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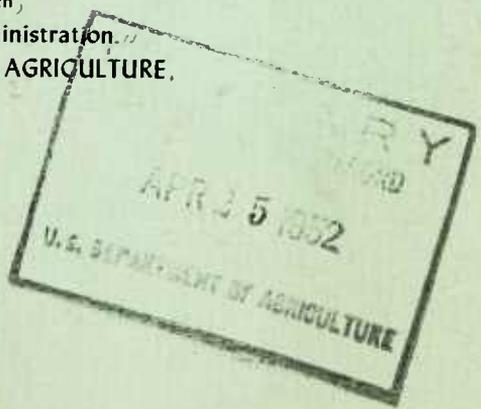
SUGGESTIONS FOR IMPROVING SERVICES AND FACILITIES AT PUBLIC TERMINAL STOCKYARDS.



7 (Prepared by Livestock Branch,
Production and Marketing Administration,
UNITED STATES DEPARTMENT OF AGRICULTURE.

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PREFACE

A project of research and investigations on ways and means for improving the marketing services, facilities, and methods of handling livestock at public stockyards was initiated by the Livestock Branch, Production and Marketing Administration, United States Department of Agriculture, in the fall of 1947, and concluded in June 1950. The results of the studies of Terminal Livestock Markets are incorporated in this handbook of "Suggestions for Improving Services and Facilities at Public Terminal Stockyards."

This handbook will be of interest to those engaged in the production, sale, or purchase of livestock, to the management of public stockyards, and to the operating personnel directly charged with the servicing of the livestock while on the market and with the construction, maintenance, and repair of facilities.

ACKNOWLEDGMENTS

Credit is due A. F. Schramm of the Livestock Branch, Production and Marketing Administration, U. S. Department of Agriculture, for his services as project leader in organizing the research studies and investigations and directing the field studies which formed the basis of this handbook.

Acknowledgment is made of the assistance and cooperation of the market supervisors and other personnel of the Department; of operating officials and engineers of the stockyard companies; and of livestock commission firms, dealers, packers, and other market interests.

Special acknowledgment is made of the cooperation of the American Stock Yards Association, and particularly of its president, A. Z. Baker.

The studies on which this handbook is based were made under authority of the Research and Marketing Act of 1946.

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Copies of plans and diagrammatic illustrations prepared according to scale may be obtained by request to the

Packers and Stockyards Division
 Livestock Branch
 Production and Marketing Administration
 U. S. Department of Agriculture
 Washington 25, D. C.

SUGGESTIONS FOR IMPROVING SERVICES AND FACILITIES AT PUBLIC TERMINAL STOCKYARDS

Prepared by Livestock Branch,
Production and Marketing Administration

INTRODUCTION

It is the responsibility of a public stockyard to provide an efficient market at which livestock can be sold under open competitive conditions. Reasonable services for reasonable and nondiscriminatory rates are required, together with efficient facilities for handling livestock during the time the animals are in the market place. The terminal stockyards neither buy, sell, nor deal in livestock; service is their principal stock in trade.

Public terminal stockyards are now confronted with problems that have arisen from the pronounced shift from rail to truck transportation of livestock, from changes in the methods of livestock marketing, the dissemination of market news by radio, the shifts in population, and the changes in economic and labor conditions which have occurred during the past two decades. Too often the design, sizes, and arrangements of the facilities are those developed for rail transportation and are neither suitable for the handling and servicing of truck receipts nor adequate for providing reasonable stockyard services under present-day service and operating demands.

Improvements in the quality and quantity of the services and the suitability and adequacy of the facilities at terminal markets are necessary to meet the present-day competitive conditions in the marketing of livestock.

These improvements should be made under a well-developed and comprehensive plan and program which will bring about a reduction in the total costs of marketing livestock at the terminal markets, including the costs of selling and buying as well as stockyard operations.

The objectives of such a plan and program should be to provide the best services and facilities to the customer, increase the worth of the market, and reduce operating costs to all parties through increased efficiency in operations and plant arrangement, design, materials, and construction. The development of the plan should consider:

1. Immediate improvements in services and operations which can be made *while using the present facilities.*
2. Improvements and changes in both services and facilities which can be made under a short-range program to be completed within 12 months and which, so far as possible, can be fitted into and become a part of the improvements and changes made under a long-range program.
3. Improvements and changes in both services and facilities which should be made under a long-range comprehensive plan and program that can be completed within 3 to 5 years.

The purpose of this handbook is to assist the stockyards in solving their individual problems. The suggestions presented are drawn from studies of stockyards in the principal livestock-producing areas of the United States, supplemented by conferences with stockyard officials and operating employees, operators on the market, Federal and State agencies, and affiliated private interests.

These studies embraced factors relevant to the services and facilities required for the reasonable and nondiscriminatory stockyard services from the time the livestock enter until they leave the yards, as well as to certain functions of the railroads, truckers, commission men, dealers, buying agencies, packers, and other purchasers, and the customs of the trade.

The Packers and Stockyards Act, the Code of Federal Regulations of the Secretary of Agriculture issued under authority of that act, and other Federal and State laws and regulations are referred to in general terms only.

The suggestions are stated in general terms, as local conditions control the final arrangement and design of facilities and methods of operating. Each yard presents an individual problem due to the topography, size, shape, and location of its lands, the fixed surroundings, such as streets, railroad tracks, and packing plants, the climatic conditions, the receipts and dispositions by species and market classes, modes of transportation, hours of arrival, sizes of consignment, sizes of the scale drafts, and other related factors.

RESPONSIBILITIES OF STOCKYARDS

In order to merit continued patronage of the shipper, to meet statutory requirements of regulatory bodies, and to improve the services and facilities, it is suggested that stockyard companies assume these responsibilities:

1. Provide facilities and personnel to assure the efficient receiving, handling, feeding, and care of livestock arriving at the market at any hour of the day or night, and to expedite trading and minimize shrinkage.
2. Follow definite programs for maintenance, cleaning, and systematic improvement of facilities.
3. Provide well-maintained comfort rooms, a restaurant, and other needed facilities for patrons.
4. Maintain an orderly system of assigning pens, scales, and other facilities, subject to change by the company to serve operating needs; clearly define, for the guidance of patrons, the services and functions performed by the market, and fix clear-cut lines of responsibility for livestock while on the market.
5. Require that arriving livestock be clearly marked as to ownership; see that claims for estrays, mix-ups, and losses are handled promptly; and maintain complete records on all livestock handled.

6. Take the leadership in eliminating undesirable trade practices, in co-operating with all market interests, and in education of shippers, truckers, and market employees in the proper marketing and handling of livestock.
7. Enforce fair regulations governing the use of facilities and conduct of operators and employees on the market.
8. Provide multiple carbon waybills for each owner, showing the ownership, description, and condition of the livestock, and any other needed information, the copies to be sufficient for the stockyard company, the consignee, and the trucker, and for any other necessary uses.

FACTORS AFFECTING STOCKYARD ORGANIZATION AND OPERATION

REQUIREMENTS OF FEDERAL AND STATE REGULATORY BODIES

The requirements of the Packers and Stockyards Act and the Code of Federal Regulations of the Secretary of Agriculture issued thereunder; the requirements of Federal and State livestock health and sanitation agencies, and the State laws and regulations covering brand inspection, weighing, truck waybills, loading of livestock trucks, separating species and sex in trucks, directly affect the design and location of livestock market facilities and the plan and methods of operation.

Types of special facilities needed to meet the incidental requirements covering disease prevention work under the jurisdiction of the Bureau of Animal Industry do not fall within the scope of this handbook.

Special consideration should be given to the following factors in planning improvements in services and facilities:

1. The shipper or consignor shall have a free choice in designating his selling agent or consignee.
2. All livestock received on consignment shall be sold on their merits and not be intermingled, prior to sale or for the purpose of sale, with the livestock belonging to other parties, except with the prior consent of the owners.
3. The stockyard company should, as soon as possible, provide proper facilities and trained operating personnel to drive and deliver each consignment of livestock, including those arriving in multiple consignments, to the assigned pens of the consignee. The consignment of each owner should be clearly identified and, when necessary, tagged or marked prior to delivery.
4. Activities of all dealers and market agencies should be conducted in separate pens.
5. All feed shall be sold by weight.

TRENDS IN MARKETING LIVESTOCK

The studies emphasized the importance of considering general trends in the manner in which livestock move to market and their effects on the arrangement and operation of stockyards. The following trends were found to be particularly significant:

1. Use of trucks for transporting livestock to and from stockyards is now the predominant mode of transportation at most yards and is increasing.
2. Terminal markets are, with few exceptions, becoming local markets, drawing most of their salable receipts from immediately adjacent trade territory.
3. At a number of yards the volume of salable receipts arriving in the daytime is increasing and tending to be concentrated between 9 a.m. and 2 p.m.
4. Feeding salable livestock arriving by truck, particularly those arriving between 6 a.m. and the close of the market, is steadily decreasing. Most of the feed is now used by dealer and packer livestock, hold-overs, and rail receipts.

ARRANGEMENT AND DESIGN OF STOCKYARDS

YARD LAYOUT AND MOVEMENT OF LIVESTOCK

Trucks now provide the principal method of transporting livestock; rail haul is secondary. The present layout and arrangement of terminal stockyards should be based on truck transportation and designed to provide suitable and adequate facilities to handle numerous small consignments arriving in a large number of trucks.

Yards should be planned and built or rearranged to provide a ready and direct movement of livestock through the market in the shortest distance, with the least amount of handling, and in the shortest time. Truck chutes, pen areas, scales, viaducts, alleys, gates, etc., should be located and arranged so as to minimize cross flows of traffic, delays, and long drives, thereby reducing labor requirements. Proper arrangement and design of the yards will minimize mix-ups, estrays, and losses. Makeshift arrangements too often work against and not with the operators. All facilities should be of sufficient number and size to prevent bottlenecks in any of the sequence operations.

Yards should be designed to make full use of labor-saving devices and mechanized equipment for cleaning; for handling, storing, and feeding hay and grain; and for economical maintenance and repair. Roads or streets, of adequate width for the traffic, should provide ready ingress, egress, and access to yards and truck chutes.

Facilities provided for marketing cattle and calves, hogs, sheep, and horses and mules, should be separated into divisions where possible, the uses being allocated by those species on the basis of volume of receipts.

Separate divisions for calves or for calves and sheep may be desirable at some markets. At yards where peak receipts of calves, hogs, and sheep occur at different periods it is usually advantageous to have part of the facilities in those divisions designed for interchangeable uses.

RECEIVING AND SHIPPING

Receiving and shipping facilities should be so located on the perimeter of the livestock handling area that the flow of livestock from one to the other will be continuous and without reverse movements. Separate truck docks should be provided for each species or division wherever practicable. Receiving more than one species at a dock often slows down receiving operations and generally hinders the orderly flow of livestock to the respective divisions.

Through shipments received for feed, water, and rest, should, wherever possible, be serviced in railroad chute pens or other pens set aside for this use. Such shipments should not be held in commission sales pens, and their servicing should not interfere with or delay the program or flow of salable stock through the market.

Shipping pens should be provided for both rail and truck outbound shipments when the outbound movement interferes with the market movement of fresh receipts.

Commission sales pens should be adjacent to truck receiving facilities and be readily and directly accessible to scales. Pens should be of varied sizes and arranged for the proper servicing, displaying, and selling of present average consignments and for separating individual consignments when necessary. The entire sales area should be planned and designed to minimize interference from and with other market movements of livestock.

PENS

Purchaser temporary-holding pens should be immediately back of and adjacent to the scale areas. Pens and alleys should be located and designed so as to minimize driving and yarding from the scales, fit the planned flow of livestock, provide suitable pens for holding average purchases, and be adequate for assembling livestock of the larger buyers prior to delivery to shipping or packer holding pens.

Dealer and stocker and feeder operations should be either in separate sections or in groups of pens distinct from commission sales pens. These pens should be located behind the purchaser temporary-holding pens, wherever possible, and in all cases, so as to provide ready access to purchaser temporary-holding and shipping pens.

Pens used for assembling and holding packer purchases prior to driving to plants should be where their use will not interfere with market operations and the flow of livestock.

All livestock buyers should be allowed a reasonable time in which to remove their purchases from the yards. Under most conditions, from 8 to 24 hours are considered reasonable. Pens for holding livestock beyond such reasonable time may be assigned for the use of packers and other buyers if such use does not interfere with the flow of livestock through the market. A suitable charge should be assessed for this use.

Some pens in each section and division should be reserved by the stockyard company. These pens should be kept available for temporary assignment to and use of operators on the market on days of unusually heavy receipts.



Figure 1.-Buyer looking over cattle at a stockyard.

All pens should be arranged and designed for bulk delivery and storage of feed and for ready feeding.

ALLEYS

Movement of livestock to, from, and within a division is facilitated by providing drive alleys at right angles to pen alleys which are used for sorting, showing, and selling. All pen gates should open into pen alleys and all drive alleys should be "blind," that is, should not directly serve any pens.

Main alleys, so located as to serve as fire lanes, should connect the various parts of the yards. Such alleys should provide adequate access for feeding, cleaning, and general servicing.

SCALES

Scales for the commission section should be located between the sales and purchaser temporary-holding pens, be readily accessible without long drives, and

appropriately located so as to fit into the planned flow of livestock with minimum interference. Sorting pens in front of the scales and catch pens beyond the platform should be of a number and type to handle the normal heavy runs of stock to market.

Separate scales should be installed in suitable locations in the dealers' section where the volume of business justifies their use. When commission scales are used for weighing dealer livestock, the dealers should be assigned definite and known allotments of weighing time at suitable scales. These joint-use scales should be located so as to avoid unduly long drives and conflicting flows of livestock.

OTHER FACILITIES

The location of the hay and feeding facilities, maintenance and repair shops, material storage areas, and the buildings used for cleaning, servicing, and housing mechanical equipment is important to efficient yard operations.

Livestock viaducts and subways should be provided where unavoidable cross-flows of livestock occur frequently. Foot viaducts leading from the exchange building to the various scales and divisions will reduce pedestrian traffic in the alleys and the consequent interference with the handling and movement of livestock. They are essential for the free and safe movement of patrons and market employees.

DIAGRAMS

Eight diagrammatic arrangements of the principal operating units, exclusive of dealer weighing facilities, are shown in figures 2 and 3, on pages 8 and 9. These basic arrangements or their opposite-hand layouts can be applied to yards or divisions of any shape.

Dealer weighing facilities are purposely omitted because of the difficulty of delineating the wide variations in needs. Where separate dealer scales are provided their location should be such as to facilitate the flow of livestock through the dealer section. Where commission scales are used for weighing dealer livestock the location of the scales and the assignment of weighing turns should provide reasonable weighing services without unduly long or conflicting drives.

INDIVIDUAL FACILITIES

TRUCK RECEIVING

The trucker is primarily interested in unloading and checking in without undue waiting either in line or at the dock. Adequate facilities, well designed and located, and prompt and efficient service in unloading and receiving will reduce both the time of waiting and the number of truck chutes required. Good service at this point pays large dividends in good will.

At most stockyards, checkers at truck-receiving docks are the first and principal contacts between patrons and the stockyard company. These employees should be intelligent, well-trained, and selected for their ability to handle the work and create good will.

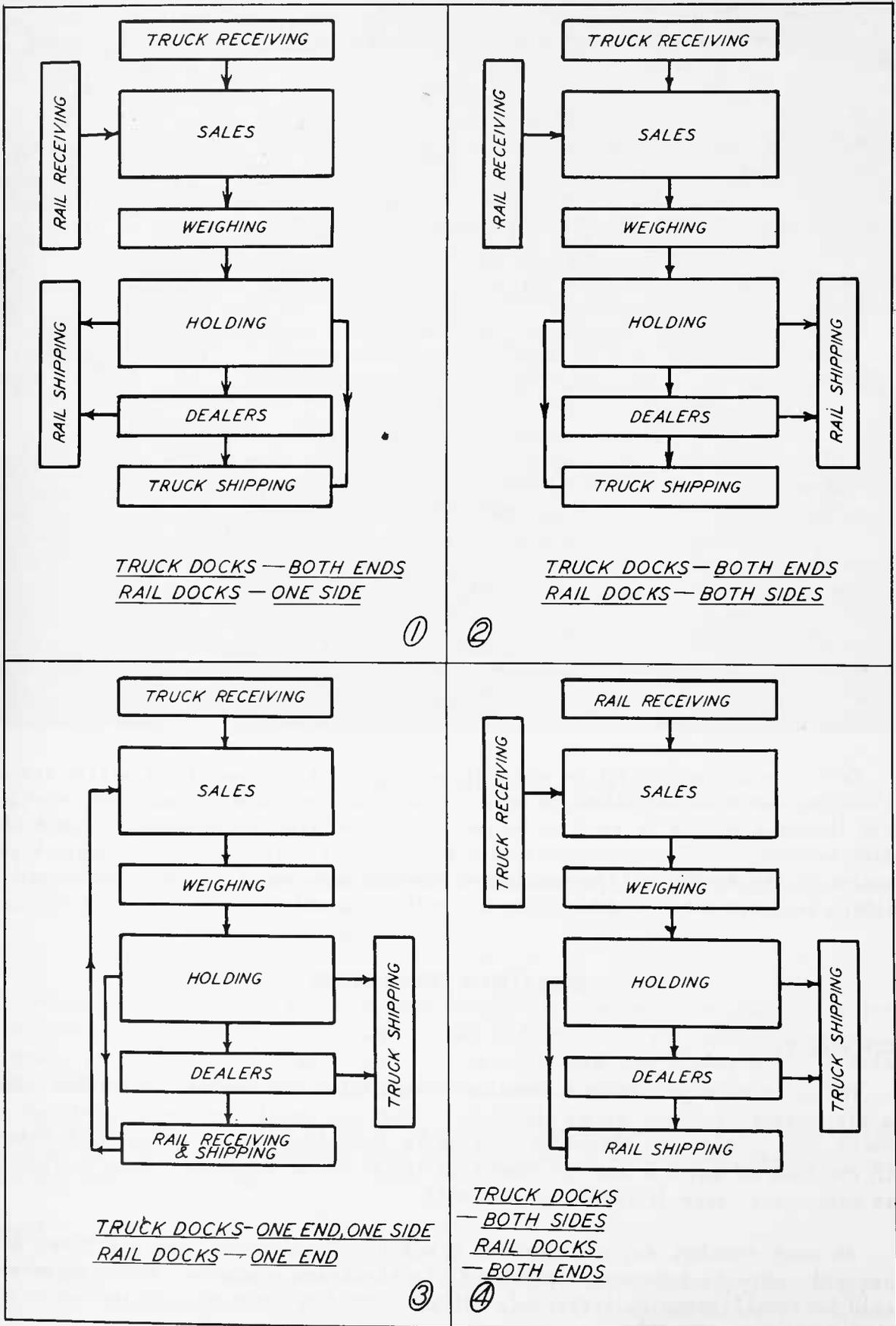
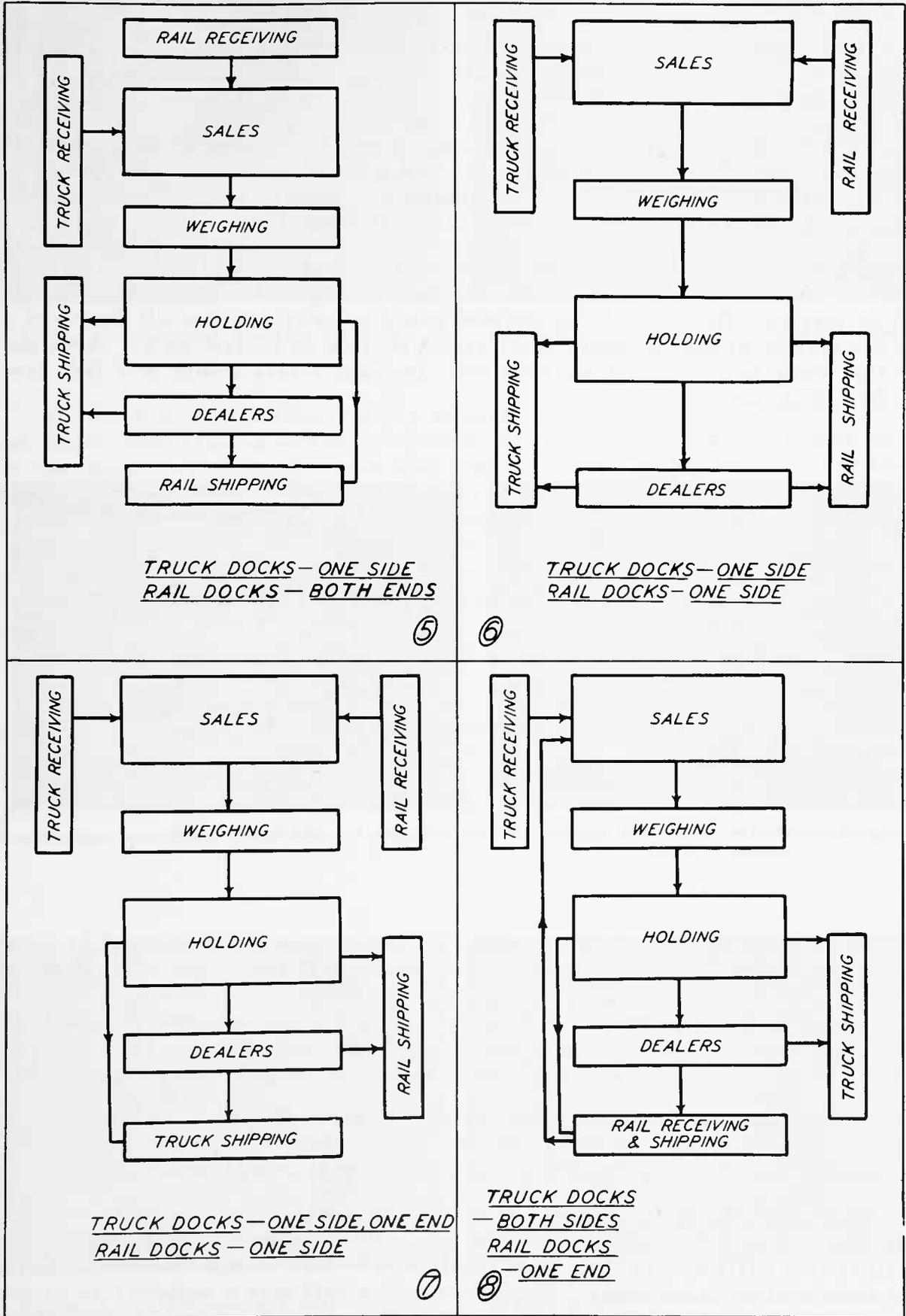


Figure 2.-Yard layout.



TRUCK DOCKS—ONE SIDE
RAIL DOCKS—BOTH ENDS

⑤

TRUCK DOCKS—ONE SIDE
RAIL DOCKS—ONE SIDE

⑥

TRUCK DOCKS—ONE SIDE, ONE END
RAIL DOCKS—ONE SIDE

⑦

TRUCK DOCKS
—BOTH SIDES
RAIL DOCKS
—ONE END

⑧

Figure 3.-Yard layout.

DOCKS AND CHUTES

The size and arrangement of the truck-receiving facilities and the number of chutes should be sufficient to avoid their becoming congested during peak runs of normal heavy marketing.

Truck docks should be substantially constructed; have a minimum distance of 12 feet center to center of chute; and have chute pens of sufficient size to hold a trailer-truck load of livestock. They should have bumpers strong enough for the heaviest type of trucks expected, and a platform at least 3 feet wide.

The approach should be well-paved and well-drained and depressed at least 18 inches at the dock face so that trucks can coast into position and be held in contact by gravity. The width of the approach should be twice the over-all length of a cab and trailer allowed by State laws, with a minimum of 80 feet at all yards and 100 feet where large trailers are received. Drainage inlets should be 3 feet from the face of the dock.

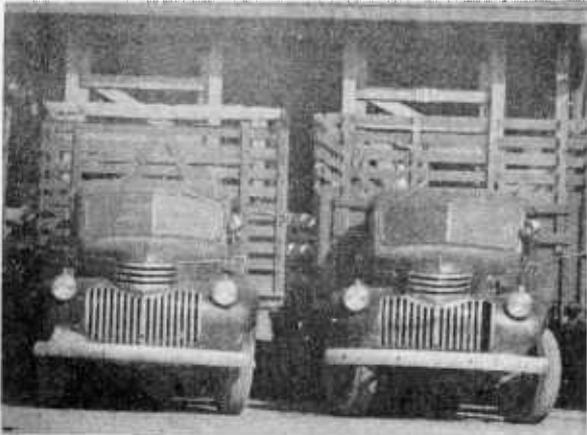


Figure 4.--Chutes on 10-foot centers; trucks crowded.

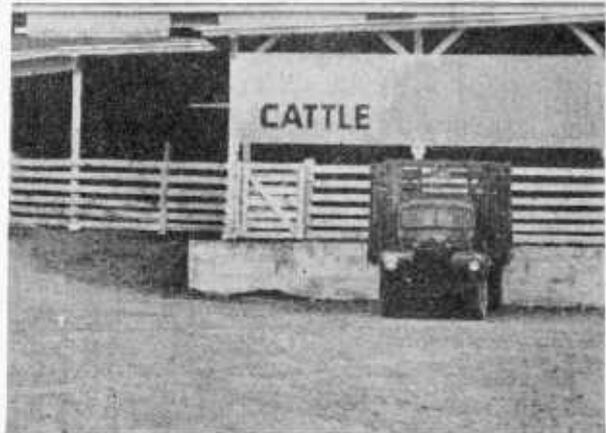


Figure 5.--Depressed truck dock approach.

Where fixed-height docks are used, the height should be governed by local conditions. The bed heights of small pick-up trucks will range from 30 to 36 inches; farm trucks from 32 to 48 inches; and semitrailers from 48 to 51 inches. A dock 44 to 46 inches high can be used by the majority of farm trucks and semitrailers. At yards where numerous small farm and pick-up trucks are received, the height of the dock should be reduced at a number of chutes sufficient to accommodate these trucks.

Truck docks should be planned and designed to allow all trucks to back in from the left side in order that the driver may have a clear view to the rear. They should be located either to the left of the approach or have ample space for turning.

The truck dock platforms should be at the same elevation as the yards or catch pens they serve. Livestock moves to the best advantage on the level; therefore, inclines from platforms to chute pens should be avoided. Stepped ramps should be used where a slope is necessary. Steps for cattle should have a maximum rise of not more than 4 inches and a tread of not less than 18 inches. For hogs and sheep these limits should be 3 inches and 10 inches, respectively.



Figure 6.--Two-level fixed-height dock.

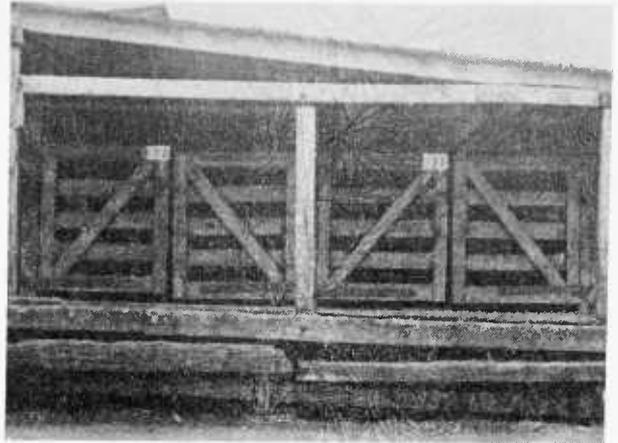


Figure 7.--Low dock and head room, 8-foot centers, poor construction.

All truck docks should be readily accessible from the roads or streets and to each other; should have a well-paved and drained approach, and a small, nearby space for the temporary parking of trucks away from the chutes, to be used by any trucker whose load of livestock has not been properly marked for ownership prior to arrival and therefore cannot be readily identified and sorted in the chute pen. In addition, a large, hard-surfaced area should be provided and reserved for parking livestock trucks while the driver is conducting his business at the yards. This parking area should be located where it is convenient for the trucker and its use will not interfere with other market operations. Where conditions warrant, suitable rest rooms and truck-cleaning and -washing facilities should be provided at the parking lot.

The number of single-deck, double-deck, and variable-height truck chutes necessary for reasonable service is dependent upon the number of straight, "jack pot", or multiple consignment loads received; the kind of waybill used; the location of the docks; the length of drives to the sales pens, etc. The number should be determined from local conditions during periods of normally large receipts. Direct comparison between yards cannot be made owing to the extreme variations in the

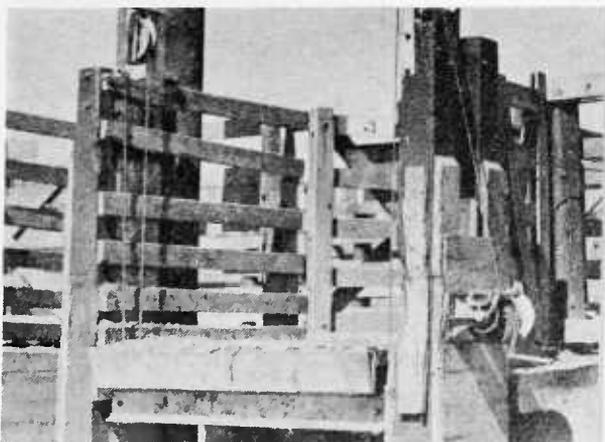


Figure 8.--Variable-height chute with under and over cable lift.

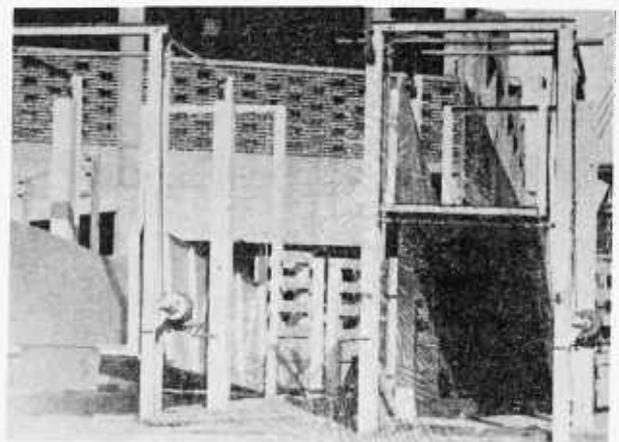


Figure 9.--Variable-height chute, metal, with direct lift.

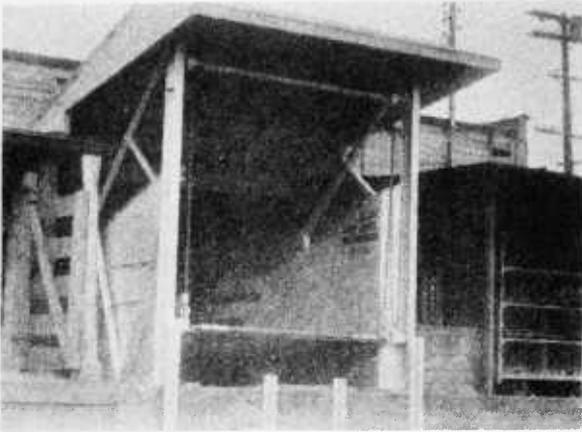


Figure 10.--Variable-height chute, metal, with chain hoist.

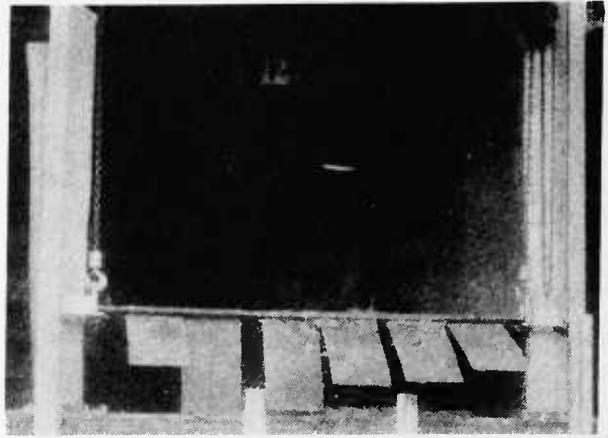


Figure 11.--Variable-height chute with sliding flaps.

truck-receiving services now rendered. However, variable-height chutes are strongly recommended because of the wide variation in bed heights of the trucks now commonly used.

Backing into the chutes will be facilitated by painting the chute gates with aluminum or light yellow paint and providing fixed guide lines in the approach. These guide lines should be of railroad rail, brick, or white concrete; should be slightly raised in order to be readily visible; and should not interfere with drainage. Access from the approach to the platform should be provided at each chute. This may be in the form of steps inside or outside of the platform line, ladders, or metal stirrups. