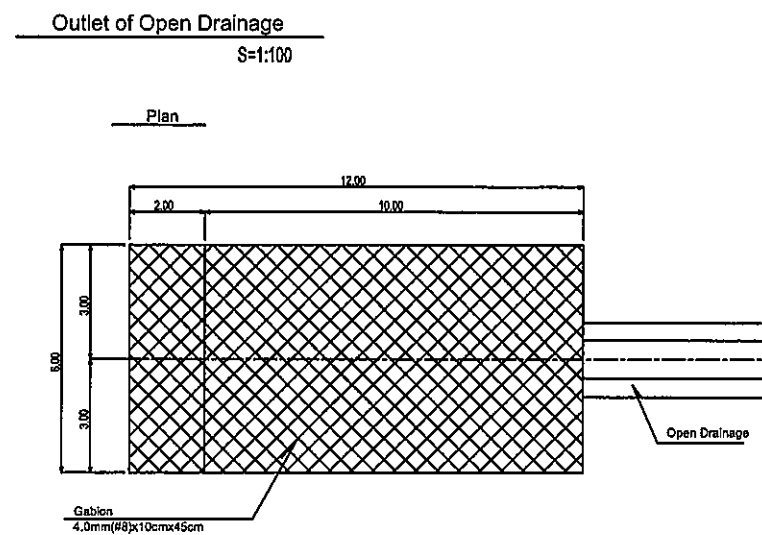
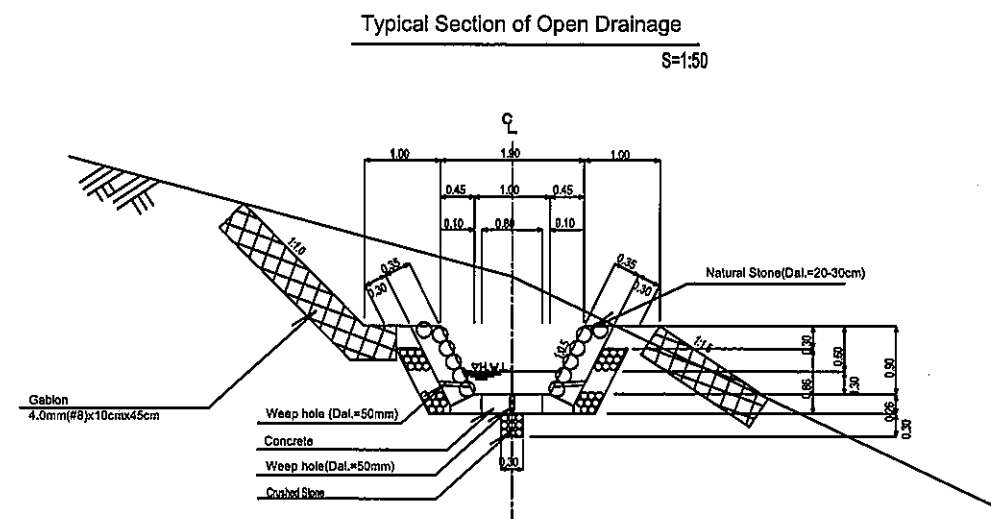
This topographical map was created based on the arbitrary
local coordinate system and the altitude system

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CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

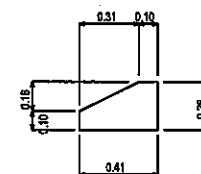
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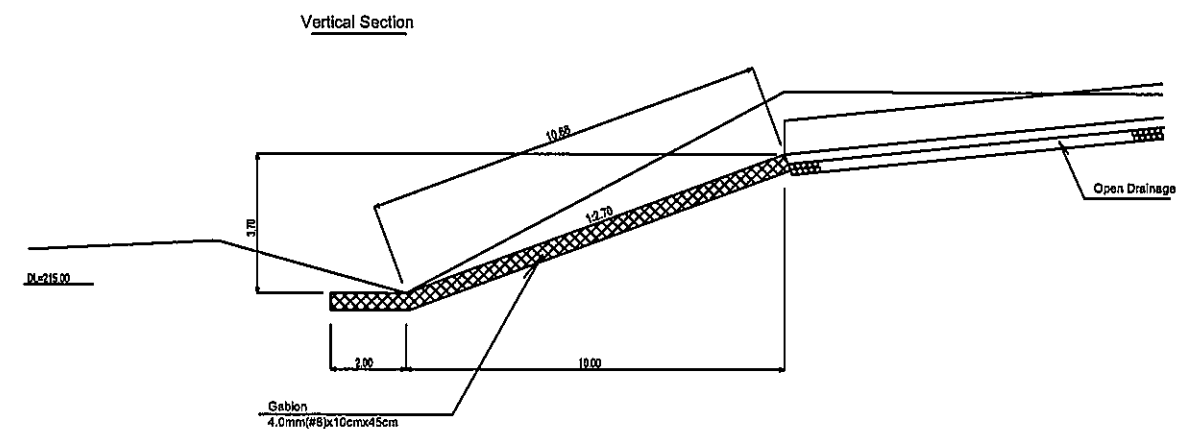
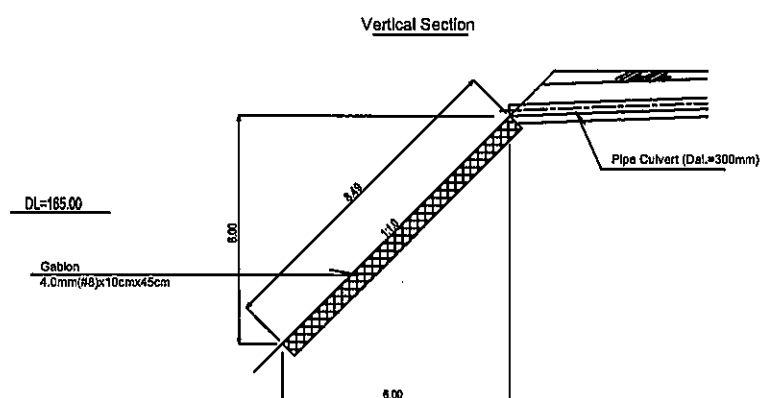
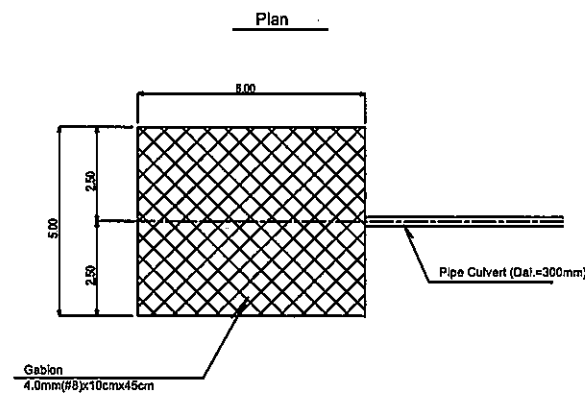
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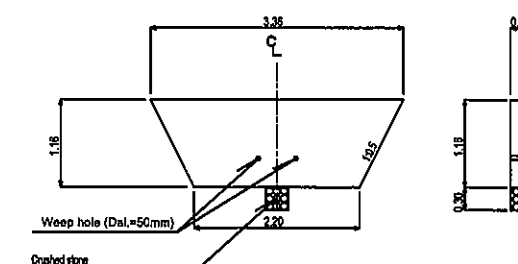
Basement of Open Drainage
S=1:20



Outlet of Pipe Culvert
S=1:100



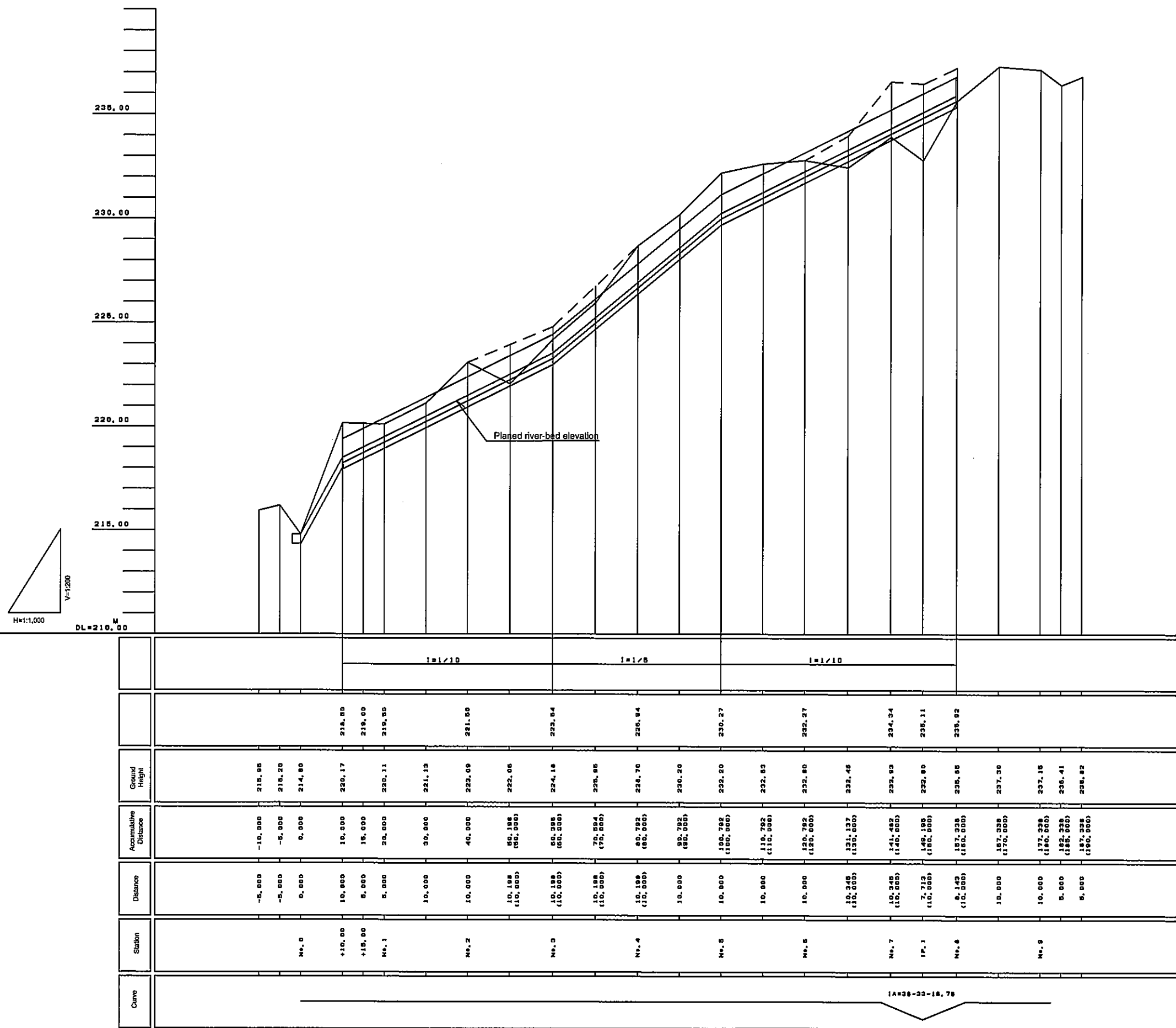
Section End of Open Drainage
S=1:50



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CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

