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कृषि, वन तथा पर्यावरण मन्त्रालय
पशु सेवा विभाग
हरिहरभवन, ललितपुर

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विषय: साना तथा मध्यमस्तरीय पशु वधशाला निर्माणको मार्गदर्शन दस्तावेज सम्बन्धमा।

प्रस्तुत विषयमा नेपालमा पशु वधशाला र मासु जाँच ऐन, २०५५ तथा पशु वधशाला र मासु जाँच नियमावली, २०५७ प्रभावकारी रूपमा कार्यान्वयन गर्ने उद्देश्यले पशु सेवा विभागले राँगा/भैंसी, बाख्रा/भेडा तथा सुङ्गुर/बङ्गुरका लागि साना तथा मध्यमस्तरीय वधशाला निर्माणको डिजाइन लेआउट, इन्जिनियरिङ ड्रइङ्ग तथा लागत अनुमान सम्बन्धी मार्गदर्शन दस्तावेज तयार गरेको व्यहोरा जानकारी गराइन्छ।

यस दस्तावेजमा दैनिक रुपमा बध गरिने पशुको संख्या र उपलब्ध बजेटको आधारमा पशु वधशालाको योजना, डिजाइन लेआउट, इन्जिनियरिङ ड्रइङ्ग तथा अनुमानित निर्माण लागत समावेश गरिएको छ। यसले निजी, सहकारी तथा सरकारी क्षेत्रबाट निर्माण हुने वधशाला निर्माण कार्यलाई सहज, वैज्ञानिक तथा स्वच्छतामैत्री बनाउन मार्गदर्शन प्रदान गर्ने उद्देश्य राखेको छ।

यस दस्तावेज मार्गदर्शनका लागि मात्र तयार गरिएको हो। दैनिक रुपमा बध गरिने पशु संख्या, भौगोलिक अवस्थिति, बजेट, स्थानीय आवश्यकता, प्रचलित भवन संहिता तथा सम्बन्धित कानुनी व्यवस्था अनुसार आवश्यक परिमार्जन गर्न सकिनेछ।

तसर्थ, सम्बन्धित निकाय, स्थानीय तह, निजी तथा सहकारी क्षेत्रले वधशाला निर्माण तथा स्तरोन्नति कार्यमा यस मार्गदर्शन दस्तावेजको आवश्यकतानुसार उपयोग गर्नुहुन अनुरोध छ।

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महानिर्देशक

CHAPTER I:

PROJECT PROPONENT AND ORGANIZATION

1.1 Project Proponent

The Department of Livestock Services (DLS), Government of Nepal, is the proponent of this study. The Department is responsible for promoting sustainable livestock development, enhancing animal health and welfare, ensuring food safety, and strengthening livestock value chains across Nepal. As part of its mandate, the Department has initiated this study to develop Standard Design Layouts, Engineering Drawings, and Cost Estimates for Small-to-Medium Scale Buffalo, Goat, and Pig Slaughterhouses to support the establishment of hygienic and environmentally sustainable slaughter facilities throughout the country.

The study is intended to serve Metropolitan Cities, Sub-Metropolitan Cities, Municipalities, and Rural Municipalities across Nepal by providing standardized technical guidelines for planning, designing, constructing, and operating slaughterhouses in compliance with national legislation and internationally accepted standards.

Project Proponent

Department of Livestock Services
Harihar Bhawan, Lalitpur, Nepal
Tel: +977-1-5522056

1.2 Organization Responsible for Preparing the Report

The ALAANA International Services Pvt. Ltd., Kathmandu, Nepal, has been engaged by the Department of Livestock Services to prepare this study report. ALAANA International Services Pvt. Ltd. is a multidisciplinary Nepalese consulting firm providing professional services in engineering, environmental management, infrastructure planning, livestock development, and technical consultancy. The firm possesses extensive experience in the preparation of feasibility studies, engineering designs, environmental assessments, and technical reports for government agencies, development partners, and the private sector.

The consultant has mobilized a multidisciplinary team of experts in engineering, slaughterhouse design, meat science, environmental management, and waste management to ensure that the study is technically sound, environmentally sustainable, economically feasible, and compliant with the prevailing laws and regulations of Nepal.

Consultant

ALAANA International Services Pvt. Ltd.
Mahakal, Kathmandu, Nepal
Phone: +977-9851115091
Email: alaanainternational555@gmail.com

1.3 Study Team

The Department of Livestock Services, Harihar Bhawan, Lalitpur, entrusted ALAANA International Services Pvt. Ltd., Kathmandu with the preparation of the study entitled: “Standard Design Layout, Engineering Drawings and Cost Estimate for Small-to-Medium Scale Buffalo, Goat and Pig Slaughterhouses in Nepal."

To accomplish the assignment, ALAANA International Services Pvt. Ltd. constituted a multidisciplinary team comprising experts in slaughterhouse engineering, meat science and technology, environmental management, and waste management. The collective expertise of the study team ensured that the proposed designs, engineering solutions and cost estimates meet national regulatory requirements, international best practices, environmental safeguards, public health standards and operational efficiency.

Name	Qualification	Area of Expertise	Contact
Er. Bharat Acharya	M.E. Civil Engineering	Slaughterhouse Design, Civil Engineering, Waste Management Systems and Infrastructure Planning	9851115091
Dr. Dilli Ram Sedai	M.V.Sc. (Meat Science and Technology)	Meat Science and Technology, Abattoir Planning and Management, Meat Inspection, Food Safety, Environmental Management, Slaughterhouse Operations	9851234359

CHAPTER II
INTRODUCTION

2.1 Introduction

Livestock farming has been practiced in Nepal since ancient times and has made a significant contribution to both the national economy and household income. However, despite its importance, farmers' interest in buffalo farming has been gradually declining.

In Nepal, cows and buffaloes are the principal dairy animals. Although improved dairy goat breeds have been imported and reared on a limited scale for experimental purposes, goat farming has not become popular among Nepali farmers as a source of milk production.

Because indigenous cattle breeds have relatively low milk production potential, cows have traditionally been kept mainly for draft power (oxen) and religious purposes, while buffaloes have been raised primarily for milk production. With the modernization of the livestock sector, both the Government of Nepal and the private sector have introduced exotic dairy cattle breeds to increase milk production. Nevertheless, despite greater policy emphasis on dairy cattle, the majority of Nepal's milk production still comes from buffaloes.

The current status of buffalo farming, milk production, and meat production in Nepal is presented below.

2.2 Buffalo Farming and Meat Management

The domestic buffalo (*Bubalus bubalis*) is believed to have developed over thousands of years from the wild buffalo (*Bubalus arnee*). The wild buffalo is still found in the forests of Nepal, Sri Lanka, and northeastern India in South Asia, as well as in countries like Vietnam and Laos in Southeast Asia.

The buffaloes that we rear belong to the family **Bovidae**, under the tribe **Bovini**, and the group **Bubalina**. Buffaloes of this group prefer to live in water. Due to the expansion of human settlements and agricultural activities, forest areas have been reduced, resulting in a decline in the population of wild buffaloes. In many places, breeding between wild buffaloes and domestic buffaloes has also occurred.

2.3 Meat and Buffalo Meat Production

According to the Slaughter house and meat inspection act meat is defined as the soft red-colored substance found in the body of animals, excluding bones, nerves, and skin. Meat is the flesh and organs of animals and fowls which are suitable for use as food. It is normally regarded as the edible parts (muscle and offal) of the food animals. There are various legal definitions of meat in different countries designed to control the composition of products made with meat. As per the Slaughter house and meat inspection act meat is defined the slaughtered animals fit for human consumption

The quality of meat depends on several factors, but mainly on the age of the animal slaughtered for meat production.

In Nepal, buffaloes are not generally raised only for meat production. However, male calves that are raised for about two years, as well as older buffaloes that become unproductive due to age or other reasons, are commonly slaughtered for meat. Buffaloes can generally be slaughtered for meat after reaching about one year of age and achieving an average live body weight of around 175 kg. Although the amount of edible meat obtained varies according to age and physical condition, on average approximately **55% of the live weight** of a buffalo can provide good quality edible meat.

2.4 Status of Meat Production in Nepal

Nepal's slaughterhouse system is still largely based on traditional and small-scale practices. Although the Animal Slaughterhouse and Meat Inspection Act, 2055, Regulation 2057 and Technical Directive 2064 have been introduced, effective implementation remains limited.

Many municipalities are interested in establishing scientific slaughterhouses but face challenges due to the lack of standard designs, technical guidelines, land requirement criteria, cost estimates and operational plans.

Existing slaughter facilities commonly face problems such as poor hygiene, inadequate animal handling, limited meat inspection, improper waste disposal and insufficient infrastructure. Buffalo, goat, and pig slaughterhouses require species-specific designs with proper lairage, slaughter processing areas, meat inspection facilities, cold storage and environmental management systems. Therefore, development of standardized slaughterhouse templates, engineering designs and technical guidelines is essential to support local governments and private investors in establishing safe, hygienic and sustainable slaughterhouse facilities throughout Nepal.

2.5. Major Livestock Population

Table 3 presents the population of major livestock species raised for milk and meat production during the four fiscal years from FY 2076/77 to FY 2079/80 (2019/20–2022/23).The data indicate that, except for goats, the populations of buffaloes, cattle, and sheep have declined. Among these livestock species, the buffalo population has experienced the sharpest decline.Rural-to-urban migration, foreign employment of young people, and increasing interest in alternative occupations have significantly changed Nepal's agricultural production system. These changes have also affected livestock farming, particularly buffalo farming.

Table 1. Population of Major Livestock Raised for Milk and Meat Production

Livestock	FY 2076/77	FY 2077/78	% Change	FY 2078/79	% Change	FY 2079/80	% Change	Livestock
Buffalo	5,257,591	5,159,931	-1.86	5,132,931	-0.523	3,081,062	-40.0	Buffalo
Cattle	7,458,885	7,466,841	+0.107	7,413,197	-0.724	4,750,329	-35.9	Cattle

Goat	12,811,953	13,442,614	+4.92 2	13,990,703	+4.07 7	14,541,244	+3.93 5	Goat
Sheep	806,079	793,725	-1.53	771,205	-2.837	501,849	-34.9	Sheep

Source: Statistical Information on Nepalese Agriculture 2079/80 (2022/23), Ministry of Agriculture and Livestock Development, Government of Nepal, 2024.

2.6 Livestock Farming and Meat Production

Although buffaloes are primarily reared for milk production in Nepal, buffalo meat remains one of the country's major sources of meat.

Table 5 presents meat production statistics for the last four fiscal years. In previous years, buffalo meat accounted for approximately 60% of the country's total meat production. However, increasing per capita meat consumption, changing consumer preferences, improved availability, and the relatively lower prices of poultry and pork have increased the consumption of these meats. As a result, although buffalo meat production has not declined substantially, its share of total meat production has decreased. Nevertheless, buffalo continues to be an important source of meat in Nepal.

Table 2. Meat Production by Livestock Species

Livestock	FY 2076/77 Production (MT)	Share (%)	FY 2077/78 Production (MT)	Share (%)	FY 2078/79 Production (MT)	Share (%)	FY 2079/80 Production (MT)	Share (%)
Total Livestock	552,156	100.00	520,742	100.00	512,788	100.00	430,085	100.00
Buffalo	189,517	34.32	188,172	36.14	194,090	37.85	116,503	27.09
Goat	75,023	13.59	70,755	13.59	74,241	14.48	77,162	17.94
Poultry	255,001	46.18	226,959	43.58	204,923	39.96	200,658	46.66
Pig	29,493	5.34	31,450	6.04	36,059	7.03	32,533	7.56
Sheep	2,735	0.50	2,964	0.57	2,880	0.56	1,874	0.44
Livestock	FY 2076/77 Production (MT)	Share (%)	FY 2077/78 Production (MT)	Share (%)	FY 2078/79 Production (MT)	Share (%)	FY 2079/80 Production (MT)	Share (%)
Total Livestock	552,156	100.00	520,742	100.00	512,788	100.00	430,085	100.00

Source: Statistical Information on Nepalese Agriculture 2079/80 (2022/23), Ministry of Agriculture and Livestock Development, Government of Nepal, 2024.

CHAPTER III
METHODOLOGY

3.1 Approach and Methodology

The study was conducted following the provisions of the Slaughterhouse and Meat Inspection Act, 2055, the Slaughterhouse and Meat Inspection Regulation, 2057, and the Slaughterhouse and Meat Inspection Technical Directive, 2064 of Nepal. The overall methodology combined desk-based reviews, technical consultations, field observations, and engineering design principles to develop a technically sound, hygienic, environmentally sustainable, and operationally efficient slaughterhouse design.

Both primary and secondary information were collected and analyzed. Secondary information was obtained through an extensive review of published reports, government publications, technical standards, research articles, maps, engineering drawings, and relevant photographs. Primary information was generated through field observations, site assessments, stakeholder consultations, and technical discussions with concerned experts.

The principal methodological steps undertaken to accomplish the assignment included:

- Desk study and comprehensive literature review
- Review of applicable laws, regulations, and technical standards
- Stakeholder and technical consultations
- Site assessment and field verification
- Functional planning and design development
- Environmental and animal welfare assessment
- Data analysis and technical evaluation
- Report preparation and finalization

3.2 Desk Study and Literature Review

A comprehensive desk study was carried out to collect and review all available secondary information relevant to slaughterhouse planning and meat processing. Published reports, government documents, engineering manuals, scientific publications, international guidelines, and best practice documents were thoroughly reviewed.

The literature review focused on:

- Slaughterhouse planning and infrastructure development
- Hygienic slaughtering procedures
- Meat inspection and food safety systems
- Animal handling and welfare practices
- Wastewater and solid waste management
- Occupational health and safety requirements
- Environmental management practices

- Facility layout and process flow optimization
- National and international standards for slaughterhouse operation
- The findings from the literature review provided the technical basis for developing the proposed slaughterhouse design and operational framework.

3.3 Technical Stakeholder Consultation

Consultative meetings and technical discussions were conducted with relevant stakeholders to obtain practical insights into existing slaughterhouse operations, operational challenges, and future requirements.

The consultation process included interaction with:

- Officials from the Department of Livestock Services
- Veterinary and livestock experts
- Slaughterhouse operators and meat processors
- Engineers and infrastructure specialists
- Local government representatives
- Environmental professionals
- Public health officials
- Other relevant technical personnel

The recommendations obtained from these consultations were incorporated into the planning and design process to ensure that the proposed facility is practical, technically feasible, economically viable, and compliant with national standards.

- Review of Legal and Technical Framework
- Slaughterhouse and Meat Inspection Act, 2055

The Slaughterhouse and Meat Inspection Act, 2055 was reviewed to understand the legal framework governing the establishment, operation, licensing, inspection, and regulation of slaughterhouses in Nepal.

The review focused on:

- Legal requirements for slaughterhouse establishment
- Meat hygiene and food safety provisions
- Animal and meat inspection procedures
- Responsibilities of regulatory authorities
- Public health protection measures
- Requirements for safe meat production and distribution
- The provisions of the Act served as the primary legal foundation for the proposed slaughterhouse planning and design.

3.4 Slaughterhouse and Meat Inspection Regulation, 2057

The Slaughterhouse and Meat Inspection Regulation, 2057 was reviewed to identify the operational procedures and technical requirements necessary for effective slaughterhouse management.

- Particular emphasis was placed on:
- Slaughterhouse operational procedures
- Anti-mortem and post-mortem inspection
- Animal handling requirements
- Hygiene and sanitation standards
- Meat handling and storage procedures
- Facility maintenance
- Waste management practices
- Operational monitoring and compliance
- The regulatory requirements were integrated into the facility planning and operational design.

3.5 Slaughterhouse and Meat Inspection Technical Directive, 2064

The Technical Directive, 2064 was reviewed to incorporate the technical specifications and engineering standards required for slaughterhouse design and operation.

The review included:

- Functional planning requirements
- Facility layout and zoning
- Process flow management
- Equipment requirements
- Hygienic design standards
- Utility services
- Operational workflow
- Occupational safety provisions
- Quality assurance measures
- The technical standards outlined in the Directive were used as key design criteria throughout the planning process.

3.6 National Livestock Transportation Standard

The National Livestock Policy was adopted in 2005 (2062 BS) to bring about improvement in the livestock production of Nepal. The primary objective of the Policy is to increase the productivity to increase the income generation of rural population so that they benefit from livestock farming. In line with the policy, this project has provision to cover the areas dealt under this policy.

3.7 Design Development

Based on the findings of the literature review, legal and technical assessments, field investigations, and stakeholder consultations, the slaughterhouse design was developed in accordance with accepted engineering principles and hygienic design standards.

The design process emphasized:

- Functional efficiency
- Hygienic process flow
- Animal welfare
- Food safety
- Worker health and safety
- Operational convenience
- Environmental sustainability
- Future expansion potential
- Cost-effectiveness
- Regulatory compliance
- The design activities included:
- Functional zoning
- Space allocation
- Process flow planning
- Equipment layout
- Utility planning
- Drainage and wastewater systems
- Waste management facilities
- Ventilation and lighting systems
- Vehicle circulation planning
- Bio security measures

3.8 Environmental Considerations Environment Protection Act, 1996and Environment Protection Rules, 1997, 1st amendment 1999.

The act has the provision such that nobody can create pollution beyond prescribed limit or standards or nobody can cause significant adverse impacts to the environment to safeguard to public life and health. The act also has provisions of environmental inspectors, protection of national heritage, protected area, compensation and punishment (GoN, 2058). These provisions of the act are directly related to the slaughterhouse and processing food quality and hence, these provisions have been considered in the design and proposed implementation.

3.9 Local Self-Governance Act, 1999 & Regulation 1999 (HMG 1999 a and b)

The following provisions of the act are related to construction and implementation of **slaughterhouse** Local government has the authority for the conservation of local natural resources, conflict management and monitoring of project activities

- The municipality / VDC have the authority to prepare development plans and establish basic community infrastructures including processing plant. The municipality / VDC can regulate constructions according to the plans.
- Municipality has the authority for the management of public convenience of transportation, parking system of vehicles, pollution control, waste management and eminence of public road plantation.
- Municipality has the authority to protect areas for drinking water, flood controls and natural and cultural heritage sites.

3.10 Solid Waste Management and Resource Mobilization Act, 1987

The Solid Waste Management and Resource Mobilization Act introduced in 1987 outlines the duties of SWMRMC and authorize it to take action to control haphazard waste disposal and to collect service fees. Likewise, the act has provisions for various preventive measures against those engaged in activities detrimental to the intentions of the act. To facilitate implementation of the Act, SWMRMC rules were formulated in 1989 (Rules and Regulations, 1989, and Bye-Laws in 1990 of SWMRMC). These Rules laid procedures to be followed by individuals and institution designing sanitation services, Solid waste collection and operation has incorporated the procedures mentioned in the rules under this Act.

3.11 Town Development Act, 1998

The act empowers Town Development Committee to regulate, control or to prohibit any act or activity that has an adverse impact on public health or the aesthetic of the town, or in any condition pollutes the environment. Permission of the Municipality /VDC will be taken for the construction works for the processing plant.

3.12 Labour Act, 199.

- Spells about the provision for a healthy, safe and secured environment for workers
- Prescribes provisions for solid waste management and control noise pollution into working areas
- Imposes mandatory provision that only Nepali citizen can be employed on permanent basis in any enterprises, permission must be sought from the Labour Department to employ non-Nepali specialist on contract basis.

3.13 Child Labour Prohibition and Regulation Act, 1999

The Child Labour Act enlists specific occupations as hazardous work and prohibits the use of children below 16 years of age in such activities. The Act regulates hours of work for children aged 14 - 16 and provides that no child shall be engaged to work during a period from 6 p.m. to 6 a.m. Further, it prohibits the engagement of children below 14 in any kind of employment

3.14 Electricity Act/regulations, 1993

This regulation states that any person or corporate body who desires to conduct survey, production, transmission or distribution of hydroelectricity of the capacity ranging from 100 to 1,000 kilo watt, shall have to provide an information with the following particulars to the Secretary through the Electricity Development Centre in the format as prescribed in Schedule – 1 pursuant to the provision clause of Section 3 of the Act:-

a) Detail description of the project
b) Map of the project site (main structures must be shown),
c) Source of water and quantity of water to be utilized,
d) Area where the electricity is to be distributed and estimated number of consumers to be benefited from it,
e) Whether the water resources to be utilized has already been utilized
f) by other or not, if done so give the particulars of the same,
g) Other necessary matters.

3.15 Land Acquisition Act, 1997

The land acquisition act 1997 provides basis for the acquisition of land and its compensation. Article 3 and 4 of Land Acquisition Act empowers the GoN to acquire any

land at any place giving compensation and all other expenses pursuant to the Act for any public purpose.

Environmental sustainability was integrated throughout the planning and design process to minimize adverse environmental impacts and ensure compliance with applicable environmental regulations.

The environmental assessment considered:

- Wastewater generation and treatment
- Solid waste management
- By-product utilization
- Odor control
- Surface drainage
- Pollution prevention
- Water conservation
- Energy efficiency
- Environmental sanitation
- Climate resilience
- Appropriate environmental mitigation measures have been incorporated into the proposed slaughterhouse design.

3.16 Animal Welfare Principles

Animal welfare principles were integrated into the planning process to promote humane handling and minimize animal stress throughout slaughter operations.

The design incorporates provisions for:

- Proper animal receiving facilities
- Adequate holding pens
- Safe unloading areas
- Appropriate lairage facilities
- Humane animal movement
- Non-slip flooring
- Adequate ventilation
- Clean drinking water
- Stress reduction measures
- Humane slaughter procedures
- These provisions contribute to improved animal welfare, enhanced meat quality, and compliance with internationally accepted slaughter practices.

3.17 Data Analysis and Technical Evaluation

All collected information was systematically reviewed and analyzed by the multidisciplinary consultant team. Technical discussions and expert review meetings were conducted to evaluate the findings and identify the critical technical requirements for slaughterhouse planning and design.

The analysis focused on:

- Compliance with legal and technical standards
- Functional requirements
- Operational efficiency
- Hygiene and sanitation
- Food safety
- Environmental performance
- Animal welfare
- Infrastructure requirements
- Engineering feasibility
- Risk assessment

Based on the analysis, appropriate design recommendations and technical improvement measures were developed and incorporated into the proposed slaughterhouse plan.

3.18 Report Preparation

The study report was prepared in accordance with the approved applicable technical guidelines, and the prescribed reporting format. The report presents the study methodology, findings, technical analyses, design considerations, conclusions, and recommendations in a systematic manner. All references used during the study have been appropriately cited and listed in the reference section. Relevant supporting documents, engineering drawings, calculations, technical specifications, photographs, and other supplementary materials have been included as appendices where necessary. Following submission of the draft report, comments and suggestions received from the concerned authorities and stakeholders were carefully reviewed and incorporated. The final report has been prepared after addressing all relevant observations to ensure technical accuracy, completeness, and compliance with the applicable legal and regulatory requirements.

CHAPTER IV
SITE SELECTION CRITERIA

4.1 Distance from Residential Area

The location of the slaughterhouse should be selected considering adequate separation from residential settlements to minimize potential impacts such as odor, noise, traffic disturbance and public health concerns. Appropriate distance from populated areas allows better environmental management, improves operational safety and reduces conflicts with nearby communities. The site should also consider future urban expansion patterns and maintain sufficient buffer space for plantation, landscaping and environmental protection measures.

4.2 Road Access

Good Road connectivity is an essential requirement for efficient slaughterhouse operation. The site should have convenient access for livestock transportation vehicles, meat delivery vehicles, waste collection vehicles, and service vehicles throughout the year. Adequate road width, vehicle turning space, loading and unloading facilities and connection to major transportation routes are important to ensure smooth movement of animals and products while reducing transportation stress and operational delays.

4.3 Water Availability

A reliable and adequate supply of clean water is a critical requirement for slaughterhouse operation. Water is required for animal washing, cleaning of equipment and working areas, meat processing activities, sanitation, employee facilities, and maintaining hygienic conditions. The selected site should have access to a sustainable water source with provision for storage tanks and distribution systems to ensure continuous operation. Water quality should meet required standards for food processing and public health safety.

4.4 Waste Disposal Possibility

The site selection should consider proper arrangements for managing slaughterhouse waste, including blood, animal by-products, wastewater, solid waste, and other organic materials generated during operations. Availability of suitable areas for waste treatment facilities, wastewater treatment systems, composting, recycling or safe disposal methods is essential. The waste management system should prevent environmental pollution, control odor, protect water resources and comply with environmental regulations while supporting sustainable slaughterhouse operation.

4.5 Electricity Availability

Reliable electricity supply is an important requirement for the smooth operation of a slaughterhouse. Electrical power is needed for lighting, refrigeration systems, water pumps, machinery, processing equipment, ventilation systems, administrative facilities and other operational activities. The site should have access to a stable power source with provision for

backup systems such as generators or alternative energy options to ensure uninterrupted operation, maintain food safety standards and support efficient facility management.

4.6 Drainage System

An effective drainage system is essential for maintaining hygiene and preventing contamination within the slaughterhouse premises. The drainage design should allow proper collection and disposal of wastewater generated from animal washing, slaughtering, cleaning activities and processing areas. The system should provide adequate slope, separate clean and dirty water flows where necessary, prevent water stagnation and connect with appropriate wastewater treatment facilities to reduce environmental impacts and comply with sanitation requirements.

4.7 Workforce Availability

Availability of skilled and trained manpower is a key factor for successful slaughterhouse operation. The facility requires workers for animal handling, slaughter operations, meat inspection, cleaning and sanitation, equipment operation, waste management, administration and maintenance activities. Adequate training in hygiene practices, occupational safety, animal welfare and operational procedures is necessary to ensure efficient, safe and hygienic functioning of the slaughterhouse.

4.8 Tools and Equipment

Proper selection and availability of tools and equipment are essential for efficient slaughterhouse performance. The facility should be equipped with appropriate slaughtering tools, animal handling equipment, weighing systems, carcass processing equipment, washing and sanitation tools, refrigeration facilities, protective equipment and waste management systems. The equipment layout should support smooth workflow, reduce manual handling risks, maintain hygiene standards and improve overall productivity and meat quality.

CHAPTER V
DESIGN BASIS AND ASSUMPTIONS

Based on the animal slaughter per day, each slaughterhouse has been classified in small, medium and large. All utilities and amenities have to be design based on the size of the slaughterhouse.

Livestock Units

Buffalo each equivalent to 1.0 livestock unit.

Small stock (sheep/ goats) each equivalent to 0.2 livestock units.

Pig each equivalent to 0.5 livestock units.

A medium size template of 20-50-100 livestock unit has been developed in this report named as standard slaughterhouse . All parameters need to be reduced or increase as per the requirement of the local demand and promoters' plans.

Parameters to be considered based on the size of a slaughterhouse

Animal	Type	Animal Holding Time	Work Force Person	Working Hours	Water Requirements Lt per day	Electricity Requirements Approx.
Buffalo	Small (15)	2 days	12–15	8	15,000–20,000	40–75-100 kW/day
	Medium (75-100)	2 days	45–75-100	8	75-100,000–80,000	120–180 kW/day
	Large (155)	2 days	120-150–130	8	175-100-75,000–200,000	300–475-100-75 kW/day
Pig	Small (30)	2 days	10–15	8	6,000–10,000	30–75-100-75 kW/day
	Medium (120)	2 days	35–75-100-75	8	25,000–40,000	120-150–175-100-75 kW/day
	Large (310)	2 days	80–110	8	70,000–120-150,000	275-100-75–375-100-75 kW/day
Goat	Small (75)	2 days	10–15	8	5,000–8,000	25–40 kW/day
	Medium (300)	2 days	35–45	8	20,000–30,000	80–120 kW/day
	Large (775)	2 days	80–120-150	8	75-100-75,000–80,000	200–300 kW/day

A separate checklist for a slaughterhouse design has been developed and presented in the Annex 13

CHAPTER XIII
CLEANING OPERATION OF A SLAUGHTERHOUSE

13.1 CLEANING OPERATION OF SLAUGHTER HOUSE

A well-planned, well-executed and controlled cleaning and sanitation program for rooms, machines and equipment is very important to achieve a hygienic standard. Cleaning and sanitation alone, however, will not assure a hygienic standard in production where process hygiene as well as personal hygiene is important factors. Well-planned working routines may assure a better cleaning standard during processing. For example, cleaning during processing, removal of solid waste and sufficient space in processing rooms are factors which facilitate cleaning. Adequate personal hygiene assures the overall cleaning process. Deterioration of the cleaning standard may occur if microorganisms are transmitted to well-cleaned surfaces from unwashed hands before neither processing starts. Neither process hygiene, personal hygiene nor cleaning and sanitation alone can assure a sufficient hygienic standard but together, if carried out in an optimal manner, they will guarantee a complete hygienic standard.

For cleaning operation depend on types of building and its equipment and facilities for cleaning. The hot water facilities is essential at a temperature not less than 60 ^{0}C preferably boosted with stem to about 82 ^{0}C. Steam alone is not efficient sterilizing agent, because it cools when it contacts a cold surface. Water pressure must be high enough to remove the accumulation of fat, blood, bone dust from floor and other surfaces. The usual method of applying hot water is through high pressure jet cleaners, the final pressure at the hose nozzle being in the region of 14kg/ cm2. USA adopted spray guns pressure is in the range of 35 – 49 kg/cm2, the volume of water averaging about 9 liters per minute. For greater efficiency the hot water is usually combined with a fixed number of detergents.

Cleaning operations must be frequent to prevent any built – up bacteria, particularly on **trolleys, hooks and gambrels,** etc which come into contact with the meat. These may be sterilized in cabinets on the overhead rail or in the sterilization room where they are immersed in batches in tanks containing hot detergent solutions, but rinse, dressing and oiling solutions. Hot water jet hoses may be used to clean certain types of equipment such as trucks, animals, trees etc but smaller items such as meat **containers, knives, scabbards, cleavers** can be sterilized in cabinets which utilize a hot water detergent solution.

An upper story slaughter floor permits higher hygiene standards, as feet, hides, fleeces, etc are discharged to the byproducts areas below through a system of chutes, and there is less cross – traffic of truck and personnel. The combination of cleaning equipment in meat plant is to perform a task efficiently, quickly and with minimum of labor. While increased mechanizations and automation have reduced production of manpower requirements.

In the process of cleaning a meat plant it is necessary to carry out the following procedures:

- Remove all gross fat, skin and meat scraps. In the slaughter hall in particular this is a round the clock operation and must be associated with tidy working methods.
- Apply cleaning compounds at proper temperature for their optimum activity
- Rinse with hot water.
- Sanitize.

  In addition to temperature, force or agitation, time and chemical concentration are involved in cleaning efficiency. It is important that for use hot or cold water hoses be equipped with proper nozzles, the pressure, volume and shape of the stream of water . Factor such as temperature and concentration of detergent solutions affect the chemical reactions between soil and detergent. Hot water may be supplied direct from the hot water boilers or mixing cold water and steam in special mixing units, which should be fitted with venture aspiration tubes through detergent can be introduced. Such high-pressure hot water cleaners can effectively clean other items of abattoir such as offal racks, trucks, containers etc. The use of lights mineral oil enhances the appearance surface.

  Sanitation is the one of the important functions in any meat plant and involves a technology more detailed than that of slaughter and carcass dressing. It demands well trained and responsible operatives whose influence on meat quality, product shelf life and working conditions should not be under estimated.

13.2 THE CLEANING SEQUENCE

The correct sequence for general routine surface cleaning of a food plant is

- Gross clean preparation
- Pre – rinsing
- Detergent application
- Post rinsing

- Disinfection
- Terminal rinsing

Gross cleaning

Meat residue that is left on the equipment, surface and floors has many negative effects on the cleaning performance.

- Detergent cannot act on the surface bacteria due to its protection.
- Due to its reaction with detergent, the chemical action is weakened.
- There are chances of recontamination of bacteria in later stage of cleaning.
- It can act as a nutrient for microorganism and directly recontamination the surfaces with grease and proteins.
- It can block the drainage system of plant.
  A poor gross clean is the single biggest reason for poor or inconsistent bacterial counts on surfaces and for high bacterial contamination in aerosols caused by rinsing.

  The residues of food product, which are larger than fingernail are removed before application of detergent. It should be done by hand picking, scarping and shoveling.

Pre – rinsing

The residue materials which cannot removed by picking,/scarping and shoveling pre – rinsing is done to remove the residue. It is more applicable in cutting boards where gross cleaning is impossible. The pre rinsing water should be removed from pools and flat surface, which can dilute the detergent and make it less effective.

Detergent application

The use of detergent in food plant is to remove the thin tenacious layers of protein, grease etc. Detergent cannot remove larger piece and thick layer of residue . In such situation foaming concentration, dryness, thickness of application and contact time are important in ensuring the controlled and optimizing the cost.

Post rinsing

Post rinsing is important to minimize the amount of splash and aerosol formed, which may recontamination of cleaned surface of walls and ventilation socks, etc. After post rinsing the surface should be free of all visible particles, layers of soiling and residues of detergent and should be clean.

Disinfection

When the food plant is visibly clean, well – rinsed surface, with minimal amounts of surface water. The walls, doors etc are disinfected daily. The disinfection is dependent upon the concentration It is essential to give proper time and concentration of the disinfecting agent. For proper understanding as to how to accomplish and what are the procedures and types of sanitizing, it can be discussed as under

Physical

Water (chlorine 5-7 ppm), hot water at 60 ^{0}C. Sterin acid steam water under pressure, burning under flame (stove, lamb etc). Hot air radiation (Ultraviolet lamp).

Chemical

Copper naphthenate used in points to prevent mould gymeth on walls and ceilings. Lime 1:3 (in water) calcium chloride 7% w/v bleaching powder 1:3 and others as stated above in detergents.

Physio- chemical

This method is the combination of above two.

13.3 DISINFECTION OF A SLAUGHTERHOUSE

General

The following agents can be used in water for routine cleaning and sanitizing. Lime water (1:3) bleaching powder (1:3) calcium chloride (7% chlorine) 7% w/v and quaternary ammonium compounds.

1. If some infection or disease is detected where contaminating agent can be easily destroyed. Use bleaching powder 1:20.
2. For those not easily destroyed eg, Anthrax, Black Quarter, Scabies, Pox, Swine fever etc.

Carcass Blood and Water – Burn or bury (with slaked lime) treat with 30% calcium chloride.

Instrument- Disinfect by heat, clothes, rubber gloves and boots treat with 3% cresol.

CHAPTER XIV
HYGIENE MAINTAINING IN A SLAUGHTERHOUSE

14.1 Hygiene standard

It must be impressed on everybody employed in the meat/food industry, that hygiene concerns both:

- process hygiene
- environmental hygiene
- personal hygiene
- cleaning, disinfection/sanitation

Monitoring of Hygiene

Monitoring of cleaning process is done by trained

A. Visual assessment

B. Microbiological examination

Visual assessment

If the food plant is not visually clean risk of microbial contamination is exist. The risk is control and avoids by using HACCP principles to secure a ***Due Diligence defence***. The critical points in the cleaning and disinfection program should be identified and measurement and control protocols set up. The hygiene supervisor and team should be periodically audited to ensure that the cleaning and disinfection procedure are being followed. Chemical solution strength should be checked by titration test kit or conductivity meter. The internal monitoring can be audits from external experts.

Microbiological examination

It should be carried out on representative and random sampling points using skilled personnel. The result should be report to management and fed back to the cleaning team for remedial action. Similarly ATP measurement is done using enzyme luciferin – luciferase, a reaction takes place with the production of light bioluminescence. The sensitive light meters in the system accurately measure the concentration of ATP and thus of the microorganism and food residues. ATP can be used to optimize the cleaning protocols, evaluate different chemicals, solution concentration and rinse water temperatures

Action to be taken in case of ANTHRAX

Dressing should be stop after symptoms are detected, notify and condemn the carcass. Hands, feet and arms are washed with 2% cresol. Knives, clothes, ropes etc are boiled for 30 minutes. Boots and belts are washed with sodium hydroxide and keep in 2% cresol for 30 minutes. Floors are flamed in blow lamp and them washed by 5% cresol, close the abattoir, reopen after through check.

Terminal rinsing

The used disinfectants are safe to leave on surface with terminal rinsing. The final rinsing should be done by potable water after the disinfectant unless the applied disinfectant is designed to remain unrinsed.

Process hygiene
It is impossible to give an adequate definition of process hygiene because the critical points will vary, depending on:

- processing
- processing buildings (site, size, buildings)
- equipment available
- permanent or non-permanent personnel (working routines, training)
- climatic conditions
- sanitary facilities
- water and energy supplies
- liquid and solid waste disposal

Personal hygiene
Personal hygiene will usually be the main element in the term “hygiene”; the reason being obvious. Bacteria causing diseases or spoilage may be carried and transmitted to surfaces and food by workers handling the food products.

14.2 Hand-washing
Careful and frequent hand-washing will do much to reduce contamination. Therefore hand-washing facilities must be sufficient if the water supply is adequate. Basically, there should be two sites where the staff can wash their hands - the rest room and the working area where sufficient hand washing facilities must be placed close to the working places. If the hand-washing facilities are situated in particular areas away from working places, there is a great risk that they will not be used.
It must be impressed on the staff that hand-washing must be done:

before work starts

- after using the toilets
- after touching dirty objects and materials
- after smoking and eating
- Shifting of operation (to avoid cross contamination)

It must be impressed on the staff that hands will be contaminated if used for scratching the skin or the hair, correcting clothes and picking the nose. Bacteria may be transmitted to the hands by these acts and thereafter transmitted to meat (food) which is handled by hand.

Special guidelines concerning hand-washing must be followed. The management of slaughterhouse/slaughter facilities or the authorities may require the use of a special bacteriostatic soap or dipping of the hands after washing in a germicidal rinse etc. Use of a nail brush is recommended because bacteria often hide along and under the nails.

14.3 Working clothes

The clothing of slaughterhouse workers must be clean.The purpose is not to protect the worker against contamination but to protect the meat/food against contamination. Working clothes must

be used exclusively in the working area and nowhere else. If possible, it is advisable to avoid admittance from the unclean area to the clean area without changing clothes. Working routines should be planned in a way that the staff works either in the clean area or in the unclean area. The staff may eventually be allowed to go from clean to unclean work but never in the opposite direction, except when they have changed working clothes and washed hands.

Working clothes should be comfortable and easy to wash. Their design should encourage good hygiene habits. Light coloured working clothes show the need for cleaning earlier than dark coloured working clothes.

In tropical climates a loincloth is recommended dispensing with working clothes.

In areas where more clothes than loincloths are necessary, aprons made of washable or even waterproof materials, such as rubber, are recommended.

Working clothes should be free of loose adornments (buttons, sequins etc.). During work jewellery, wrist-watches etc. are prohibited as these objects may be sources for contamination and make hand-washing difficult.

Working clothes should ideally be supplied by the slaughterhouse and a laundry service is recommended to assure a certain level of hygiene.

Arrangements for storage of aprons and tools should be available outside toilets and rest rooms.

14.4 Hair covering

Human hair and beards are normally heavily contaminated with bacteria and to prevent contamination of food a hair or beard covering in the process area is a necessary part of the working clothes.

Many different types of hair coverings are seen in the food industry. It is important that the hair is completely covered and that the covering is clean. Disposable or washable hair and beard coverings are recommended.

14.5 Gloves

If the use of gloves is indicated they must be kept in the same good hygienic conditions as hands, otherwise it is better to avoid their use. Gloves may be of rubber or plastic and they are used to protect the meat against contamination. They may also be used to protect the hands against knife cuts and will then be made of steel. Great care should be taken to keep a certain hygienic standard of these gloves.

14.6 Health

Good health is important for workers in the meat industry. Ill persons will often be carriers of more microorganisms (pathogenic microorganisms) than is usually the case. These microorganisms may

then be transmitted to the meat/food with the risk of causing disease to the consumers. Illness must always be reported to the manager and/or the meat inspector of the slaughterhouse who will decide if the worker can stay or has to leave.

14.7 Cleaning/disinfection standard

The cleaning programme must be performed regularly, dependent on the demand for cleaning in the specific areas. The requirements for cleaning have to be defined before establishing cleaning programmes. The disinfection programme should follow the cleaning programme and must be planned in relation to the previous cleaning programme and specific requirements.

Sanitation includes more than disinfection, and procedures concerning sanitation (pest control, waste disposal, maintenance of buildings, proper fencing, etc.) should be planned and carried out accordingly.

14.8 Hygiene requirements for animal waste processing plant

- The premises of the processing plant must be adequately separated from the public highway and other such as meat plants.
- Processing of high-risk materials must not be on the same site as meat plants. It must be in separate buildings.
- The meat plant should be separated clean and unclean section.
- The unclean area must have covered area and must be constructed for easy to clean and disinfect.
- Floor must be laid to facilate the draining of liquid. The plant must have adequate lavatories, changing rooms and wash basin for staff.
- In the unclean section, there must be adequate facilities for de- skinning or dehairing of animals and a storage room for hides.
- The plant should be of sufficient size and have enough hot water and steam to process hygienically the waste received.
- The unclean section must reduce the size of the animal waste and equipment for loading the crushed animal waste into processing unit.
- A close processing installation is required in which to process the waste where heat treatment is required with measuring equipment to check temperature.
- To ensure no cross contamination by incoming raw materials is unloaded and processed and the area set aside for further processing of the heated material and the storage of the finished processed product.
- There must be adequate facilities for cleaning and disinfecting the containers. The wheels of the vehicles carrying high risk material must be disinfected before leaving the unclean section of the processing plant.

Hygiene requirements relating to the operation of animal waste processing plants

- Animal waste must be processed immediately after arrival.
- Containers, equipment and vehicles used for the transport of animal waste must be cleaned washed and disinfected after use.
- Personnel working in the unclean section must not enter the clean section without changing their clothes and footwear.

- Waste water originating in the unclean section must be treated to ensure no pathogens remain.
- There must be a systemic method to prevent the ingress of birds, rodents, insects or other vermin.

Animal waste must be processed under the following conditions

1. High risk material must be heated to a core temperature of at least 133 0C for 20 minutes at a pressure of 3 bars. The particles size of raw materials prior to processing must be reduced to at least 75 mm by means of prebreaker or grinder.
2. Recording thermograph must be provided at the critical points of the heating process to monitor the heat treatment.
3. Pressure monitoring devices should be installed to record pressure at different stages in the process.
4. The particle size should be monitored regularly and corrected when wear or damage to the breaking equipment larger than 75 mm to enter the process.
5. For continuous systems a residence time test should be completed under normal operating conditions, e.g. manganese dioxide (Mno2) should be introduced into the continuous systems at time zero. Samples of product leaving the process are taken to monitor the recovery of the insoluble marker until the majority of the marker is expected to have passed throughout the system.

CHAPTER XV
SLAUGHTER HOUSE WASTE MANAGEMENT

15.1 Collection of Blood

The blood available from the slaughter houses should be collected and made use of in pharmaceutical industry. Bleeding areas should be clearly identified in the slaughter houses and blood drains should be and collection should be done immediately so that its full potential could be utilized.

At each slaughter house adequate tools should be provided for dehiding of the animals, hides and skins should be immediately transported out of the slaughtering area in a closed wheel-barrow or similar other devices. In no case the hides and skins should be spread on the floor of the slaughtering area for inspection. Legs, bones, hooves etc. should also be removed immediately from the slaughtering area through a spring load floor chute or closed wheel-barrow.

15.2 Evisceration

At slaughter houses adequate compartments for immediate separation and disposal of condemned material must be provided. The authority must take care that intestines are not punctured during evisceration to avoid contamination of carcasses.

15.3 Safe Disposal of Waste Products

Slaughtering of animals generates wastes consisting of non-edible offal (like lungs, large intestines, various glands, animal tissues, organs, various body parts, etc.) stomach/intestinal contents, dung, sludge from waste water treatment, bones, etc. All these types of wastes are required to be disposed by adopting methods like rendering/controlled incineration/burial/composting/anaerobic digestion etc. The estimated waste generated in a slaughter house is stated as under-mentioned

15.4 Oduors Control

The tropical climate of our country enhances the process of degeneration of any tissue material remaining as a waste in the premises of the slaughter houses. Therefore, the slaughter house premises always give a particular stink. In order to avoid this stinking odour proper ventilation of slaughtering halls, washing of the floors with non-poisonous disinfectants and if need be use of aerobic deodorants must be provided at each slaughter house.

15.5 Sources of waste in a meat abattoir

The different sources of waste in meat abattoirs could be categorized as:

- Lairage / animal pens
- Bleeding / stunning;
- Carcass processing / cleaning;
- Offal processing; and
- By-products processing.

15.6 MANAGEMENT OF SOLID WASTE

The best practicable methods currently available for processing and disposal of different wastes for the slaughter houses are

- Solids separation by screening;
- Fat / oil removal by flotation / skimming;
- Primary settling;
- Blood separation (protein recovery);
- Waste effluent balancing;
- pH correction (chemical correction);
- Protein recovery
- Ultra filtration;
- Reverse osmosis.

Process for Treatment of Solid Waste

The slaughter house waste can be used for compost making. The agriculture residue and dung from the lairage, ruminal and intestinal contents, blood, meat cuttings, floor sweepings, hair, feathers, hide trimmings can be stabilized by composting. The compost stack is prepared by making heaps of waste and for preparation of compost stack, the layers of waste should be built up to a height of 4 to 5 feet. The heap should preferably be laid direct on the ground. The waste contains large organs such as kidneys and lungs or other similar wastes, then they are not put in whole but need to be minced or chopped into 2 to 3 inch pieces. For better results it is advised to mix these pieces with earth and evenly spread out in the center of the heap where the temperature is high. Higher temperature in compost keeps rats, dogs or other vermin away. The ruminal and intestinal contents provide sufficient moisture for a start of bacterial activities. As such no water is required initially. To achieve optimum conditions for the bacteria, moisture and proper aeration must be maintained from start to finish. A gradual reduction in height will follow, because of the shrinkage of decomposed matter. At least two turnings are required to obtain a uniform compost material. The first turning is normally advised after 2 to 3 weeks and the second turning after 3 to 4 weeks. The compost can be removed after 4 to 5 weeks. This is reasonably enough time for composting, although it depends on many factors, such as type of material, size of heap, ambient temperature etc. The quality of compost can be improved gradually with experience by proper combination of different wastes, providing appropriate time intervals for mixing, and moisture control.

Anaerobic stabilization

Bio methanation of slaughterhouse is done in many places. The success of the process, especially the effective removal BOD has led Biogas plant to be acceptable for slaughter house. Bio methanation plant can be constructed in two ways. The gas is produced in one or more digesters and then it can be stored in a separate gas holder from where it is drawn as and when required. The other alternative is that the digester and gas holder are built so as to form one single unit. The gas is produced in the lower part of the structure, while the upper tank serves as a gas holder. While the second option is extremely simple and cheap in construction, but it has the disadvantage that gas production is affected during recharge. On the other hand, with a separate gas holder, continuous supply of gas can be assured even when one or more digesters are being charged. It is,

therefore, more practicable for larger units to have separate gas holders. Conventional Biogas Plant: Conventional floating drum type Bio methanation (biogas) plant. An inverted drum with a diameter slightly less than that of cylindrical digester serves as gas holder. The plant delivers gas at uniform pressure and provides good seal against gas leakage. It is reliable and has proven performance for cattle dung processing. However, the plant feed on slaughter house wastes such as rumen and paunch contents, dung etc. will also exhibit same performance when loading rate is maintained about 0.5 - 0.6 kg volatile solids / m3/day. The waste should be suitably diluted before feed. The plant can handle feed with solid content up to 8 percent.

The anaerobic ally digested sludge has higher nitrogen content than compost manure. The sludge should be dewatered by sand filtration or filter press. The dried sludge can be utilized as manure in field. The filtrate is recycled for preparation of feed slurry, which contains microorganism. The biogas can be used for boiler or power generation.

Large slaughter house are mostly in cities and located in congested areas. They generate substantial quality of solid wastes, which have to be processed in environmentally acceptable manner. For the large slaughter houses, Bio-methanation of waste and rendering waste are suggested. Bio-methanation requires less space, which is advantageous for the slaughter houses with land constraints.

Bio-methanation waste and rendering waste should also be considered for medium size slaughter houses with an alternative of composting. In the case of small slaughter houses, sophisticated and capital intensive technologies are unviable due to low volume of wastes and non-availability of other infrastructure facilities. For small slaughter houses, a more pragmatic approach would be to make use of natural process such as composting. This would be financially and technically viable and can be acceptable by the small slaughter houses.

Composting

Composting involves the aerobic biological decomposition of organic materials to produce a stable humus-like product. This is a common practice of wastes stabilization but requires proper understanding of the following steps.

• **Feedstock and nutrient balance:** Controlled decomposition of the wastes requires a proper balance of organic materials which contain the right nutrient mix. The ratio must be established on the basis of available carbon rather than total carbon. An initial ratio of 30:1 for carbon: nitrogen is considered ideal. To adjust the carbon: nitrogen ratios, different bio - solids should be added.

• **Particle size:** Grinding, chipping, and shredding materials increases the surface area on which the microorganism can feed. Smaller particles also produce a more homogeneous compost mixture and improve pile insulation to help maintain optimum temperatures. If the particles are too small, however, they might prevent air from flowing freely through the pile.

• **Moisture content:** Microorganisms living in a compost pile need an adequate amount of moisture to survive. Water is the key element that helps transports substances within the compost pile and makes the nutrients in organic material accessible to the microbes. Organic material contains some moisture in varying amounts, but it needs to be supplied on requirement. Excessive moisture can create anaerobic conditions, which may lead to rotting and obnoxious odors.

• **Maintaining pH:** pH affects the amount of nutrients available to the microorganisms, the solubility of heavy metals, and the overall metabolic activity of the microorganisms. A pH between 6 and 8 is normal.

• **Oxygen flow:** Turning the pile, placing the pile on a series of pipes, or including bulking agents such as vegetable matter shall help in better aeration of the pile. Aerating the pile allows decomposition to occur at a faster rate than anaerobic conditions. Care must be taken, however, not to provide too much oxygen, which can dry out the pile and impede the composting process.

• **Temperature:** Microorganisms require a certain temperature range for optimal activity. Certain temperatures promote rapid composting and destroy pathogens. Microbial activity can raise the temperature of the pile's. If the temperature does not increase, anaerobic conditions (i.e., rotting) occur. Controlling the previous four factors can bring about the proper temperature.

Rendering

The objective of rendering process is to physically separate the fat, the water and the solids. All the animal matter such as inedible offal, tissues, meat trimmings, waste and condemned meat, bones etc. can be processed in a rendering system as the main constituents of animal matter are fat, water and solids. Rendering is affected by heating and rupturing connective tissue of individual fat and muscle cells so that raw fat and other material bound within is freed. In rendering, fat recovered is used for industrial purposes, such as soap and greases.

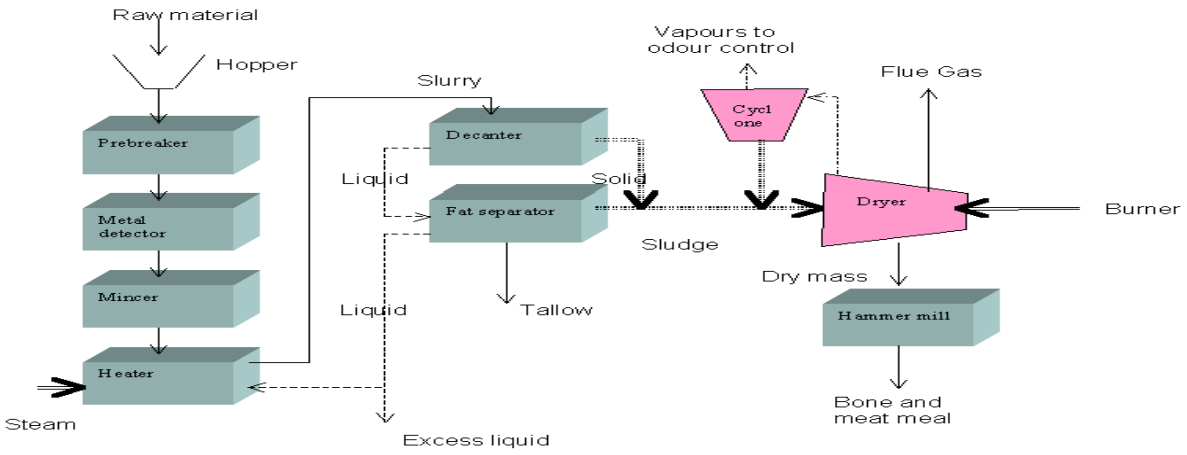
Fat recovered from flesh of healthy parts can also be used for edible purposes. Solid portion, which is known as meat meal or bone meal, is utilized for the manufacture of stock feed and fertilizers. All the animal matter such as inedible offal, tissues, meat trimmings, waste and condemned meat, bones etc. can be processed in rendering system. The main constituents of animal matter are fat, water and solids.

