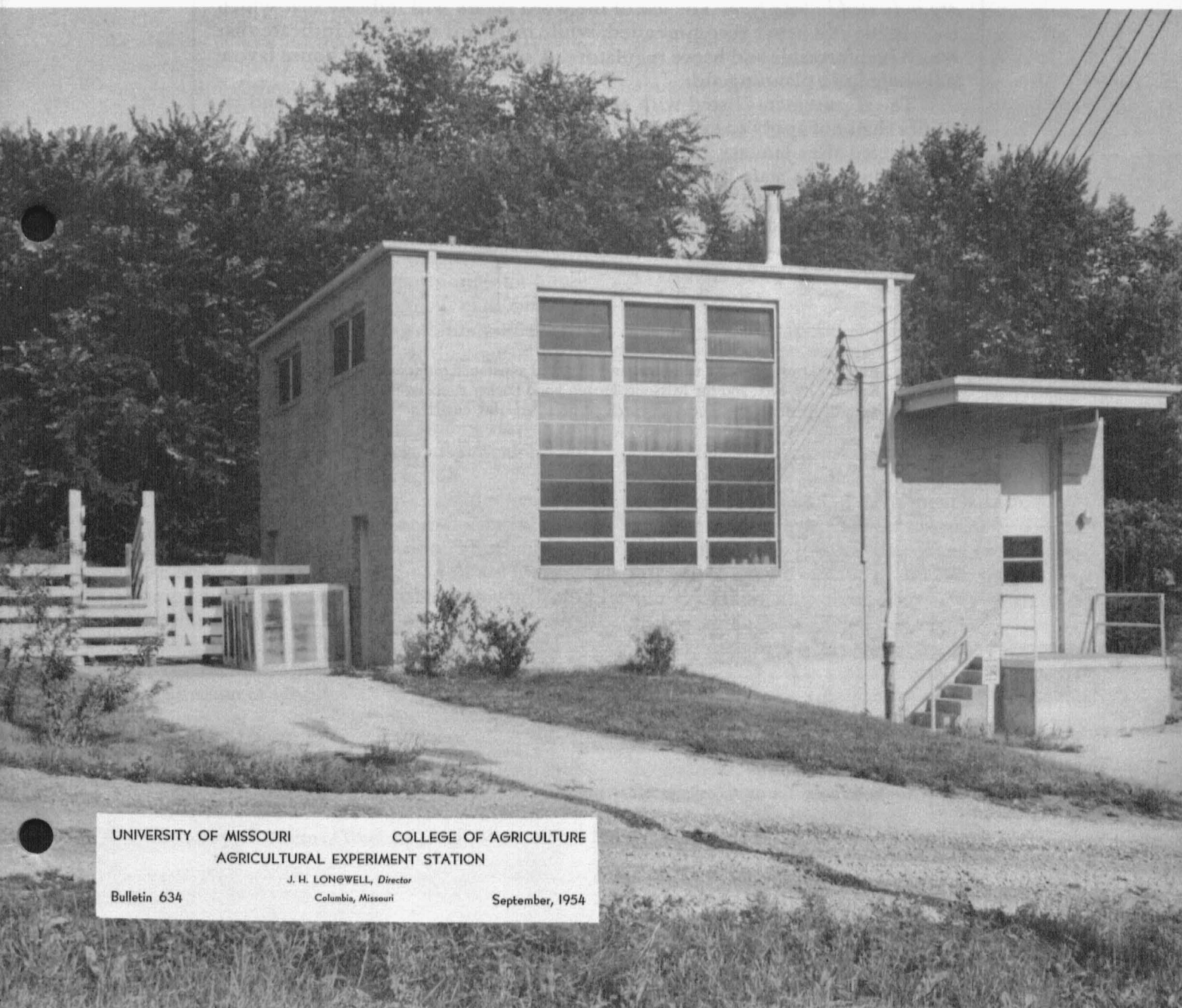


RECOMMENDATIONS AND REQUIREMENTS FOR SLAUGHTERING PLANTS

- *Construction*
- *Operation*



UNIVERSITY OF MISSOURI

COLLEGE OF AGRICULTURE

AGRICULTURAL EXPERIMENT STATION

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This publication has been prepared jointly by the members of the staff of the University of Missouri College of Agriculture and the Bureau of Food and Drugs, Missouri State Division of Health. It was prepared to assist those planning to remodel existing slaughtering facilities and especially those planning to construct new slaughtering plants. A knowledge of recommended and required procedure will benefit both the prospective operators and the people of the state.

It should be understood that the recommended and regulating procedures are difficult if not impractical to separate from one another in actual practice. For this reason it is recommended that very careful consideration be given to deviations from the suggestions which are outlined. *Those portions which are regulatory and enforceable under the authority of the State Division of Health are indicated in bold type.* The use of the word *should* will indicate that which is desirable and hence recommended, while the word *shall* will indicate that which is enforceable and hence regulatory. A suggested slaughter house layout is included as a planning aid.

The requirements listed with regard to construction, equipment and facilities shall not apply to existing slaughtering plants but shall govern those constructed after January 1, 1955. Construction prior to this is governed by regulations of the State Division of Health effective prior to January 1, 1955. Effective January 1, 1955, all slaughtering plants will be required to maintain the sanitary operational standards outlined in this publication.

The authors acknowledge the technical and practical assistance rendered by the Koch Supply Company, Kansas City, Mo., and the Missouri Frozen Food Locker Association. The bulletin reports on Department of Animal Husbandry research project No. 100, entitled "Food Preservation and Utilization."

RECOMMENDATIONS AND REQUIREMENTS

For

Slaughtering Plants

D. E. BRADY, MERLE L. ESMAY AND JOHN McCUTCHEN¹

INTRODUCTION

A well operated slaughtering plant in a farming community can mean a definite improvement in the standards of living. In too many communities the term "slaughter house" has a connotation that is undesirable. This is not necessary. Well constructed, clean and properly operated plants can overcome much public disfavor.

A successful slaughtering operation depends to a great extent on proper design and good construction. Good design will insure that the work can be done with a minimum of interference. Interference results from crowding, lack of handy space and overlapping operations. Good design provides a means for reduced labor cost through increased efficiency. It can also provide practical alternative opportunities for future expansion and plant changes. This is extremely important, because the potential possibilities usually exceed the funds that are available at the time of initial construction. It is, therefore, strongly recommended that anyone considering construction of a slaughter plant contact both the State Division of Health and the University of Missouri College of Agriculture prior to taking steps toward construction.

Illustrated in this publication is a suggested floor plan designed for absolute minimum floor area. However, it allows for future expansion. This slaughter house layout has been prepared as an aid for your planning rather than as an inflexible plan which cannot be altered to fit individual conditions and desires. Additional copies of this plan may be obtained by writing either the Missouri College of Agriculture or State Division of Health.

LOCATION

The right plant at the right location is extremely important. The site should be large enough to allow

for future expansion and changes. Crowding generally results in poor housekeeping. It should be so located that the future plant will fit well into the surroundings as a food handling plant. Avoid areas where prevailing winds will carry dust or smoke into the plant. Exercise caution with regard to "nature hazard" locations such as river overflow, springs and poor drainage areas. The location should be such that a safe and abundant supply of water can be obtained. The tendency is always to underestimate the amount of water required. Next in importance is an approved sewage disposal system. When municipal sewers are not available it is imperative that local or state health authorities be consulted. Failure to do this may result in delay, serious inconvenience and increased cost.

GENERAL CONSTRUCTION

In planning the construction of a slaughtering plant, three points should receive consideration in obtaining the desired objectives:

1. Strength and durability
2. Convenience
3. Cleanliness

The following recommendations and requirements should be carefully studied if these objectives are to be obtained. The interior of the plant should be so constructed that it can be readily maintained. Wood, plywood, the various "plaster" boards and similar materials will soak up water and grease and, therefore, are very difficult to keep clean. They may also serve as a harbor for bacteria, insects and vermin.