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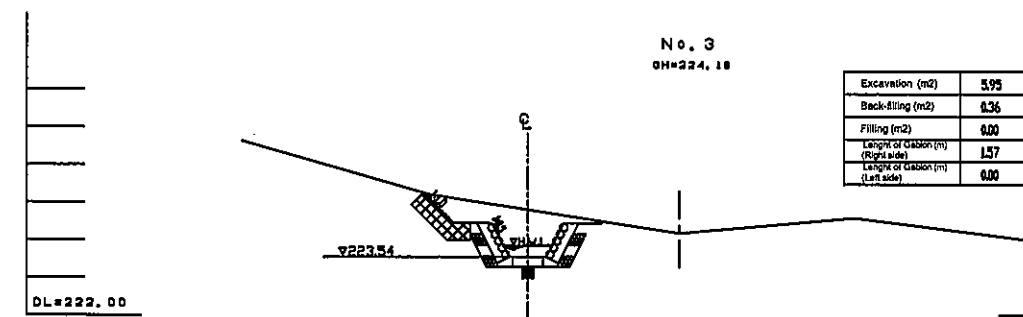
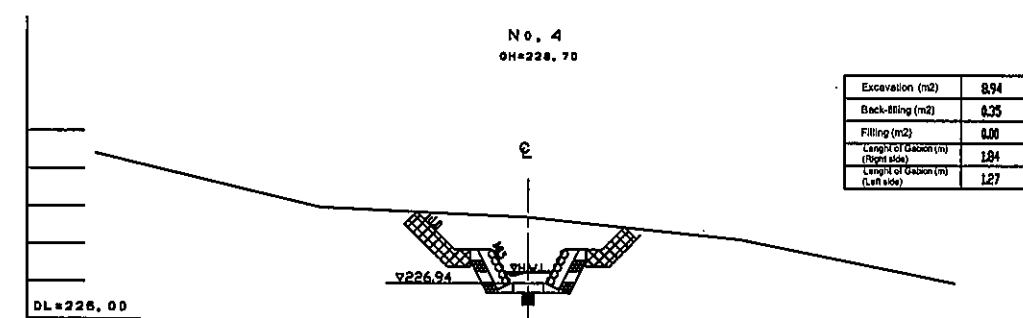
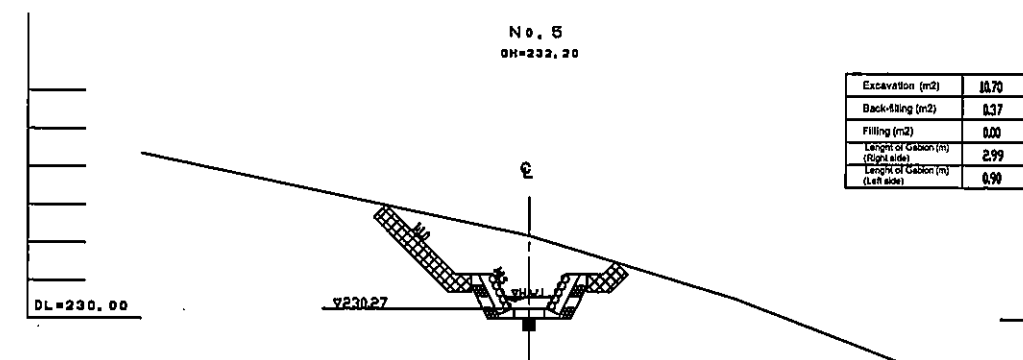
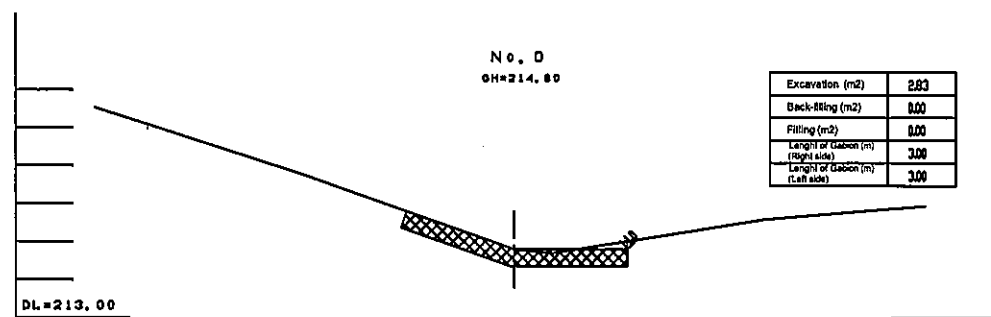
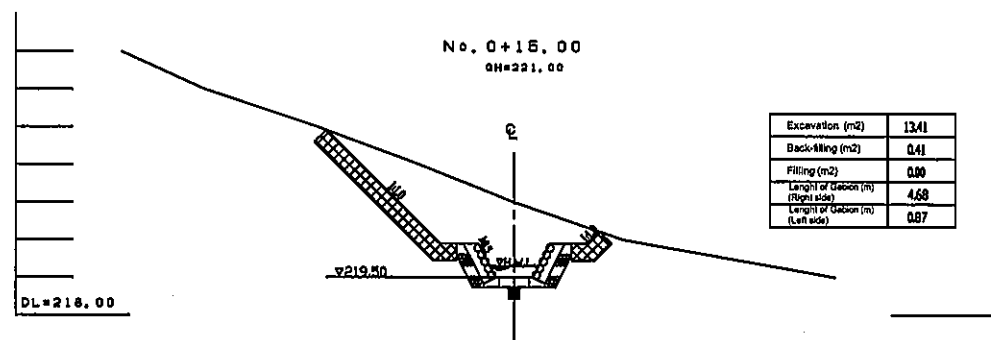
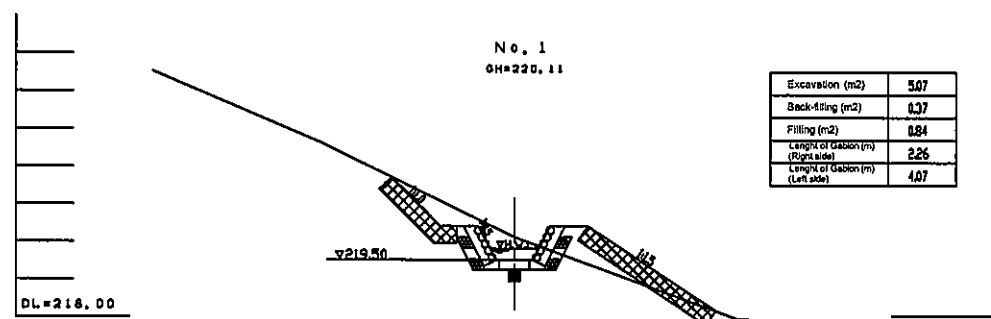
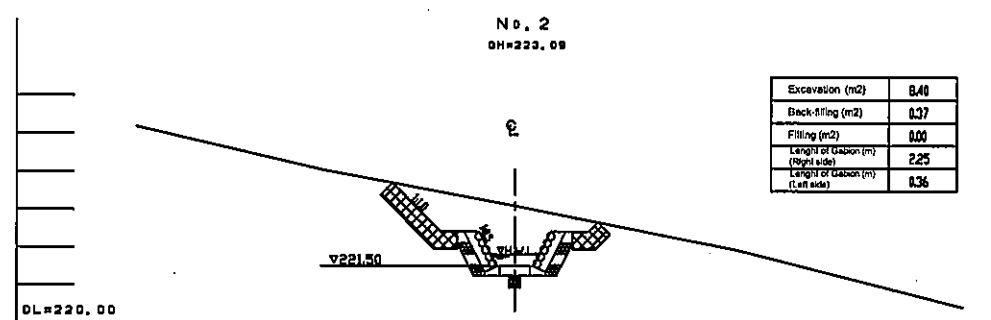
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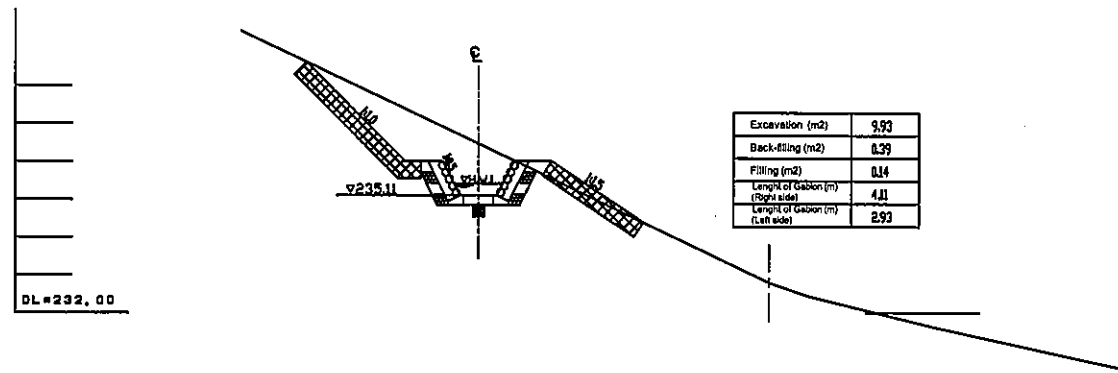


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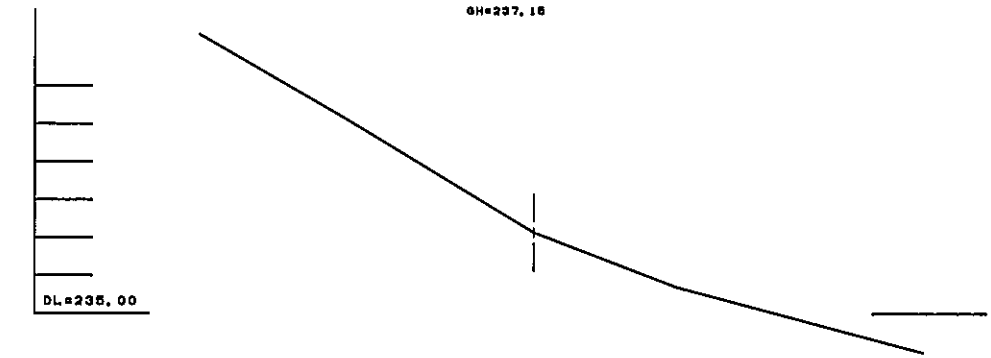


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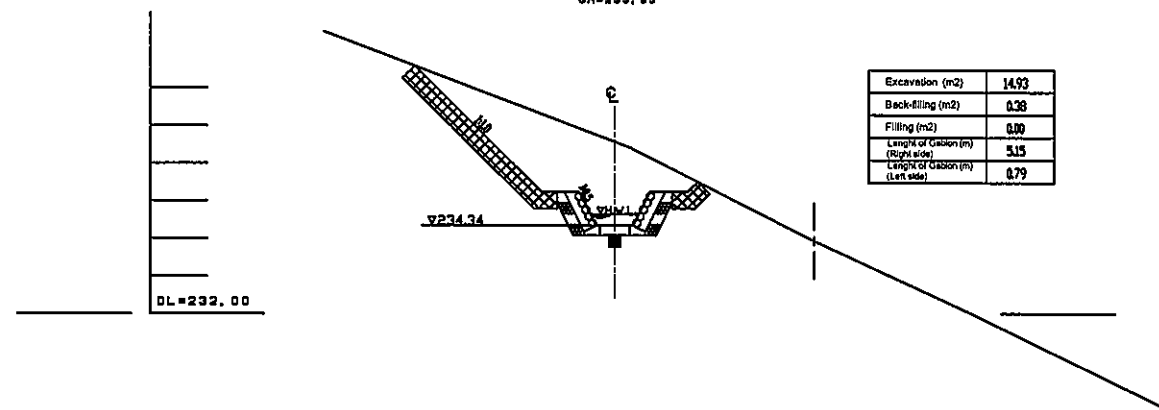
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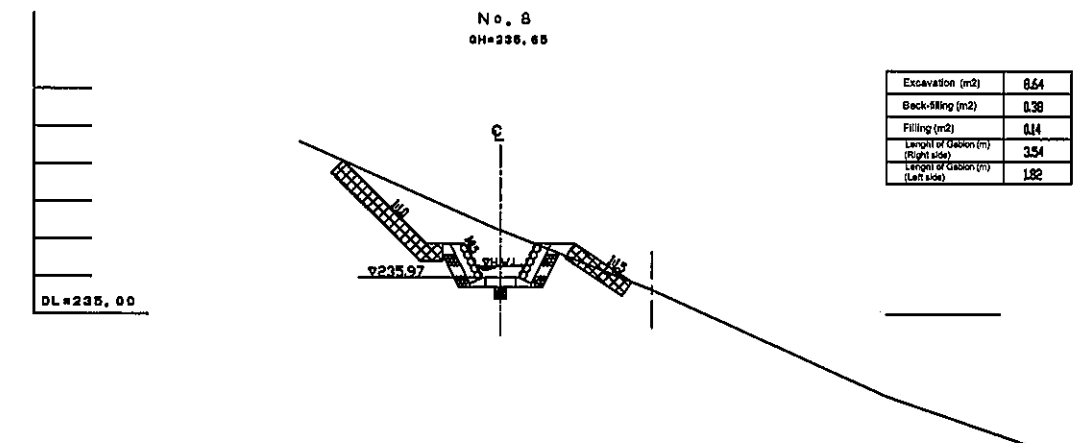
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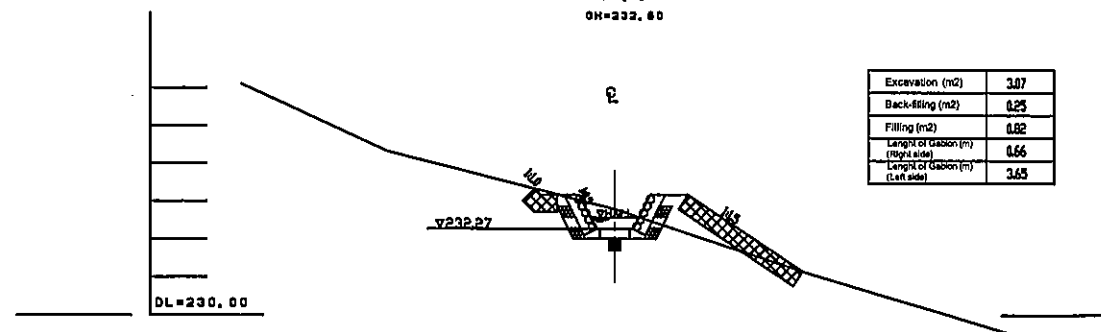
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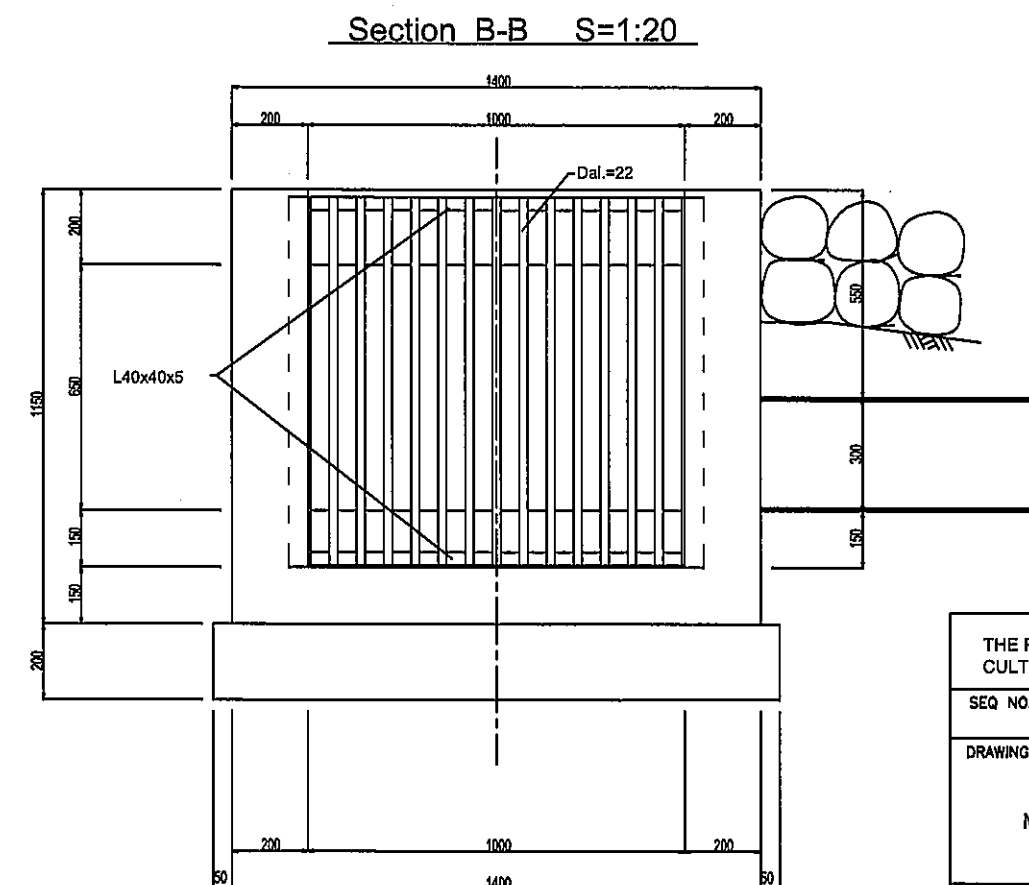
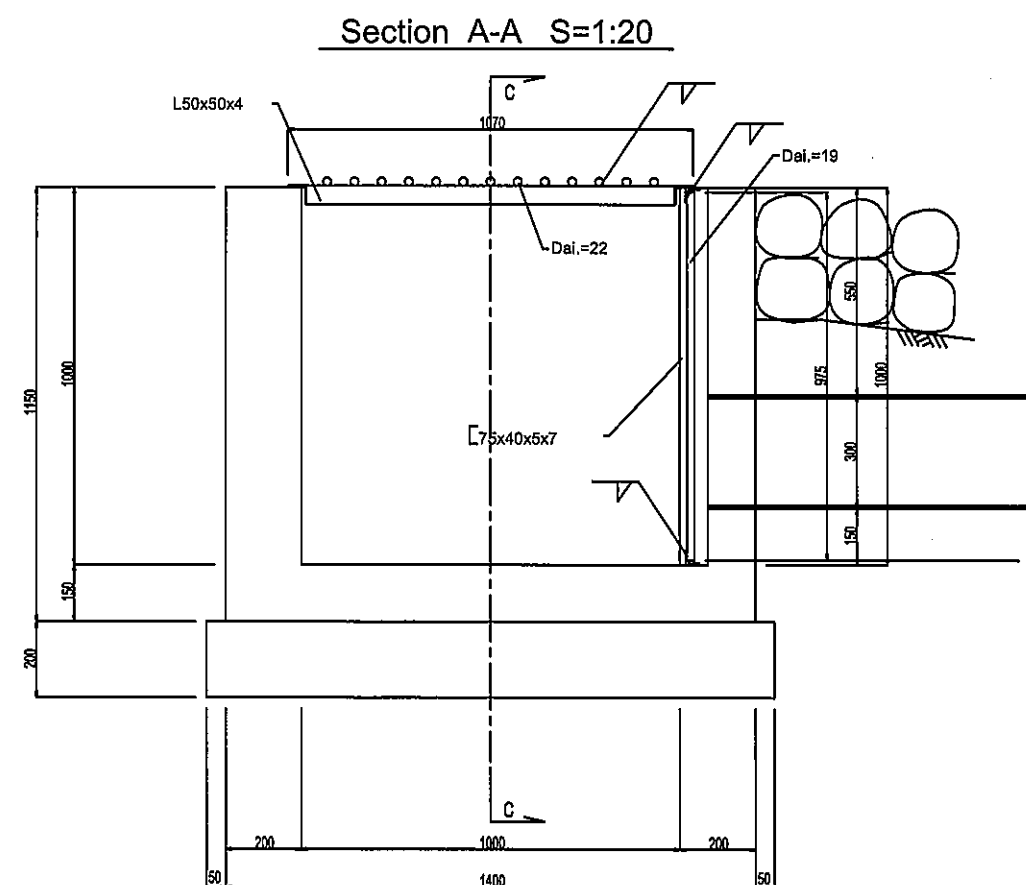
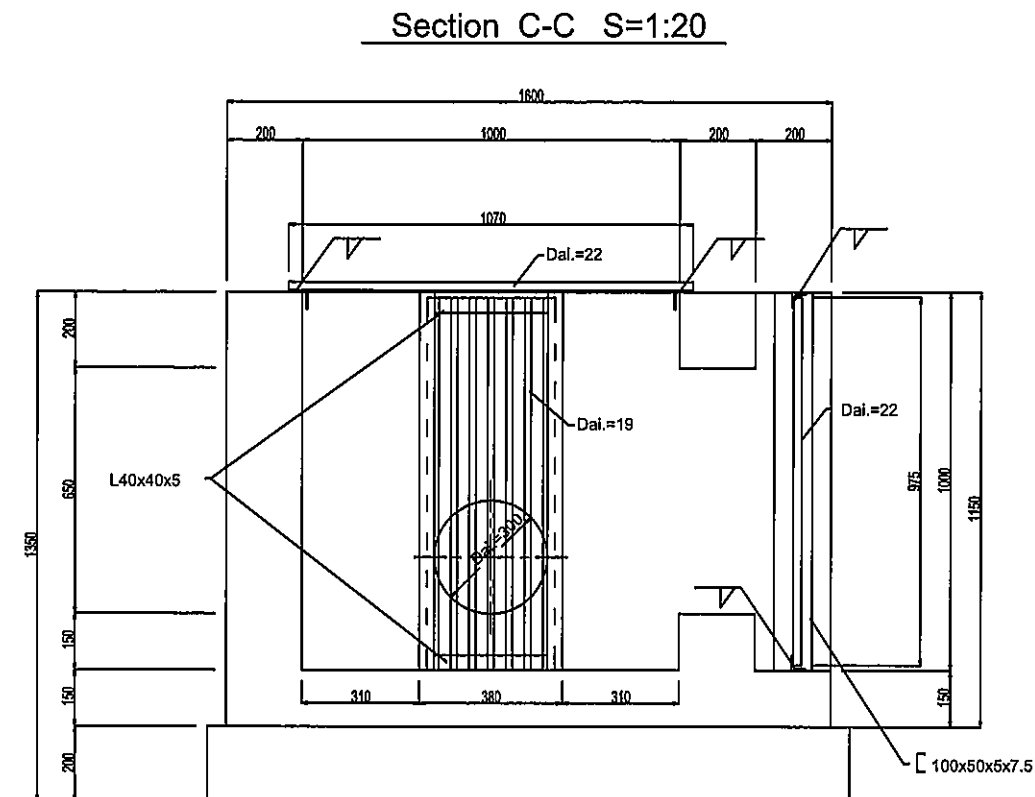
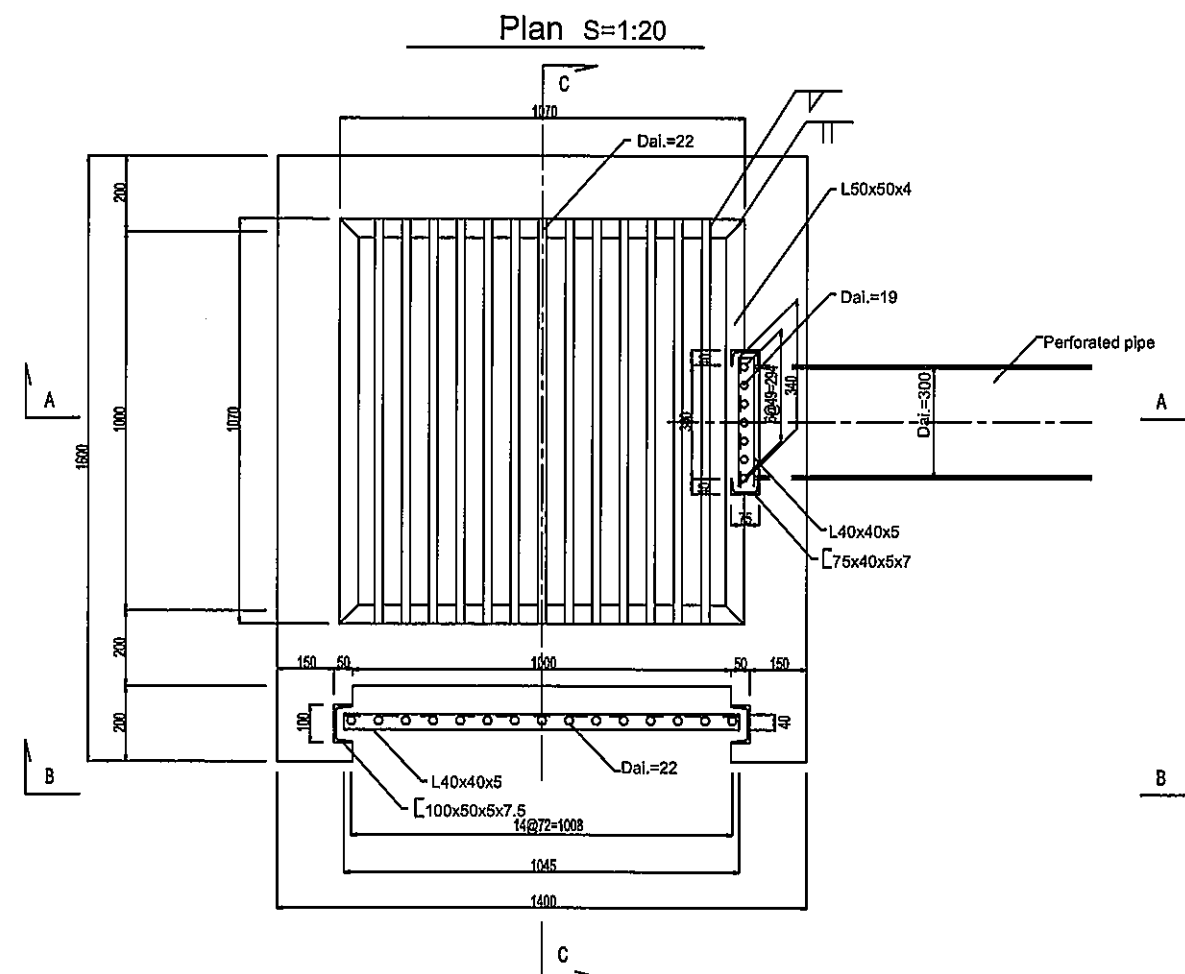



