

ETHIOPIAN STANDARD

First edition
2005-03-12

Abattoirs — Basic Requirements

ICS: 67.120.

Descriptors: definitions, requirements, utilities, design, service facilities, store, laboratory, first aid, fire protection, isolation pen, foot bath, blood collection, rooms, packing labelling, dispatch, weighing, incinerator, waste treatment

Reference number
ES 1118:2005

Price based on 12 pages.

Foreword

This Ethiopian Standard has been prepared under the direction of Agricultural and Food Technology Technical Committee and published by the Quality and Standards Authority of Ethiopia (QSAE)

In the preparation this Ethiopian Standard references have been made to the following:

Codex Alimentarius, Meat and meat products including soups and Broths Vol.10 Second edition 1993

-Indian Standards IS 4393-1979 Basic requirements for an Abattoir

-Codex Alimentarius Commission, CAC/ RCP 11-1976 Rev. 1(1993) recommended international code of hygienic practice for fresh meat.

Acknowledgement is made for the use of information from the above publications.

Abattoirs- Basic requirements

1 Scope

This Ethiopian Standard Covers the typical layout plan, major design requirements, sitting and utilities, major Operational, service, storage, waste treatment and dispatch facilities waste disposal system, water supply, Hygiene and sanitary for abattoirs carrying out sheep, goats, pigs, camels and cattle.

2 Normative references

The following Ethiopian Standard contains provisions which, through reference in this text, constitute provisions of this Ethiopian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES 269:2001 Drinking water specification.

3 Definitions

For the purpose of this Ethiopian Standard the following definitions shall apply

3.1

Bar

shall mean unit of pressure expressed as kg/cm^2

3.2

Carcass

shall mean body of slaughtered animal especially one ready for cutting up as meat.

3.3

Casing Cleaning Room

shall mean a room where stomach and intestine contents are cleaned.

3.4

Cold Room

shall mean a facility operating under low temperature to preserve meat and meat products.

3.5

Condemned Room

shall mean room where carcass or other animal organ(s) officially declared dangerous or not fit for use for human or animal consumption is temporarily stored.

3.6

Dressed Carcass

shall mean the eviscerated body less the external offal and the diaphragm

3.7

Deboning

shall mean the act of separating meat from bone.

3.8

Detained Room

shall mean a room where suspected carcass or organ(s) is waiting for inspection judgement.

3.9

Disinfectant tub

shall mean an open container at the main gate(s) and doors to the slaughter house holding disinfecting solution to suppress or destroy the infectious agents of animal diseases including zoonoses.

3.10

Effluent

shall mean liquid wastewater or sewage that pours out of an abattoir.

3.11

Emergency Slaughter

shall mean slaughter by necessity of any animal which has recently suffered accident or injury, or which is affected by a disease, which does not necessarily call for total condemnation at meat inspection, which however is likely to deteriorate unless slaughter takes place immediately

3.12

Abattoir

shall mean premises used for the slaughter of animals for human consumption approved and registered by controlling authority.

3.13

Foot bath

shall mean a small pool holding chemical solution for disinfecting and washing animals' feet entering the slaughter hall.

3.14

Incinerator

shall mean an apparatus used for burning rubbish.

3.15

Isolation Pen

shall mean sheltered area surrounded by fence where sick, suspected or injured animals are kept.

3.16

Lairage

shall mean a sheltered place where slaughter animals get water and rest only for about 24 hours before slaughter.

3.17

Offal

shall mean in relation to slaughtered animals any edible or non-edible part of the animal other than carcass

3.18

Potable Water

shall mean water, which shall comply with ES 269: 2001 drinking water specification.

3.19

Reception Area

shall mean fully or partially sheltered place where slaughter animals get feed, water and rest for about 72 hrs. and above.

3.20

Slaughter hall

shall mean a hall in the abattoir where slaughtering activities from stunning to dressing are carried out.

3.21

Stock Room

shall mean a room in the abattoir where packing and labelling materials are kept.

3.22**Stunning pen/Box**

shall mean a pen or a box where a slaughter animal is made unconscious before cutting the throat for bleeding

3.23**Shoat**

shall mean Sheep and Goats.

3.24**Waste Water**

shall mean liquid waste matter arising as a result of the activity of abattoir.

3.25**Working Area**

shall mean slaughter hall and slaughter hall accessories.

4. Requirements**4.1 Siting and utilities abattoir****4.1.1 Siting**

4.1.1.1 In siting an abattoir, checking the availability of potable water, access road & power source is required.

4.1.1.2 The plant shall be 2 km away from residential areas, social services and pungent or objectionable odour emanating industries.

4.1.1.3 It shall be away from airfields according to Civil Aviation's regulation.

4.1.1.4 An abattoir shall be 1km radius away from surface water bodies & deep wells.

4.1.1.5 The abattoir premises shall be free from big trees those harbour scavenging birds.

4.1.1.6 The abattoir shall be on the leeward of residential areas and social services.

4.1.1.7 The abattoir shall be 2 km away from any ranch boundary, quarantine station and a neighbouring abattoir.

4.1.1.8 For proper and safe operation and possible future expansion of an abattoir an additional area of land is required (horizontal construction). The total area includes land allocated for recommended facilities and future expansion.

4.2 Utilities**4.2.1 Road accessibility**

4.2.1.1 Access roads to abattoirs shall be at least compacted gravel road as per the Ethiopian Road Authority's Rural Road Standard (RR10).

4.2.1.2 The building verge, main internal access road, loading bays and all areas serving vehicular traffic shall be either paved or tarred.

4.2.2 Water and electricity

4.2.2.1 In-case potable water supply system is inadequate or absent, deep wells shall be bore holed at least 300 meters radius away from wastewater treatment plant.

4.2.2.2 If possible, hydro- electricity power or diesel engine supply is required.

4.2.2.3 If possible stand by source of energy shall be available in all times.

4.2.3 Waste disposal and drainage

4.2.3.1 Any waste treatment plant shall be at least 50 meters away from the slaughter hall and accessories.

4.2.3.2 Septic tanks and soak pits shall be located on lower points relative to water wells.

- 4.2.3.3 Septic tanks and soak pits shall be located separately from water wells at least at a distance of 300 meters.
- 4.2.3.4 Dry animal and other solid wastes shall be avoided according to environmental protection principles.
- 4.2.3.5 To keep the abattoir compound clean and hygienic, animal by-products like horns, bones, hooves etc. shall be avoided as per environmental protection principles, if not further utilized.