Peak loads are a severe test on the plant design and layout. It is then that the bottlenecks develop and efficiency is lost. No arrangement will prevent confusion and lost motion when the plant is doing more business than it was originally designed to handle. It is, therefore, strongly recommended that possibilities for additions to the plant be carefully considered.

¹Director of the Bureau of Food and Drugs, Missouri State Division of Health.

In a well planned plant thought should be given to sewer lines, posts and cross traffic. If the plant is well designed confusion will be reduced, meat protected, and the cleanup will be accomplished much more easily. Keep travel in the plant as short as possible. Have a place for everything and keep everything in its place. Clean, tidy, and convenient plants build good will, not only with the customer, but with the employees as well.

If you build the right kind of a plant you will welcome visitors. This will keep your plant on its toes. Good or poor housekeeping is equally contagious. A well designed plant helps build good employee habits. It discourages carelessness in the handling of personal belongings. It encourages employees to keep tools and equipment where they belong. It also encourages the wearing of clean clothes and taking care of other matters of good personal hygiene and appearance.

It is suggested that you visit other recommended slaughtering plants. See if they are as practical as you would like. Sit down then and list all of the desired features you would like in your plant, using suggested plans and information in this publication. Next, prepare the best floor plan possible. (You may want to contact an engineering or architectural firm for this step.) Then check and see if the plan has satisfied the objectives of (1) strength and durability, (2) convenience and (3) sanitation. Next see if it really meets the needs of the community. After all of this is done see if you can fit it in with your finances. Submit the completed plan to the Bureau of Food and Drugs, State Division of Health, Jefferson City, Mo., for approval before construction is started. This is the practical approach to building a successful slaughtering plant.

SANITATION REQUIREMENTS

1. **Floors**—All floors shall be of sound construction and kept clean and in good repair. Floors in killing rooms or areas, in processing rooms, and in all other rooms where floors are not kept dry, shall be constructed of concrete or other equally impervious and easily cleaned material, and shall be smooth and properly drained.

Floors in all areas of the plant, except where kept continually dry, shall be constructed of durable concrete, packing house brick flooring or ceramic tile masonry with flush impervious joints, or of other equally impervious and easily cleaned material. The floors (except where livestock enter) shall be smooth for ease of cleaning, but not glazed to the extent they are dangerously slippery when wet. Concrete floors

must be steel trowel finished but not with a glazed surface. Floor areas where livestock enter should consist of concrete with a broomed surface or other material of equivalent non-slipping characteristics.

A durable concrete floor may be constructed as follows:

- A. If ready-mix concrete is used, specify 6-bags of cement per cubic yard of concrete to be delivered on the job with a minimum of water in it. The mix should be just mushy enough (not sloppy) so it can be readily placed, leveled and finished. (If the mix arrives too stiff, a little water can always be added.)
- B. If concrete is to be mixed on the job, use a washed sand, a durable well-graded coarse aggregate, and add not more than 5 gallons of water per bag of cement in mixing. Mix thoroughly for at least two minutes after all materials have been placed in the mixer.
- C. Place concrete carefully and vibrate thoroughly, preferably with a mechanical vibrator, to remove all air pockets. Concrete should fill all voids, and be perfectly bonded to all reinforcing.
- D. Scrape excess concrete off carefully to the proper grade for drainage. A uniform slope of $\frac{1}{4}$ inch per foot toward drains to eliminate any ponding is of vital importance in the maintenance of optimum sanitary conditions.
- E. Finish concrete carefully, preferably with power equipment, in order to establish a smooth, non-dusting, non-slipping surface.
- F. Spray the green concrete floor with a commercially prepared paraffin base curing compound, or keep moist for at least seven days. This can mean the difference between a durable or non-durable floor, inasmuch as the resulting strength of the concrete can be increased from 25 to 50 percent by proper curing.

There shall be at least one floor drain for each 200 square feet of floor area and the floor shall be graded with a slope of $\frac{1}{4}$ inch per foot toward the nearest drain. All floor drains shall be equipped with non-clogging traps similar to those illustrated on page 11. All floor drainage lines shall be of durable metal, preferably of cast iron and at least 4 inches in diameter. The junction of all floors and walls shall have a curved cove of concrete or other impervious material on a radius of not less than 2 inches.

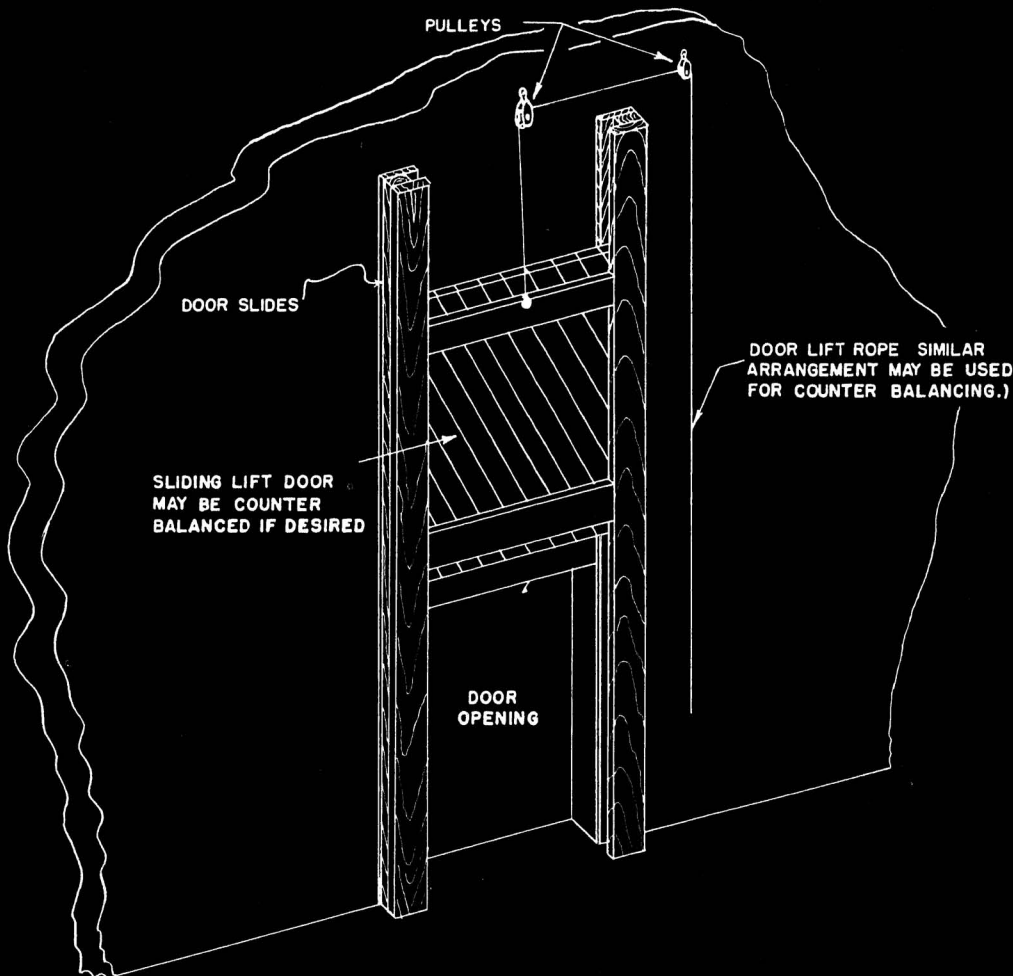
2. **Walls and Ceilings**—Walls and ceilings of all rooms and compartments in which exposed edible products are processed or stored, or in which utensils are washed, and in refuse rooms, shall have a smooth, washable, light-colored surface impervious to moisture.