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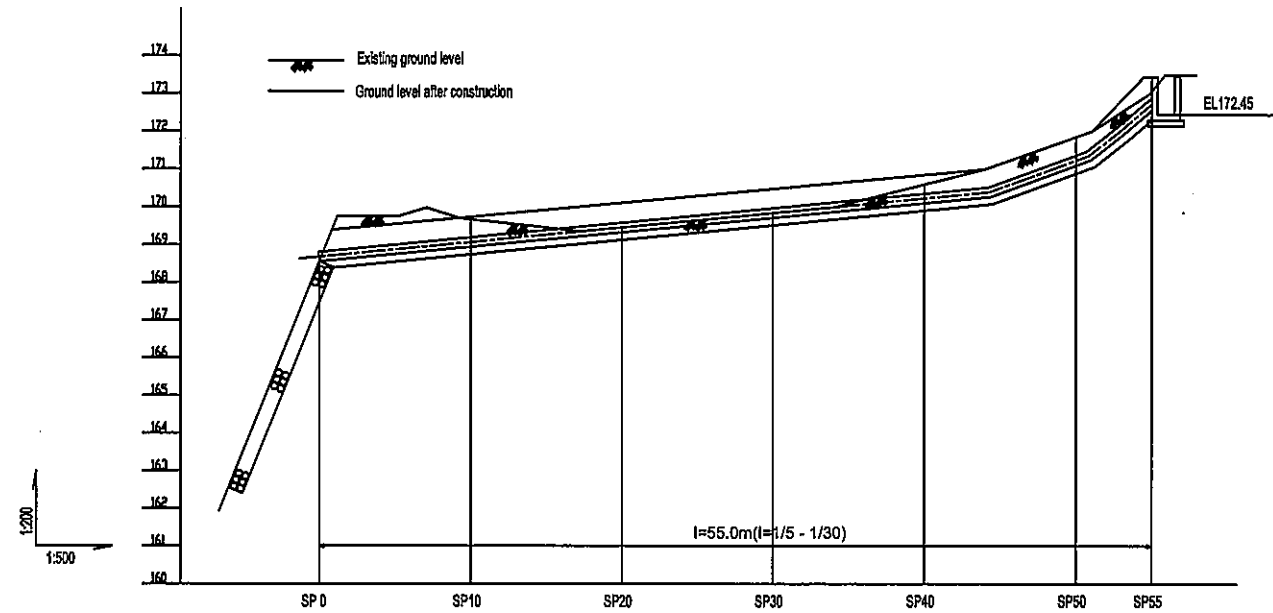


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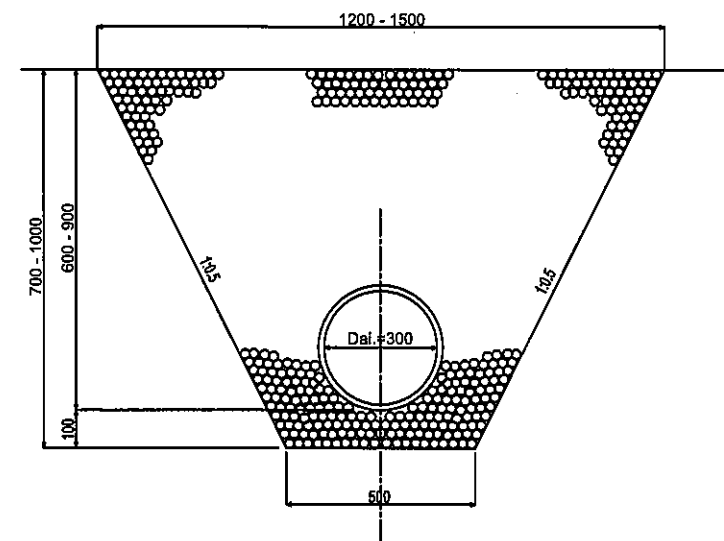


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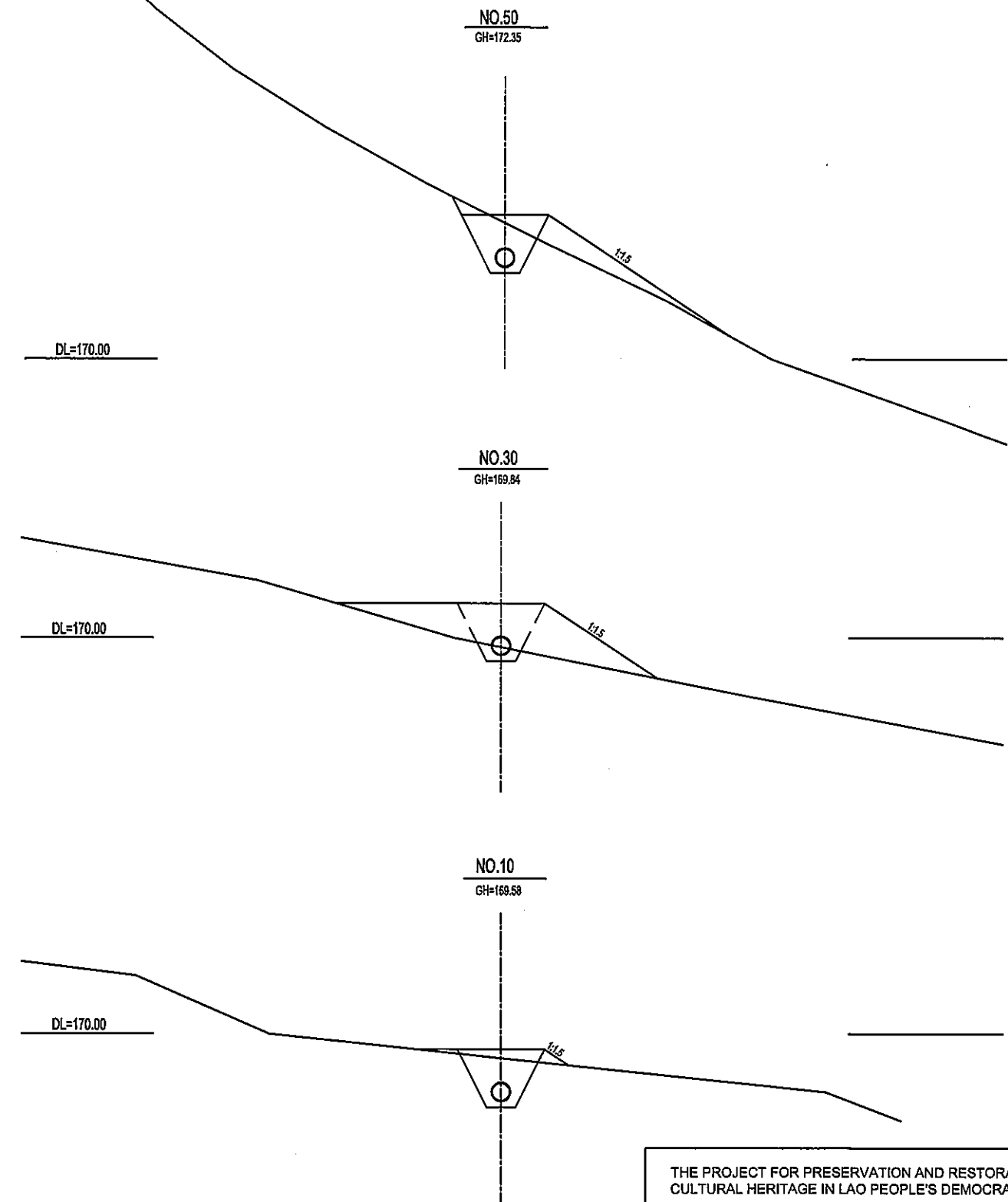
Vertical Section of Pipe Culvert HS=1:500 VS=1:200