5 Major design requirements for an abattoir

- 5.1 Building design and layout shall be planned to meet the basic requirements of divisions into clean and unclean working operations.
- 5.2 The main gate(s) to the abattoir shall have disinfectant tubs 3m by 5m by 50cm deep at the centre. The width of the disinfectant tub(s) at each door to the slaughter hall shall be as wide as the door by 100cm length, 5cm deep at the centre.
- 5.3 The roof of the slaughter hall and all buildings with direct relation to the service of the slaughter hall shall be such that they do not transmit any undesirable substances to the slaughter product/meat/.
- 5.4 The roof cover of the slaughter hall and its accessories shall be at least galvanized corrugated iron sheet.
- 5.5 Slaughter hall's and accessories' doors shall have smooth, non-absorbent surfaces and, where appropriate, be self closing and close fitting.
- 5.6 The windows of the slaughter hall and accessories shall be at least 2 meters high from the floor, glazed with glass, the ledge sloped at a 45 degree angle to the out side.
- 5.7 To avoid insects, rodents and vermin, windows and openings made for sufficient ventilation shall be covered with screens.
- 5.8 All corners and edges of the slaughter hall and accessories shall have curved finishing.
- 5.9 The abattoir boundary fence shall be at least 2 meters high to protect scavenging dogs, jackals etc., and unauthorised personnel.
- 5.10 Where appropriate, the abattoir shall have guardhouse at each gate.
- 5.11 Where required, cold and hot water point, at a pressure of 0.5 - 0.8 bar shall be installed for cleaning meat transporting trucks and the truck washing area shall be located downward of the slaughterhouse and shall be connected to the main drainage canal.
- 5.12 To protect the distortion of the natural colour of carcass or offals, adequate natural or artificial lighting shall be provided.
- 5.13 Where appropriate, Wash hand basins (Hand washing facilities) shall be either knee or pedal operated, with suitable hand cleaning preparation and with suitable hygienic means of drying hands, shall be provided adjacent to toilet and in such a position that the employee must pass them when returning to the processing area. Notice board shall be provided to direct personnel to wash their hands after using the toilet.
- 5.14 For all rooms in the slaughter hall and accessories, the floors shall slope 1-2% to drain liquids to trapped outlets.

6 Service Facilities

6.1 Veterinarian and meat inspector office

- 6.1.1 The veterinarian(s) and meat inspector(s) office shall be at least 5m² per person, if more than two persons are accommodated in, additional 2.5 m² per person is recommended.
- 6.1.2 The room shall be furnished with shelves and lockers and other necessary office facilities.

6.2 Toilets and urinals

- 6.2.1 Toilets and urinals for male and female shall be separately constructed in an area that does not bring ill effect on the products of the abattoir and shall be furnished with high or low cistern flush.

- 6.2.2 The floor of the toilets and urinals shall be non-absorbent, washable and non-slip materials, without services and shall be easy to clean and disinfect. Where appropriate, floors shall slope sufficiently for liquids to drain to trapped outlets including grates.
- 6.2.3 The wall shall be constructed from non- absorbent, washable materials and shall be light coloured up to a height appropriate for the operation and they shall be smooth and without crevices and shall be easy to clean and disinfect. Where appropriate angles between walls and floors shall be sealed and covered, and angles between walls and walls, and ceilings and walls, shall be sealed to facilitate cleaning.
- 6.2.4 Where appropriate, the toilets and urinals shall be furnished with hand washing facilities equipped with liquid soap dispenser or solid soap holder, nail brushes, disposable towels or air-drying equipment and tissue paper hunger.
- 6.2.5 Toilets and urinals shall be connected with roofed corridor to the abattoir and the walkway shall be paved.
- 6.2.6 Toilets shall be constructed at a rate of 1 to 1 - 15, 2 to 16 - 35, 3 to 36 - 55, 4 to 56 - 80, 5 to 81 - 110, 6 to 111 - 150 employees and over 150 employees one additional fixture for each additional 40 employee.
- 6.2.7 Urinals can be supplied under condition as above with 1 stall for 40 men.
- 6.2.8 Toilets shall be so designed as to insure hygienic removal of waste matter. These areas should be well lit, ventilated and should not be open directly onto meat handling areas.

6.3 Changing room and shower

- 6.3.1 Changing room(s) and shower(s) shall be attached with slaughter hall and accessories.
- 6.3.2 Where appropriate, the shower(s) shall be attached with changing room(s), shall have floor at least cement tiles and wall 2 meters high white ceramic tiles finishing.
- 6.3.3 There shall be separate changing room(s) and shower(s) for male and female workers
- 6.3.4 By-product (Hide and Skin, Feet and Head, Casing Cleaning, Lairage and Reception) staff shall be supplied with separate changing room(s) and shower(s).
- 6.3.5 Changing room(s) shall be furnished with labelled lockers.
- 6.3.6 Where appropriate, the shower(s) room(s) shall be furnished with chrome plated metal or plastic towel hanger and ceramic soap holder.
- 6.3.7 Shower(s) attached with changing room(s) shall be constructed at a rate of 1 to 15 workers for up to 100 workers and at rate of 1 to 30 workers for more than 100 workers

6.4 Equipment Store

- 6.4.1 The equipment store shall be attached with the Slaughter hall.
- 6.4.2 Where appropriate, the wall of the equipment store shall be trowelled cement plaster, light plastic paint.
- 6.4.3 The floor shall have non- absorbent, washable and non slip materials without crevices and should be easy to clean and disinfect.
- 6.4.4 Where appropriate, the equipment store shall be furnished with metal shelves, painted with synthetic anti-rust paint.

6.5 Laboratory

- 6.5.1 Where appropriate, the laboratory shall have sufficient area and be divided into two rooms (office and working room).
- 6.5.2 The floor shall be non-absorbent, washable and non slip materials without crevices, easy to clean and disinfect.
- 6.5.3 The wall shall be at least white oil paint finishing and the ceiling can be cheap wood.
- 6.5.4 Hot and cold water supply shall be available in the laboratory.
- 6.5.5 The laboratory shall be equipped with at least binocular microscope, centrifuge, post mortem kit(s), wash hand basin(s), electrical or non-electrical sterilizer, double bowl stainless steel sink and working tables, butane gas cylinder and Bunsen burner and written analytical procedures shall be available.

6.6 First aid accommodation

- 6.6.1 The first aid accommodation shall be available as per the standards and authorization by the Ministry of Health.
- 6.6.2 The first aid accommodation shall be kept in appropriate and accessible places.