Rendering is carried out in dry rendering or wet rendering plants. In both the processes, large pieces such as heads, bones etc are reduced in size by shredders or other machinery. Large soft offal are also cut to size before processing. Intestines, stomach and similar soft materials contain manure and, therefore, they are opened and cleaned before feeding to rendering plant.

Wet Rendering

The name wet-rendering is applied where the raw material is processed with added water or condensate derived from steam. The wet-rendering tank is usually a vertical, cylindrical boiler, having a cone shaped bottom, with a gate valve outlet.

Wet Rendering Flow Lines



Batch Type Wet Rendering Plant

At the top of the tank there is a manhole through which raw material is loaded, and also a valve through which obnoxious gases escape without reducing the pressure. Steam is injected from the bottom of the tank. Several draw-off cocks on the side of the tank, at different levels, enable the fat and water to be removed. After the raw material is loaded, the manhole is tightly closed and steam is let into the mass. The steam pressure used will very with the material. The higher the pressure, the quicker the disintegration. For this reason, large plants often render the offal at a pressure of 4 kg/cm2. However, high pressure may reduce the quality of the material, especially of the fat. For this reason, a pressure of 3 kg/cm2 is usually maintained in the tank. The time required to disintegrate the tissue and free all the fat varies from four to six hours, depending on the character of the offal. After cooking is completed, the contents of the tank are allowed to settle for about two hours. After settling, clean divisions are formed between the digested material, water and fat. The fat, having the lowest specific gravity, will be on the top, the sludge and solids having the high specific gravity will be at the bottom. The center will be occupied by water. Gradually the pressure is reduced to that of the atmosphere, and then the water and fat are ready to be drawn off through the side cocks. If the fat level is below a cock, the level can be raised as required by addition of water.

Integrated Wet Rendering Plant

After the fat and tank water have been removed, the gate valve is opened and the digested mass of meat and bones is taken out. At this stage the mass may contain up to 55 percent moisture and about 15 percent fat which can be dried in the dryer to obtain meat meal or bone and meat meal. For large operation, integrated continuous rendering plants are used. An integrated rendering plant consists of pre-breaker, metal detector, fat separator, dryer and hammer mill. Total yield of bone and meat meal by wet rendering system is about 30 per cent of raw material weight and tallow about 10 per cent. For large operation, integrated continuous rendering plants are used. An integrated rendering plant consists of prebreak, metal detector, fat separator, dryer and hammer mill.

Dry Rendering

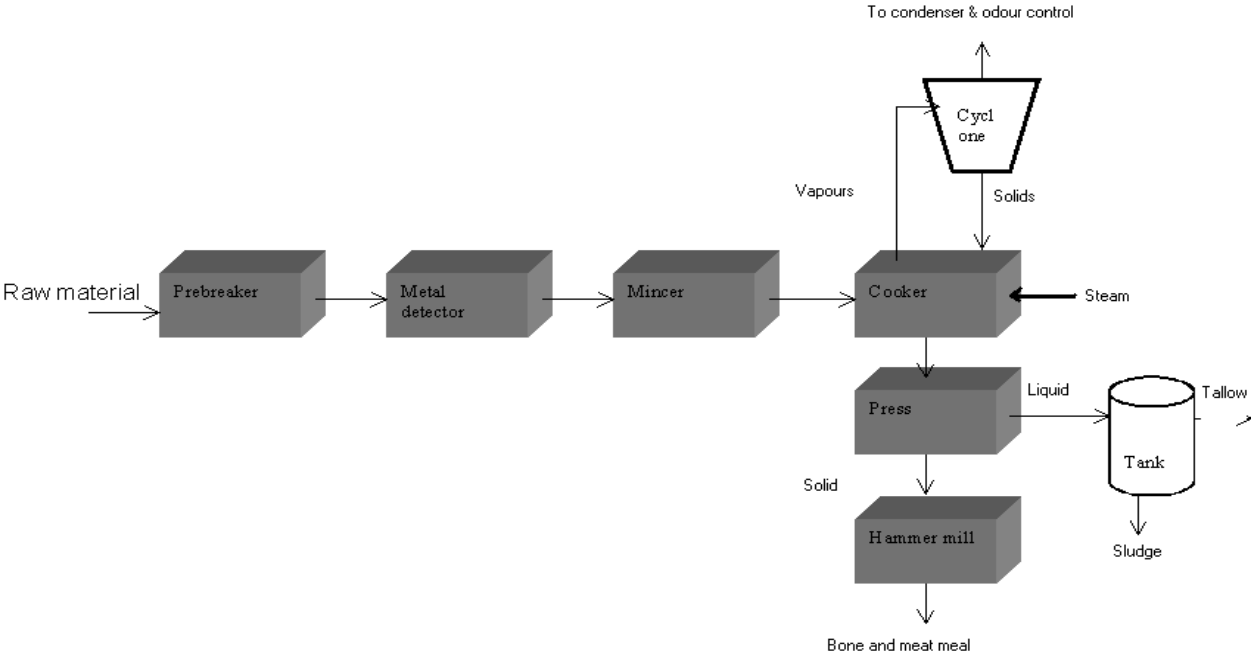
In this process, all the unwanted moisture is eliminated from wastes without the loss of any nutrient by using specially designed cooker. The dry rendering cooker, is a horizontal steam jacket equipped with a set of agitators, which keep the material in continuous motion. The steam is applied to the jacket only and not to the material to be processed, as in wet-rendering. The material remains in the cookers for about 4 to 5 hours in most plants. Steam pressure in the cooker jackets usually ranges from 3 to 4 kg/cm2. The dry heat transmitted from the steam jacket to the raw material converts the moisture present in material into steam, which gradually builds up the internal pressure of cooker. This pressure, combined with agitation, disintegrates the material and breaks down the fat cell.

Dry rendering therefore works on steam pressure develop from the moisture contained in the raw material itself, and not as in wet-rendering, from the pressure created by injected steam. In the wet-rendering process, the fat floats on top of the liquid and is separated out. In dry-rendering, the fat is released from the fat cells but is still dispersed throughout the material. The fat in the solids may be removed by either a hydraulic press or by using a centrifugal turbine fat extractor.

Dry Rendering Plant

The whole process, i.e., sterilization, digestion, and drying, take place in cooker only. Therefore, there is no loss of nutrient. The dry rendering process allows approximately 20 percent higher yields than the wet rendering, as the water containing water-soluble extractives and protenious suspended matter is not discarded. The dry rendering plants have units such as metal detector, pre-breaker, cooker, fat extractor and hammer mill. On an average the plant renders 65 tons/day of animal matters to produce 20.25 tons bone and meat meal and 8 tones tallow in a day.

Dry Render Flow Lines



Approximate Rendering - Raw Material Volumes

Species	Developed Country	Developing Country
Cattle	0-5 kg/ head	75-100 kg/ head
Sheep	0-1 kg/ head	4-8 kg/ head
Pig	0 – 1 kg/ head	2-10 kg/ head
Poultry	0- 0.2kg/ head	0.2 – 0.5 kg/ head

Quantity of Solid Waste

Animal	Kg/Head	TLWK	% of Animal Weight
Bobine	83	275	27.5
Sheep/ goat	2.5	175	17
Pig	2.3	40	4

TLWK- Total Livestock Weight Killed

15.7 MANAGEMENT OF SEMISOLID, LIQUID AND EFFLUENT

The processing plant produces highly polluting waste waters, semi – solids and solids, which must be separated and treated before being discharged into the environment. The objective of effluent treatment is to produce a product that can be safely discharged into a water or sewer in compliance with the recommended limits for discharge.

Effluents can be divided into four categories:

1. Non – toxic and not directly pollutant but liable to disturb the physical nature of the receiving water.
2. Non – toxic and pollutant due to organic matter content of high oxygen demand.
3. Toxic – containing highly poisonous materials.
4. Toxic and pollutant due to organic matter of high oxygen demand and toxic in addition.

The first priorities are to separate effluent from storm water and solids from fluid and to lessen the amount of treatment required. This can be achieved by the use of grills over drains, fat, traps and other preliminary treatments, along with continuous dry cleaning during the operation of the plant at breaks in production.

Liquid Waste/Effluent

During the above-mentioned operations, the waste generated is of liquid and solid nature. The liquid waste should be washed away by safe potable and constant supply of fresh water at adequate pressure throughout the premises of slaughtering. The waste water from slaughter house is heavy in pollution and, therefore, it should not be allowed to mix with the municipal drain system without pre-treatment meeting sewage standards as per the EPA 1997.

The waste water treatment system should essentially comprise of,

(i) Self-cleaning type screening or two stage screening (Bar type);

(ii) Anaerobic treatment;

(iii) Aerobic treatment; and

(iv) Filter press for dewatering of the sludge.

For the treatment of liquid waste/effluent from slaughter houses, the guidelines contained in the policies, acts, regulations, guidelines and manuals.

Pollution parameters

Biochemical oxygen demand (BOD)

It is a measure of the readily biodegradable material in an effluent. It is obtained by measuring the oxygen consumed by aerobic organisms, when a known volume of the effluent is added to a known volume of oxygen – saturated water and incubated at 200C for 5 days. It is usual practice to determine the concentration of pollutant after treatment and prior to discharge.

Chemical oxygen demand (COD)

It is a measure of the oxygen required for the oxidation of all organic matter in a known volume of effluent, using a standard technique. The COD is often used as an accurate means of determining the oxygen requirements of an effluent before treatment. BOD is more appropriate measurement than COD for discharge consents.

Chloride (Cl) is a measure of salinity.

Dry matter (DM) or total solids (TS) are the final weight of a known amount of effluent that has been dried to a constant weight at 105 0C over 24 hours. It is measured in g/ liter or mg/ liter.

Grease, fat and oil are a group of substances having common properties of immiscibility with water and a lower specific gravity causes to float. The concentrations are measured by the amount of solvent required for the effluent to become soluble.

pH is defined as the reciprocal of negative logarithm of hydrogen ion concentration. It is an expression of the degree of acidity or alkalinity of a substance. Pure water has a **pH value of 7.0**

Nitrogen (N)

It is found in three forms in effluents

a) Organic nitrogen
b) Ammonium salts
c) Dissolved ammonia gas and nitrates which are found in aerobically treated effluents.

Ammonia in solution is toxic to aquatic life; the maximum discharge to sewers is **40 mg / liters**. The maximum level in portable water **0.5 mg/ liter.**

Suspended solids (SS)

The organic material which is insoluble and is suspended in the water will eventually be degraded and add to the BOD.

Pathogenic bacteria

Portable water should not contain any Coliform organisms.

Temperature

The temperature should not be more than a few degrees above the temperature of the receiving water in order not to disturb the natural biocycle.

Turbidity and color

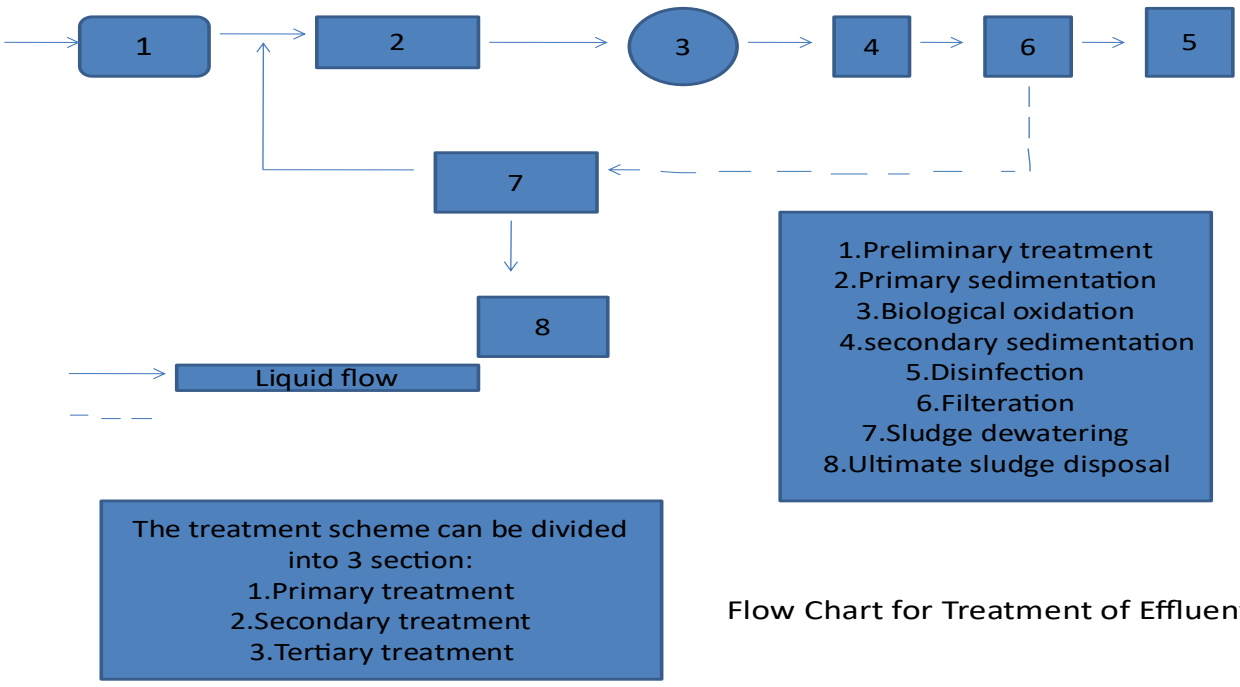
Effluent should be clear and colorless.

Volatile solids (VS) are used as a measure of bio- gas production

The typical characteristics of the effluent coming out from the slaughter house are as follows:

Parameters Characteristic

1. Quantity - 2000 cum/day
2. Total solids - 4000 mg/1
3. BOD - 4000 mg/1
4. COD - 8000 mg/1
5. pH - 6 to 7



Flow Chart for Treatment of Effluent

Solid Waste (Manure) Management

Animal	Type	Animal Holding Time	Work Force Person	Working Hours	Water Requirements Lt per day	Electricity Requirements Approx.
Buffalo	Small (15)	2 days	12–15	8	15,000–20,000	40–75-100 kW/day
	Medium (75-100)	2 days	45–75-100	8	75-100,000–80,000	120–180 kW/day

	Large (155)	2 days	120-150–130	8	175-100-75,000–200,000	300–475-100-75 kW/day
Pig	Small (30)	2 days	10–15	8	6,000–10,000	30–75-100-75 kW/day
	Medium (120)	2 days	35–75-100-75	8	25,000–40,000	120-150–175-100-75 kW/day
	Large (310)	2 days	80–110	8	70,000–120-150,000	275-100-75–375-100-75 kW/day
Goat	Small (75)	2 days	10–15	8	5,000–8,000	25–40 kW/day
	Medium (300)	2 days	35–45	8	20,000–30,000	80–120 kW/day
	Large (775)	2 days	80–120-150	8	75-100-75,000–80,000	200–300 kW/day

CHAPTER XVI
RECOMMENDATIONS

16.1 Adoption of Standard Templates

To promote uniformity, efficiency and compliance with national and international standards, it is recommended that standardized design templates be adopted for slaughterhouse development. Standard templates should include layout plans, process flow, utility requirements, equipment specifications, biosecurity measures, waste management systems and food safety provisions. Using standardized designs will reduce planning time, improve construction quality, facilitate regulatory approval and ensure that slaughterhouses consistently meet the requirements of HACCP, Good Hygienic Practices (GHP), Good Manufacturing Practices (GMP), Codex Alimentarius and relevant national regulations.

16.2 Capacity-Based Construction

Slaughterhouses should be planned and constructed based on the expected number and type of animals to be processed each day. Capacity-based construction ensures that facilities, utilities, manpower, equipment, chilling capacity and waste management systems are appropriately sized to meet operational demands without unnecessary investment or underutilization. Standardized designs for different capacities such as 100 goats/day, 75 pigs/day, and 50 buffalo/day will enable local governments and investors to select facilities that match local livestock availability, market demand and future expansion requirements while maintaining operational efficiency and food safety.

16.3 Local Government Implementation Strategy

Local governments should adopt a phased implementation strategy for slaughterhouse development based on regional livestock production, market demand and available financial resources. Priority should be given to municipalities with high livestock populations and inadequate slaughter facilities. Implementation should include land identification, preparation of detailed project reports (DPRs), allocation of sufficient budget, compliance with environmental and veterinary regulations and establishment of effective operation and maintenance mechanisms. Public-private partnerships (PPP), cooperative management models and private sector participation should be encouraged to improve operational sustainability. Continuous training of personnel, regular veterinary inspection, strict enforcement of food safety standards and routine monitoring should be integrated into the implementation strategy to ensure hygienic meat production and long-term success of the facilities.

16.4 Animal Traceability and Biosecurity

To ensure food safety, animal health, disease prevention and compliance with national and international standards, the following biosecurity and traceability measures shall be incorporated into the design and operation of the slaughterhouse.

Animal Traceability

Every animal presented for slaughter shall have complete traceability records identifying its origin. The slaughterhouse shall maintain verifiable records of the animal's source and movement history for a minimum period of three months prior to the planned date of slaughter.

Livestock Inventory Management

The slaughterhouse shall maintain an updated inventory of animals scheduled for slaughter for at least one week's operational requirement. The inventory records shall be readily available for inspection by the competent authority and maintained within or in the immediate vicinity of the slaughterhouse.

Quarantine and Disease Control

Animals originating from areas outside a designated Foot-and-Mouth Disease (FMD)-Free Zone shall not be permitted to enter the slaughterhouse without completing the prescribed quarantine period in accordance with the prevailing regulations of the Government of Nepal. The slaughterhouse shall provide a properly designed quarantine facility equipped with adequate feeding, watering, veterinary care and animal welfare provisions.

Veterinary Supervision

The slaughterhouse shall operate under the supervision of a qualified Chief Veterinary Officer responsible for implementing disease surveillance, biosecurity measures, ante-mortem and post-mortem inspection and compliance with national regulations and internationally accepted slaughterhouse standards. Qualified veterinary personnel shall also be assigned to supervise quarantine operations and monitor animal health.

Animal Identification and Digital Record System

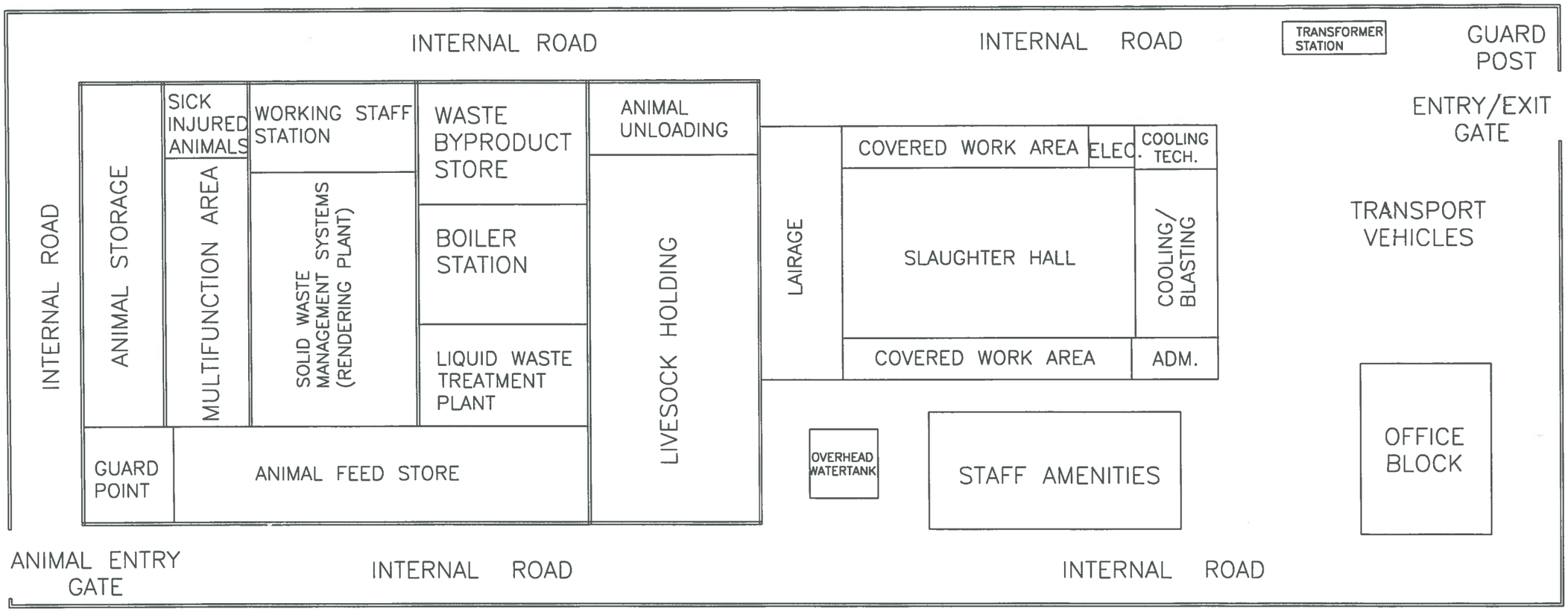
Every animal shall carry a unique identification tag linked to a digital record containing as applicable, the animal's date of birth, farm or source of origin, movement history, vaccination records, medication history, feeding records and other relevant health information. These records shall be maintained to support full traceability throughout the slaughtering process.

Authorization for Slaughter

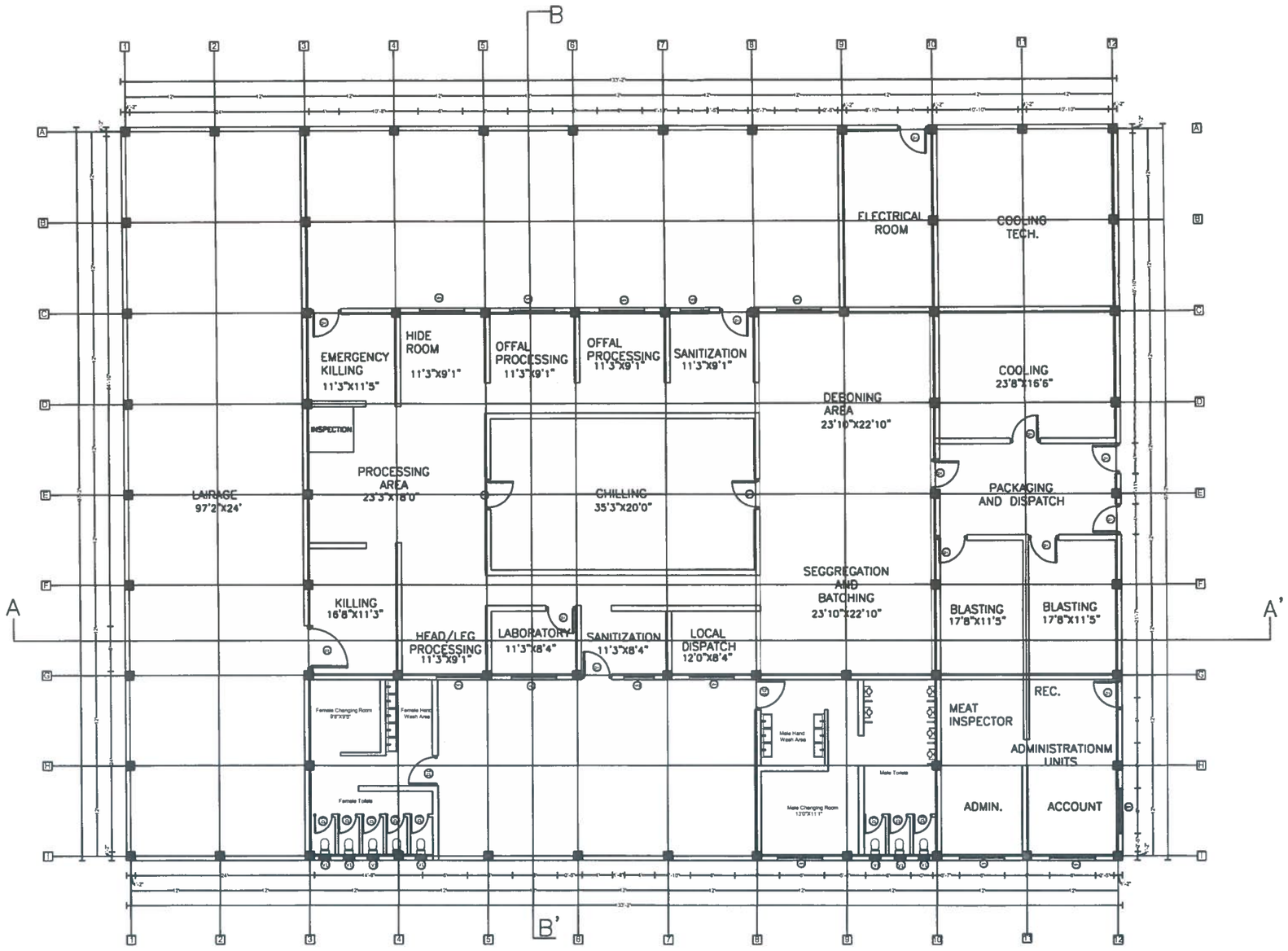
Animals shall not be transferred from the quarantine or receiving area to the final lairage or slaughter line until all required veterinary inspections and documentary verifications have been completed and authorization has been granted by the competent authority in accordance with the applicable laws and regulations of the Government of Nepal.