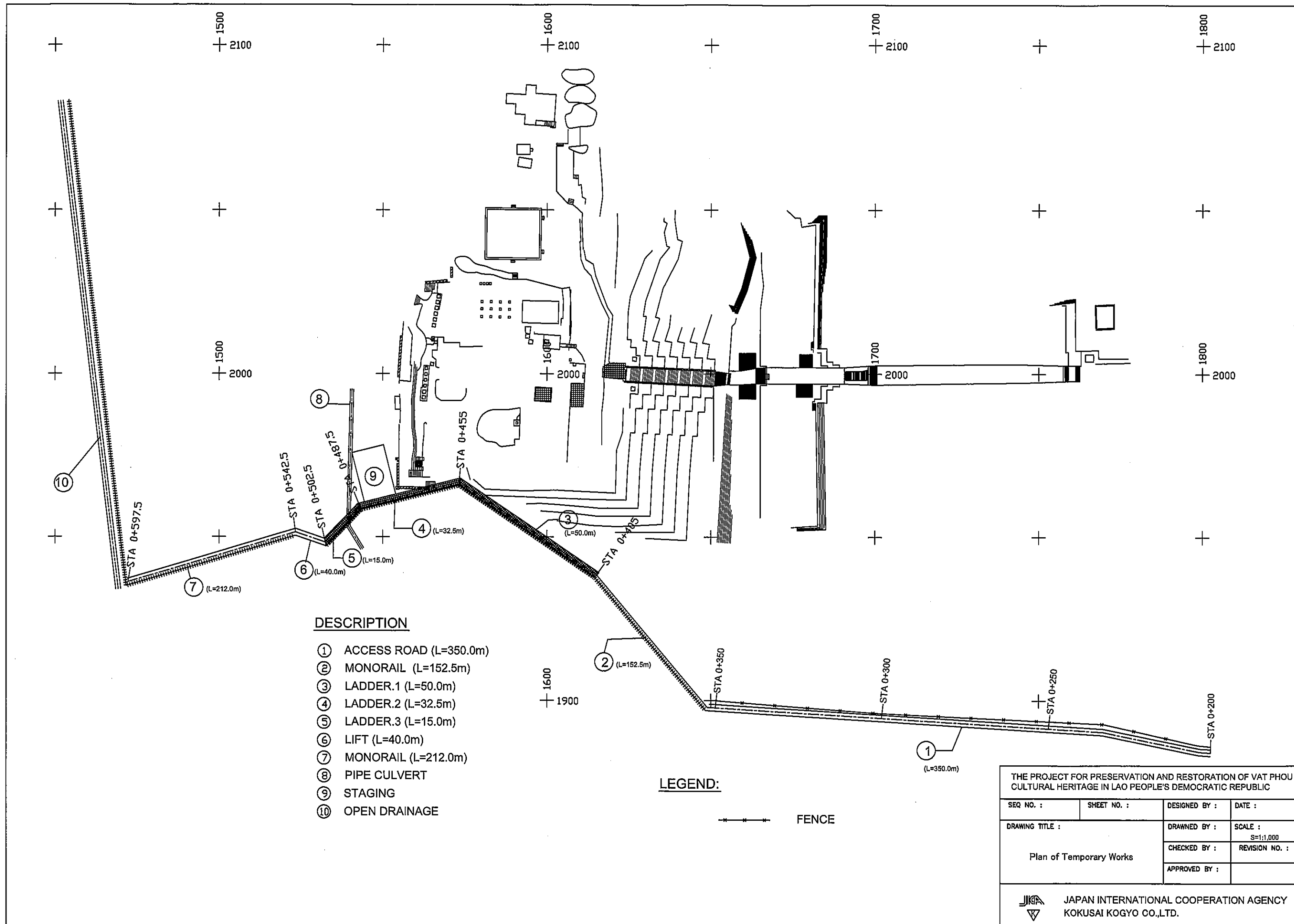
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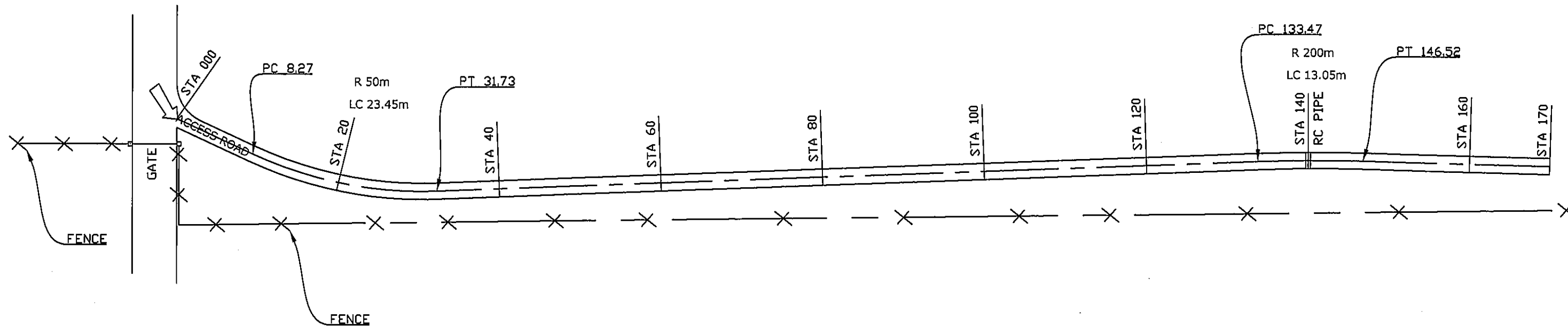


Cross Section of Pipe Culvert S=1:100

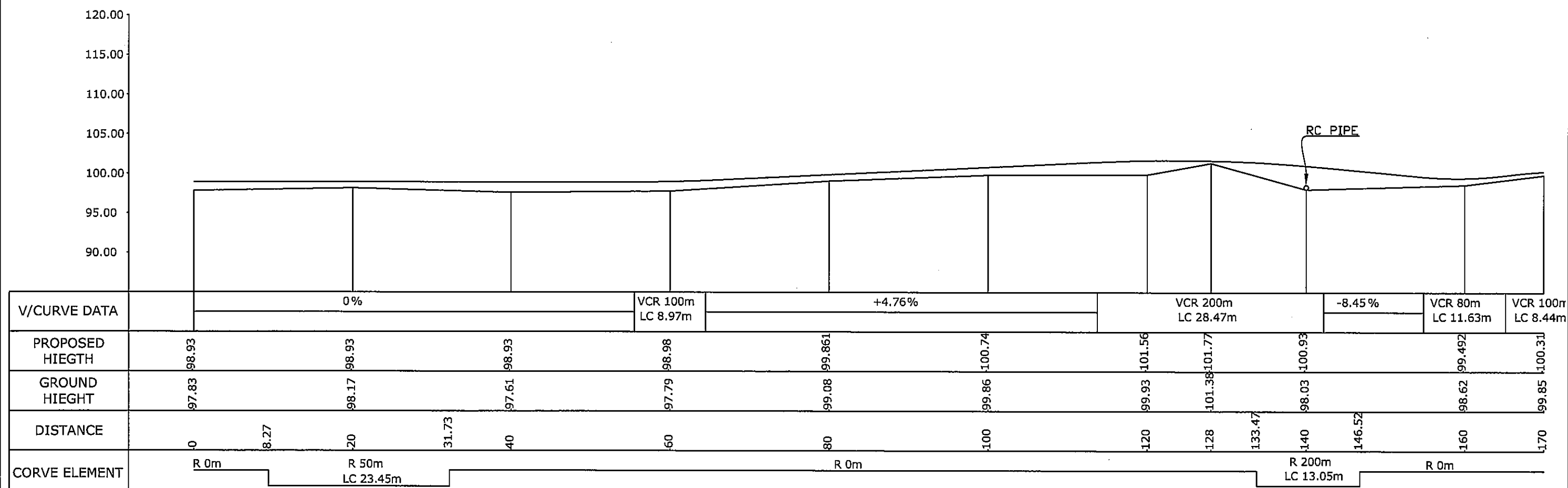


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE :
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO.,LTD.			





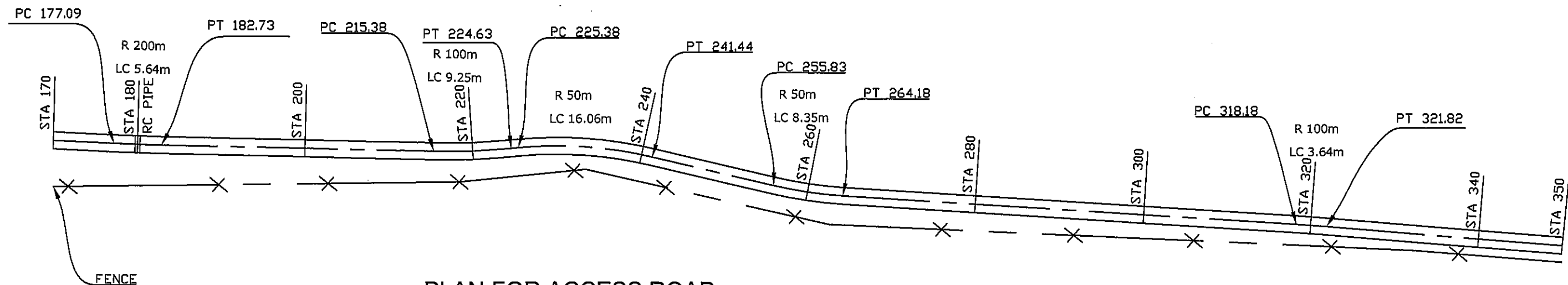


PLAN FOR ACCESS ROAD

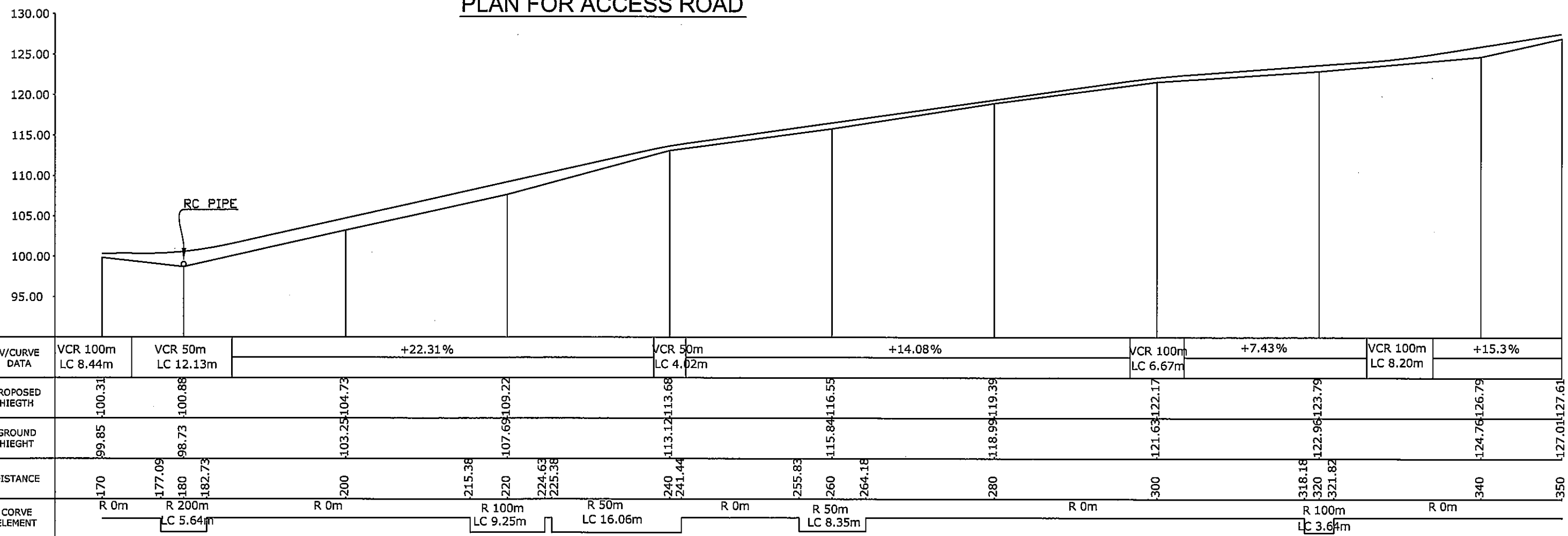


PROFILE FOR ACCESS ROAD


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE : Plan & Vertical Section of Temporary Road 1		DRAWN BY :	SCALE : S=1:500
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY  KOKUSAI KOGYO CO.,LTD.			



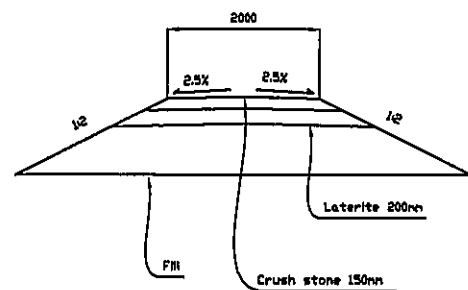
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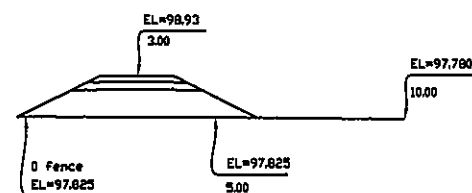
PROFILE FOR ACCESS ROAD

THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE : Plan & Vertical Section of Temporary Road 2		DRAWN BY :	SCALE : S=1:500
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO.,LTD.			

