Government of Nepal

Water and Energy Commission Secretariat

Singha Durbar, Kathmandu

Study on Identification and Development of Hot Water Spring Sources in Nepal

Contract No.: WECS/SEED/078-79/01

FINAL REPORT

Volume 3: Master Plans

3B: Master Plan of Tapta Kunda, Dang

July, 2024

Submitted By:

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Executive Summary

Introduction

Nepal is globally renowned for its natural beauty, encompassing the majestic Himalayas, diverse topography, and rich cultural heritage. Among its natural assets are numerous hot water springs, which are manifestations of geothermal activity beneath the Earth's surface. These springs emerge along tectonic belts like the Main Central Thrust (MCT), Main Boundary Thrust (MBT), and Ramgarh Thrust (RT), making them significant from geological, cultural, and economic perspectives.

Hot water springs in Nepal serve diverse purposes, including tourism, wellness, and potential renewable energy sources. However, limited scientific exploration and unstructured development have restricted their utility and potential contributions to sustainable development. This study, commissioned by the Water and Energy Commission Secretariat (WECS), aims to identify, evaluate, and propose development strategies for these natural resources.

This volume of the report consists master plan including tourism infrastructure, cost estimates, revenue potential, and recommendations for implementation and investment structures on Tapta Kunda.

Objective and Scope of Work

The primary objective of this study is to identify hot water spring resources in Nepal and develop a comprehensive plan for their promotion as tourism destinations. The scope of the work includes identifying hot water springs, conducting site visits to collect data, and assessing various parameters such as accessibility, historical significance, and geological conditions. The study will also evaluate the tourism potential and vulnerability of these resources while preparing a detailed development plan, including cost estimation and economic analysis of selected four sources. This volume of the report focuses solely on Tapta Kunda in Dang District.

Location and Accessibility

The Tapta Kunda is located in Dang District in the Lumbini Province of Nepal. The location of the hot water spring lies in the Lamahi Municipality ward no-9 and on the right bank of the Rihar Khola within the vicinity of Rihar Dham. The hot spring's coordinates are approximately 82°03'49.75"E longitude and 29°14'10.45"N latitude.

The Tapta Kunda, situated in Deukhuri valley of Dang district, is approximately 46 kilometers from Bhaluwang, a town located on the Mahendra Highway (NH01) which is also the capital of the Lumbini province. Visitors primarily reach the Tapta Kunda via road from the Bhalubang, with the journey taking approximately 1 hr., depending on the road condition and traffic. Local buses are available from the Bhalubang and/or Lamahi bus stations.

Methodology

After selecting this location as one of the four sites for the preparation of a site-specific master plan, a site visit by experts was conducted. Information gathered during the identification stage—including locations, discharges, temperatures, accessibility, geological conditions, historical and religious significance, and tourism potential—was verified. Additionally, the master plan concept was developed, and a list of required surveys and investigations was prepared. Following the field studies,

a topographic survey was conducted. Finally, the consultant developed a master plan outlining conservation measures, tourism infrastructure such as ponds, cost estimates, revenue potential, and recommendations for implementation and investment structures.

Master Plan

Site-specific master plans were prepared for four priority sites, integrating tourism, ecological conservation, and community engagement. These plans were developed based on extensive field visits conducted by a multidisciplinary team of experts, including geologists, urban planners, topographic surveyors, and hydrologists. Hydrological analyses were conducted using long-term data from rivers associated with each hot water spring source, while detailed topographic surveys were carried out using appropriate methods and advanced technology.

Topographic Survey

A UAV-based topographic survey was conducted to produce accurate point clouds, digital terrain models, and orthophotos. The survey used high-precision trigonometrical points (Trig. 132 and 133) as control points. The GIS database and base maps from the Survey Department of Nepal were utilized for precise mapping and data collection.

Hydrological Study

The hydrological study determined critical parameters for infrastructure design along the Rihar Khola, which has a watershed area of 26.3 km^2. Using satellite data and empirical methods (WECS DHM), the 100-year flood was calculated at 165.83 m^3/s. At the Tapta Kunda, flood levels and flow velocities were assessed, with the high flood level set at 234.0 m, an average velocity of 3.48 m/s, and a flow depth of 1.52 m. These results informed the planning of flood-resistant infrastructure.

Tapta Kunda

The Tapta Kunda master plan emphasizes leveraging existing structures while introducing immersive architectural features to enhance visitor experiences. The architectural design presented for the Tatopani site embodies a thoughtful and comprehensive approach to meeting the programmatic requirements outlined. From the main entry parking area accommodating both cars and motorbikes to the strategically placed secondary entry and parking facility catering to visitors and café patrons, every aspect of the design has been meticulously planned to optimize functionality and enhance user experience.

The inclusion of features such as the open food court, hot spring facility, and Surya Kunda reflects a deep understanding of the site's cultural and natural context, providing visitors with opportunities for relaxation, rejuvenation, and spiritual reflection. Additionally, the provision for future expansion and the preservation of natural vegetation demonstrates a commitment to sustainability and adaptability, ensuring that the Tatopani site can evolve and thrive in the years to come.

Key proposed facilities include:

- Parking areas (main and secondary).
- Toilets, changing rooms, and open showers.
- Hot spring and Surya Kunda bathing facilities.
- Cafeteria, food court, and landscaped garden.
- A Shiva Mandir and pathways for spiritual and recreational purposes.

- River retaining walls and provisions for future expansions.

The design integrates sustainability by preserving natural vegetation and planning for adaptability while enhancing the site's cultural, recreational, and natural appeal.

Overall, the architectural design not only fulfills the programmatic requirements but also elevates the Tatopani site into a harmonious blend of cultural, natural, and recreational elements, inviting visitors to immerse themselves in its serene ambiance and enriching experiences.

Cost Estimate and Economic Analysis

The total project cost for the Tapta Kunda development is estimated at NPR 46,759,321.86, including VAT and contingencies. The economic analysis confirms the project's viability with an internal rate of return (IRR) of 16.35%**,** a net present value (NPV) of NPR 19,117,379.20**,** and a benefit-cost ratio (BCR) exceeding 1.1**.** The payback period for the investment is projected at 10 years. Annual gross revenue is estimated at NPR 5,816,250, with an annual net revenue of NPR 4,653,000 after accounting for operational expenses. The inclusion of an entry fee of NPR 100 per person in the revenue model further ensures economic sustainability.

Organization of Report

This Final Report is presented in three volumes, Volume-1: Main Report, Volume-2: Annexes and Volume-3: Master Plans.

Volume 1: Main Report

1 Introduction

2 Methodology

3 Data Collection

4 Qualitative Parameters of Hot Water

5 Findings

6 Geothermal Energy

7 Ranking of Hot Water Spring from Tourism Aspect

8 Selection of Hot Water Spring for Preparation of Master Plan

9 Preparation of Master Plan

10 Conclusions

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Volume 3: Master Plans

3A: Master Plan of Paudwar and Bhurung Tatopani, Myagdi

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List of Abbreviations

BCR	Benefit Cost Ratio
BM	Benchmark
CAD	Computer Aided Design
DEM	Digital Elevation Model
DGPS	Differential Global Positioning System
DOP	Dilution of Precision
DTM	Digital Terrain Model
EDM	Electro-magnetic Distance Measuring
EIRR	Economic Rate of Return
EPA	Environmental Protection Act
EPR	Environmental Protection Regulation
GCP	Ground Control Point
GIS	Geographical Information System
GNSS	Global Navigation Satellite Systems
GoN	Government of Nepal
GPS	Global Positioning System
HEC-RAS	Hydrologic Engineering Centre-River Analysis System
IGS	International GNSS Service
JV	Joint Venture
HS/HWS	Hot Water Spring
LED	Light Emitting Diode
masl	meter above sea level
MUTM	Modified Universal Transverse Mercator
NPV	Net Present Value
NRs	Nepalese Rupees
PNet	Professional Network for Engineering Services Pvt. Ltd.
PV	Photovoltaic
SRTM	Shuttle Radar Topography Mission
SW-DTM	Softwel-Digital Terrain Model
T	Temperature
TIA	Tribhuvan International Airport

ToR	Terms of Reference
UAV	Unmanned Aerial Vehicle
US	United States
WECS	Water and Energy Commission Secretariat

1 INTRODUCTION

Water and Energy Commission Secretariat (WECS) intends to study on Identification and Development of Hot Water Spring Sources in Nepal. For conducting consultant services of the same, WECS has nominated Global – PNet – Azad JV as per the governing laws.

This Final Report has been prepared in accordance with the Term of Reference (ToR) prepared by the Water and Energy Commission Secretariat (WECS), Singha Durbar, Kathmandu for the consulting services of the study on the Identification and Development of Hot Water Spring Sources in Nepal. This volume of the document, Volume-3B, consists the part of the report and deals with topographic survey, hydrological study and preparation of Master plan of Tapta Kunda, Dang.

1.1 Location and Accessibility

The Tapta Kunda is located in Dang District in the Lumbini Province of Nepal. The location of the hot water spring lies in the Lamahi Municipality ward no-9 and on the right bank of the Rihar Khola within the vicinity of Rihar Dham. The hot spring's coordinates are approximately 82°03'49.75"E longitude and 29°14'10.45"N latitude. The location is shown in Figure 1.1 and Figure 1.2.

Figure 1.1: Location in Topographic Map published by Department of Survey, GoN

Figure 1.2: Location of Tapta Kunda in Google Earth Image

The Tapta Kunda, situated in Deukhuri valley of Dang district, is approximately 46 kilometers from Bhaluwang, a town located on the Mahendra Highway (NH01) which is also the capital of the Lumbini province. Visitors primarily reach the Tapta Kunda via road from the Bhalubang, with the journey taking approximately 1 hr., depending on the road condition and traffic. Local buses are available from the Bhalubang and/or Lamahi bus stations.

There are a few different ways to access the Tapta Kunda hot water spring from Kathmandu. The journey involves traveling from Kathmandu through a blacktopped road to Tatopani. There is mainly one route leading towards the site and this is around 420 km via the Prithvi and Mahendra Highway from Kathmandu to reach the Tapta Kunda, road passes through the hilly as well as plain terrains.

From Kathmandu, one can take a flight to the Dang airport, located at Tulsipur, which takes around 1 hour and 20 minutes in the air. From the Dang airport, it takes about a 1-hour drive covering 43 km to reach the hot water spring.

Another option is to fly to the Nepalgunj airport, which is approximately 103 km away from the Tapta Kunda hot water spring. This journey typically takes around 2 hours and 10 minutes. These alternatives are shown in Table 1.1.

Table 1.1: Road Accessibility to the site

Destination	**Approx. Distance (km)**	**Approx. Time**	**Type of Road**	**Remarks**
Alternative 1				
Kathmandu to Mugling	110	3 hrs. 15 min	Blacktopped Road	Prithvi Highway
Mugling to Narayanghat	36	45 min	Blacktopped Road	

Narayanghat to Tapta Kunda	261	6 hrs. 15 min	Blacktopped Road	Mahendra Highway
Alternative 2				
Kathmandu To Dang Airport	-	1 hr. 20 min	-	Flight
Dang Airport- Tapta Kunda	43	1 hr.	Blacktopped road	
Alternative 3				
Kathmandu To Nepalgunj Airport	-	55 min	-	
Nepalgunj to Tapta Kunda	103	2 hrs. 10 min	Blacktopped road	

1.2 Tapta Kunda, Dang (HS/5100709-38)

The Tapta Kunda hot water spring is located in an area with predominantly flat terrain of Deukhuri valley, within the Churia range. The hot water source is situated on the right bank of the Rihar khola and discharge approximately 1.8 liters per second and a temperature of 41.1 degrees Celsius on 2080/8/29. The water from the spring is clear and free of any unpleasant odors. The hot spring is situated in close proximity to the river, surrounded by expansive plains, and the location coincides with the accumulation of alluvial deposits along the river's course.

Photograph 1.1: Local people taking bath at the hot water spring

From a geological perspective, the region lies within the Dun Valley of Dang and is commonly referred to as the Churia Group. However, bedrock exposure was not noted in the area. Land use in the area includes a variety of features, including forests, agricultural land, roads, settlements, and the presence of the river. The region experiences a hot climate, with the elevation of the hot water source is approximately 220 meters above sea level.

The climate in the hot water spring area is warm and temperate. In winter, there is much less rainfall in the region than in summer. The climate here is classified as Cwa by the Köppen-Geiger. The temperature here averages 19.6 °C | 67.3 °F.

The Tapta Kunda hot water spring is located in an area with a significant amount of precipitation, with an average of 1960 mm (77.16 inches) per year. The driest month is November, with only 9 mm (0.4 inches) of rain, while the wettest month is July, with 561 mm (22.1 inches) of rain. The temperature varies throughout the year, with June being the warmest month at 24.7°C (76.5°F) and January being the coldest at 11.6°C (52.9°F).

To safeguard the hot springs from potential flooding during the rainy season, a protective structure has been constructed, ensuring the proper management of the hot spring. Visitors to the area can enjoy bathing in designated pools and have access to changing rooms. Flooding is identified as the primary natural disaster that could have a direct impact on the hot water source.

The area of Tapta Kunda hot water spring is home to a diverse community of approximately 2,500 individuals. The community is predominantly composed of Bahun, Chhetri, Kumal, Chaudhary, and Yadav ethnic groups, with Bahun making up about 20% of the population. The community holds deep-rooted religious and traditional beliefs, with active participation in worship ceremonies at the hot spring aimed at promoting the well-being of individuals suffering from various ailments. It is also culturally believed that the deity blesses as no mud sticks in the body even soaking in the muddy pond. The area is also marked by its historical and religious significance, with several temples and festivals celebrated throughout the year, contributing to the local culture and economy.

Photograph 1.2: Discussion with the local people and the stake holder about the development of the hot water spring with the team from WECS and consultant during second field visit

The Tapta Kunda hot water springs are a natural wonder with minimal ecological impact. They are revered for their medicinal value, alleviating various ailments, and have a subtle impact on the surroundings. The springs have transitioned into tourist attractions without significant losses in vegetation or threats to local wildlife, including endangered species. The risk of waterborne diseases and social, economic, or political conflicts over water rights is minimal.

The hot springs water is characterized by a moderately alkaline pH, warm temperature, and notable bicarbonate content. The higher turbidity level suggests more suspended particles, which could affect the clarity and purity of the water. This profile indicates potential benefits for skin health and relaxation, with no major health hazards noted from the analysis.

Prior to preparation of Master Plan, discussion with stakeholders including local people was done (Photograph 1.2, Photograph 1.3 and Photograph 1.4)

Photograph 1.3: Discussion between team of consultant and representative from WECS

Photograph 1.4: Meeting held with ward chairman of ward no. 9 of Lamahi Municipality

2 TOPOGRAPHIC SURVEY

This report presents the findings from the topographical survey and mapping of Tapta Kunda Tatopani located in the Dang district. The primary objective of this survey was to accurately map the terrain and features of the area to facilitate further development and conservation efforts. It provides a comprehensive understanding of the area's physical characteristics. This data is crucial for planning future development projects and conservation efforts. The detailed maps and models generated from this survey will serve as valuable resources for stakeholders involved in the sustainable development of the project.

2.1 Background

Topographical survey and mapping are an essential task in the study of any project. The survey of the project area will allow the project designer to set out project components on appropriate location and prepare and prepare quantity estimation. In addition, the topographical mapping will be useful for geological mapping, geophysical investigation and social studies.

Topographical survey was conducted survey method with the help of an unmanned aerial vehicle (UAV). Unmanned aerial vehicles, however, present us with the possibility of measuring large areas just as accurately and far more elegantly than in the case of classical land surveying methods. Standard results of a photogrammetric survey consist of point clouds, digital terrain models and digital orthophotos.

2.2 Objectives and Scope of Work

2.2.1 Objectives

1. **Accurate Mapping:** To create a detailed topographical map of the Tapta Kunda Tatopani area.
2. **Data Collection:** To gather comprehensive data on the physical features and elevations within the survey area.
3. **Analysis:** To analyze the topographical data for potential development and conservation projects.

2.2.2 Scope

The scope of the survey is to conduct Topographical Survey using the latest surveying technology and techniques to ensure precision and reliability. The steps involved are:

1. **Pre-Survey Preparation:**
    - Identifying key landmarks and boundaries.
    - Setting up reference points for accurate measurements.
2. **Field Survey:**
    - Using DGPS and UAV equipment to record data points.
    - Conducting ground verification to ensure data accuracy.
3. **Data Processing:**
    - Analyzing the collected data using specialized software.
    - Creating detailed maps and elevation models.

2.3 Available Information

The following hard copy topographical base maps and GIS database of the same maps have been collected together with the coordinates data from Survey Department, GoN. The survey control points are 3rd ordered geodetic points which are supposed to be precise trig. Points in terms of accuracy.

(i) Topographical base maps and GIS database of Map Sheet no 2782-02A have been purchased from Survey Department, GoN

(ii) GIS database of the above topographical maps have been purchased from Survey Department, GoN.

(iii) The collected coordinates and elevations data of Trig. points 132 and 133 have been tabulate below:

Government of Nepal
Ministry of Land Management, Cooperative and Poverty Alleviation
SURVEY DEPARTMENT
(Geodetic Survey Division)
(Data Section)

(Department) Tel.: 4622713, 4622733
Fax: 4622957
Email: survey@dept.wlink.com.np
Planning@sd.com.np

(Division) Tel.: 4622547, 4620372, 4622314
Fax No.: 4622314
Email: geodetic@wsn.com.np

Our Ref. No.:
Your Ref. No.:
Dispatch No.: 47

Minbhawan, Kathmandu
Date:- 2080/12/18

Global –Pnet- Azad JV
Lalitpur

Subject:– About the Data and D-Card

We are hereby pleased to provide you the following geodetic Co-ordinate/Level Height/Gravity data as requested by you. These data are not transferable and reuse without a written permission from our office, in any form upon completion of the use of control station marker in the ground; please keep the control station marker to keep the point/s well hidden by means of its original cover/soil/stone for its safety.

Grid Sheet /Alignment	Trig./B.M. /Gravity No.	Description Card	Co-ordinates		Level Height MSL(M.)	Gravity	Remarks
			Easting	Northing			
042	132 133		631309.536 631629.546	3088327.699 3087520.464			Provided according to cash receipt no2035of Survey Department

Surveyor

Survey officer

Chief Survey Officer

Note :-This co-ordinate are provided from archive data /old record, if there found any types of error than it will be corrected from original record.

Table 2.1: Coordinates and Elevations data collected from Survey Department

S.N.	Point Name	Easting (m.)	Northing (m.)	Height (m.)	Remarks
01	Trig. 132	631309.536	3088327.699	232.5	
02	Trig. 133	631629.546	3087520.464		

2.4 Approach and Methodology

The Consultant ensures the highest quality engineering services to the proposed assignment by application of relevant international and national practices, guidelines and standards relating to study and implementation. Similarly, the Consultant has made optimum use of its experience of working in the study and other similar projects by properly considering site conditions.

2.4.1 Desk Study and Field Planning

At the preliminary stage, desk study of the study area has been done by looking at the secondary data such as topographic maps, river maps and their structure, hydrology maps etc. Standard known control point has been collected from the client for the reference. Initial Planning has been done in Google Map including the location selection for numbers of Ground Control Points and Reference Station. This study has acted as a guide for field planning and mobilization as well as logistics requirements. After preliminary study of the available documents and proper planning, mobilization of crew has been done to the project area and data collection has been do

2.4.2 GNSS Mission Planning

GNSS mission planning involves systematically defining objectives, assessing environmental factors, and selecting appropriate GNSS systems. Key steps include using GNSS planning tools to predict satellite availability and DOP values, conducting field reconnaissance to identify and mitigate potential obstructions, and preparing and calibrating equipment. During data collection, continuous monitoring ensures data quality, followed by post-processing to enhance accuracy through differential corrections or precise point positioning. Finally, data is analyzed, results are reported, and lessons learned are documented for future missions. This comprehensive approach ensures accurate, reliable, and efficient GNSS data collection tailored to mission requirements.

GNSS receiver receives the GPS signals from the satellite constellation to fix the position of the receiver. The static method of point positioning can be improved by observing the GNSS Mission Planning so that the positional accuracy can be controlled. GNSS mission planning refers to the formation and health of the satellite that contribute the position of receiver. Mission planning also provides the ionosphere data that helps us to determine the time and duration to take the data from the GNSS satellite. The GNSS Mission Planning provides elevation of the satellite, number of satellites available, and dilution of precision, visibility and ionosphere data. Figure shown below are the sample of Mission Planning for Trig Control Point transfer day and same has been done for our DGPS work day. Below figure shows the GNSS Mission Planning at particular location at site.

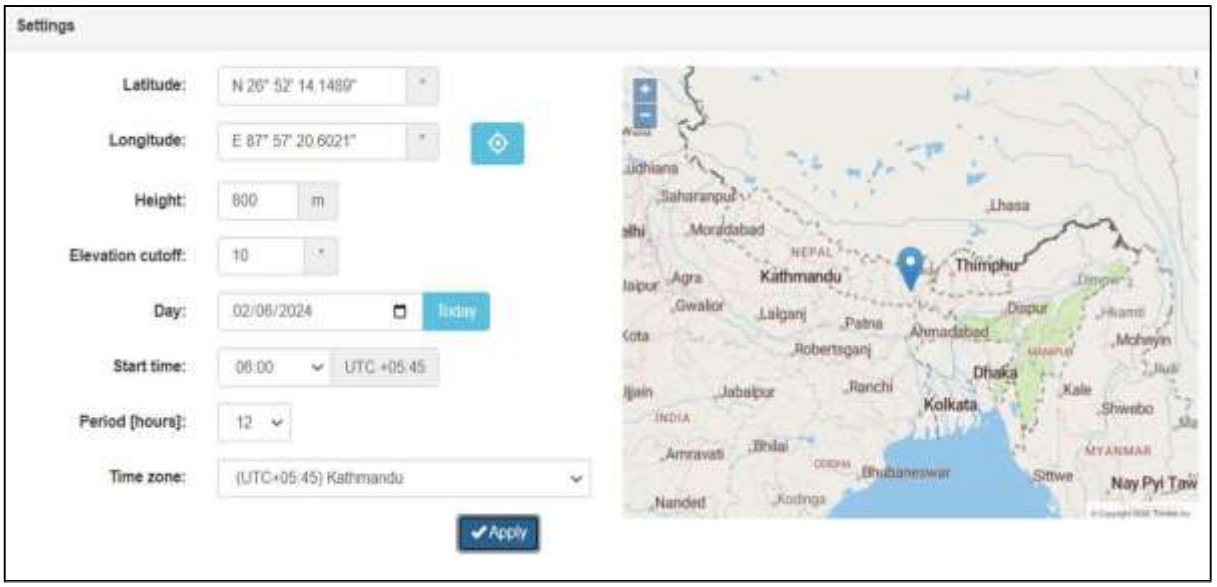


Figure 2.1: GNSS and Mission Planning

2.4.3 Reference Stations/ Base stations

Known reference point has been identified and team has been mobilized on the site for transfer of the Benchmark and Coordinates to the proposed site and location. For the transfer of the Coordinates Multi band GNSS receiver (DGPS) has been used.

Table 2.2: List of reference known control point

Trig/BM Gravity No.	Easting	Northing	Latitude	Longitude	Elevation	Remarks
132	631309.536	3088327.699	27.906891°	82.333971°		Provided accoring to cash receipt no 2023 of Survey Department
133	631629.546	3087520.464	27.899957°	82.337000°		
132	631280.28	3088309.648	27.90773266	82.33208833	232.5	DGPS Static Survey

2.4.4 Differential Global Positioning System (DGPS)

A Differential Global Positioning System (DGPS) is an enhancement to the Global Positioning System (GPS) which provides improved location accuracy, in the range of operations of each system, from the 15-meter nominal GPS accuracy to about 1–3 cm in case of the best implementations. Each DGPS uses a network of fixed ground-based reference stations to broadcast the difference between the positions indicated by the GPS satellite system and known fixed positions. These stations broadcast the difference between the measured satellite pseudo-ranges and actual (internally computed) pseudo-ranges, and receiver stations may correct their pseudo-ranges by the same amount. The digital correction signal is typically broadcast locally over ground-based transmitters of shorter range.

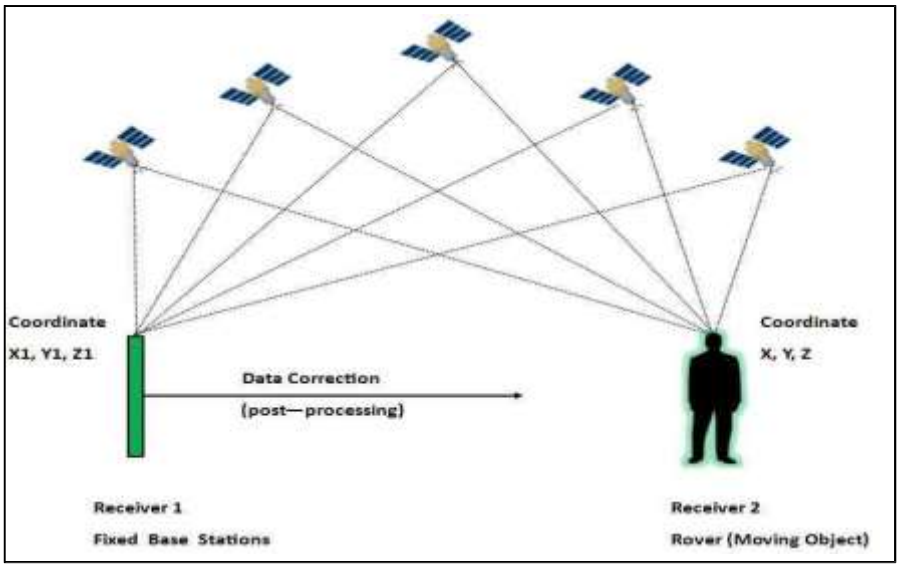


Figure 2.2: Simple Working Process of DGPS

2.4.5 Projection System

Projection : MUTM 81 N

Zone : 81

Spheroid : EVEREST 1830

Scale : 0.9999

False Easting : 500000

False Northing : 0

2.4.6 GPS Operation and data collection

During the field works, following parameters were used:

Data Recording Interval: 1 second

Elevation Mask: 15 degrees

Minimum satellites number: 4

Table 2.3: DGPS Observation planning sheet.

S.No	Baseline Length	No of Satellite Available	Time of Observation
1	1 to 10 km	6	45 Minutes
		4	60 Minutes
62	10 to 20 km	6	50 Minutes
		4	90 Minutes
3	More than 20 km	6	1 hour 30 Minutes
		4	2 hours

2.4.7 Differential Global Positioning System (DGPS) Surveying Method for Establishment of GCP

Major control point has been transferred to the Project area with the help of static point positioning system. All of the Survey area is very close to each other hence, control point has been established so that it will be common for different area or scope of work.

DGPS-Static Survey

Static GPS Survey procedures allow various systematic errors to be resolved when high accuracy positioning is required. Static procedures are used to produce baselines between stationary GPS units by recording data over an extended period of time.

Specification of Static Survey:

Table 2.4: Static Survey Specifications

Specification	Static
General Network Design	
Minimum number of reference station to control the Project.	1 previous control point.
Maximum distance between the Survey Project boundary and network reference control stations	50 km
Minimum number of all baselines contained in a loop	100%
Field	
Maximum PDOP during station occupation	5
Minimum observation time on station	5 hr
Maximum Epoch interval for data sampling	1 sec
Minimum satellite mask angle above the horizon	15 degrees
Office	
Fixed integer solution for all baselines	Yes
Ephemeris	Broadcast
Maximum loop length	50 km
Maximum misclosure per loop, in terms of loop length	15 ppm
Maximum misclosure per loop in any one component (x, y, z) not to exceed	5 cm
Repeat baseline difference in any component (x, y, z) not to exceed	10 ppm
Maximum length misclosure allowed for a baseline in a properly weighted, least squares network adjustment	50ppm

Maximum allowable residual in any one component (x,y,z) in a properly weighted, least squares network adjustment	5 cm

Linear_unit: Meters

Projection: MUTM 81

Geoid: EGM2008

Datum: EVEREST 1830

Post-Processing Engine: Auto

Elevation Mask: 15 degrees

Satellite System: GPS, GLONASS, Galileo, QZSS, BeiDou

Post-Processing Engine: Auto

L1&L2 — Processing of dual frequency measurements (L1/L2 GPS/GLONASS code and carrier phase measurements) for GPS observation which length is shorter than 10 km. L1 and L2 observables will be treated by the engine as independent data sets. The final solution type of the processed GPS observation is "Fixed / Float".

L1&L2, Fixed Iono Free — Processing of dual frequency measurements (L1/L2 GPS/GLONASS code and carrier phase measurements) for GPS observation length falling into the 10 km to 30 km interval. After integer ambiguity resolution for a GPS observation with dual frequency measurements, iono free combinations will be created and ionospheric error is eliminated. The final solution type of the processed GPS observation is "Fixed, Iono Free / Float, Iono Free".

General practice of the DGPS processing involves a known coordinate of a reference points and other control points has been established based on these reference points by differentially correcting the systematic GPS errors. Accurate coordinates of the reference points in WGS84 should be available or accurate transformation parameter from it to WGS84 should be available in order to process DGPS data and compute the coordinates of ground control points. In this Project following approaches were adopted:

- Determination of precise WGS84 coordinates of one point (BASE) in Projects area with 5 to 6 hours' observation and differential solution using IGS stations;
- Processing of the Project Control Points with respect to the base stations with double differences and network adjustments;
- Conversion of coordinates to UTM
- Export the point and quality control report

2.4.8 Findings and Limitations

Among the two triangulation points provided by the Survey Department, Trig 133 was removed and could not be located on the site. The coordinates for Trig 132, supplied by the Survey Department, contained significant errors, as detailed below. The consultant conducted a static survey to accurately determine the location of Trig 132, and this corrected data was used to generate the maps.

Trig/BM Gravity No.	Easting	Northing	Latitude	Longitude	Elevation	Remarks
132	631309.536	3088327.699	27.906891°	82.333971°		Provided accoring to cash receipt no 2023 of Survey Department
132	631280.28	3088309.648	27.90773266	82.33208833	232.5	DGPS Static Survey
132/Difference	29.2556	18.0508				Discrepency in Trig Coordinate and DGPS Static Survey

2.4.9 UAV (Drone) Survey

This presents topographical survey with the help of an unmanned aerial vehicle (UAV). Traditional land survey maps consist of CAD line drawings. They are produced by measuring points of interest with classical equipment, such as total stations. Unmanned aerial vehicles, however, present us with the possibility of measuring large areas just as accurately and far more elegantly than in the case of classical land surveying methods. Standard results of a UAV based land survey consist of point clouds, digital terrain models and digital orthophotos.

We believe low altitude photogrammetry can enhance classical tachymetric measurements. The technology offers the advantage in the form of fast data acquisition. While even experienced surveyors can only determine positions of approximately 3 points per minute, low altitude photogrammetry one the other hand has the ability to provide millions of points in less than an hour.

In addition, UAV based measurements are contactless which allows for highly visual representations of natural or manmade environment. They can be used to get information from places which cannot be easily (or safely) accessed, such as highways, rocky cliffs, remote locations, etc. As taking measurements does not interfere with traffic of work processes, low altitude photogrammetry can offer elegant control over quarries, landfills, cultivation, drainage, highways etc.

UAV based mapping offers a completely new paradigm of what is considered to be land surveying. Surveyors can map huge areas of land, and make technical and business decisions later, focusing on anything from which survey maps to produce to the question of resolution and level of detail. Furthermore, if at later stage a more detailed survey map is required, one can extract additional measurements from existing aerial images without having to do any more field work.

Hot water is one of the most important components of the economic development in the country. The main concerns on Groundwater management are its efficiency and effectiveness. Most of the problems are derived from the lack of accurate data of Groundwater systems for conducting best management practices. Unmanned Aerial Vehicle development has promised a new way to collect important Groundwater systems data in an efficient and effective manner. The UAV makes data collection can be done virtually anytime, anywhere at very reasonable cost. Some study has proven the potential use of UAV in agriculture, such as crop status mapping, vegetation sensing or soil erosion monitoring. UAV has advantages which almost impossible to get from conventional aircraft. i.e. it can fly at a lower altitude so it able to provide a higher resolution image needed by site-specific farm management.

2.4.10 Data Collection

Data collection in UAV surveying involves meticulous pre-flight planning, including defining mission objectives, designing flight paths with appropriate overlap and altitude, and setting up Ground Control Points (GCPs) for enhanced accuracy. The UAV and sensors are calibrated and inspected before executing

the flight under suitable weather conditions. During the flight, the UAV autonomously follows the programmed path, capturing high-quality georeferenced images. Post-flight, the data is retrieved, backed up, and initially reviewed for completeness and quality. This structured approach ensures precise and reliable geospatial data for applications such as mapping, construction monitoring, and agricultural assessment.

The study employed a general workflow for mapping which is similar to the one based on aerial mapping. The workflow consists of: (i) preparation; (ii) flight planning; (iii) automated flight; (iv) data processing. The first phase is preparation which includes area definition and hardware setup. The second phase is flight planning using Mission Planner software. This step will be done in the field to make the best plan based on real terrain and weather condition. We will define the time lapse interval of camera shutting in this phase. Below are flight and data acquisition parameters:

Altitude : 30 - 120 m

Ground speed : 10 m/second

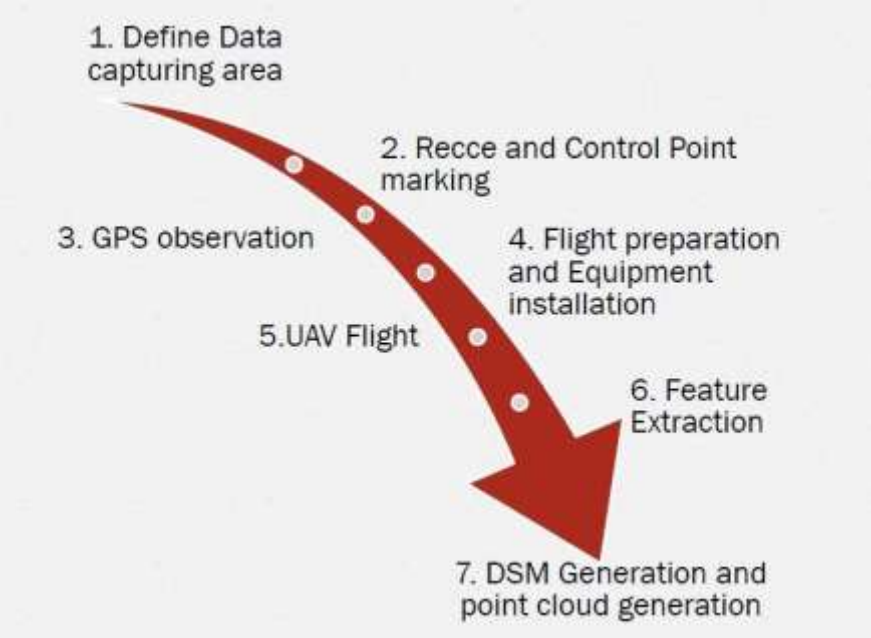
Shutting intervals: 3.9 seconds

Side overlap : 75%

Forward overlap : 60%

Flights was done automatically using waypoints defined on the flight planning phase. Flight controller recorded all of flight parameters into a log file which will be used to determine data acquisition parameter such as camera viewing angle, position and orientation of sensors.

Data collected from previous phase then processed using Pix4D Mapper software to stitched images and get georeferenced-orthophoto.



Two polygons were created, and a flight was conducted to capture ground positions.

Polygon F1; Outer Polygon - Flight Height 100m, Contour Interval 0.5m

Polygon F2; Inner Polygon – Flight Height

50m, Contour Interval 0.1 m

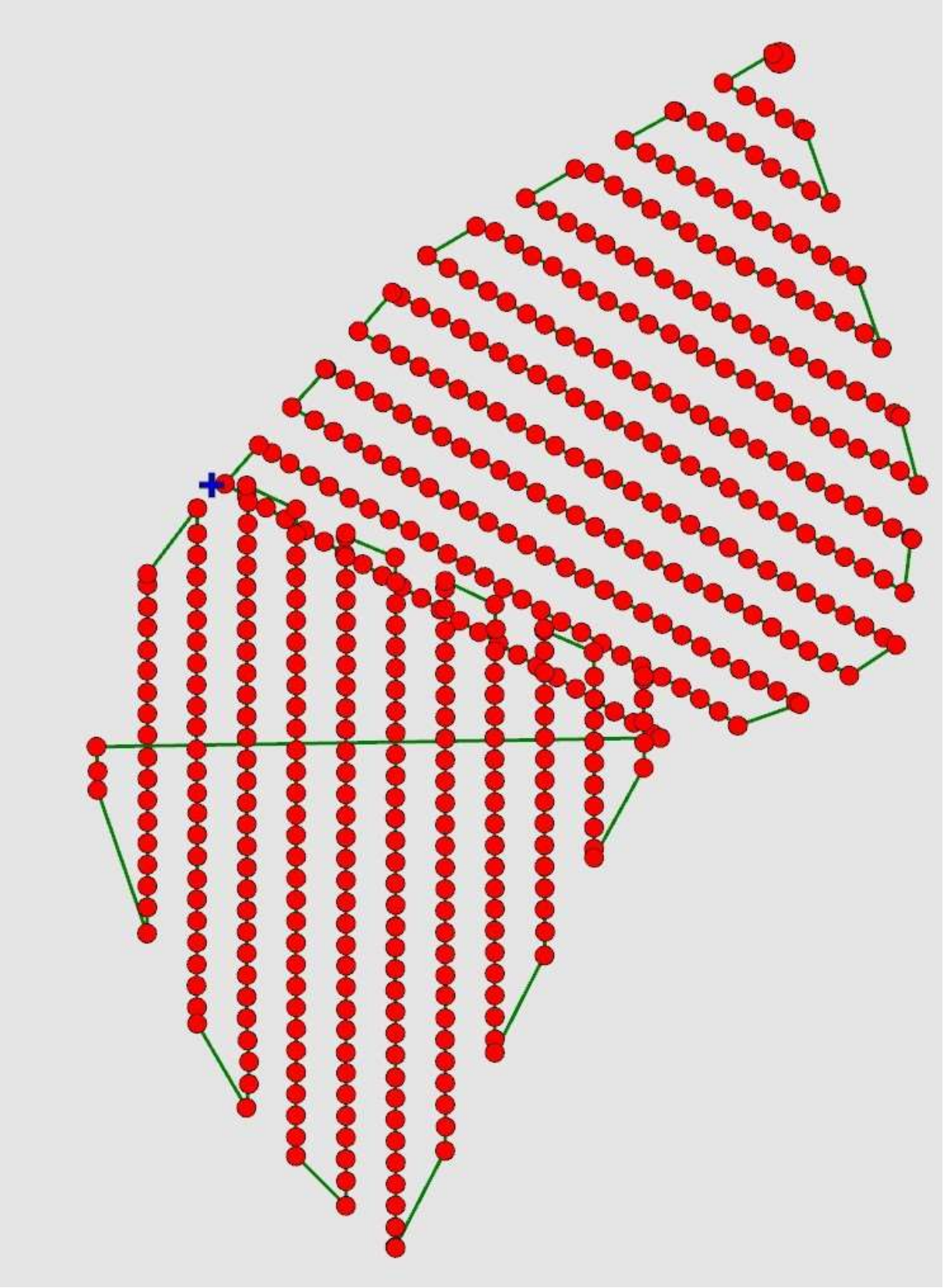


Figure 2.3: Some snaps of Method of Data Collection, UAV Flight Plan

2.4.11 Data Analysis

Analyze the processed data to extract the required topographic information, such as elevation data, contour lines, and surface models. Use this information to create maps and reports for use in planning and design.