Annex 1:

Engineering Drawings for 50 buffalo slaughterhouses



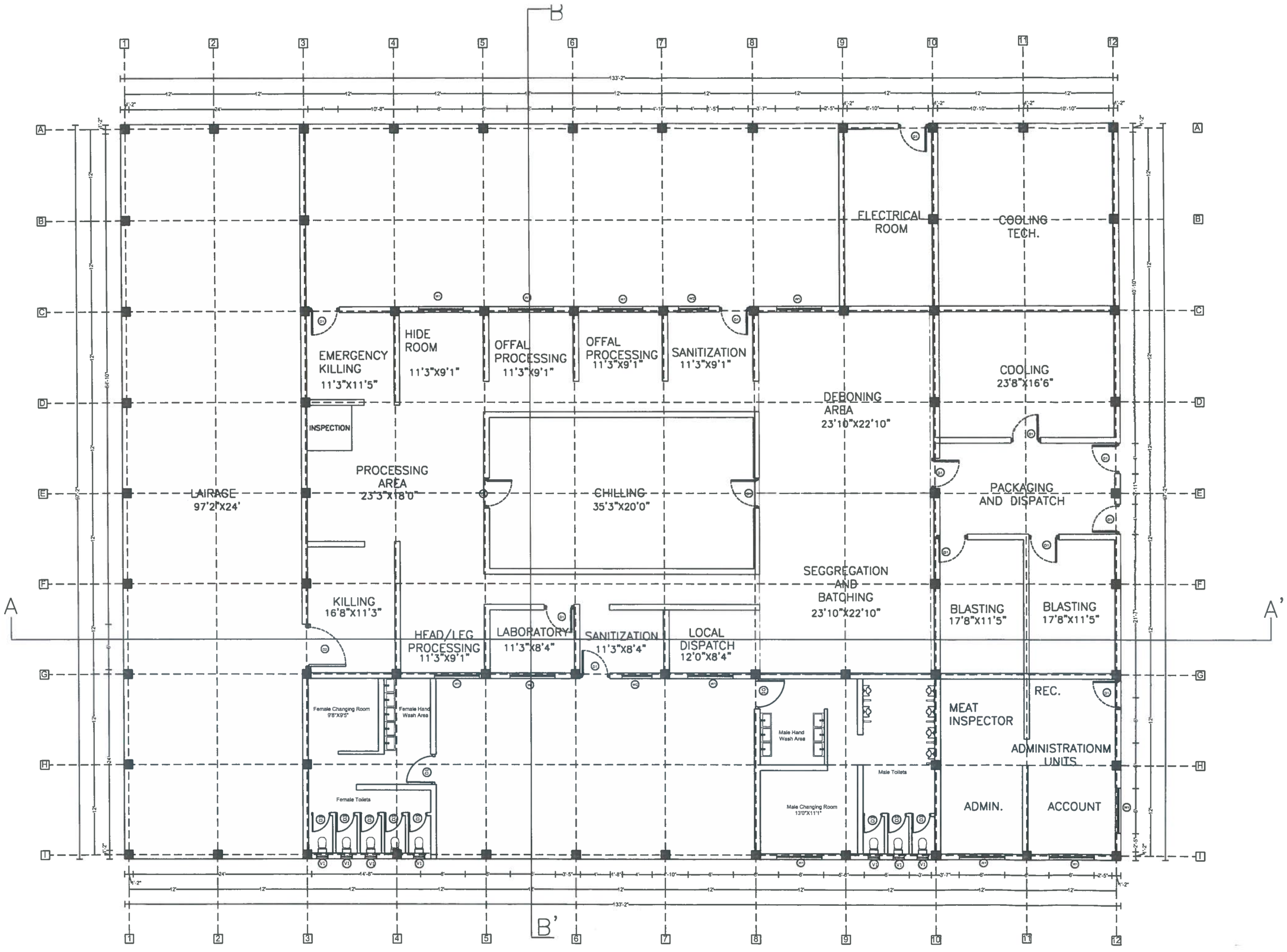
Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House 50 Buffaloes Dwg.Title: Master Plan	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:400 Date: Jun 2026	Sheet No: 01



SLAUGHTER HALL AND COLD STORE

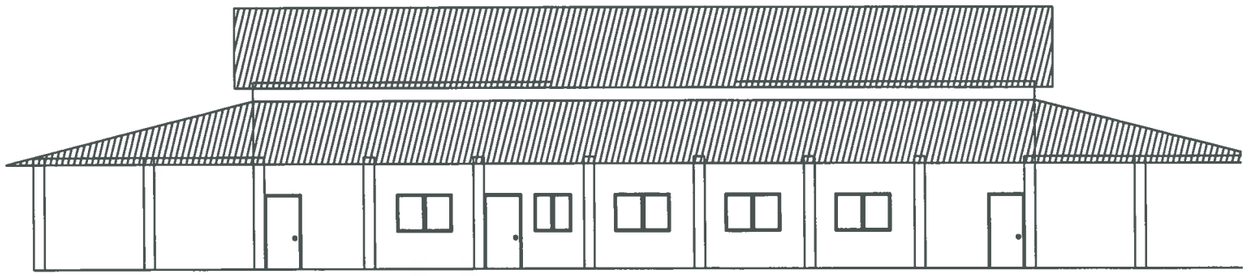
AREA : 12939.36 SQ. FT

Nepal Government Ministry of Agriculture, Forest and Environment **Department of Livestock Services** Hariharbhawan, Lalitpur, Nepal	Design By: **Alaana International Services P.Ltd.** Kathmandu, Nepal	Project Title: Model Slaughter House 50 Buffalo Dwg.Title: Architectural Floor Plan	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:200 Date: Jun 2026	Sheet No: 02

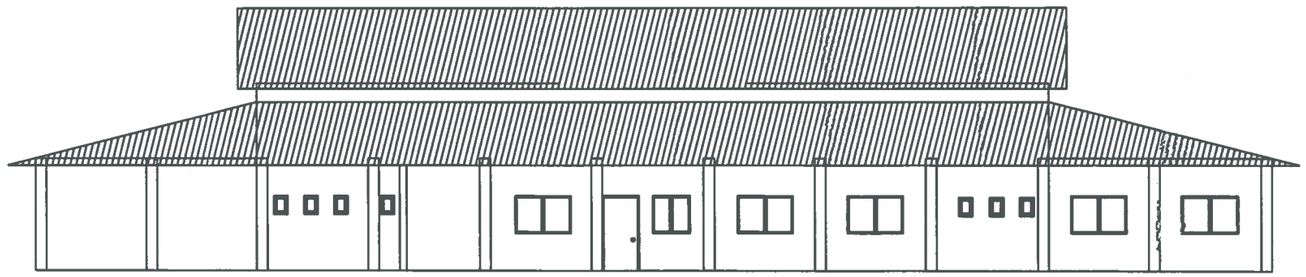


SLAUGHTER HALL AND COLD STORE

AREA : 12939.36 SQ. FT



RIGHT ELEVATION



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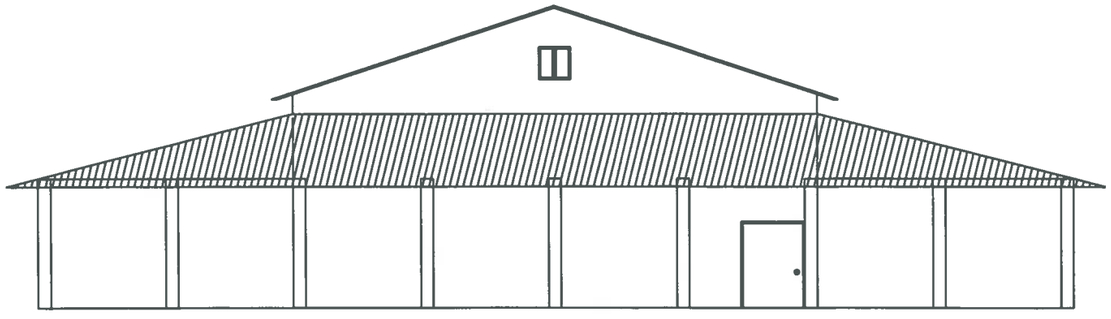
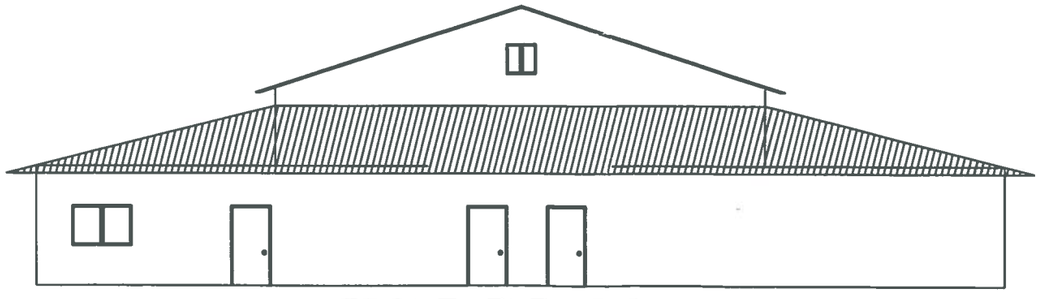
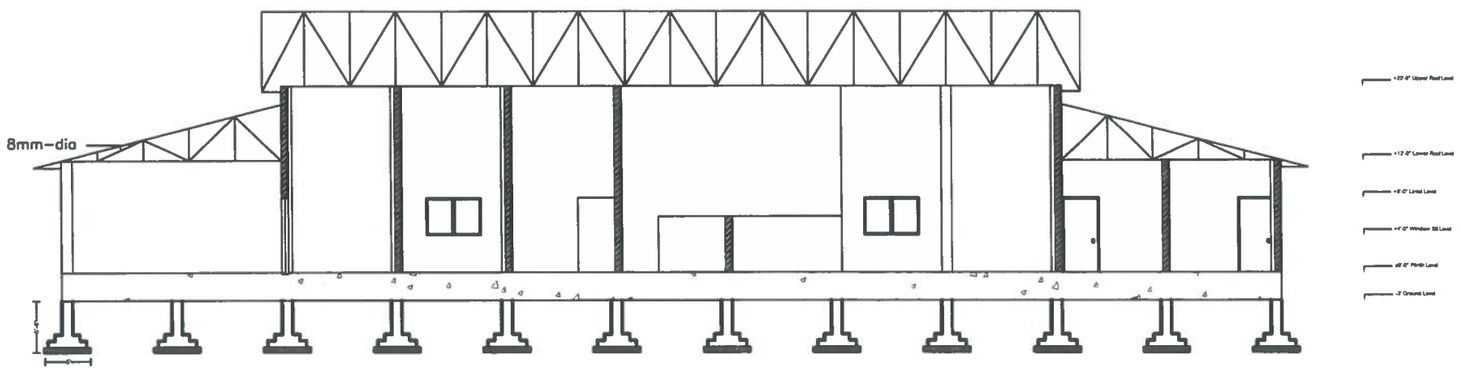


BACK ELEVATION



FRONT ELEVATION

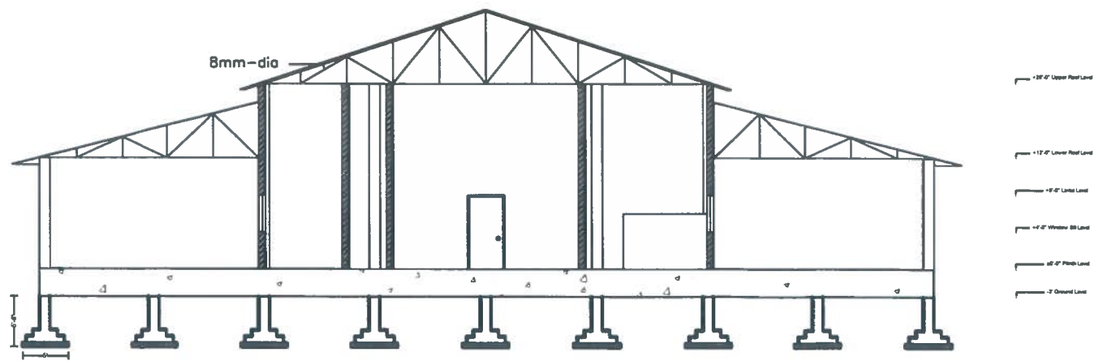
Nepal Government Ministry of Agriculture, Forest and Environment **Department of Livestock Services** Hariharbhawan, Lalitpur, Nepal	Design By: **Alaana International Services P.Ltd.** Kathmandu, Nepal	Project Title: Model Slaughter House 50 Buffaloes Dwg.Title: Architectural Elevations	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	N W E S	Sheet No: 03



SECTION A–A'

OPENING SCHEDULE

SN	DESCRIPTION	NO.	SIZE
1	DOOR D1	14	4' X 8'
2	DOOR D2	1	6' X 8'
3	DOOR D3	8	2'6" X 8'
4	WINDOW W1	11	6' X 4'
5	WINDOW W2	2	4' X 4'
6	VENTILATION V1	7	2' X 1'6"
7	VENTILATION V2	2	3' X 3'



SECTION B–B'

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House 50 Buffaloes Dwg.Title: Architectural Section and Opening Schedules	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:200 Date: Jun 2026	N W E S	Sheet No: 04

Annex 2:

Quantity Estimates for 50 buffalo slaughterhouses

Department of Livestock Services

Project :Model Slaughter house

Processing : 50 Buffaloes

COST ESTIMATE FOR Construction works of Building including Material and Labour.

Date: June 2026

SUMMARY OF COST ESTIMATES

S.N.	Description	Amount	Remarks
1	Civil Works	42,231,572.02	
2	Electrical & Allied Works	2,168,930.00	
3	Water-supply & Sanitary Works	2,533,894.32	
4	Refrigeration Units Installations	8,446,314.40	
5	Hanging Rail and Mechanical Accessori	4,645,472.92	
6	Administratives and Amenities furnishir	2,111,578.60	
	Total Amount (NRs.)	**62,137,762**	
	VAT @ 13 %	8,077,909.09	
	G. Total Amount (NRs.)	**70,215,671**	
In Words: Seven Crore Two Lakhs Fifteen Thousand Six Hundred and Seventy One Nepalese Rupees Only			

Department of Livestock Services

Project : Slaughter house for 50 Buffaloes

Civil Work Quantity of a slaughter house Date: June 2026

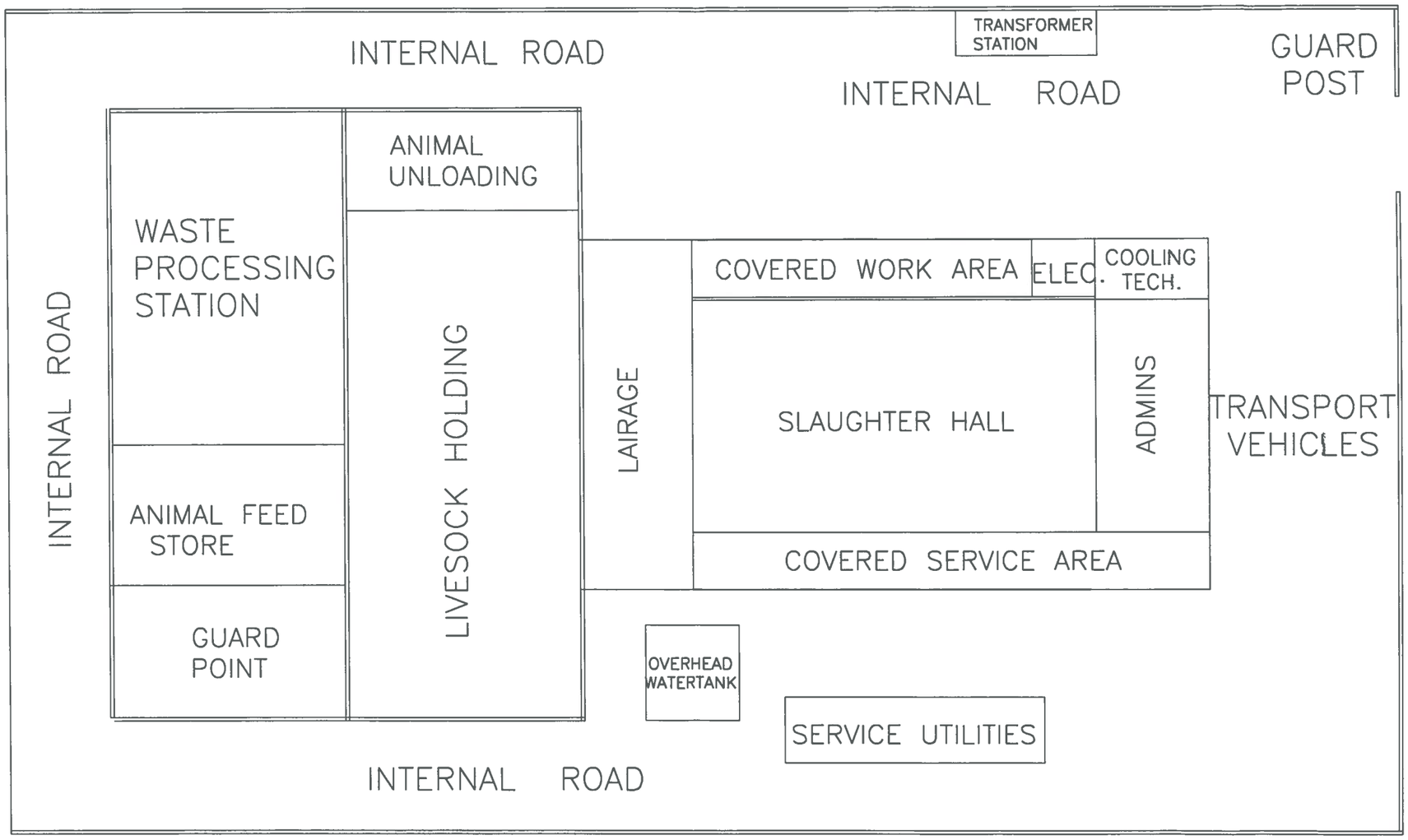
Item No.	Description of Works	Unit	Quantity
1	**EARTHWORK EXCAVATION**		
	E/W in excavation for foundation trenches, water tanks, etc. including labours, tools/ plants (showel, axe, etc.), stacking excess earth clear from building line including ramming of trench bottom, shoring/ supporting the sides of trenches.	Cft	14930.00
2	**EARTHWOR FILLING (Excavated Soil)**		
	E/W in filling in floor with manual means with excavated materials/ soil including labour, tools, plants, etc.	Cft	7,465.00
3	**EARTHWOR FILLING (ImportedSoil)**		
	E/W in filling in floor with manual means with excavated materials/ soil including labour, tools, plants, etc.	Cft	29,784.00
4	**BRICK SOLING**		
	Dry Brick Flat soling in foundation and floor with 1st class bricks complete to level as per specification and direction complete work.	Sqft	16,313.56
5	**1:2:4 PCC WORK**		
	Plain Cement Concrete (P.C.C.) in 1:2:4 in foundation and floor with cement, sand and aggregate including mixing, laying, finishing to approved level, line and dimensions and curing all complete as per specification and direction.	Cft	4,078.39
6	**1:1.5:3 PCC FOR RCC WORK**		
	Do but P.C.C.(1:1.5:3) M20 for R.C.C.work in foundation, beams, slabs, lintels etc. with cement, sand, and stone ballast 38mm. Gauge including mixing with concrete mixture, compacting the concrete with vibrator machine, laying, finishing to approved level ,lines and dimensions and curing all complete nett.	Cft	6,967.00
7	**REINFORCEMENT WORK**		
	TMT /TOR steel reinforcement bar tested including straightening, cleaning, cutting, bending and fixing in position with 20 B. G. annealed binding wire as per drawing and instruction complete work	Kg	42,817.00
8	**FORMWORK**		
	19mm thick waterproof plywood formwork with steel props, shuttering, centering for all works necessary proping, scaffoldong, staging, suppoting inclusive of wedging and cutting holes for utilization work till the suport is full unyielding nett for COLUMNS/BEAMS/SLABS complete work.	Sqft	16,617.00
9	**MASONRY WORK (Brick):**		
	Local/ Chinese chimney Brickwork in cement sand mortar in foundation and superstructure with 1st class bricks in perfect line and level including wetting the bricks,packing the joints and curing the work in all types and thickness of walls, column, etc. all complete work.		
9.1	In cement sand mortar 1:6 ratio for 9" and 14" brick walls	Cft	15,440.78
10	**PLASTERING WORKS**		
10.1	Outside plastering works in perfect plumb and lines/ levels with 1:4 C/S mortar for all floors including material and labours, tools, plants, scaffolding all complete.	Sqft	7,152.00

10.2	Inside plastering works in perfect plumb and lines/ levels with 1:4 C/S mortar for all floors including material and labours, tools, plants, scaffolding all complete.	Sqft	27,994.00
11	**FLOORING WORKS:**		
11.1	Supply and laying of **IPS floor finish** of maximum upto 38 mm thick 1:2:4 cement : sand : chips (10mm aggregate or pea grave) ratio supply of materials, curing, levelling to the required.	Sqft	12,939.36
11.2	Supply, laying and application of 3mm 1:1 c/s ratio punning for skirting and plastered floor/ wall surfaces including leveling, troweled to smooth, curing all complete including labour and materials.	Rft	1,255.88
12	**PAINTING WORKS:**		
12.1	Supply and applying of two or more coats of Putty on plastered surface of wall and ceiling including materials and labour with surface preperation by sanding all complete.	Sqft	27,924.00
12.2	Supply and applying of two coats of interior emulsion paint with primer of desired shade/ colour over putty applied surface of wall and ceiling including materials and labour with surface preperation, filling and finishing all complete.	Sqft	27,924.00
12.3	Supply and applying of two or more coats of Putty on external plastered surface of wall materials and labour with surface preperation by sanding all complete.	Sqft	7,152.00
12.4	Supply and applying of two coats of Exterior Weather coat paint with primer over exterior putty on external plastered surface of wall including materials and labour with surface preperation all complete.	Sqft	7,152.00
12.5	Supply and applying of two coats of Enamel paint with primer on door and window including materials and labour with surface preperation all complete.	Sqft	1,848.00
13	**WOOD WORKS:**		
	Preperation of Salwood Door(chaukhat) as per drawing and specification including supply of materials, labours, making as per design/ details, fixing it to perfect position, moulding on edges, grooves for plasters, fixing with necessary MS	Cuft	38.23
14	**DOORS AND WINDOW WORK INCLUDING TITANIUM OR BRONZE COLOUR PAINTING OR ENAMEL/CHOPRA POLISH FINISHING:**		
14.1	Supplying and fitting Ready made Teak wood Doors, special (Seasoned and poisoned treated, one side teak) with all necessary hardware all complete.	Sqft	632.00
14.2	Aluminium window shutters with approved quality of Agarani or equivalent including nails, bolts, handles all complete as per design, drawings, specifications and instructions of the Engineer.	Sqft	335.00
14.3	38mm thick Salwood Panel door with 4mm teak at both side with necessary hardwares and locking arrangement and painting polishing.	Sqft	48.00
15	**METAL WORKS**		

	Providing, fabricating and erecting structural steel roof truss system including trusses, purlins, sag rods, wind bracing, gusset plates, cleats, connection plates, anchor bolts, welding, bolting, erection, alignment, one coat of red oxide primer and two coats of approved paint, complete as per drawings and specifications.	Sqft	22,756.00
16	**CGI SHEET**		
	Providing and fixing 0.50 mm thick pre-painted corrugated galvanized iron (PPGI/CGI) roofing sheets of approved colour and profile, including side and end laps, J/L hooks, galvanized nuts and bolts, bitumen/neoprene washers, ridge cap, flashings, cutting, fitting and all necessary accessories, complete in all respects as per drawings and specifications.	Sqft	22,756.00
17	**CERAMIC FLOOR / WALL TILE**		
	Ceramic floor & wall plain tiles flooring on T & B, laid with 1 : 1 cement sand mortar including 12.5 to 50 mm thick bed of PCC 1 : 2 : 4 cement sand & 6 to 12.5 mm aggregate in proper slope for draining water, finishing the joints with necessary white cement and pigment (if necessary) all complete as per design, drawing, specification & instructions of the Engineer.	Sqft	22,781.00

Annex 7:

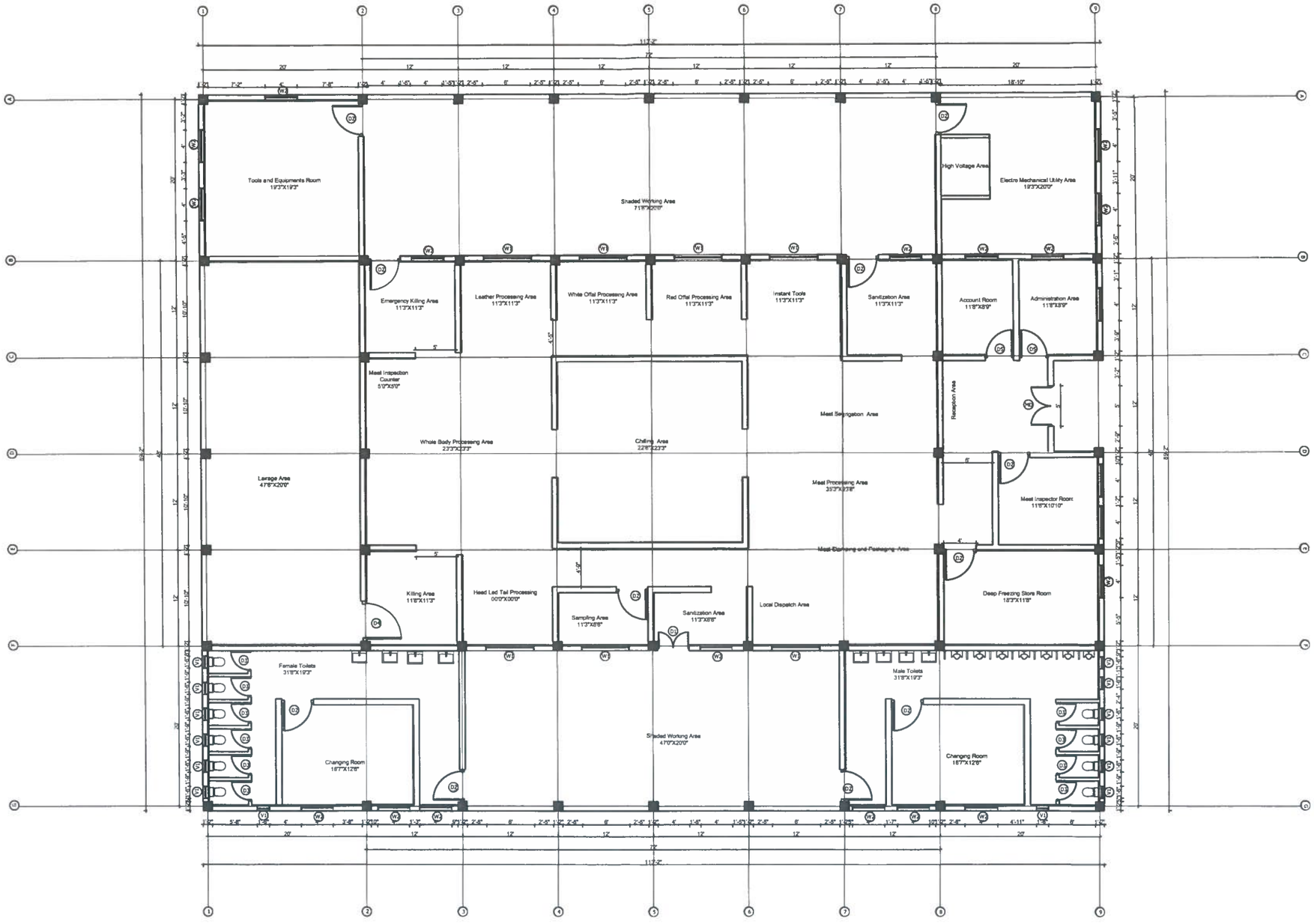
Engineering Drawings for standard slaughterhouse for 20 buffalo, 50 pigs and 100 goats