All walls and ceilings shall be constructed of smooth, washable, non-absorbent material, free from cracks, crevices, and open joints. All 90° angles shall be coved and horizontal surfaces such as window sills provided with slopes of at least 45°. Killing room ceilings may be left out if roof construction is of such type allowing for a minimum of dirt collection and if it lends itself readily to washing down with a hose.

3. **Doors and Windows**—All openings to the outer air shall be effectively screened or protected to prevent entrance of flies, insects, birds, rodents, and other vermin. Screen doors shall open outward. All doors shall be self-closing and

fly tight. There shall be solid doors between rooms in which edible products are processed, otherwise handled, stored, or sold and those rooms or areas used as ramps, receiving areas, killing rooms, and refuse rooms. Necessary openings, such as openings for continuous conveyor lines, are permissible.

All openings to the outer air, except those through which the live animals enter the slaughtering plant, shall be effectively screened with wire of 16 mesh or finer, except that double acting doors or fans of sufficient force to prevent the entrance of flies may be used in lieu of screened doors, provided that rodents are prevented from entering the establishment by other means. Solid sliding doors or lift type doors may be used on openings where animals enter the slaughtering plant. All outside doors should be constructed of metal or should be flanged or edged with sheet metal to a height of 6 inches to prevent the entrance of rodents.



Solid self-closing doors shall be installed between rooms where edible products are processed, packaged, stored or sold, and those rooms and areas used for receiving, killing, or for the handling and storing of refuse or inedible products.

4. Lighting—All rooms and compartments shall be adequately lighted.

Window glass area equivalent to 15 percent of the floor area shall be provided in the killing room. Where possible, 25 percent is desirable. For optimum lighting and ventilation without drafts, the sash should not be closer than five feet from the floor. For convenient operation, cleaning and long life it is strongly recommended that all window frames be of metal. The sash should either be of hinged or pivot type and designed for the attachable type screens. All killing room work surfaces should be provided with a minimum of 10 foot candles of light. Grading and inspection stations shall have light intensity of at least 25 foot candles.

5. Ventilation—There shall be sufficient ventilation for all rooms and compartments to promote healthful and sanitary conditions.

If adequate natural ventilation cannot be provided to eliminate objectionable odors and minimize moisture condensation, adequate exhaust fans shall be provided. Toilet rooms and dressing rooms shall be ventilated to the outside air and protected from the entrance of flies and other insects. Any steam exhausting equipment should be supplied with adequate hoods or exhaust fans directly over the equipment to prevent undue condensation in the plant.

6. Toilet Facilities—Toilet facilities shall comply with the state plumbing code. Toilet rooms shall be conveniently located, and kept clean and in good repair. Toilet rooms shall not open directly into any room in which edible products or utensils are handled and/or stored. The doors of all toilet rooms shall be self-closing and fly tight. Signs directing employees to wash hands before returning to work shall be conspicuously posted in all toilet rooms.

Adequate and convenient toilet facilities shall be provided for employees. These facilities shall comply with local and/or state plumbing codes, or with the minimum requirements of the national plumbing code where the former do not exist.

All toilet rooms shall have doors provided with springs, weights, checks or other satisfactory devices to make them self-closing.

The toilet rooms and fixtures shall be kept clean, sanitary, in good repair, and free from flies, other insects, and rodents.

The toilet room shall be well lighted and ventilated to the outside air. The vent, or window if this is used in lieu of a conventional vent, shall be constructed to prevent the entrance of flies and other insects.

Durable, legible signs shall be posted conspicuously in each toilet room directing employees to wash their hands before returning to work.

Toilets in the building, and approved outside toilets shall be under the supervision of the establishment and shall be used exclusively for the plant personnel.

Toilet tissues shall be provided at all times.

Privies or earth closets, if used, shall be in compliance with state and local regulations and shall be separate from the slaughtering plant. They shall be of a sanitary type, located, constructed, operated, and maintained so that the waste is inaccessible to flies and does not pollute the surface soil.

Toilet facilities shall be provided in accordance with the following minimum formula:

No. Persons of the Same Sex	Toilet Bowls Required
1 to 15, inclusive	1
16 to 35, inclusive	2
36 to 55, inclusive	*3
56 to 80, inclusive	*4
For each additional 30 persons in excess of 80	*1

*Urinals may be substituted for toilet bowls but only to the extent of one-third of the total number of bowls stated.

7. Water Supply—Water under ample pressure shall be easily accessible to all rooms in which meat and/or meat food products are prepared or utensils washed, and the water supply shall be adequate, and of a safe, sanitary quality.

The water supply shall be ample, clean and potable (except that used in condensers), with adequate facilities for its distribution in the plant and its protection against contamination and pollution. Water used in condensers need not be potable. (If a private sewerage disposal system is used, condenser water should be discharged to street or natural surface drainage to prevent overloading the septic tank and tile field.)

There shall be no cross-connection between the potable and non-potable water supplies and said supply lines shall be distinctly labeled and identified.

Hot water at a temperature of not less than 145°F shall be available for sanitation purposes.

Minimum available water supply shall be 100

gallons per animal slaughtered per working day.

Hose connections with steam and water mixing valves or hot water hose connections shall be provided at convenient locations throughout the plant for cleaning purposes.

8. Lavatory Facilities—Adequate lavatory facilities, conveniently located, shall be provided, including hot and cold running water, soap, and approved sanitary towels. The use of a common towel is prohibited. Handwashing facilities shall be kept clean and employees shall wash hands whenever necessary.

Hand-washing facilities, including hot and cold running water, soap, and individual towels, shall be provided, and the lavatory and accessories shall be kept clean.

One or more lavatories shall be conveniently located adjacent to each food preparation area and each toilet room. Utensil or equipment washing vats, water flushing troughs, isolated spray nozzles, and other such items of equipment used in processing operations are not acceptable as lavatory facilities.

Hot and cold water or warm water shall be available at all times.

Lavatory faucets should not be of the hand-operated types, but should be of the approved foot-pedal or knee-pressure types.

A sufficient number of containers of impervious material shall be provided near each lavatory for used towels and other wastes.

9. Plumbing and Drainage System—All plumbing and drainage systems shall be so designed, installed, and maintained as to prevent contamination of the water supply, plant equipment or meat and/or meat food products, and shall comply with local and/or state plumbing codes, or with the minimum requirements of the national plumbing code where the former do not exist.

All plumbing shall be installed in accordance with the state or local plumbing code and the regulations of the State Division of Health. In the absence of specific regulations or codes, the recommendations as set forth in the "Report of the Coordinating Committee for a National Plumbing Code" shall be used.

Storm or surface drainage water outside the building should be removed from the premises.

Grease traps which are connected with the sewer

system should be suitably located, that is, not near any edible products department or in any area where products are unloaded from, or loaded into, vehicles.* To facilitate cleaning, such traps should have inclined bottoms and should be provided with suitable covers.

All drains and gutters shall be properly installed with approved traps and vents. Where refrigerators are equipped with drains, such drains shall discharge on the floor into open receptacles or shall be properly trapped and discharged through an air gap into the sewer.

Protection against backflow shall be provided wherever practicable, by means of a fixed air gap above the flood level of not less than twice the diameter of the water inlet; otherwise, by an approved vacuum breaker located between the control valve and the fixture and located not less than 6 inches above the flood level of the fixture. By "flood level" is meant the maximum level to which the water rises in flowing over the top or rim of the tank or through an opening below the top which discharges directly to the atmosphere through an air gap, when water is entering the tank at maximum flow and all tank drains are closed. Fixtures and equipment that are checked include toilet bowls, urinals, sinks, slop sinks, scalding vats, waste basins, cooling tanks, steam tables, steam kettles, refrigerators, condensers, and cooling systems. Hose connections to or from tanks, which can be extended below the surface of any liquid in the tank or container, or can lie on the floor, are backflow connections.