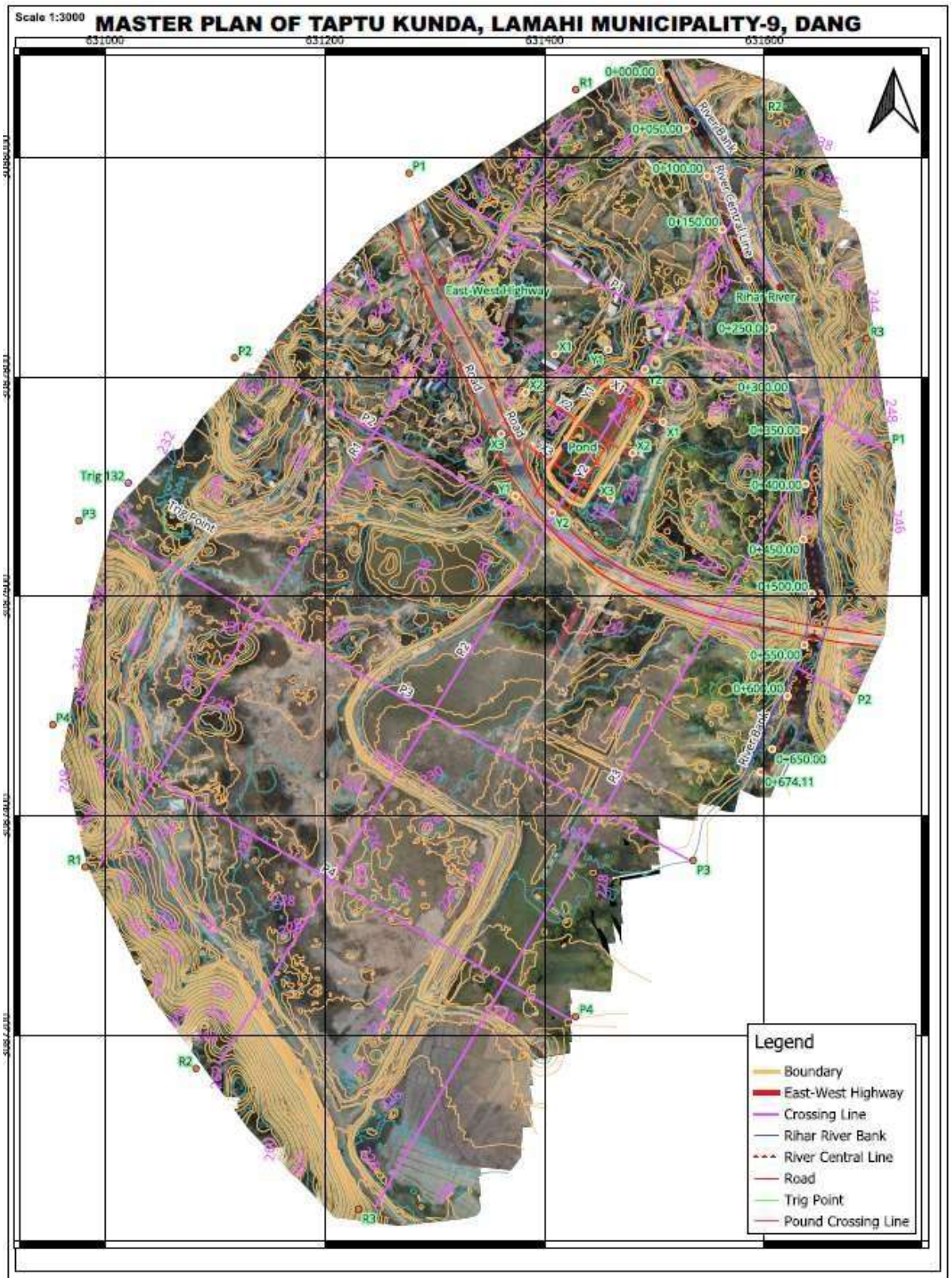


Figure 2.4: Data obtained from Flight F1; Contour Interval 0.5m

2.5 Conclusion

- The topographical mapping and survey of Hot Water Spring, Tapta Kunda Tatopani, Dang helped understand the area's land features such as position and elevation.
- This information is crucial for knowing the natural characteristics of the region and can assist in tasks like planning and protecting the environment.
- The data collected will be useful for managing resources and making decisions that balance development and conservation in the region.
- Mapping out the terrain accurately allows for better planning and protection of the area's natural resources, supporting sustainable development efforts.
- Among the two triangulation points provided by the Survey Department, Trig 133 was removed and could not be located on the site. The coordinates for Trig 132, supplied by the Survey Department, contained significant errors. The consultant conducted a static survey to accurately determine the location of Trig 132, and this corrected data was used to generate the maps.
- Overall, this study emphasizes the importance of detailed topographical surveys like this one to guide responsible decision-making and sustainable practices in the area around Hot Water Spring, Tapta Kunda Tatopani, Dang.

Benchmarks and topographical map are shown in Annex I and Annex II respectively.

3 HYDROLOGICAL STUDY

3.1 Introduction

The preparation of the master plan includes the conservation plan and the tourism development plan. The development plan includes tourism development infrastructure such as recreational areas, swimming ponds, bath showers, sliding decks, etc. The main objective of a hydrological study is to determine the hydrological parameters of the river for the design of infrastructure, ensuring that the design flood would pass without endangering the structures.

3.2 Catchment description

The river basin characteristics is determined based on satellite data. SRTM 30m DEM is used for analysis of basin characteristics and river morphometry. Rihar Khola originates from Siwalik range and has an ephemeral flow. The highest and lowest elevation in the catchment is 945.0 masl and 237.0 masl respectively. Gradient of Rihar khola at hot water spring stretch is 0.98%. The watershed area of Rihar khola at hot water spring is 26.3 km^2 which is shown in Figure 3.1.

Figure 3.1: Watershed Map of Rihar khola at hot water spring on Google Earth Basemap

3.3 Data availability

The rainfall data of meteorological station 515 was used for analysis. The data for 24-hr peak rainfall is available from 1989 to 2013 which is presented in Table 3.1 below.

Table 3.1: 24-hr peak rainfall at Ghorai station 515

Year	24-hr peak rainfall	Year	24-hr peak rainfall
1989	99.6	2002	93.2

1990	111.2	2003	117.1
1991	100	2004	93.6
1992	85	2005	93.8
1993	116	2006	101.7
1994	101.8	2007	102.1
1995	110.2	2008	99.6
1996	98	2009	155.6
1997	107.4	2010	148.2
1998	128.8	2011	83.8
1999	195	2012	129.1
2000	79	2013	95.8
2001	95.6		

24 hours maximum rainfall for 100 years return period and 2 years return period is calculated by Gumbel's frequency analysis. The extreme rainfall for 2 years and 100 years return period were taken as 105.79 mm and 205.08 mm respectively for discharge calculation.

3.4 Design flood

Maximum design discharge is the peak river discharge that corresponds to a certain return period, which is usually taken as 100 years for the design of the infrastructure. Rihar khola is ungauged river and does not have discharge data. Hence, different Empirical method was employed to compute the peak discharge. The maximum discharge was given by WECS DHM approach. Thus, the adopted 100-year flood for the Rihar khola at the hot water spring is 165.83 m^3/s. The peak discharge obtained from different empirical approach is listed in Table 3.2.

Table 3.2: Peak discharge for Rihar Khola using various empirical approaches

SN	Peak Discharge for Rihar Khola	Maximum Discharge	
		Q2 (m^3/sec)	Q100 (m^3/sec)
1	WECS DHM	**34.25**	**165.83**
2	Modified Dicken's	50.15	129.42
3	BD Richards	70.70	137.05
4	Snyder's	50.14	97.20
5	Rational	-	143.40
6	MHSP	-	109.45

3.5 Flood Modelling

The determination of high flood level, waterway width, velocity of flow at site, and depth of flow was performed on a 1D HEC RAS interface. HEC-RAS, a computer program developed by the US Department of Defense, Army Corps of Engineers, is used for modelling flood discharge flowing

through systems of open channels and computing water surface profiles. The basic computational procedure of HEC-RAS for steady flow is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction and contraction/expansion. The momentum equation may be used in situations where the water surface profile is rapidly varied. These situations include hydraulic jumps, hydraulics of bridges, and evaluating profiles at confluences. A total length of 680 m of khola stretches was considered for modeling. Manning's coefficient of 0.06 is considered for both the thalweg part and overbanks. The HEC RAS model for the hot water spring at Rihar khola is presented in Figure 3.2.

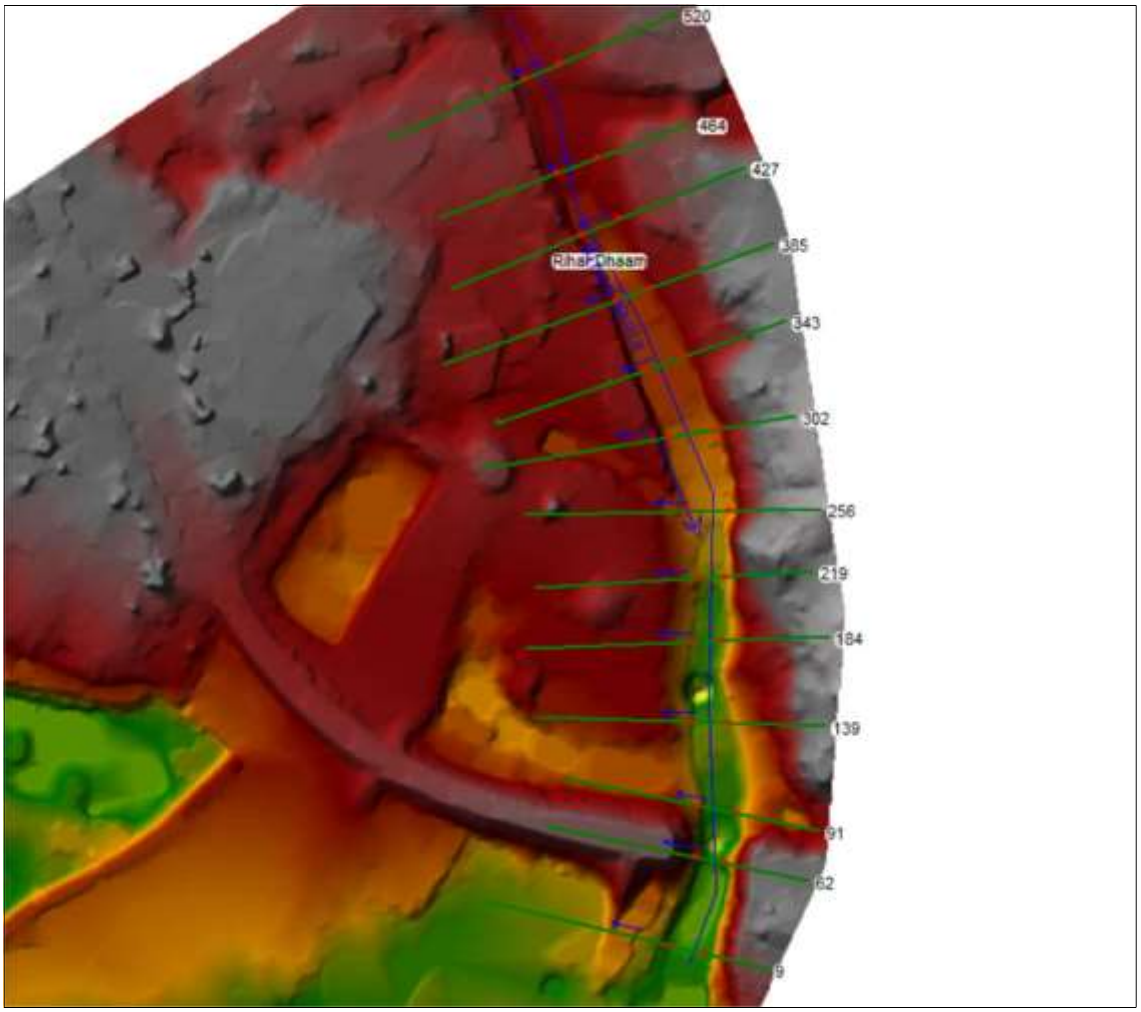


Figure 3.2: HEC-RAS Model for hot water spring at Rihar khola

3.6 Output

The high flood level computed at Tapta kunda hot water spring (HS/5100709-38) is 234.0 m with an average velocity of 3.48 m/s and flow depth of 1.52 m. The velocity distribution across the cross section and high flood level at Tapta kunda hot water spring is presented in Figure 3.3.

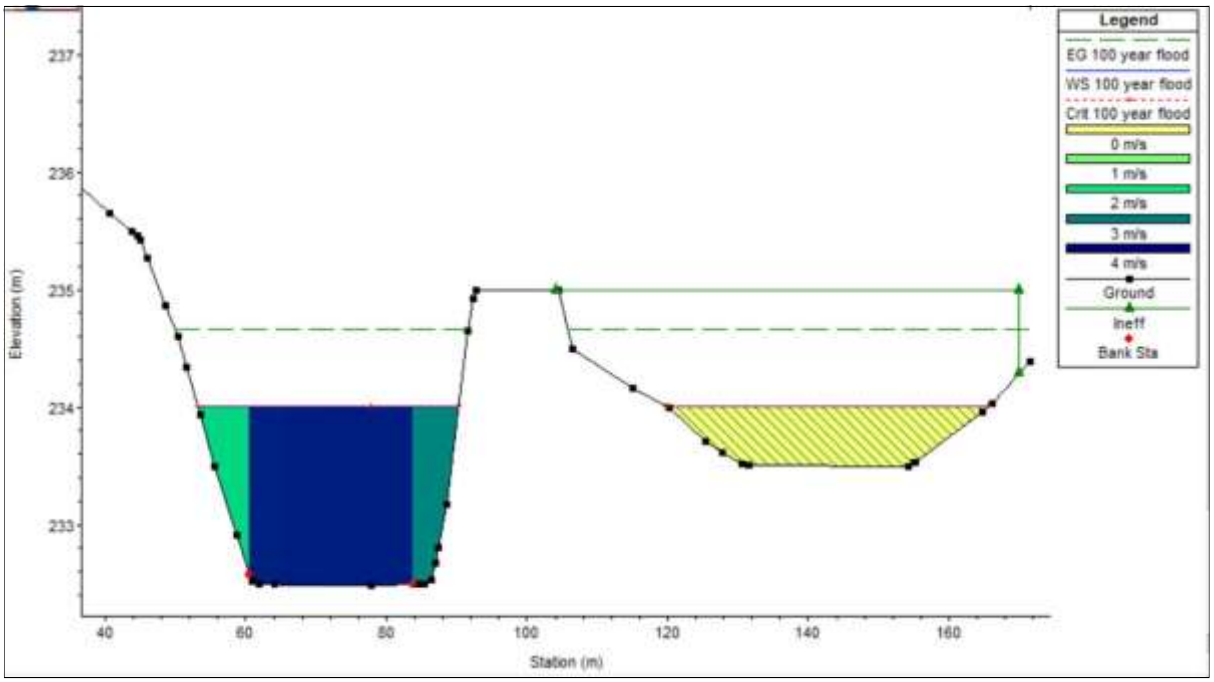


Figure 3.3: Velocity distribution and high flood level during 100 years flood at Tapta kunda hot water spring (HS/5100709-38)

The rating curve for elevation versus discharge at Tapta kunda hot water spring (HS/5100709-38) is presented in Figure 3.4.

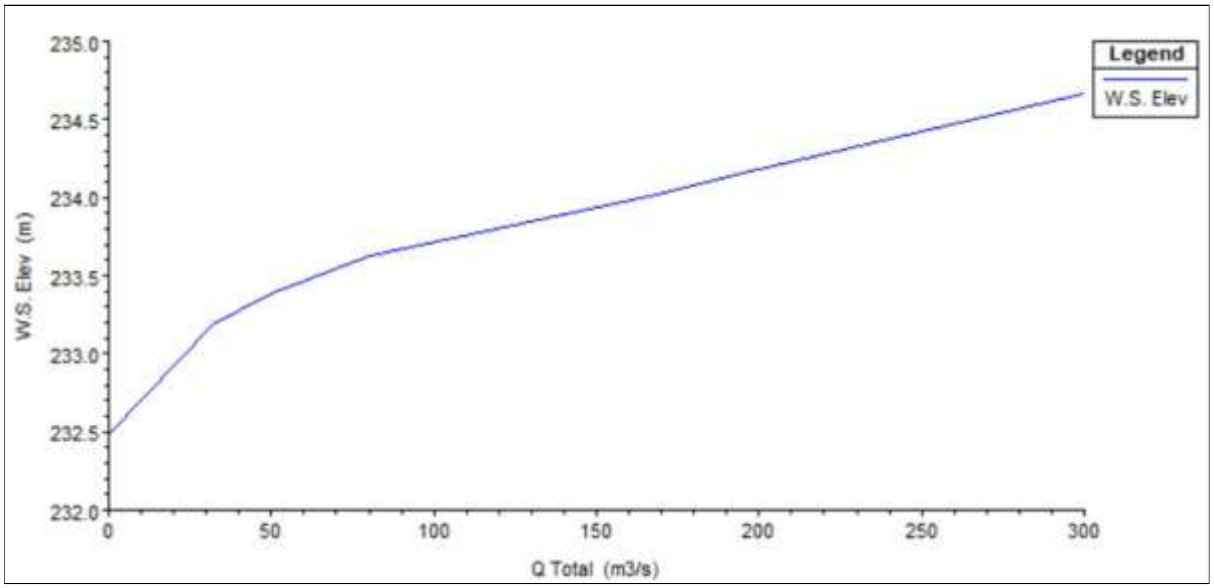


Figure 3.4: Rating Curve at Tapta Kunda hot water spring (HS/5100709-38)

3.7 River Protection Requirement

The river protection structure is proposed based on site condition, hydrological analysis and river hydraulics condition.

Tapta Kunda Tatopani lies at left bank of Rihar Khola. The Kunda area is safe from river erosion however occasional inundation occurs during monsoon season. Considering river hydraulics model there are two factors leading to inundation. First factor is overbank flow due to high discharge at area

upstream of Kunda, which subsequently flow to Kunda area causing inundation. The other factor causing inundation is lack of outlet for rainwater at Kunda area. During monsoon season when the water level rises at Rihar Khola the rainwater accumulated in Kunda area will not flow due to lack of hydraulic gradient and hence the pond area is inundated.

Two different solution is proposed for flooding problem. For overbank flow from upstream it is recommended to continue current embankment with gabion wall at Kunda area to upstream. For the problem of inundation due to lack of drainage capacity the overall area needs to be elevated and Kunda management has already started such works.

Hence considering flood level the plinth level of structures is recommended as 234.5 m.

4 THE MASTER PLAN OF HOT SPRING

Nestled in the tranquil beauty of Nepal's landscape, hot springs have great potential to grow as a tourism destination. Travelers seeking physical rejuvenation and cultural immersion have taken notice of Nepal's major hot springs, among which the consultant team along with the coordination with WECS have identified and shortlisted 5 hot springs, out of which two hot water springs are recommended to develop in combination. A thorough evaluation that considered a number of variables, including accessibility, geological significance, cultural legacy, and the potential for sustainable development, led to their selection for the master plan.

Historically, hot springs have held a special place in Nepal's cultural fabric, revered for their therapeutic properties and spiritual significance. Despite their cultural and natural importance, many of these hot springs have faced neglect in terms of infrastructure and management. This neglect has not only hindered their ability to attract visitors but has also posed threats to their ecological integrity.

The initiation of the master plan marks a crucial step towards addressing these challenges. It aims to revitalize the existing infrastructure of the hot springs, including bathing facilities, accommodation options, and recreational amenities. Additionally, the plan proposes the development of new structures and services tailored to enhance the overall visitor experience, thereby unlocking the full tourism potential of these natural assets.

Moreover, the master plan is underpinned by a strong commitment to environmental conservation and sustainable practices. Efforts will be made to minimize the ecological footprint of tourism activities, with initiatives focusing on waste management, biodiversity conservation, and the promotion of eco-friendly practices among visitors and local stakeholders.

The master plan recognizes the importance of community engagement and empowerment in ensuring the long-term success of tourism initiatives. Local communities will be actively involved in the planning and implementation process, with opportunities for capacity building, entrepreneurship, and cultural preservation initiatives. By fostering a sense of ownership and stewardship among local residents, the master plan seeks to create a tourism ecosystem that is not only economically viable but also socially and environmentally sustainable.

In essence, the development of the master plan represents a holistic approach to hot springs tourism in Nepal, one that seeks to balance the economic benefits of tourism with the imperative of environmental conservation and cultural preservation. Through strategic interventions and collaborative efforts, it aims to transform these hot springs into thriving destinations that offer enriching experiences for visitors while safeguarding Nepal's natural and cultural heritage for generations to come.

4.1 Necessity of Redevelopment

Nepal's hot springs need to be developed again for a number of reasons that will help the local population as well as the tourism industry. The hot springs, a natural attraction, have a lot of promise for tourism as they entice people looking for rest and healing properties. However, the attractiveness of the current amenities may be limited if they don't live up to the expectations of tourists. The location can draw more people and create economic opportunities for the community by improving the amenities, bathing spaces, and changing rooms. Additionally, by addressing environmental issues

like waste management and water quality, rehabilitation projects can guarantee the site's sustainability for coming generations. Better security protocols and hygienic amenities can also improve the general guest experience while fostering health and wellbeing. In the end, redevelopment offers a chance to several issues currently plague the site of in Nepal, impacting both the local community and visitors. These problems hinder the area's potential for tourism and economic development. Here's an overview of the key challenges:

- Underdeveloped tourism infrastructure, including accommodation options, restaurants, and recreational activities.
- Insufficient facilities such as changing rooms, toilets, and bathing areas.
- Limited road access and poor transportation infrastructure.
- Seasonal fluctuation of visitors.
- Lack of sustainable management of water resources.
- Lack of Management.
- Inadequate sanitation facilities and safety measures

4.2 Concept and Design Development

Redevelopment of hot springs offers an opportunity to transform the site into a sustainable and attractive destination that celebrates its natural beauty, cultural heritage, and offers enriching experiences for visitors. The main concept for the redevelopment is to create a premier eco-tourism destination that harmonizes with nature, celebrates local culture, promotes wellness, and fosters economic opportunities for the community while preserving the environment for future generations.

4.2.1 Key Concept of Redevelopment

4.2.1.1 Natural Hot Springs Enhancement

Restore and enhance the natural hot springs while preserving their ecological integrity. Develop bathing/soaking pools and relaxation areas with eco-friendly infrastructure. Integrate natural landscaping to create a tranquil and immersive experience.

4.2.1.2 Sustainable Infrastructure

Implement sustainable design practices in all infrastructure development, focusing on energy-efficient buildings, water conservation measures, and waste management systems. Design pedestrian-friendly pathways to minimize environmental impact and promote active transportation. Introduce renewable energy sources, such as solar power, for lighting and heating.

4.2.1.3 Wellness and Eco-Tourism Offerings

Develop eco-lodges and sustainable accommodations that blend with the natural surroundings. Offer wellness retreats, yoga sessions, and holistic healing experiences cantered around the hot springs. Provide opportunities for eco-friendly adventure activities such as hiking, birdwatching, and nature walks.

4.2.1.4 Universal Design

Universal design principles are crucial to ensuring inclusion and accessibility for all people in the re-development plan. Ramps facilitate easy access to pathways, entrances, and common areas by being

smoothly incorporated into the infrastructure. In order to safely and pleasantly accommodate those with mobility issues, these ramps have non-slip surfaces, large widths, and moderate slopes. Wider entrances and accessible fixtures are examples of accessibility features that prioritize the comfort of visitors with impairments in the design of accommodations and restrooms. Ramps are also thoughtfully positioned to accommodate a variety of ground levels and open areas, according to the natural curves and facilitating smooth transitions between them. The town creates a friendly atmosphere for both locals and guests by ensuring clear navigation and accessibility throughout with inclusive signage and wayfinding.

4.2.1.5 Community Engagement and Empowerment:

Involve the local community in the planning, development, and management of the site. Create opportunities for community-owned enterprises, including homestays, guided tours, and handicraft sales. Invest in training and capacity building programs to enhance the skills and entrepreneurship of local residents.

4.2.1.6 Sustainable/Green features

These features help sustain the hot spring leaving behind less carbon footprint. By prioritizing sustainability, the natural environment is preserved for future generations.

4.2.1.7 Renewable resources

Maximizing the use of daylight can reduce energy consumption by incorporating PV cells for electricity production. This approach includes utilizing direct, indirect, and isolated gain, along with proper planning of windows and sun shading devices.

4.2.1.8 Water Pollution

The hot spring should not put pressure on the nearby water body and shouldn't pollute the existing river. The activities related to hot spring should have minimal effects on the water body used for placing the remains.

4.2.1.9 Solid Waste Management

Segregation of waste should be done before disposal such that maximum organic materials are composted and recyclable materials are sent for recycling. Following the 5R principles for disposal of waste can help minimize the overall waste.

By embracing this concept for the redevelopment of hot springs, the site can emerge as a model for sustainable tourism, offering memorable experiences that enrich the lives of visitors, support the livelihoods of the local community, and safeguard the natural and cultural heritage of the region for generations to come.

4.3 Tapta Kunda, Dang

4.3.1 Site Introduction

Location: Rihar Dang

An image taken using UAV technology and the site location has been displayed below:

Figure 4.1: Photograph of Tapta Kunda using UAV technology

The site is located at the heart of the Rihar Chettra, surrounded by lush greenery and Rapti River.

4.3.2 Discharge

The hot water source is situated on the right bank of the river, discharging approximately 1.82 liters per second and having an average temperature of around 41.8 degrees Celsius. The water from the

spring is clear and free of any unpleasant odors. The hot spring is situated in close proximity to the river, surrounded by expansive plains, and the location coincides with the accumulation of alluvial deposits along the river's course. The available discharge is sufficient for current use as per Kunda Management. However, the further development has envisioned growth in visitors. The sufficiency of water and need of storage of hot water in insulated tank shall be studied based on increased visitors such that the discharge at night time can be collected and used by visitor during day time. For now, the master plan has not considered the storage of hot water.

4.4 Masterplan

The masterplan is based on the idea of making maximum use of existing structures while creating immersive architectural experience.

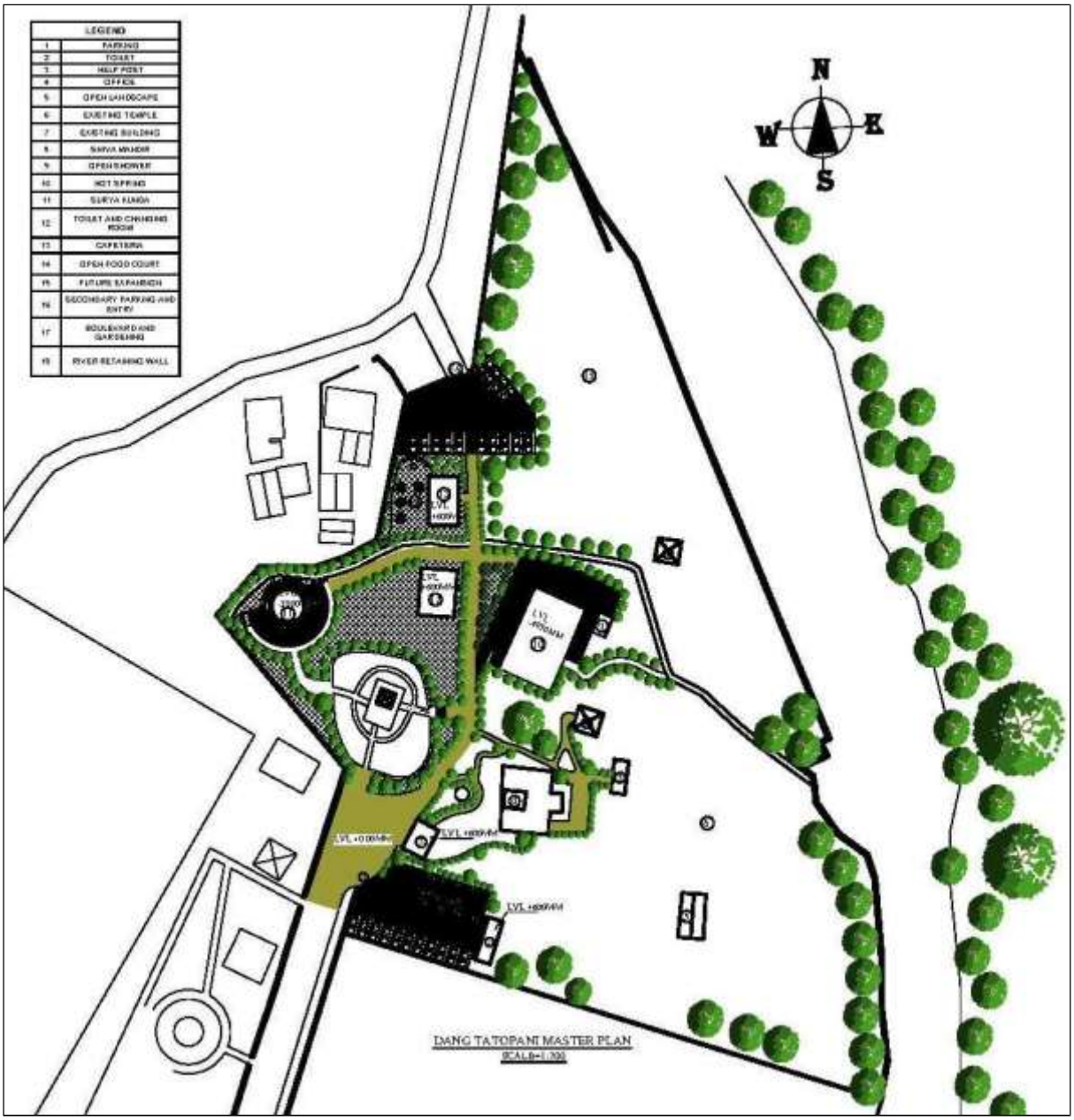


Figure 4.2: Outline of Masterplan

The masterplan is based on the idea of making maximum use of existing structures while creating immersive architectural experience.

An illustrative plan with conceptual view profiles is give below:

Figure 4.3: The Master Plan

List of Programmes

1) Parking.
2) Toilet.
3) Help Post.
4) Office.
5) Existing Building.
6) Landscape.
7) Existing Temple.
8) Shiva Mandir.
9) Open Shower.
10) Hot Spring.
11) Surya Kunda.
12) Toilet and Changing Room.
13) Cafeteria.
14) Food Court.
15) Future Expansion.
16) Secondary entry and Parking.
17) Boulevard and Garden.
18) River Retaining Wall.

4.4.1 Main Entry and Parking

At the main entry, the parking area (no 1 in image below) accommodates up to 11 cars and 51 motorbikes, ensuring ample space for visitors' vehicles. Accessible via an 8-meter-wide access road, the parking facility features natural vegetation strategically positioned to provide shade, enhancing comfort for parked vehicles. Parking spaces are organized in a 90-degree layout, optimizing utilization of the area while facilitating ease of parking and navigation. The access road is paved with black top pitch, ensuring durability and smooth access for arriving and departing vehicles.

4.4.2 Landscape

In the landscape, a clear delineation between hard and soft surfaces is paramount in the master plan, ensuring visual clarity and functional efficiency. Pre-existing routes are seamlessly integrated, capitalizing on their inherent flow and connectivity to enhance the overall user experience. Emphasizing the preservation of the site's natural essence, a significant portion of space is designated as green space or soft ground, fostering a harmonious coexistence with nature while providing a serene environment for inhabitants and visitors alike.

4.4.3 Existing Temple

The preservation and maintenance of the existing temples are fundamental aspects of the architectural strategy. Special care is taken to ensure their integrity and cultural significance are upheld, serving as focal points within the site. Well-defined pathways intricately weave through the landscape, guiding visitors with clarity and reverence towards these sacred spaces, fostering a sense of spiritual journey and connection within the architectural narrative.

4.4.4 Toilet

The architectural design incorporates toilet (no 2 in image below), strategically positioned for convenience and accessibility which is centrally located within the premises, enhancing convenience

for occupants and visitors alike. The provision includes separate facilities for males and females, catering to diverse needs and ensuring privacy and comfort. With a total area of 39 square meters, these restroom facilities are thoughtfully integrated into the design, prioritizing functionality and user comfort within the architectural scheme.

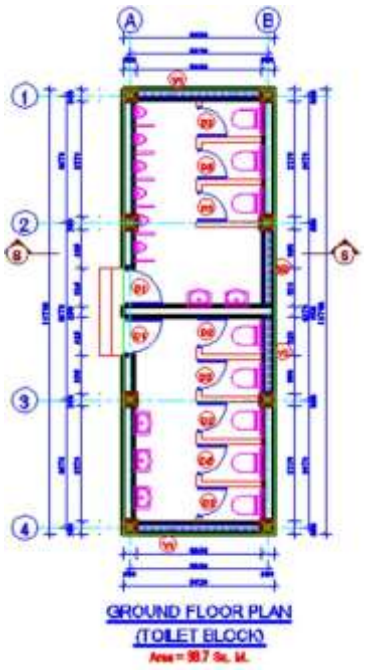


Figure 4.4: Plan of Toilet

Figure 4.5: Location of Parking and Toilet

4.4.5 Help Post

A help post has been strategically placed at the entry to the Tatopani landscape, positioned at a junction to maximize visibility and accessibility. Its prominent location ensures that it is clearly visible to all those entering the area, serving as a reliable point of assistance for visitors and passersby. Whether individuals require directions, information, or assistance of any kind, the help post stands ready to provide support, enhancing safety and convenience within the Tatopani landscape.

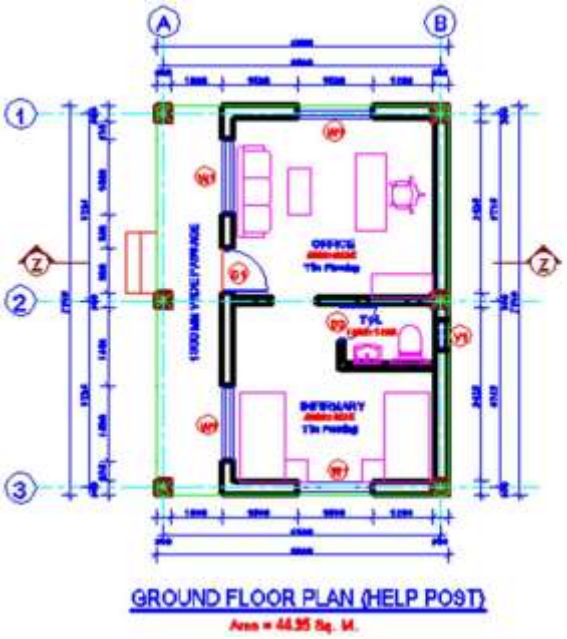


Figure 4.6: Plan of Help Post

4.4.6 Office

The office space is an existing building envisioned to maximize the potential of the current building structure, emphasizing efficient utilization of space while maintaining a clear, visible presence within its surroundings. The design emphasizes a flat roof configuration, enhancing its contemporary appeal while ensuring seamless integration with the existing architectural context.

4.4.7 Shiva Mandir

The Shiva Mandir stands as the pinnacle of spiritual reverence within the architectural composition, esteemed as the most significant temple. Strategically centralized, its presence commands attention and serves as a focal point for visitors. Pathways and spatial arrangements are intricately designed to convey the hierarchical importance and profound religious value attributed to the mandir, guiding devotees on a journey of spiritual significance. Encircling the temple is a meticulously planned concentric landscape, symbolizing devotion and reverence, while its elevated position at +1500mm LVL further accentuates its sacred stature, imbuing the space with a sense of transcendence and divine connection.

4.4.8 Shower

The open shower design features a spacious standing path accommodating up to 8 people at a time, spanning a generous 5 meters. This layout facilitates a communal bathing experience, fostering a sense of togetherness and connection. Each kundas have an open shower and each are protected by natural screenings enhancing privacy while ensuring an efficient and comfortable bathing process.

4.4.9 Tapta Kunda

The hot spring (no 10 in image below) facility features a spacious rectangular layout measuring 13.4 meters by 21.5 meters, offering ample space for approximately 200 individuals at a person-per-area ratio of 1.5 square meters. The original size of the kunda will be extended. A partition is being planned in the Kunda after extension which will divide the whole facility into two parts and again the original area will be divided into male and female partition. A reliable source of heat ensures a consistent and comfortable bathing experience for visitors. After use, the facility is drained into the nearby river, ensuring environmental sustainability and water conservation. Surrounding the kunda is a lush buffer vegetational layer, providing both aesthetic appeal and natural insulation. Positioned at an elevation of LVL -4050mm, the hot spring facility offers a tranquil retreat amidst the surrounding landscape.

Figure 4.7: Existing Photo of Tapta Kunda

Figure 4.8: Proposed plan of Tapta Kunda

4.4.10 Surya Kunda

The Surya Kunda (no 11 in image below), named for its circular shape reminiscent of the sun, offers a unique bathing experience. Its circular design symbolizes the celestial orb it honors. The surrounding

area is paved in a manner that emulates the sun's sinking appearance during sunset, creating an atmospheric ambiance. Positioned at LVL -3900mm, the kunda features a diameter of 7.4 meters, accommodating approximately 44 individuals at a person-per-area ratio of 1 square meter. The source of the water emanates from the center of the kunda, enhancing the immersive and revitalizing experience for visitors.

Figure 4.9: Surya Kunda

4.4.11 Toilet and Changing Room

The toilet changing room (No 12 in image below) serves as a centrally located facility, providing convenient access for visitors. Separate sections are designated for male and female users, ensuring privacy and comfort. Currently spanning 98.3 square meters, the facility ingeniously houses a water tank within the roof, optimizing space utilization while ensuring a sustainable water supply. Topping off the structure is a flat roof design, seamlessly integrating with the architectural aesthetic while offering additional functionality.