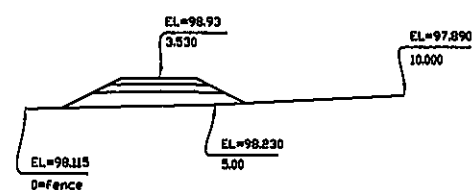
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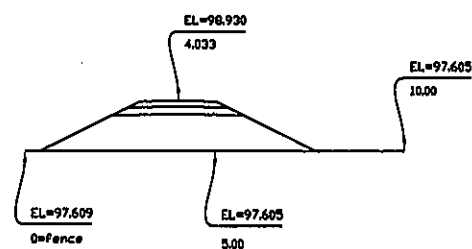
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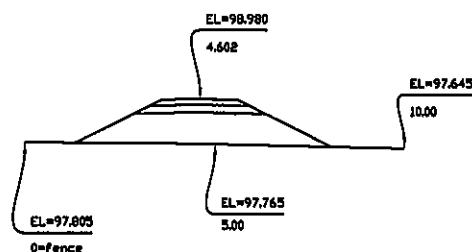
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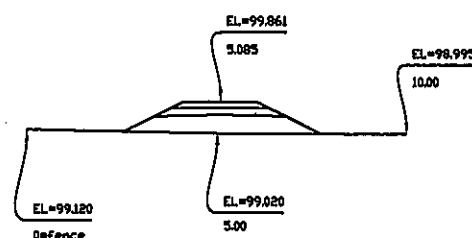
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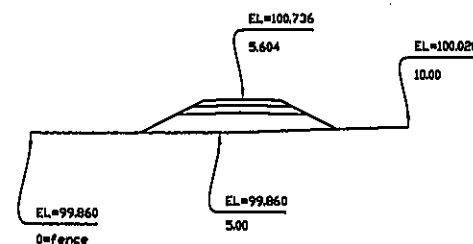
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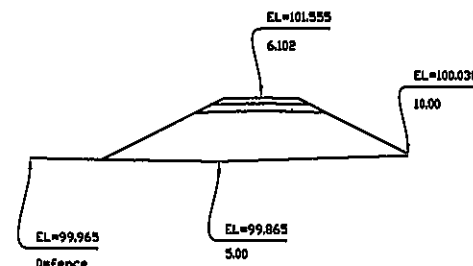
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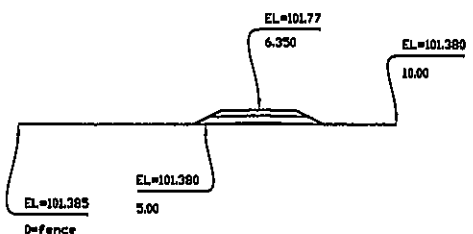
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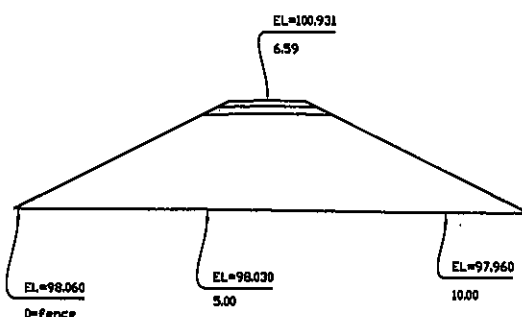
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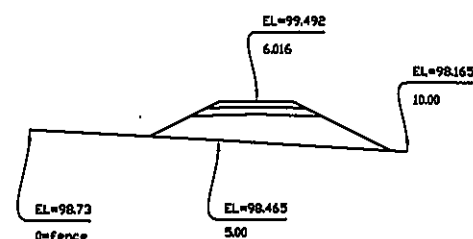
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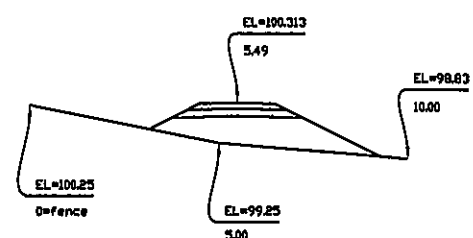
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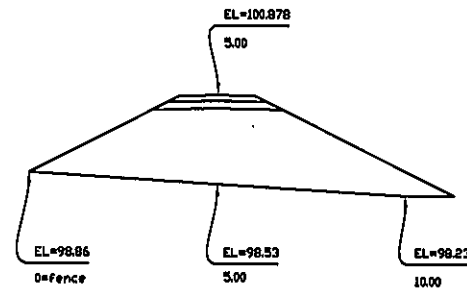
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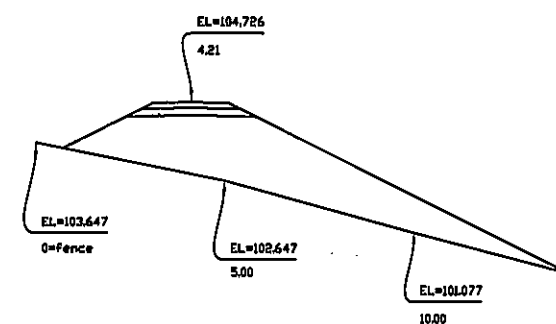
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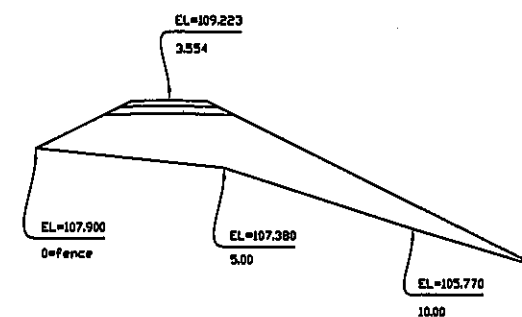
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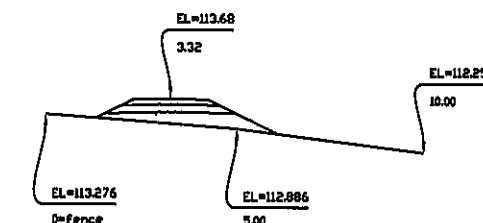
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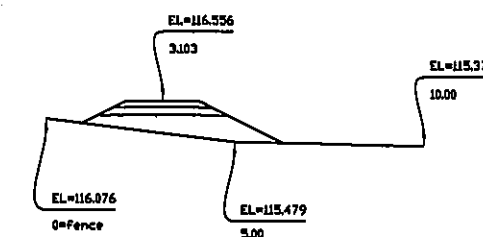
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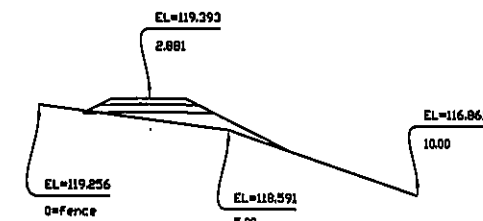
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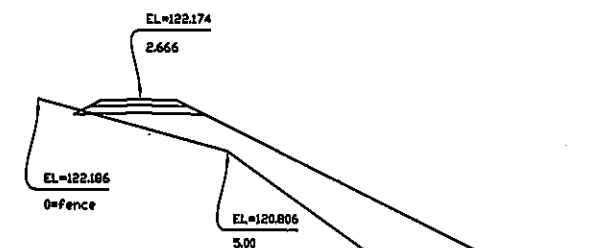
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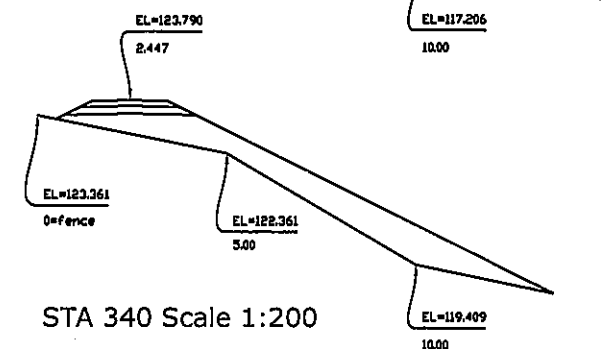
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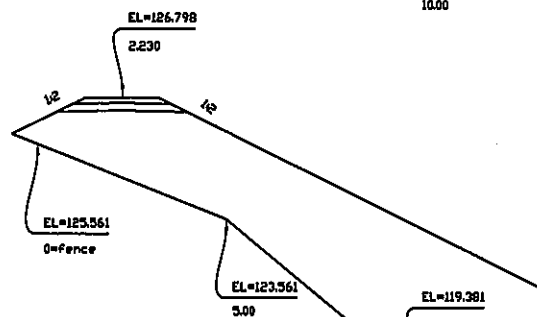
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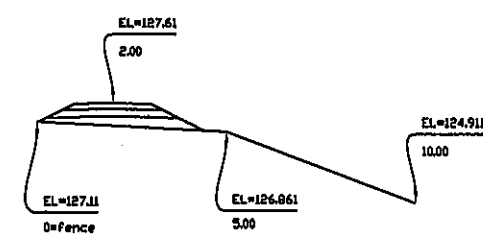
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STA 340 Scale 1:200



STA 350 Scale 1:200

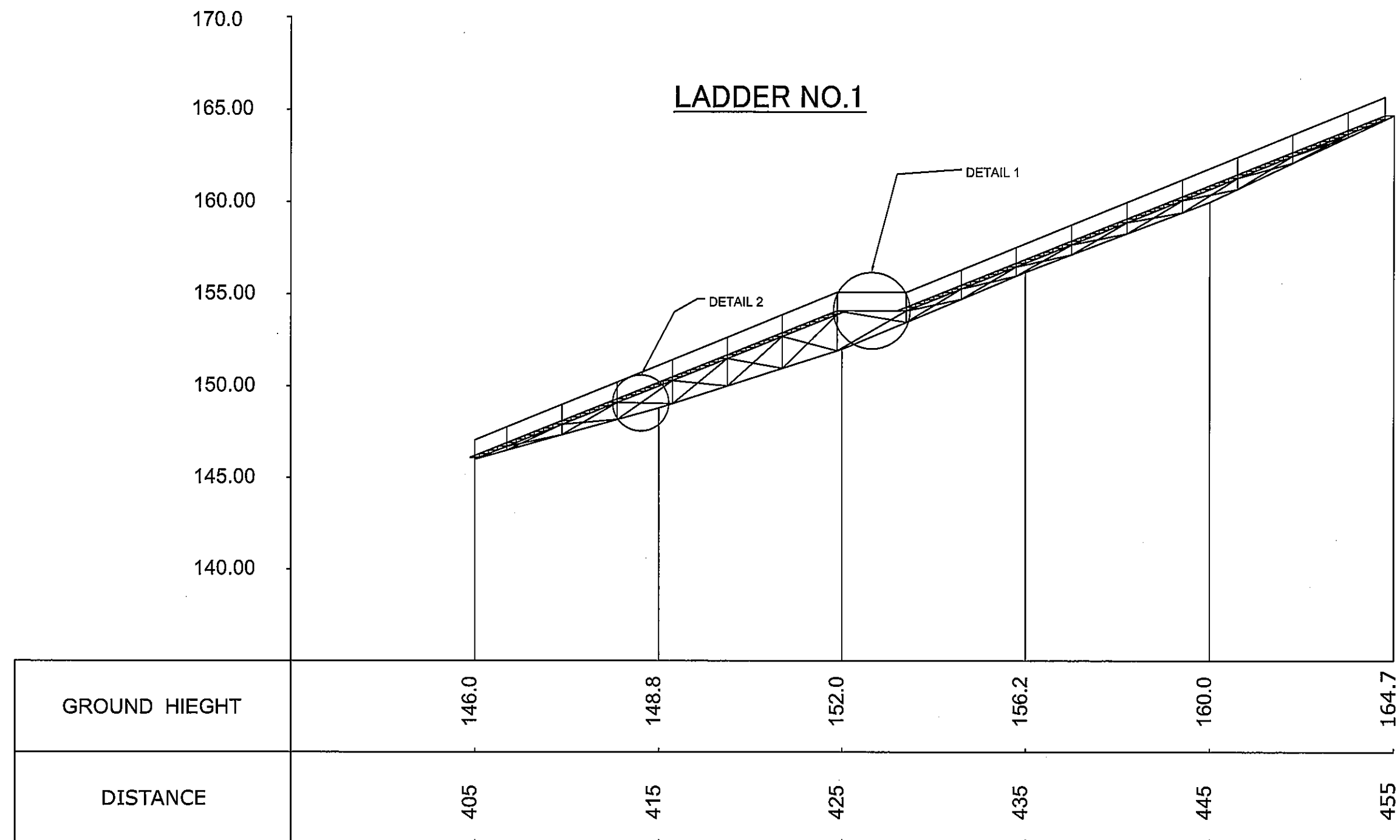


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU
CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE : S=1:200
Cross Section of Temporary Road		CHECKED BY :	REVISION NO. :
		APPROVED BY :	

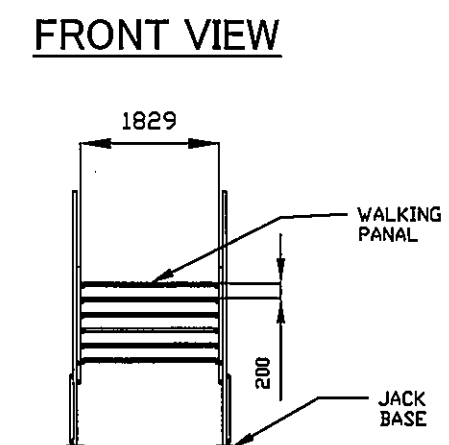
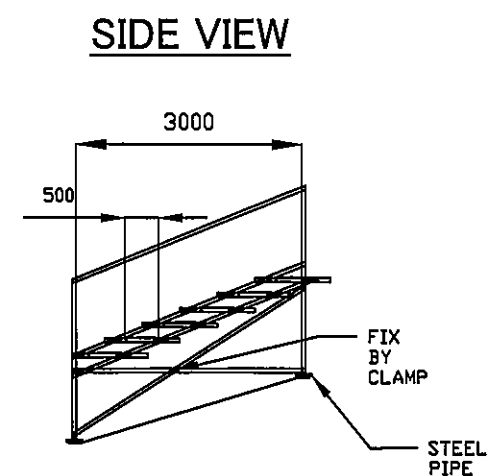
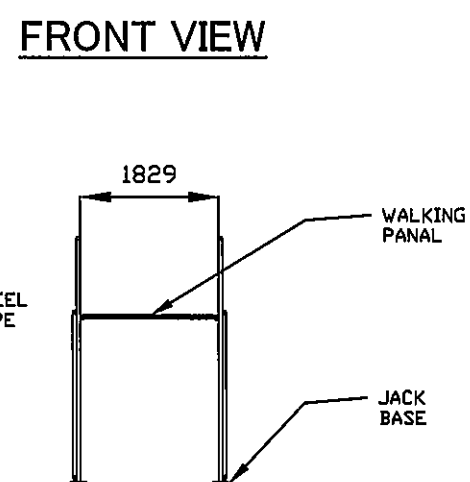
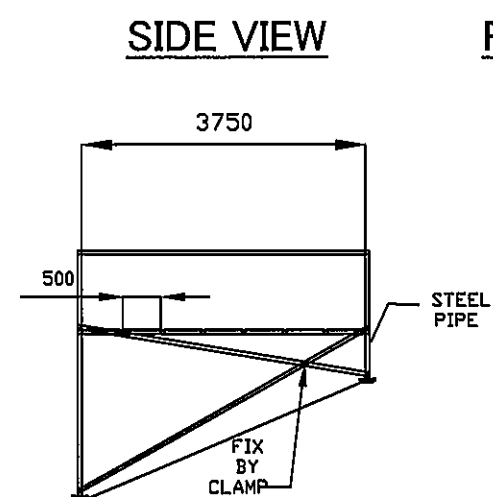



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KOKUSAI KOGYO CO.,LTD.



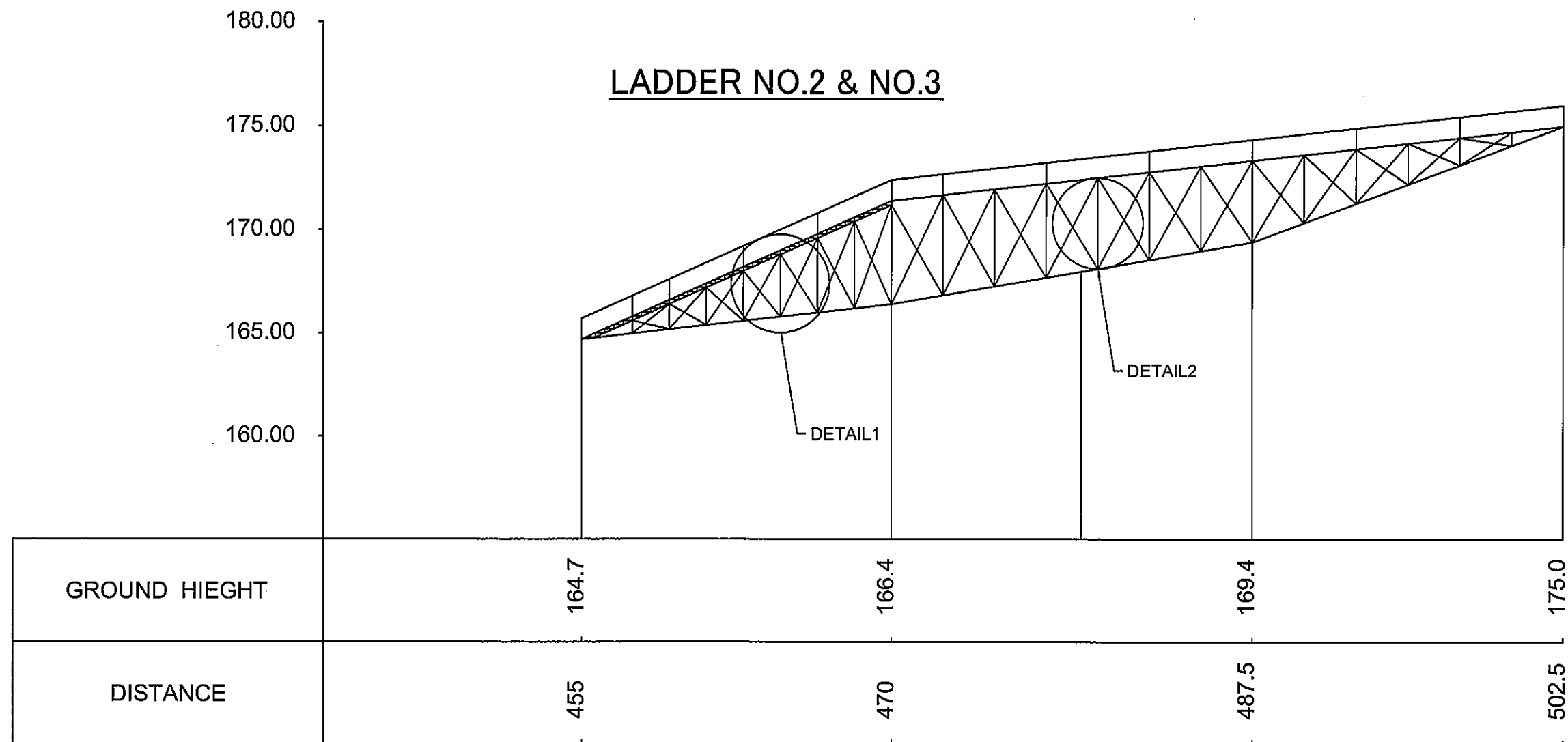
DETAIL 1

DETAIL 2



THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE : Temporary Ladder (LADDER 1)		DRAWN BY :	SCALE : S=1:250
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO.,LTD.			