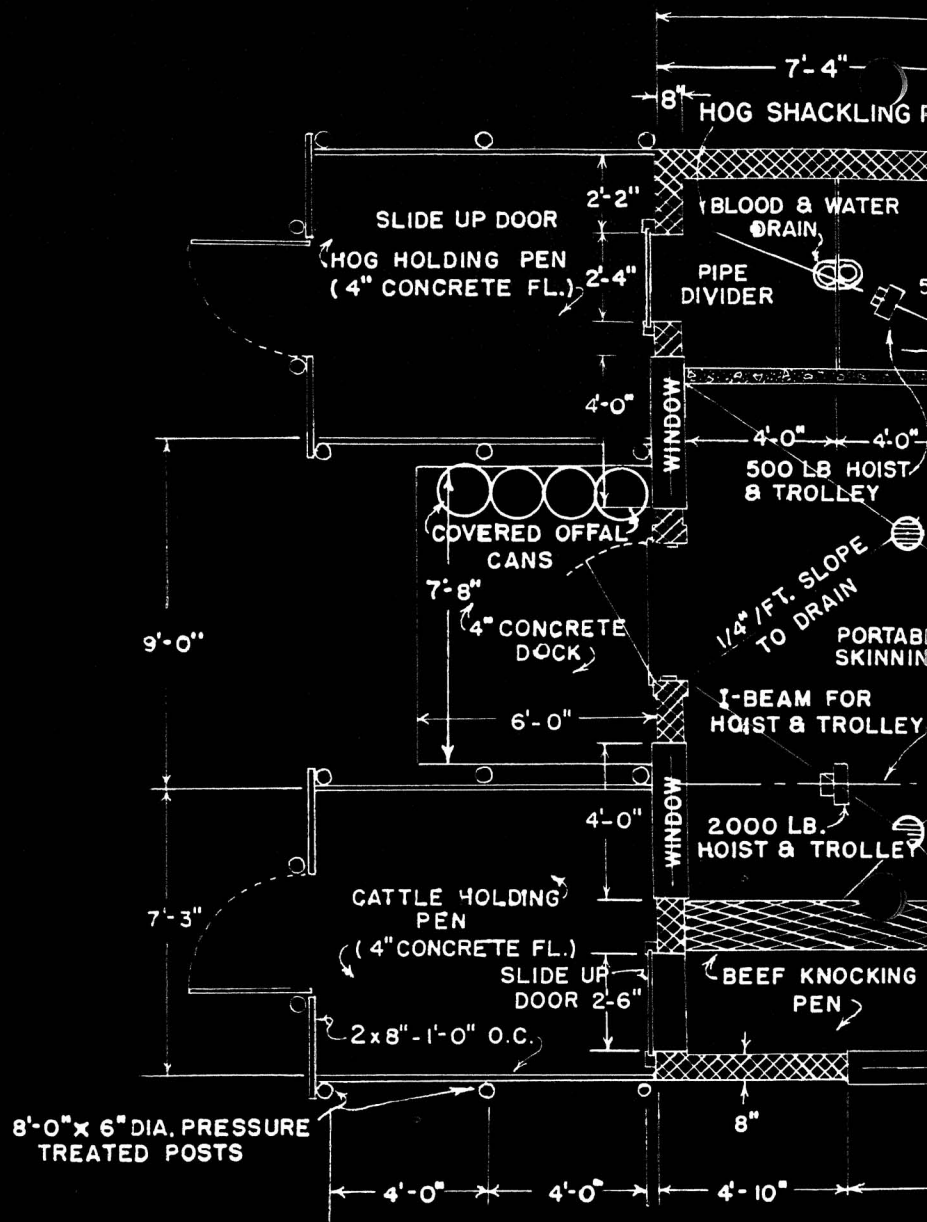
To prevent contamination of equipment by possible sewage backflow in case of drain stoppage, drainage from all equipment in which food or utensils are placed, except open sinks, shall discharge through an air gap into an open sink or drain, properly trapped and sewer connected.

No unprotected overhead sewer lines shall be installed in processing, storage, packing, or sales rooms. In existing establishments, food processing operations or food storage shall not take place beneath overhead sewer or drain pipes unless such pipes are provided with suitable means of carrying off possible leakage or condensation.

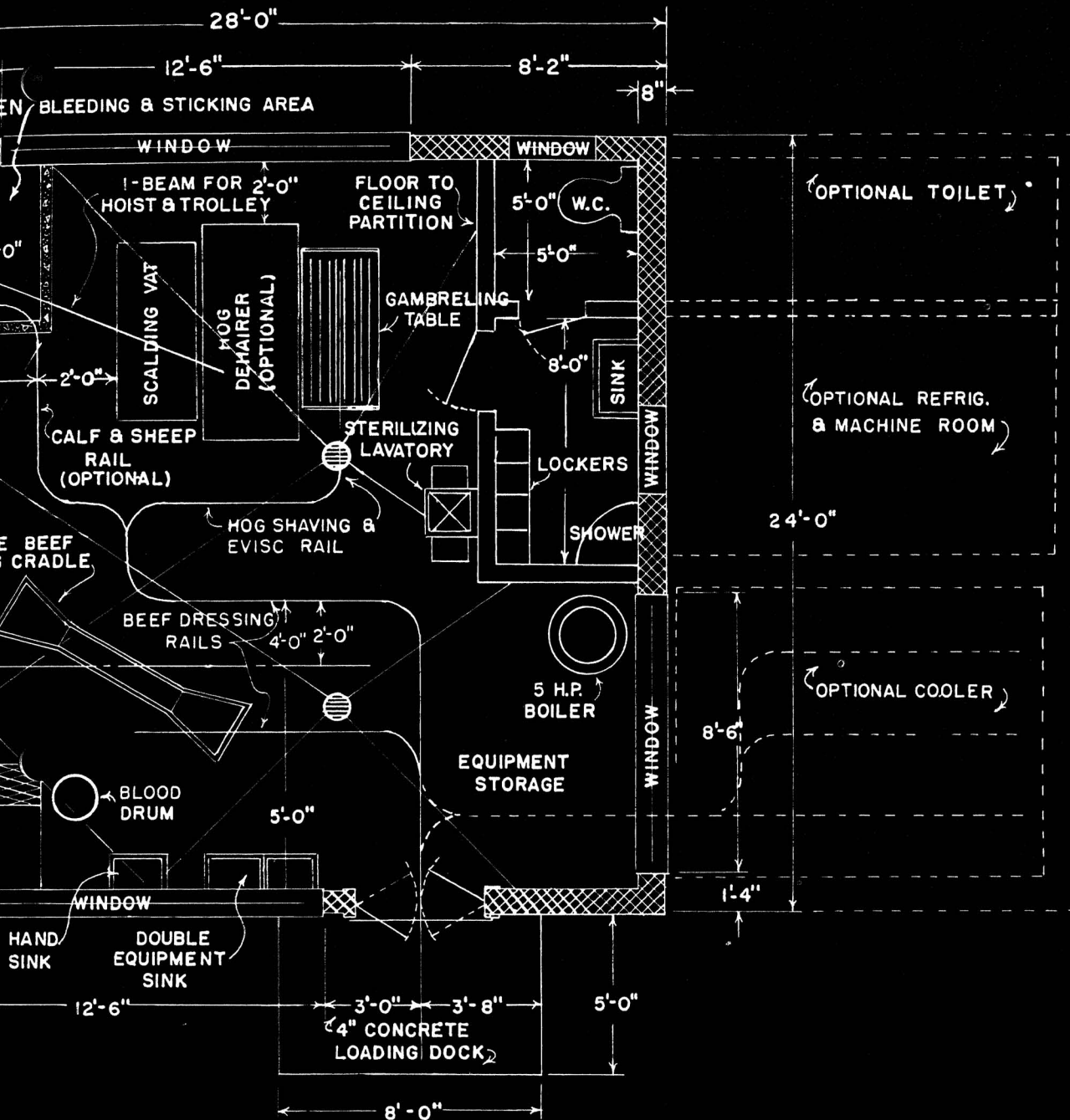
10. Disposal of Wastes—All solid and liquid wastes shall be disposed of properly.