MASTER PLAN

Area Rdequired: 9 Ropani

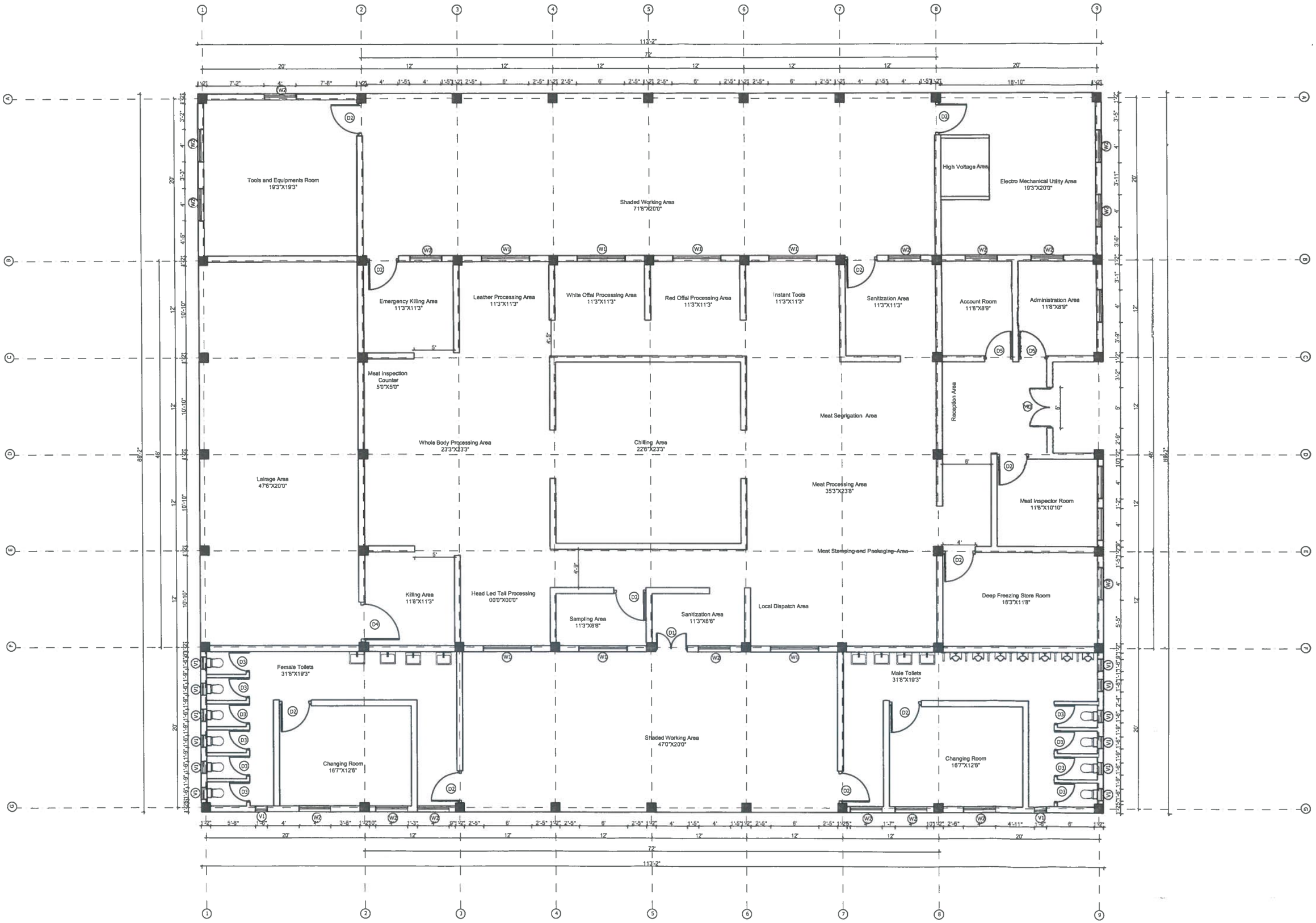
Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar	Drawn By: Sweksha Poudel	Scale: 1:100	N W E S	Sheet No: 01
		Dwg.Title: Master Plan	Checked By: Bharat Acharya	Date: Jun 2026		



FLOOR PLAN

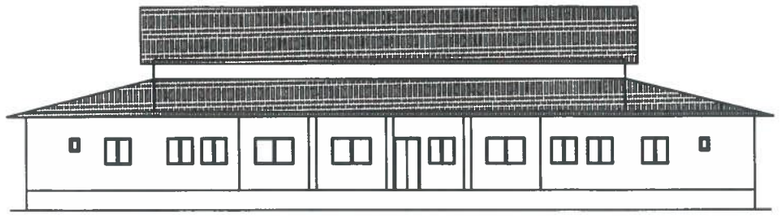
Area: 10,090 sq.ft.

Nepal Government Ministry of Agriculture, Forest and Environment **Department of Livestock Services** Hariharbhawan, Lalitpur, Nepal	Design By: **Alaana International Services P.Ltd.** Kathmandu, Nepal	Project Title: Model Slaughter House Standar Dwg.Title: Architectural Floor Plan	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	N W E S	Sheet No: 02

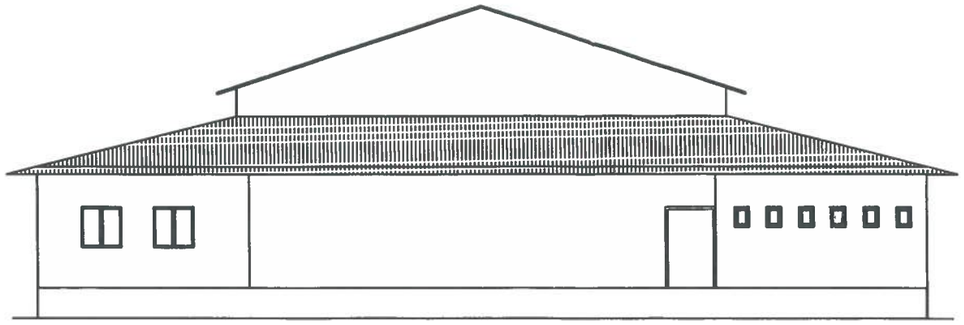


FLOOR PLAN

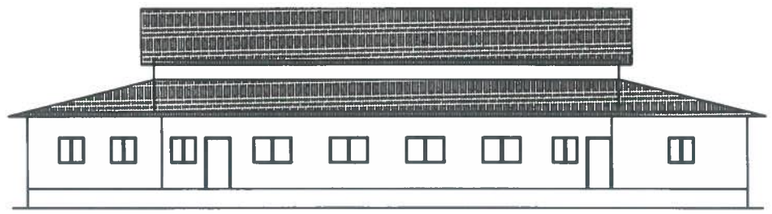
Area: 10,090 sq.ft.



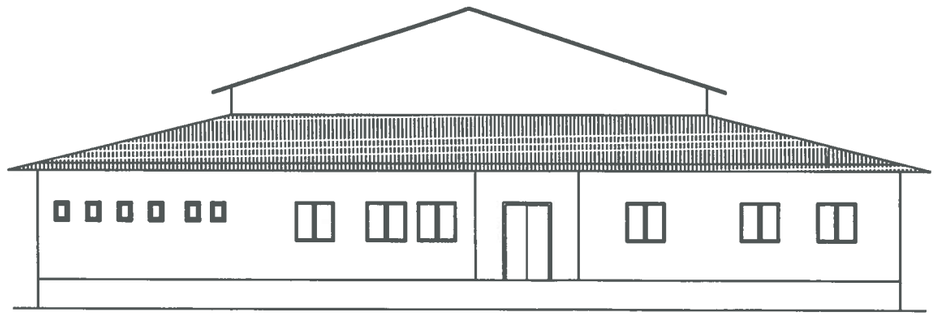
SIDE ELEVATION



BACK ELEVATION

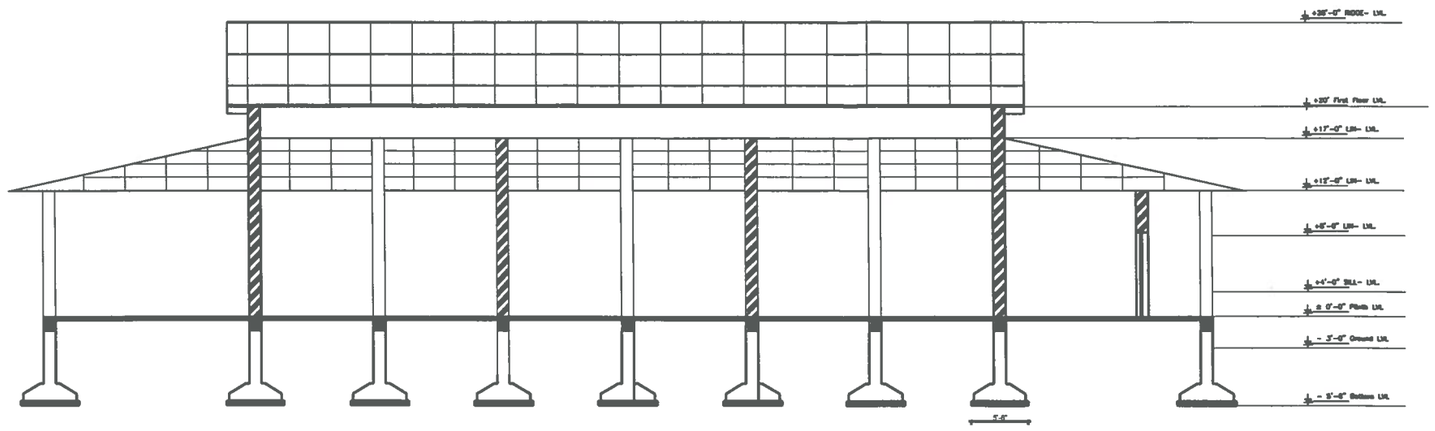


SIDE ELEVATION

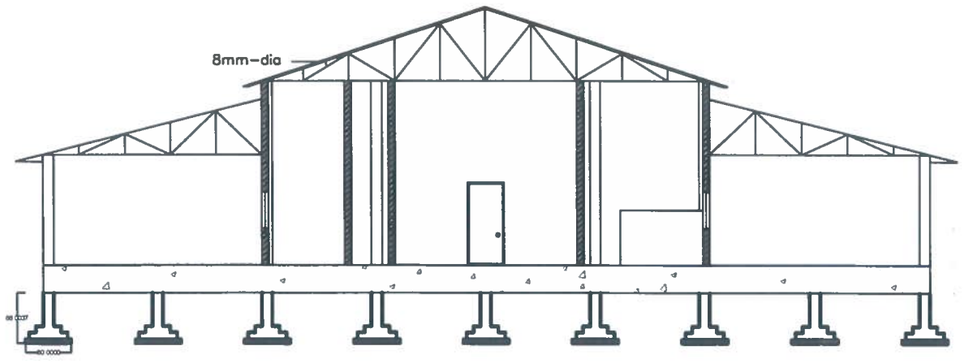


FRONT ELEVATION

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar Dwg.Title: Architectural Elevations	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	N W E S	Sheet No: 03



SECTION AT A-A

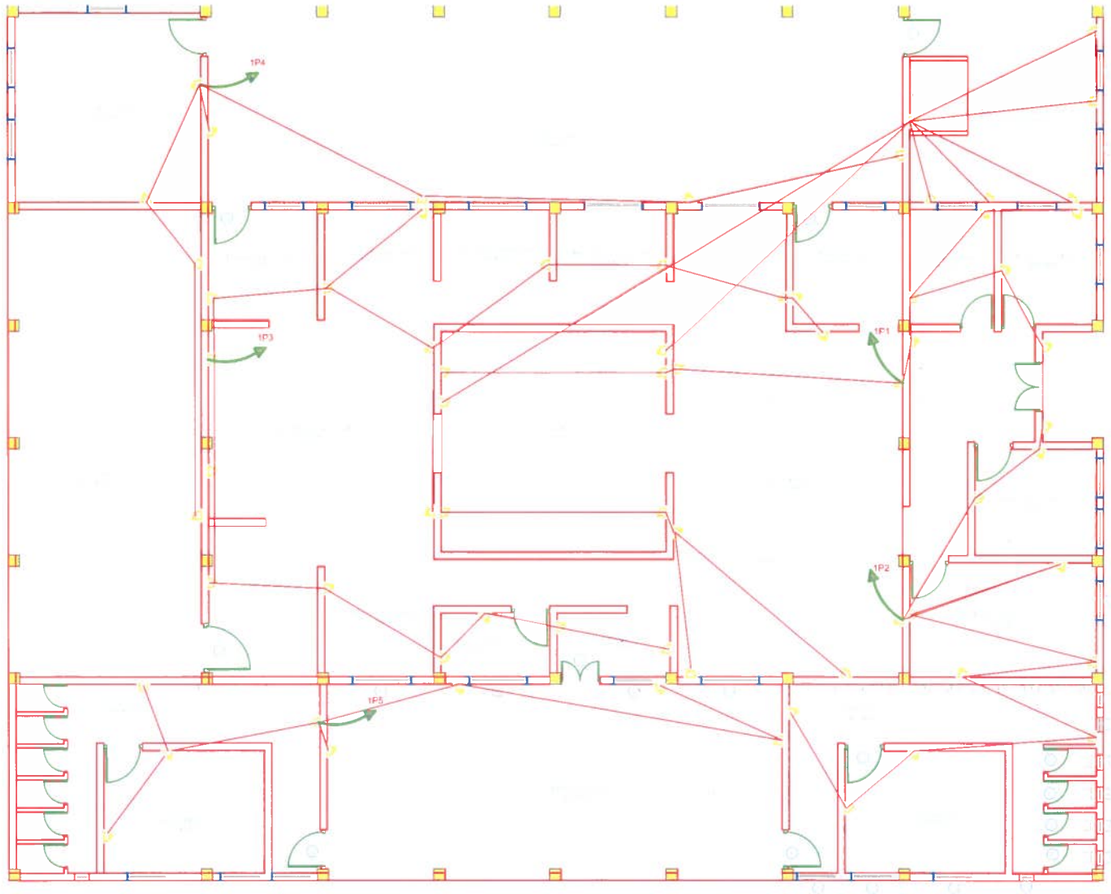


SECTION B-B'

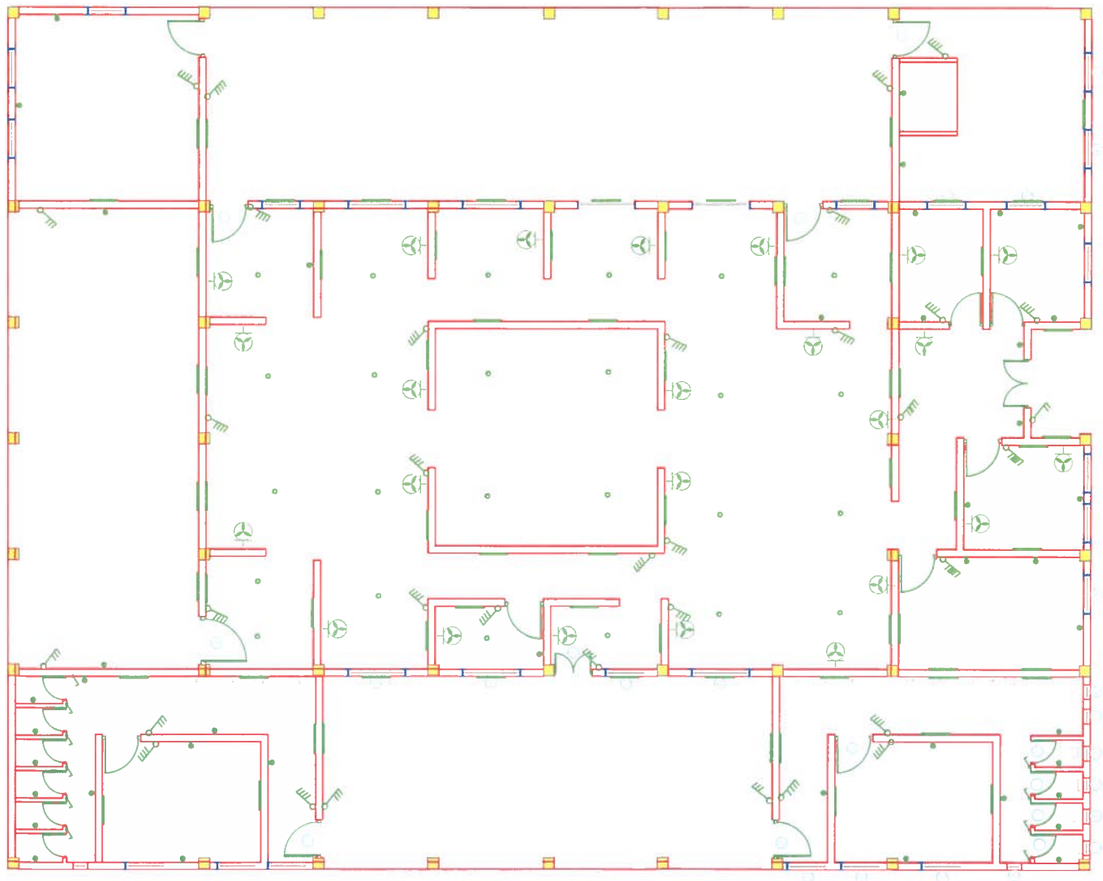
OPENING SCHEDULE

sn	Description	Size	No.
1	Main Door MD	5'-0" x 8'-0"	1
2	Door D1	4'-0" x 8'0"	1
3	Door D2	4'-0" x 8'0"	11
4	Door D3	2'-6" x 7'-0"	10
5	Door D4	5'0" x 8'-0"	1
6	Door D5	3'6" x 8'-0"	2
7	Window W1	6'0" x 4'-0"	7
8	Window W2	4'-0" x 4'-0"	20
9	Ventilation V1	2'-0" x 1'-8"	14

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar	Drawn By: Sweksha Poudel	Scale: 1:100	Sheet No: 04
		Dwg.Title: Architectural Section and Opening Schedules	Checked By: Bharat Acharya	Date: Jun 2026	

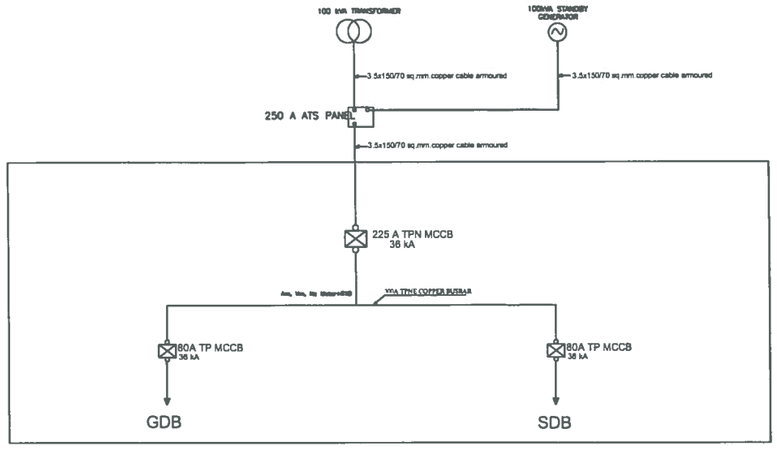


ELECTRICAL POWER PLAN

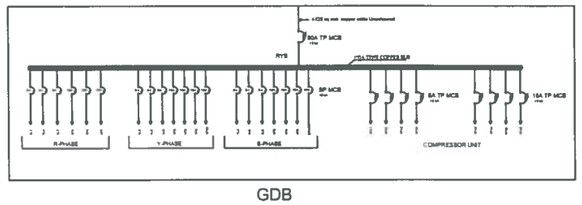


ELECTRICAL LIGHTING FIXTURE PLAN

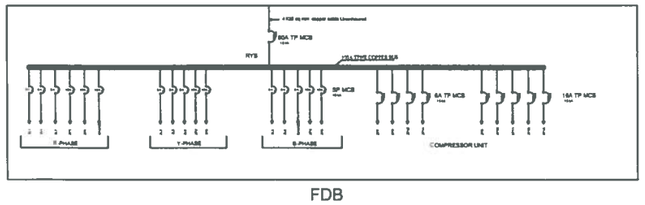
Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar	Drawn By: Sweksha Poudel	Scale: 1:100	N W E S	Sheet No: 05
		Dwg.Title: Electric Power and Fixture Layout Plan	Checked By: Bharat Acharya	Date: Jun 2026		



MAIN PANEL BOARD (MPB)



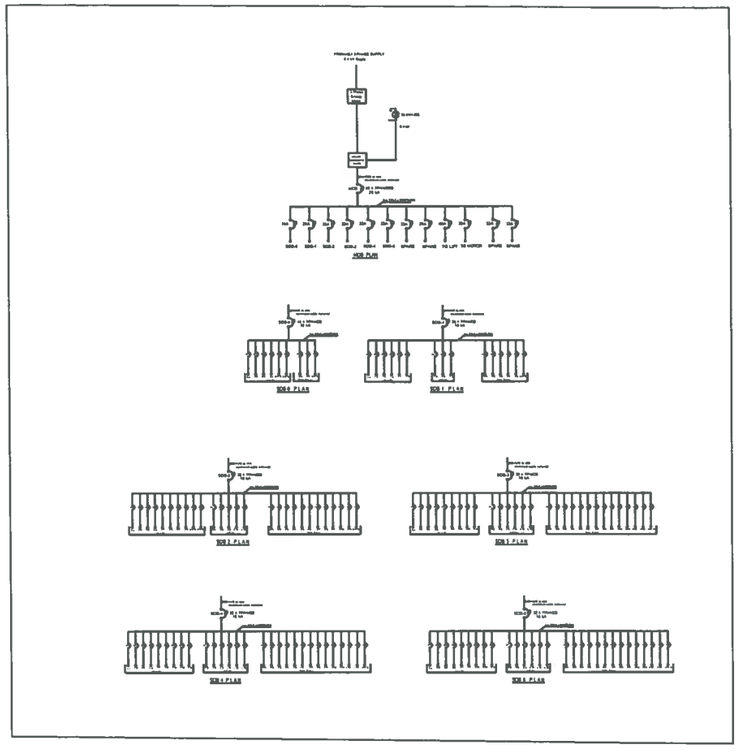
GDB



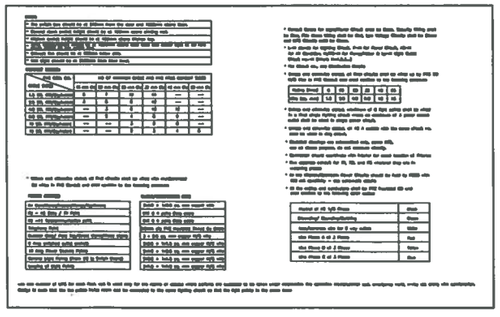
FDB

OVERALL SCHEMATIC POWER DISTRIBUTION DIAGRAM WITH CABLE SCHEDULE

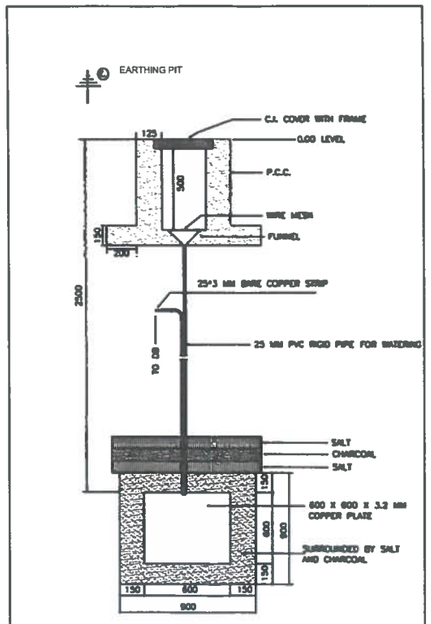
Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar Dwg.Title: Electric Power Distribution schedules	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	Sheet No: 06



LEGEND	
	1,2,3,4,6 Gang Switches
	1,2 Gang 2 Way Switches
	10W Sq. LED Panel
	6W Round LED Downlight
	1x20W LED Diffused Tube Light
	25W LED Panel sq Light
	12W Mirror Light
	18W Batten LED Tube Light
	1x22W LED Pendent Tube Light
	12W Wall Mount LED
	10W Post Light
	16" Wall Fan
	9" Exhaust Fan
	16A Power Socket
	Main Distribution Board(MDB)
	Sub Distribution Board(SDB)