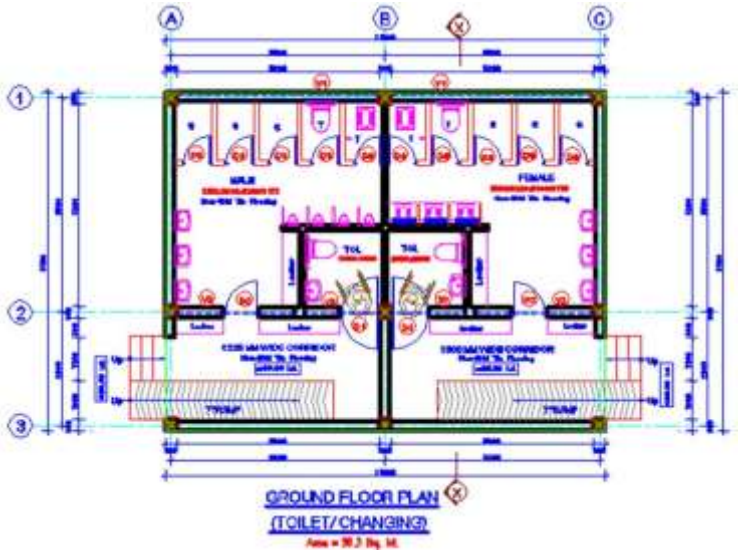


Figure 4.10: Plan of Toilet and Changing Room

Figure 4.11: Location of Toilet and Changing Room in Master Plan

4.4.12 Cafeteria

Positioned at the furthest end from the main entrance, the cafeteria (no 13 in image below) is strategically situated alongside a secondary entrance, offering accessibility to both visitors within the Tatopani site and passersby. This placement ensures the café's commercial viability, allowing it to cater to individuals without requiring entry into the main Tatopani area. The covered cafeteria spans 84.3 square meters, providing ample space for patrons to dine comfortably while enjoying the scenic surroundings.

Figure 4.12: Plan of Cafeteria

Figure 4.13: Location of Cafeteria Room in Master Plan

4.4.13 Open Food Court

The open food court (no 14 of Figure 4.13) boasts a capacity to comfortably accommodate 36 people, providing a spacious and inviting dining experience. Set amidst lush garden surroundings, the food court offers patrons an impeccable dining environment, seamlessly blending natural beauty with culinary enjoyment.

Figure 4.14: Location of Future Expansion Area

4.4.14 Future Expansion

The expansive northern section of the site (no 15 in image below) is intentionally left in its natural state, reserved for future expansion opportunities. Its direct linkage to the river enhances its appeal as a potential picnic spot, offering visitors the opportunity to enjoy serene natural surroundings and waterfront views. This strategic planning not only preserves the site's natural beauty but also ensures flexibility for future development endeavors. This are will be used for accommodating people during festival season- Maghi and Teej by constructing camps and temporary toilets as existing features are designed for general seasons. This area can also be used for park construction, burial ghat construction- the north east corner (as it lies on the river bank) or construction of temples, dharmashalas, etc.

4.4.15 Secondary Entry and Parking

The secondary entry and parking area provide accommodation for 14 four-wheelers and 15 two-wheelers, catering to both Tatopani visitors and café patrons. Accessible via a 5-meter-wide access road, the parking lot features a black-top surface, ensuring durability and ease of maintenance. Parking is organized in a 90-degree layout, optimizing space utilization and facilitating convenient ingress and egress for vehicles.

Figure 4.15: Secondary Entry and Parking Area

4.4.16 Boulevard and Garden

The boulevard and gardening feature a charming blend of stone and brick paved pathways, gracefully bordered by lush vegetation. These pathways follow an organic flow, seamlessly connecting all distinct zones within the site. Not only do they enhance the aesthetic appeal of the surroundings, but they also provide functional connectivity, inviting visitors to explore and enjoy the diverse offerings of the Tatopani complex.

5 COST ESTIMATION

Preliminary quantity estimates are based on the measurements of the structures and the section in the drawings. The architectural drawing of main civil works was created and quantity were derived. The cost for other works is estimated on lump sum basis. Rate for items were derived from GoN norms.

5.1 Estimating Methodology

The project cost estimate is carried out in parallel with the quantities of various items taken from the feasibility level of drawings and quantities derived from empirical relations.

The cost estimation is divided into following subheadings.

- Civil works
    - Major civil works are estimated based on architectural drawing
    - River protection works is estimated based on prepared protection plan
    - For minor civil works quantity is directly extracted from master plan
    - Physical and price contingency is considered
- Electrical works
    - Sufficient provision for indoor and outdoor lights is made
    - The outdoor light will be pole mounted LED light with pole height 5 m and spacing 10 m considering 25 watt led light which will provide around 2200 lumens
    - The wiring and accessories are adopted on lumpsum basis from previous experience
- Water supply and sanitary works
    - The number of faucets, bathtubs, showers, commodes and pans is counted based on architectural drawing.
    - The piping cost is adopted on lumpsum basis from previous experience

5.2 Basic Rates of Material at Site and Rate Analysis

5.2.1 Labor Cost

For estimating purpose, the labor force has been subdivided into three categories of workers, namely unskilled, semi-skilled and skilled. It is also assumed that the work force required for the project will be from the local market, and only specific skilled labor will be brought from outside.

Considering the overall construction requirements for the project, 6 days x 8 hours work a week was selected as the basis for planning and estimating the major construction activities.

5.2.2 Construction Equipment

The access road is proposed to be constructed first to transport the heavy machineries and equipment to the project site. For the purpose of rate analysis, equipment rates were derived from DOR published hire rates and adjusted to cope with the project site condition.

5.2.3 Construction Material

It has been assumed that most of the construction materials like cement and reinforcement steel will be supplied from the nearest local market.

5.2.4 Unit Rates

Unit rates have been derived for the major construction activities. GoN norms of practice and consultant's in-house experience have been utilized in the derivation of the unit rates. The prices of materials and labors were obtained from the approved District Rates.

5.3 Contingencies and VAT

Physical Contingencies

The estimated costs include physical contingencies, which allow for unforeseen cost increases that may become necessary as more information is obtained and evaluated. In view of the extent of study carried out to date, the present stage of feasibility designs and the cost analysis performed, 10 % physical contingency has been added to cost additionally 10 % price contingency is added.

Value Added Tax - VAT

It is additional cost on the construction material, labor cost and other equipment. In general, the amount of VAT is considered as 13 %.

Table 5.1: Cost Estimate for Tapta Kunda

S. No.	Particulars	Amount (NRs.)	Remarks
A	Civil & Architectural Works - Building		
1	Civil works	33,198,087.00	
	Total of Civil & Architectural Works - Building	33,198,087.00	
B	Electrical and Allied Installations		
1	Electrical works	2,709,000.00	
	Total of Electrical and Allied Installations	65,188.71	
C	Sanitary, Plumbing & Water Supply Works		
1	All sanitary, plumbing and water supply	1,220,000.00	
	Total of Sanitary, Plumbing & Water Supply Works	1,220,000.00	
D	**Total Cost of Building (A+B+C):**	**34,483,275.71**	
E	Physical Contingency @ 10% of Sub-Total D	3,448,327.57	
F	Price Contingency @ 10% of Sub-Total D	3,448,327.57	
G	**Subtotal (D+E+F)**	**41,379,930.85**	
H	VAT @ 13% of Sub-Total G	5,379,391.01	
I	**Total Cost with VAT and Contingency (G+H)**	**46,759,321.86**	

6 ECONOMIC ANALYSIS

Economic analysis is carried out to assess economic viability of the project. Various indicative parameter including Economic Rate of Return (EIRR), Net Present Value (NPV), Benefit cost ration (BCR) and payback period has been evaluated considering the project cost and direct benefit resulted from tangible income as revenue generated from hot water spring.

6.1 Expected Social Benefit

6.1.1 Current Scenario

Efforts to manage the hot spring are commendable, with the committee ensuring the provision of facilities for visitors. These include a dedicated changing room and a well-maintained pool, offering a pleasant bathing experience. The hot spring attracts an average of 25 visitors daily, with a monthly footfall of around 800 individuals. The popularity of the hot spring peaks during the winter season, although it continues to welcome visitors throughout the year. During the peak season, an estimated 150 individuals visit the hot spring daily for bathing, while special occasions like Maghe Sankranti witness a significant influx of up to 15,000 people.

6.1.2 Social Benefits

The development of hot water spring generates significant indirect revenue for the community through various economic, social, and environmental mechanisms. These benefits, while not always directly measurable, contribute to the overall economic health and quality of life in the community.

6.1.2.1 Increase Local Business

The development of new tourism facility will increase the flow of visitor and subsequently promotes local business.

6.1.2.2 Creates Jobs

The influx of tourists supports jobs in the hospitality, retail, and service sectors, contributing to local employment and economic stability.

6.1.2.3 Increase in Property Value

Proximity to tourism can increase property values in the surrounding area, benefiting homeowners and increasing property tax revenues for local governments.

6.1.2.4 Cultural Expansion

The local culture can be shared and presented with tourist increasing cultural expansion. Cultural expansion through tourism refers to the process by which local traditions, customs, and arts are shared and promoted beyond their native contexts. As tourists visit a region, they experience and often take-home elements of its culture, such as cuisine, music, and crafts. This exchange fosters a broader appreciation and understanding of the local culture, leading to its wider recognition and sometimes adoption. Additionally, increased tourism can encourage the preservation and revitalization of cultural practices, enriching the cultural fabric and helping sustain local identity.

6.1.2.5 Economic Development

The increased economic activity around the hot water spring area will subsequently play role in economic development of surrounding. Increased economic activity around a hot water spring can drive economic development in surrounding areas by attracting tourism, which boosts local businesses such as hotels, restaurants, and shops. This growth in tourism infrastructure and spending creates jobs, enhances local services, and stimulates further investment in the region.

6.1.3 Economic Benefits

The development can attract businesses and tourism, leading to economic growth and job creation. This contributes to overall social stability by providing employment opportunities and improving the standard of living.

6.1.3.1 Economic Benefit in Travel Route

Businesses along travel routes, such as hotels, restaurants, and roadside attractions, benefit from increased tourist traffic and spending. This influx of travelers boosts local revenue and supports the growth of these enterprises, leading to a more vibrant and prosperous economy in the area.

Tapta Kunda is one of the easily accessible Natural Hot spring. The hot spring system is just 200m N from Rihar of Mahindra Highway. From Kathmandu it is 361km in distance takes 11 hrs. and costs NRs. 1794.00. Nepalgunj Airport is nearest airport which is 103km from Rihar. Different types of Hotels could be found along the Mahindra Highway and in Lamahi Bazzar (20 km East from Rihar) for accommodation. In general, price for one-night stay cost NRs. 2,000 per room and one-time meal cost NRs. 500 per person in this route. Estimated Travel cost and time for a person to reach Tapta Kunda Tatopani is presented on following table.

Table 6.1: Economical travel cost and tourist destination time

SN	Itinerary	Distance (km)	Approx. Time	Expenses (NRs)	Remarks
1	Kathmandu To Rihar	361	11 Hrs	1794	By Bus
Flying to Nepalgunj					
1	Kathmandu to Nepalgunj		0.5 Hrs	6600	By Flight
2	Nepalgunj to Rihar	103	2 Hrs	250	By Bus
From Nearest Border					
1	Rupaidiya- Nepalgunj-Rihar	120	2.5 hrs	300	By Bus

6.1.3.2 Infrastructure Development

Increased tourism can lead to improvements in local infrastructure, such as better roads and public transportation, which can benefit both tourists and local residents. Increased tourism often drives the development of local infrastructure, including enhancements to roads, public transportation, and utilities. These improvements facilitate easier and more efficient travel for tourists, attracting more visitors and boosting the local economy. Additionally, enhanced infrastructure benefits residents by providing better connectivity, reducing travel times, and improving overall quality of life.

6.1.3.3 Growth in Existing Business

The growth in local businesses is driven by the increased demand for hospitality, food and beverage, retail, transportation, and recreational services. This growth not only boosts the local economy but also enhances the overall quality of life for residents by providing more job opportunities, better services, and improved infrastructure.

6.1.3.4 Attraction of New Business

The growth in existing business also attracts new business of similar nature and also increases new type of business opportunity. This influx of new enterprises can lead to economic diversification, job creation, and a more dynamic local economy.

6.1.3.5 Enhanced Commercial Activities

The development activities stimulate local economies by increasing foot traffic and attracting tourists, which boosts sales for nearby retail, food, and beverage businesses. Proximity to spring source raises property values, encouraging real estate development and higher investments. The growth of businesses creates jobs and enhances visitor services such as guided tours, equipment rentals, and accommodations. Improved infrastructure and transport services also support increased commercial activities, while cultural and educational programs foster community engagement and promote a vibrant local culture, leading to sustained economic growth and diversification.

6.1.4 Tourism Benefit

Tourism sector can be benefitted by several ways, enhancing their economic and social impact. Tourist attraction contribute directly to revenue through entrance fees and other facility charges. Tourism also stimulates local businesses, including hotels, restaurants, and retail stores, boosting employment and generating tax revenue. Beyond economic impacts, tourism supports cultural exchange, environmental awareness, and conservation efforts, fostering community pride and engagement. Additionally, the activity attract investment in infrastructure and amenities, improving accessibility and enhancing visitor experiences. Overall, tourism promotes sustainable development while preserving natural resources, making it vital contributors to regional economies and community well-being.

6.1.4.1 Increased Tourism Mobility

The new development creates area of public attraction resulting increased tourism mobility. The development of an area can attracts businesses and tourism, which in turn stimulates economic growth and generates job opportunities. This influx of economic activity enhances the local economy, leading to better infrastructure and services. By providing stable employment and improving the standard of living, such development contributes to social stability and reduces economic disparities.

6.1.4.2 Tourism Connection

The tourism connection can be created with nearby places of tourist attraction such that defined tourism circuit is promoted. The new development attracts the tourist visiting the surrounding location to hot water location for recreation and also tourist visiting hot water location will visit nearby

location. Dang valley is known for its rich multi-ethnic cultures and traditions, preserving a wide range of ethnic historical, linguistic, and archaeological heritage. Its captivating landscapes, diverse flora and fauna, vibrant wildlife, and scenic forest along the Rapti and Babai rivers make it a popular destination.

Key attractions include the religious site "Brahathan" at Barakune Daha of the Kham people in Ghorahi Sub Metropolis and the Dharpani area, home to the tallest Trident of Lord Shiva or Kirateswor. Domestic tourists can explore numerous Hindu and Buddhist temples and monasteries, visit historical sites, and enjoy the Tharu people's museums and homestays in the Chakhaura area. Banglachuli, a high-altitude area reachable in about two hours from Ghorahi, offers opportunities for picnics, hiking, and viewing the snow-capped Himalayan ranges from its view tower. Promoting the Tapta kunda to Tourist visiting those places will increase tourist influx to both Kunda and other areas.

6.2 Revenue Source

6.2.1 Social Benefit

The social benefit acts as indirect source of revenue. The project with social benefit has to be launched even if the direct revenue of the project does not payback the initial investment. In the long run after project launching the cumulative effect of its social benefit will make project viable.

6.2.2 Economic Benefits

The economic benefits such as increased tourist mobility, benefit of travel route, infrastructure development, growth in existing business and attracting new business will increase the value of the area and creates job opportunity. The indirect economic benefit also serves as booster of economic viability of project even if the project is not directly financially viable. The project with economic benefit will attract funding from government agencies on construction and development cost making the project financially viable.

6.2.3 Entrance Fees

The entry fee in hot water spring area can be a source of direct revenue. The entry fee of NRs 100 per person shall be charged with the visitor with free access to hot water shower area and additional charge should be enforced for facility such as jacuzzi/ bathtubs and hot water pools.

6.2.4 Activity Fees

The activity fees include the charges taken for use of hot water pools and bathtubs. Also, the use of cafeteria and accommodation shall be charged separately.

6.2.5 Parking Fees

The provision of pay parking on hourly basis also help in increase in revenue.

6.2.6 Partnership and Sponsorship

With increase in tourist flow the hot water spring public private partnership can be effective way to increase the required further investment for its enhancement. Also, sponsorship agreement with various local companies with advertisement at various location of park will increase the revenue.

6.2.7 Grants and Donation

Grants from different level of government including local, provincial and federal to enhance the existing facility and develop the hot water spring area will increase the socio-economic activities in vicinity and tourist route to reach the spring area. The increase economic activity will enhance economy of the local area around the spring area.

6.3 Basis of Revenue Estimation

The revenue was estimated on the basis of following assumption

- The average number of visitors adopted based on data provided by current operation management committee. The current number of visitors is adopted as based data and increase rate of average annual number of visitors is taken as 2%.
- Ticket fees per person NRs. 100.
- The average rate of escalation in ticket fee is adopted as 5%.
- Among the total visitor 25 % will use pools and jacuzzi and fees to use those facility is adopted as NRs. 200 per person.
- The accommodation facilities will have average occupancy of 30%
- The net revenue generated from cafeteria will be about 50% of total revenue generated from ticket sale
- The revenue generated from sponsorship will be 10% of all other revenue combined.

6.4 Parameters for Economic Analysis

The economic parameters including BCR, NPV and payback period were estimated based on following parameters.

Table 6.2: Adopted parameters for financial analysis

Parameter	Value	Remarks
Total Project cost	46,759,321.86	
annual O&M	5.0%	
Escalation rate	5.0%	
Discount rate	10.0%	
Annual Gross revenue	5,816,250.00	
Annual Net Revenue	4,653,000.00	Considering 20% expense
Annual benefit increment	2.0%	
Operation duration	20 years	
Construction duration	2 years	(40% cashflow on first and 60 % on second year)

From the economic analysis following output is obtained

Table 6.3: Output of financial analysis

Parameter	Value	
IRR	16.35	
NPV	19,117,379.20	
Payback period	10	
BCR	>1.1	

At present the use of Tapta Kunda is free. As the Kunda attracts many tourist years around there is possibility to introduce entry fees. The entry fee considered in analysis is NRs. 100 per person for the visitors throughout the year with special discounted fee of NRs.50 per person for the visitors during Maghe Sangranti Mela. With the entry fee of NRs. 100 on base year the project is feasible economically.

7 IMPLEMENTATION AND OPERATION MECHANISM

7.1 Funding Mechanism

Tourism infrastructure has become a crucial sub-sector within Nepal's broader infrastructure development efforts. Recognizing its potential to drive economic growth and improve living standards, local governments have prioritized its expansion and enhancement. They view tourism infrastructure as a key element in regional development and management strategies. One specific area of interest is the development of hot springs as tourist attractions. Hot springs have the potential to draw significant numbers of visitors, both domestic and international, thus becoming an important infrastructure focus at both regional and national levels. To support these projects, local governments may seek financial assistance from provincial and federal levels.

Special grants and complementary funding from higher levels of government can significantly bolster these initiatives. Additionally, the federal government may provide viability gap funding to bridge any financial shortfalls, ensuring that projects are feasible and sustainable. This collaborative approach can help maximize the benefits of tourism infrastructure projects, fostering economic growth, creating jobs, and enhancing the overall tourism experience in Nepal. The local government then implement the project through local management committee.

7.2 Operation mechanism

Local governments, with support from higher levels of government, will take a central role in the development, operation, and management of tourism infrastructure projects, such as hot spring areas. The responsibility for the day-to-day operations and management of these hot springs will fall to a local management committee. This committee will oversee all operational aspects, ensuring that the hot springs are well-maintained and efficiently run. In addition to covering operational and management costs, the local management committee will also be tasked with generating sufficient revenue to repay the initial investment made by the local government. This repayment will be made from the revenue generated by the hot springs, ensuring that the project is financially sustainable and beneficial for the local economy. Through this model, the local community gains a significant role in managing and benefiting from the tourism infrastructure, while higher levels of government provide the necessary support and oversight to ensure the project's success.

The federal and provincial governments can play a crucial role in promoting and supporting the development of tourism infrastructure, such as hot springs. By sharing information about these developed sites, they can ensure these attractions are included in broader tourism plans and strategies. This collaborative effort can help maximize the visibility and appeal of these destinations, attracting more visitors both domestically and internationally.

To further enhance the promotion of these tourism infrastructures, they can be incorporated into national and international publications. This might include travel guides, brochures, websites, and social media platforms dedicated to tourism. Additionally, showcasing these attractions in embassies and consulates around the world can help raise awareness and interest among potential international visitors. By leveraging these promotional channels, the federal and provincial governments can help drive tourism growth, contributing to the economic development of the regions where these infrastructures are located.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

In conclusion, the architectural design presented for the Tatopani site embodies a thoughtful and comprehensive approach to meeting the programmatic requirements outlined. From the main entry parking area accommodating both cars and motorbikes to the strategically placed secondary entry and parking facility catering to visitors and café patrons, every aspect of the design has been meticulously planned to optimize functionality and enhance user experience.

The inclusion of features such as the open food court, hot spring facility, and Surya Kunda reflects a deep understanding of the site's cultural and natural context, providing visitors with opportunities for relaxation, rejuvenation, and spiritual reflection. Additionally, the provision for future expansion and the preservation of natural vegetation demonstrates a commitment to sustainability and adaptability, ensuring that the Tatopani site can evolve and thrive in the years to come.

Overall, the architectural design not only fulfills the programmatic requirements but also elevates the Tatopani site into a harmonious blend of cultural, natural, and recreational elements, inviting visitors to immerse themselves in its serene ambiance and enriching experiences.

At present the use of Tapta Kunda is free. As the Kunda attracts many tourist years around there is possibility to introduce entry fees. The entry fee considered in analysis is NRs. 100 per person for the visitors throughout the year with special discounted fee of NRs.50 per person for the visitors during Maghe Sangranti Mela. With the entry fee of NRs. 100 on base year the project is feasible economically.

8.2 Recommendations

Based on Master plan level analysis following recommendation are made:

- The visitor number increased significantly during Maghi Mela which is more than 100s time of normal visitor influx. Hence the permanent facilities such as toilet, bath area and emergency health care will be insufficient during the Mela. Hence temporary management of such facilities is required cover the peak visitor influx.
- The area is periodically inundated during monsoon season and hence required to be elevated and protected against river erosion.
- The availability of hot water is sufficient for current tourist flow however with proper development and marketing the tourist flow may be increased and causing increase in water demand. Hence temporal variation demand and supply is to be studied and water storage facility shall be planned. However, the peak visitor during Maghi mela should be treated separately during water management planning.
- The tourist facilities like restaurants, hotels, and resorts nearby required to be monitored to ensure proper hospitality for visitors. This will enhance tourists' overall satisfaction. In the long run, it will increase the area's popularity among tourists and hence increased tourist flow.
- The dissemination and marketing of health and wellness benefits of hot water spring beneficial for increase in tourist influx.
- Safety measure shall be implemented with proper signage, lifeguards and first aid station. The visitors should be advised about the safety regulation before entering the area.
- Phased implementation is recommended for facilities planned in master plan. Detailing of each facility required to be carried out during detail project report preparation.

- The overall planning system and management committee of hot water spring shall be monitored and evaluated by local government and with some inputs from experts from relevant fields. Based on the outcome of evaluation the management system can be improved.
- Detailed environmental study as per EPA 2075 and EPR 2077 shall be carried out.

9 ANNEXES

Annex-I: D-Cards of Bench Marks

Annex-II: Topographic Survey Maps

Annex-III: Drawings

Annex-IV: Rate Analysis and Estimate

Annex-V: Economic Analysis and Revenue estimate

Annex-I: D-Cards of Bench Marks

D-Card

Station No.	BM-1	District:-	Dang
Type of Pillar:-	Concrete Piller		
Location :-	Rihar		
Municipality	Lamahi Municipality		
Ward No :-	9		

Description

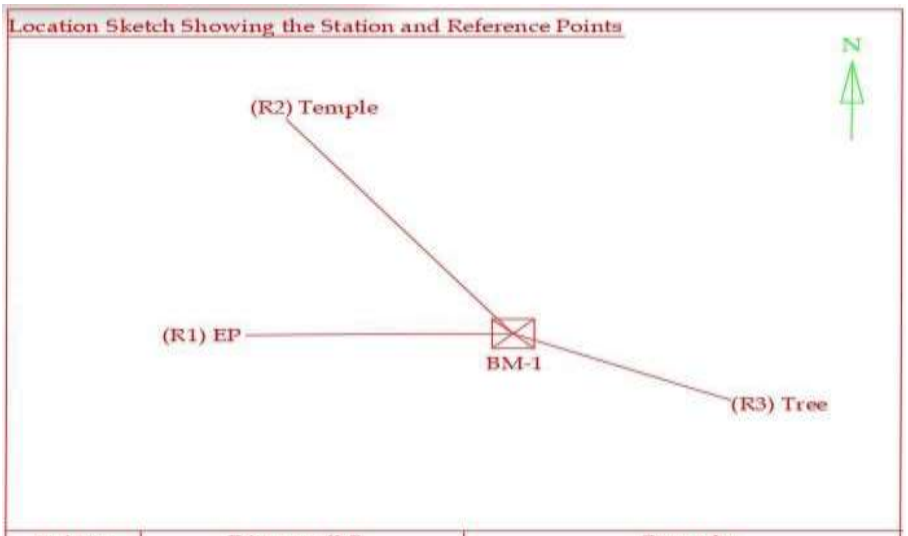
This point is situated in Rihar Dham. It is located at 190m north from Mahendra Highway. The BM is placed at the top of a pcc post at the eastern side of the temple complex.

Reference Co-ordinates:-

Easting:-	631728.983	Northing:-	3088442.481	Elevation:-	237.000
Latitude:	27.908503°	Longitude:	82.336569°		

Photograph

Sketch



Ref.No.	Distance (M)	Remarks
R1	3.2	EP
R2	4.2	Temple
R3	2.8	Tree

D-Card

Station No.	BM-2	District:-	Dang
Type of Pillar:-	Concrete Piller		
Location :-	Rihar		
Municipality	Lamahi Municipality		
Ward No :-	9		

Description

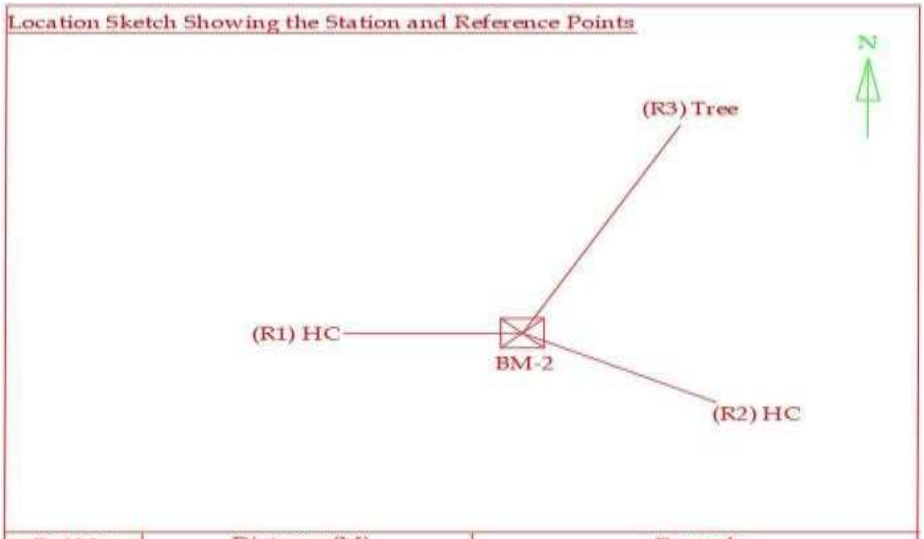
This point is situated in Rihar Dham. It is located at 173m north from Mahendra Highway. The BM is placed at the top of a pcc post at the south/east side of the temple complex.

Reference Co-ordinates:-

Easting:-	631763.359	Northing:-	3088420.018	Elevation:-	235.000
Latitude:	27.908368°	Longitude:	82.336782°		

Photograph

Sketch



Ref.No.	Distance (M)	Remarks
R1	2.1	House Corner
R2	2.5	House Corner
R3	3.6	Tree

D-Card

Station No.	BM-3	District:-	Dang
Type of Pillar:-	Top of Stapes Pond		
Location :-	Rihar		
Municipality	Lamahi Municipality		
Ward No :-	9		

Description

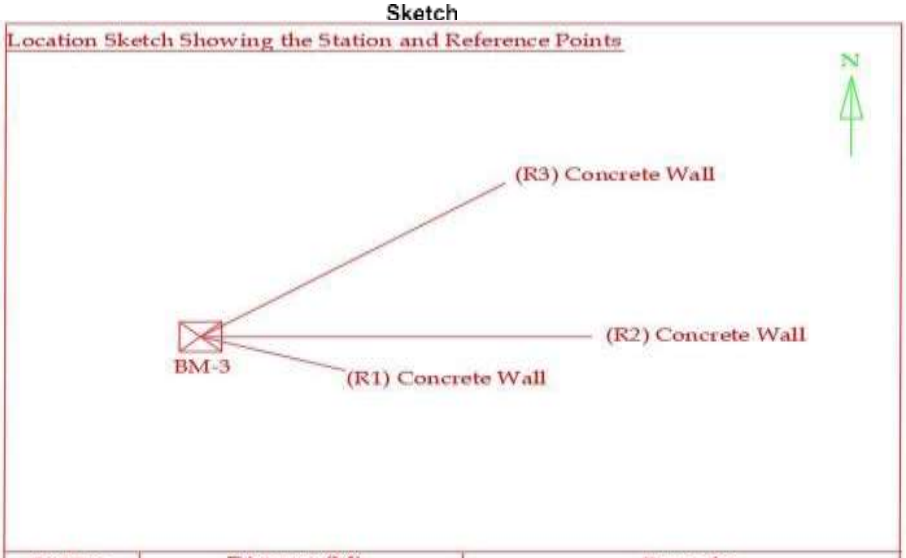
This point is situated in Rihar Dham. It is located at 197m north from mahendra highway. The BM is placed at the top of a Closest Stapes of the pond.

Reference Co-ordinates:-

Easting:-	631761.597	Northing:-	3088451.594	Elevation:-	233.500
Latitude:	27.908741°	Longitude:	82.336777°		

Photograph

Sketch



Ref.No.	Distance (M)	Remarks
R1	4.3	Concrete Wall
R2	4.7	Concrete Wall
R3	1.8	Concrete Wall

D-Card

Station No.	BM-4	District:-	Dang
Type of Pillar:-	Canal Concrete Top		
Location :-	Rihar		
Municipality	Lamahi Municipality		
Ward No :-	9		

Description

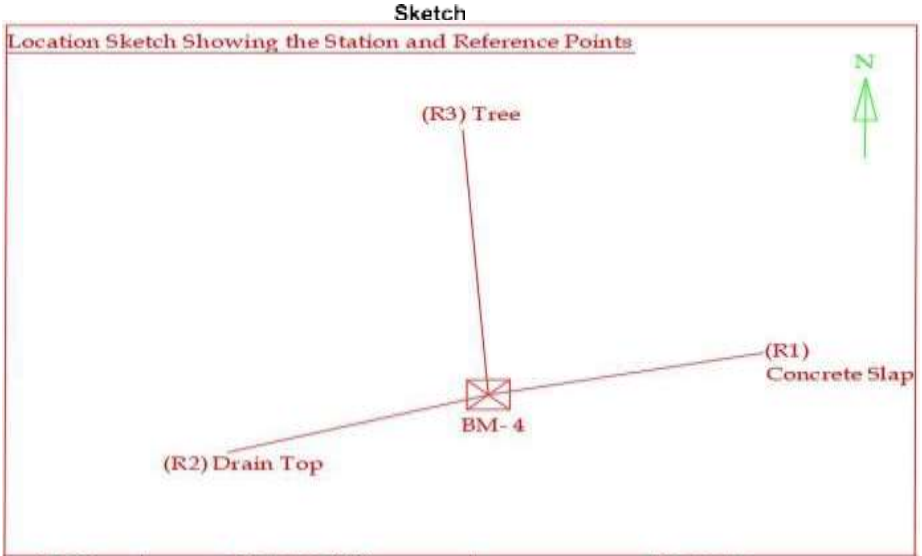
This point is situated in Rihar Dham. It is located at 228m north from mahendra highway. The BM is placed at the canal top.

Reference Co-ordinates:-

Easting:-	631785.855	Northing:-	3088468.678	Elevation:-	234.000
Latitude:	27.908671°	Longitude:	82.336951°		

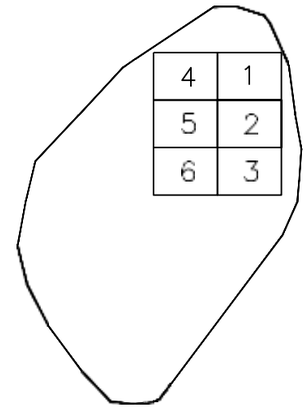
Photograph

Sketch



Ref.No.	Distance (M)	Remarks
R1	3.3	Concrete Slap
R2	3.2	Drain Top
R3	3.9	Tree

Annex-II: Topographic Survey Maps



N

LEGEND	
	HOUSE/HUT/TOILET/SHED
	ROAD EDGE/TRACK
	TEMPLE
	POND
	FOOT TRAIL
	RIVER

CLIENT:
Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

PROJECT
MASTERPLAN OF TAPTA KUNDA,
LAMAHI MUNICIPALITY-9, DANG
HS/5100709-38

PREPARED BY:
Global-PNet-Azad JV
Kathmandu, Nepal

DATE :	July 2024	SIGNATURE
SURVEYED BY :		
Drawn BY :		
CHECKED BY :		

DRAWING TITLE
Topographic Survey maps

SCALE
1:5000

SHT No.
1/16

Org. Size A3

LEGEND

	HOUSE/HUT/TOILET/SHED
	ROAD EDGE/TRACK
	TEMPLE
	POND
	FOOT TRAIL
	RIVER

CLIENT:
Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

PROJECT
MASTERPLAN OF TAPTA KUNDA,
LAMAHI MUNICIPALITY-9, DANG
HS/5100709-38

PREPARED BY:
Global-PNet-Azad JV
Kathmandu, Nepal

DATE :	July 2024	SIGNATURE
SURVEYED BY :		
Drawn BY :		
CHECKED BY :		

DRAWING TITLE
Topographic Survey maps

SCALE
1:500

SHT No.
2/16

Org. Size A3

CLIENT:
Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

PROJECT
MASTERPLAN OF TAPTA KUNDA,
LAMAHI MUNICIPALITY-9, DANG
HS/5100709-38

PREPARED BY:
Global-PNet-Azad JV
Kathmandu, Nepal

DATE :	July 2024	SIGNATURE
SURVEYED BY :		
Drawn BY :		
CHECKED BY :		

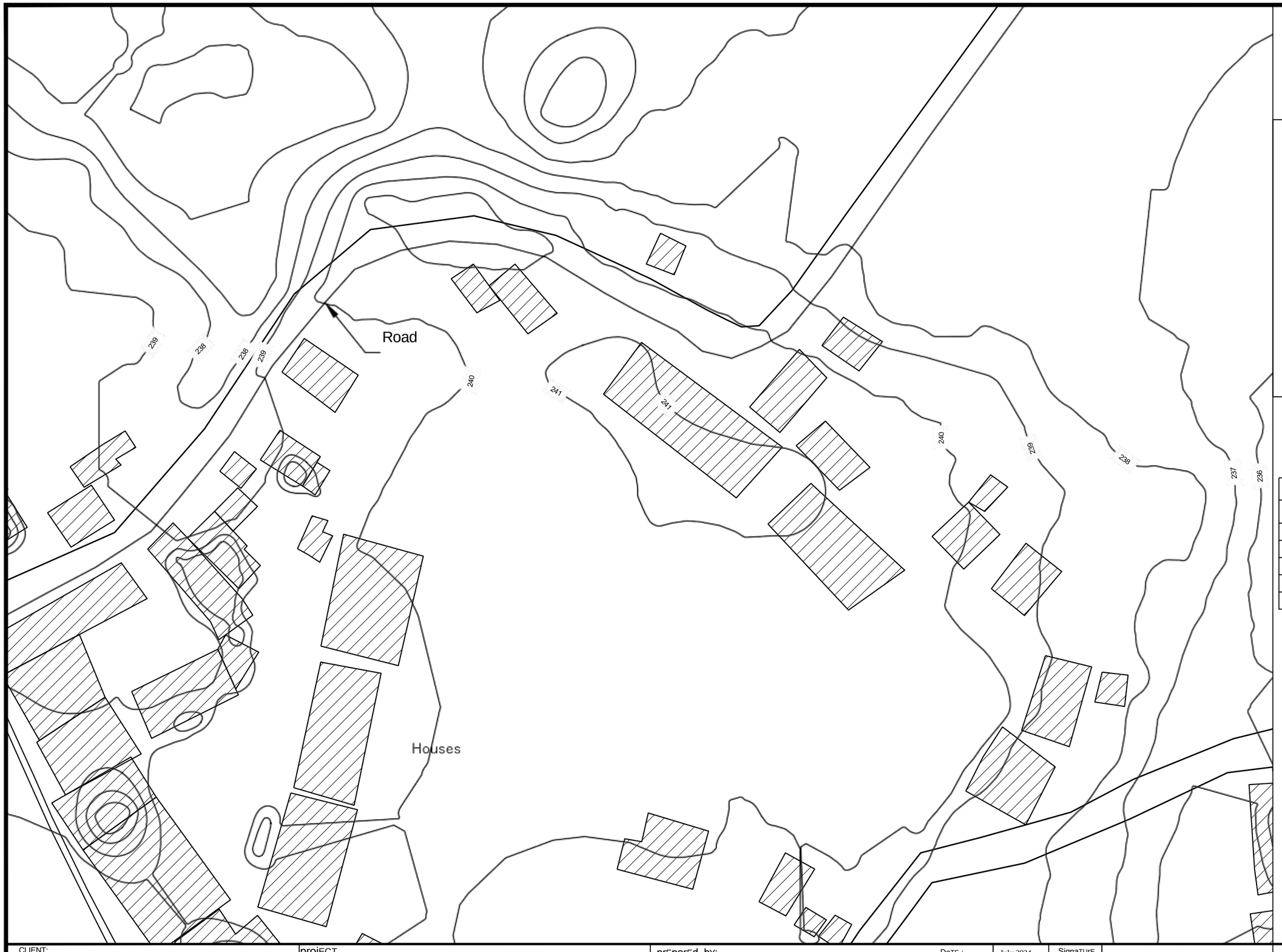
DRAWING TITLE
Topographic Survey maps

SCALE
1:500

SHT No.
3/16

Org. Size A3

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	PROJECT MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG HS/5100709-38	PREPARED BY: Global-PNet-Azad JV Kathmandu, Nepal	DATE : July 2024 SURVEYED BY : Drawn BY : CHECKED BY :	SIGNATURE	DRAWING TITLE Topographic Survey maps	SCALE 1:500	SHT No. 4/16 Org. Size A3



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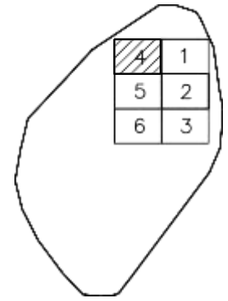

LEGEND	
	HOUSE/HUT/TOILET/SHED
	ROAD EDGE/TRACK
	TEMPLE
	POND
	FOOT TRAIL
	RIVER

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	projECT MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG HS/5100709-38	prEparEd bY: Global-PNet-Azad JV Kathmandu, Nepal	DaTE : July 2024 SurvEYEd bY : Drawn bY : ChECkEd bY :	DRAWING TITLE Topographic Survey maps	SCALE 1:500	ShT No. 5/16 Org. Size A3

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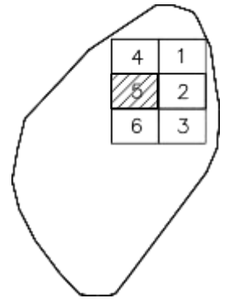