The handling and disposal of wastes are two of the most important problems involved in the sanitary operation of an abattoir or slaughtering plant. There are five separate types of wastes: (1) blood, (2) floor wash, (3) paunch contents, (4) viscera,

*This does not apply to existing installations if operated in a sanitary manner.



1. THIS PLAN HAS BEEN PREPARED AS AN AID FOR YOUR PLANNING, RATHER THAN AN INFLEXIBLE PLAN WHICH CANNOT BE CHANGED TO FIT INDIVIDUAL CONDITIONS AND DESIRES.
2. THIS PLAN HAS, HOWEVER, BEEN DESIGNED FOR AN ABSOLUTE MINIMUM FLOOR AREA. MORE SPACE WOULD BE ADVANTAGEOUS.
3. THE TOILET AND LOCKER ROOM FACILITIES ARE ESSENTIAL AND SHOULD BE SEPARATED FROM THE WORK AREA WITH A FLOOR TO CEILING PARTITION.
4. THIS PLANT IS DESIGNED FOR A MAXIMUM SLAUGHTERING CAPACITY OF 10 HOGS PER HOUR OR 2 BEEF PER HOUR.



A SUGGESTED
 FLOOR PLAN
 SCALE 1/4" = 1'

bones and hoofs, and (5) sanitary toilet wastes. Where public sewers are not available, three of the types—blood, floor wash, and toilet wastes—present special disposal problems. It is strongly recommended that advice be obtained from the Division of Health relative to the best means of handling and treating these various types of wastes. In case of new plants, this should be done before the location is selected. The following guide lists recommended treatments:

Wastes and By-products	Suggested Disposal
1. Toilets and wastes from floor drains (no municipal sewer)	Grease unit and adequate primary and secondary waste disposal. (See State Division of Health plans and operating notes.)
2. Blood	Pit in bleeding area, or caught in containers. Sell, bury or heat to 212°F or higher and feed.
3. Viscera, bones, hoofs, etc.	Offal room in cans; render, sell, bury, or heat to 212°F or higher and feed.
4. Paunch contents	On truck; removed to fields daily and spread thinly.
5. Hides	Remove daily to separate hide room.

Toilet sewer lines shall be separate from plant drainage lines to a point outside the building and drainage from toilet bowls and urinals shall not be discharged into a grease catch basin.

All sewage and other liquid waste resulting from the cleaning of floors and equipment and similar operations shall be discharged into a municipal sewerage system, when available, or into a disposal system approved by the State Division of Health. It is strongly urged that every effort be made to connect with a city sewerage system; however, when such facility is not available, a sewerage or waste treatment plant shall be constructed in accordance with the requirements of the State Division of Health. In the case of new construction, it is important that the exact location of the abattoir on the building site be tentative until all questions of drainage and location of the waste treatment plants have been fully answered and settled.

11. Building Construction and Plant Layout—The building shall be of sound construction and kept in good repair, shall provide ample space and area for proper operations, and shall be so designed to protect as completely as possible all edible products from contamination.

Make the exterior of the plant as attractive as possible. First appearances are often most lasting.

Filth and odors have no place around the outside of the plant. To prevent this condition on the premises, all wastes, inedible by-products, and accumulations of refuse shall be disposed of in a manner approved by the State Division of Health, and all departments handling inedible products shall be maintained in an acceptably clean condition. Whenever necessary, approved grease traps, blood pits, etc., shall be provided, and satisfactorily maintained. Garbage cans in sufficient numbers to receive all bones, viscera, hoofs, etc., shall be provided, and such wastes shall be kept tightly covered, pending removal. These cans shall be emptied daily, and thoroughly cleaned inside and outside immediately after emptying. The livestock holding pens shall be so constructed as to permit flushing of the floors and other measures to maintain sanitary conditions.

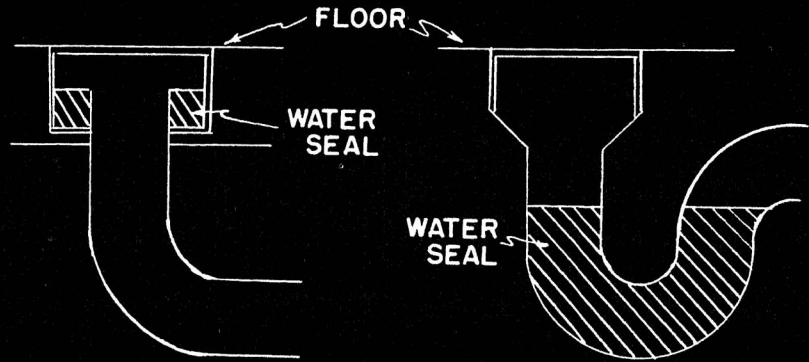
There shall be an efficient drainage and plumbing system for the plant and premises and all drains and gutters shall be properly installed with approved traps and vents. Such drainage and plumbing system must permit the quick run-off of all water from plant buildings and surface water around the plant and on the premises, and all such water shall be disposed of in such a manner as to prevent it from becoming a nuisance or health hazard.

12. Construction and Location of Equipment—Equipment and utensils shall be suitable for the purpose intended. The construction and location of equipment and utensils and the materials from which they are made shall facilitate thorough cleaning and insure cleanliness in the preparation and handling of products. They shall be kept in good repair.

A number of factors should be considered; namely, durability, appearance, ease of cleaning, and cost. Materials include wood, metal and the more recently developed plastics. Soft woods absorb meat juices easily and quickly become contaminated with spoilage bacteria. Hard woods are only comparatively less susceptible to this condition. Good hard wood, preferably hard maple, is necessary for meat tables and blocks, at least until a better substitute can be found.

Black iron and steel tend to rust quickly and are almost impossible to keep clean. They are of limited usefulness. Galvanized iron or that coated with tin is satisfactory and can be easily cleaned. Galvanized metal will corrode in the presence of salt or acid and become more difficult to clean. It is possible to reglaze and retain equipment when needed, although this may not always be practicable.