6.7 Stock room

- 6.7.1 Where appropriate, the stock room shall be attached to the packing area.
- 6.7.2 The wall shall be finished at least with light plastic paint.
- 6.7.3 The floor shall have cement screed finishing.
- 6.7.4 The room need to be equipped with metal shelf /ves/.

6.8 Clothes washing and ironing room

- 6.8.1 Where appropriate, the clothes washing & ironing room shall be available in the premises of the abattoir
- 6.8.2 The room shall be supplied with hot & cold water and laundry facility, tray or tube for every twenty employees.

6.9 Fire protection equipment

- 6.9.1 Portable cylinder (fire extinguisher) with chemical substance shall be available as per the standards and authorization by the local Fire Brigade Station.
- 6.9.2 The fire extinguisher (s) shall be kept in appropriate and accessible places.

7 Major operational facilities

7.1 Reception area

- 7.1.1 Where appropriate, the reception shall be divided into pens of maximum holding capacity.
- 7.1.2 The floor of the reception area shall have rough cement mortar finishing with 1% slope to the drainage canal.
- 7.1.3 The reception area shall be partially roofed.
- 7.1.4 Each pen in the reception area shall be supplied with concrete water troughs with a height of 50 cm, width 50 cm, depth 25cm.
- 7.1.5 Concrete feed troughs or metallic/wooden hayracks shall be installed in each pen at a rate of 50cm and 35cm per head of large and small animal respectively with height 30cm, width 50cm, and depth 25cm for feed troughs and 1m height, 60cm top width for a V- shaped hayrack.
- 7.1.6 Each pen in the reception shall be constructed considering an area of about 4m², 3m² and 0.75m² per head of camel, cattle and shoats respectively.
- 7.1.7 The pens shall poles at least 1.8m high for large animal and 1m for small animals purlins spaced from bottom to top, the first three at 15cm, the next two at 20cm, the next two at 30cm and the last one at 35cm. The poles can be spaced at 2 meters intervals.
- 7.1.8 Where appropriate, there shall be concrete pavement path from the reception to the lairage. The width of the path shall be 3m.

7.2 Lairage

- 7.2.1 The lairage shall be divided into pens of maximum holding capacity.
- 7.2.2 The lairage shall have galvanized iron sheet roofing, metal/wooden truss, purlin, and tubular poles.
- 7.2.3 If the lairage is to have wall, the wall shall be finished with washable, non-absorbent.
- 7.2.4 There shall be an open space between the wall and the roof of the lairage.
- 7.2.5 Where appropriate, the floor of the lairage shall be rough cement screed with slope of 1.5% towards the main drainage canal.

- 7.2.6 The pens shall be similar with reception pen shown under sub-article 7.1.7.
- 7.2.7 Each pen in the lairage shall have water trough with height of 50cm, width 50cm, depth 25cm.
- 7.2.8 In each pen space requirement per head shall be considered at 3m² for large animals and 0.6m² for shoats.
- 7.2.9 The lairage shall have crush, poles and purlins made of tubular iron pipe spaced with similar interval as indicated in sub-article 7.1.7.
- 7.2.10 The floor of the crush shall be at least paved with stone, the Poles shall have width of 50cm at the bottom & 90cm at the top.
- 7.2.11 The lairage shall be connected to the slaughter hall with an animal race.
- 7.2.12 The lairage shall be followed by a passage to the slaughter hall with a minimum width of 3m leading to a final collecting pen, joined by a forcing crush to the slaughter point of a minimum length of 10m.
- 7.2.13 The width of the narrow path from lairage to stunning box or directly to the slaughter hall shall not be greater than 90cm for cattle/camels and 35cm for shoats.
- 7.2.14 Where appropriate, in addition to natural light, the Lairage shall be supplied with artificial lighting.

7.3 Isolation Pen

- 7.3.1 Materials and facilities used to construct the isolation pen shall be similar with the materials and facilities used for reception and lairage as stated under sub-article 7.1.5, 7.1.7, 7.2.5 & 7.2.7.
- 7.3.2 The isolation pen shall be constructed as indicated under sub article 7.1.6 considering about 2% suspected animals from the expected maximum daily kill.
- 7.3.3 There shall be separate isolation pens for different species of animals.
- 7.3.4 The isolation pen for each species of animals shall be constructed at least 10 meters away from lairage, reception and slaughter hall.
- 7.3.5 The pen shall be equipped with at least 3-pole crush.

7.4 Foot bath

- 7.4.1 Where appropriate, the footbath shall be paved with concrete and be connected to the drainage system.
- 7.4.2 The footbath shall have 90cm width, 5 meters length and 20cm depth for cattle/camel, and 50cm width, 5-meter length and 10cm depth for shoats.
- 7.4.3 The sides of the foot bath shall be tubular iron poles and purlins spacing and height shall be similar with the lairage pen as shown under sub- article 7.1.7

7.5 Slaughter hall & bleeding Area

7.5.1 Restraining and stunning pen

- 7.5.1.1 Where appropriate, the restraining pen for Islamic slaughter shall be semi-rotary casting pen for large animals, and small ruminants shall be restrained as per the Islamic ritual system of slaughtering /Halal /.
- 7.5.1.2 Where appropriate, for Christian slaughtering, the stunning pen shall be an individual stunning or knocking pen. The sides and floor of the device shall be metal sheet and RHS (Rectangular Hollow Section) frames.
- 7.5.1.3 The floor of the stunning box is recommended to be 35 cm raised above the floor of the bleeding area.

7.5.2 Slaughter hall

- 7.5.2.1 The floor of the slaughter hall shall be finished with washable, non-absorbent and easy to clean material.
- 7.5.2.2 Where appropriate, the wall of the slaughter hall shall be white ceramic tile up to the level of rail (s).
- 7.5.2.3 The canal in the slaughter hall shall be open top covered with iron grill.
- 7.5.2.4 The rail throughout the slaughter hall shall be made at least from rust resistant material.

- 7.5.2.5 The recommended rail height for cattle and other large animals is 4.5 meters with the head and 3.5 meters head removed. Rail height for shoats shall be 2 meters with/without the head.
- 7.5.2.6 The hook of the hoist shall be rust resistant material.
- 7.5.2.7 Where appropriate, the slaughter hall shall be furnished with wash hand basin(s), pressurized water hoses of 0.8 - 1.2 bar & knife sterilizing boxes.
- 7.5.2.8 Carcass spacing on the rail shall be 2 cattle or 5 small animals per two meters and the distance between double rails shall be 1.8m in the slaughter hall, but double rails leading to storage, treatment and dispatch facilities shall be spaced at least at 1 meter. The rails shall be 1.8 meter away from the wall for cattle/camel and 2.4 m for small animals for safety operation.
- 7.5.2.9 Where available, water temperature for washing carcass of different species shall be 60°C for 20 seconds and 82°C for sterilizing instruments.
- 7.5.2.10 Hangers and hooks for liver, heart, lung, and spleen shall be installed in the slaughter hall.
- 7.5.2.11 Platforms, ladders, tables, chutes and similar equipment shall be resistant to fracture, rust resistant and non- absorbent.
- 7.5.2.12 If double rails are used in the slaughter hall, slaughter hall accessories shall be on both sides to avoid cross contamination of carcasses.

7.5.3 Blood collection

- 7.5.3.1 Where necessary, the bleeding trough shall have smooth impervious surface and be made of either smooth concrete or rust resistant material.
- 7.5.3.2 If blood is to be collected for further use, there shall be blood tank.
- 7.5.3.3 If blood is not to be collected for further use, it has to be led to an open canal that ends up in a Cesspool.

7.6 Slaughter hall accessories

7.6.1 Heads and feet room

- 7.6.1.1 Where appropriate, heads and feet room shall be adjacent to the bleeding and flaying area and possibly connected with a conveyor or with sliding chute made of rust resistant material.
- 7.6.1.2 The wall of the room shall be ceramic tile 2 meter high from the floor.
- 7.6.1.3 The floor of the room shall be grooved glazed tile with the slope of 2%.
- 7.6.1.4 The room shall have an open drainage canal top covered with iron grill.
- 7.6.1.5 The size of the room shall be sufficient to accommodate the daily kill heads and feet.
- 7.6.1.6 The heads and feet room shall be supplied with wash hand basin(s) connected to hot and cold water supply, head hanger with resistant material hook and pressurized water hose of 0.5-0.8 bar.

7.6.2 Hides and skins room

- 7.6.2.1 Where necessary, the hides and skins room shall be adjacent to the flaying area.
- 7.6.2.2 The floor of the room shall be finished with cement screed with a slope of 2% to the drainage canal.
- 7.6.2.3 The wall of the room shall be easy to clean, non-absorbent, free from crevices and if possible painted with oil paint .
- 7.6.2.4 The drainage canal in the room shall be open top covered with iron grill.
- 7.6.2.5 The room shall be furnished with wash hand basin(s) with hot and cold water supply, and pressurized water hose of 0.8-1.2 bar.
- 7.6.2.6 Where appropriate, the room shall be provided with sliding chute.

7.6.3 Casing-Cleaning room

- 7.6.3.1 The casing cleaning room shall be adjacent to the dressing area.
- 7.6.3.2 The floor of the room shall be non-absorbent, easy to clean and with 2% slope to the drainage canal.

- 7.6.3.3 The wall of the room shall be non- absorbent, easy to clean, washable and free from crevices.
- 7.6.3.4 The drainage canal of the room shall be open top covered with iron grill.
- 7.6.3.5 Where appropriate, the room shall have sliding chute.
- 7.6.3.6 The room shall be furnished with wash hand basin(s), hot and cold water supply, and pressurized water hose 0.8 - 1.2 bar, knife sterilizing box(s) and rust resistant casing inspection table.

7.6.4 Offal preparation room

- 7.6.4.1 Where appropriate, the room shall be adjacent to the casing cleaning room.
- 7.6.4.2 The floor of the room shall be non-absorbent, easy to clean and with 2% slope to the drainage canal.
- 7.6.4.3 The wall of the room shall be non- absorbent, easy to clean, washable and free from crevices.
- 7.6.4.4 The drainage canal of the room shall be open top covered with iron grill.
- 7.6.4.5 Where appropriate, the room shall have rust resistant chute at the wall between casing cleaning and offal preparation room .
- 7.6.4.6 The room shall be furnished with wash hand basin(s), hot and cold water supply, and pressurized water hose 0.8 - 1.2 bar, knife sterilizing box(s) and rust resistant offal preparation table.

7.6.5 Detained room

- 7.6.5.1 Where appropriate, the wall of the detained room shall be non- absorbent, easy to clean, washable and free from crevices.
- 7.6.5.2 The floor of the room shall be non-absorbent, easy to clean and with 2% slope to the drainage canal.
- 7.6.5.3 The room shall be furnished with wash hand basin(s), rust resistant inspection table and 0.8-1.2 bar water hose with cold and hot water supply.

7.6.6 Condemned room

- 7.6.6.1 The condemned room shall be built separately from the slaughter hall and accessories and edible product storage room.
- 7.6.6.2 The room shall be provided with a door and be locked at all times.
- 7.6.6.3 The wall and floor of the room shall be oil paint and cement screed finish respectively.
- 7.6.6.4 The room shall be equipped with clearly marked watertight container (s) to ensure their use for no other purpose and be furnished with wash hand basin.

8 Storage, treatment and dispatch facilities

8.1 Cold room

- 8.1.1 Where appropriate, every cold room can be adjustable to negative or positive holding temperature for carcass treatment, and the cooling or chilling and freezing temperatures shall be -1 to 7⁰c and -18 to -30⁰c respectively.
- 8.1.2 The floor of the cold room shall be resistant to blood, fat, acid, and non-slippery.
- 8.1.3 The rail layout and carcass spacing in the cold room shall be 0.5m for cattle/camel, and 0.2m for shoats. The distance between rails shall be 1 meter.
- 8.1.4 If the cold room is to be built locally, the room shall have height of at least 3.5m for large and 2.75 m for small animals.
- 8.1.5 Automatic temperature recording devices (Thermometer and Thermograph) shall be installed for all cold rooms.
- 8.1.6 Maximum refrigeration temperature and load capacity shall be clearly marked on the door of each cold room.
- 8.1.7 Polystyrene of 20cm thickness shall be built in the wall and floor area of the cold room, if the room is to be built locally.

- 8.1.8 The polystyrene of corrugated iron sheet roof shall be at least 10cm thicker than polystyrene used for wall and floor.
- 8.1.9 The floor shall be finished with at least cement screed if locally made.
- 8.1.10 The wall shall be finished with white ceramics.
- 8.1.11 The hangers in the cold room shall be stainless steel.
- 8.1.12 The doors of the cold room shall be resistant to temperature variation and air tight with rubber gaskets but not opposite to one another.
- 8.1.13 The entrance of the cold storage shall be along anteroom or dispatch hall.

8.2 Deboning, packing and labelling area.

- 8.2.1 Where appropriate, the wall of the deboning, packing & labelling area shall be finished with white ceramic tiles at least 2 meters high from the floor.
- 8.2.2 The floor shall be non-absorbent, easy to clean with a slope of 1% to the drainage canal.
- 8.2.3 The area shall be furnished with wash hand basin(s), pressurized water hose 0.5 - 0.8 bar, rust resistant table(s) suitable for deboning, sterilizing box(es) and hot & cold water supply.
- 8.2.4 The deboning, packing and labelling area can be connected to the chilling/cold room with a rail system and shall be kept 7⁰-10⁰c at all times.

8.3 Dispatch and weighing area

- 8.3.1 The whole wall of the dispatch area shall be finished with light colour oil paint.
- 8.3.2 The floor shall be non-absorbent, easy to clean with a slope of 0.5% to the drainage canal.
- 8.3.3 The dispatch area can be connected with a rail system to the final product storage & carcass-weighing machine.
- 8.3.4 Carcass hangers in the dispatch area shall be rust resistant.
- 8.3.5 The doors shall be furnished with strip curtains to protect insects.

8.4 Incinerator

- 8.4.1 The incinerator shall be built on the leeward of the abattoir and height of the chimney shall be higher than the abattoir's height.
- 8.4.2 The incinerator could be built either from metal or bricks.
- 8.4.3 The size of the incinerator shall be enough to incinerate whole carcass of a large animal at a time and shall be at least 50 meters away from service facilities and the slaughterhouse.

9 Waste disposal system

9.1 Waste treatment

- 9.1.1 There shall be waste treatment system subject to environmental protection principles.
- 9.1.2 Human waste from toilets, showers and lavatories shall be dealt separately by collecting in a septic tank extended to soak pits.
- 9.1.3 Wastewater from slaughter hall, lairage & other processing wastes shall be led to waste water treatment system.

9.2 Drainage

- 9.2.1 Piped waste disposal system shall include manhole and other sewer appurtenance.
- 9.2.2 Manhole covers shall fit the manhole and be sealed with cement mortar when closed.
- 9.2.3 The slope of floors shall be at least 0.5%, but for wet operation areas 1%.
- 9.2.4 The drainage canal in the slaughter hall shall be open top covered with iron grills.
- 9.2.5 Where drainage pipes are required at least one inlet shall be provided for every 40m² of floor area.

9.2.6 The external drainage shall be closed pipe system.

10 Energy production unit

10.1 Location

10.1.1 Where appropriate, packaged boiler, refrigeration units and an electric generator or connections to the public supply shall be housed in separate room(s).

10.1.2 Hot water heaters or heat exchangers for the abattoir supply shall be located in a central boiler room.

10.1.3 The diesel engine room shall be built separately on the leeward of the abattoir.

10.2 Boiler room

10.2.1 Where appropriate, the boiler room shall be adjacent to the sterilization room.

10.2.2 The wall and the floor shall be finished with oil paint and cement screed respectively.

10.3 Sterilization room

10.3.1 The sterilization room shall be adjacent to the slaughter hall or any of the accessories.

10.3.2 The room shall be equipped at least with autoclave(s).

10.3.3 The wall & floor shall be finished with oil paint and cement screed.

11 Water supply

11.1 Average potable (drinking) water requirements per day per head of cattle, shoats, and camels is 45 litres, 5 litres, and 70 liters respectively kept in reception or lairage areas.

11.2 Average potable water required per slaughtered cattle, shoats, & camel is 1000, 100, & 1200 liter respectively for processing purpose (from bleeding to dressing).

11.3 The distribution of water throughout the works shall be in a range of 0.5-1.2 bars.

11.4 Where necessary, in slaughter and edible product handling accommodation hot, cold and steam shall be provided.

11.5 Water from deep wells shall meet the Ethiopian Standards on drinking water, specification, ES 269:2001

11.6 Water from deep wells shall be pumped up to elevated reservoirs whose capacity shall be adequate for at least 12 hours supply of the abattoir.

11.7 Water reservoir is elevated to meet necessary pressure of water points. Reservoirs shall be kept clean, and painted with anti-rust once a year if it is metal.

11.8 Standby pumps are required to use in case of pump failure.

11.9 In-case deep well is less feasible, and surface water is available, a conventional water treatment plant shall be constructed to produce potable water satisfying the Ethiopian Standard on drinking water, specification, ES 269: 2001

11.10 Water supply pipes shall preferably be laid parallel to and away from waste disposal pipes.

12 Emergency slaughter house

12.1 Where appropriate, for emergency slaughter of exhausted, injured or crippled animals emergency slaughter hall is necessary.

12.2 The facilities, fittings and finishes would match those of the main slaughter hall.

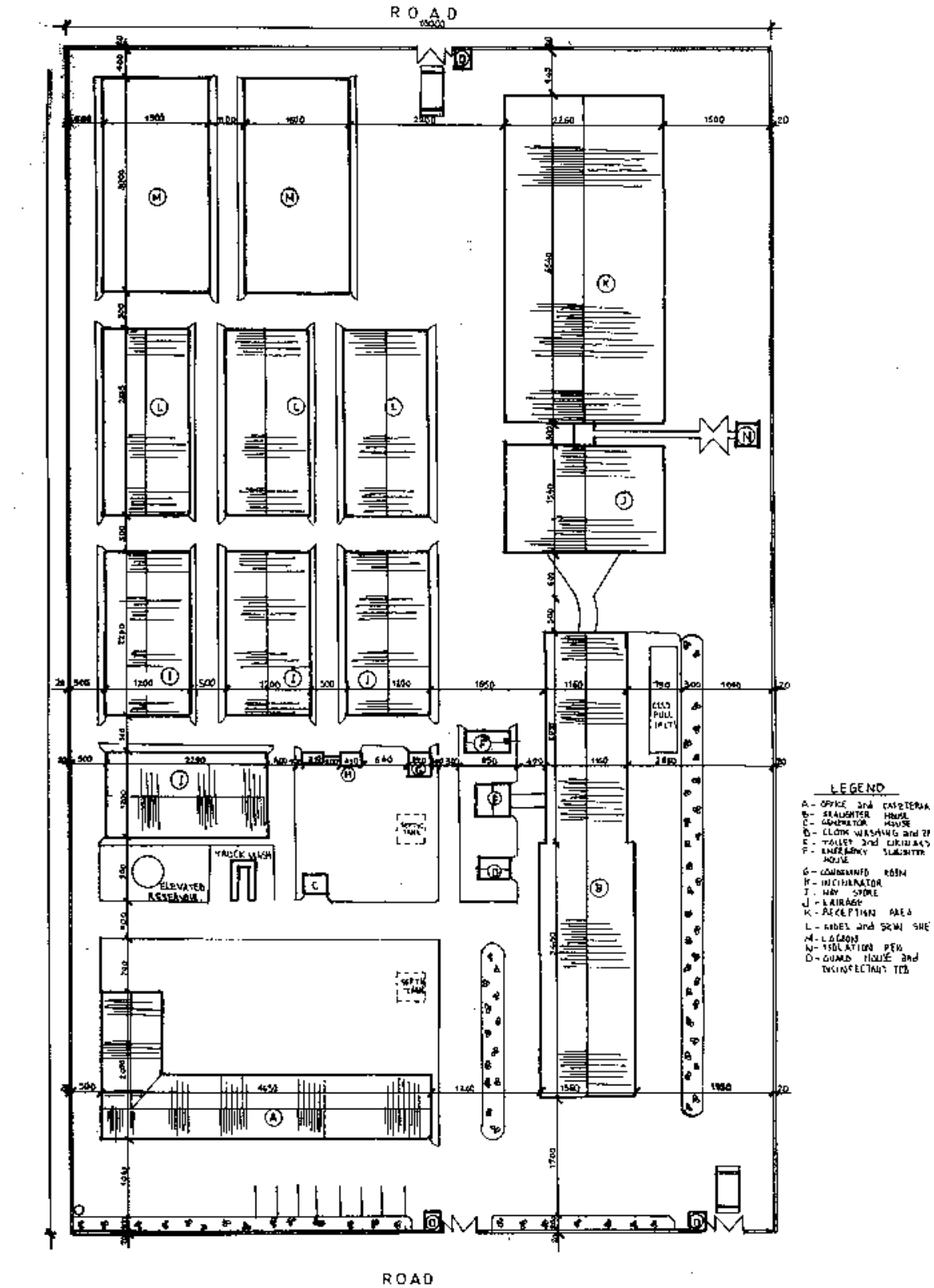
12.3 Where appropriate, the cattle unit would be equipped with floor pulling ring, hoist and rail system, cradles and equipment sterilizer and hand washing facilities.

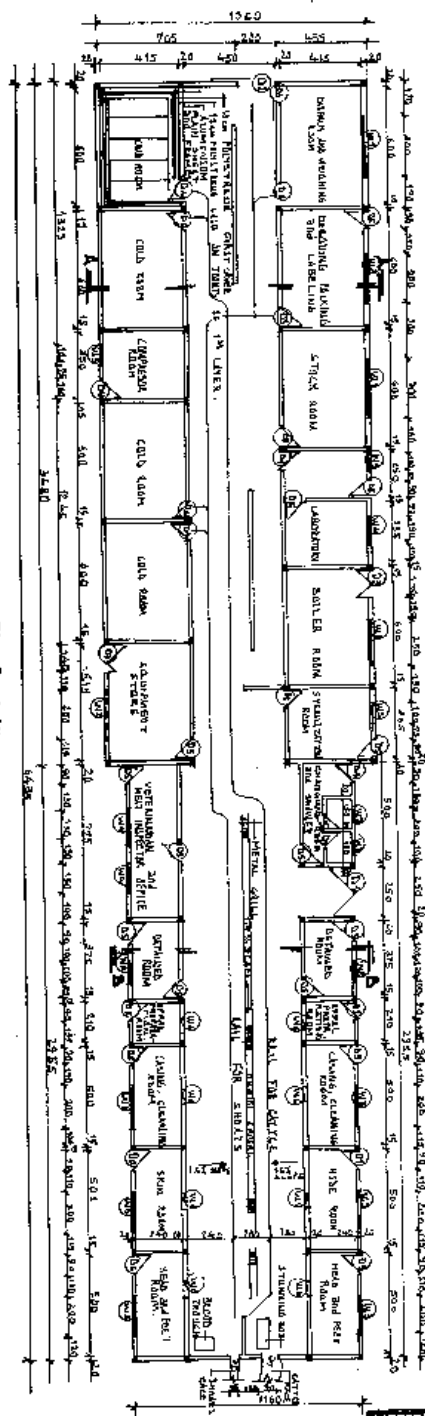
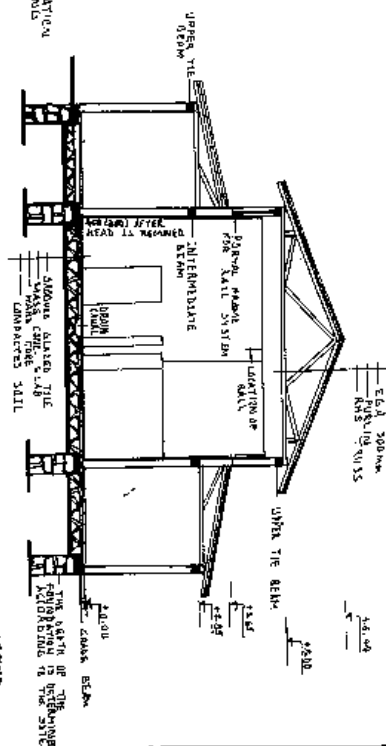
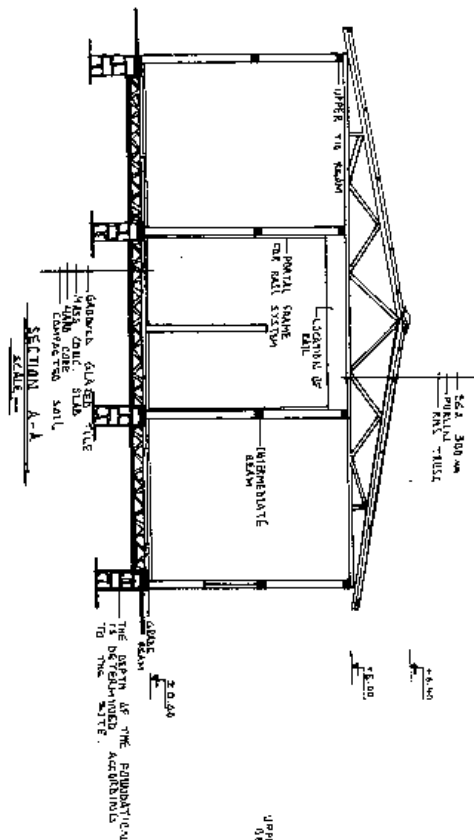
12.4 The shoats unit would be the same except that it would not have a pulling hoist or rail system.

12.5 The units shall be equipped with stainless steel table, drain hole, cold water and a wash down point.

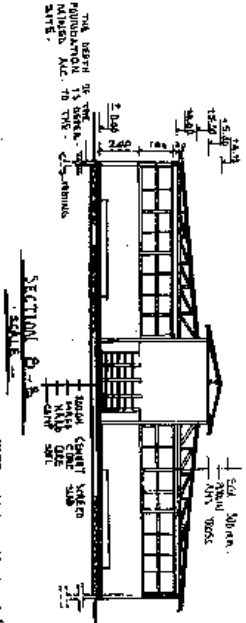
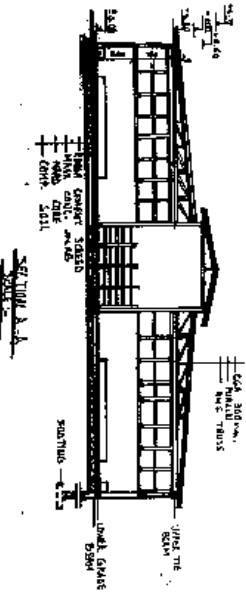
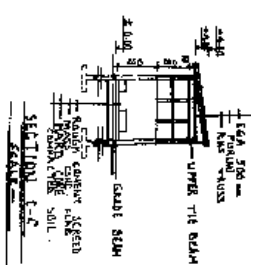
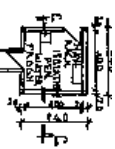
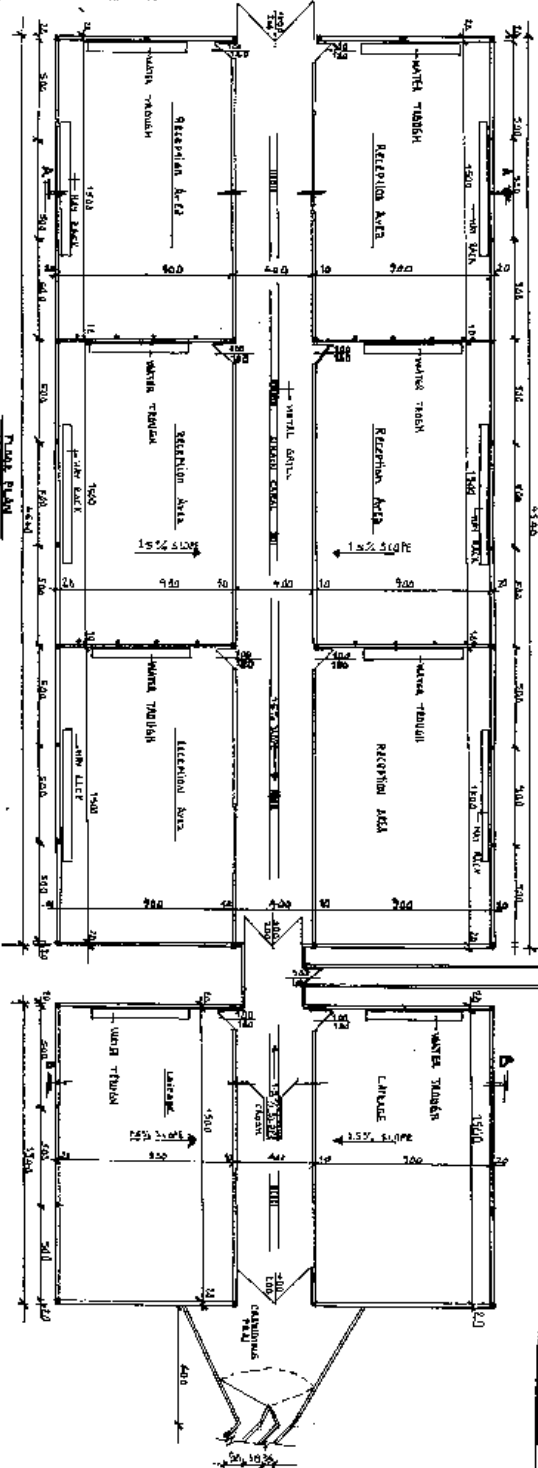
13 Other recommended facilities(Optional)

- 13.1 Manager's, administration and finance offices, cafeteria, conference hall and warehouse are facilities believed to enhance work and create conducive working environment. The facilities can be established either in or outside the premises of the abattoir.
- 13.2 If the facilities are constructed in the premises of the abattoir, the construction materials shall commensurate with the standard of the abattoir and do not bring ill effect to hygiene and sanitary condition of the abattoir.
- 13.3 The facilities shall be equipped with necessary accessories and communication means.
- 13.4 The topography of the abattoir's site be preferably gentle slope.
- 13.5 The site has to ideally allow for sensible orientation of buildings, expansion as a future possibility and the construction of dependent secondary industries.
- 13.6 A bay with concrete standing and a curb, draining to effluent main shall be planned if the vehicle maintenance area is constructed within the premises of the abattoir.
- 13.7 Availability of laundry machine in the premises of the abattoir supplied with hot water, rinsing and drying machine is an advantage to the abattoir.
- 13.8 Hides and skins shed facilities are recommended for better handling of the by-products
- 13.9 Separate offal preparation and storage room is recommended for efficient use of products.
- 13.10 Stand by compressor in case of compressor failure is recommended.
- 13.11 Hay/feed or formulated ration store is recommended.