LEGEND	
	HOUSE/HUT/TOILET/SHED
	ROAD EDGE/TRACK
	TEMPLE
	POND
	FOOT TRAIL
	RIVER

CLIENT:
Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

project
MASTERPLAN OF TAPTA KUNDA,
LAMAHI MUNICIPALITY-9, DANG
HS/5100709-38

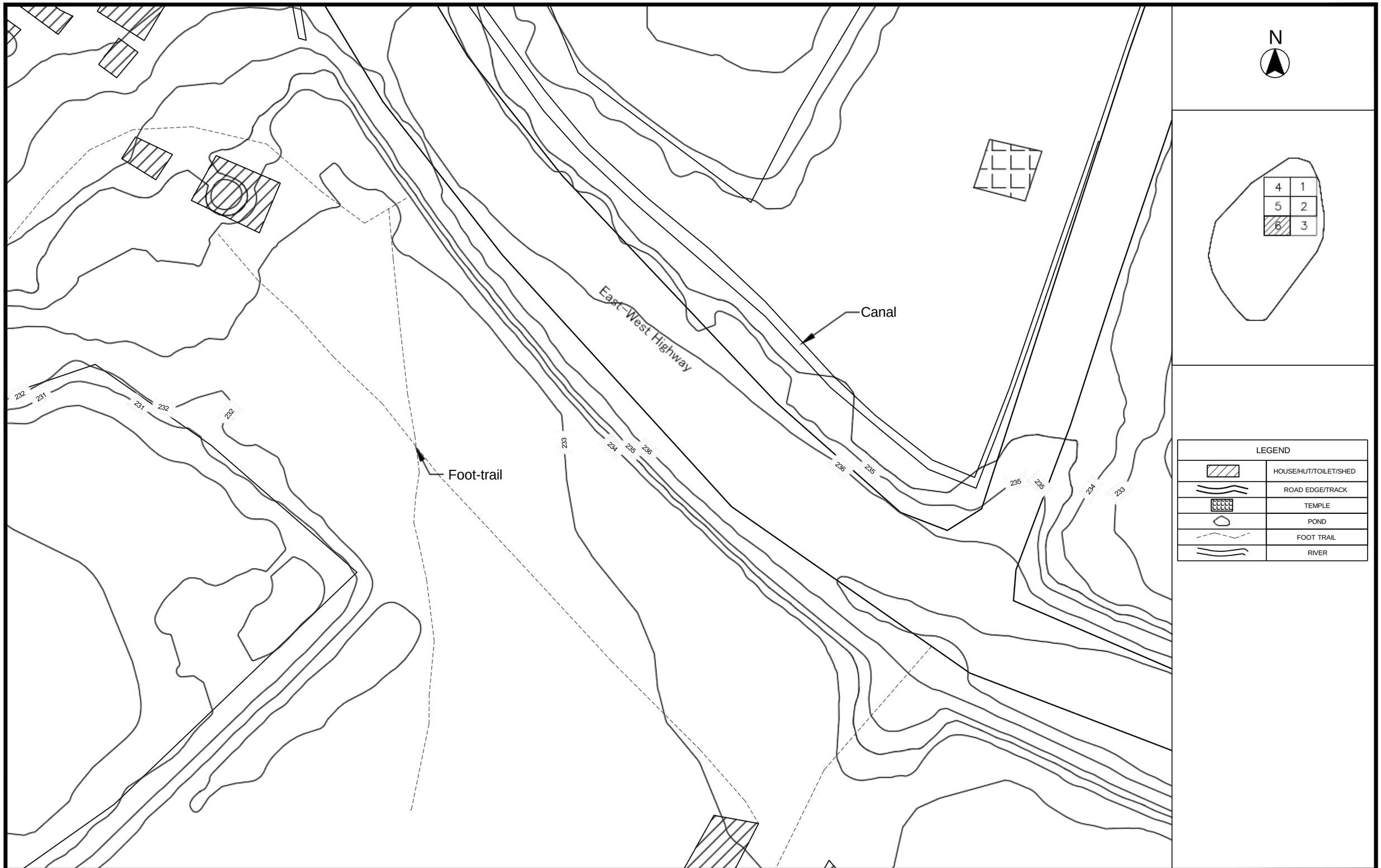
prepared by:
Global-PNet-Azad JV
Kathmandu, Nepal

Date :	July 2024	Signature
Surveyed by :		
Drawn by :		
Checked by :		

DRAWING TITLE
Topographic Survey maps

SCALE
1:500

Sht No.
6/16
Org. Size A3



CLIENT:
Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

PROJECT
MASTERPLAN OF TAPTA KUNDA,
LAMAHI MUNICIPALITY-9, DANG
HS/5100709-38

PREPARED BY:
Global-PNet-Azad JV
Kathmandu, Nepal

DATE :	July 2024	SIGNATURE
SURVEYED BY :		
Drawn BY :		
CHECKED BY :		

DRAWING TITLE
Topographic Survey maps

SCALE
1:500

SHT No.
7/16

Org. Size A3

Annex-III: Drawings

LEGEND

1. PARKING
2. TOILET
3. HELP POST
4. OFFICE
5. EXISTING BUILDING
6. OPEN LANDSCAPE
7. EXISTING TEMPLE
8. SHIVA MANDIR
9. OPEN SHOWER
10. HOT SPRING
11. SURYA KUNDA
12. TOILET AND CHANGING ROOM
13. CAFETERIA
14. OPEN FOOD COURT
15. FUTURE EXPANSION
16. SECONDARY ENTRY & PARKING
17. BOULEVARD AND GARDENING
18. RIVER RETAINING WALL

Rihar Khola

VIEW PROFILES

EXISTING PAVILION

PARKING

CAFE OUTDOOR SEATING

HOT SPRING

OPEN SHOWER

BOULEVARD

Government of Nepal

Water and Energy Commission Secretariat

Singha Durbar, Kathmandu

Study on Identification and Development of Hot Water Spring Sources in Nepal

Master Plan of Tapta Kunda,Dang

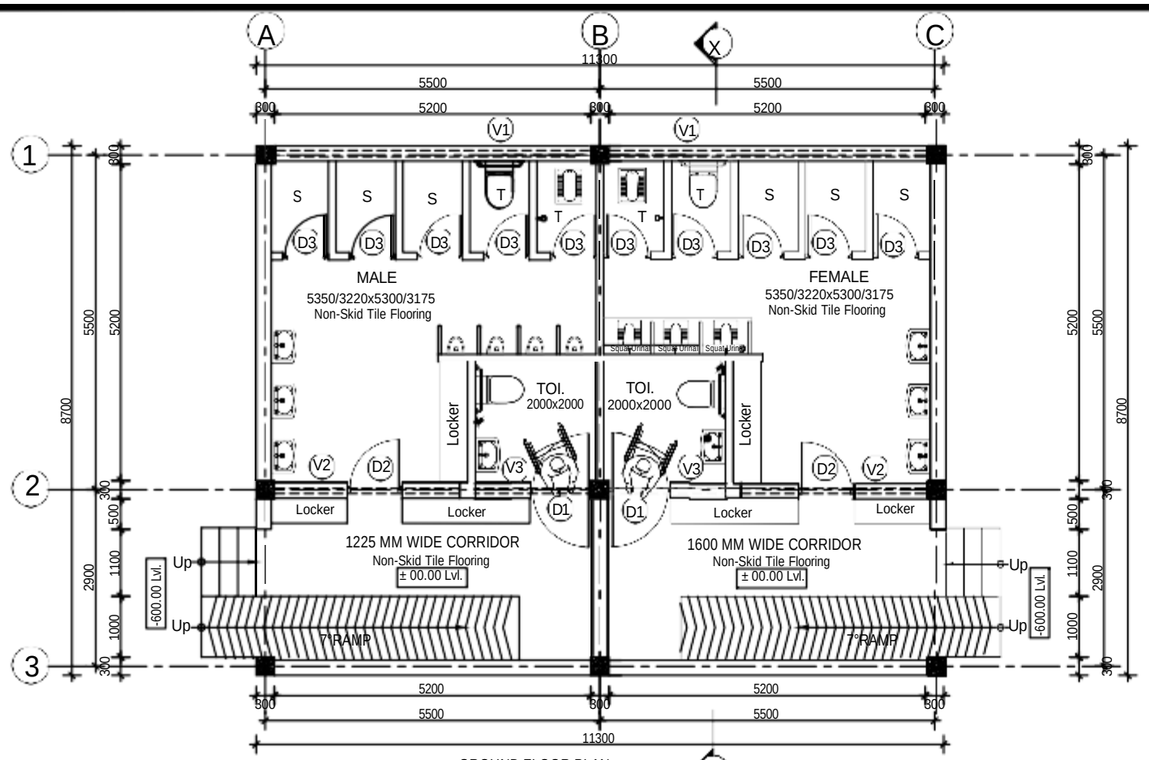
Consultant

Global – PNet - Azad JV

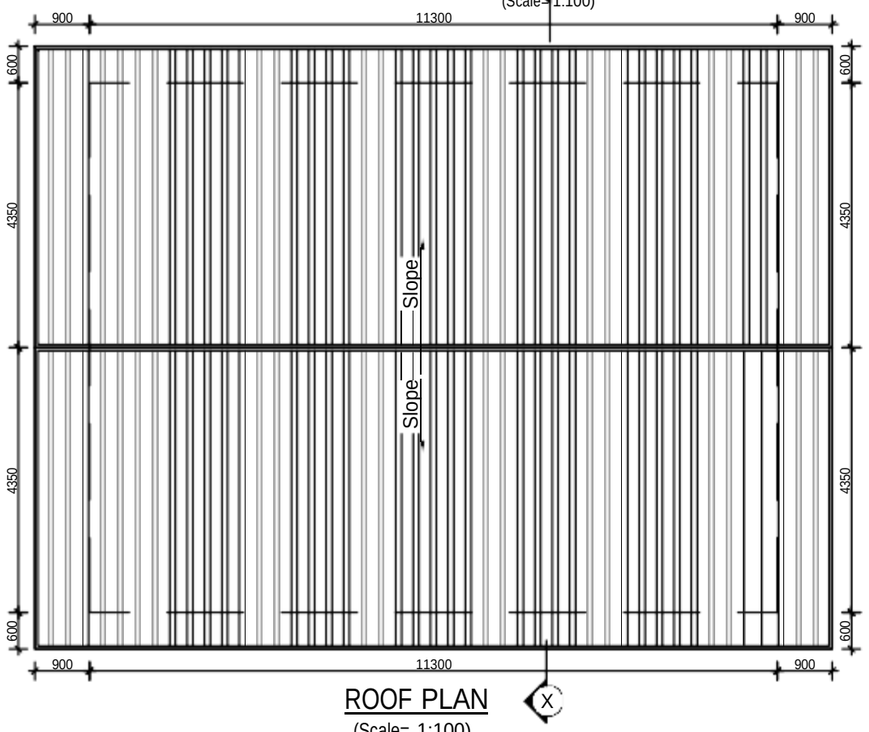
CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	projECT MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	prEparEd bY: Global-PNet-Azad JV Kathmandu, Nepal	DaTE : July 2024 SignaTurE SurvEYEd bY : Drawn bY : ChECkEd bY :	DRAWING TITLE Master Plan Layout	SCALE 1:1000	ShT No. 8/16 Org. Size A3

LEGEND	
1	PARKING
2	TOILET
3	HELP POST
4	OFFICE
5	OPEN LANDSCAPE
6	EXISTING TEMPLE
7	EXISTING BUILDING
8	SHIVA MANDIR
9	OPEN SHOWER
10	HOT SPRING
11	SURYA KUNDA
12	TOILET AND CHANGING ROOM
13	CAFETERIA
14	OPEN FOOD COURT
15	FUTURE EXPANSION
16	SECONDARY PARKING AND ENTRY
17	BOULEVARD AND GARDENING

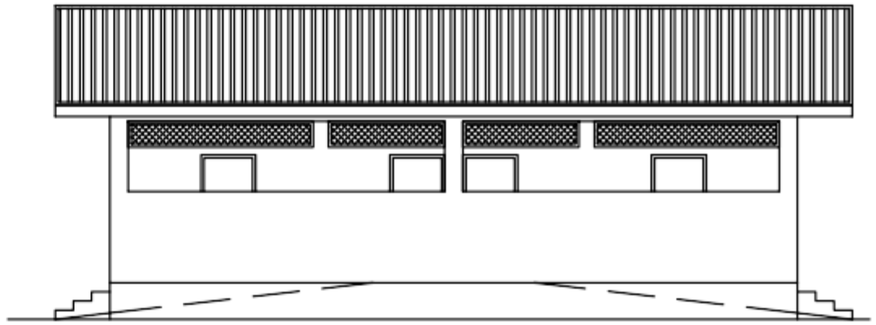
CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	PROJECT: MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	PREPARED BY: Global-PNet-Azad JV Kathmandu, Nepal	DATE : July 2024 SURVEYED BY : Drawn BY : CHECKED BY :	SIGNATURE	DRAWING TITLE: Master Plan	SCALE: 1:1000	SHT No. 9/16 Org. Size A3



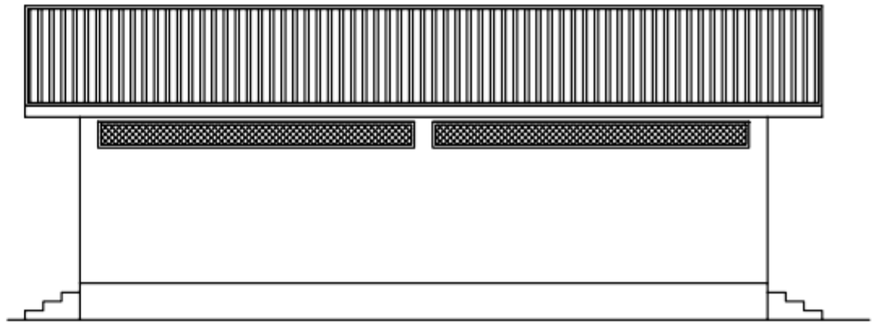
GROUND FLOOR PLAN
(TOILET/ CHANGING)
Area = 98.3 Sq. M.
(Scale= 1:100)



ROOF PLAN
(Scale= 1:100)



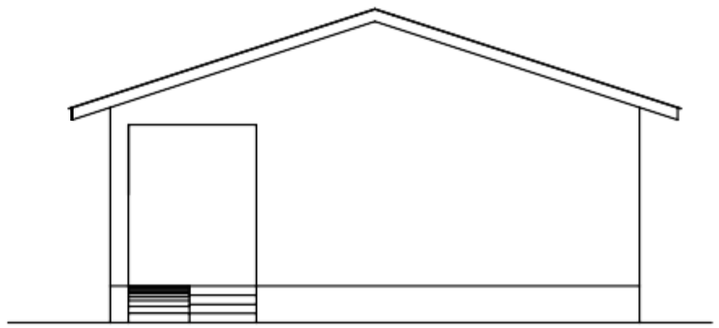
FRONT ELEVATION



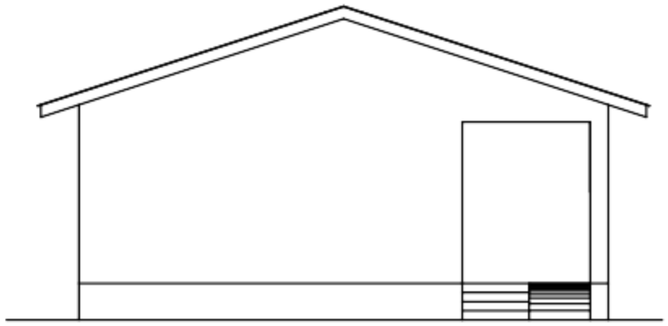
BACK ELEVATION

DOORS & WINDOWS SCHEDULE:

S.N.	SYMBOL	SIZES	NOS.	REMARKS
1.	V1	5200 x 425	2	MS Frame
2.	V2	3040 x 2100	2	MS Frame
3.	V3	1910 x 2100	2	MS Frame
4.	D1	1000 x 2100	2	UPVC Frame & Shutter
5.	D2	900 x 2100	2	UPVC Frame & Shutter
6.	D3	750 x 1350	10	UPVC Frame & Shutter
		TOTAL	20	



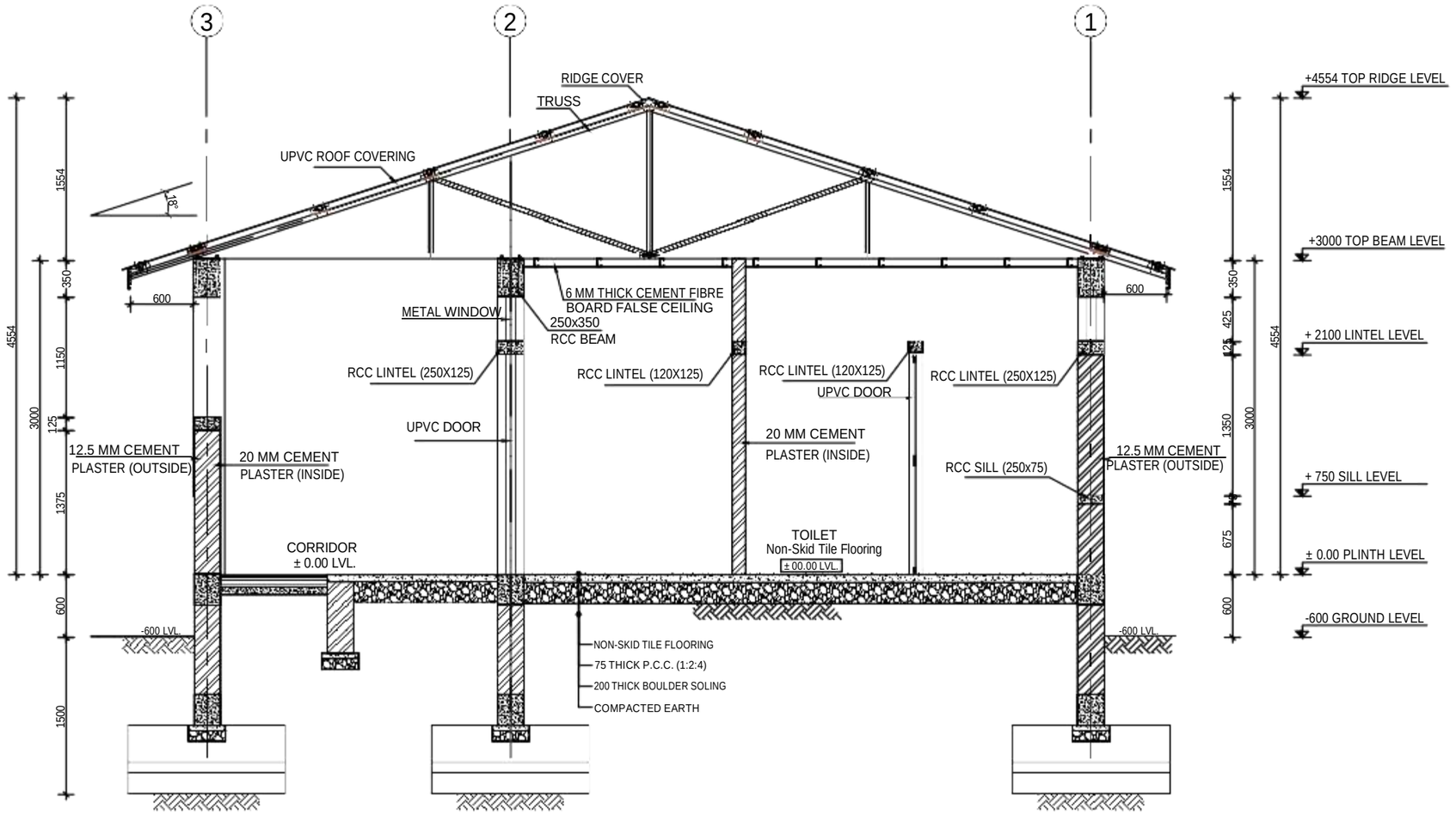
SIDE (RIGHT) ELEVATION



SIDE (LEFT) ELEVATION

12. TOILET AND CHANGING ROOM

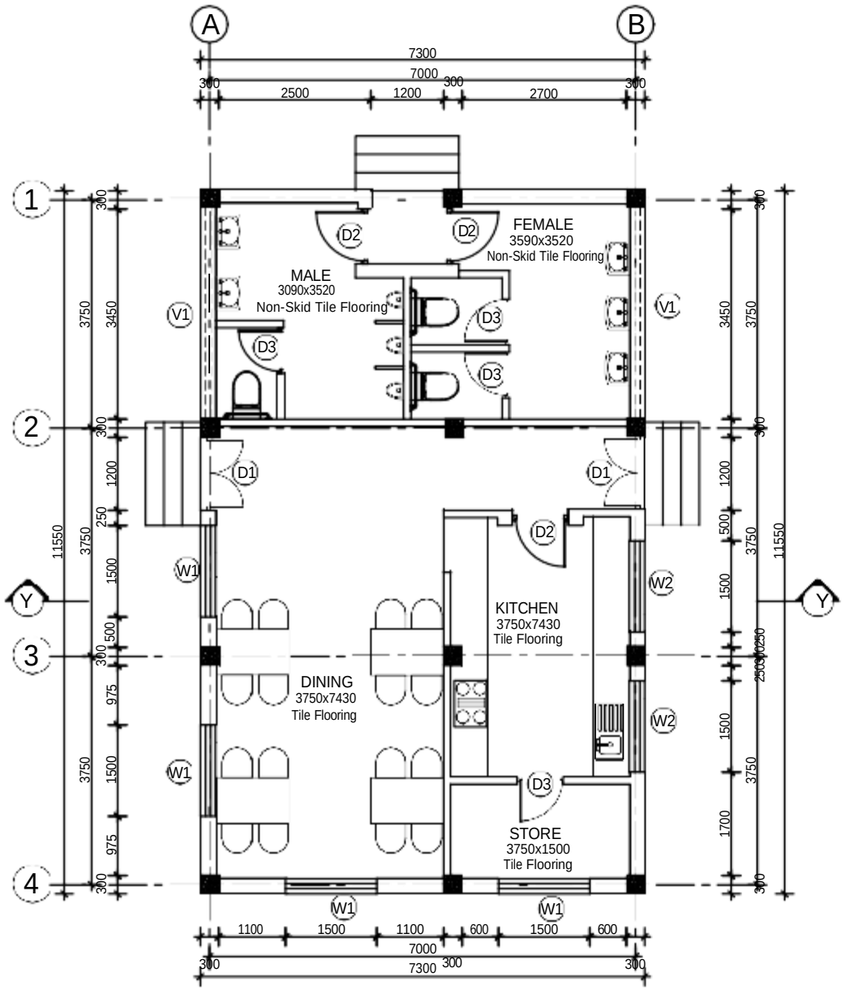
CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	projECT: MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	prEparEd bY: Global-PNet-Azad JV Kathmandu, Nepal	DaTE : July 2024 SurvEYEd bY : Drawn bY : ChECkEd bY :	DRAWING TITLE: Master Plan	SCALE: 1:100	ShT No. 10F10 Org. Size A3



SECTION AT X-X
(Scale= 1:50)

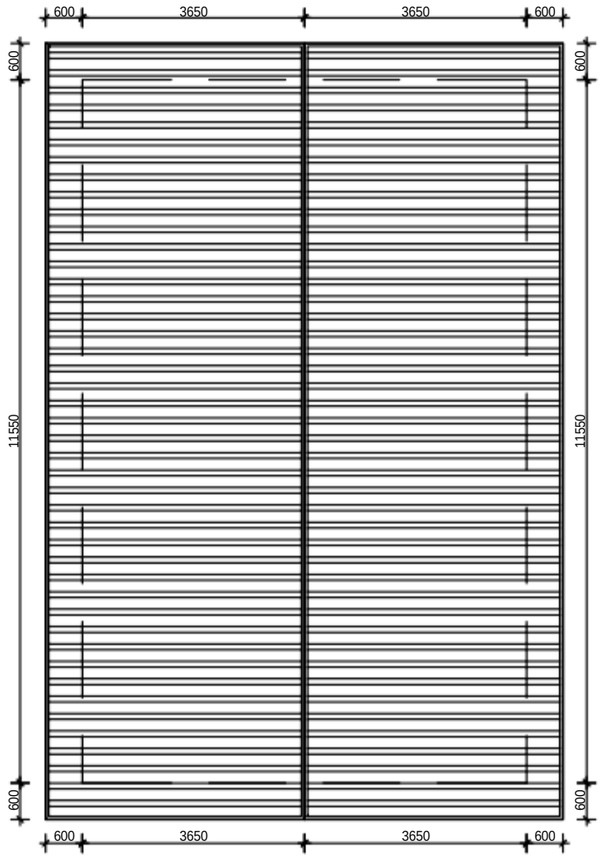
12. TOILET AND CHANGING ROOM

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	project MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	prepared by: Global-PNet-Azad JV Kathmandu, Nepal	Date :	July 2024	Signature	DRAWING TITLE Master Plan	SCALE 1:50	Sht No. 11/16 Org. Size A3
			Surveyed by :					
			Drawn by :					
			Checked by :					



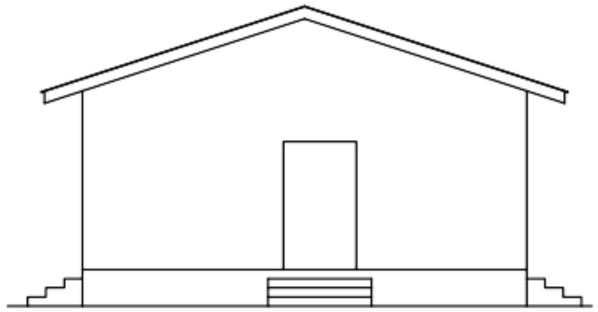
GROUND FLOOR PLAN (CAFETERIA)

Area = 84.31 Sq. M.
(Scale= 1:100)

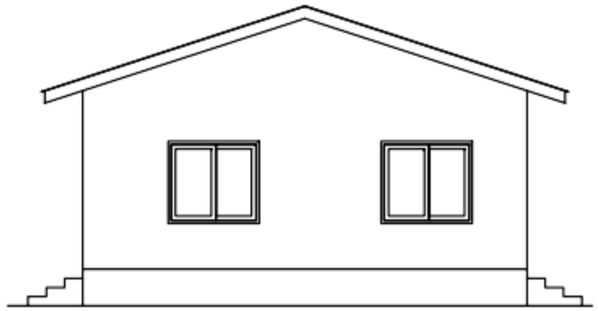


ROOF PLAN (CAFETERIA)

Area = 84.31 Sq. M.
(Scale= 1:100)



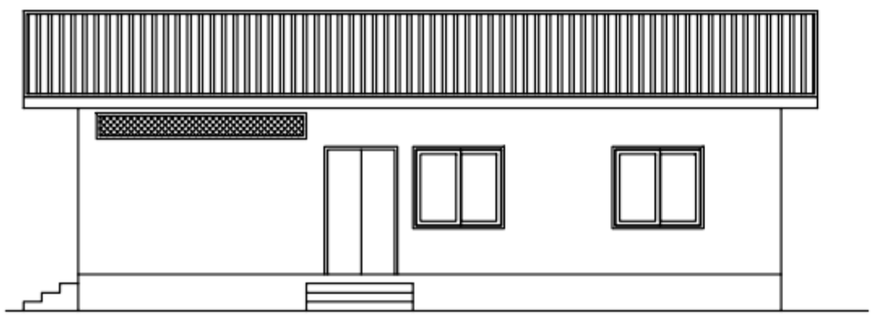
SIDE (RIGHT) ELEVATION



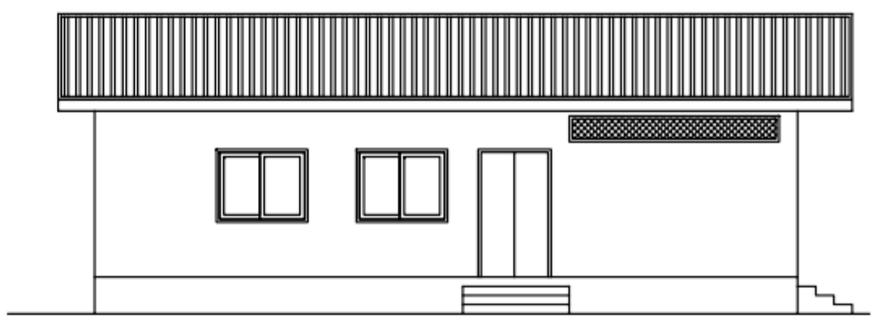
SIDE (LEFT) ELEVATION

DOORS & WINDOWS SCHEDULE:

S.N.	SYMBOL	SIZES	NOS.	REMARKS
1.	W1	1500 x 1350	4	UPVC Frame & Shutter
2.	W2	1500 x 1200	2	UPVC Frame & Shutter
3.	V1	3450 x 425	2	MS Frame
4.	D1	1200 x 2100	2	UPVC Frame & Shutter
5.	D2	900 x 2100	3	UPVC Frame & Shutter
6.	D2	750 x 2100	6	UPVC Frame & Shutter
		TOTAL	19	



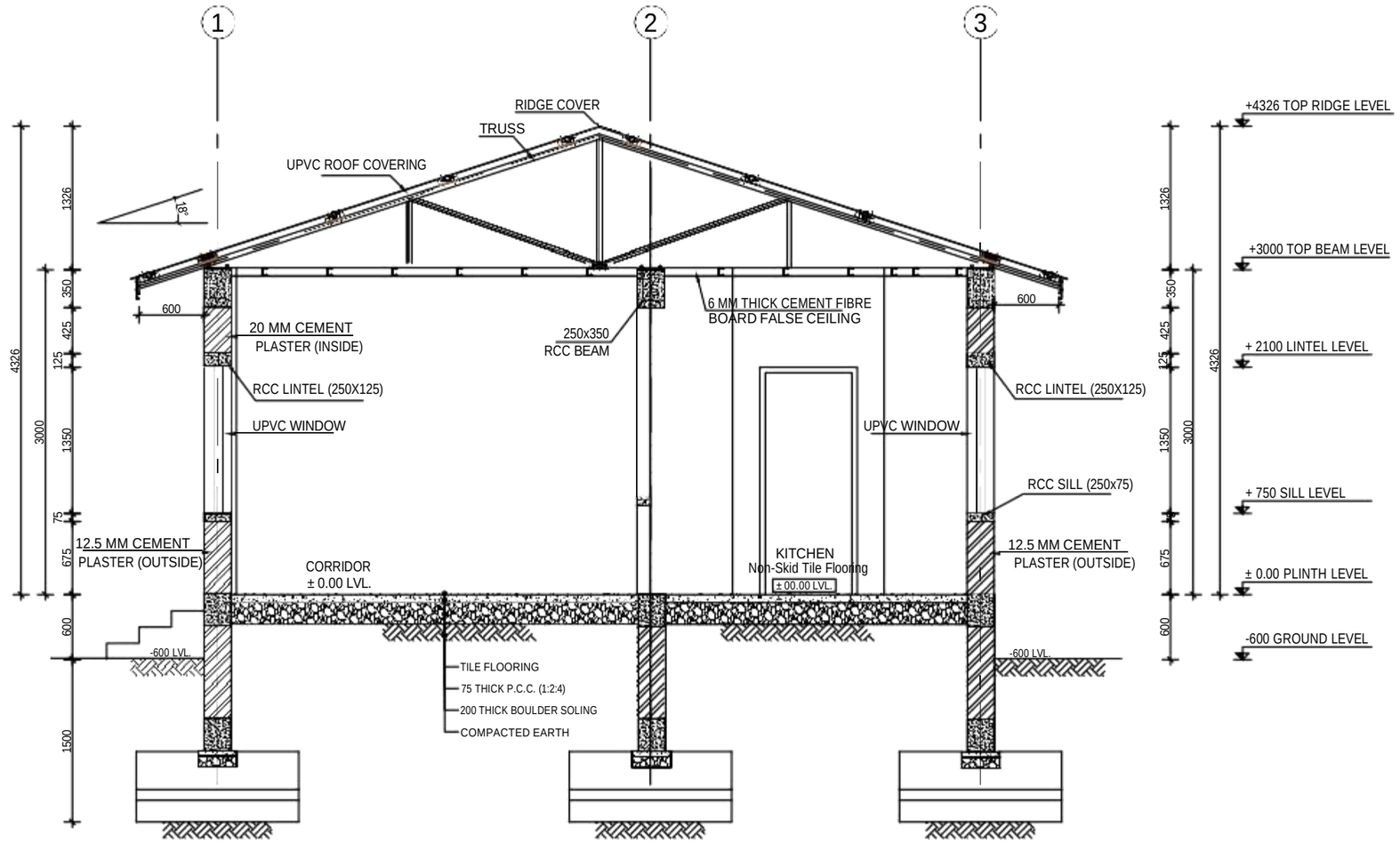
BACK ELEVATION



FRONT ELEVATION

13. CAFETERIA

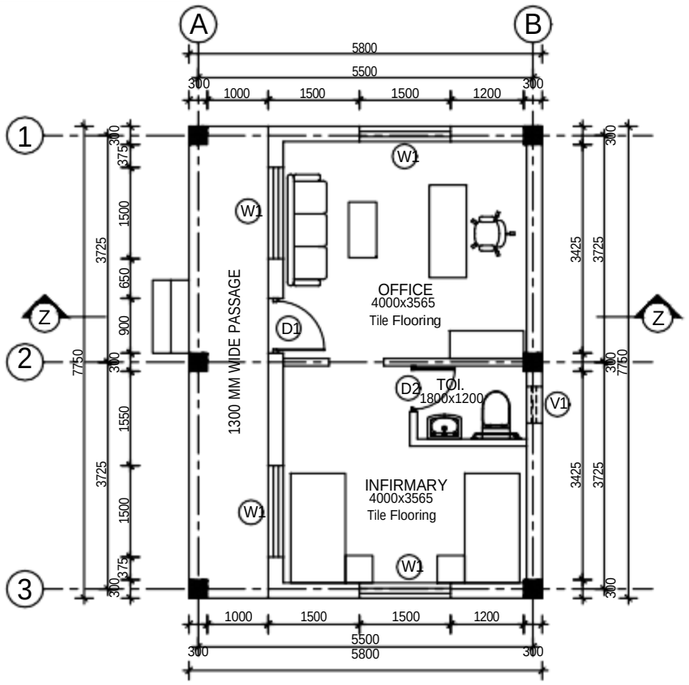
CLIENT:	PROJECT	PREPARED BY:			DRAWING TITLE	SCALE	SHT No.
Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	Global-PNet-Azad JV Kathmandu, Nepal	DATE : July 2024	SIGNATURE	Master Plan	1:100	12/16
			SURVEYED BY :				Org. Size A3
			DRAWN BY :				
			CHECKED BY :				



SECTION AT Y-Y
(Scale= 1:50)

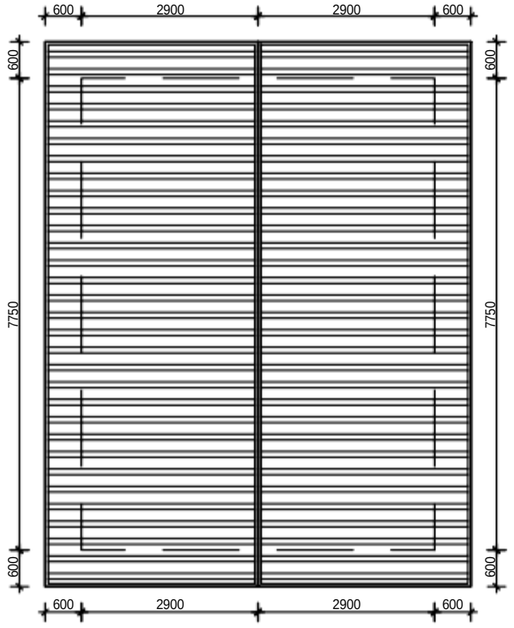
13. CAFETERIA

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	PROJECT MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	PREPARED BY: Global-PNet-Azad JV Kathmandu, Nepal	DATE : SURVEYED BY : Drawn BY : CHECKED BY :	July 2024	SIGNATURE	DRAWING TITLE Master Plan	SCALE 1:50	SHT No. 13/16 Org. Size A3



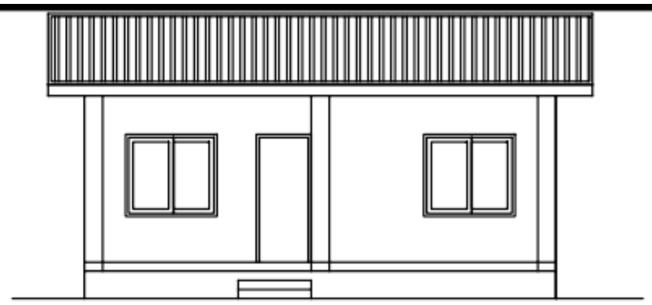
GROUND FLOOR PLAN (HELP POST)

Area = 44.95 Sq. M.