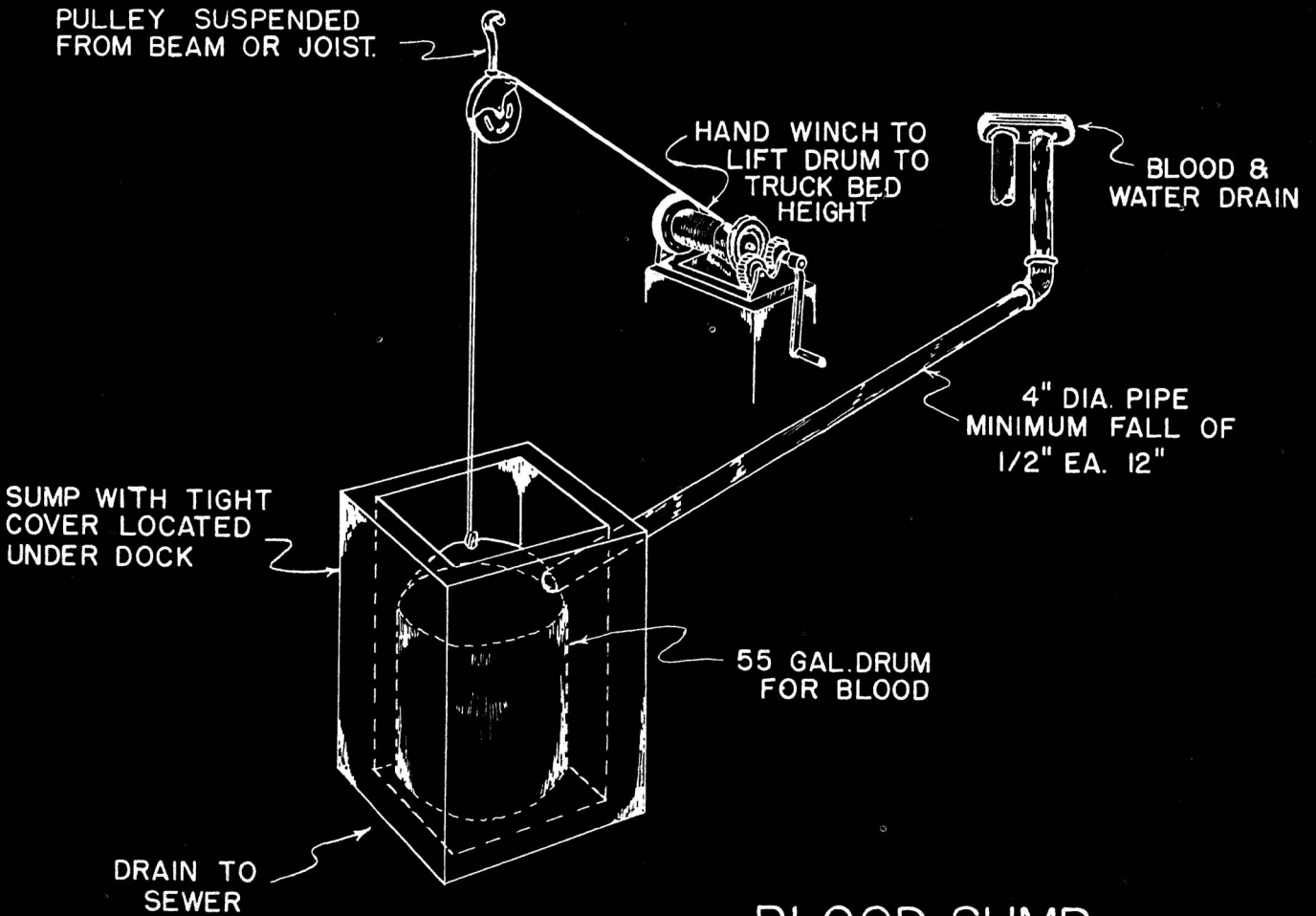
Copper and brass should not be used in contact with meat unless tin coated.



BELL TRAP

UNDER - THE - FLOOR
TRAP

TRAP DESIGN



BLOOD SUMP

Aluminum and aluminum alloys are excellent materials. They are light, easy to handle and give a good appearance. Aluminum has the disadvantages of being subject to denting and pitting and not being resistant to salt.

Stainless steel and Monel are by far the best materials for general use. They have practically all of the desired characteristics except the matter of initial cost. In the long run they will usually prove to be the most economical materials to use. Their principal value lies in their durability and non-corrosive characteristics.

Synthetic plastic materials have recently come into widespread use. Care must be exercised to use the correct materials. Molded polyethylene containers, such as buckets, have proven very satisfactory.

Movable equipment may be adaptable to a number of convenient locations. The problem may arise as to where this equipment should be kept if not in constant use. Examples are dollies, trucks and cleaning equipment.

Stationary equipment preferably should be set about 8 to 10 inches from the wall and about an equal distance off the floor. This will insure easy cleaning.

Equipment and utensils used for preparation, processing or otherwise handling any product in the plant shall be of such material and construction as will facilitate their thorough cleaning and insure cleanliness in the preparation and handling of all products. So far as it is practical, such equipment and utensils shall be made of metal or other impervious material. Wood tubs and non-seamless metal containers cannot be cleaned easily and thoroughly and, therefore, cannot be approved for slaughtering operations. Trucks and receptacles used for handling inedible products shall be of similar construction and shall be conspicuously and distinctively marked and shall not be used for handling any edible product.

Equipment and utensils should not be used outside the plant except under such conditions as may be prescribed or approved by the Division of Health.

13. Cleaning and Bactericidal Treatment.—
Equipment and utensils shall be kept clean and in a sanitary condition. Equipment and utensils, used in preparing or otherwise handling any edible product, shall be thoroughly cleaned and subjected to an approved bactericidal process following the day's operation and at such other times as may be necessary to prevent contamination of edible products.

No aspect of the day's operation is of greater importance than the cleanup of rooms and equip-

ment. Except for refrigerated rooms, a daily cleanup is essential for all rooms and equipment to stop the growth of spoilage bacteria. It is here that a wise choice of materials and equipment becomes so obvious because of the time saved. Cleaning labor can easily equal 20 percent of the total hours of labor output. Savings in cleaning time of 50 percent are easily possible with the correct type of construction and cleaning methods. Few slaughterers are really aware that the savings which can be made on the cost of cleaning may make the difference between profit and loss.

The secret of efficient cleaning is an adequate amount of water of the right temperature coming from conveniently located outlets, coupled with good detergents and sanitizers. There are a number of satisfactory cleaning procedures. The following procedures are recommended on the basis of their reliability and simplicity. For easy cleaning, scrape all tables and blocks with a metal scraper to remove as much of the meat residues as possible. Do not use a wire block brush as this will cause unnecessary wear and will make tables more difficult to keep clean. Sweep all loose debris from the floor.

Next, flush the floor, and other equipment adaptable to flushing with cold water. This will dislodge and flush small pieces of debris, including meat scraps, blood and fine particles from the equipment and floor. Hoses should be light, short and fitted with an adjustable nozzle to regulate the spray. Ordinary rubber and plastic hoses tend to deteriorate. Grease resistant hoses are recommended. Hose outlets should be conveniently located around the room. Overhead hose connections are, however, favored by many operators and are entirely satisfactory.

Hot water (145 to 150°F) flushing should be used next. Hot water will remove most of the grease which has collected on the equipment and floor. Following this operation a good alkali detergent should be used. A hot solution should be applied directly, using a medium stiff brush on the equipment and a stiff broom on the floor. The detergent also may be applied dry. The alkali detergent will combine with the grease to form a soap which will wash off easily. Excess alkali should be rinsed off.

Following each operation, the equipment which comes in contact with the food should be sanitized. Hypochlorites of calcium and sodium are most commonly used. Calcium hypochlorite (chlorides of lime) is available in the more stable form with an available chlorine content of 65 to 70 percent, as well as in the less stable form with an available free chlorine content of 15 to 35 percent. Liquid sodium hypochlorite

is available in household strengths (2 to 6 percent available chlorine) and industrial strengths (10 to 20 percent available chlorine). Rinse hypochlorite off of metal equipment after 20 to 30 minutes to prevent corrosion. It is not necessary to rinse wood and preferably the sanitizer should remain on the wood overnight after it has been wiped dry with a clean cloth.

To prevent rusting, equipment should be wiped dry with clean cloths at the end of the cleaning period and covered with white technical mineral oil if this equipment comes in contact with the food. Pale paraffin oil can be used if the equipment does not come in contact with the food.

An approved wash sink of adequate size and depth shall be installed in a convenient place for the washing of utensils, containers, and other equipment used in connection with slaughtering, or meat processing operations. This sink shall be provided with a metal drainboard and a combination supply faucet for the mixing of hot and cold running water. Adequate hot water facilities shall be installed, and shall be available for use at all times that the abattoir is in operation.

An approved means of thoroughly cleaning and sanitizing all knives, saws, cleavers, etc., used in slaughtering operations, such as a sterilizing lavatory, shall be provided. When meat processing and packing operations are carried out in connection with an abattoir, sinks in such numbers, sizes, and capacities as are necessary shall be provided to properly wash and sanitize all utensils, containers, and equipment used in the packing plant.