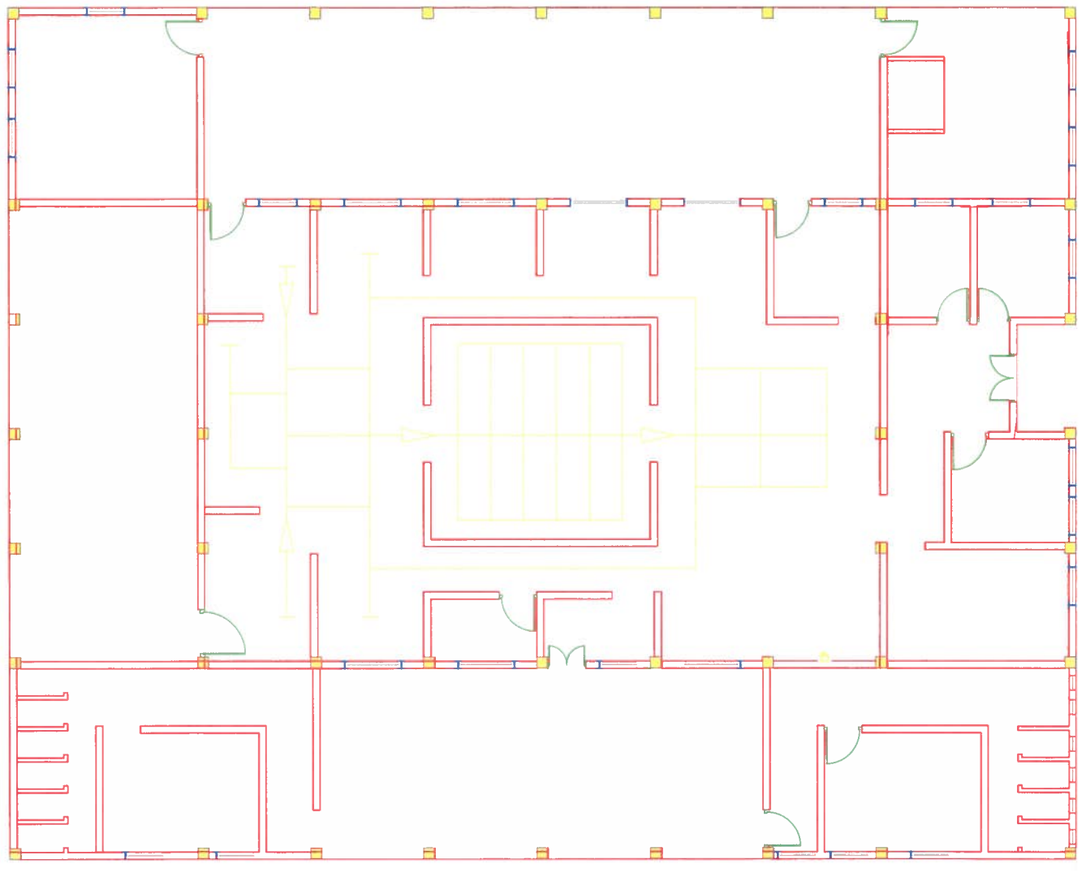


TYPICAL EARTHING

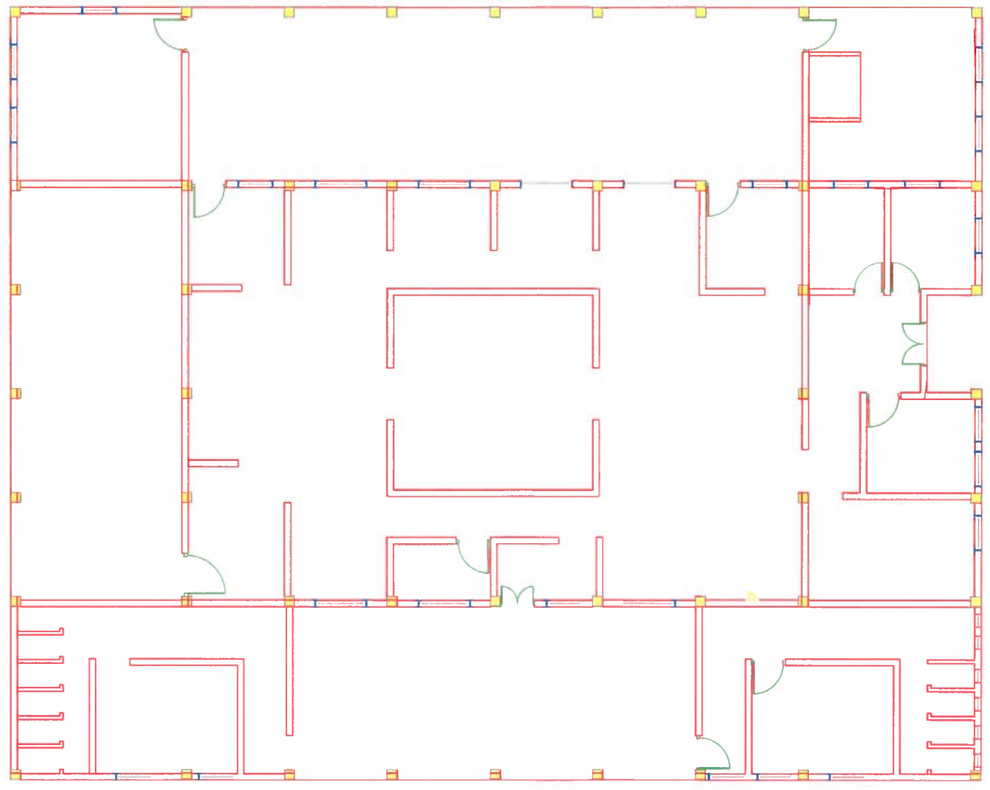


COPPER PLATE EARTHING DETAIL

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar	Drawn By: Sweksha Poudel	Scale: 1:100	Sheet No: 07
		Dwg.Title: Electric Power Distribution Utilities	Checked By: Bharat Acharya	Date: Jun 2026	



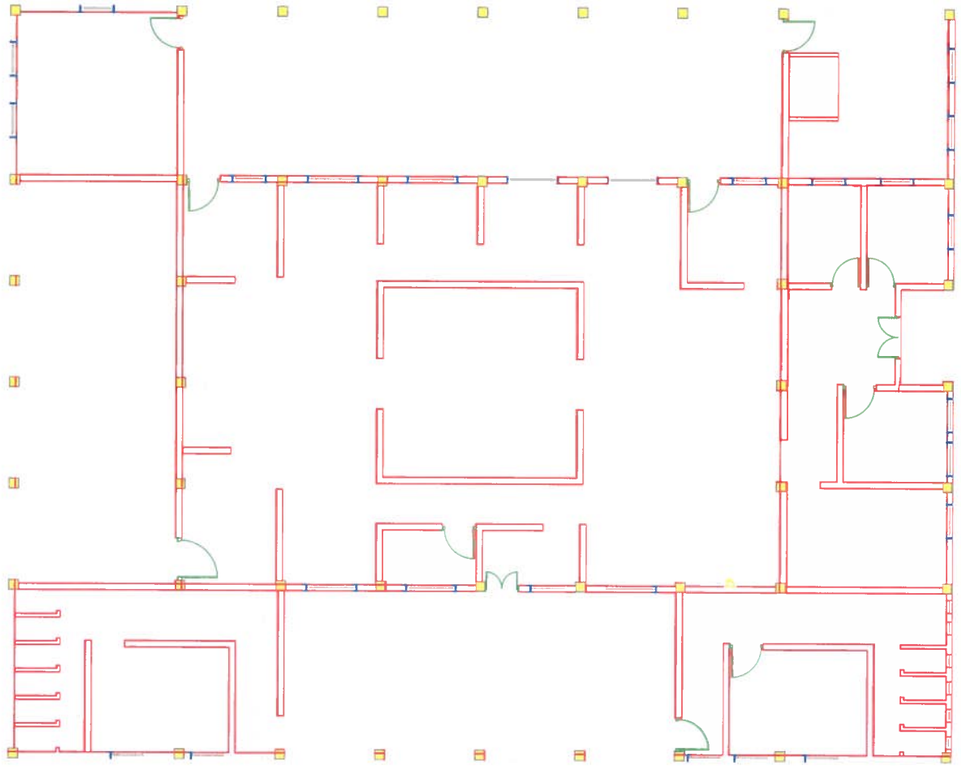
HANGING RAIL MECHANICAL PLAN



MEAT PRODUCTION LINE PLAN

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar	Drawn By: Sweksha Poudel	Scale: 1:100	Sheet No: 08
		Dwg.Title: Mechanical Layout Plan	Checked By: Bharat Acharya	Date: Jun 2026	

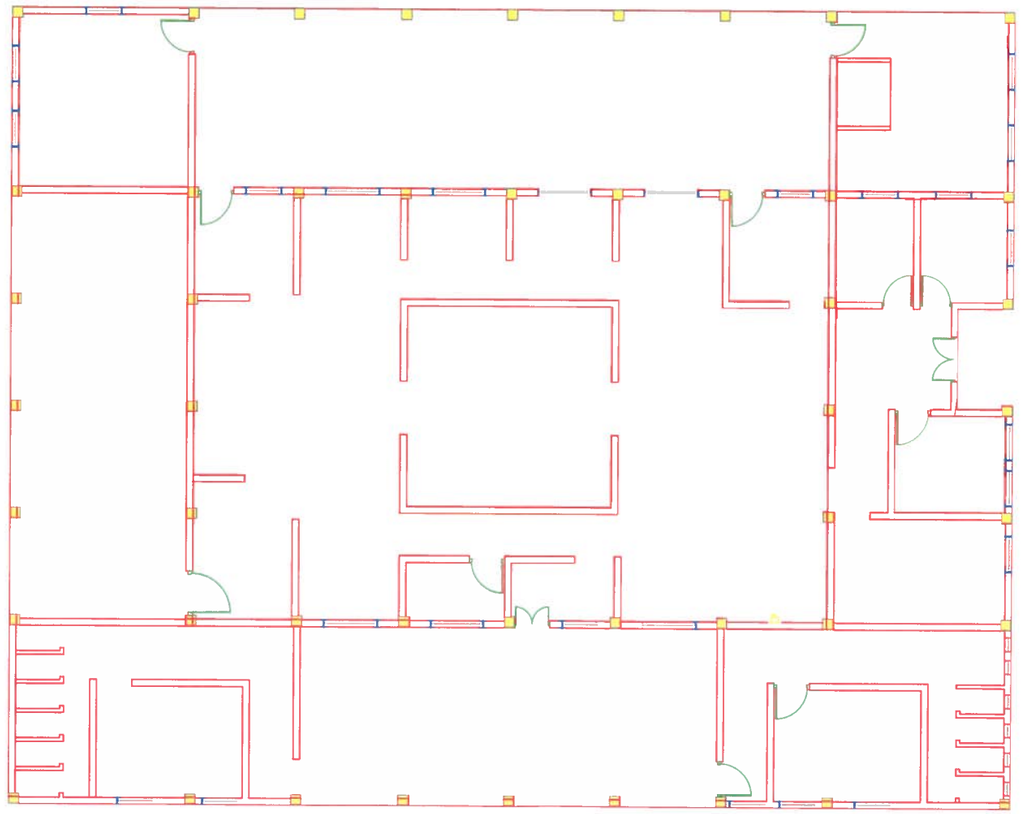
TO LIQUID WASTE
TREATMENT SYSTEM



TO LIQUID WASTE
TREATMENT SYSTEM

LIQUID WASTE FLOW LINE PLAN

TO SOLID WASTE
TREATMENT SYSTEM



SOLID WASTE TRANSPORT LINE PLAN

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter House Standar	Drawn By: Sweksha Poudel	Scale: 1:100	N W E S	Sheet No: 09
		Dwg.Title: Waste Management Layout Plan	Checked By: Bharat Acharya	Date: Jun 2026		

Annex 8:

Quantity Estimate for standard slaughterhouse for 20 buffalo, 50 pigs and 100 goats

Department of Livestock Services
Project :Model Slaughter house
Processing : 20 Buffaloes, 50 Pigs and 100 Goat
COST ESTIMATE FOR Construction works of Building including Material and Labour.

Date: June 2026

SUMMARY OF COST ESTIMATES

S.No.	Descriptions	Amount (NRs.)	Remarks
1	Civil Works	37,999,170.47	
2	Electrical & Allied Works	1,899,958.52	
3	Water-supply & Sanitary Works	2,279,950.23	
4	Side Development Works	1,139,975.11	
5	Electro, Mechanical, Steel Accessories	7,599,834.09	
6	Office and Admin Amenities	1,899,958.52	
	Total Amount (NRs.)	**52,818,846.96**	
	VAT @ 13 %	6,866,450.10	
	G. Total Amount (NRs.)	**59,685,297**	

In Words: Five Crore Ninety Six Lakhs Eighty Five Thousand Two Hundred and Ninety Seven Nepalese Rupees Only

Department of Livestock Services

Project : Slaughterhouse for 20 Buffaloes, 50 Pigs and 100 Goats

Quantity for CIVIL Construction works of Building including Material and Labour.

Date: June 2026

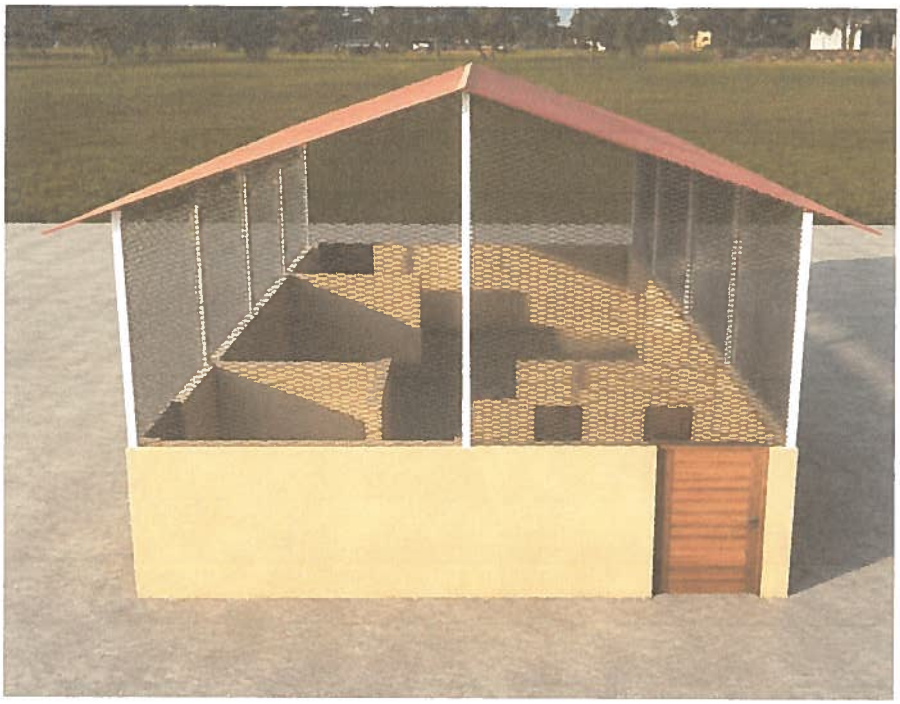
S.N.	DESCRIPTION OF WORKS	QUANTITY	UNIT
1	**SITE CLEARANCE**		
	Cleaning up top soil & bushes, levelling the surface, making, establishing necessary fencing, office, labour camp & mobilization of equipments, tools, working force as per instructions of the Engineer.	14000.00	Sq.Ft.
2	**EARTHWORK IN EXCAVATION**		
	Earthwork in excavation for foundation, trenches, pits,raft etc in all kinds of soil including gravel boulder mix soil, boulders, rocks etc. including dressing of sides, ramming of bottom, lift up to 4 m., stacking of excavated materials at least 3 m. clear from the edge of the foundation trench all complete as per design, drawing specifications and		
	Ordinary soil	13857.00	Cu.Ft.
3	**EARTH BACK FILLING WITH EXCAVATED SOIL**		
	Filling in earth or mixed soil stacked at site in sides, foundations & floor in 20 cm thk layers including loading, unloading, sprinkling water, ramming, compacting etc. all complete as per design, drawing, specifications and instructions of the Engineer.	6928.50	Cu.Ft.
4	**EARTH BACK FILLING WITH IMPORTED SOIL:**		
	Filling in earth or mixed soil imported from out side in foundations & floor in 20 cm thick layers including loading unloading, sprinkling water, ramming, compacting etc. all complete as per design, drawing, specifications and instructions of the Engineer.	21189.00	Cu.Ft.
5	**BRICK SOLING**		
	Providing and laying local brick soling in foundation and floor with sand blinding, ramming, compacting all complete in perfect line and level as per design, drawing, specifications and instructions of the Engineer.	13262.04	Sq.Ft.
6	**PLAIN CEMENT CONCRETE (1 : 2 : 4)**		
	Cement (equivalent of Grade 53), sand , aggregate (10 mm to 38 mm stone ballast) of approved quality including mixing, finishing, laying, compaction(**For foundation and floor including appron drain**) using vibrator in perfect line, level & dimensions, curing all complete as per	3315.00	Cu.Ft.
7	**FORM WORKS**		
	19mm thick waterproof plywood formwork with steel props, shuttering, centering for all works necessary proping, scaffoldong, staging, suppoting inclusive of wedging and cutting holes for utilization work till the suport is full unyielding nett for COLUMNS/BEAMS/SLABS complete work.	12061.78	Sq.Ft.
8	**LOCAL BRICK MASONRY WORKS IN 1:4 C/S**		

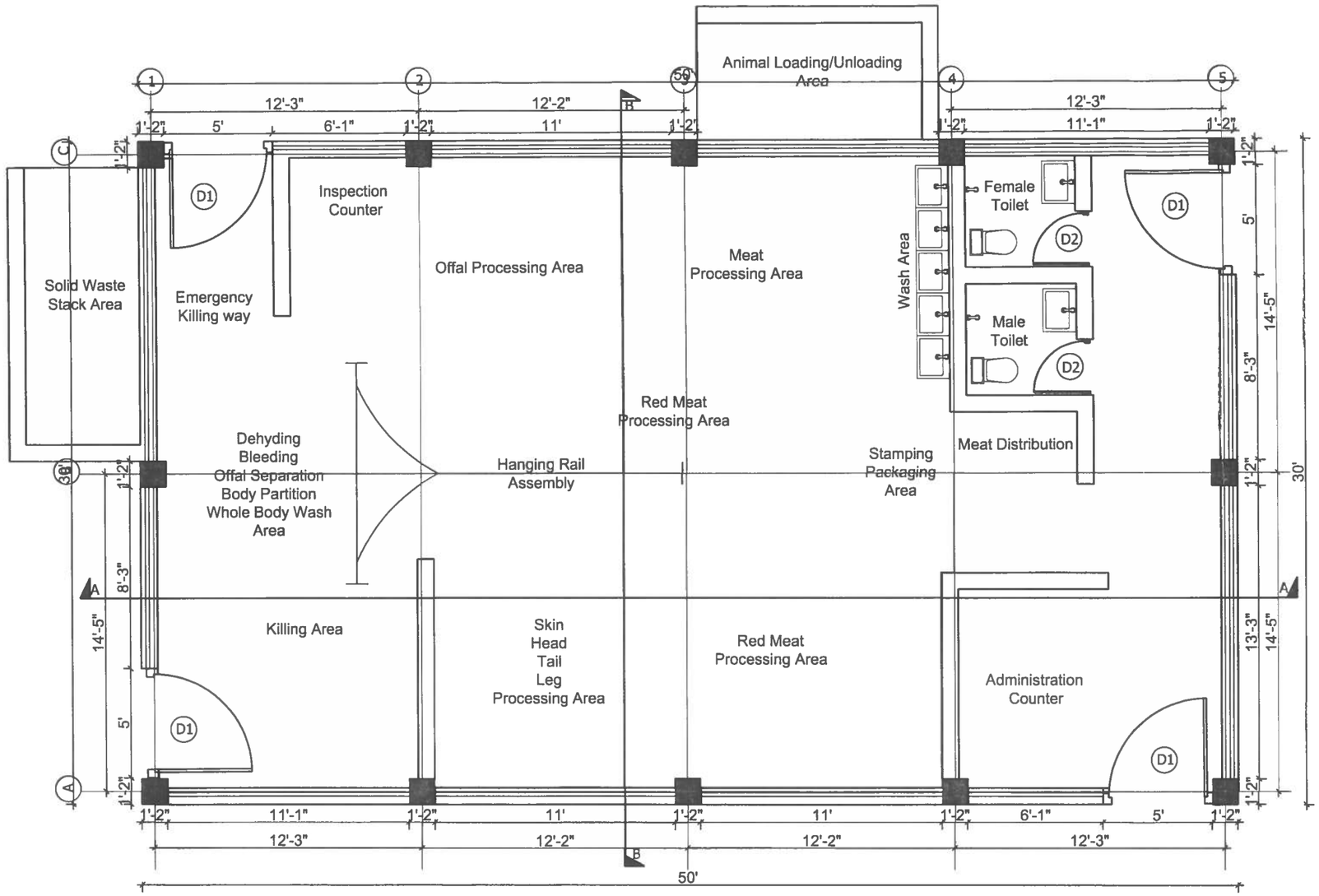
S.N.	DESCRIPTION OF WORKS	QUANTITY	UNIT
	Providing & laying local brick masonry works in 1:4 cement sand mortar in foundation and super structure in perfect line & level as per design, drawing, specifications and instructions of the Engineer.	14984.85	Cu.Ft.
9	**P.C.C. for R.C.C. Works**		
	Plain cement concrete for R.C.C. works for foundation columns, beams, slabs, lintels, shear wall etc. including lintel, sill, moldings, with Udayepur or equivalent of Grade 53 cement , sieved sand & aggregates (10 mm, 20 mm, 38 mm) of approved quality including mixing, laying, finishing with proper compaction in line & level curing all complete excluding reinforcement, centering, shuttering as per design, drawings, specifications and instructions of the		
	P.C.C. of M 20 TO 20 Grade	6306.00	Cu.Ft.
10	**STEEL REINFORCEMENT**		
	TMT steel reinforcement bars (Himal Iron & equivalent) all sizes (dia.) including straightening, cleaning, cutting, bending, binding with 20 SWG Annealed type wire and fixing in positions all complete as per design, drawing, specifications and instructions of the Engineer.	35078.02	Kg.
11	**DOORS & WINDOWS WORKS**		
11.1	Wood works for frames for doors as per design, drawing, specification and instructions of the Engineer.	41.56	Cu.Ft.
11.2	Water proof solid core door 32mm thick ,including hinges (3 nos-125mm long per leaf)tower bolts,aldrup and screws , nails, all complete as per design, drawing, specification and instructions of the Engineer.	639.00	Sq.Ft.
11.3	Aluminium window shutters with approved quality of Agarani or equivalent including nails, bolts, handles all complete as per design, drawings, specifications and instructions of the Engineer.	530.00	Sq.Ft.
12	**CEMENT PLASTER**		
	Plastering the concrete and wall inner and outer 25 mm thk. cement sand mortar (1:6) including making edges/ joints at the corner as per required in perfect line and level, including cleaning, chipping, cutting and curing, all complete as per design, drawings, specification and instructions of the Engineer.	31963.10	Sq.Ft.
13	**PAINTING WORKS**		
13.1	CEMENT PAINT		
	Approved quality and brand of Weather Coat painting works in two coats or more if required to make uniform color all complete as per design, drawings, specifications and instructions of the Engineer.	31963.10	Sq.Ft.
13.2	ENAMEL PAINT		
	Approved quality and brand of enamel painting works in two coats or more if required to make uniform color on doors and windows including cleaning, grinding, with sand paper all complete as per design, drawings, specification and instructions of the Engineer.	956.00	Sq.Ft.

S.N.	DESCRIPTION OF WORKS	QUANTITY	UNIT
14	**NEAT CEMENT FLOORING**		
	Providing & laying 40 - 50 mm thick PCC with 1: 2 : 4 cement, sand & 6 - 12.5 mm aggregates laid on floor in panels finished with 3 mm floating coat of neat cement finish 1:1all complete in perfect line & level as per design drawings, specs. and instructions of the Engineer.	12826.00	Sq.Ft.
15	**CERAMIC FLOOR / WALL TILE**		
	Ceramic floor & wall plain tiles flooring on T & B, laid with 1 : 1 cement sand mortar including 12.5 to 50 mm thick bed of PCC 1 : 2 : 4 cement sand & 6 to 12.5 mm aggregate in proper slope for draining water, finishing the joints with necessary white cement and pigment (if necessary) all complete as per design, drawing, specification & instructions of the Engineer.	21050.00	Sq.Ft.
16	**ROOFING WORK**		
	M.S.black pipe roof truss / purlinwith I.S. or B.S. section including jointing, fixing, erection and primer painting with all necessary M.S. bed plates, shoe angles anchor bolts leas sheeting or cement grouting as per drawing and instructions, all complete .	19730.00	Sq.Ft.
	Supplying, laying, errection and bolting of UPVC sheet with PMMA coating and mesh(regular) for roofing, 3mm thk sunrise or equivalent with all necessary bolts and accessories as per design all complete.	19730.00	Sq.Ft.

Annex 9:

Engineering Drawings for SMALL SLAUGHTER PLACE

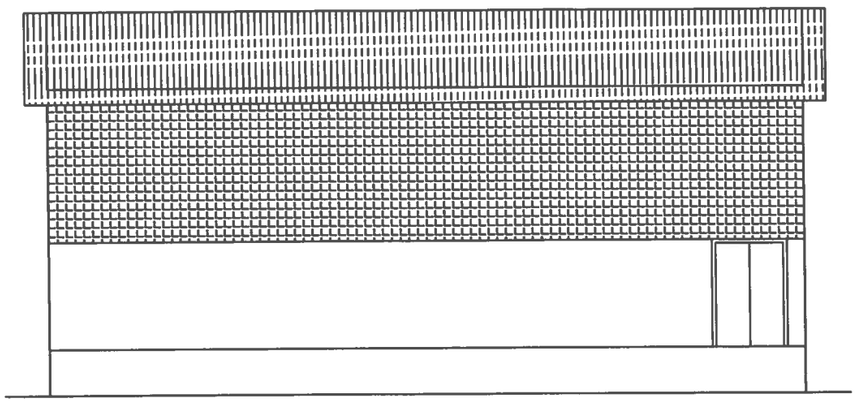




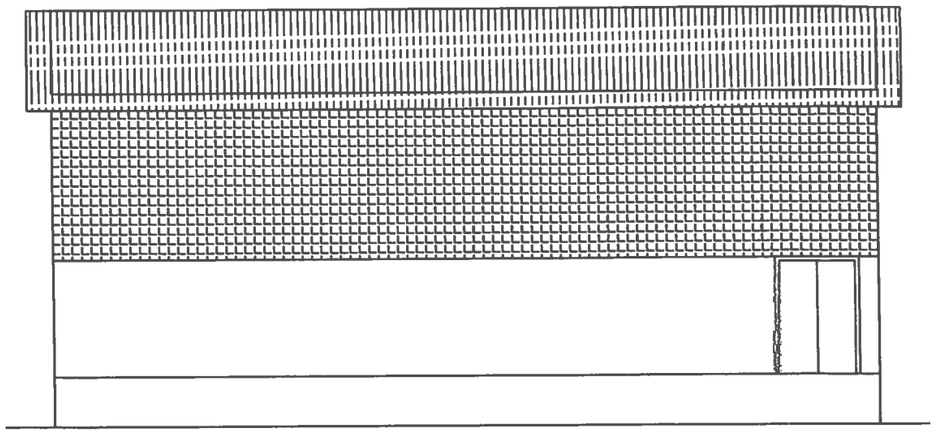
SLAUGHTER PLACE SMALL FLOOR PLAN

Area: 1,500.00 sq.ft.