LADDER NO.2 & NO.3

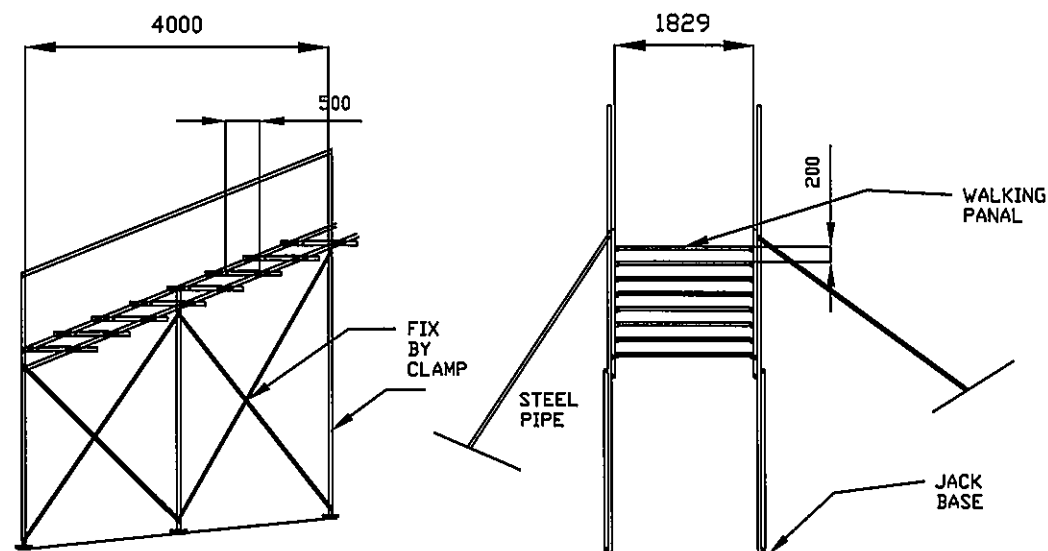


DETAIL 1

DETAIL 2

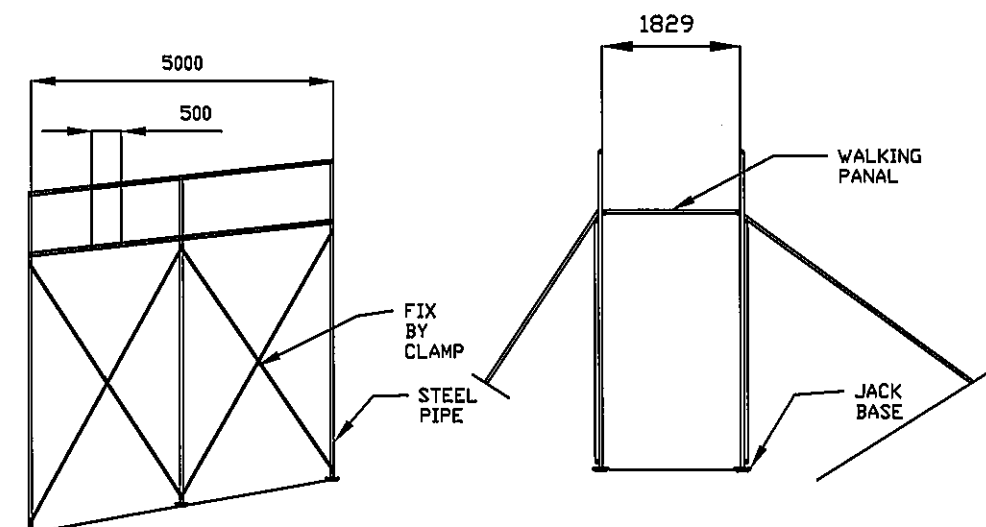
SIDE VIEW

FRONT VIEW

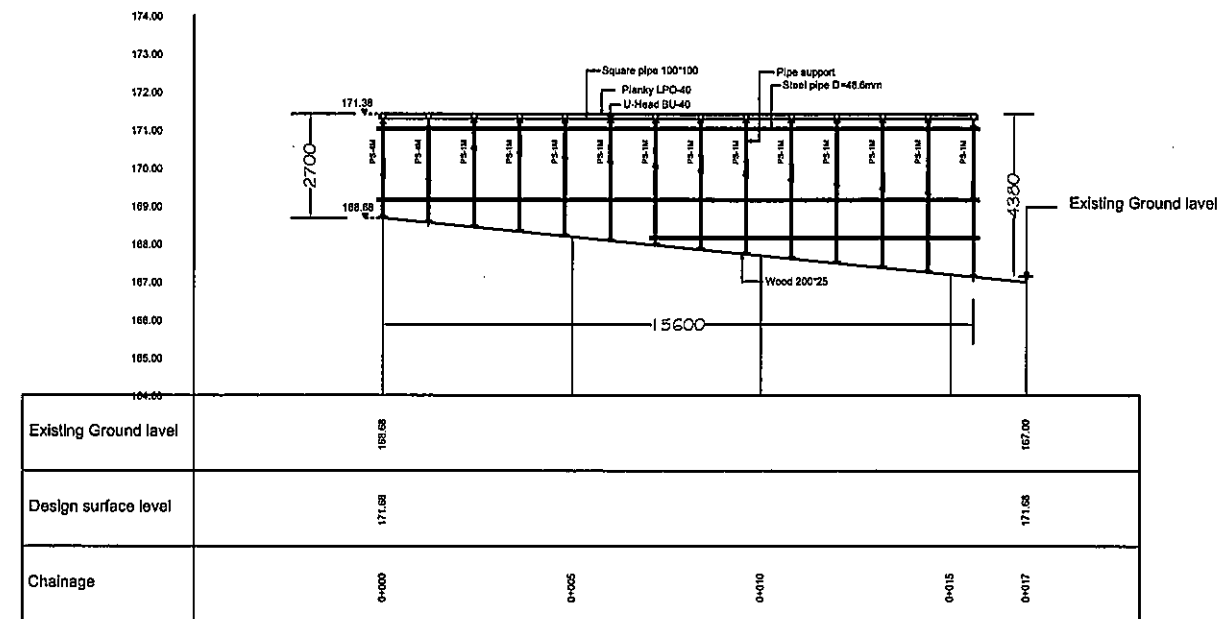


SIDE VIEW

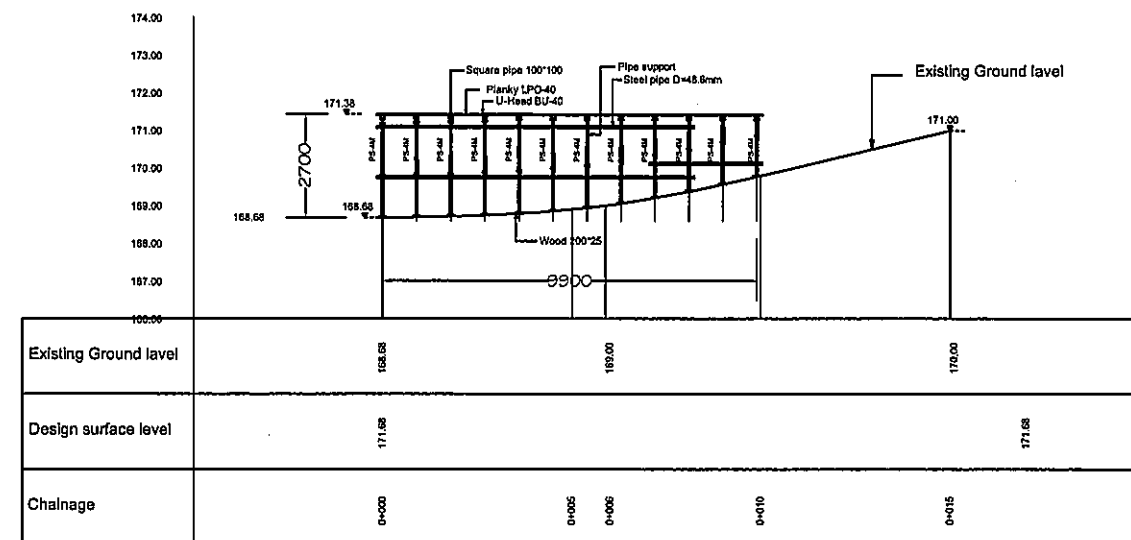
FRONT VIEW



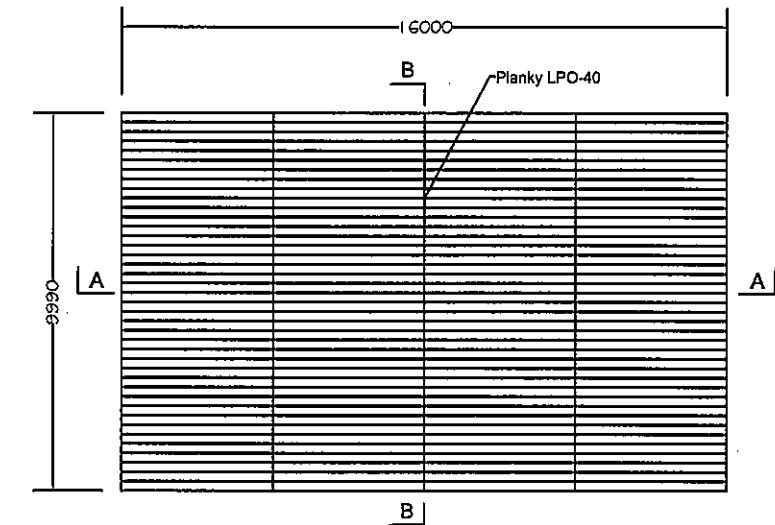
THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE :
Temporary Ladder		CHECKED BY :	REVISION NO. :
(LADDER 2 & LADDER3)		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY  KOKUSAI KOGYO CO.,LTD.			



SECTION A-A




SECTION B-B







Plan of Staging (Pipe support Style)

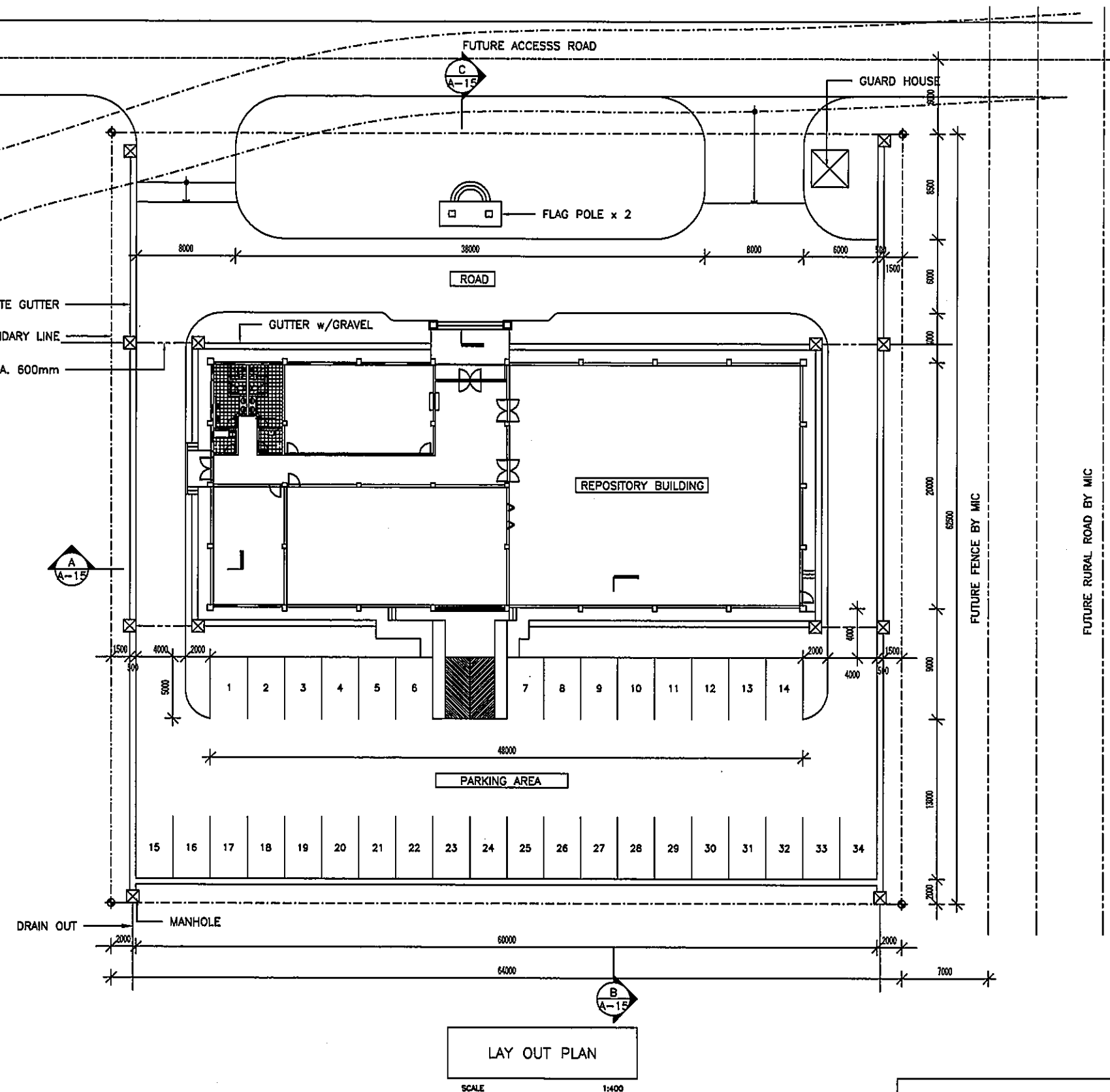
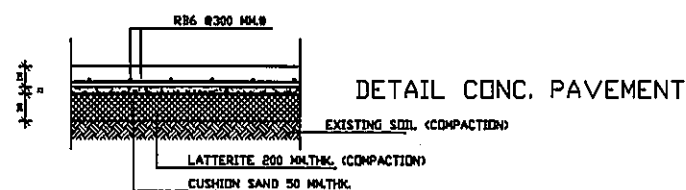
LIST OF MATERIAL



Item	Description	Code	Number	Unit	Remark
1	Pipe support	PS-4M	59	Pcs	
2	Pipe support	PS-1M	109	Pcs	
3	Square pipe	100x100x6000	36	Pcs	
4	Steel pipe (6m)	D=48.6mm	104	Pcs	
5	Steel pipe (4m)	D=48.6mm	40	Pcs	
6	Planky	LPO-40	160	Pcs	
7	U-Head	BU-40	168	Pcs	
8	Bracing clamp		510	Pcs	
9	Swivel Clamp		510	Pcs	
10	Jack base	BB-400	168	Pcs	
11	Stairs	SSE-17	20	Pcs	

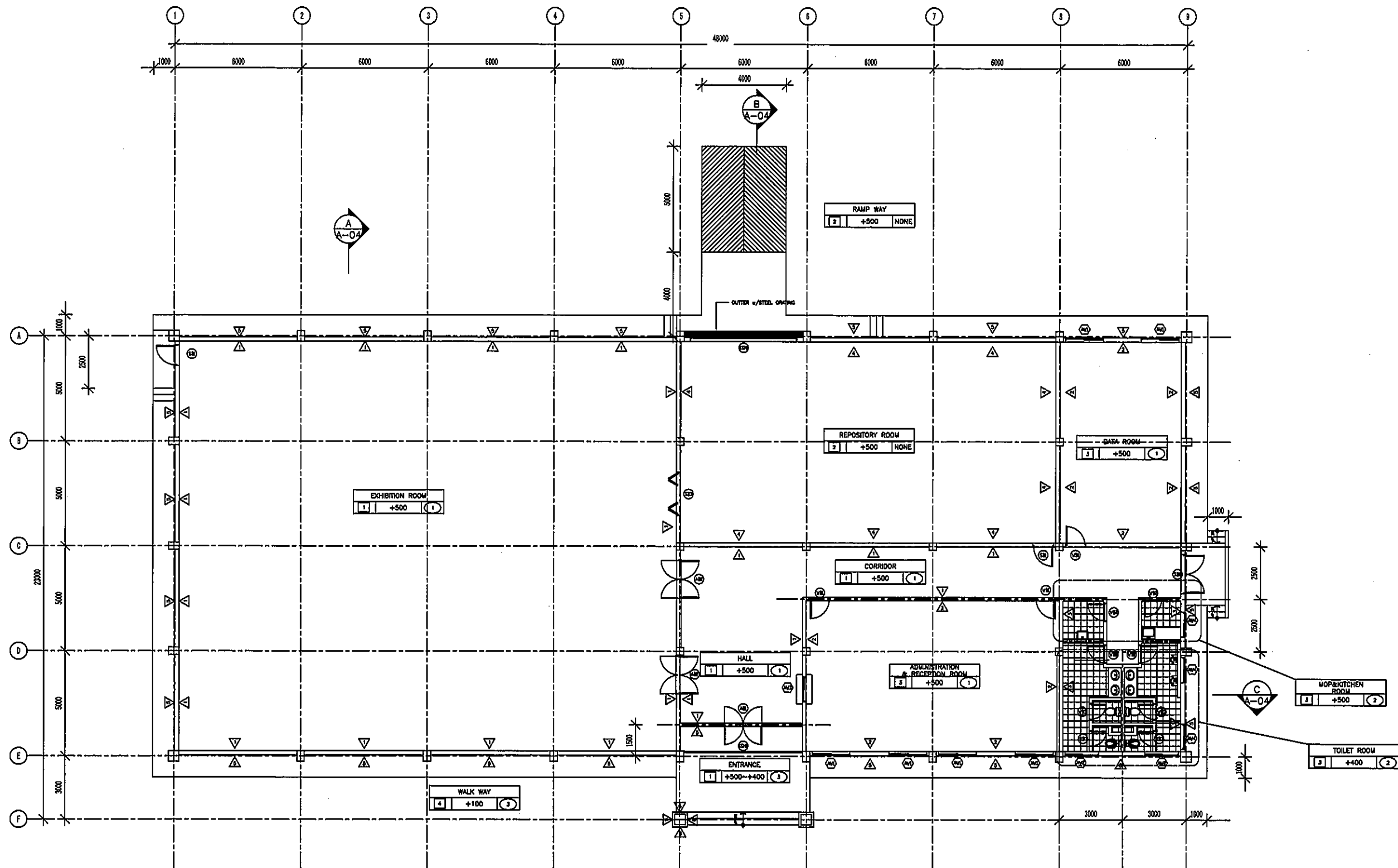
THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE : Temporary Stage		DRAWN BY :	SCALE : S=1:200
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO.,LTD.			

REMARK :

-  MANHOLE
-  U GUTTER DRAIN
-  U GUTTER DRAIN W/GRATING
-  RC PIPE

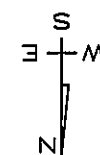


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE :
Lay Out Plan of Repository Building		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY  KOKUSAI KOGYO CO., LTD.			



GROUND FLOOR PLAN

SCALE 1:200

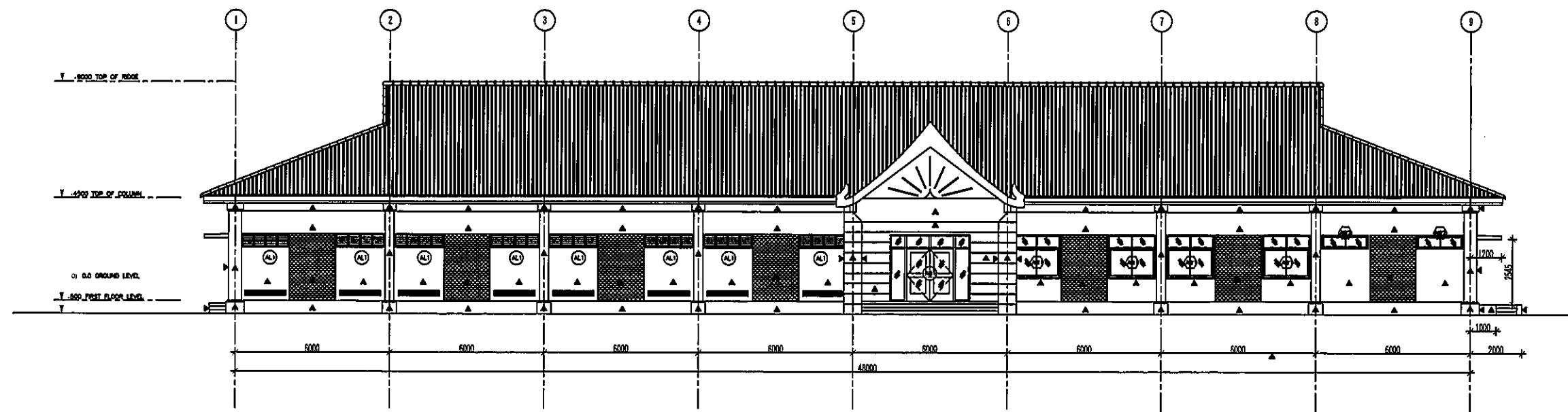


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU
CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE : S=1:200
Ground Floor Plan		CHECKED BY :	REVISION NO. :
		APPROVED BY :	

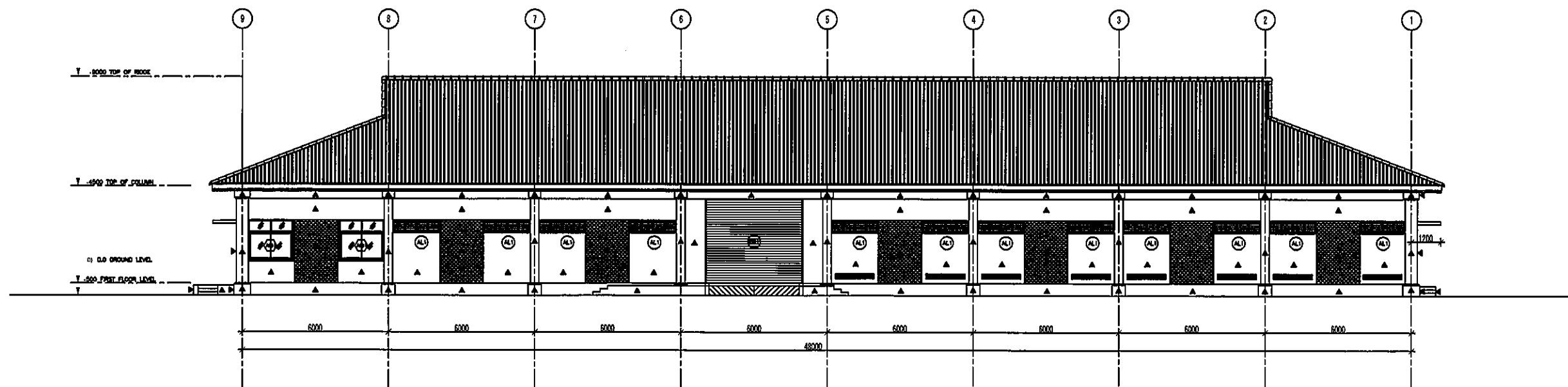


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ELEVATION-1

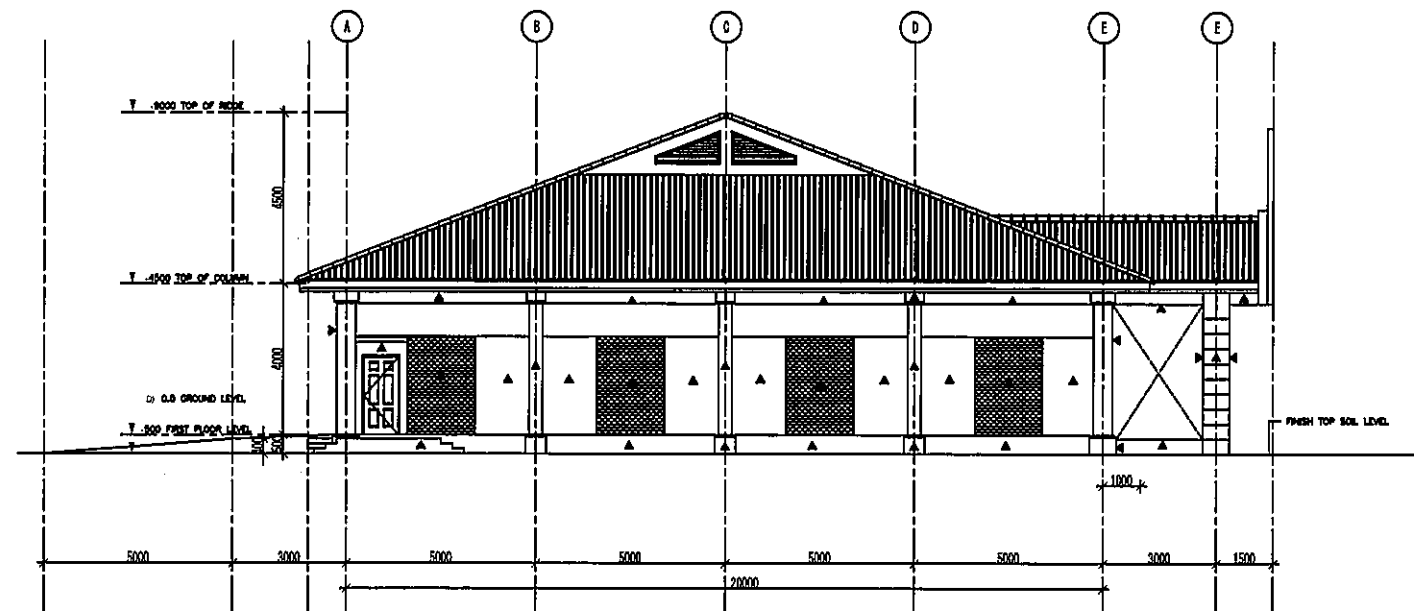
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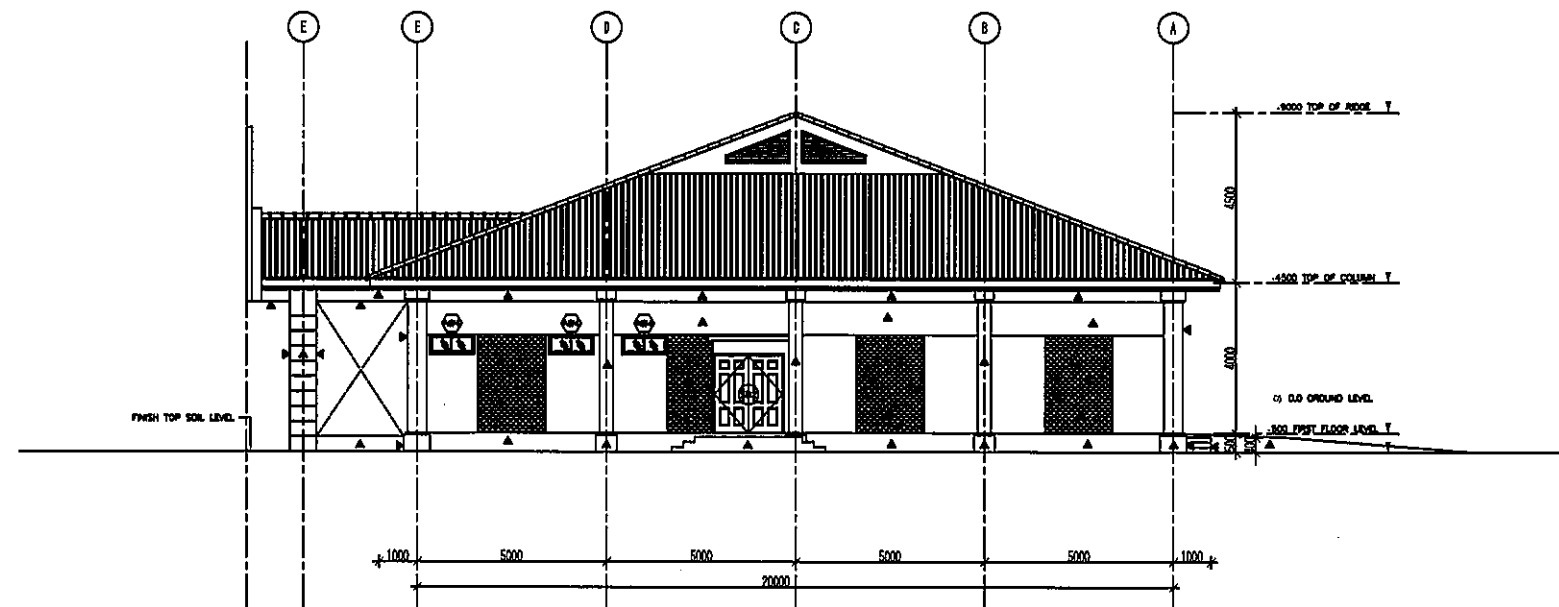
ELEVATION-3

SCALE 1:200


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE : Elevation Plan -1 and 3		DRAWN BY :	SCALE : S=1:200
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO., LTD.			

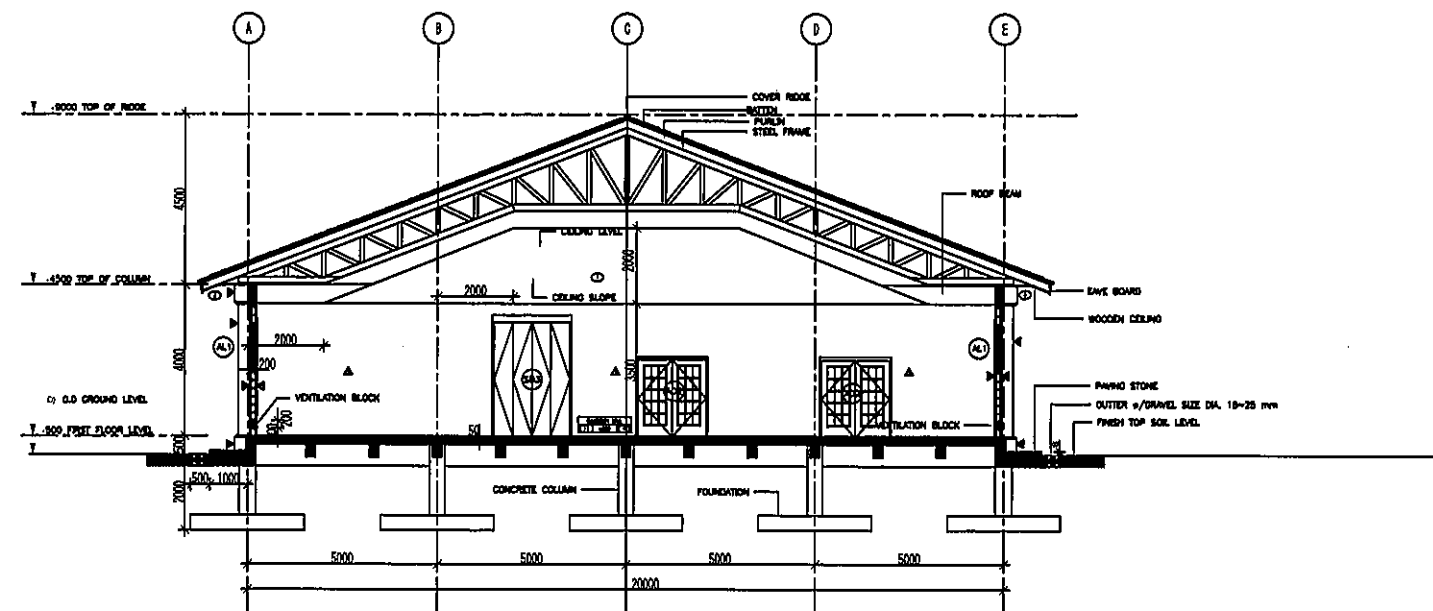


ELEVATION -4



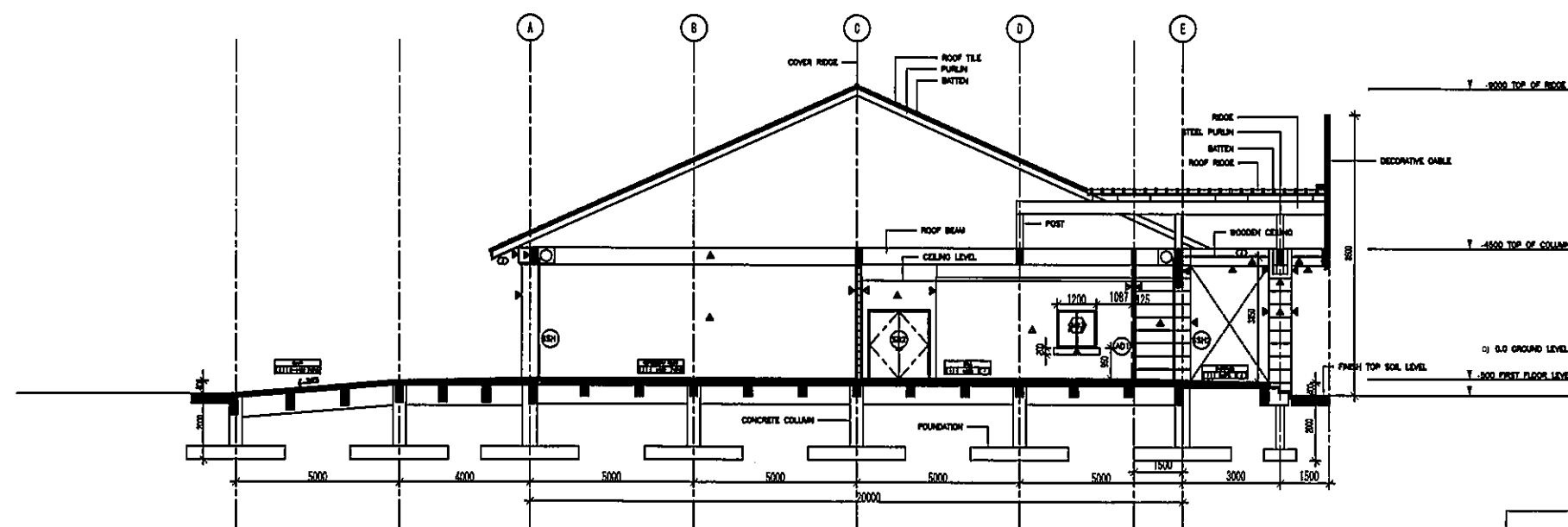
ELEVATION-2

THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE : Elevation Plan -2 and 4		DRAWN BY :	SCALE : S=1:200
		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO., LTD.			



SECTION A-A

SCALE 1:200



SECTION B-B

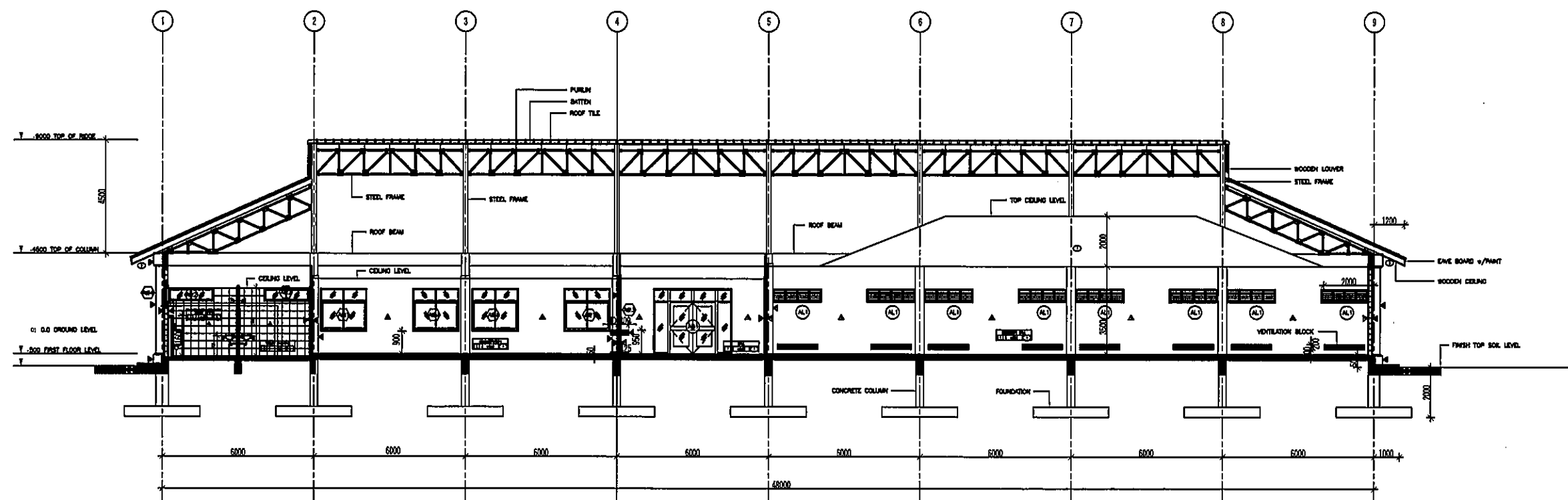
SCALE 1:200

THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU
CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE :
Section Plan A-A & B-B		CHECKED BY :	REVISION NO. :
		APPROVED BY :	



JAPAN INTERNATIONAL COOPERATION AGENCY
KOKUSAI KOGYO CO., LTD.



SECTION C-C

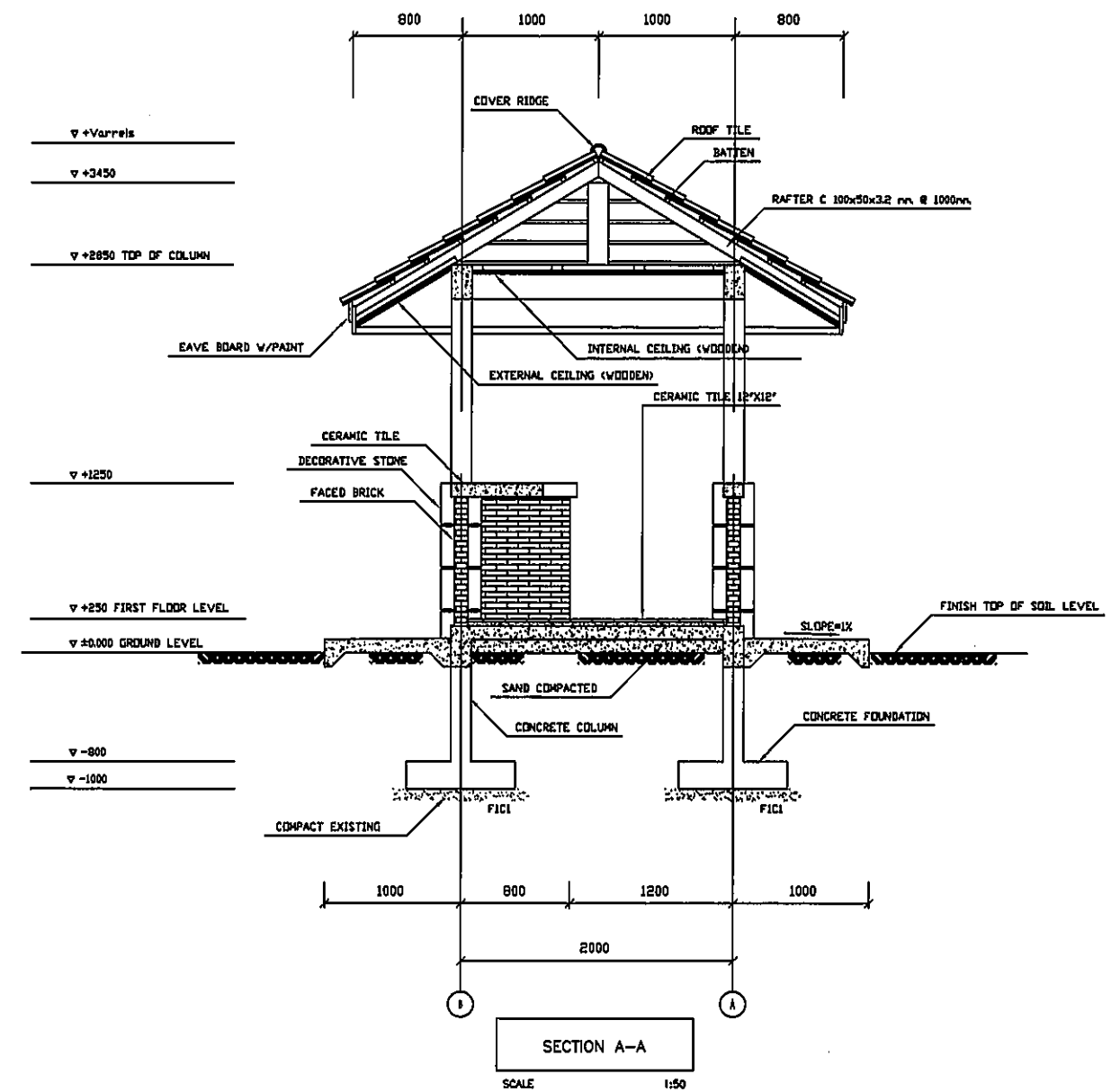
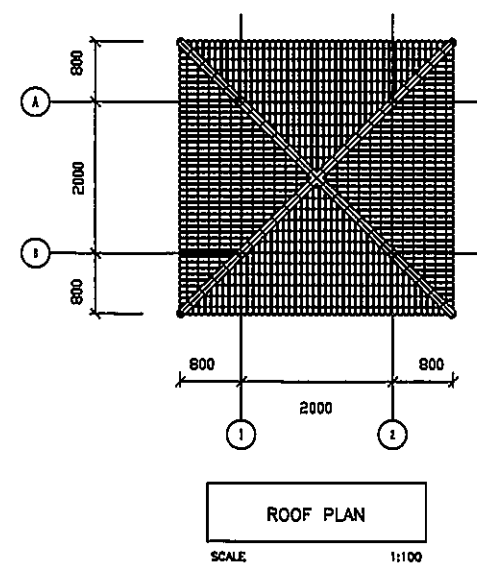
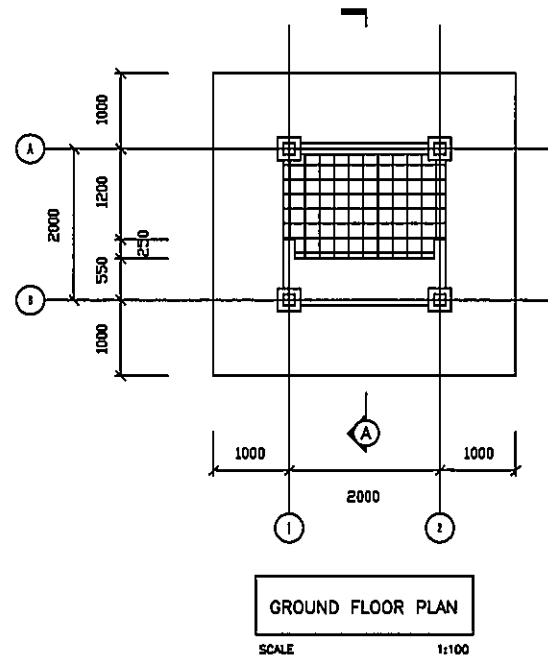
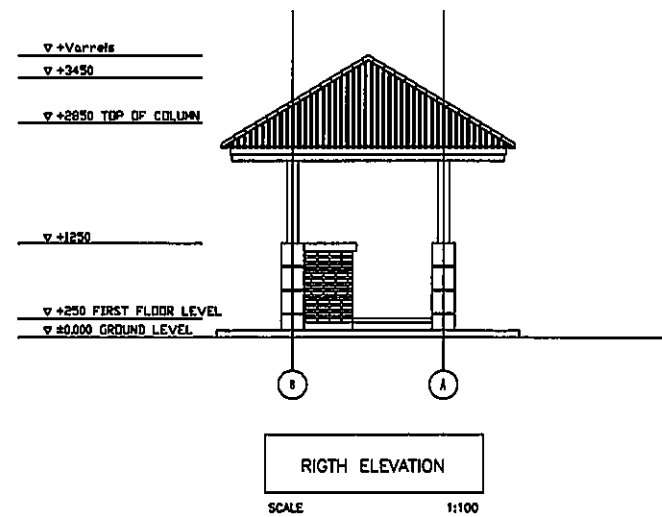
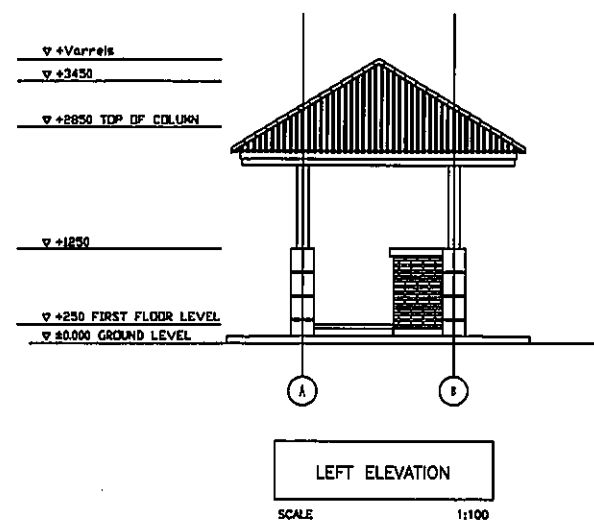
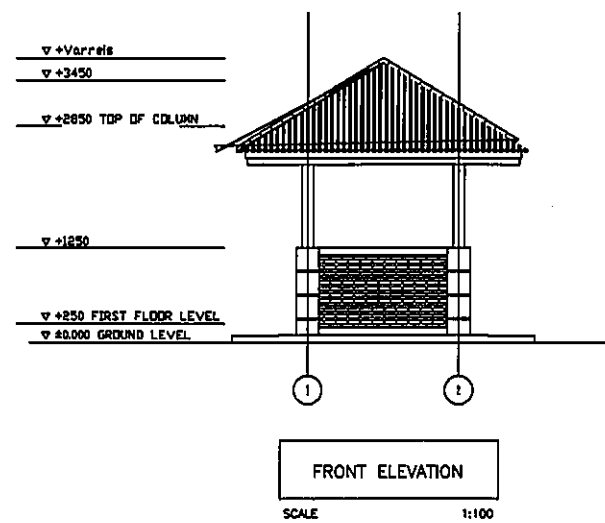
SCALE 1:200


THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU
CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE :
Section Plan C-C		CHECKED BY :	REVISION NO. :
		APPROVED BY :	



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THE PROJECT FOR PRESERVATION AND RESTORATION OF VAT PHOU CULTURAL HERITAGE IN LAO PEOPLE'S DEMOCRATIC REPUBLIC			
SEQ NO. :	SHEET NO. :	DESIGNED BY :	DATE :
DRAWING TITLE :		DRAWN BY :	SCALE :
Guard House Plan Elevation and Section Plan		CHECKED BY :	REVISION NO. :
		APPROVED BY :	
 JAPAN INTERNATIONAL COOPERATION AGENCY KOKUSAI KOGYO CO., LTD.			