All knives, saws, cleavers, containers, tubs, blocks, tables, as well as cutting, slicing, mixing, stuffing, and grinding machinery, and similar utensils and equipment used in slaughtering, preparing, processing, or packing of meat and meat products should be thoroughly cleaned and sanitized each day, or oftener if necessary, and, if essential to the protection of the public health, subjected to special bactericidal treatment.

14. Storage of Utensils and Equipment—Equipment, utensils, and packaging materials shall be stored in suitable locations, in such manner as to be protected from contamination. Single-service containers, and all wrapping and lining materials shall be packaged, transported, and stored under sanitary conditions.

Storage of machinery, equipment, and similar items shall be so located, protected, or elevated that thorough cleaning of the floors is possible. Killing

room floors, and floors of preparation and processing rooms shall be cleaned following each day's operations, and more often if necessary, to keep them in a sanitary condition, and no obsolete or unnecessary items shall be permitted to accumulate or to be stored in these rooms. All meat, meat products, and ingredients shall be covered, or otherwise protected. All utensils and equipment shall then be neatly stored inverted on a clean surface, or suspended on approved racks, covered or otherwise protected against possible contamination.

Equipment used in preparation of any article (including but not being limited to animal feed) from inedible material shall not be used outside of the inedible products department except under such conditions as may be prescribed or approved by the Division of Health.

There shall be no handling or storing of materials which creates an objectionable condition in rooms, compartments or places in the plant where any product is prepared, stored or otherwise handled.

The rooms and compartments in which any edible products are prepared or handled shall be kept free from dust and odors, as well as from dressing and toilet rooms, catch basins, inedible products departments and other rooms or places in the plant or vicinity thereof.

15. Handling of Utensils, Equipment and Supplies—Equipment, utensils and all packaging materials with which food products come into contact shall be so handled as to prevent their contamination.

All utensils and equipment shall be handled in such a manner as to prevent contamination of clean and bactericidally treated items when not in use.

Containers and utensils shall not be handled by the surfaces which come into contact with food, except as absolutely necessary in certain established commercial practices.

Toxic materials shall be handled and stored in a manner as not to create a hazard to edible products or result in an objectionable condition.

16. Wholesomeness of Product—All edible products shall be clean, wholesome, free from adulteration, and so processed and handled as to be safe for human consumption. The management shall eliminate from production for food, all visibly diseased or unwholesome animals. Handling of dead animals is prohibited.

All edible products shall be wholesome, free from adulteration, and so processed as to be safe for human

consumption; all ingredients used therein shall be wholesome and free from adulteration.

Animals obviously diseased (tumors, open sores, discolored flesh) or otherwise inedible shall be removed immediately from the line and promptly disposed of in an approved manner. Edible products shall be kept off the floor at all times.

In the event the viscera discloses obvious diseased conditions, the animal shall be immediately removed from the line and the entire carcass condemned at once, unless held for further inspection. Condemned animals shall be either rendered or denatured, as by liberal application of pine oil or crude phenol.

All bruises, unless very small, shall be trimmed.

17. Temperatures, Chilling, Holding, Freezing.—Temperatures and procedures which are necessary for cooling, freezing and storing of meat and/or meat food products shall be in accordance with sound operating practices which insure the prompt removal of the animal heat and which retain the quality and condition of the product.

Adequate refrigeration shall be available for reducing the internal temperatures of all meats and meat products prepared and otherwise handled in the plant to 36°F within 24 hours. In the case of heavy beef it may be necessary to extend this period to 48 hours.

Refrigerators shall have such interior surfaces as are impervious to moisture and permit thorough cleansing and they shall be free from objectionable odors of any kind and shall be maintained in a sanitary condition, including but not being limited to the prevention of drippings from cooler coils onto products.

Cooling racks should be made of metal and be readily accessible for thorough washing and cleansing. Drains shall be properly trapped and shall discharge through an air gap into the sewer. All new installations and all replacements of refrigerators equipped with drains shall meet these requirements. The holding room temperature should ordinarily not exceed 40°F. Preferably, this room should be partitioned from the chilling room or other suitable arrangements made to prevent sweating on the cold carcasses.

Freezing Rooms: Freezing rooms shall have such interior surfaces as will permit thorough cleansing and they shall be free from objectionable odors of any kind and shall be maintained in a sanitary

condition. Freezing rooms should be maintained at 0°F. or lower.

18. Cleanliness of Employees—All employees coming into contact with exposed edible products, or edible-products-processing-equipment shall wear clean garments, keep their hands clean, and conform to good hygienic standards at all times while thus engaged.

All persons coming in contact with exposed edible products and equipment used to handle them shall wear clean garments and should wear caps or hair nets and shall keep their hands clean at all times while thus engaged.

Hands and arms of employees handling dressed meat, or other edible products or edible product handling equipment shall be clean and free of infected cuts, boils, and open sores at all times while thus engaged.

Every person, after each use of toilets or changing of garments shall wash his or her hands thoroughly with soap and water before returning to duties that require the handling of meat, dressed meat, dressed poultry or edible products or containers for them, or edible products handling equipment.

Neither smoking nor chewing of tobacco shall be permitted in the room where exposed edible products are prepared, processed or otherwise handled. Confine smoking to relief periods in a designated area, such as locker room, rest room or outside of plant. Wash hands before returning to work.

19. Miscellaneous Protection of Product From Contamination—All edible products shall be so processed, stored, transported, and displayed as to be protected as completely as possible from all sources of contamination.

All handling operations conducted with respect to meat and meat products shall be such as will prevent contamination of the product.

Buildings and equipment shall be so designed and arranged as to minimize traffic through areas where meat and meat products are handled or stored.

Every practical precaution shall be taken to exclude flies, rats, mice and other vermin from the plant.

Dogs, cats and other pets shall be excluded from the plant.

All meat and meat products shall be properly wrapped or otherwise protected against rain, dust, sun and other exposure, during transportation. Vehicles in which any meat or meat products are distributed from cold storage plants, refrigerated railroad cars, abattoirs, packing plants, or other points

of distribution shall be provided with approved covered bodies, or otherwise equipped so that the meat can be properly covered to protect it during transportation. Insulated trucks are recommended to protect the meat during periods of long haul. Maximum internal temperature of fresh meat or meat products shall not exceed 45°F. Trucks shall be kept in a clean and sanitary condition. Trucks in which live animals are hauled by an individual owner to an abattoir for slaughter may be used for returning the dressed meat to the market or outlet, provided the body of the truck is thoroughly washed and the floor covered with a clean tarpaulin, or its equal.

20. Premises—The premises shall be kept clean and free from refuse, waste materials, and other sources of objectionable conditions.

The premises shall be kept free from refuse, rubbish, waste material, and all other sources of objectionable odors. Insects and rodents shall, insofar as practical, be excluded from the plant. All blood, offal, bones, hides and parts of bodies too severely damaged to be salvaged and all discarded containers and other materials shall be completely disposed of daily.

The buildings shall be kept in good repair and shall be so constructed and maintained as to prevent the entrance or harboring of rodents.

21. Miscellaneous Operating Procedures—Operating procedures shall be such as will maintain a clean environment and insure clean, wholesome products at all times.

Metal racks, receptacles and other suitable devices shall be provided for retaining such parts as the head, tongue, and other parts of the carcass, and viscera and blood to be used in meat and meat products until examination is completed in order that they may be identified for this purpose. Equipment and utensils used for preparing, processing or otherwise handling of any meat, meat product or meat food product shall be of such materials and construction as will make them suitable and permit ready and thorough cleaning. Metal shall be used in place of wood wherever practical.