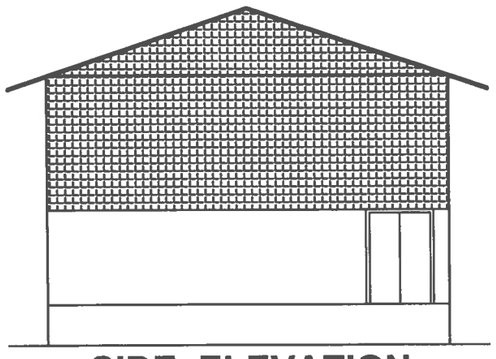
Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter Place Small Dwg.Title: Architectural Floor Plan	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	N W E S	Sheet No: 01



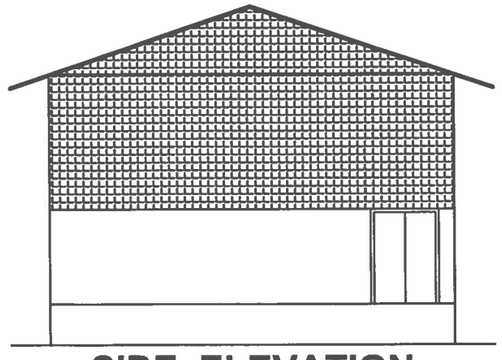
FRONT ELEVATION



BACK ELEVATION

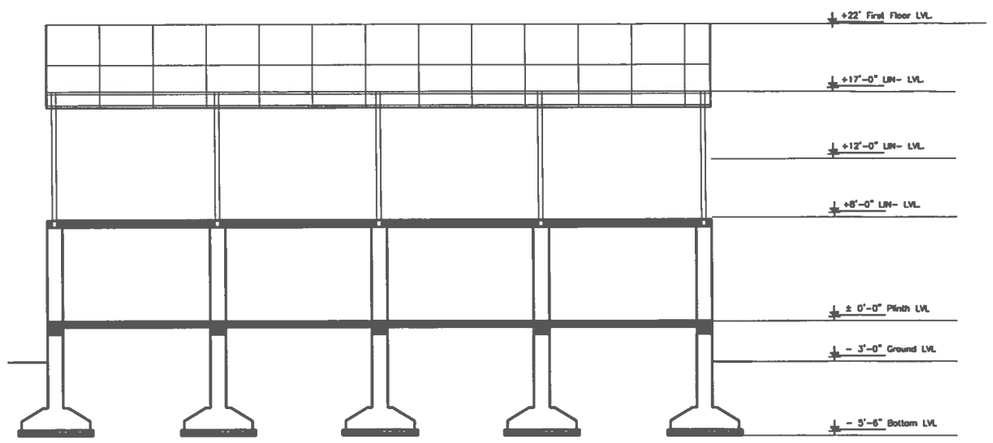


SIDE ELEVATION

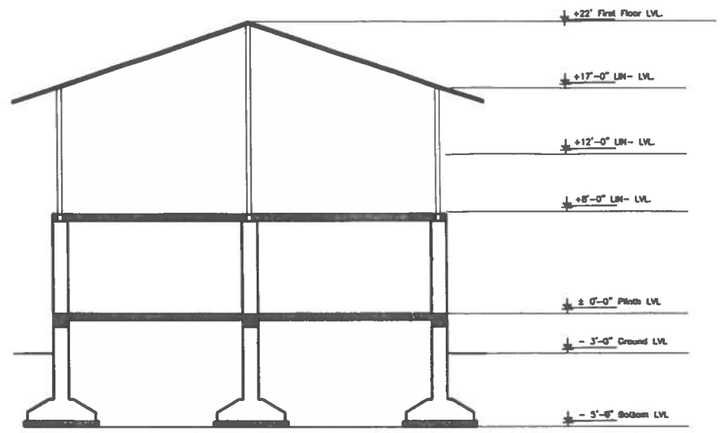


SIDE ELEVATION

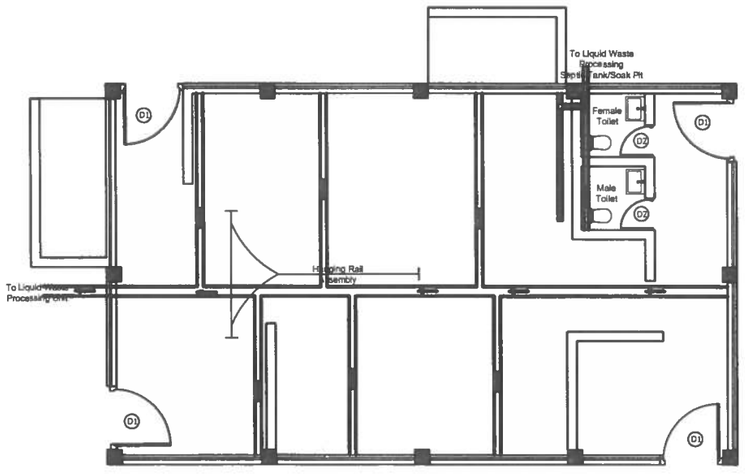
Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter Place Small Dwg.Title: Architectural Elevations	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	N W E S	Sheet No: 02



SECTION AT A-A



SECTION AT B-B

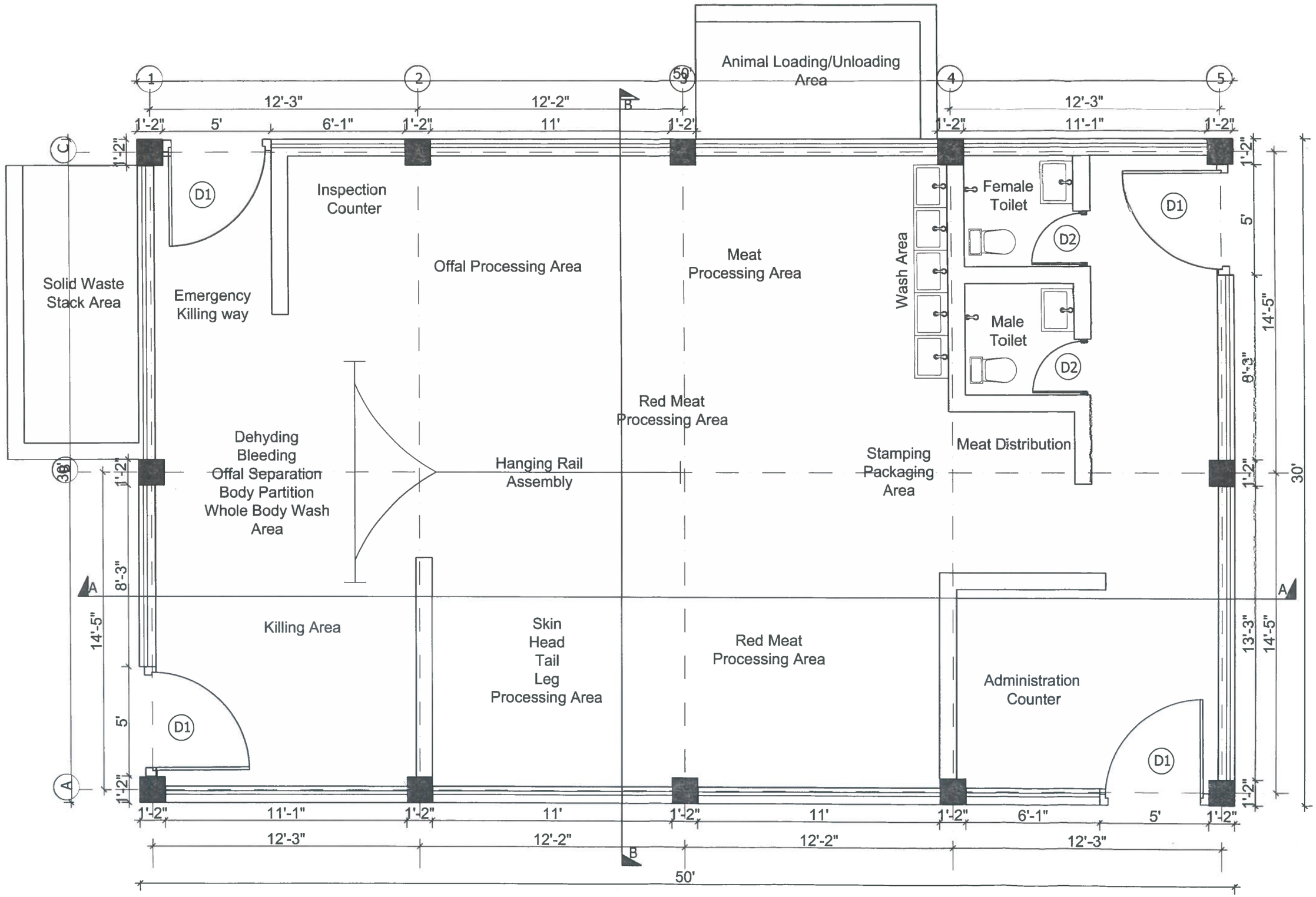


SLAUGHTER PLACE SMALL
Liquid Waste Drain Plan

OPENING SCHEDULE

SN	Description		No.
Stainless Steel Fence Net Around the Wall Top			
1	Door D1	5-0" x 7'-0"	4
2	Door D2	2'-6" x 7'0"	2

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter Place Small	Drawn By: Sweksha Poudel	Scale: 1:100	Sheet No: 03
		Dwg.Title: Architectural Section ,Opening Schedules and Liquid waste drain Plan	Checked By: Bharat Acharya	Date: Jun 2026	



SLAUGHTER PLACE SMALL FLOOR PLAN

Area: 1,500.00 sq.ft.

Annex 10:

Quantity Estimates for
SMALL SLAUGHTER PLACE

Department of Livestock Services
Project :Model Small Size Slaughter Place
COST ESTIMATE FOR Construction works of Building including Material and Labour.
Date: June 2026

SUMMARY OF COST ESTIMATES

S.No.	Descriptions	Amount (NRs.)	Remarks
1	Civil Works	6,314,902.07	
2	Electrical & Allied Works	462,370.00	
3	Water-supply & Sanitary Works	517,400.00	
4	Mechanical Accessories	1,262,980.41	
	Total Amount (NRs.)	**8,557,652**	
	VAT @ 13 %	1,112,494.82	
	G. Total Amount (NRs.)	**9,670,147**	
In Words: Nepalese Rupees Ninety Six Lakhs Seventy Thousand One Hundred Forty Seven Only			

Department of Livestock Services
Project : Small Slaughter Place
Quantity for CIVIL Construction works of Building including Material and Labour
Date: June 2026

Item No.	Description of Works	Unit	Quantity	Remarks
	A. CIVIL WORKS			
1	**EARTHWORK EXCAVATION**			
	E/W in excavation for foundation trenches, water tanks, etc. including labours, tools/ plants (showel, axe, etc.), stacking excess earth clear from building line including ramming of trench bottom, shoring/ supporting the sides of trenches.	Cft	2519.80	
2	**EARTHWOR FILLING (Excavated Soil)**			
	E/W in filling in floor with manual means with excavated materials/ soil including labour, tools, plants, etc.	Cft	1,259.90	
3	**EARTHWOR FILLING (ImportedSoil)**			
	E/W in filling in floor with manual means with excavated materials/ soil including labour, tools, plants, etc.	Cft	3,551.00	
4	**BRICK SOLING**			
	Dry Brick Flat soling in foundation and floor with 1st class bricks complete to level as per specification and direction complete work.	Sqft	2,126.99	
5	**1:2:4 PCC WORK**			
	Plain Cement Concrete (P.C.C.) in 1:2:4 in foundation and floor with cement, sand and aggregate including mixing, laying, finishing to approved level, line and dimensions and curing all complete as per specification and direction.	Cft	492.93	
6	**1:1.5:3 PCC FOR RCC WORK**			
	Do but P.C.C.(1:1.5:3) M20 for R.C.C.work in foundation, beams, slabs, lintels etc. with cement, sand, and stone ballast 38mm. Gauge including mixing with concrete mixture, compacting the concrete with vibrator machine, laying, finishing to approved level ,lines and dimensions and curing all complete nett.	Cft	1,447.15	
7	**REINFORCEMENT WORK**			
	TMT /TOR steel reinforcement bar tested including straightening, cleaning, cutting, bending and fixing in position with 20 B. G. annealed binding wire as per drawing and instruction complete work	Kg	6,315.00	

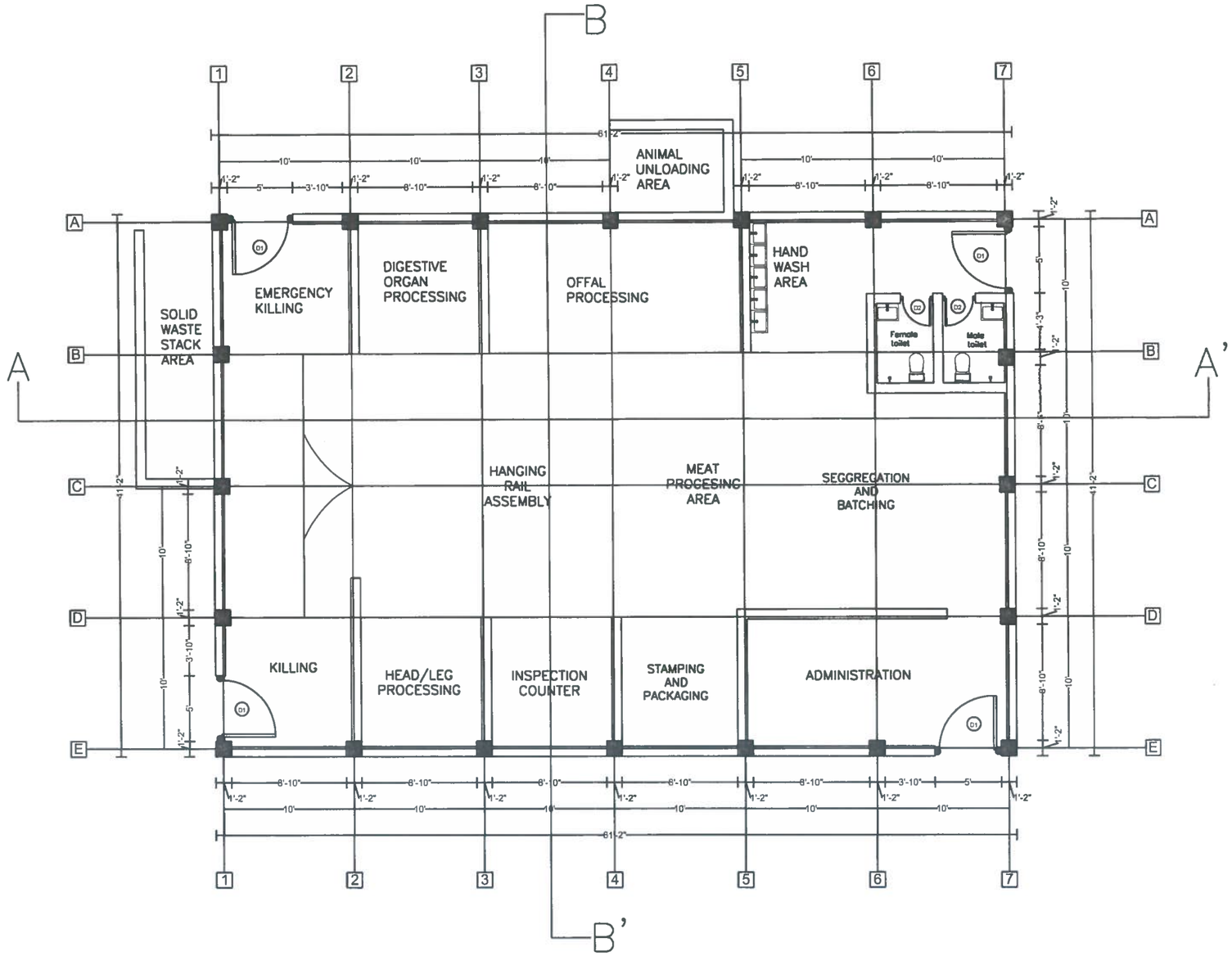
8	**FORMWORK**			
	19mm thick waterproof plywood formwork with steel props, shuttering, centering for all works necessary proping, scaffoldong, staging, suppoting inclusive of wedging and cutting holes for utilization work till the suport is full unyielding nett for COLUMNS/BEAMS/SLABS complete work.	Sqft	3,456.00	
9	**MASONRY WORK (Brick):**			
	Local/ Chinese chimney Brickwork in cement sand mortar in foundation and superstructure with 1st class bricks in perfect line and level including wetting the bricks,packing the joints and curing the work in all types and thickness of walls, column, etc. all complete work.			
9.1	In cement sand mortar 1:6 ratio for 9" and 14" brick walls	Cft	1,540.00	
10	**PLASTERING WORKS**			
10.1	12.5mm thick Inside Wall plastering works in perfect plumb and lines/ levels with 1:4 cement sand mortar including curing and finishing for all floors including material and labours, tools, plants, scaffolding all complete.	Sqft	2,887.36	
10.2	Outside plastering works in perfect plumb and lines/ levels with 1:4 C/S mortar for all floors including material and labours, tools, plants, scaffolding all complete.	Sqft	1,012.76	
11	**FLOORING WORKS:**			
11.1	Supply and laying of **IPS floor finish** of maximum upto 38 mm thick 1:2:4 cement : sand : chips (10mm aggregate or pea grave) ratio supply of materials, curing, levelling to the required.	Sqft	1,500.00	
11.2	Supply, laying and application of 3mm 1:1 c/s ratio punning for skirting and plastered floor/ wall surfaces including leveling, troweled to smooth, curing all complete including labour and materials.	Rft	515.32	
12	**PAINTING WORKS:**			
12.1	Supply and applying of two or more coats of Putty on plastered surface of wall and ceiling including materials and labour with surface preperation by sanding all complete.	Sqft	2,887.36	
12.2	Supply and applying of two coats of interior emulsion paint with primer of desired shade/ colour over putty applied surface of wall and ceiling including materials and labour with surface preperation, filling and finishing all complete.	Sqft	2,887.36	

12.3	Supply and applying of two or more coats of Putty on external plastered surface of wall materials and labour with surface preperation by sanding all complete.	Sqft	3,900.12	
12.4	Supply and applying of two coats of Exterior Weather coat paint with primer over exterior putty on external plastered surface of wall including materials and labour with surface preperation all complete.	Sqft	1,012.76	
12.5	Supply and applying of two coats of Enamel paint with primer on door and window including materials and labour with surface preperation all complete.	Sqft	350.00	
13	**TILE WORKS:**			
	Supply, delivery and laying in perfect line and level of (Floor and wall of kazzaria, Somany or equivalent) **glazed or non glazed ceramic wall & floor tiles** (of approved colour and size) including necessary cement grout and backing of 1:4 c/s mortar.	Sqft	60.00	
13	**WOOD WORKS:**			
	Preperation of Salwood Door(chaukhat) as per drawing and specification including supply of materials, labours, making as per design/ details, fixing it to perfect position, moulding on edges, grooves for plasters, fixing with necessary MS	Cuft	15.11	
14	**DOORS WORK INCLUDING TITANIUM OR BRONZE COLOUR PAINTING OR ENAMEL/CHOPRA POLISH FINISHING:**			
	38mm thick Salwood Panel door with 4mm teak at both side with necessary hardwares and locking arrangement and painting polishing.	Sqft	175.00	
15	**METAL WORKS**			
	Providing, fabricating and erecting structural steel roof truss system including trusses, purlins, sag rods, wind bracing, gusset plates, cleats, connection plates, anchor bolts, welding, bolting, erection, alignment, one coat of red oxide primer and two coats of approved paint, complete as per drawings and specifications.	Kg	8,400.00	
16	**CGI SHEET**			

	Providing and fixing 0.50 mm thick pre-painted corrugated galvanized iron (PPGI/CGI) roofing sheets of approved colour and profile, including side and end laps, J/L hooks, galvanized nuts and bolts, bitumen/neoprene washers, ridge cap, flashings, cutting, fitting and all necessary accessories, complete in all respects as per drawings and specifications.	Sqft	2,230.00	
17	**METAL MESH**			
	Providing and fixing G.I. Welded Wire Mesh of approved size and gauge including all necessary accessories complete.	Sqft	1,646.80	

Annex 11:

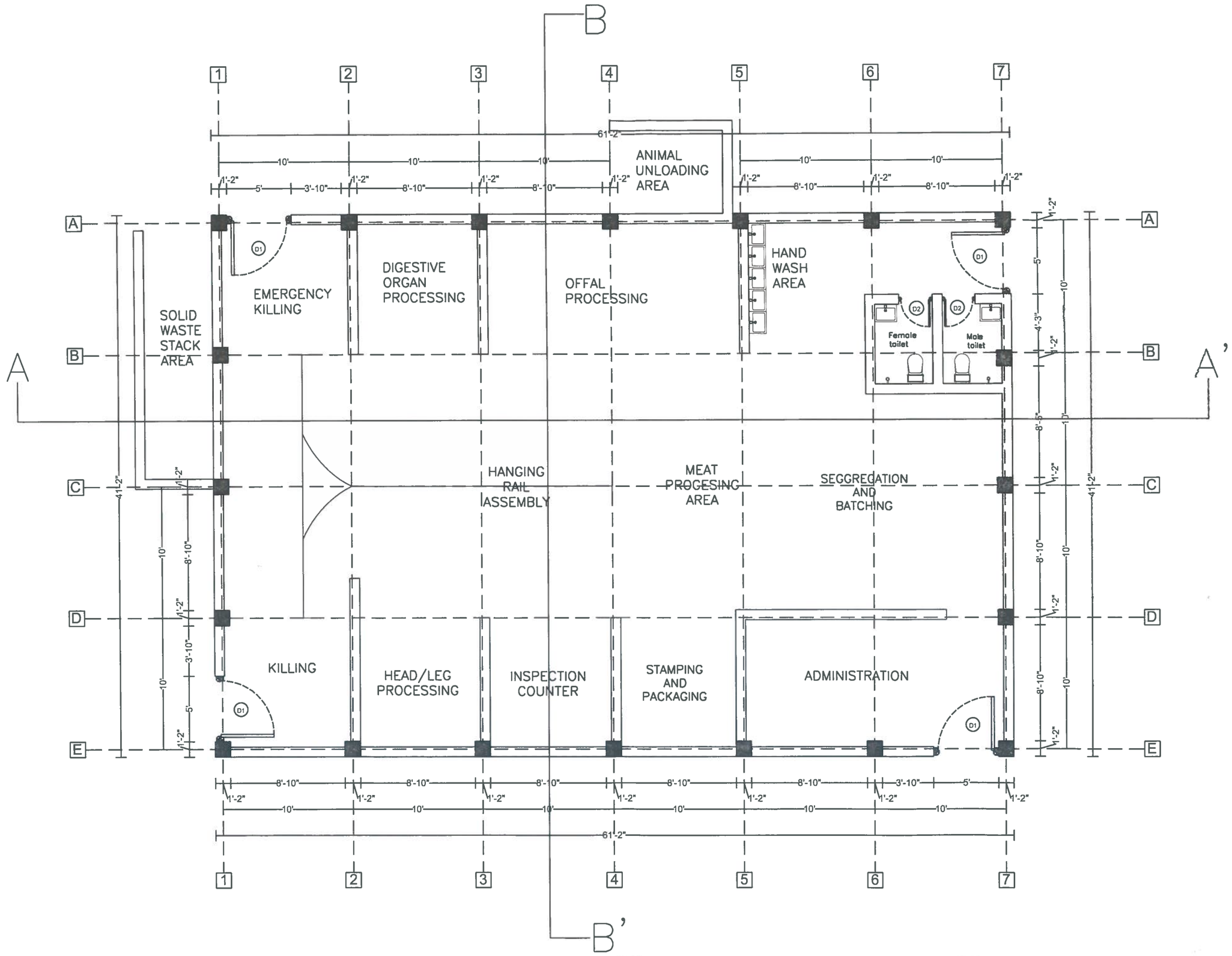
Engineering Drawings for MEDIUM SLAUGHTER PLACE



SLAUGHTER PLACE (MEDIUM) FLOOR PLAN

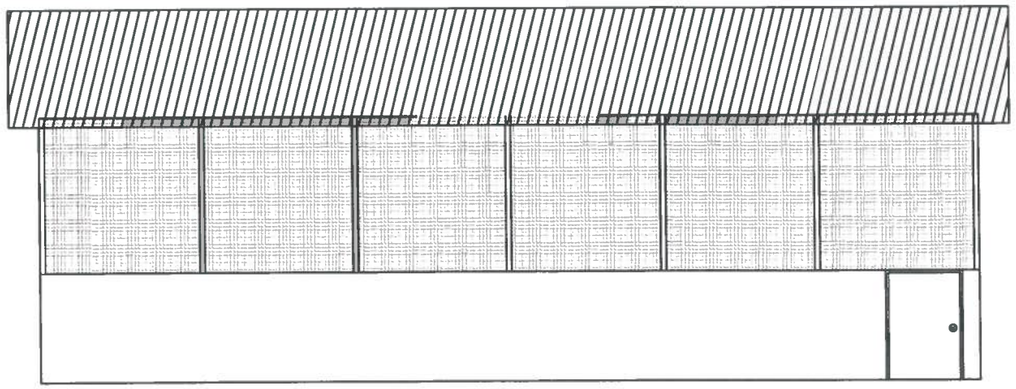
AREA : 2518.02 SQ. FT

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter Place Medium	Drawn By: Sweksha Poudel	Scale: 1:100	N W E S	Sheet No: 01
		Dwg.Title: Architectural Floor Plan	Checked By: Bharat Acharya	~~Date:~~ Jun 2026		