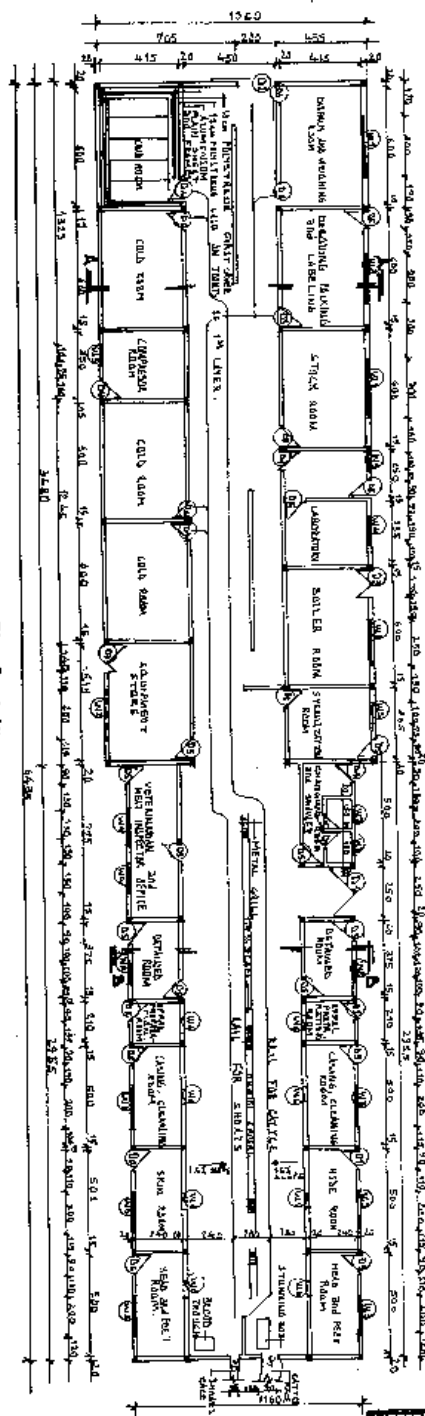
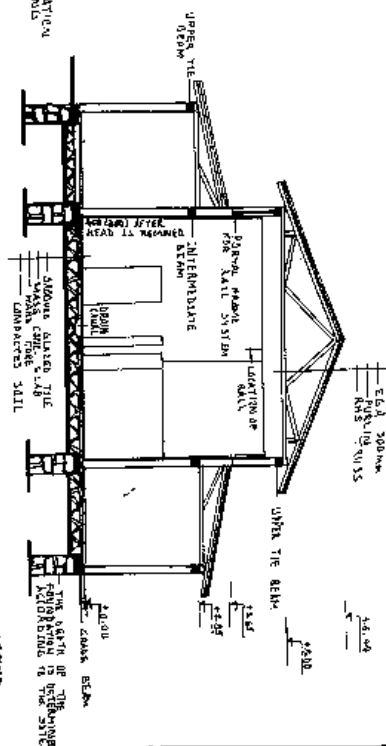
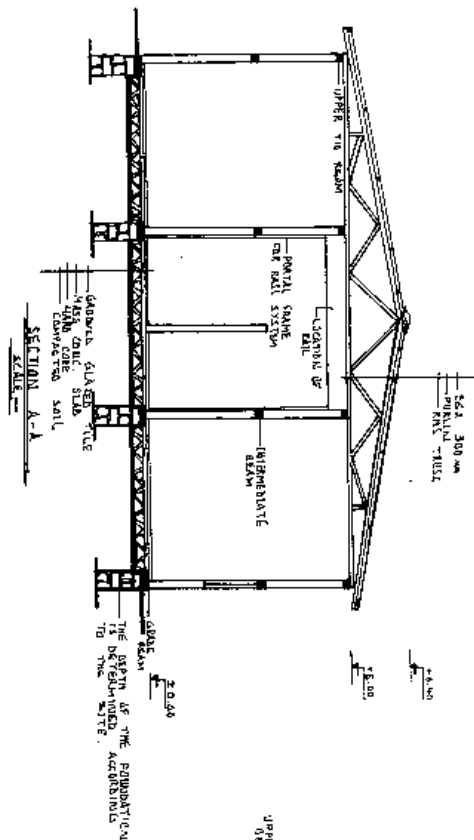


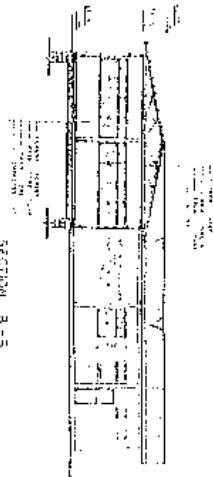


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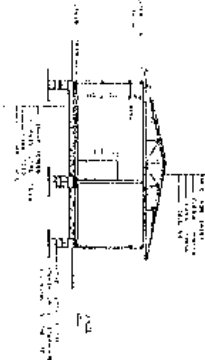


NOTE - CAPACITY OF LITTLE BOAT IS 215 SHORTS.

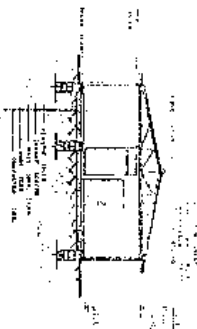
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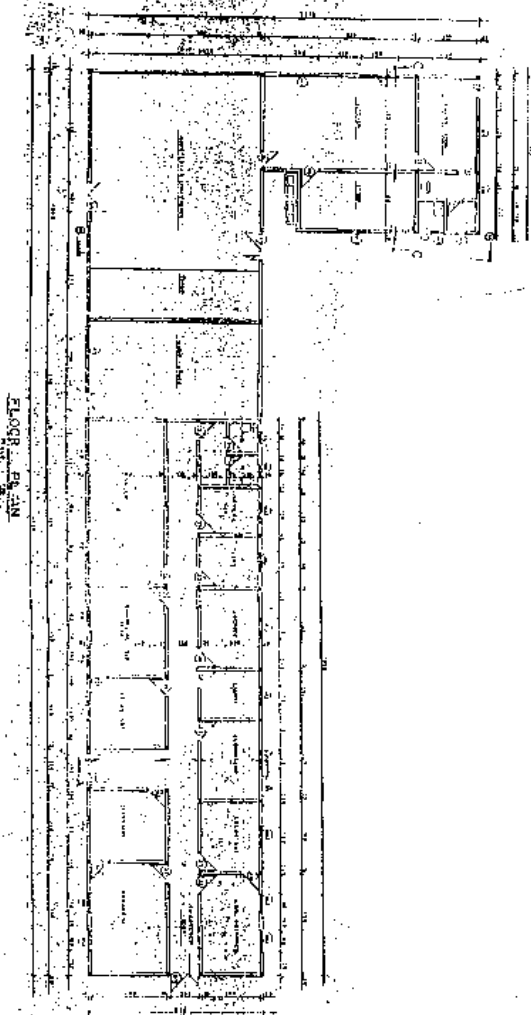
SECTION B-S



SECTION C-C



SECTION A-A



FLOOR PLAN