Operations and procedures involving the killing, preparation, storing, or handling of any meat products shall be strictly in accord with approved sanitary methods, such as the following:

It is recommended that all animals be elevated for thorough bleeding.

In existing one-room abattoirs, approved for

limited slaughtering, each dressed animal must be removed and the floor thoroughly cleaned after the slaughtering of each animal. If the killing room is large enough to accommodate the storage of meat in a limited quantity in one end, each carcass must be placed out of the way of subsequent slaughtering operations in a manner that will avoid contamination.

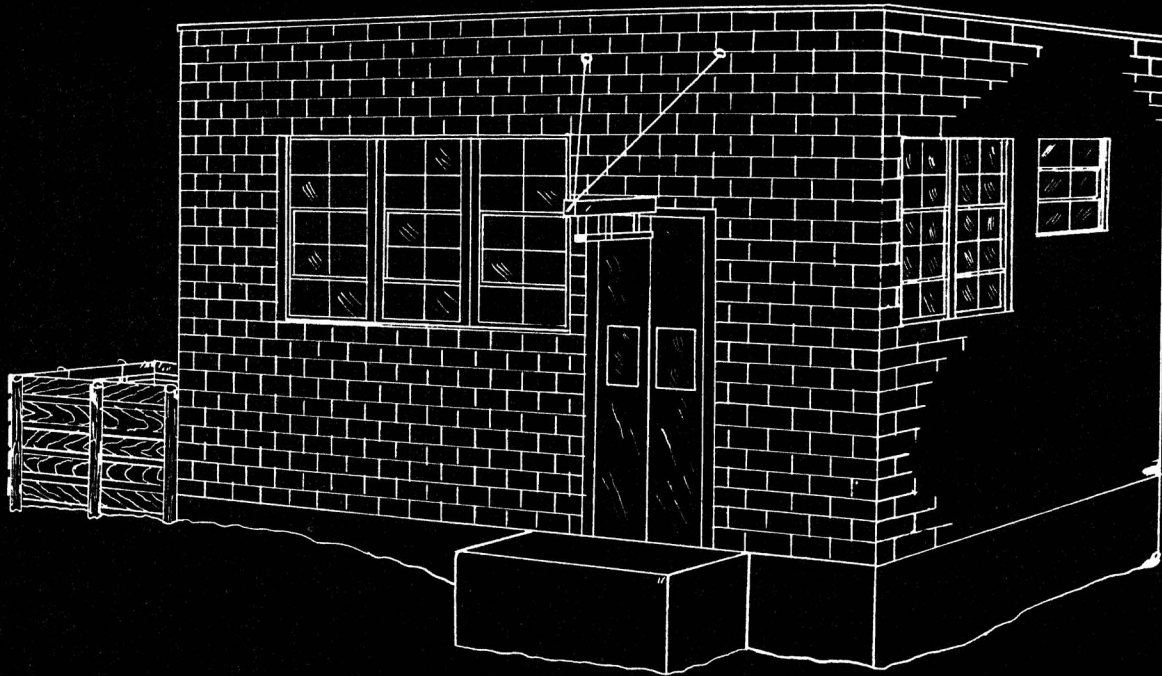
Meat handling rails shall be constructed not less than 24 inches from the nearest wall, and 30 inches from each other. No carcass may hang closer than four inches to the floor. Beef slaughter rails shall not be less than 10 feet from the floor.

Inedible portions of the viscera, hides, hoofs, etc., shall be removed from the killing room floor following the slaughter of each animal, unless satisfactorily stored in covered cans provided for the purpose, or, temporarily, in offal carts.

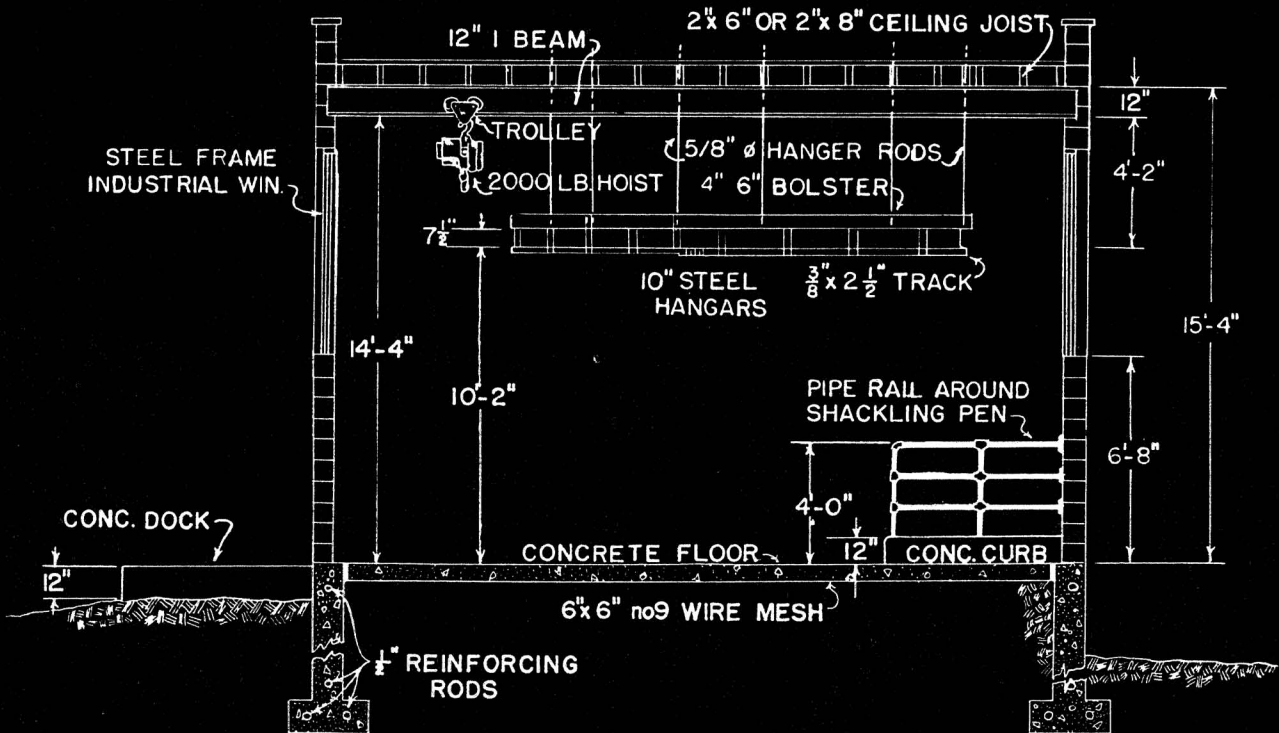
Hearts, livers, heads, and other edible parts of the carcasses shall be handled strictly in a sanitary manner. Suitable containers, hooks, racks, etc., shall be provided and used for this purpose. The storage of such edible items on floors, in general utility sinks, or in dirty containers shall not be permitted.

Disease Control—A person who is affected with any disease in a communicable form or is a carrier of such disease shall not work in any edible products department of a meat processing plant, and no such plant shall knowingly employ any such person or any persons suspected of being affected with any disease in a communicable form or of being a carrier of such disease. If the plant owner suspects that any employee has contracted any disease in a communicable form or has become a carrier of such disease, he shall notify the health officer immediately. A placard containing this section shall be located in all toilet rooms.

Approval Required for Future Plants and Remodeling—All meat processing establishments located in the State of Missouri or its police jurisdiction which are hereafter constructed, reconstructed, or extensively altered, shall conform in their construction to the requirements of these regulations. Properly prepared plans for meat processing establishments which are hereafter constructed, reconstructed or extensively altered shall be submitted to the State Division of Health, Jefferson City, Mo., for approval before work is begun; signed approval shall be obtained from the State Division of Health.



PERSPECTIVE



CROSS - SECTION