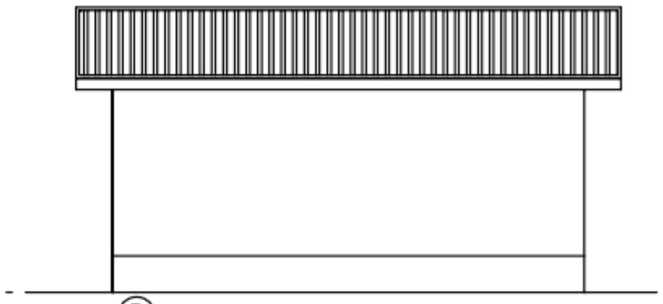


ROOF PLAN

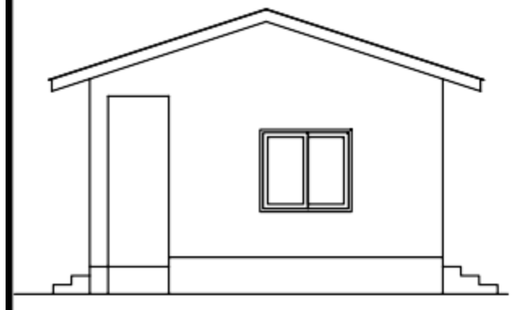
(Scale= 1:100)



FRONT ELEVATION



FRONT ELEVATION

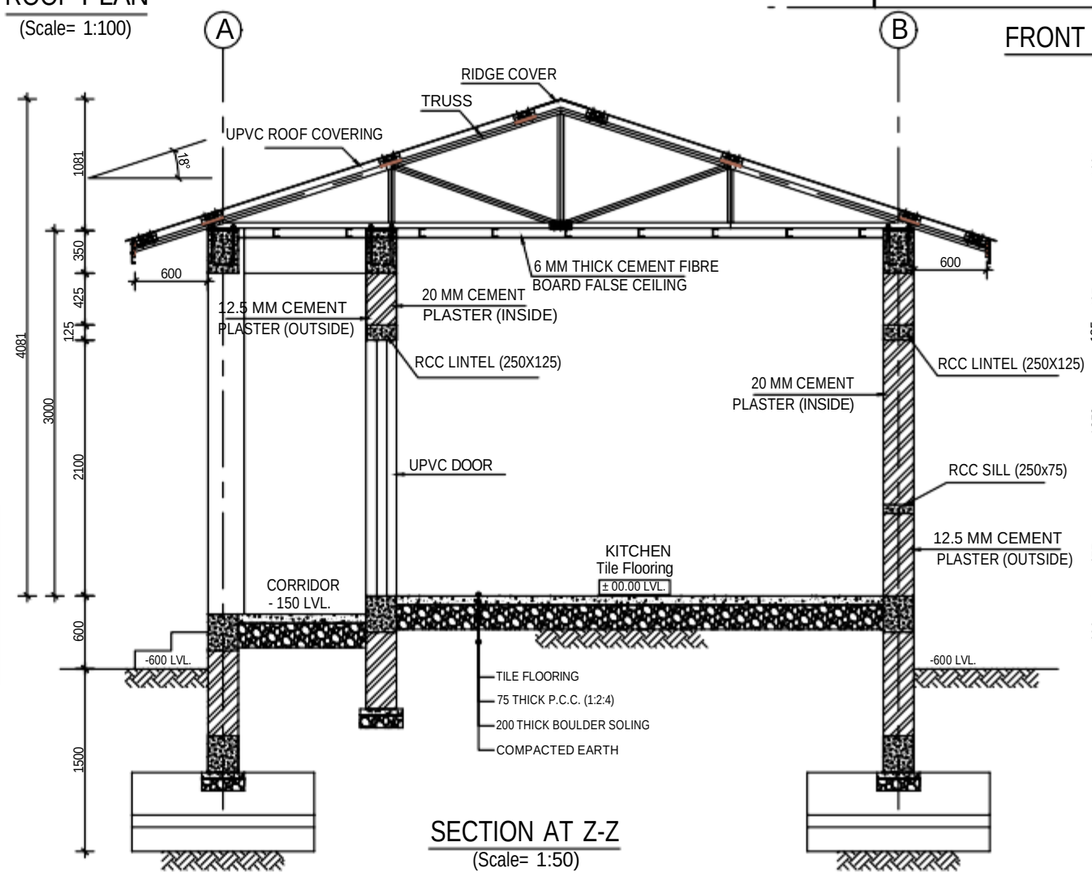


SIDE (RIGHT) ELEVATION

SIDE (LEFT) ELEVATION

DOORS & WINDOWS SCHEDULE:

S.N.	SYMBOL	SIZES	NOS.	REMARKS
1.	V1	600 x 425	1	MS Frame
2.	D1	900 x 2100	1	UPVC Frame & Shutter
3.	D2	750 x 2100	1	UPVC Frame & Shutter
4.	W1	1500 x 1350	4	UPVC Frame & Shutter
		TOTAL	7	

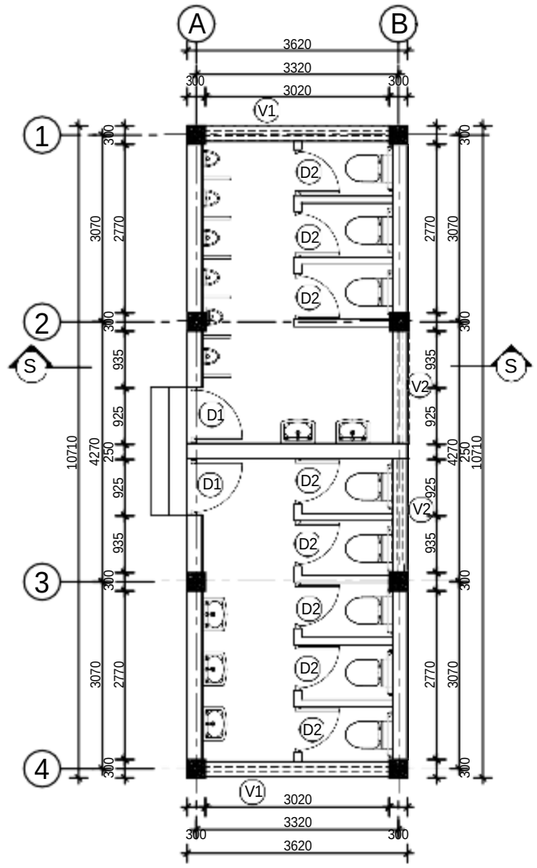


SECTION AT Z-Z

(Scale= 1:50)

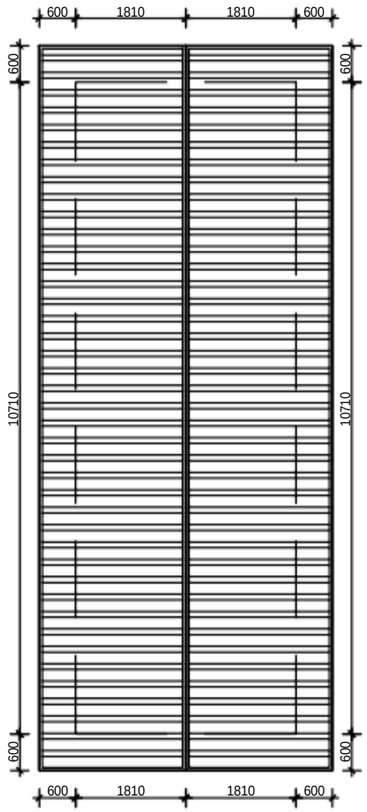
3. HELP POST

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	PROJECT: MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	PREPARED BY: Global-PNet-Azad JV Kathmandu, Nepal	DATE: July 2024 SURVEYED BY: Drawn BY: CHECKED BY:	SIGNATURE	DRAWING TITLE: Master Plan SCALE: 1:100 SHT No. 14/16 Org. Size A3

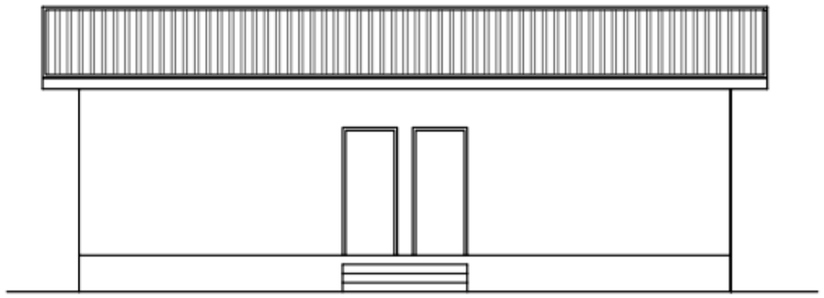


GROUND FLOOR PLAN
(TOILET BLOCK)

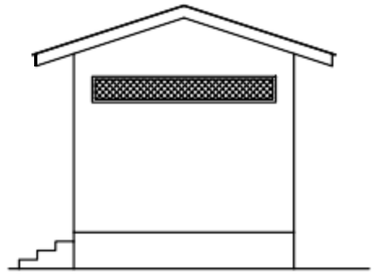
Area = 38.7 Sq. M.



ROOF PLAN (TOILET BLOCK)



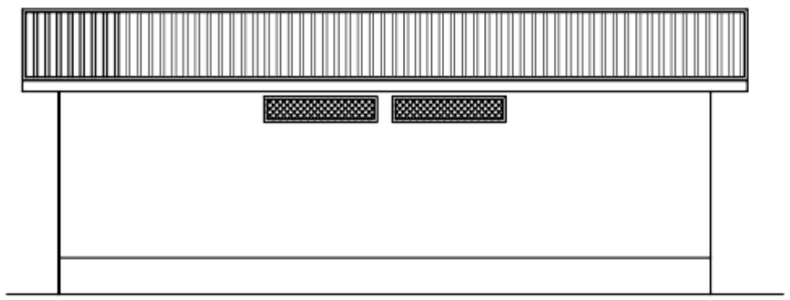
FRONT ELEVATION



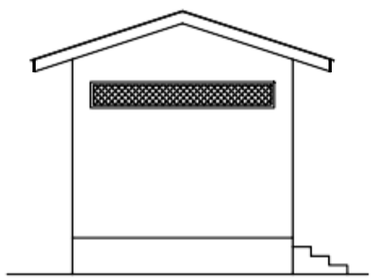
SIDE (RIGHT) ELEVATION

DOORS & WINDOWS SCHEDULE:

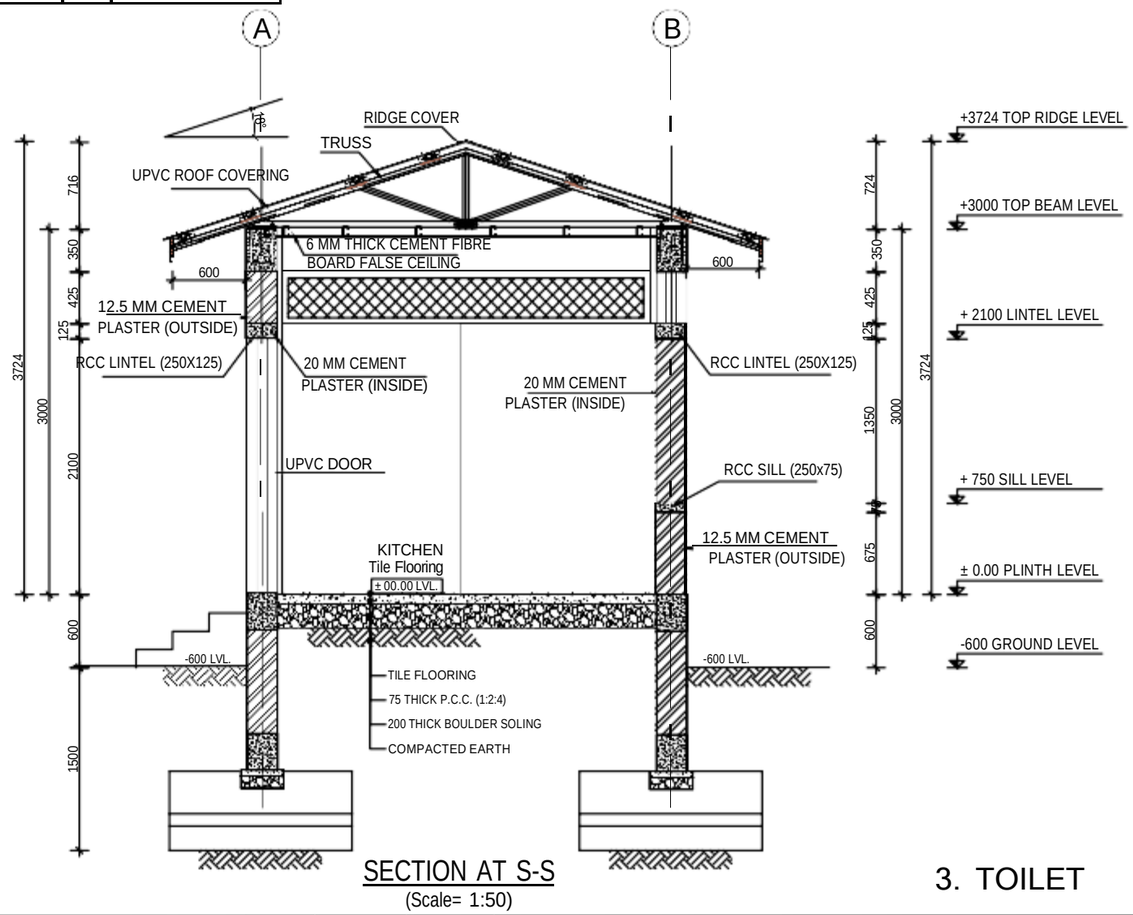
S.N.	SYMBOL	SIZES	NOS.	REMARKS
1.	V1	3020 x 425	2	MS Frame
2.	V2	1860 x 425	2	MS Frame
3.	D1	900 x 2100	2	UPVC Frame & Shutter
4.	D2	750 x 2100	8	UPVC Frame & Shutter
		TOTAL	14	



BACK ELEVATION



SIDE (LEFT) ELEVATION

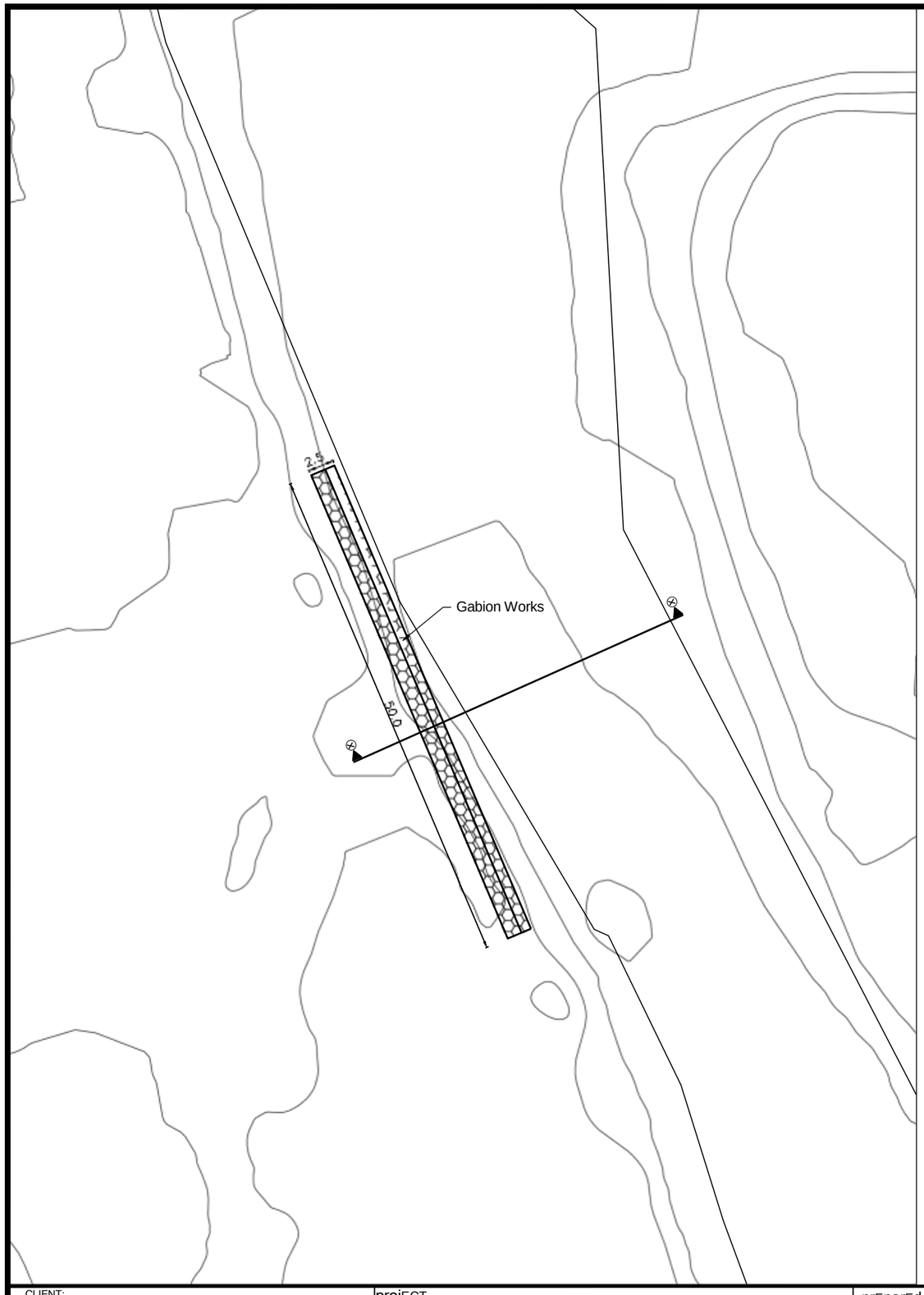


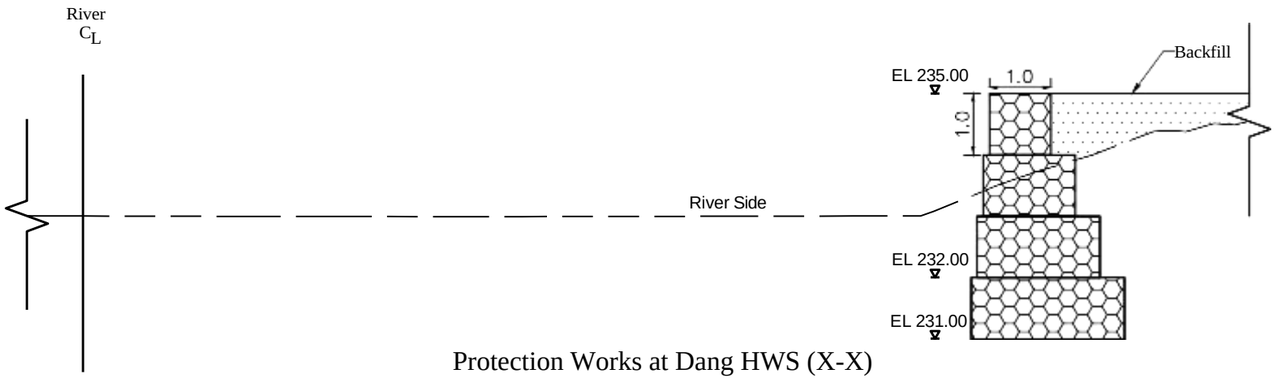
SECTION AT S-S

(Scale= 1:50)

3. TOILET

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	project: MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	prepared by: Global-PNet-Azad JV Kathmandu, Nepal	Date: July 2024 Surveyed by: Drawn by: Checked by:	DRAWING TITLE: Master Plan SCALE: 1:100 1:50 Sht No. 15/16 Org. Size A3





Protection Works at Dang HWS (X-X)

CLIENT: Government of Nepal Water and Energy Commission Secretariat Singhdurbar Kathmandu	project MASTERPLAN OF TAPTA KUNDA, LAMAHI MUNICIPALITY-9, DANG Hs/5100709-38	prEparEd bY: Global-PNet-Azad JV Kathmandu, Nepal	DaTE :	July 2024	SignaTUrE	DRAWING TITLE Protection Works	SCALE 1:200 1:100	ShT No. 16/16 Org. Size A3
			SurvEYEd bY :					
			Drawn bY :					
			ChECkEd bY :					

Annex-IV: Rate Analysis and Estimate

RATE ANALYSIS

Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

Project: Study on Identification and Development of Hot Water Spring Sources in Nepal
Site: Lamahi Municipality-9, Dang

Material Rate (Dang District Rate 80/81)

S.No.	Description	District			Remarks
		Unit	Rate	Rate with Vat(Material)	
	A. APPROVED LABOUR RATE				
1	Skilled (carpenter, mason)	m.d.	975.00	975.00	Dang DR
2	Unskilled	m.d.	620.00	620.00	Dang DR
3	Plumber	m.d.	975.00	975.00	Dang DR
4	" helper	m.d.	625.00	625.00	Dang DR
5	Electrician	m.d.	975.00	975.00	Dang DR
6	" helper	m.d.	625.00	625.00	Dang DR
	B. GENERAL CONS.MATERIAL				
1	Excavator(1 nos)	1 hr	1800	1800.00	
2	Bricks 1st class	no.	13.60	13.60	Dang DR
3	" Machine made (Chinese)	no.	13.60	13.60	Dang DR
4	Blockstone/ Bond stone	cu.m.	1600.00	1600.00	Dang DR
5	Boulder stone	cu.m.	1600.00	1600.00	Dang DR
6	Gravel of river	cu.m.	900.00	900.00	Dang DR
7	(Chips agg.) of 10 mm	cu.m.	2000.00	2000.00	Dang DR
8	River agg. Average 10-40 mm	cu.m.	900.00	900.00	Dang DR
9	Crushed or brocken agg.for RCC 5-10, 10-20, 20-50 mm	cu.m.	1012.50	1012.50	Dang DR
10	Crushed or brocken agg.for RCC 10-40 mm	cu.m.	1012.50	1012.50	Dang DR
11	Sand (Coarse & fine)	cu.m.	1200.00	1200.00	Dang DR
12	Soil for mud mortar	cu.m.	310.00	310.00	Dang DR
13	Soil for earth filling	cu.m.	105.00	105.00	Dang DR
14	Sal wood	cu.m.	190552.78	190552.78	Dang DR
15	Sisamwood	cu.m.	134886.67	134886.67	Dang DR
16	Other Ku kath (local wood)	cu.m.	57165.83	57165.83	Dang DR
17	Cement NS Nepali PPC(50 kg)	Bag	500.00	500.00	Dang DR
18	Cement NS Nepali OPC (50 kg)	Bag	600.00	600.00	Dang DR
19	Water Proofing Compound	Kg	45.00	45.00	Dang DR
20	Cement white (50 kg)	Kg	35.00	35.00	Dang DR
21	Ropes - Nylon	Kg	270.00	270.00	Dang DR
22	- Coconut	Kg	80.00	80.00	Dang DR
23	Bamboo 20' long	no	310.00	310.00	Dang DR
24	Jute (hemp)	kg	55.00	55.00	Dang DR
25	Fire wood (a) Kukath	kg	12.00	12.00	Dang DR
26	cement Concrete tile 25 mm	sqm	145	145.00	Kathmandu DR
27	Flag stone 32.5mm	sqm	365.00	365.00	Dang DR
28	Fuel	Lit	157.00	157.00	NOC
29	Elastrometric water profing all work complete	sqm	643.45	643.45	Kathmandu DR

S.No.	Description	District			Remarks
		Unit	Rate	Rate with Vat(Material)	
	C. IRON / GLASS / HARDWARE				
1	Tor-Steel rod avg.	kg	95.00	95.00	Ktm DR
2	T.M.T. Rod Avg	kg	90.33	90.33	Dang DR
3	Binding wire	kg	110.00	110.00	Dang DR
4	Barbed wire 12 guage	kg	135.00	135.00	Dang DR
5	Hinges heavy - 3"	no.	18.00	18.00	Dang DR
6	" - 4" NS	no.	28.00	28.00	Dang DR
7	" - 6"	no.	45.00	45.00	Dang DR
8	Bolts - Aluminium	no.	20.00	20.00	
9	" - G.I.	no.	20.00	20.00	
10	Holdfast	kg	97.00	97.00	Dang DR
11	Mortise lock steel	no	787.00	787.00	Dang DR
12	Handle aluminium	no	28.00	28.00	Dang DR
13	Handle Iron	no	23.00	23.00	Dang DR
14	Door spring 6"	no	185.00	185.00	Dang DR
15	Handle lock small	no	183.00	183.00	Dang DR
16	Handle lock large (Aldrop 10" long)	no	215.00	215.00	Dang DR
17	Mortice Lock (a) Bronze	no	787.00	787.00	Dang DR
18	(b) Steel	no	787.00	787.00	Dang DR
19	Nails ½" to 4"/Screws	kg	110.00	110.00	Dang DR
20	Wirenail	kg	860.00	860.00	
21	Mosquito proof wiremesh	sqm	180.00	180.00	Dang DR
22	Expanded metal wiremesh 4 feet wide	sqm	198.00	198.00	
23	" " " 3 feet wide	sqm	165.00	165.00	
24	½"Listi of wood	R.ft.	4.57	4.57	Dang DR
25	1" " "	R.ft.	7.62	7.62	Dang DR
26	Glass - 4mm	Sq.ft	53.45	53.45	Dang DR
27	" - 5mm	Sq.ft	59.49	59.49	Dang DR
28	CGI sheet (a)24 medium(0.5mm)	Bndle	11500.00	11500.00	Dang DR
29	(b) 26medium(0.38mm)	Bndle	9500.00	9500.00	Dang DR
30	(c) 26 medium colour(0.38mm)	Bndle	11243.12	11243.12	Dang DR
31	0.5mm coloured plane sheet	Mtr	1000.00	1000.00	Dang DR
32	Sky light sheet (pepsi glass)	Sq ft	120.00	120.00	Kathmandu DR
33	J or U hook	kg	132.00	132.00	Dang DR
34	Bitumen Washer	pack	40.00	40.00	Myagdi DR
35	Nut & Bolt	kg	215.00	215.00	Dang DR
36	Plywood - 4 mm	sqm	245.00	245.00	Dang DR
37	" - 6 mm	sqm	375.00	375.00	Dang DR
38	" - 9 mm	sqm	510.00	510.00	Dang DR
39	" - 12 mm	sqm	670.00	670.00	Dang DR
40	" - 4 mm teak	sqm	390.00	390.00	Dang DR
41	Gabion wire Medium zinc coated				
42	12 guage comercial	kg	115.00	115.00	Dang DR

S.No.	Description	District			Remarks
		Unit	Rate	Rate with Vat(Material)	
43	10 guage comercial	kg	115.00	115.00	Dang DR
44	8 guage comercial	kg	115.00	115.00	Dang DR
45	MS Black pipe	kg	114.00	114.00	Dang DR
46	MS Grill Work with red oxide paint	kg	125.00	125.00	Dang DR
47	16 Gauge MS metal Gate with fixing	sqm	8912.52	8912.52	
48	38 mm thick steel pipe	Rm	599.00	599.00	Dang DR
49	25 mm thick steel pipe	Rm	402.00	402.00	Dang DR
50	Bracket	pc	81.54	81.54	Kathmandu DR
51	Kazzaria, Simany or equivalent tile	sqm	1155.00	1155.00	Dang DR
52	clay tile	pc	34.00	34.00	Kathmandu DR
	D.PAINTING MATERIALS				
1	Lime	Bag	1400.00	1400.00	Dang DR
2	White putty	Kg	65.00	65.00	Dang DR
3	Snowcem (cem. paint)	kg	70.00	70.00	Dang DR
4	Gum	kg	300.00	300.00	Dang DR
5	Enamel paint	litre	525.00	525.00	Dang DR
6	Aluminium paint	litre	660.00	660.00	Dang DR
7	Tarpentine	litre	145.00	145.00	Dang DR
8	Varnish (a) General	litre	400.00	400.00	Dang DR
9	Primer (a) Wood	litre	365.00	365.00	Dang DR
10	(b) Metal	litre	365.00	365.00	Dang DR
11	(C) Cement	litre	365.00	365.00	Dang DR
12	Thinner T101	litre	735.00	735.00	Dang DR
13	Distemper	kg	155.00	155.00	Dang DR
14	Sand paper iron	Mtr	30.00	30.00	Kathmandu DR
15	" general	PC	6.00	6.00	Kathmandu DR
16	Plastic emulsion paint (Interior)	litre	525.00	525.00	Dang DR
17	Exterior Wether Coat paint	litre	925.00	925.00	Dang DR
18	Bitumen paint	litre	73.00	73.00	Dang DR
19	Painting brush	Inch	71.75	71.75	Dang DR
20	Road marking paint	Ltr	610.00	610.00	Dang DR

Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

Project: Study on Identification and Development of Hot Water Spring Sources in Nepal
Site: Lamahi Municipality-9, Dang

Transportation Cost

S.No.	Description	District		Norms		Source	Lead from market/Source (km)			Transportation Cost				Site Rate	Remarks
		Unit	Rate	Unit	Rate		Metalled	Earthen	Manual	Metalled	Earthen	Manual	Load/ unload		
							From Source	Km.	m.						
	A. APPROVED LABOUR RATE														
1	Skilled (carpenter, mason)	m.d.	975.00	m.d.	975.00	Dang DR								975.00	
2	Unskilled	m.d.	620.00	"	620.00	Dang DR								620.00	
3	Plumber	m.d.	975.00	"	975.00	Dang DR								975.00	
4	" helper	m.d.	625.00	"	625.00	Dang DR								625.00	
5	Electrician	m.d.	975.00	"	975.00	Dang DR								975.00	
6	" helper	m.d.	625.00	"	625.00	Dang DR								625.00	
	B) Vehicle Transportation														
		By vehicle			unit	Easy goods	Difficult goods								
		For> 50 Km Transportation													
		Metalled Road			KG/km	0.032	0.043								
		Earthen Road			KG/km	0.052	0.050								
		For<50 Km Transportation													
		Metalled Road			KG/km	0.032	0.043								
		Earthen Road			KG/km	0.052	0.050								
		Loading Unloading			KG	0.2	0.30								
		By portar			unit per	Easy goods	Difficult goods								
					per Kg/km	1.25	1.56								
	C) Machine analysis														
		Source	Destination	Roadtype	Price/hr										
		Kathmandu	Sukute	Metalled	2700.00	36720.00									
		Sukute	Site	Earten	1800.00	15000.00									
		Site	Kathmandu			51720.00									
	D. GENERAL CONS.MATERIAL														
2	Bricks 1st class	no.	13.60	no	13.60	Bhalubang	46.00	0.00	0.00	3.68	0.00	0.0000	0.5000	17.78	
3	" Machine made (Chinese)	no.	13.60	no	13.60	Bhalubang	46.00	0.00	0.00	3.68	0.00	0.0000	0.5000	17.78	
4	Blockstone/ Bond stone	cu.m.	1600.00	cu.m.	1600.00	Local	10.00	0.00	0.00	560.00	0.00	0.0000	350.0000	2510.00	
5	Boulder stone	cu.m.	1600.00	cu.m.	1600.00	Local	10.00	0.00	0.00	560.00	0.00	0.0000	350.0000	2510.00	
6	Gravel of river	cu.m.	900.00	cu.m.	900.00	Bhalubang	46.00	0.00	0.00	2576.00	0.00	0.0000	350.0000	3826.00	
7	(Chips agg.) of 10 mm	cu.m.	2000.00	cu.m.	2000.00	Bhalubang	46.00	0.00	0.00	2576.00	0.00	0.0000	350.0000	4926.00	
8	River agg. Average 10-40 mm	cu.m.	900.00	cu.m.	900.00	Bhalubang	46.00	0.00	0.00	2576.00	0.00	0.0000	350.0000	3826.00	
9	Crushed or brocken agg.for RCC 5-10, 10-20, 20-50 mm	cu.m.	1012.50	cu.m.	1012.50	Bhalubang	46.00	0.00	0.00	2576.00	0.00	0.0000	350.0000	3938.50	
10	Crushed or brocken agg.for RCC 10-40 mm	cu.m.	1012.50	cu.m.	1012.50	Bhalubang	46.00	0.00	0.00	2576.00	0.00	0.0000	350.0000	3938.50	
11	Sand (Coarse & fine)	cu.m.	1200.00	cu.m.	1200.00	Bhalubang	46.00	0.00	0.00	2266.88	0.00	0.0000	308.0000	3774.88	
12	Soil for mud mortar	cu.m.	310.00	cu.m.	310.00	Local	10.00	0.00	0.00	464.00	0.00	0.0000	290.0000	1064.00	
13	Soil for earth filling	cu.m.	105.00	cu.m.	105.00	Local	10.00	0.00	0.00	464.00	0.00	0.0000	290.0000	859.00	
14	Sal wood	cu.m.	190552.78	cu.m.	190552.78	Bhalubang	46.00	0.00	0.00	1457.28	0.00	0.0000	198.0000	192208.06	
15	Sisamwood	cu.m.	134886.67	cu.m.	134886.67	Bhalubang	46.00	0.00	0.00	1457.28	0.00	0.0000	198.0000	136541.95	

S.No.	Description	District		Norms		Source	Lead from market/Source (km)			Transportation Cost				Site Rate	Remarks
		Unit	Rate	Unit	Rate		Metalled	Earthen	Manual	Metalled	Earthen	Manual	Load/ unload		
							From Source	Km.	m.						
16	Other Ku kath (local wood)	cu.m.	57165.83	cu.m.	57165.83	Bhalubang	46.00	0.00	0.00	1457.28	0.00	0.0000	198.0000	58821.11	
17	Cement NS Nepali PPC(50 kg)	Bag	500.00	mt	10000.00	Bhalubang	46.00	0.00	0.00	1472.00	0.00	0.0000	200.0000	11672.00	
18	Cement NS Nepali OPC (50 kg)	Bag	600.00	mt	12000.00	Bhalubang	46.00	0.00	0.00	1472.00	0.00	0.0000	200.0000	13672.00	
19	Water Proofing Compound	Kg	45.00	Kg	45.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	46.67	
20	Cement white (50 kg)	Kg	35.00	Kg	35.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	36.67	
21	Ropes - Nylon	Kg	270.00	Kg	270.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	271.47	
22	- Coconut	Kg	80.00	Kg	80.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	81.47	
23	Bamboo 20' long	no	310.00	no	310.00	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	0.0000	324.72	
24	Jute (hemp)	kg	55.00	kg	55.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	56.47	
25	Fire wood (a) Kukath	kg	12.00	kg	12.00	local	10.00	0.00	0.00	3.20	0.00	0.0000	0.0000	15.20	
26	cement Concrete tile 25 mm	sqm	145.00	sqm	145.00	Kathmandu	407.00	0.00	0.00	65.12	0.00	0.0000	1.0000	211.12	5kg/no
27	Flag stone 32.5mm	sqm	365.00	sqm	365.00	Bhalubang	46.00	0.00	0.00	63.30	0.00	0.0000	8.6000	436.90	43KG/SQM
28	Fuel	Lit	157.00	Lit	157.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	158.47	
29	Elastrometric water profing all work complete	sqm	643.45	sqm	643.45	Kathmandu	407.00	0.00	0.00	23.31	0.00	0.0000	0.0000	666.76	1.79 kg/sqm
	D. IRON / GLASS / HARDWARE														
1	Tor-Steel rod avg.	kg	95.00	mt	95000.00	Bhalubang	46.00	0.00	0.00	1978.00	0.00	0.0000	300.0000	97278.00	
2	T.M.T. Rod Avg	kg	90.33	mt	90333.33	Bhalubang	46.00	0.00	0.00	1978.00	0.00	0.0000	300.0000	92611.33	
3	Binding wire	kg	110.00	kg	110.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	111.67	
4	Barbed wire 12 guage	kg	135.00	rm	16.88	Bhalubang	46.00	0.00	0.00	15.82	0.00	0.0000	1.6000	34.30	
5	Hinges heavy - 3"	no.	18.00	no	18.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	18.15	
6	" - 4" NS	no.	28.00	no	28.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	28.15	
7	" - 6"	no.	45.00	no	45.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	45.15	
8	Bolts - Aluminium	no.	20.00	no	20.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	20.15	
9	" - G.I.	no.	20.00	no	20.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	20.15	
10	Holdfast	kg	97.00	no	13.86	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	14.00	7 pc/kg
11	Mortise lock steel	no	787.00	no	787.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	787.15	
12	Handle aluminium	no	28.00	no	28.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	28.15	
13	Handle Iron	no	23.00	no	23.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	23.15	
14	Door spring 6"	no	185.00	no	185.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	185.15	
15	Handle lock small	no	183.00	no	183.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	183.15	
16	Handle lock large (Aldrop 10" long)	no	215.00	no	215.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	215.15	
17	Mortice Lock (a) Bronze	no	787.00	no	787.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	787.15	
18	(b) Steel	no	787.00	no	787.00	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	787.15	
19	Nails ½" to 4"/Screws	kg	110.00	no	1.10	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	1.25	
20	Wirenail	kg	860.00	no	8.60	Bhalubang	46.00	0.00	0.00	0.15	0.00	0.0000	0.0000	8.75	
21	Mosquito proof wiremesh	sqm	180.00	sqm	180.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	181.67	
22	Expanded metal wiremesh 4 feet wide	sqm	198.00	sqm	198.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	199.67	
23	" " " 3 feet wide	sqm	165.00	sqm	165.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	166.67	
24	½"Listi of wood	R.ft.	4.57	R.ft.	4.57	Bhalubang	46.00	0.00	0.00	0.66	0.00	0.0000	0.0000	5.24	
25	1" " "	R.ft.	7.62	R.ft.	7.62	Bhalubang	46.00	0.00	0.00	0.66	0.00	0.0000	0.0000	8.28	
26	Glass - 4mm	Sq.ft	53.45	sqm	575.09	Bhalubang	46.00	0.00	0.00	19.78	0.00	0.0000	3.0000	597.87	
27	" - 5mm	Sq.ft	59.49	sqm	640.10	Bhalubang	46.00	0.00	0.00	19.78	0.00	0.0000	3.0000	662.88	

S.No.	Description	District		Norms		Source	Lead from market/Source (km)			Transportation Cost				Site Rate	Remarks
		Unit	Rate	Unit	Rate		Metalled	Earthen	Manual	Metalled	Earthen	Manual	Load/ unload		
							From Source	Km.	m.						
28	CGI sheet (a)24 medium(0.5mm)	Bndle	11500.00	sqm	686.98	Bhalubang	46.00	0.00	0.00	7.91	0.00	0.0000	0.0120	694.90	
29	(b) 26medium(0.38mm)	Bndle	9500.00	sqm	567.50	Bhalubang	46.00	0.00	0.00	7.91	0.00	0.0000	0.0120	575.43	
30	(c) 26 medium colour(0.38mm)	Bndle	11243.12	sqm	671.63	Bhalubang	46.00	0.00	0.00	7.91	0.00	0.0000	0.0120	679.56	
31	0.5mm coloured plane sheet	Mtr	1000.00	Rm	277.78	Bhalubang	46.00	0.00	0.00	3.96	0.00	0.0000	0.0060	281.74	
32	Sky light sheet (pepsi glass)	Sq ft	120.00	Sq.m	1291.20	Kathmandu	407.00	0.00	0.00	35.00	0.00	0.0000	0.0040	1326.21	
33	J or U hook	kg	132.00	no	18.86	Bhalubang	46.00	0.00	0.00	0.19	0.00	0.0000	0.0000	19.05	7 pc/kg
34	Bitumen Washer	pack	40.00	no	2.67	Bhalubang	46.00	0.00	0.00	0.19	0.00	0.0000	0.0000	2.86	
35	Nut & Bolt	kg	215.00	No	14.33	Bhalubang	46.00	0.00	0.00	0.09	0.00	0.0000	0.0000	14.42	15pc/kg
36	Plywood - 4 mm	sqm	245.00	sqm	245.00	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	2.0000	261.72	
37	" - 6 mm	sqm	375.00	sqm	375.00	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	2.0000	391.72	
38	" - 9 mm	sqm	510.00	sqm	510.00	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	2.0000	526.72	
39	" - 12 mm	sqm	670.00	sqm	670.00	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	2.0000	686.72	
40	" - 4 mm teak	sqm	390.00	sqm	390.00	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	2.0000	406.72	
41	Gabion wire Medium zinc coated														
42	12 guage comercial	kg	115.00	KG	115.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	116.67	
43	10 guage comercial	kg	115.00	KG	115.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	116.67	
44	8 guage comercial	kg	115.00	KG	115.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	116.67	
45	MS Black pipe	kg	114.00	KG	114.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	115.67	
46	MS Grill Work with red oxide paint	kg	125.00	KG	125.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.2000	126.67	
47	16 Gauge MS metal Gate with fixing	sqm	8912.52	Sqm	8912.52	Bhalubang	46.00	0.00	0.00	14.72	0.00	0.0000	2.0000	8929.24	10 kg/sqm
48	38 mm thick steel pipe	Rm	599.00	Rm	599.00	Bhalubang	46.00	0.00	0.00	2.43	0.00	0.0000	0.3300	601.76	1.65 kg/m
49	25 mm thick steel pipe	Rm	402.00	Rm	402.00	Bhalubang	46.00	0.00	0.00	2.43	0.00	0.0000	0.3300	404.76	1.65 kg/m
50	Bracket	pc	81.54	pc	81.54	Kathmandu	407.00	0.00	0.00	2.60	0.00	0.0000	0.0400	84.18	
51	Kazzaria, Simany or equivalent tile	sqm	1155.00	sqm	1155.00	Bhalubang	46.00	0.00	0.00	58.88	0.00	0.0000	8.0000	1221.88	40 kg/sqm
52	clay tile	pc	34.00	pc	34.00	Kathmandu	407.00	0.00	0.00	14.98	0.00	0.0000	0.2300	49.21	1.15 kg/nos
	E.PAINTING MATERIALS														
1	Lime	Bag	1400.00	kg	35.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	36.47	
2	White putty	Kg	65.00	kg	65.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	66.47	
3	Snowcem (cem. paint)	kg	70.00	kg	70.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	71.47	
4	Gum	kg	300.00	kg	300.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	301.47	
5	Enamel paint	litre	525.00	ltr	525.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	526.47	
6	Aluminium paint	litre	660.00	ltr	660.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	661.47	
7	Tarpentine	litre	145.00	ltr	145.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	146.47	
8	Varnish (a) General	litre	400.00	ltr	400.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	401.47	
9	Primer (a) Wood	litre	365.00	ltr	365.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	366.47	
10	(b) Metal	litre	365.00	ltr	365.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	366.47	
11	(C) Cement	litre	365.00	ltr	365.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	366.47	
12	Thinner T101	litre	735.00	ltr	735.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	736.47	
13	Distemper	kg	155.00	kg	155.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	156.47	
14	Sand paper iron	Mtr	30.00	Mtr	30.00	Kathmandu	407.00	0.00	0.00	1.00	0.00	0.0000	0.0000	31.00	
15	" general	PC	6.00	PC	6.00	Kathmandu	407.00	0.00	0.00	1.30	0.00	0.0000	0.0000	7.30	
16	Plastic emulsion paint (Interior)	litre	525.00	litre	525.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	526.47	