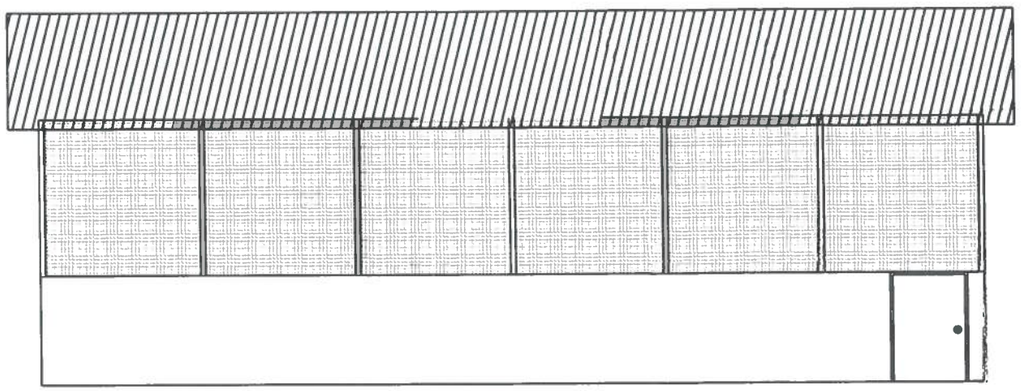


SLAUGHTER PLACE (MEDIUM) FLOOR PLAN

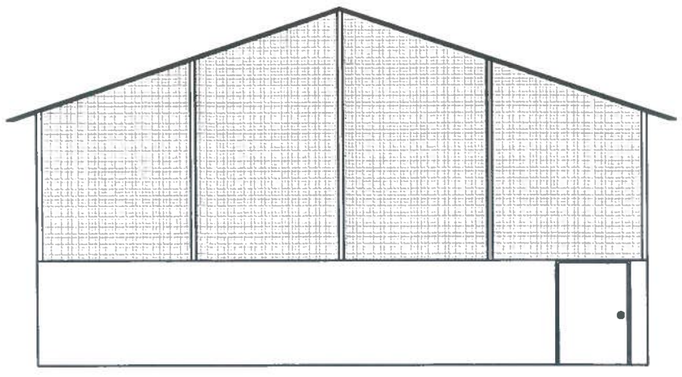
AREA : 2518.02 SQ. FT



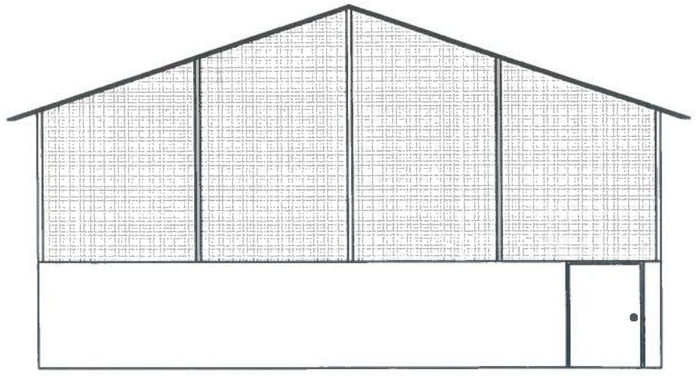
FRONT ELEVATION



BACK ELEVATION

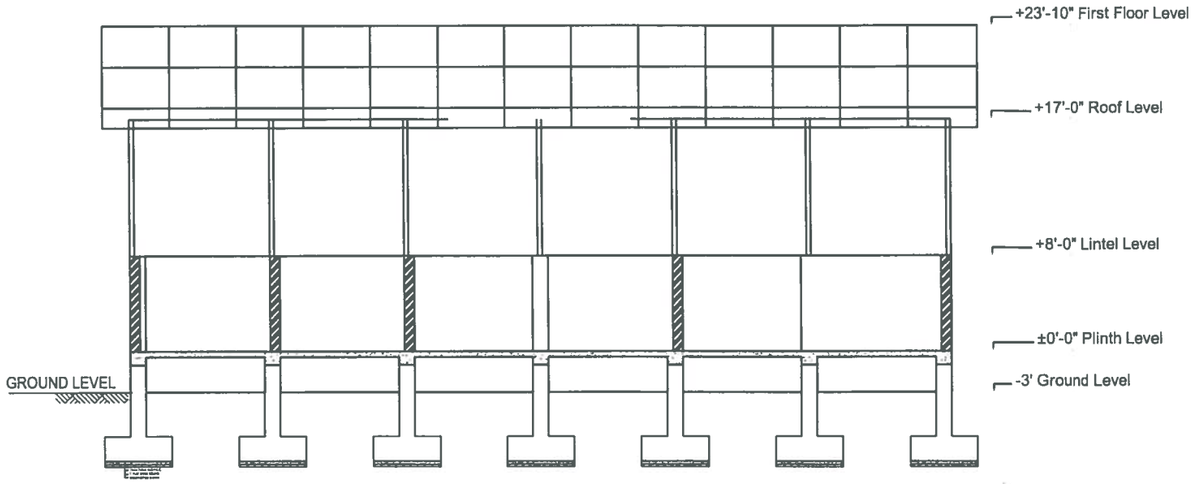


SIDE ELEVATION

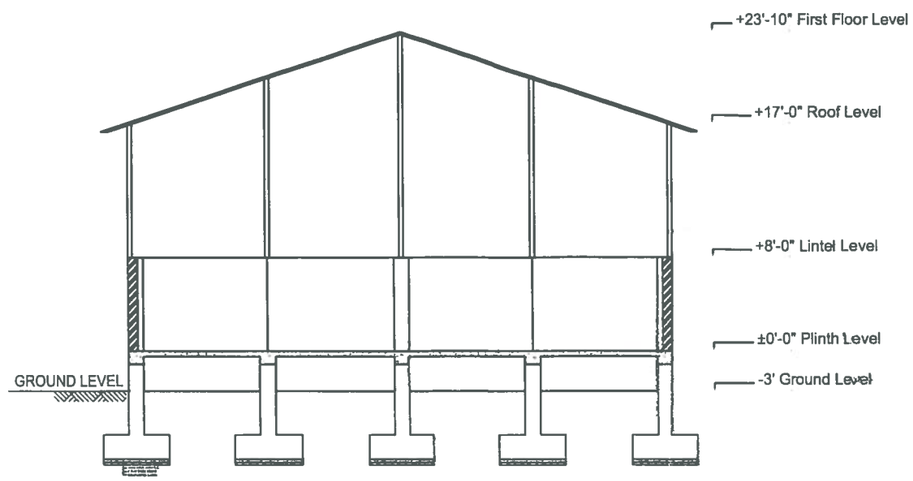


SIDE ELEVATION

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter Place Medium Dwg.Title: Architectural Elevations	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	N W E S	Sheet No: 02

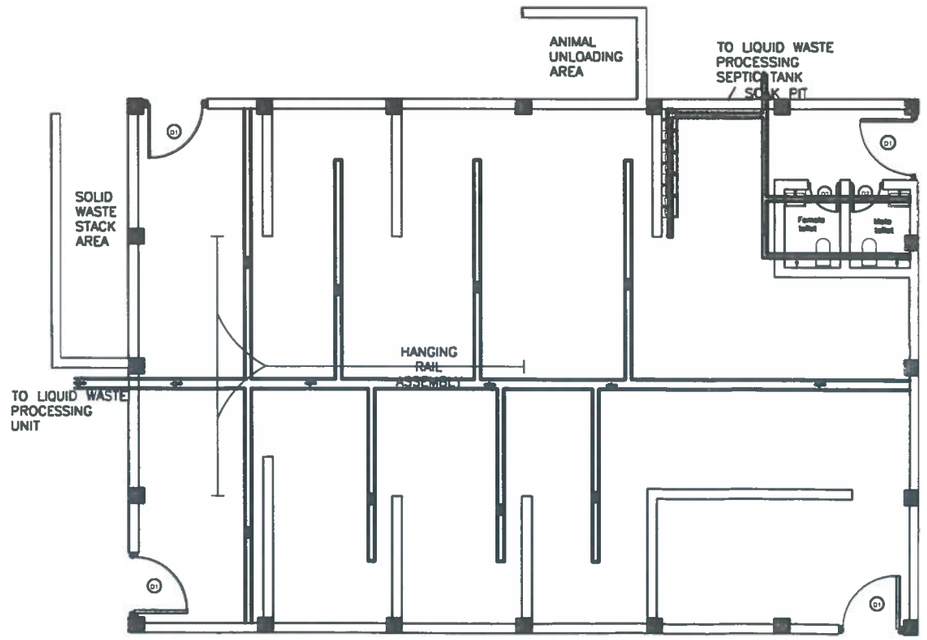


Section at A-A'



Section at B-B'

SN	DESCRIPTION	NO.	SIZE
	DOOR D1	4	5' X 7'
	DOOR D2	2	2'6" X 7'
STAINLESS STEEL FENCE NET AROUND THE TOP OF THE WALL			



SLAUGHTER PLACE (MEDIUM)

LIQUID WASTE DRAIN PLAN

Nepal Government Ministry of Agriculture, Forest and Environment Department of Livestock Services Hariharbhawan, Lalitpur, Nepal	Design By: Alaana International Services P.Ltd. Kathmandu, Nepal	Project Title: Model Slaughter Place Medium Dwg.Title: Architectural Section, Drain Plan and Opening Schedules	Drawn By: Sweksha Poudel Checked By: Bharat Acharya	Scale: 1:100 Date: Jun 2026	Sheet No: 03

Annex 12:

Quantity Estimates for
MEDIUM SLAUGHTER PLACE

Department of Livestock Services
Project :Model Medium Size Slaughter Place
COST ESTIMATE FOR Construction works of Building including Material and Labour.
Date: June 2026

SUMMARY OF COST ESTIMATES

S.No.	Descriptions	Amount (NRs.)	Remarks
1	Civil Works	8,636,381.45	
2	Electrical & Allied Works	693,555.00	
3	Water-supply & Sanitary Works	776,100.00	
4	Mechanical Accessories	1,727,276.29	
	Total Amount (NRs.)	**11,833,313**	
	VAT @ 13 %	1,538,330.66	
	G. Total Amount (NRs.)	**13,371,643**	
In Words: Nepalese Rupees One Crore Thirty Three Lakhs Seventy One Thousand Six Hundred Forty Three Only			

Department of Livestock Services
Project : Medium Size Slaughter Place
Quantity for CIVIL Construction works of Building including Material and Labour.

Date: June 2026

Item No.	Description of Works	Unit	Quantity	Remarks
	A. CIVIL WORKS			
1	**EARTHWORK EXCAVATION**			
	E/W in excavation for foundation trenches, water tanks, etc. including labours, tools/ plants (showel, axe, etc.), stacking excess earth clear from building line including ramming of trench bottom, shoring/ supporting the sides of trenches.	Cft	4390.87	
2	**EARTHWOR FILLING (Excavated Soil)**			
	E/W in filling in floor with manual means with excavated materials/ soil including labour, tools, plants, etc.	Cft	2,195.00	
3	**EARTHWOR FILLING (ImportedSoil)**			
	E/W in filling in floor with manual means with excavated materials/ soil including labour, tools, plants, etc.	Cft	4,676.00	
4	**BRICK SOLING**			
	Dry Brick Flat soling in foundation and floor with 1st class bricks complete to level as per specification and direction complete work.	Sqft	3,463.90	
5	**1:2:4 PCC WORK**			
	Plain Cement Concrete (P.C.C.) in 1:2:4 in foundation and floor with cement, sand and aggregate including mixing, laying, finishing to approved level, line and dimensions and curing all complete as per specification and direction.	Cft	865.97	
6	**1:1.5:3 PCC FOR RCC WORK**			
	Do but P.C.C.(1:1.5:3) M20 for R.C.C.work in foundation, beams, slabs, lintels etc. with cement, sand, and stone ballast 38mm. Gauge including mixing with concrete mixture, compacting the concrete with vibrator machine, laying, finishing to approved level ,lines and dimensions and curing all complete nett.	Cft	1,531.30	
7	**REINFORCEMENT WORK**			
	TMT /TOR steel reinforcement bar tested including straightening, cleaning, cutting, bending and fixing in position with 20 B. G. annealed binding wire as per drawing and instruction complete work	Kg	8,754.33	

8	**FORMWORK**			
	19mm thick waterproof plywood formwork with steel props, shuttering, centering for all works necessary proping, scaffoldong, staging, suppoting inclusive of wedging and cutting holes for utilization work till the suport is full unyielding nett for COLUMNS/BEAMS/SLABS complete work.	Sqft	2,874.00	
9	**MASONRY WORK (Brick):**			
	Local/ Chinese chimney Brickwork in cement sand mortar in foundation and superstructure with 1st class bricks in perfect line and level including wetting the bricks,packing the joints and curing the work in all types and thickness of walls, column, etc. all complete work.			
9.1	In cement sand mortar 1:6 ratio for 9" and 14" brick walls	Cft	1,779.51	
10	**PLASTERING WORKS**			
10.1	12.5mm thick Inside Wall plastering works in perfect plumb and lines/ levels with 1:4 cement sand mortar including curing and finishing for all floors including material and labours, tools, plants, scaffolding all complete.	Sqft	3,167.36	
10.2	Outside plastering works in perfect plumb and lines/ levels with 1:4 C/S mortar for all floors including material and labours, tools, plants, scaffolding all complete.	Sqft	1,292.76	
11	**FLOORING WORKS:**			
11.1	Supply and laying of **IPS floor finish** of maximum upto 38 mm thick 1:2:4 cement : sand : chips (10mm aggregate or pea grave) ratio supply of materials, curing, levelling to the required.	Sqft	2,518.02	
11.2	Supply, laying and application of 3mm 1:1 c/s ratio punning for skirting and plastered floor/ wall surfaces including leveling, troweled to smooth, curing all complete including labour and materials.	Rft	595.32	
12	**PAINTING WORKS:**			
	Supply and applying of two or more coats of Putty on plastered surface of wall and ceiling including materials and labour with surface preperation by sanding all complete.	Sqft	3,167.36	
	Supply and applying of two coats of interior emulsion paint with primer of desired shade/ colour over putty applied surface of wall and ceiling including materials and labour with surface preperation, filling and finishing all complete.	Sqft	3,167.36	

	Providing and fixing 0.50 mm thick pre-painted corrugated galvanized iron (PPGI/CGI) roofing sheets of approved colour and profile, including side and end laps, J/L hooks, galvanized nuts and bolts, bitumen/neoprene washers, ridge cap, flashings, cutting, fitting and all necessary accessories, complete in all respects as per drawings and specifications.	Sqft	3,625.00	
17	**METAL MESH**			
	Providing and fixing G.I. Welded Wire Mesh of approved size and gauge including all necessary accessories complete.	Sqft	2,046.80	

Annex 13:

Standard Slaughterhouse Design Parameters Checklist

Department of Livestock Services
Project : Model Slaughterhouse Standar
Standar Slaughterhouse Design Parameter Checklist
Annex 13
Date: June 2026

S.N.	DESCRIPTION OF WORKS	Design Parameters	Remarks
1	**Master Planning**		
	Land Requirements	Minimum 9 Ropani	Space for future expansion
	Road Access	Comfortable	
	Water Supply	20,000 lt per day	
	Waste water	Drainage system	Septic tank and Soak pit
	Solid waste	Rendering plant	Everyday Dispatch system
	Vehicle Parking	Minimum 3 Vehicle	
	Electrical Supply	3 Phase line	11000 KVA
2	**Water Requirements**		
	Buffalo	272 Lt per buffalo	25% extra for each
	Pig	454 Lt per pig	
	Goats	45 Lt per goat	
3	**Drainage systems**		
	Wet areas slope	1 ft in 50 ft	
	Bleeding Areas slope	1 ft in 20 ft	
	Drain requirements	1 drain in each 430 Sq.Ft	
	Drain size for offal processing area	20 cm dia	
	Drain size for bleeding areas	60 cm deep 25 cm wide	
	Effluent Screen	4 mm	
4	**Lightening Requirements**		
	All inspection points	540 lux	Measur light from 3 ft
	Work rooms	220 lux	Inspection area 5 ft
	Other Areas	110 lux	Fixtures should be damp proo
	Light emmission radient flux	380 to 760 nanometer	
	Switches	should be at non washing areas	
	Power shockets	should be non washing areas	
5	**Ventilation**		
	Sill slope	out door	
	Screen	normal SS Net	
	Exhaust ventilators	15 inch dia	
6	**Floor and Wall Finishings**		
	Washable wall with hard surface	9.84 ft	
	Non skid hard floor	No joint gaps	Tile or IPS
	Ceiling finishing	Laminated	
	Windows and doors	Non absorbant and non toxic materials	Air tight washers
	Size of doors	more than 4.5 ft	Non rustic materials
	Paints	With high level of plasticity	
7	**Metal surfaces**		
	Meat and hand touch surfaces	Stain less steel hooks	
	Metal and metal surfaces	Galvanized iron	
	Metal for structural elements	Black iron	Should be painted well
8	**Working tables**		
	Meat processing	Stainless steel	
	Packging areas	Aluminium	
	Office and utility areas	woods	Painted well
9	**Service rails**	Gravity and Electro mechanical system with water level	
	Bleeding rail for buffaloes	16 ft	from the landing floor
	Dressing rail for buffalo	11 ft	from the landing floor
	Bleeding rail for pigs	11 ft	from the landing floor
	Dressing rail for pigs	11 ft	from the landing floor
	Bleeding rail for goats	9 ft	from the landing floor
	Dressing rail for goats	7.5 ft	from the landing floor
10	**General areas**		

S.N.	DESCRIPTION OF WORKS	Design Parameters	Remarks
	Stunning areas	15 ft X 10 ft	
	Slaughter hall for whole body processing	22 ft X 22 ft	buffalo
	Slaughter hall for whole body processing	15 ft X 15 ft	pig
	Slaughter hall for whole body processing	11 ft X 11 ft	goat
	Killing chamber	32 Sq ft	buffalo
	Killing chamber	6 Sq ft	goat
	Killing chamber	21 Sq ft	pig
	Floor height from normal ground	3 ft	DPC level
	Normal height of the ceiling	17 ft	buffalo
	Normal height of the ceiling	15 ft	pig
	Normal height of the ceiling	14 ft	goat
11	**Temperatures**		
	Carcas chilling	7 degree celsius	
	Offal cuts chilling	3 degree celsius	
	Store hall	Minus 18 degree celsius	
	Blast room	Minus 36 degree celsius	Time based
	Stable chilling room	Minus 1 to 1 degree celsius	87 to 91 percent humidity
	Cutting room should not exceed	12 degree celsius	
12	**Carcas spacings**		
	Buffalo	3 ft	
	Pig	2.3 ft	
	Goat	1.6 ft	
	Gap between carcases in rails	1 ft	
13	**Lairage**		
	Buffalo	35 sq ft per animal	
	Pig	8 sq ft per animal	
	Goat	6 sq ft per animal	
14	**Administrative amenities**		
	Small	43 sq ft per working space	
	Medium	56 sq ft per working space	
	Standar	81 Sq ft per working space	
15	**Utility areas**		
	Toilets	1 for 8 users	male female separate
	Urinals	1 for 12 users	with toilets
	Changing room	144 sq ft	
	Sanitization room	120 sq ft	
16	**Work flow management areas**		
	Waste management	1200 sq ft	
	Boiler space	300 sq ft	
	Feed space	200 sq ft	
	Mechanical work shops	200 sq ft	
	Guard posts	240 sq ft	
	Food management areas for workers	300 sq ft	
	Space for multi purposes	450 sq ft	

S.N.	DESCRIPTION OF WORKS	Design Parameters	Remarks
	Stunning areas	15 ft X 10 ft	
	Slaughter hall for whole body processing	22 ft X 22 ft	buffalo
	Slaughter hall for whole body processing	15 ft X 15 ft	pig
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	Feed space	200 sq ft	
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	Guard posts	240 sq ft	
	Food management areas for workers	300 sq ft	
	Space for multi purposes	450 sq ft	

Annex 14:

Technical Standards

ANNEX 14
TECHNICAL STANDARDS

वध स्थल, वध गोठ र वधशालाको तुलनात्मक तालिका

आधार (Criteria)	वध स्थल (Slaughter Place)	वध गोठ / अस्थायी वधशाला (Slaughter Shed)	वधशाला / एबट्वार (Slaughter House / Abattoir)
परिभाषा	सानो, अनौपचारिक वा खुला ठाउँ जहाँ जनावर काटिन्छ	छानो भएको अर्ध–औपचारिक संरचना	व्यवस्थित, मापदण्डयुक्त स्थायी भवन
संरचना	खुला आकाशमुनि वा अस्थायी, स्थायी पूर्वाधार नभएको	साधारण छानो, आंशिक पर्खाल र आधारभूत फर्श	विभागहरूमा विभाजित स्थायी भवन (ल्यारेज, वध हल, अफल कोठा, चिलिङ आदि)
सुविधा	न्यूनतम; पानी, नाली, निरीक्षण नहुन सक्छ	केही आधारभूत सुविधा (पानी, रगत नाली, फोहोर व्यवस्थापन) तर सीमित	पूर्ण पूर्वाधार (पानी आपूर्ति, नाली, चिस्यान/कोल्ड स्टोरेज, निरीक्षण कक्ष, कर्मचारी सुविधा)
प्रयोग	ग्रामीण क्षेत्रमा आत्म–उपभोग वा स्थानीय सानो बिक्री	सामुदायिक वा सानो स्तरको सहरी/अर्ध–सहरी वध	ठूला स्तरको वध, बजार, होटल, रेष्टुराँ र निर्यातका लागि
स्वच्छता र नियन्त्रण	अस्वच्छ, कानुनसम्मत नभएको अवस्थामा धेरै देखिन्छ	वध स्थल भन्दा राम्रो तर अझै अधुरो; निरीक्षण हुन सक्छ वा नहुन सक्छ	कानुन र मापदण्डअनुसार नियमन; पशु चिकित्सकको निगरानीमा; खाद्य सुरक्षा सुनिश्चित

विभिन्न कार्य अनुसार पानीको अनुमानित वितरण

.

क्र.सं.	कार्य	पानी प्रयोग (%)	पानी आवश्यकता (लिटर/दिन)
१	पशुधन प्राप्ति, पानी खुवाउने तथा धुने	७–२२ %	१,१९० – ३,७४०
२	भित्री अङ्ग निकाल्ने कार्य	४४–६० %	७,४८० – १०,२००
३	अफल प्रशोधन	७–३८ %	१,१९० – ६,४६०
४	आन्द्रा प्रशोधन	९–२० %	१,५३० – ३,४००
५	रेन्डरिङ (बोसो तथा उप–उत्पादन प्रशोधन)	२–८ %	३४० – १,३६०
६	सरसफाइ तथा स्वच्छता	२५–५० %	४,२५० – ८,५००

व्यावहारिक डिजाइनका लागि पानीको वितरण

५० भैंसी/दिन क्षमताको आधुनिक वधशालाका लागि सामान्यतया निम्न वितरण उपयुक्त हुन्छ:

क्र.सं.	कार्य	पानी (लिटर/दिन)
१	पशु धुने तथा गोठ	२,५००
२	वध तथा ड्रेसिङ	२,०००
३	आन्द्रा–भुँडी प्रशोधन	४,५००
४	अफल प्रशोधन	१,५००

५	चिस्याउने तथा उपकरण सफाइ	१,५००
६	कर्मचारी प्रयोग (शौचालय, स्नान, हात धुने)	१,०००
७	भवन तथा उपकरण सरसफाइ	४,०००

जम्मा : १७,००० लिटर/दिन (१७ m³/दिन)

यस आधारमा ५० भैंसी प्रतिदिन क्षमता भएको वधशालाका लागि १७–२० m^3 /दिन पानी आपूर्ति प्रणाली तथा ३० m^3 क्षमताको ओभरहेड/भूमिगत ट्यांकी उपयुक्त मानिन्छ।

५० भैंसी/दिन वधशालाको दैनिक ठोस फोहोर तथा उप-उत्पादन सारांश

क्र.सं.	विवरण	मात्रा
१	कुल ठोस उप-उत्पादन	9.55 टन/दिन
२	कम्पोस्टयोग्य पदार्थ	1.75 टन/दिन
३	रेन्डरिङका लागि सामग्री	4.9 टन/दिन
४	खाने योग्य अफल तथा बोसो	1.75 टन/दिन
५	छाला	1.75 टन/दिन
६	रगत	0.75–1.0 m³/दिन

निष्कर्ष

- ५० वटा भैंसी प्रतिदिन वध हुने वधशालाबाट करिब ९.५–१० टन ठोस उप-उत्पादन र ७५०–१००० लिटर रगत उत्पादन हुन्छ। यसलाई व्यवस्थापन गर्न:
- कम्तीमा २ टन/दिन कम्पोस्टिङ क्षमता
- ५ टन/दिन रेन्डरिङ क्षमता
- २ टन/दिन अफल तथा छाला भण्डारण क्षमता
- १,००० लिटर रगत सङ्कलन ट्याङ्की

- ❖ २ टन/दिन अफल तथा छाला भण्डारण क्षमता
- ❖ १,००० लिटर रगत सङ्कलन ट्याङ्की
- ❖ व्यवस्था गर्नु उपयुक्त हुन्छ।

विद्युत्

औद्योगिक तीन-फेज विद्युत् आपूर्ति तथा ब्याकअप जेनरेटरको व्यवस्था हुनुपर्छ।

प्रकाश व्यवस्था

मासु प्रशोधन केन्द्रभरि पर्याप्त प्राकृतिक वा कृत्रिम प्रकाशको व्यवस्था हुनुपर्छ। प्रकाशले रङ्ग परिवर्तन देखिन नहुने हुनुपर्छ। सामान्यतया प्रकाशको तीव्रता

निम्नानुसार हुनुपर्छः

- निरीक्षण स्थलमा ५४० लक्स (५० फुट क्यान्डल)
- कार्य कक्षहरूमा २२० लक्स (२० फुट क्यान्डल)
- अन्य क्षेत्रमा ११० लक्स (१० फुट क्यान्डल)

यी प्रकाश मापनहरू सामान्यतया भुइँबाट ०.९ मिटर उचाइमा गरिन्छ, तर निरीक्षण क्षेत्रमा १.५ मिटर उचाइमा गरिन्छ।