S.No.	Description	District		Norms		Source	Lead from market/Source (km)			Transportation Cost				Site Rate	Remarks
		Unit	Rate	Unit	Rate		Metalled	Earthen	Manual	Metalled	Earthen	Manual	Load/ unload		
							From Source	Km.	m.						
17	Exterior Wether Coat paint	litre	925.00	litre	925.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	926.47	
18	Bitumen paint	litre	73.00	litre	73.00	Bhalubang	46.00	0.00	0.00	1.47	0.00	0.0000	0.0000	74.47	
19	Painting brush	Inch	71.75	Inch	71.75	Bhalubang	46.00	0.00	0.00	0.01	0.00	0.0000	0.0000	71.76	
20	Road marking paint	Ltr	610.00	Ltr	610.00	Bhalubang	46.00	0.00	0.10	1.47	0.00	0.1250	0.0000	611.60	

Government of Nepal
Water and Energy Commission Secretariat
Singhdurbar Kathmandu

Project: Study on Identification and Development of Hot Water Spring Sources in Nepal
Site: Lamahi Municipality-9, Dang

Summary of Rates at site

S.No.	Description	District		Site Rate		Source
		Unit	Rate	Unit	Rate	
	A. APPROVED LABOUR RATE					
1	Skilled (carpenter, mason)	m.d.	975.00	m.d.	975.00	
2	Unskilled	m.d.	620.00	"	620.00	
3	Plumber	m.d.	975.00	"	975.00	
4	" helper	m.d.	625.00	"	625.00	
5	Electrician	m.d.	975.00	"	975.00	
6	" helper	m.d.	625.00	"	625.00	
	B. GENERAL CONS.MATERIAL					
1	Excavator(1 nos)	hr	1800.00	hr	1800.00	Kathmandu
2	Bricks 1st class	no.	13.60	no	17.78	Bhalubang
3	" Machine made (Chinese)	no.	13.60	no	17.78	Bhalubang
4	Blockstone/ Bond stone	cu.m.	1600.00	cu.m.	2510.00	Local
5	Boulder stone	cu.m.	1600.00	cu.m.	2510.00	Local
6	Gravel of river	cu.m.	900.00	cu.m.	3826.00	Bhalubang
7	(Chips agg.) of 10 mm	cu.m.	2000.00	cu.m.	4926.00	Bhalubang
8	River agg. Average 10-40 mm	cu.m.	900.00	cu.m.	3826.00	Bhalubang
9	Crushed or brocken agg.for RCC 5-10, 10-20, 20-50 mm	cu.m.	1012.50	cu.m.	3938.50	Bhalubang
10	Crushed or brocken agg.for RCC 10-40 mm	cu.m.	1012.50	cu.m.	3938.50	Bhalubang
11	Sand (Coarse & fine)	cu.m.	1200.00	cu.m.	3774.88	Bhalubang
12	Soil for mud mortar	cu.m.	310.00	cu.m.	1064.00	Local
13	Soil for earth filling	cu.m.	105.00	cu.m.	859.00	Local
14	Sal wood	cu.m.	190552.78	cu.m.	192208.06	Bhalubang
15	Sisamwood	cu.m.	134886.67	cu.m.	136541.95	Bhalubang
16	Other Ku kath (local wood)	cu.m.	57165.83	cu.m.	58821.11	Bhalubang
17	Cement NS Nepali PPC(50 kg)	Bag	500.00	mt	11672.00	Bhalubang
18	Cement NS Nepali OPC (50 kg)	Bag	600.00	mt	13672.00	Bhalubang
19	Water Proofing Compound	Kg	45.00	Kg	46.67	Bhalubang
20	Cement white (50 kg)	Kg	35.00	Kg	36.67	Bhalubang
21	Ropes - Nylon	Kg	270.00	Kg	271.47	Bhalubang
22	- Coconut	Kg	80.00	Kg	81.47	Bhalubang
23	Bamboo 20' long	no	310.00	no	324.72	Bhalubang
24	Jute (hemp)	kg	55.00	kg	56.47	Bhalubang
25	Fire wood (a) Kukath	kg	12.00	kg	15.20	local
26	cement Concrete tile 25 mm	sqm	145.00	sqm	211.12	Kathmandu
27	Flag stone 32.5mm	sqm	365.00	sqm	436.90	Bhalubang
28	Fuel	Lit	157.00	Lit	158.47	Bhalubang
29	Elastrometric water profing all work complete	sqm	643.45	sqm	666.76	Kathmandu
	C. IRON / GLASS / HARDWARE					
1	Tor-Steel rod avg.	kg	95.00	mt	97278.00	Bhalubang
2	T.M.T. Rod Avg	kg	90.33	mt	92611.33	Bhalubang
3	Binding wire	kg	110.00	kg	111.67	Bhalubang
4	Barbed wire 12 guage	kg	135.00	rm	34.30	Bhalubang
5	Hinges heavy - 3"	no.	18.00	no	18.15	Bhalubang
6	" - 4" NS	no.	28.00	no	28.15	Bhalubang
7	" - 6"	no.	45.00	no	45.15	Bhalubang
8	Bolts - Aluminium	no.	20.00	no	20.15	Bhalubang
9	" - G.I.	no.	20.00	no	20.15	Bhalubang
10	Holdfast	kg	97.00	no	14.00	Bhalubang

S.No.	Description	District		Site Rate		Source
		Unit	Rate	Unit	Rate	
11	Mortise lock steel	no	787.00	no	787.15	Bhalubang
12	Handle aluminium	no	28.00	no	28.15	Bhalubang
13	Handle Iron	no	23.00	no	23.15	Bhalubang
14	Door spring 6"	no	185.00	no	185.15	Bhalubang
15	Handle lock small	no	183.00	no	183.15	Bhalubang
16	Handle lock large (Aldrop 10" long)	no	215.00	no	215.15	Bhalubang
17	Mortice Lock (a) Bronze	no	787.00	no	787.15	Bhalubang
18	(b) Steel	no	787.00	no	787.15	Bhalubang
19	Nails ½" to 4"/Screws	kg	110.00	no	1.25	Bhalubang
20	Wirenail	kg	860.00	no	8.75	Bhalubang
21	Mosquito proof wiremesh	sqm	180.00	sqm	181.67	Bhalubang
22	Expanded metal wiremesh 4 feet wide	sqm	198.00	sqm	199.67	Bhalubang
23	" " " 3 feet wide	sqm	165.00	sqm	166.67	Bhalubang
24	½"Listi of wood	R.ft.	4.57	R.ft.	5.24	Bhalubang
25	1" " "	R.ft.	7.62	R.ft.	8.28	Bhalubang
26	Glass - 4mm	Sq.ft	53.45	sqm	597.87	Bhalubang
27	" - 5mm	Sq.ft	59.49	sqm	662.88	Bhalubang
28	CGI sheet (a)24 medium(0.5mm)	Bndle	11500.00	sqm	694.90	Bhalubang
29	(b) 26medium(0.38mm)	Bndle	9500.00	sqm	575.43	Bhalubang
30	(c) 26 medium colour(0.38mm)	Bndle	11243.12	sqm	679.56	Bhalubang
31	0.5mm coloured plane sheet	Mtr	1000.00	Rm	281.74	Bhalubang
32	Sky light sheet (pepsi glass)	Sq ft	120.00	Sq.m	1326.21	Kathmandu
33	J or U hook	kg	132.00	no	19.05	Bhalubang
34	Bitumen Washer	pack	40.00	no	2.86	Bhalubang
35	Nut & Bolt	kg	215.00	No	14.42	Bhalubang
36	Plywood - 4 mm	sqm	245.00	sqm	261.72	Bhalubang
37	" - 6 mm	sqm	375.00	sqm	391.72	Bhalubang
38	" - 9 mm	sqm	510.00	sqm	526.72	Bhalubang
39	" - 12 mm	sqm	670.00	sqm	686.72	Bhalubang
40	" - 4 mm teak	sqm	390.00	sqm	406.72	Bhalubang
41	Gabion wire Medium zinc coated					
42	12 guage comercial	kg	115.00	KG	116.67	Bhalubang
43	10 guage comercial	kg	115.00	KG	116.67	Bhalubang
44	8 guage comercial	kg	115.00	KG	116.67	Bhalubang
45	MS Black pipe	kg	114.00	KG	115.67	Bhalubang
46	MS Grill Work with red oxide paint	kg	125.00	KG	126.67	Bhalubang
47	16 Gauge MS metal Gate with fixing	sqm	8912.52	Sqm	8929.24	Bhalubang
48	38 mm thick steel pipe	Rm	599.00	Rm	601.76	Bhalubang
49	25 mm thick steel pipe	Rm	402.00	Rm	404.76	Bhalubang
50	Bracket	pc	81.54	pc	84.18	Kathmandu
51	Kazzaria, Simany or equivalent tile	sqm	1155.00	sqm	1221.88	Bhalubang
52	clay tile	pc	34.00	pc	49.21	Kathmandu
	D.PAINTING MATERIALS					
1	Lime	Bag	1400.00	kg	36.47	Bhalubang
2	White putty	Kg	65.00	kg	66.47	Bhalubang
3	Snowcem (cem. paint)	kg	70.00	kg	71.47	Bhalubang
4	Gum	kg	300.00	kg	301.47	Bhalubang
5	Enamel paint	litre	525.00	ltr	526.47	Bhalubang
6	Aluminium paint	litre	660.00	ltr	661.47	Bhalubang
7	Tarpentine	litre	145.00	ltr	146.47	Bhalubang
8	Varnish (a) General	litre	400.00	ltr	401.47	Bhalubang
9	Primer (a) Wood	litre	365.00	ltr	366.47	Bhalubang
10	(b) Metal	litre	365.00	ltr	366.47	Bhalubang
11	(C) Cement	litre	365.00	ltr	366.47	Bhalubang
12	Thinner T101	litre	735.00	ltr	736.47	Bhalubang
13	Distemper	kg	155.00	kg	156.47	Bhalubang
14	Sand paper iron	Mtr	30.00	Mtr	31.00	Kathmandu

S.No.	Description	District		Site Rate		Source
		Unit	Rate	Unit	Rate	
15	" general	PC	6.00	PC	7.30	Kathmandu
16	Plastic emulsion paint (Interior)	litre	525.00	litre	526.47	Bhalubang
17	Exterior Wether Coat paint	litre	925.00	litre	926.47	Bhalubang
18	Bitumen paint	litre	73.00	litre	74.47	Bhalubang
19	Painting brush	Inch	71.75	Inch	71.76	Bhalubang
20	Road marking paint	Ltr	610.00	Ltr	611.60	Bhalubang

Analysis of Rates
FY:2080/81

Detail of item	Description	Unit	Quantity	Unit Rate	Amount
1. EARTHWORK					
Excavation of soft clay & silty soils including disposal upto 10m leadincluding disposal upto 10m lead and 1.5m lift	Unskilled	m.d.	0.70	620.00	434.00
	Equipment				
	3%of labour				13.02
Item No. 1.1	Sub-Total				447.02
Norms - 2(1) page 5	including@15% overhead		**cu.m.**		514.07
E/W in excav. in soft soil .		**material vat @ 13 %**			1.69
Excavation of hard clay and soils mixed	Unskilled	m.d.	0.80	620.00	496.00
with soft moorum stones (upto 30mm	Equipment				
size) including disposal upto 10m lead	3%of labour				14.88
and 1.5m lift					
Item No. 1.2	Sub-Total				510.88
Norms - 2(2) page 5	including@15% overhead		**cu.m.**		587.51
E/W in excav. in B.M.Soil		**material vat @ 13 %**			1.93
Excavation of soft soil, disposal upto	Unskilled	m.d.	1.00	620.00	620.00
10m lead and 1.5m lift	Equipment				
	3%of labour				18.60
Item No. 1.3	Sub-Total				638.60
Norms - 2(9) page 8	including@15% overhead		**cu.m.**		734.39
E/W excav.in found.- soft soil		**material vat @ 13 %**			2.42
Excavation for foundation drain, pipe	Unskilled	m.d.	1.59	620.00	985.80
line etc.in boulder mixed soil, disposal	Equipment				
(upto 10m lead and 1.5m lift)	3%of labour				29.57
Item No. 1.4	Sub-Total				1015.37
	@15% overhead				
Norms - 2(14) page 9	including@15% overhead		**cu.m.**		1167.68
E/W in found. of drain pipe line B.M.Soil		**material vat @ 13 %**			3.84
excavation using hydraulic excavator) including disposal upto 10m and lift upto 1.5 m etc. , trimming bottom and side slopes in accordance with requirements of lines, grades and cross sections all complete as per specification.	Unskilled	m.d.	0.06	620.00	37.20
	Equipment				
	Excavator	Hr	0.02	1800.00	30.60
	Fuel	Lit	0.34	158.47	53.88
for lead upto 1 Km	Tipper	Hr	0.04	700.00	30.80
	Fuel	Lit	0.13	158.47	20.92
Item No. 1.5	Sub-Total				173.40
Norms - 2(1) page 5	including@15% overhead		**cu.m.**		199.41
E/W in excav. in soft soil using excavator .		**material vat @ 13 %**			17.71
2. EARTH FILLING					
Filling with ordinary soil in 15 cm thick	Unskilled	m.d.	0.50	620.00	310.00
layer and hand compaction (haulage	Sub-Total				310.00
distance 10m) with sprinkling water					
Item No. 2.1					
Norms - 2(25a) page 15	including@15% overhead		**cu.m.**		356.50
Earth filling - compaction work with watering		**material vat @ 13 %**			0.00

Analysis of Rates
FY:2080/81

Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Filling with ordinary soil in 15 cm thick	Unskilled	m.d.	0.25	620.00	155.00
layer and hand compaction (haulage					
distance 10m) without water					
Item No. 2.2	Sub-Total				155.00
Norms - 2(25a) page 15	including@15% overhead				178.25
Earth filling-compaction work without watering			**material vat @ 13 %**		0.00

Filling with ordinary soil in 15 cm thick	Unskilled	m.d.	0.50	620.00	310.00
layer and hand compaction (haulage	soil	cu.m	1.20	859.00	1030.80
distance 10m) with sprinkling water Soil from outer place	Sub-Total				1340.80
Item No. 2.3					
Norms - 2(25a) page 15			**cu.m.**		1541.92
Earth filling lead upto 2 km			**material vat @ 13 %**		0.00

Filling with gravel mix soil in 15 cm thick	Unskilled	m.d.	0.50	620.00	310.00
layer and hand compaction (haulage distance 10m)	Gravel	cu.m	1.20	3826.00	4591.20
with sprinkling water,soil from outer place					
Item No. 2.4	Sub-Total				4901.20
Norms - 2(25a) page 15	including@15% overhead		**cu.m.**		5636.38
Gravel filling with manual- compaction			**material vat @ 13 %**		596.86

Filling by sand and hand compaction	Unskilled	m.d.	0.70	620.00	434.00
(haulage distance 10m) with sprinkling	Sand	cu.m.	1.10	3774.88	4152.37
water					
Item No. 2.5	Sub-Total				4586.37
Norms - 2(42) page 21	including@15% overhead		**cu.m.**		5274.32
Sand Filling Works			**material vat @ 13 %**		539.81

3. SITE CLEARENCE

Site Clearence	Unskilled	m.d.	0.04	620.00	24.80
Cutting thick vegetation, grubbing their roots and disposing them 25m from the construction site(dia <=30cm and density <15 nos. per 100m2)	Equipment				
	3%of labour				0.74
Item No. 3.1	Sub-Total				25.54
Norms - 1(1.3)	including@15% overhead		**sq.m.**		29.38
			material vat @ 13 %		0.10

Uprooting trees & disposal 15 far from the construction site (12 to 30) cm dia	Unskilled	m.d.	0.40	620.00	248.00
	Equipment				
	3%of labour				7.44
Item No. 3.2	Sub-Total				255.44
Norms - 2(2) page 5	including@15% overhead		**per nos**		293.76
			material vat @ 13 %		0.97

Analysis of Rates
FY:2080/81

Detail of item	Description	Unit	Quantity	Unit Rate	Amount
4. BRICK WORK					
Chimney (bhatta) brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	560.00	17.78	9956.80
of brick wall including haulage distance	Cement	m.t.	0.13	13672.00	1777.36
upto 30m	Sand	cu.m	0.27	3774.88	1019.22
a) 1:3	Add.unskilled	m.d.	0.20	620.00	124.00
Item No. 4.1	Equipment	3%			3.72
	Sub-Total				15707.60
Norms - 5(1-b-1) page 31	including@15% overhead		**cu.m.**		18063.74
B/W in c.m.1:3 in G. floor		**material vat @ 13 %**			1658.42
Chimney (bhatta) brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unkilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	560.00	17.78	9956.80
of brick wall including haulage distance	Cement	m.t.	0.10	13672.00	1367.20
upto 30m	Sand	cu.m	0.28	3774.88	1056.97
a) 1:4	Add.unkill	m.d.	0.20	620.00	124.00
	Equipmen.	3%			3.72
Item No. 4.2	Sub-Total				15335.19
Norms - 5(1b2) page 32	including@15% overhead		**cu.m.**		17635.46
B/W in c.m.1:4 in G.floor		**material vat @ 13 %**			1610.01
Chimney (bhatta) brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	560.00	17.78	9956.80
of brick wall including haulage distance	Cement	m.t.	0.07	13672.00	957.04
upto 30m	Sand	cu.m	0.30	3774.88	1132.46
a) 1:6	Add.unkill	m.d.	0.20	620.00	124.00
Item No.4.3	Equipmen.	3%			3.72
	Sub-Total				15000.52
Norms - 5(1b3) page 32	including@15% overhead		**cu.m.**		17250.60
B/W in c.m. 1:6 in G. fioor		**material vat @ 13 %**			1566.50

Analysis of Rates
FY:2080/81

Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Chimney (bhatta) brick masonry works	skilled	m.d.	1.00	975.00	975.00
along with supplying bricks making	unskilled	m.d.	1.70	620.00	1054.00
mud mortar and construction of brick	Brick	nos.	560.00	17.78	9956.80
wall including haulage distance upto	mud	cu.m	0.42	1064.00	446.88
30m	Add.unkill	m.d.	0.20	620.00	124.00
a) mud mortar	Equipmen.	3%			3.72
Item No. 4.4	Sub-Total				12560.40
Norms - 5(1-b-6) page 32	including@15% overhead		**cu.m.**		14444.46
B/W in mud mortar in G. floor		**material vat @ 13 %**			1352.96

Chimney (bhatta) brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	560.00	17.78	9956.80
of brick wall including haulage distance	Cement	m.t.	0.10	13672.00	1367.20
upto 30m (First floor)	Sand	cu.m	0.28	3774.88	1056.97
a) 1:4	Add.unkill	m.d.	0.70	620.00	434.00
Item No. 4.5	Equipmen.	3%			13.02
	Sub-Total				15654.49
Norms - 5(1-b-2) page 32	including@15% overhead		**cu.m.**		18002.66
B/W in c.m. 1:4 in first floor		**material vat @ 13 %**			1611.22

Chimney (bhatta) brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	560.00	17.78	9956.80
of brick wall including haulage distance	Cement	m.t.	0.07	13672.00	957.04
upto 30m (First floor)	Sand	cu.m	0.30	3774.88	1132.46
a) 1:6	Add.unkill	m.d.	0.70	620.00	434.00
Item No. 4.6	Equipmen.	3%			13.02
	Sub-Total				15319.82
Norms - 5(1b3) page 32	including@15% overhead		**cu.m.**		17617.80
B/W in c.m. 1:6 in first floor		**material vat @ 13 %**			1567.71
Machine made brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	530.00	17.78	9423.40
of brick wall including haulage distance	Cement	m.t.	0.07	13672.00	957.04
upto 30m	Sand	cu.m	0.30	3774.88	1132.46
a) 1:6	Add.unkill	m.d.	0.20	620.00	124.00
Item No. 4.7	Equipmen.	3%			3.72
	Sub-Total				14467.12
Norms - 5(1a4) page 32	including@15% overhead		**cu.m.**		16637.19
B/W in c.m. 1:6 in G. fioor (machine made)		**material vat @ 13 %**			1497.16

Machine made brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	530.00	17.78	9423.40
of brick wall including haulage distance	Cement	m.t.	0.10	13672.00	1367.20
upto 30m	Sand	cu.m	0.27	3774.88	1019.22
a) 1:4	Add.unkill	m.d.	0.20	620.00	124.00
Item No. 4.8	Equipmen.	3%			3.72
2.5	Sub-Total				14764.04
Norms - 5(1a2) page 32	including@15% overhead		**cu.m.**		16978.64
B/W in c.m. 1:4 in G. fioor (machine made)		**material vat @ 13 %**			1535.76

Analysis of Rates
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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Machine made brick masonry works					
along with supplying bricks making	skilled	m.d.	1.50	975.00	1462.50
cement sand mortar and construction	unskilled	m.d.	2.20	620.00	1364.00
of brick wall including haulage distance	Brick	nos.	530.00	17.78	9423.40
upto 30m	Cement	m.t.	0.07	13672.00	957.04
a) 1:6	Sand	cu.m	0.30	3774.88	1132.46
Item No. 4.9	Add.unkill	m.d.	0.70	620.00	434.00
	Equipmen.	3%			13.02
2.5	Sub-Total				14786.42
Norms - 5(1a4) page 32	including@15% overhead		**cu.m.**		17004.39
B/W in c.m. 1:6 in First fioor (machine made)		**material vat @ 13 %**			1498.37

Machine made brick masonry works	skilled	m.d.	1.50	975.00	1462.50
along with supplying bricks making	unskilled	m.d.	2.20	620.00	1364.00
cement sand mortar and construction	Brick	nos.	530.00	17.78	9423.40
of brick wall including haulage distance	Cement	m.t.	0.10	13672.00	1367.20
upto 30m	Sand	cu.m	0.27	3774.88	1019.22
a) 1:4	Add.unkill	m.d.	0.70	620.00	434.00
Item No. 4.10	Equipmen.	3%			13.02
2.5	Sub-Total				15083.34
Norms - 5(1a2) page 32	including@15% overhead		**cu.m.**		17345.84
B/W in c.m. 1:4 in first fioor (machine made)		**material vat @ 13 %**			1536.97

5. STONE WORKS

Filling by stones in the foundation and	Unskilled	m.d.	1.50	620.00	930.00
levelling including haulage distance	Block stone	cu.m.	1.00	2510.00	2510.00
upto 30m	Bond stone	cu.m.	0.20	2510.00	502.00
Item No. 5.1	Sub Total				3942.00
Norms - 6(5) page 39	including@15% overhead		**cu.m.**		4533.30
Stone filling in foundation trench		**material vat @ 13 %**			391.56

Rubble masonry work including supply	skilled	m.d.	1.50	975.00	1462.50
of hard stone blocks preparing cement	unskilled	m.d.	5.00	620.00	3100.00
sand mortar and construction of the	cement	m.t.	0.159	13672.00	2173.85
wall upto 5m high haulage distance	Sand	cu.m	0.45	3774.88	1698.70
upto 10m	bl.stone	"	1.00	2510.00	2510.00
a) cement sand mortar 1:4	bond st.	"	0.10	2510.00	251.00
Item No. 5.2	Sub-Total				11196.04
Norms - 6(1-2) page 35	including@15% overhead		**cu.m.**		12875.45
Stone work(RM) in c.m. - 1:4		**material vat @ 13 %**			862.36

Rubble masonry work including supply	skilled	m.d.	1.50	975.00	1462.50
of hard stone blocks preparing cement	unskilled	m.d.	5.00	620.00	3100.00
sand mortar and construction of the	cement	m.t.	0.106	13672.00	1449.23
wall upto 5m high haulage distance	Sand	cu.m	0.47	3774.88	1774.19
upto 10m	bl.stone	"	1.00	2510.00	2510.00
a) cement sand mortar 1:6	bond st.	"	0.10	2510.00	251.00
Item No. 5.3	Sub-Total				10546.93
Norms - 6(1-3) page 35	including@15% overhead		**cu.m.**		12128.96
Stone work(RM) in c.m. - 1:6		**material vat @ 13 %**			777.98

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Rubble masonry work including supply	skilled	m.d.	1.00	975.00	975.00
of hard stone blocks preparing mud	unskilled	m.d.	2.25	620.00	1395.00
mortar and construction of the wall	bl.stone	cu.m	1.00	2510.00	2510.00
upto 5m high haulage distance upto 30m	bond st.	"	0.10	2510.00	251.00
a) in mud mortar	mud	"	0.42	1064.00	446.88
Item No. 5.4	Sub-Total				5577.88
Norms - 6(2-2) page 36	including@15% overhead		**cu.m.**		6414.56
Stone work(RM) in mud mortar		**material vat @ 13 %**			417.02

Boulder Pitching on slope and bed including haulage upto 100	skilled	m.d.	1.00	975.00	975.00
of hard stone blocks and construction	unskilled	m.d.	2.00	620.00	1240.00
of the wall upto 5m high haulage	bl.stone	cu.m	1.00	2510.00	2510.00
distance upto 30 m a) dry wall	bond st.	"	0.10	2510.00	251.00
Item No. 5.5	Sub-Total				4976.00
Norms - 6(2-1) page 36	including@15% overhead		**cu.m.**		5722.40
Dry stone masonry work		**material vat @ 13 %**			358.93

Boulder Pitching on slope and bed including haulage upto 100 m and lift 1.5 m	skilled	m.d.	0.71	975.00	692.25
	unskilled	m.d.	2.12	620.00	1314.40
	bl.stone	cu.m	1.00	2510.00	2510.00
Item No. 5.6	Sub-Total				4516.65
Norms - 6(2-1) page 36	including@15% overhead		**cu.m.**		5194.15
Boulder pitching		**material vat @ 13 %**			326.30

6. CONCRETE WORKS

Concreting of foundation, vertical faces	skilled	m.d.	1.00	975.00	975.00
walls (cement concrete) including supply	unskilled	m.d.	4.00	620.00	2480.00
of materials and haulage distance upto	cement	m.t.	0.22	13672.00	3007.84
30 m a) P.C.C.(1:3:6)	Aggregate1	cu.m.	0.65	3938.50	2560.03
aggregate 1 = 40 mm	" 2	cu.m.	0.24	3938.50	945.24
aggregate 2 = 20 mm	sand	cu.m.	0.47	3774.88	1774.19
Item No.6.1	Sub-Total				11742.30
Norms-7 -2-(c) page 44	including@15% overhead		**cu.m.**		13503.64
P.C.C. - 1:3:6 in foundation,walls etc.		**material vat @ 13 %**			1077.35

Concreting of foundation, vertical faces	skilled	m.d.	1.00	975.00	975.00
walls (cement concrete) including supply	unskilled	m.d.	4.00	620.00	2480.00
materials and haulage distance upto 30m	cement	m.t.	0.32	13672.00	4375.04
a) P.C.C.(1:2:4)	aggregate 1	cu.m.	0.52	3938.50	2048.02
aggregate 1 = 40 mm	aggregate 2	cu.m.	0.22	3938.50	866.47
aggregate 2 = 20 mm	aggregate 3	cu.m.	0.11	3938.50	433.24
aggregate 3 = 10 mm	sand	cu.m.	0.4450	3774.88	1679.82
Item No. 6.2	Sub-Total				12857.59
Norms-7- 2(d) page 44	including@15% overhead		**cu.m.**		14786.22
P.C.C. - 1:2:4 in foundation,walls etc.		**material vat @ 13 %**			1222.34

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Concreting works of super structure,	skilled	m.d.	0.80	975.00	780.00
deck slabs, beams including supply	unskilled	m.d.	7.00	620.00	4340.00
of materials and haulage distance upto	cement	m.t.	0.32	13672.00	4375.04
30 m	Aggregate 1	cu.m.	0.52	3938.50	2048.02
Aggregate1 = 40 mm	Aggregate 2	cu.m.	0.22	3938.50	866.47
Aggregate2 = 20 mm crushed	" 3	cu.m.	0.11	3938.50	433.24
Aggregate3 = 10 mm crushed	sand	cu.m.	0.445	3774.88	1679.82
Item No. 6.3	Sub-Total				14522.59
Norms-7(4)a page 46	including@15% overhead		**cu.m.**		16700.97
1:2:4 PCC for RCC		**material vat @ 13 %**			1222.34

Concreting works of super structure,	skilled	m.d.	0.80	975.00	780.00
deck slabs, beams including supply	unskilled	m.d.	7.00	620.00	4340.00
of materials and haulage distance upto	cement	m.t.	0.40	13672.00	5468.80
30 m	Aggregate 1	cu.m.	0.00	3938.50	0.00
Aggregate1 = 40 mm	Aggregate 2	cu.m.	0.57	3938.50	2244.95
Aggregate2 = 20 "	" 3	cu.m.	0.29	3938.50	1142.17
Aggregate3 =10 "	sand	cu.m.	0.425	3774.88	1604.32
Item No.6.4	Sub-Total				15580.23
Norms-7(4)b page 46	including@15% overhead		**cu.m.**		17917.27
1:1.5:3 PCC for RCC		**material vat @ 13 %**			1359.83

Concreting works of super structure,	skilled	m.d.	0.70	975.00	682.50
deck slabs, beams including supply	unskilled	m.d.	7.00	620.00	4340.00
of materials and haulage distance upto	cement	m.t.	0.61	13672.00	8339.92
30 m	Aggregate 1	cu.m.	0.00	3938.50	0.00
Aggregate1 = 40 mm	Aggregate 2	cu.m.	0.21	3938.50	827.09
Aggregate2 = 20 "	" 3	cu.m.	0.43	3938.50	1673.86
Aggregate3 =10 "	sand	cu.m.	0.425	3774.88	1604.32
Item No.6.5	Sub-Total				17467.69
Norms-7(4)b page 46	including@15% overhead		**cu.m.**		20087.85
1:1:2 PCC for RCC		**material vat @ 13 %**			1617.87

Concreting work for Precast slab,	skilled	m.d.	1.20	975.00	1170.00
beam etc.haulage distance upto 30 m.	unskilled	m.d.	6.80	620.00	4216.00
a) P.C.C.(1:2:4)	cement	m.t.	0.32	13672.00	4375.04
	river aggre.40mm	cu.m.	0.52	3938.50	2048.02
	aggregate20mm	cu.m.	0.22	3938.50	866.47
Item No. 6.6	aggregate10mm	cu.m.	0.11	3938.50	433.24
	sand	cu.m.	0.445	3774.88	1679.82
	Sub-Total				14788.59
Norms-7-9 page 52	including@15% overhead		**cu.m.**		17006.87
P.C.C. 1:2:4 work for precast slab		**material vat @ 13 %**			1222.34

Providing and laying Plum concrete (Boulder mixed concrete) as per Drawing and Specifications. [60% M15 concrete and 40% boulders/stones / Manual Means]	skilled	m.d.	1.00	975.00	975.00
	unskilled	m.d.	4.00	620.00	2480.00
	cement	m.t.	0.19	13672.00	2529.32
`	river aggre.40mm	cu.m.	0.16	3938.50	614.41
	aggregate20mm	cu.m.	0.07	3938.50	283.57
Item No. 6.6	aggregate10mm	cu.m.	0.30	3938.50	1177.61
	sand	cu.m.	0.30	3774.88	1128.69
	stone	cu.m.	0.44	2510.00	1104.40
	Sub-Total				10293.00
Norms-7-9 page 52	including@15% overhead		**cu.m.**		11836.95
Plum Concrete(M15)		**material vat @ 13 %**			745.37

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
7. REINFORCEMENT					
Cutting, bending, placing in position as	skilled	m.d.	12.00	975.00	11700.00
shown in the drawing & binding by GI	unskilled	m.d.	12.00	620.00	7440.00
wire of reinforcement steel bar for RCC	iron rod	m.t.	1.05	92611.33	97241.90
works incl. haulage dist. upto 30m	bind.wire	kg	10.00	111.67	1116.72
Item No.7.1	Sub-Total				117498.62
			mt		117498.62
Norms-7-5 page 47	including@15% overhead		kg		**135.12**
Reinforcement work		**material vat @ 13 %**			12.79
8. FORMWORK					
Making wooden form work including supply	skilled	m.d.	1.72	975.00	1677.00
and selection of materials fixing, nailing	unskilled	m.d.	2.57	620.00	1593.40
according to drawings, placing separa-	wood	cu.m.	0.06575	58821.11	3867.49
tors, dismantling forms and hauling	killa	kg	2.50	100.00	250.00
upto 30 m distance ***for slab***					
Item No. 8.1	Sub-Total				7387.89
Norms-8(2a) page 55	including@15% overhead		**sq.m.**		**849.61**
Form work for slab		**material vat @ 13 %**			53.53
Making wooden form work including supply	skilled	m.d.	3.748	975.00	3654.30
and selection of materials fixing, nailing	unskilled	m.d.	5.622	620.00	3485.64
according to drawings, placing separa-	wood	cu.m.	0.06575	58821.11	3867.49
tors, dismantling forms and hauling	killa	kg	2.50	100.00	250.00
upto 30 m distance ***for columns 2 m.girth***					
Item No. 8.2	Sub-Total				11257.43
Norms-8(3a) page 56	including@15% overhead		**sq.m.**		**1294.60**
Form work for coloums		**material vat @ 13 %**			53.53
Making wooden form work including supply	skilled	m.d.	4.00	975.00	3900.00
and selection of materials fixing, nailing	unskilled	m.d.	6.00	620.00	3720.00
according to drawings, placing separa-	wood	cu.m.	0.06575	58821.11	3867.49
tors, dismantling forms and hauling	killa	kg	2.50	100.00	250.00
upto 30 m distance ***for beams ht. Up to 0.3 m***	Sub-Total				11737.49
Item No. 8.3					
Norms-8(4a) page 57	including@15% overhead		**sq.m.**		**1349.81**
Form work for beam		**material vat @ 13 %**			53.53
9. ROOFING WORK:-					
26 gause C.G.I. sheet roofing works	skilled	m.d.	1.10	975.00	1072.50
with supply of materials using J or L hooks	unskilled	m.d.	1.25	620.00	775.00
all complete	CGIsheet	sq.m.	12.00	575.43	6905.12
Item No.	nutbolt	nos.	30.00	14.42	432.65
9.1	J-hook	nos.	25.00	19.05	476.21
	bit.washer	nos.	55.00	2.86	157.19
	Sub-Total				9818.68
Norms-9(1) page 69	including@15% overhead		**sq.m.**		**1129.15**
CGI sheet roofing - 26 # M.C.		**material vat @ 13 %**			103.63

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
26 gause coloured C.G.I. sheet roofing works	skilled	m.d.	1.10	975.00	1072.50
with supply of materials with all complete	unskilled	m.d.	1.25	620.00	775.00
	CGIsheet	sq.m.	12.00	679.56	8154.67
	nutbolt	nos.	30.00	14.42	432.65
Item No. 9.3	J-hook	nos.	25.00	19.05	476.21
7.1	bit.washer	nos.	55.00	2.86	157.19
	Sub-Total				11068.23
Norms-9(1) page 69	including@15% overhead		**sq.m.**		1272.85
ColouredCGI sheet roofing - 26 #		**material vat @ 13 %**			119.87

Pepsi glass sheet roofing works	skilled	m.d.	1.10	975.00	1072.50
with supply of materials with all complete	unskilled	m.d.	1.25	620.00	775.00
	pepsi sheet	sq.m.	12.00	1326.21	15914.47
	nutbolt	nos.	30.00	14.42	432.65
Item No. 9.5	J-hook	nos.	25.00	19.05	476.21
	bit.washer	nos.	55.00	2.86	157.19
	Sub-Total				18828.03
Norms-9(1) page 69	including@15% overhead		**sq.m.**		2165.22
pepsi glass sheet roofing work		**material vat @ 13 %**			220.75

0.5mm coloured .G.I. sheet 150mm width works ,450mm gutter works with all work complete	skilled	m.d.	1.75	975.00	1706.25
	unskilled	m.d.	2.00	620.00	1240.00
	CGIsheet 0.5mm	sq.m.	13.50	281.74	3803.49
	nutbolt	nos.	48.00	14.42	692.24
Item No. 9.6	Bracket	nos.	32.00	84.18	2693.91
	bit.washer	nos.	48.00	2.86	137.19
	Sub-Total				10273.08
	including@15% overhead		**sq.m.**		1181.40
Gutter works		**material vat @ 13 %**			95.25

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
10. WOODEN WORKS					
Making and fixing seasoned sal wood	skilled	m.d.	34.00	975.00	33150.00
chaukhat	unskilled	m.d.	3.40	620.00	2108.00
Suppose 1 Kg holdfast = 5 nos.	wood	cu.m	1.10	192208.06	211428.87
	holdfast	nos.	92.00	14.00	1288.40
Item No. 10.1	killa	"	184.00	1.25	229.48
	Sub-Total				248204.75
Norms - 10(1-b) page 75	including@15% overhead		**cu.m.**		285435.46
Sal wood work - chaukhat		**material vat @ 13 %**			27683.08
Making and fixing sal wood 38 mm thick panelled	skilled	m.d.	10.00	975.00	9750.00
shutters using 38x75 mm frame	unskilled	m.d.	1.00	620.00	620.00
Shutter size:	wood	cu.m	0.084	192208.06	16145.48
1.07m * 1.982 m=2.114 sq.m.	hinges	nos.	6.00	28.15	168.88
Hinges (Kabja) - 100 mm	bolt_1	nos.	1.00	20.15	20.15
bolt _1(Chheskini) - 150 mm	bolt_2	nos.	1.00	20.15	20.15
bolt _2(Chheskini) - 300 mm	lock	nos.	1.00	215.15	215.15
lock - Aldrop set - 250 mm	handle	nos.	2.00	28.15	56.29
Item No. 10.2	nails	L.S.	48.00	1.25	59.87
	Sub-Total				27055.96
Norms - 10(2) page 76	including@15% overhead		**sq.m.**		14718.24
38 mm thick salwood panelled shutters		**material vat @ 13 %**			1026.10
Making and fixing sal wood and 9 mm ply	skilled	m.d.	10.00	975.00	9750.00
shutters using 38 mm x 100mm sal wood frame	unskilled	m.d.	1.00	620.00	620.00
(without listi)	wood	cu.m	0.049	192208.06	9418.19
	9mm ply	sq.m	1.688	526.72	889.10
Shutter size:	hinges	nos.	6.00	28.15	168.88
1.07m * 1.982 m=2.114 sq.m.	bolt_1	nos.	1.00	20.15	20.15
Hinges (Kabja) - 100 mm	bolt_2	nos.	1.00	20.15	20.15
bolt _1(Chheskini) - 150 mm	lock	nos.	1.00	787.15	787.15
bolt _2(Chheskini) - 300 mm	handle	nos.	2.00	28.15	56.29
lock - Mortice lock 250 mm	nails	L.S.			24.00
Item No. 10.3	Sub-Total				21753.92
Norms - 10(2) page 76	including@15% overhead		**sq.m.**		11833.97
In 1.5" sal frame -9 mm ply shutters		**material vat @ 13 %**			700.05
Making and fixing sal wood and 6mm ply	skilled	m.d.	10.00	975.00	9750.00
shutters using 38 mm* 100mm sal wood frame	unskilled	m.d.	1.00	620.00	620.00
Shutter size:	wood	cu.m	0.049	192208.06	9418.19
1.07m * 1.982 m=2.114 sq.m.	6mm ply	sq.m	1.688	391.72	661.22
Hinges (Kabja) - 100 mm	hinges	nos.	6.00	28.15	168.88
bolt _1(Chheskini) - 150 mm	bolt_1	nos.	1.00	20.15	20.15
	bolt_2	nos.	1.00	20.15	20.15
bolt _2(Chheskini) - 300 mm	lock	nos.	1.00	787.15	787.15
lock - Mortise lock 250 mm	handle	nos.	2.00	28.15	56.29
	nails	L.S.			24.00
Item No. 10.4	Sub-Total				21526.04
Norms - 10(2) page 76	including@15% overhead		**sq.m.**		11710.00
In1.5"sal frame6mm ply shutters with listi		**material vat @ 13 %**			686.04

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Making and fixing 4 mm thick glazed	skilled	m.d.	9.00	975.00	8775.00
shutter using sal wood shutter of	unskilled	m.d.	0.90	620.00	558.00
size : 38 mm x 75 mm	wood	cu.m	0.049	192208.06	9418.19
hinges (Kabja) - 75 mm	glass	sq.m.	1.085	597.87	648.68
bolts (Chheskini) - 100 mm	hinges	nos.	8.00	18.15	145.18
	bolts	nos.	4.00	20.15	80.59
Item No. 10.5	handle 4"	nos.	2.00	28.15	56.29
	screws	nos.	48.00	1.25	59.87
	Sub-Total				19741.81
Norms - 10(4) page 78	including@15% overhead		**sq.m.**		10180.75
38 mm thick glazed shutter with 4 mm glass		**material vat @ 13 %**			606.79

Making and fixing 4 mm commercial	skilled	m.d.	7.00	975.00	6825.00
plywood flush shutter (plywood both	unskilled	m.d.	0.70	620.00	434.00
sides) in 38 mm sal wood frame.	wood	cu.m	0.0346	192208.06	6650.40
Shutter size :1.092*2.058 = 2.245	Plywwod	sq.m.	4.65	261.72	1217.00
lock - Mortise lock	hinges	nos	3.00	28.15	84.44
hinges - 100 mm	bolts	nos	2.00	20.15	40.29
bolts - 150 mm	lock	nos	1.00	787.15	787.15
Item No. 10.6	screws	L.S.			24.00
	Sub-Total				16062.28
Norms - 10(7) page 80	including@15% overhead		**sq.m.**		8227.89
38mm thick flush shutter with 4mm plywood		**material vat @ 13 %**			509.77

Making and fixing 38 mm thick Mosquito proof	skilled	m.d.	5.00	975.00	4875.00
wire mesh net shutter with expanded metal net	unskilled	m.d.	0.50	620.00	310.00
flush shutter on salwood frames	wood	cu.m.	0.026	192208.06	4997.41
Shutter size:	Mosq. net	sq.m.	2.13	181.67	386.96
1.092*2.058 = 2.245 sq.m.	exp. net	sq.m.	2.13	199.67	425.30
hinges - 100 mm	hinges	nos	3.00	28.15	84.44
bolts - 150 mm	bolt	nos	2.00	20.15	40.29
Item No. 10.9	spring	nos	1.00	185.15	185.15
	handle	nos	2.00	28.15	56.29
	screws	L.S.			50.00
	Sub-Total				11410.85
Norms-10(10) page 83	including@15% overhead		**sq.m.**		5845.20
38mm thick shutter with M.net+Expen.net		**material vat @ 13 %**			360.52

Making and fixing 38 mm thick Mosquito proof	skilled	m.d.	5.00	975.00	4875.00
wire mesh net flush shutter on salwood frames	unskilled	m.d.	0.50	620.00	310.00
Shutter size:	wood	cu.m.	0.026	192208.06	4997.41
1.092*2.058 = 2.245 sq.m.	Mosq. net	sq.m.	2.13	181.67	386.96
hinges - 100 mm	hinges	nos	3.00	28.15	84.44
bolts - 150 mm	bolt	nos	2.00	20.15	40.29
Item No. 10.10	spring	nos	1.00	185.15	185.15
	handle	nos	2.00	28.15	56.29
	screws	L.S.			50.00
	Sub-Total				10985.55
Norms-10(10) page 83	including@15% overhead		**sq.m.**		5627.34
38mm thick shutter with M.net		**material vat @ 13 %**			335.89

Fixing 4 mm thick comercial plywood	skilled	m.d.	0.06	975.00	58.50
using necessary nails.	unskilled	m.d.	0.006	620.00	3.72
	4mm plywood	sq.m.	1.05	261.72	274.81
Item No. 10.11	nails	L.S.			15.00
	Sub-Total				352.03
Norms-10(11)b page 84	including@15% overhead		**sq.m.**		404.83
Fixing of 4 mm thick plywood with nails		**material vat @ 13 %**			37.67

Making and fixing 4 mm thick glass	skilled	m.d.	0.06	975.00	58.50
using necessary listi.	unskilled	m.d.	0.006	620.00	3.72
Item No. 10.12	glass	sq.m.	1.00	597.87	597.87

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
	½" listi	r.m.	4.05	5.24	21.20
	nails	L.S.			15.00
	Sub-Total				696.29
Norms-10(11)b page 84	including@15% overhead		**sq.m.**		800.73
Fixing of 4 mm thick Glass with nails		**material vat @ 13 %**			82.43

Fixing mosquito proof mesh net	skilled	m.d.	0.06	975.00	58.50
using listi.	unskilled	m.d.	0.006	620.00	3.72
Item No. 10.13	net	sq.m.	1.05	181.67	190.76
	1"listi	r.m.	4.05	8.28	33.55
	nails	L.S.			35.00
	Sub-Total				321.53
Norms - similar to 10(12) page 85	including@15% overhead		**sq.m.**		369.76
Fixing of M.P.net with listi		**material vat @ 13 %**			33.71

Fixing mosquito proof mesh net	skilled	m.d.	0.06	975.00	58.50
with expanded metal net using listi	unskilled	m.d.	0.006	620.00	3.72
	M.P. net	sq.m.	1.05	181.67	190.76
Item No. 10.14	exp.net	sq.m.	1.05	166.67	175.01
4.8	1" listi	r.m.	4.05	8.28	33.55
	nails	L.S.			35.00
	Sub-Total				496.53
Norms - similar to 10(12) page 85	including@15% overhead		**sq.m.**		571.01
Fixing of M.P.net &Exp.net with listi		**material vat @ 13 %**			56.46

Fixing expaded metal wire mesh net with listi.	skilled	m.d.	0.06	975.00	58.50
	unkilled	m.d.	0.006	620.00	3.72
Item No. 10.15	Exp.net	sq.m.	1.05	166.67	175.01
	1" listi	r.m.	4.05	8.28	33.55
	nails	L.S.			35.00
	Sub-Total				305.78
Norms - similar to 10(12) page 85	including@15% overhead		**sq.m.**		351.64
Fixing of expanded metal net with listi		**material vat @ 13 %**			31.66

Analysis of Rates
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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Making ceiling with 50*75 mm sal wood frames,	skilled	m.d.	6.50	975.00	6337.50
0.6*0.6 m box size and fixing 25mm thick	unskilled	m.d.	0.65	620.00	403.00
planks with all complete	wood	cu.m	0.421	192208.06	80919.59
10.00sq.m	Listi	L.S.			150.00
Item No. 10.16	killa	L.S.			100.00
	Sub-Total				87910.09
Norms no 11-21 p 109	including@15% overhead		**sq.m.**		10109.66
25mm Sal wood planking with wooden frames		**material vat @ 13 %**			1055.20

Making ceiling with 50*75 mm size local wood	skilled	m.d.	23.00	975.00	22425.00
0.6*0.9m segment and fixing 4mm ply	unskilled	m.d.	2.30	620.00	1426.00
35.68 sq.m	Local wood	cu.m	0.45	58821.11	26469.50
	4 mm plywood	sq.m	37.50	261.72	9814.50
Item No. 10.17	Listi	L.S.			125.00
	killa	L.S.			75.00
	Sub-Total				60335.00
Norms no 10(16-a) p 89	including@15% overhead		**sq m**		1944.65
False ceiling of 4 mm ply with local wood		**material vat @ 13 %**			132.93

Making variou types of flush ceiling	skilled	m.d.	23.00	975.00	22425.00
in sal wood frame of size 50mm*75mm	unkilled	m.d.	2.30	620.00	1426.00
using 4 mm commercial plywood	Salwood	cu.m.	0.45	192208.06	86493.63
Ceiling size	plywood	sq.m.	37.50	261.72	9814.50
9.75 x 3.65 = 35.68 sq.m.	Listi	L.S.			125.00
	killa	L.S.			75.00
Item No.10.18	Sub-Total				120359.13
Norms-10(16-a) page 89	including@15% overhead		**sq m**		3879.29
False ceiling of 4 mm ply with Salwood		**material vat @ 13 %**			351.63

Making beams, rafter, purlin cross	skilled	m.d.	17.65	975.00	17208.75
beams from seasoned local wood with	unskilled	m.d.	1.76	620.00	1091.20
fitting and fixing	wood	cu.m	1.05	58821.11	61762.17
Item No. 10.19	killa	L.S.		500.00	125.00
	Sub-Total				80187.12
Norms - 10(17) page 90	including@15% overhead		**cu.m.**		92215.19
Local wood work - beam, rafter etc.		**material vat @ 13 %**			8045.33

Making beams, rafter, purlin cross	skilled	m.d.	17.65	975.00	17208.75
beams from seasoned sal wood with	unskilled	m.d.	1.76	620.00	1091.20
fitting and fixing	wood	cu.m	1.05	192208.06	201818.46
	killa	L.S.		500.00	125.00
Item No. 10.20	Sub-Total				220243.41
Norms - 10(17) page 90	including@15% overhead		**cu.m.**		253279.93
Sal wood work - beam, rafter etc.		**material vat @ 13 %**			26252.65

Making & fixing 25mm thick sal wood eaves	skilled	m.d.	1.43	975.00	1394.25
board	unkilled	m.d.	0.143	620.00	88.66
Item No. 10.21	salwood	cu.m.	0.275	192208.06	52857.22
	killa	L.S.			100.00
	Sub-Total				54440.13
Norms-10(19) page 91	including@15% overhead		**sq m**		6260.61
25mm thick salwood eaves board		**material vat @ 13 %**			688.44

Making false ceiling of sal wood frame of size	skilled	m.d.	23.00	975.00	22425.00
50mm*75mm in 600 * 900 mm boxes with 12mm	unkilled	m.d.	2.30	620.00	1426.00
planks.	wood	cu.m.	0.45	192208.06	86493.63
Ceiling size	12 mm Ply	sq.m.	37.50	686.72	25752.00
9.75 x 3.65 = 35.68 sq.m.	1" Listi	R.m	61.00	8.28	505.35
Item No. 10.22	killa	L.S.			150.00
	Sub-Total				136751.97
Norms-10(16a) page 89	including@15% overhead		**sq m**		4407.64

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
False ceiling of salwood with 12 mm Plywood		**material vat @ 13 %**			411.35
Making and fixing seasoned sal wood	skilled	m.d.	34.00	975.00	33150.00
chaukhat (excluding salwood)	unskilled	m.d.	3.40	620.00	2108.00
	wood	cu.m	1.10	0.00	0.00
Item No. 10.23	holdfast	nos.	92.00	14.00	1288.40
	killa	"	184.00	1.25	229.48
	Sub-Total				36775.88
Norms - 10(1-b) page 75	including@15% overhead		**cu.m.**		42292.27
Sal wood work - chaukhat excluding salwood		**material vat @ 13 %**			197.32
Making and fixing sal wood38 mm th.panelled	skilled	m.d.	10.00	975.00	9750.00
shutters using 38x75 mm frame(exclu. Salwood)	unskilled	m.d.	1.00	620.00	620.00
Shutter size:	wood	cu.m	0.084	0.00	0.00
1.07m * 1.982 m=2.114 sq.m.	hinges	nos.	6.00	28.15	168.88
Hinges (Kabja) - 100 mm	bolt_1	nos.	1.00	20.15	20.15
bolt _1(Chheskini) - 150 mm	bolt_2	nos.	1.00	20.15	20.15
bolt _2(Chheskini) - 300 mm	lock	nos.	1.00	787.15	787.15
lock - Aldrop set - 250 mm	handle	nos.	2.00	28.15	56.29
Item No. 10.24	nails	nos.	48.00	1.25	59.87
	Sub-Total				11482.48
Norms - 10(2) page 76	including@15% overhead		**sq m**		6246.38
38 mm thick p. shutters(excluding wood)		**material vat @ 13 %**			68.41
Making and fixing 4 mm thick glazed	skilled	m.d.	9.00	975.00	8775.00
shutter using sal wood shutter of	unskilled	m.d.	0.90	620.00	558.00
size : 38 mm x 75 mm(excluding salwood)	glass	sq.m.	1.085	597.87	648.68
hinges (Kabja) - 75 mm	hinges	nos.	8.00	18.15	145.18
bolts (Chheskini) - 100 mm	bolts	nos.	4.00	20.15	80.59
handle 4" aluminium	handle 4"	nos.	2.00	28.15	56.29
Item No. 10.25	screws	nos.	48.00	1.25	59.87
	Sub-Total				10323.61
Norms - 10(4) page 78	including@15% overhead		**sq m**		5323.84
38 mm th. G. S. with 4 mm glass(excl.wood)		**material vat @ 13 %**			57.75
Fixing 4 mm thick teak plywood	skilled	m.d.	0.06	975.00	58.50
using necessary nails.	unskilled	m.d.	0.006	620.00	3.72
Item No. 10.26	4mm plywood	sq.m.	1.05	406.72	427.06
10.26	nails	L.S.			15.00
	Sub-Total				504.28
Norms-10(11)b page 84	including@15% overhead		**sq m**		579.92
Fixing of 4 mm thick teak plywood		**material vat @ 13 %**			57.47
Making beams, rafter, purlin cross	skilled	m.d.	17.65	975.00	17208.75
beams from seasoned sal wood with	unskilled	m.d.	1.76	620.00	1091.20
fitting and fixing (excluding salwood)	killa	L.S.			125.00
Item No. 10.27	Sub-Total				18424.95
Norms - 10(17) page 90	including@15% overhead		**cu.m.**		21188.69
Fixing of beam, rafter etc (exclu. Salwood)		**material vat @ 13 %**			16.25
Partioning the room with 38*75 mm sal wood	skill	m.d.	23.00	975.00	22425.00
and making frame 0.61*0.915 m size 4mm	Unskill	m.d.	2.30	620.00	1426.00
commercial ply wood fixing both side	sal wood	Cu.m	0.34	192208.06	65350.74
frame 9.75*3.65=35.68	Ply wood	Sq.m	75.00	261.72	19629.00
Item No. 10.28	miscellane.	L.S			50.00
	Sub-Total				108880.74
	including@15% overhead		**sq m**		3509.33
Partion with sal wood & 4mm ply b/s		**material vat @ 13 %**			313.32

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
11. FLOORING WORKS :					
1" thick 1:2:4 cement concrete work with	skilled	m.d.	1.10	975.00	1072.50
finishing by rubbing	unskilled	m.d.	1.50	620.00	930.00
	cement	m.t.	0.09	11672.00	1050.48
Item No.	sand	cu.m.	0.12	3774.88	452.99
11.1	aggregate12mm	cu.m.	0.23	3938.50	905.86
Norms-11(1)a page 96	Sub-Total				4411.82
	including@15% overhead		**sq m**		507.36
25mm thick PCC(1:2:4)		**material vat @ 13 %**			31.32
1.5" thick 1:2:4 cement concrete work with	skilled	m.d.	1.25	975.00	1218.75
finishing by rubbing	unskilled	m.d.	2.00	620.00	1240.00
	cement	m.t.	0.13	11672.00	1517.36
Item No.	sand	cu.m.	0.18	3774.88	679.48
11.2	aggreg.12mm	cu.m.	0.36	3938.50	1417.86
Norms-11(1)b page 96	Sub-Total				6073.45
	including@15% overhead		**sq m**		698.45
37.5 mm thick PCC(1:2:4) work		**material vat @ 13 %**			46.99
2" thick 1:2:4 cement concrete work with	skilled	m.d.	1.25	975.00	1218.75
finishing by rubbing	unkilled	m.d.	2.50	620.00	1550.00
	cement	m.t.	0.17	11672.00	1984.24
Item No.	sand	cu.m.	0.23	3774.88	868.22
11.3	aggreg.20mm	cu.m.	0.46	3938.50	1811.71
Norms-11(1)c page 96	Sub-Total				7432.92
	including@15% overhead		**sq m**		854.79
50 mm thick PCC(1:2:4) work		**material vat @ 13 %**			60.63
3" thick 1:2:4 cement concrete work with	skilled	m.d.	1.25	975.00	1218.75
finishing by rubbing	unkilled	m.d.	3.00	620.00	1860.00
	cement	m.t.	0.26	11672.00	3034.72
Item No.	sand	cu.m.	0.34	3774.88	1283.46
11.4	aggreg.20mm	cu.m.	0.68	3938.50	2678.18
Norms-11(1)d page 97	Sub-Total				10075.11
	including@15% overhead		**sq m**		1158.64
75mm thick PCC (1:2:4) work		**material vat @ 13 %**			90.95
Flat brick laying (soling) in cement sand (1:6)	skilled	m.d.	2.25	975.00	2193.75
with pointing in joins with (1:2) cement sand	unskilled	m.d.	3.25	620.00	2015.00
mortar.	Brick	nos.	430.00	17.78	7645.40
Item No.	cement	m.t.	0.078	11672.00	910.42
11.5	Sand	cu.m.	0.229	3774.88	864.45
Norms - 11(12) page 105	Sub-Total				13629.01
	including@15% overhead		**sq m**		1567.34
Flat Brick soling in cement mortar (1:6)		**material vat @ 13 %**			122.46
On edge brick laying (soling) in cement sand (1:6)	skilled	m.d.	1.10	975.00	1072.50
with pointing in joins with (1:2) cement sand	unskilled	m.d.	1.80	620.00	1116.00
mortar.	Brick	nos.	750.00	17.78	13335.00
Item No.	cement	m.t.	0.121	11672.00	1412.31
11.6	Sand	cu.m	0.431	3774.88	1626.97
Norms - 11(13) page 106	Sub-Total				18562.79
	including@15% overhead		**sq m**		2134.72
Edge Brick soling in cement mortar(1:6)		**material vat @ 13 %**			212.87
Dry brick laying (soling) in sand	skilled	m.d.	0.50	975.00	487.50
a) flat	unskilled	m.d.	1.00	620.00	620.00
Item No.	Brick	nos.	420.00	17.78	7467.60
11.7	Sand	cu.m.	0.71	3774.88	2680.16
Norms - 11(15-a) page 107	Sub-Total				11255.26
	including@15% overhead		**sq m**		1294.36
Dry flat Brick soling -		**material vat @ 13 %**			131.92

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Dry brick laying (soling) in sand	skilled	m.d.	1.00	975.00	975.00
a) on edge (vertical)	unskilled	m.d.	3.25	620.00	2015.00
Item No.	Brick	nos.	750.00	17.78	13335.00
11.8	Sand	cu.m	0.71	3774.88	2680.16
Norms - 11(15-b) page 107	Sub-Total				19005.16
	including@15% overhead		**sq m**		2185.59
Dry on edge Brick soling		**material vat @ 13 %**			208.20

Dry stone laying (soling) in sand	skilled	m.d.	1.00	975.00	975.00
	unskilled	m.d.	3.50	620.00	2170.00
Item No.	stone	cu.m	1.10	2510.00	2761.00
11.9	Sand	cu.m	0.71	3774.88	2680.16
Norms - 11(16) page 107	Sub-Total				8586.16
	including@15% overhead		**cum**		9874.09
Dry stone soling in sand		**material vat @ 13 %**			707.35

Sand filling	skilled	m.d.	6.50	975.00	6337.50
Item No.	unskilled	m.d.	0.00	620.00	0.00
11.10	sand	cum	11.00	3774.88	41523.68
Norms-11(19-a) page 108	Sub-Total				47861.18
	including@15% overhead		**cum**		5504.04
Sand filling		**material vat @ 13 %**			539.81

Brick bats filling up to 15 cm. Size.	skilled	m.d.	10.00	975.00	9750.00
Item No.	unskilled	m.d.	0.00	620.00	0.00
11.11	brick bats	cum	11.00	800.00	8800.00
Norms-11(19-b) page 108	Sub-Total				18550.00
	including@15% overhead		**cum**		2133.25
Brick bats filling work.		**material vat @ 13 %**			114.40

3 mm thick fine cement punning works	skilled	m.d.	1.00	975.00	975.00
Item No.	unkilled	m.d.	1.00	620.00	620.00
11.12	cement	m.t.	0.0532	11672.00	620.95
Norms-11(20) page 109	Sub-Total				2215.95
	including@15% overhead		**sq m**		254.83
3mm cement punning		**material vat @ 13 %**			8.07

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
25mmmm flat stone flooring)	skilled	m.d.	2.00	975.00	1950.00
	unskilled	m.d.	4.50	620.00	2790.00
Item No.	Stone	sqm	11.00	436.90	4805.86
11.13	cement	m.t.	0.060	11672.00	700.32
	Sand	cu.m	0.165	3774.88	622.86
Norms - 11(13) page 106	Sub-Total				10869.03
	including@15% overhead		**sq m**		1249.94
flat stone flooring in cement mortar(1:6)		**material vat @ 13 %**			79.68

porcelian Glazed/unglazed Tile in 1:4 C/s Mortar	skilled	m.d.	13.00	975.00	12675.00
all work Complete	unskilled	m.d.	4.50	620.00	2790.00
	cement	m.t.	0.06	11672.00	653.63
	sand	cu.m.	0.15	3774.88	573.78
	white cement	kg	3.23	36.47	117.73
Item No.	Kazzaria, Simany or	sqm	11.00	1221.88	13440.68
11.14	equivalent tile				
	Sub-Total				30250.83
	including@15% overhead		**sq m**		3478.84
porcelian Glazed/unglazed Tile		**material vat @ 13 %**			192.22

clay tile works	skilled	m.d.	0.50	975.00	487.50
(Size in cm=0.19*0.3 for .22*.35)	unkilled	m.d.	1.50	620.00	930.00
Item No.	machine tile	pcs	184.0000	49.21	9054.20
11.15	Sub-Total				10471.70
	including@15% overhead		**sq m**		1204.25
clay tile		**material vat @ 13 %**			117.70

25 mm cement concrete tiles of Grey colour in 1:4 c/s	skilled	m.d.	13.00	975.00	12675.00
	unkilled	m.d.	4.50	620.00	2790.00
	cement	m.t.	0.06	11672.00	700.32
	sand	cu.m.	0.15	3774.88	573.78
	CC tile	sqm	11.00	211.12	2322.32
Item No.					
11.16	Sub-Total				19061.42
	including@15% overhead		**sq m**		2192.06
25 mm cement concrete tiles		**material vat @ 13 %**			46.75

12. PLASTERING WORKS

12.5 mm thick cement sand plastering work on	skilled	m.d.	12.00	975.00	11700.00
walls .	unskilled	m.d.	16.00	620.00	9920.00
a) Cement sand ratio - 1:3	cement	m.t.	0.625	11672.00	7295.00
	sand	cu.m	1.28	3774.88	4831.85
Item No. 12.1	Sub-Total				33746.85
Norms-12(1b) page 110	including@15% overhead		**sq m**		388.09
12.5mm C. P. on walls in c.m. - 1:3		**material vat @ 13 %**			15.76

12.5 mm thick cement sand plastering work on	skilled	m.d.	12.00	975.00	11700.00
walls.	unskilled	m.d.	16.00	620.00	9920.00
a) Cement sand ratio - 1:4	cement	m.t.	0.538	11672.00	6279.54
Item No.	sand	cu.m	1.46	3774.88	5511.32
12.2	Sub-Total				33410.86
Norms-12(1c) page 110	including@15% overhead		**sq m**		384.22
12.5mm th. C.P. on walls in c.m. - 1:4		**material vat @ 13 %**			15.33

12.5 mm thick cement sand plastering work on	skilled	m.d.	12.00	975.00	11700.00
walls.	unskilled	m.d.	16.00	620.00	9920.00
a) Cement sand ratio - 1:6	cement	m.t.	0.382	11672.00	4458.70
Item No.	sand	cu.m	1.57	3774.88	5926.56
12.3	Sub-Total				32005.27
Norms-12(1d) page 110	including@15% overhead		**sq m**		368.06
12.5 mm th.C.P. on walls in c.m. - 1:6		**material vat @ 13 %**			13.50

Analysis of Rates
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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
20mm (3/4") thick cement sand plastering					
works	skilled	m.d.	14.00	975.00	13650.00
a) Cement sand ratio - 1:4	unskilled	m.d.	19.00	620.00	11780.00
Item No.	cement	m.t.	0.810	11672.00	9454.32
12.4	sand	cu.m	2.20	3774.88	8304.74
Norms-12(4-b) page 112	Sub-Total				43189.06
	including@15% overhead		**sq.m.**		496.67
20mm th. C.P. on walls in c.m. - 1:4		**material vat @ 13 %**			23.09

20mm (3/4") thick cement sand plastering	skilled	m.d.	14.00	975.00	13650.00
works	unskilled	m.d.	19.00	620.00	11780.00
a) Cement sand ratio - 1:6	cement	m.t.	0.570	11672.00	6653.04
	sand	cu.m	2.35	3774.88	8870.97
Item No. 12.5	Sub-Total				40954.01
Norms-12(4-c) page 112	including@15% overhead		**sq m**		470.97
20mm th.C.P. on walls in c.m. - 1:6		**material vat @ 13 %**			20.18

12.5 mm thick cement sand plastering work on	skilled	m.d.	15.00	975.00	14625.00
ceiling.	unskilled	m.d.	20.00	620.00	12400.00
a) Cement sand ratio - 1:3	cement	m.t.	0.625	11672.00	7295.00
Item No.	sand	cu.m	1.28	3774.88	4831.85
12.6	Sub-Total				39151.85
Norms-12(1b) page 110	including@15% overhead		**sq m**		450.25
12.5 mm th.C.P. on ceiling in c.m. - 1:3		**material vat @ 13 %**			15.76

12.5 mm thick cement sand plastering work on	skilled	m.d.	15.00	975.00	14625.00
ceiling.	unskilled	m.d.	20.00	620.00	12400.00
a) Cement sand ratio - 1:4	cement	m.t.	0.538	11672.00	6279.54
Item No.	sand	cu.m	1.46	3774.88	5511.32
12.7	Sub-Total				38815.86
Norms-12(1c) page 110	including@15% overhead		**sq m**		446.38
12.5 mm th. on ceiling in c.m. - 1:4		**material vat @ 13 %**			15.33

20 mm thick cement sand plastering work on	skilled	m.d.	17.50	975.00	17062.50
ceiling.	unskilled	m.d.	23.75	620.00	14725.00
a) Cement sand ratio - 1:3	cement	m.t.	0.96	11672.00	11205.12
Item No.	sand	cu.m	1.95	3774.88	7361.02
12.8	Sub-Total				50353.64
Norms-12(4-a) page 112	including@15% overhead		**sq m**		579.07
20 mmth. C.P. on ceiling in c.m. - 1:3		**material vat @ 13 %**			24.14

20 mm thick cement sand plastering work on	skilled	m.d.	17.50	975.00	17062.50
ceiling.	unskilled	m.d.	23.75	620.00	14725.00
a) Cement sand ratio - 1:4	cement	m.t.	0.81	11672.00	9454.32
Item No.	sand	cu.m	2.20	3774.88	8304.74
12.9	Sub-Total				49546.56
Norms-12(4-b) page 112	including@15% overhead		**sq m**		569.79
20 mm C.P. on ceiling in c.m. - 1:4		**material vat @ 13 %**			23.09

13. POINTING WORKS

Flush pointing work on brick masonary walls	skilled	m.d.	10.50	975.00	10237.50
a) Cement sand ratio - 1:2	unskilled	m.d.	12.00	620.00	7440.00
	cement	m.t.	0.21	11672.00	2451.12
Item No.	sand	cu.m	0.29	3774.88	1094.72
13.1	Sub-Total				21223.34
Norms-14(1-b) page 121	including@15% overhead		**sq m**		244.07
Flush pointing work on Brick M. walls		**material vat @ 13 %**			4.61

Analysis of Rates
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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Flush pointing work on stone masonary walls	skilled	m.d.	10.00	975.00	9750.00
a) Cement sand ratio - 1:2	unskilled	m.d.	14.00	620.00	8680.00
Item No.	cement	m.t.	0.408	11672.00	4762.18
13.2	sand	cu.m	0.57	3774.88	2151.68
Norms-14(2-b) page 122	Sub-Total				25343.86
Flush pointing work on stone masonary walls	including@15% overhead		**sq m**		291.45
		material vat @ 13 %			8.99

Ruled pointing work on brick masonary walls	skilled	m.d.	15.75	975.00	15356.25
a) Cement sand ratio - 1:2	unskilled	m.d.	18.00	620.00	11160.00
Item No.	cement	m.t.	0.21	11672.00	2451.12
13.3	sand	cu.m	0.29	3774.88	1094.72
Norms-14(1-b) page 121	Sub-Total				30062.09
	including@15% overhead		**sq m**		345.71
Ruled pointing work on brick masonary walls		**material vat @ 13 %**			4.61

Ruled pointing work on stone masonary walls	skilled	m.d.	15.00	975.00	14625.00
a) Cement sand ratio - 1:2	unskilled	m.d.	21.00	620.00	13020.00
Item No.	cement	m.t.	0.408	11672.00	4762.18
13.4	sand	cu.m	0.57	3774.88	2151.68
Norms-14(2-b) page 122	Sub-Total				34558.86
	including@15% overhead		**sq m**		397.43
Ruled pointing work on stone masonary walls		**material vat @ 13 %**			8.99

3 mm thick flushing plaster of cement sand	skilled	m.d.	10.00	975.00	9750.00
a) Cement sand ratio - 1:1	unskilled	m.d.	10.00	620.00	6200.00
	cement	m.t.	0.336	11672.00	3921.79
Item No.	sand	cu.m	0.23	3774.88	868.22
13.5	Sub-Total				20740.01
Norms-14(6) page 123	including@15% overhead		**sq m**		238.51
3 mm thick flushing plaster of cement sand		**material vat @ 13 %**			6.23

3 mm thick flushing plaster of cement	skilled	m.d.	10.00	975.00	9750.00
Item No.	unskilled	m.d.	10.00	620.00	6200.00
13.6	cement	m.t.	0.518	11672.00	6046.10
Norms-14(8) page 124	Sub-Total				21996.10
	including@15% overhead		**sq m**		252.96
3 mm thick flushing plaster of cement		**material vat @ 13 %**			7.86

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
14. PAINTING WORKS					
Water proof Cement Paint (White Cement) painting	skilled	m.d.	1.70	975.00	1657.50
application a) in 1 coats	unkilled	m.d.	1.70	620.00	1054.00
Item No.	White cement	kg	30.00	36.67	1100.16
14.1	Sub-Total				3811.66
Norms-13(4-a) page 116	including@15% overhead		**sq m**		43.83
1 coat White cement painting works		**material vat @ 13 %**			1.43
cement paint (Snowcem)	skilled	m.d.	3.50	975.00	3412.50
application	unkilled	m.d.	3.50	620.00	2170.00
a) in 1 coats	Snowcem	kg	30.00	71.47	2144.16
Item No. 14.2	Sub-Total				7726.66
Norms-13(12-a) page 120	including@15% overhead		**sq m**		88.86
1 coat Snowcem painting		**material vat @ 13 %**			2.79
cement paint (Snowcem)	skilled	m.d.	6.50	975.00	6337.50
application	unkilled	m.d.	6.50	620.00	4030.00
a) in 2 coats	Snowcem	kg	50.00	71.47	3573.60
Item No. 14.3	Sub-Total				13941.10
Norms-13(12-b) page 120	including@15% overhead		**sq m**		160.32
2 coats Snowcem painting		**material vat @ 13 %**			4.65
Readymade enamel paint application	skilled	m.d.	8.00	975.00	7800.00
in addition to one base or lining coat	unkilled	m.d.	5.00	620.00	3100.00
(primer)	primer	litre	8.10	366.47	2968.42
a) in 1 coats	enamel syn.	litre	9.00	526.47	4738.25
Item No. 14.5	Sub-Total				18606.67
Norms-13(5 -a&b) page 117	including@15% overhead		**sq m**		213.98
1 coats enamel painting with primer		**material vat @ 13 %**			10.02
Readymade enamel paint application	skilled	m.d.	12.00	975.00	11700.00
in addition to one base or lining coat	unkilled	m.d.	8.00	620.00	4960.00
(primer)	primer	litre	8.10	366.47	2968.42
a) in 2 coats	enamel syn.	litre	16.00	526.47	8423.55
Item No. 14.6	Sub-Total				28051.98
Norms-13(5a,b&c) page 117	including@15% overhead		**sq m**		322.60
2 coats enamel painting with primer		**material vat @ 13 %**			14.81
Readymade enamel paint application	skilled	m.d.	5.00	975.00	4875.00
work one coat (excluding primer)	unkilled	m.d.	2.00	620.00	1240.00
	enamel	litre	9.00	526.47	4738.25
Item No.14.7	Sub-Total				10853.25
Norms-13(5 - b) page 117	including@15% overhead		**sq m**		124.81
1 coat enamel painting excluding primer		**material vat @ 13 %**			6.16
Readymade enamel paint application without	skilled	m.d.	9.00	975.00	8775.00
priming coat.	unkilled	m.d.	5.00	620.00	3100.00
a) in 2 coats	primer	litre	0.00	366.47	0.00
Item No.	enamel syn.	litre	16.00	526.47	8423.55
14.8	Sub-Total				20298.55
Norms-13(5-b&c) page 117	including@15% overhead		**sq m**		233.43
2 coats enamel painting excluding primer		**material vat @ 13 %**			10.95
Readymade aluminium paint application with	skilled	m.d.	10.75	975.00	10481.25
primer.	unkilled	m.d.	10.75	620.00	6665.00
a) in 2 coats	primer	litre	8.10	366.47	2968.42
Item No.	alumin.pnt	litre	10.76	661.47	7117.44
14.9	sand paper	nos.	4.00	31.00	124.00
Norms-13(6) page 117	Sub-Total				27356.11
2 coats aluminium painting with primer	including@15% overhead		**sq m**		314.60
		material vat @ 13 %			13.27

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Readymade bitumen paint application work	skilled	m.d.	4.00	975.00	3900.00
a) in 2 coats	unkilled	m.d.	3.00	620.00	1860.00
Item No.	bitumen paint	litre	19.00	74.47	1414.97
14.10	Sub-Total				7174.97
Norms-13(10-a&b) page 119	including@15% overhead		**sq m**		82.51
2 coats bitumen painting		**material vat @ 13 %**			1.84
Readymade distemper application in addition	skilled	m.d.	4.00	975.00	3900.00
to one base or lining coat (primer)	unkilled	m.d.	4.00	620.00	2480.00
a) in 1 coats	Cement Primer	litre/Kg	8.00	366.47	2931.78
Item No.	distemper	kg	6.50	156.47	1017.07
14.11	Sub-Total				10328.84
Norms-13(3-a,b page 115	including@15% overhead		**sq m**		118.78
1 coat Distemper painting work With Primer		**material vat @ 13 %**			5.13

Analysis of Rates
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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Readymade distemper application in addition	skilled	m.d.	5.80	975.00	5655.00
to one base or lining coat (primer)	unkilled	m.d.	5.80	620.00	3596.00
a) in 2 coats	Cement Primer	litre/Kg	8.00	366.47	2931.78
Item No.	distemper	kg	11.50	156.47	1799.43
14.12	Sub-Total				13982.20
Norms-13(3-a,b&c) page 115	including@15% overhead		**sq m**		160.80
2 coat Distemper painting work With Primer		**material vat @ 13 %**			6.15

Readymade weather coat paint application	skilled	m.d.	4.00	975.00	3900.00
in addition to one base or lining coat	unkilled	m.d.	4.00	620.00	2480.00
(primer)	Cement Primer	kg	8.00	366.47	2931.78
a) in 1 coats	Weather Coat	litre	9.00	926.47	8338.25
Item No. 114.13	Sub-Total				17650.02
Norms-13(5 -a&b) page 117	including@15% overhead		sq m		202.98
1 Coat Exterior Weather Coat painting with primer		**material vat @ 13 %**			14.65

Readymade weather coat paint application	skilled	m.d.	5.80	975.00	5655.00
in addition to one base or lining coat	unkilled	m.d.	5.80	620.00	3596.00
(primer)	Cement Primer	kg	8.00	366.47	2931.78
a) in 2 coats	Weather Coat	litre	16.00	926.47	14823.55
Item No. 14.14	Sub-Total				27006.33
Norms-13(5a,b&c) page 117	including@15% overhead		sq m		310.57
2Coat Exterior Weather Coat painting with primer		**material vat @ 13 %**			23.08
Readymade interiorr Emuulsion paint application	skilled	m.d.	8.00	975.00	7800.00
in addition to one base or lining coat	unkilled	m.d.	5.00	620.00	3100.00
(primer)	Cement Primer	kg	8.10	366.47	2968.42
a) in 1 coats	plastic emulsion	litre	9.00	526.47	4738.25
Item No. 14.15	Sub-Total				18606.67
Norms-13(5 -a&b) page 117	including@15% overhead		sq m		213.98
1 Coat interior plastic emulsion painting with primer		**material vat @ 13 %**			10.02

Readymade interior Emuulsion paint application	skilled	m.d.	12.00	975.00	11700.00
in addition to one base or lining coat	unkilled	m.d.	8.00	620.00	4960.00
(primer)	Cement Primer	kg	8.10	366.47	2968.42
a) in 2 coats	plastic emulsion	litre	16.00	526.47	8423.55
Item No. 14.16	Sub-Total				28051.98
Norms-13(5a,b&c) page 117	including@15% overhead		sq m		322.60
2Coat interior plastic emulsion painting with primer		**material vat @ 13 %**			14.81

2mm Wall or ceiling puttty	skilled	m.d.	1.00	975.00	975.00
	unkilled	m.d.	1.00	620.00	620.00
Item No. 14.17	white putty	kg	10.64	65.00	691.60
	Sub-Total				2286.60
	including@15% overhead		sq m		262.96
2mm Wall or ceiling puttty		**material vat @ 13 %**			8.99

15. Water Proofing works

38 mm thick Damp Proof Course of	skilled	m.d.	1.00	975.00	975.00
cement concrete of the ratio 1:2:4	unskilled	m.d.	2.00	620.00	1240.00
Note :-	cement	m.t.	0.12	11672.00	1400.64
Item No	sand	cum	0.17	3774.88	641.73
Item No. 15.1	aggregates12mm	cum	0.34	3938.50	1339.09
	w p c	kg	2.88	46.67	134.42
	Sub- Total				5730.87
Norms-18(9) page 188	including@15% overhead		**sq m**		659.05
38 mm th. D.P.C. IN (1:2:4) with w.p.c.		**material vat @ 13 %**			45.71

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
25 mm thick Damp Proof Course of	skilled	m.d.	1.00	975.00	975.00
cement concrete of the ratio 1:1.5:3	unskilled	m.d.	1.25	620.00	775.00
Note :-	cement	m.t.	0.1125	11672.00	1313.10
Sieved gravel from river	sand	cu.m.	0.113	3774.88	426.56
Item No 15.2	12 mm aggreg	cum	0.250	3938.50	984.63
	w p c	kg	2.25	46.67	105.01
Norms-18(8) page 188	Sub-Total				4579.30
25 mm th. D.P.C. IN (1:1.5:3) with w.p.c.	including@15% overhead		**sq m**		526.62
25 mm th. D.P.C. IN (1:1.5:3) with0ut w.p.c.		**material vat @ 13 %**			36.78

38 mm thick Damp Proof Course of	skilled	m.d.	1.00	975.00	975.00
cement concrete of the ratio 1:2:4	unskilled	m.d.	2.00	620.00	1240.00
Note :-	cement	m.t.	0.12	11672.00	1400.64
Item No 15.3	sand	cum	0.17	3774.88	641.73
	aggregates12mm	cum	0.34	3938.50	1339.09
Norms-18(9) page 188	recron	kg	2.88		0.00
	Sub- Total				5596.46
			sq m		643.59
38 mm th. D.P.C. IN (1:2:4)		**material vat @ 13 %**			43.96

16. DISMANTLING & REPAIRING WORKS

Dismantalling of mud masonry wall &removing	skilled	m.d.	0.00	975.00	0.00
upto 10 m lead	Unskilled	m.d.	1.06	620.00	657.20
Item No. 16.1	Sub-Total				657.20
Norms 19-1	including@15% overhead		**cum**		755.78
Dismantaling mud masonry wall		**material vat @ 13 %**			0.00

Dismantalling of cement masonry wall &removing	skilled	m.d.	0.00	975.00	0.00
upto 10 m lead	Unskilled	m.d.	2.12	620.00	1314.40
Item No. 16.2	Sub-Total				1314.40
Norms 19-2 ,page no 191	including@15% overhead		**cum**		1511.56
Dismantaling cement masonry wall		**material vat @ 13 %**			0.00

Dismantalling of R.C.C./R.B.Cl & removing them	skilled	m.d.	0.00	975.00	0.00
upto 10 m lead	Unskilled	m.d.	11.00	620.00	6820.00
Item No. 16.3	Sub-Total				6820.00
Norms 19-3 page no 191	including@15% overhead		**cum**		7843.00
Dismantalling of R.C.C./R.B.Cl wall		**material vat @ 13 %**			0.00

Dismantaling of P.C.C./L.C.C. & removing them	skilled	m.d.	0.00	975.00	0.00
upto 10 m lead	Unskilled	m.d.	4.00	620.00	2480.00
Item No. 16.4	Sub-Total				2480.00
Norms 19-4 ,page no 191			**cum**		2852.00
Dismantaling of P.C.C./L.C.C.		**material vat @ 13 %**			0.00

Dismantaling of Cement/Lime.plastering & remo-	skilled	m.d.	0.00	975.00	0.00
ving them upto 10m lead	Unskilled	m.d.	0.108	620.00	66.96
Item No. 16.5	Sub-Total				66.96
page no 191	including@15% overhead		**sq m**		77.00
Dismantaling of cement /lime plastering		**material vat @ 13 %**			0.00

Dismantaling of tile roofing & removing the mate-	skilled	m.d.	0.054	975.00	52.65
rials including stacking upto 10 m lead	Unskilled	m.d.	0.081	620.00	50.22
Item No. 16.6	Sub-Total				102.87
Norms 19-6 ,page no 191	including@15% overhead		**sq m**		118.30
Dismantaling of tile roofing		**material vat @ 13 %**			0.00

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
17.IRON WORKS					
G.I barbed wire (12 Gauge) fencing with supply of	Skilled	m.d	1.076	975.00	1049.10
materials and fitting all complete	unkilled	m.d.	5.38	620.00	3335.60
1kg=8m.	barb.wire	Rm	110.00	34.30	3772.89
Item No. 17.1	killa	L.S.			60.00
Norms-24(6) page 240	Sub-Total				8217.59
	including@15% overhead		**Rm**		94.50
Barbed wire fencing		**material vat @ 13 %**			4.98
Fixing of 5 line hor.&2 lines diag.barbed wire	Skilled	m.d	1.00	975.00	975.00
with Concret poles@3m distance	unkilled	m.d.	2.00	620.00	1240.00
Concret poles of size(100x100x2.1)m	Concret pole 7 ' long	No	11.00	158.47	1743.19
Item No. 17.2	barb.wire	Rm	250.00	34.30	8574.75
	U-Hook or GI Wire	L.S.	77.00	2.50	192.50
Norms-24(7) page 240	Sub-Total				12725.44
per m. labour rate only	including@15% overhead		**Rm**		487.81
Barbed wire fencing with Concret poles		**material vat @ 13 %**			37.99
18. River Training and Gabion Work					
3 x 1.5 x 0.75 m box of (100mm *100mm) square	skilled	m.d.	0.70	975.00	682.50
mesh size.Supplying, weaving, work complete	Unskilled	m.d.	0.440	620.00	272.80
Mesh wire10SWG; Selwage wire 8 SWG	Unskilled	m.d.	0.600	620.00	372.00
Item No. 18.1	C.coated10	kg	33.30	116.67	3885.18
16-8kh&9ka	including@15% overhead				5994.35
3 *1.5 *.75 m box of (100 *100)mm square		**material vat @ 13 %**			505.07
3 *1.5 *0.75 m box of (150mm *150mm) square					
mesh size.Supplying, weaving, work complete	skilled	m.d.	0.50	975.00	487.50
Mesh wire10SWG; Selwage wire 8 SWG	Unskilled	m.d.	0.20	620.00	124.00
Item No. 18.2	Unskilled	m.d.	0.60	620.00	372.00
16-8kh&9kha	C.coated 10	kg	20.00	116.67	2333.44
page	including@15% overhead				3814.48
3 *1.5 *0.75 m box of (150 *150)mm square		**material vat @ 13 %**			303.35

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Detail of item	Description	Unit	Quantity	Unit Rate	Amount
2*1 *1 m box of (100mm *120mm)haxagonal	skilled	m.d.	0.45	975.00	438.75
mesh size.Supplying, weaving, Laying and binding work comp	Unskilled	m.d.	0.20	620.00	124.00
Mesh wire10SWG; Selwage wire 8 SWG,binding wire 12SWG	Unskilled	m.d.	0.40	620.00	248.00
Item No. 18.3	C.coated 10	kg	24.15	116.67	2817.63
16-5ka&7 ka	C.coated 8	kg	2.65	116.67	309.18
page	C.coated 12	kg	0.95	116.67	110.84
	including@15% overhead				4655.66
2 *1 *1 m box of (100 *120)mm hexagonal		**material vat @ 13 %**			420.89

3*1 *1 m box of (100mm *120mm)haxagonal	skilled	m.d.	0.63	975.00	614.25
mesh size.Supplying, weaving, Laying and binding work comp	Unskilled	m.d.	0.28	620.00	173.60
Mesh wire10SWG; Selwage wire 8 SWG,binding wire 12SWG	Unskilled	m.d.	0.60	620.00	372.00
Item No. 18.4	C.coated 10	kg	35.10	116.67	4095.19
16-5kha&-7 kha	C.coated 8	kg	3.40	116.67	396.68
page	C.coated 12	kg	1.30	116.67	151.67
	including@15% overhead				6673.90
3 *1 *1 m box of (100 *120)mm hexagonal		**material vat @ 13 %**			603.66

Launching Apron work

2 *1 *.50m box of (100mm *120mm)hexagonal	skilled	m.d.	0.32	975.00	312.00
mesh size.Supplying, weaving, Laying and binding work comp	Unskilled	m.d.	0.14	620.00	86.80
Mesh wire10SWG; Selwage wire 8 SWG,binding wire 12SWG	Unskilled	m.d.	0.20	620.00	124.00
medium coated	G.I.wire10swg	kg	16.45	116.67	1919.25
Item No. 18.5	selwage wire8swg	kg	2.10	116.67	245.01
16-5 ga&7-ga	C.coated 12	kg	0.70	116.67	81.67
	including@15% overhead				3184.05
2 *1 *.5m box of (100 *120)mm hexagonal		**material vat @ 13 %**			291.97

3 *1 *.50m box of (100mm *120mm)hexagonal	skilled	m.d.	0.45	975.00	438.75
mesh size.Supplying, weaving, Laying and binding work comp	Unskilled	m.d.	0.20	620.00	124.00
Mesh wire10SWG; Selwage wire 8 SWG,binding wire 12SWG	Unskilled	m.d.	0.30	620.00	186.00
medium coated	G.I.wire10swg	kg	24.15	116.67	2817.63
Item No. 18.6	selwage wire8swg	kg	2.75	116.67	320.85
16-5 gha&7-gha	C.coated 12	kg	0.95	116.67	110.84
	including@15% overhead				4597.77
3 *1 *.5 box of (100mm *120mm) hexagonal		**material vat @ 13 %**			422.41

Boulder filling in crates upto 30mlead	skilled	m.d.	0.00	975.00	0.00
Item No. 18.7	Unskilled	m.d.	0.50	620.00	310.00
	Boulder	Cu.m	1.10	2510.00	2761.00
page	Sub-Total				3071.00
	including@15% overhead		**Cum**		3531.65
Boulder filling upto 30 m lead		**material vat @ 13 %**			358.93

Boulder filling (for launching)150m. Haulage	skilled	m.d.	0.26	975.00	253.50
Item No. 18.8	Unskilled	m.d.	3.50	620.00	2170.00
	Boulder	Cu.m	1.10	2510.00	2761.00
page	Sub-Total				5184.50
	including@15% overhead		**Cum**		5962.18
Boulder filling upto 150m lead		**material vat @ 13 %**			358.93

19 Railing work

Analysis of Rates
FY:2080/81

Detail of item	Description	Unit	Quantity	Unit Rate	Amount
Providing and fixing stainless steel railing of 38 mm dia vertical post and hand rail, 25mm dia three layer horizontal pipe with painting on both side all complete as per specification, drawing and instruction of Site Engineer.	skilled	m.d.	7.78	975.00	7585.50
	unskilled	m.d.	11.35	620.00	7037.00
Note :-	38mm steel pipe	m	15.49	601.76	9321.24
Item No 19.1	25mm steel pipe	m	20.00	404.76	8095.18
	Welding+painting	LS	1.00	500.00	500.00
	Sub- Total				32538.92
	including@15% overhead		**sq m**		4089.59
Railing work		**material vat @ 13 %**			254.55

20 Truss work

Providing, fabricating and erecting at site steel members with mild steel section of minimum yield strength of 18.94kg/sq.m. for truss, including application of primer paint, all complete, as per specification, drawing and instruction of Site Engineer.	skilled	m.d.	0.69	975.00	669.83
	unskilled	m.d.	0.78	620.00	484.22
Note :-	MS black pipe fabricating and erecting	KG	18.94	115.67	2190.83
Item No 20.1					
	primer	LS			110.00
	Sub- Total				3973.10
	including@15% overhead		**Kg**		209.77
Truss work		**material vat @ 13 %**			15.79

Analysis of Rates
FY:2080/81

Detail of item	Description	Unit	Quantity	Unit Rate	Amount
21 Greenary work					
laying Dubo grass with watering with Chemical Fertilizer	unskilled	no	5.04	620.00	3124.80
Material rate					
Note :- for material , rate from kathmandu is taken	Dubo Grass	sqm	100.00	355.08	35508.00
with 5% transpotation charge					
Item No 21.1	Fertilizer	Kg	7.00	28.00	196.00
	5% Transportation for material				1785.20
	Sub- Total				40614.00
	including@15% overhead		**sq m**		467.06
Greenary Work		**material vat @ 13 %**			48.74
22 Aluminium Doors					
Single/Double panel swing door of section 101*45*1.5 with 5mm glass	Kathmandu Rate				7789.08
	5% Transportation				389.45
	Sub- Total				8178.54
			sq m		8178.54
Aluminium Doors work		**material vat @ 13 %**			0.51
23 Aluminium Window					
Sliding cum fix window of section 101*45*1.5 with 5mm glass with net shutter	Kathmandu Rate				9913.87
	5% Transportation				495.69
	Sub- Total				10409.56
			sq m		10409.56
Aluminium Window work		**material vat @ 13 %**			0.64

Name Project : Masterplan, Tapta Kunda
Location : Dang District, Nepal.
Client : WECS

SUMMARY OF COST ESTIMATE

S. No.	Particulars	Amount (NRs.)	Remarks
A	**Civil & Architectural Works - Building**		
1	Civil works	33,198,087.00	
	Total of Civil & Architectural Works - Building	**33,198,087.00**	
B	**Electrical and Allied Installations**		
1	Electrical works	2,709,000.00	
	Total of Electrical and Allied Installations	**65,188.71**	
C	**Sanitary ,Plumbing & Water Supply Works**		
1	All sanitary, plumbing and water supply	1,220,000.00	
	Total of Sanitary ,Plumbing & Water Supply Works	**1,220,000.00**	
	Total Cost of Building (A+B+C):	**34,483,275.71**	
	Physical Contingency @ 10% of Sub-Total (D):	**3,448,327.57**	
	Price Contingency @ 10% of Sub-Total (D):	**3,448,327.57**	
	Subtotal	**41,379,930.85**	
	VAT @ 13% of Sub-Total (E):	**5,379,391.01**	
	Total Cost With VAT and Contingency (A+B+C+D+E) :	**46,759,321.86**	

Name Project : Masterplan, Tapta Kunda
Location : Dang District, Nepal.
Client : WECS

Detail Quantity Calculation Sheet

S.N.	DESCRIPTION	NO.	LENGTH	BREADTH	HEIGHT	TOTAL	UNIT
1	**Site clearance**						
1.1	**Site clearance**						
	Toilet and Changing Block	1	17.00	14.00		238.00	
	Cafeteria	1	17.00	12.00		204.00	
	Help Post	1	13.00	11.00		143.00	
	Toilet Block	1	16.00	9.00		144.00	
	Pavements	1	Area=	1025.00		1,025.00	
		Total of Site clearance				**1,754.00**	**sq.m**
2	**EARTH WORKS**						
2.1	**Earth Work Excavation**						
	Earth Work Excavation Soft soil						
	Toilet and Changing Block						
	Column foundations	9	2.00	2.00	1.80	64.80	
	Tie beam	3	11.00	0.50	1.00	16.50	
		3	8.40	0.50	1.00	12.60	
	Cafeteria						
	Column foundations	12	2.00	2.00	1.80	86.40	
	Tie beam	3	11.25	0.50	1.00	16.88	
		4	7.00	0.50	1.00	14.00	
	Help Post						
	Column foundations	6	2.00	2.00	1.80	43.20	
	Tie beam	2	7.40	0.50	1.00	7.40	
		3	5.50	0.50	1.00	8.25	
	Toilet Block						
	Column foundations	8	2.00	2.00	1.80	57.60	
	Tie beam	2	10.40	0.50	1.00	10.40	
		5	3.30	0.50	1.00	8.25	
	Pond	1	12.60	12.90	4.00	650.16	
		Total of Earth Work Excavation				**996.44**	**cu.m**
2.2	**Earth Back Filling**						
	Foundation	1				498.22	
	For raising the ground level	1	Area=	729.00	1.00	730.00	
	Pavemets	1	Area=	1025.00	0.60	1,025.60	
		Total of Cafeteria				**2,253.82**	

S.N.	DESCRIPTION	NO.	LENGTH	BREADTH	HEIGHT	TOTAL	UNIT
3	**Stone works**						
3.1	**Stone soling**						
	Toilet and Changing Block						
	Column foundations	9	1.50	1.50	0.20	4.05	
	Tie beam	3	11.00	0.50	0.20	3.30	
		3	8.40	0.50	0.20	2.52	
	Cafeteria						
	Column foundations	12	1.50	1.50	0.20	5.40	
	Tie beam	3	11.25	0.50	0.20	3.38	
		4	7.00	0.50	0.20	2.80	
	Help Post						
	Column foundations	6	1.50	1.50	0.20	2.70	
	Tie beam	2	7.40	0.50	0.20	1.48	
		3	5.50	0.50	0.20	1.65	
	Toilet Block						
	Column foundations	8	1.50	1.50	0.20	3.60	
	Tie beam	2	10.40	0.50	0.20	2.08	
		5	3.30	0.50	0.20	1.65	
	For flooring for all blocks		Area=	266.26	0.20	53.25	
	Pond	1	12.60	12.40	0.20	31.25	
					Total	**119.11**	
4	**Concrete works**						
4.1	**75 mm thk. PCC work (M10)**				**Total**	**44.66**	
	RCC work						
	Toilet and Changing Block						
	Column footings	9	1.50	1.50	0.35	7.09	
	columns	9	0.30	0.30	4.50	3.65	
	Tie beam	9	11.00	0.25	0.35	8.66	
		9	8.40	0.25	0.35	6.62	
	Cafeteria						
	Column footings	12	1.50	1.50	0.35	9.45	
	columns	12	0.30	0.30	4.50	4.86	
	Tie beam	9	11.25	0.25	0.35	8.86	
		12	7.00	0.25	0.35	7.35	
	Help Post						
	Column footings	6	1.50	1.50	0.20	2.70	
	columns	6	0.30	0.30	4.50	2.43	
	Tie beam	6	7.40	0.25	0.35	3.89	
		9	5.50	0.25	0.35	4.33	
	Toilet Block						
	Column footings	8	1.50	1.50	0.20	3.60	
	columns	8	0.30	0.30	4.50	3.24	
	Tie beam	6	10.40	0.25	0.35	5.46	
		15	3.30	0.25	0.35	4.33	Beams vol.
							49.494
	Sill and lintel bands					14.14	
	Pond	1	12.60	12.40	0.25	39.06	
	wall	1	58.00	4.00	0.35	81.20	
					Total concrete	**220.91**	

S.N.	DESCRIPTION	NO.	LENGTH	BREADTH	HEIGHT	TOTAL	UNIT
4.2	Reinforcement					34.68	
4.3	Formwork						
	cols	35	1.20		4.50	189.00	
	beams	1	565.65		0.70	395.96	
	pond	1	58.00	4.00		464.00	
					Total formwork	**1,153.85**	
5	**BRICK WORKS**						
5.1	**Full Brick (250 mm) Works (1:4c/s) With One Side Fair Face**						
	Toilet and Changing Block						
	Walls	3	11.00	0.25	3.50	28.88	
		3	8.40	0.25	3.50	22.05	
	Cafeteria						
	Walls	3	11.25	0.25	3.50	29.53	
		4	7.00	0.25	3.50	24.50	
	Help Post						
	walls	2	7.40	0.25	3.50	12.95	
		3	5.50	0.25	3.50	14.44	
	Toilet Block						
	walls	2	10.40	0.25	3.50	18.20	
		5	3.30	0.25	3.50	14.44	
					Total of 250 thk BK wall	**164.98**	**cu.m**
5.2	**Half Brick (125 mm) Works (1:4c/s)**						
	Toilet and Changing Block						
		2	5.30		2.10	22.26	
		8	1.50		2.10	25.20	
		1	5.30		3.00	15.90	
		2	2.00		3.00	12.00	
	Cafeteria						
		1	2.40		2.10	5.04	
		2	1.50		2.10	6.30	
		1	1.00		2.10	2.10	
	Help Post						
		1	1.30		3.00	3.90	
		1	1.80		3.00	5.40	
	Toilet Block						
		2	5.00		2.10	21.00	
		1	3.10		2.10	6.51	
		7	1.50		2.10	22.05	
					Total of 125 thk BK wall	**147.66**	**sq.m**

S.N.	DESCRIPTION	NO.	LENGTH	BREADTH	HEIGHT	TOTAL	UNIT
6	**Flooring and Finishing**						
6.1	Plastering	2	188.55		3.5	1,319.85	
		2	52.6		2.1	220.92	
		2	12.4		3	74.40	
					Total of 12.5 thk Plaster	**1,615.17**	**sq.m**
6.2	**Painting**					**1,615.17**	
6.3	**Floor tiling**						
	Toilet and Changing Block	1			98.3	98.30	
	Cafeteria	1			84.3	84.30	
	Help Post	1			44.9	44.90	
	Toilet Block	1			38.7	38.70	
	pond	1	12.6	12.4		156.24	
	pond wall	1	58.00	4		232.00	
					Total area of floor tiles	**654.44**	**sq.m**
7	**Roofing**						
7.1	**Color CGI Roofing**						
	Toilet and Changing Block	1	10.6	13.1		138.86	
	Cafeteria	1	9	13.1		117.90	
	Help Post	1	7.5	9		67.50	
	Toilet Block	1	5.2	11.9		61.88	
						386.14	
7.2	**False Ceiling**					**654.44**	
7.3	**Metal works for Roofing**					**5.79**	
8	**Openings**						
8.1	**Windows/ Ventilations**						
	Toilet and Changing Block						
	V1	2		5.2	0.425	4.42	
	V2	2		3.04	0.425	2.58	
	V3	2		1.91	0.425	1.62	
	Cafeteria						
	W1	4		1.5	1.35	8.10	
	W2	2		1.5	1.2	3.60	
	V1	2		3.45	0.425	2.93	
	Help Post						
	V1	1		0.65	0.425	0.28	
	W1	4		1.5	1.35	8.10	
	Toilet Block						
	V1	2		3.02	0.425	2.57	
	V2	2		1.86	0.425	1.58	
						35.78	

S.N.	DESCRIPTION	NO.	LENGTH	BREADTH	HEIGHT	TOTAL	UNIT
8.2	**Doors**						
	Toilet and Changing Block						
	D1	2		1	2.1	4.20	
	D2	2		0.9	2.1	3.78	
	D3	10		0.75	2.1	15.75	
	Cafeteria						
	D1	2		1.2	2.1	5.04	
	D2	3		0.9	2.1	5.67	
	D3	6		0.75	2.1	9.45	
	Help Post						
	D1	1		0.9	2.1	1.89	
	D2	1		0.75	2.1	1.58	
	Toilet Block						
	D1	2		0.9	2.1	3.78	
	D2	8		0.75	2.1	12.60	
						63.74	
9	Gabion works						
	Gabion wall	1	55	Area=	7	385.00	
						385.00	

Name Project : Masterplan, Tapta Kunda
Location : Dang District, Nepal.
Client : WECS

Abstract of Cost - Civil Works

Item No.	Description of Works	Unit	Quantity	Rate (NRs.)	Amount (NRs.)
1	**EARTH WORKS**				
1.1	**SITE CLEARANCE & MOBILIZATION :**				
	Clearing and grubbing the site for construction by removing 150mm thick top soil including bushes, small trees, leveling of undulated ground, shorting and stacking/storing selected top soil for reuse in landscaping works, disposing unsuitable materials from site, etc., all complete as per drawings, specifications and instructions of the Engineer.	sq.m	1,754.00	29.38	51,524.80
1.2	**EARTHWORK IN EXCAVATION :**				
	Excavation in foundations in all type of soils for foundation, trenches, footing, pits etc. to the required depth including dewatering by manual or mechanical means etc. as per specifications with all contractor's own machinery and equipment's, providing crossing of track, shoring, strutting, timbering and buttressing with appropriate materials and all such measures necessary to retain in position the sides of the foundation pit and including refilling the excavated material with watering, ramming, leveling the site and disposing off the surplus/unusable earth to outside the construction premises, etc. all complete as per drawings, specifications and instructions of the	cu.m	996.44	514.07	512,240.33
1.3	**EARTH BACK FILLING :**				
	Back filling in foundation and sides of foundation with approved soil obtained from the excavation at site and stacked at site or brought from outside in layer not exceeding 15 cm thick (compacted thickness) including transportation of soil, spreading in required line and level, sprinkling water, ramming, compacting with mechanical rammers, testing, etc., all complete as per drawing, specification and instructions of the Engineer.	cu.m	2,253.82	356.50	803,485.94
1.4	**BOULDER SOLING**				
	Providing and laying uncoursed hand packed Dry Rubble Stone soling in foundation, under floor plinth with out any special dressing of stone including filling interstices with suitable quarry waste or stone chips or quarry sand, watering, compacting using appropriate mechanical compaction means with all contractors materials, handling, placing etc. all complete as per drawings, specifications and instruction of the Engineer. The complete item including all lead & lift.	cu.m	119.11	9,874.09	1,176,053.43

2	**CONCRETE WORKS**				
2.1	**P.C.C**				
2.1.1	**P.C.C (1:3:6) Works**				
	Providing and laying machine mixed Plain Cement Concrete of nominal mix 1:3:6 (1 cement : 3 sand : 6 coarse aggregate) for leveling course in foundations and under floor of building, etc. in all level with broken stone aggregate of size not more than 25 mm of approved quality including formwork wherever necessary, dewatering, batching, mixing, transporting, placing, compacting, curing, including all lead and lift, etc. all complete as per drawings, specifications and the instructions of the Engineer.	cu.m	44.66	13,503.64	603,131.79
2.2	**P.C.C. FOR R.C.C. WORKS**				
	Providing and laying in position machine mixed and machine vibrated cement concrete of mix 1:1.5:3 (1 cement:1.5 sand: 3 coarse aggregate) M20 grade for reinforced cement concrete work using approved cement with 20 mm graded machine crushed stone aggregate of approved quality in various locations and heights including transportation of concrete to site of placing, compaction, finished to required line and level, protection and curing, etc. all complete as per drawings, specifications and the instructions of the Engineer, but excluding the cost of centering, shuttering, and reinforcement, all complete as per drawings, specifications and instructions of the Engineer.	cu.m	220.91	17,917.27	3,958,070.32
2.3	**STEEL REINFORCEMENT**				
	Providing and fixing in position Fe 500 steel reinforcement of various diameter confirming to relevant IS code in R.C.C. works including straightening, cutting, bending, binding with 20 SWG annealed wire for tying the reinforcement bars at each junctions (binding wire shall not be measured separately) including all waste and cut pieces, provision for adequate numbers of spacers, chairs, providing and placing cement mortar (1:1) cover blocks to keep the bars in intended position at all levels all complete as per drawings, specifications and instructions of the Engineer. (Authorized lap length and for the bar length exceeding 10 meter in length shall be measured for the payment, except to column).	Mt.	34.68	135,123.41	4,686,427.99
2.4	**FORM WORKS**				
	Supplying and laying centering, shuttering of various pattern formworks with 19/12 mm thick water proof ply wood & steel adjustable props for all kinds of RCC works for foundations, columns, shear walls, beams, slab, staircase, lintel, sill, pergola, including nails, propping scaffolding, staging, supporting and bracing in proper lines and level, sealing the joints with heavy duty brown self adhesive tape, aligning to line and levels including Ties, PVC Spacer, Providing openings/ cutouts/ pockets, applying De-shuttering chemical, De-shuttering as approved by the Engineer etc., complete at all levels as per drawing, specifications and instructions of the Engineer.	sq.m	1,153.85	849.61	980,319.63

3	**BRICK/ STONE MASONRY WORKS**				
3.1	**BRICK MASONRY WORKS (1 : 4 c/s) ONE SIDE FAIRFACE**				
	Providing and laying first class selected factory pressed wire cut Fair Face brick (machine made brick) one or more brick thick wall in cement mortar 1:4 (1 cement : 4coarse sand) in ,superstructure and other specified places in all heights and level including the cost of single or multi stage self standing scaffolding, soaking bricks, curing, raking joints, provision for recesses, openings, toothing etc., all complete as per drawing, specifications and instructions of the Engineer.	cu.m	164.98	17,635.46	2,909,520.95
3.2	**HALF BRICK WORKS (1 : 4 c/s)**				
	Providing and laying non-fairfaced half brick work masonry in cement mortar 1:4 (1 cement:4 sand) in superstructure with approved first class fired bricks in perfect line & level, required size and shape at any height and level, including the cost of single or multi stage scaffolding, cleaning, soaking of the bricks, packing of the joints, raking joints, provision for recesses, openings, curing, providing 25x3mm GI Straps Fixed to columns at every 5th course of brick and 60mm width 14 gauge welded GI mesh anchored to GI strap, all complete as per design, drawing, specifications instructions of the Engineer.	cu.m	147.66	17,635.46	2,604,052.67
4	**Roofing**				
4.1	W1	sq m	386.14	1,272.85	491,496.74
	D1	sq m	654.44	1,630.00	1,066,737.20
4.1.1	D2	kg	5,792.10	209.77	1,215,027.10
4.2	**DOOR AND WINDOW SHUTTER**				
4.2.1	**Almunium Door**				
	Single/Double panel swing door of section 101*45*1.5 with 5mm gla	sq.m	63.74	8,178.54	521,258.97
4.2.2	**Almunium Window**				
	Sliding cum fix window of section 101*45*1.5 with 5mm glass with n	sq.m	35.78	10,409.56	372,498.26
5	**FLOORING WORKS**				
5.1	**Tiling works**				
	Providing and laying 10 mm thick non-skidding vitrified tiles for floor of approved standard quality, pattern, standard make and of size 300mmx300mm in floor over 40 mm thick cement sand mortar in ratio (1:4) and maintaining proper slope including filling joints with cement etc all complete as per drawings, specifications and instructions.	sq.m	654.44	3,478.84	2,276,695.27
5.2	**Flag stone flooring**				
	Providing and laying flagstone in outdoor pathways with 1:4 cement and sand ratio as per design and instruction by engineer	sq.m	1.00	2,500.00	2,500.00
5.3	**Grass**				
	Providing and laying grass slumps as per design and specification	sq.m	2,252.00	450.00	1,013,400.00

6	**PLASTERING/ WALL FINISHING WORKS**				
6.1	**CEMENT PLASTER WORKS**				
6.1.1	**Cement plaster (1:6)**				
	Providing and applying at all levels and shape 20 mm thick cement plaster in building inside in specified cement mortar in two layers as 6 to 8 mm thick final coat with 1:6 (1 cement :6 fine sand) cement mortar over the 12 to 14 mm thick 1:6 (1 cement : 6 coarse sand) under coat in all surface at all height including mixing mortar, laying in perfect line, level and plumb and finishing in regular and even surface including all necessary single or multi-stage scaffolding, making grooves and recesses, throating, dusting, dripping, wetting, curing, protection, providing chicken wire mesh at the junction of concrete and masonry etc., all complete as per drawing , specification and instruction of the Engineer. [Rate shall also include for providing drips band, moulds, groove, chicken wire mesh at junction of RCC and masonry, etc., to complete the works at any heights].	sq.m	1,615.17	368.06	594,480.37
6.2	**DISTEMPER PAINT**				
	Providing and applying two or more coats of washable distemper paint of approved manufacturer and shade over a coat of alkali resistant cement primer of approved manufacturer as per manufacturer's specifications to the surface of wall, ceiling, beams columns, canopies, staircase, lobbies etc., all complete as per drawings, specifications and instruction. The rates shall include for scraping, washing the surface with water, surface preparation, scaffolding etc., all complete as per the manufacturer's recommendations and as approved by the Engineer.	sq.m	1,615.17	160.80	259,711.82
7	**Dismateling existing structure**	LS	1.00	200,000.00	200,000.00
8	**Furnishing works**	LS	1.00	1,000,000.00	1,000,000.00
9	**Concrete Interlocking Block**	sq m	520.00	2,500.00	1,300,000.00
10	**Chain link Fencing**	rm	520.00	3,500.00	1,820,000.00
11	**Railing**	rm	70.00	3,000.00	210,000.00
12	**Gabion works**	m3	385.00	6,673.90	2,569,453.40
	Total Cost of Civi Works for Tc(M), Carried Over to Summary(Without VAT) :				**33,198,087.00**

Name Project : Masterplan, Tapta Kunda
Location : Dang District, Nepal.
Client : WECS

Abstract of Cost - Sanitary and Electrical Works

Item No.	Description of Works	Quantity	Unit	Rate (NRs.)	Amount (NRs.)
13	**Sanitary and water supply**				
13.1	Commode or Pan incl. spray and TPH	18	nos	20000	360,000.00
13.2	Wash Basin incl Tap	19	nos	8000	152,000.00
13.3	Urinals with flush	16	nos	7000	112,000.00
13.4	Showers incl mixer	8	nos	12000	96,000.00
13.5	Pipes and fittings	**1**	LS	500000	500,000.00
					1,220,000.00
14	**Eletrical Installation**				
14.1	Outdoor Lighting	40	nos	50000	2,000,000.00
14.2	Indoor/ Normal	20	nos	2200	44,000.00
14.3	electrification and wiring	1	LS	500000	500,000.00
14.4	Pumps	1	nos	40000	40,000.00
14.5	Safety hooters	1	nos	125000	125,000.00
					2,709,000.00

Annex-V: Economic Analysis and Revenue estimate

Economic Analysis of Hot Water Spring, Dang

Project cost	**46,759,321.86**		Cash Flow		Returns		
Annual O&M	5.0%		Year 1	18,703,728.75	IRR	16.25%	
Escalation rate	5%		Year 2	28,055,593.12	NPV	16,803,200.05	
Discount rate	10%				Payback period	10	years
Annual Gross revenue	5,791,500.00				BCR	> 1.13	
Annual Net Revenue	4,633,200.00	**80%**					
Annual benefit increment	5%						
Duration	20						

Year	Description	Cashflow Construction	O & M	Revenue	Total cash outflow	Total cash inflow	Net cash flow	Cumulative Net cash flow	Current value
1	Construction	18,703,728.75		4,633,200.00	(18,703,728.75)	4,633,200.00	(14,070,528.75)	(14,070,528.75)	(14,070,528.75)
2	Construction	28,055,593.12	935,186.44	5,108,103.00	(28,990,779.56)	5,108,103.00	(23,882,676.56)	(37,953,205.30)	(31,366,285.37)
3	Operation		2,337,966.09	5,631,683.56	(2,337,966.09)	5,631,683.56	3,293,717.46	(34,659,487.84)	(26,040,186.20)
4	Operation		2,454,864.40	6,208,931.12	(2,454,864.40)	6,208,931.12	3,754,066.72	(30,905,421.11)	(21,108,818.46)
5	Operation		2,577,607.62	6,845,346.56	(2,577,607.62)	6,845,346.56	4,267,738.94	(26,637,682.17)	(16,539,904.86)
6	Operation		2,706,488.00	7,546,994.58	(2,706,488.00)	7,546,994.58	4,840,506.59	(21,797,175.58)	(12,303,937.36)
7	Operation		2,841,812.40	8,320,561.53	(2,841,812.40)	8,320,561.53	5,478,749.13	(16,318,426.45)	(8,373,933.01)
8	Operation		2,983,903.02	9,173,419.09	(2,983,903.02)	9,173,419.09	6,189,516.07	(10,128,910.38)	(4,725,211.45)
9	Operation		3,133,098.17	10,113,694.54	(3,133,098.17)	10,113,694.54	6,980,596.37	(3,148,314.01)	(1,335,192.47)
10	Operation		3,289,753.08	11,150,348.23	(3,289,753.08)	11,150,348.23	7,860,595.16	4,712,281.15	1,816,788.37
11	Operation		3,454,240.73	12,293,258.93	(3,454,240.73)	12,293,258.93	8,839,018.20	13,551,299.34	4,749,647.75
12	Operation		3,626,952.77	13,553,317.97	(3,626,952.77)	13,553,317.97	9,926,365.20	23,477,664.54	7,480,707.45
13	Operation		3,808,300.41	14,942,533.06	(3,808,300.41)	14,942,533.06	11,134,232.65	34,611,897.19	10,025,833.73
14	Operation		3,998,715.43	16,474,142.70	(3,998,715.43)	16,474,142.70	12,475,427.27	47,087,324.46	12,399,564.21
15	Operation		4,198,651.20	18,162,742.32	(4,198,651.20)	18,162,742.32	13,964,091.13	61,051,415.59	14,615,223.49
16	Operation		4,408,583.76	20,024,423.41	(4,408,583.76)	20,024,423.41	15,615,839.65	76,667,255.24	16,685,028.50
17	Operation		4,629,012.95	22,076,926.81	(4,629,012.95)	22,076,926.81	17,447,913.87	94,115,169.11	18,620,184.47
18	Operation		4,860,463.59	24,339,811.81	(4,860,463.59)	24,339,811.81	19,479,348.22	113,594,517.33	20,430,972.43
19	Operation		5,103,486.77	26,834,642.52	(5,103,486.77)	26,834,642.52	21,731,155.75	135,325,673.07	22,126,828.91
20	Operation		5,358,661.11	29,585,193.38	(5,358,661.11)	29,585,193.38	24,226,532.27	159,552,205.34	23,716,418.66
						IRR	**16.25%**	**Total**	**16,803,200.05**

Revenue Estimate of Dang

SN	Description of item	No.	Amount(NRs.)	Remarks
1	Monthly Visitors	800		Visitor per month
	Daily visitors during winter	150		Visitor per day
	Visitors during Mela	15000		Total Visitor
	Yearly visitors	20700	2,820,000.00	Revenue from Ticket sales
	Subtotal		**2,820,000.00**	Basic Revenue
2	Pool and jacuzzi		**1,035,000.00**	Revenue from pool
3	Cafeteria		**1,410,000.00**	Revenue from cafeteria
	Subtotal		**5,265,000.00**	
4	Sponsorphip		**526,500.00**	Revenue from sponsorship
	Total revenue		**5,791,500.00**	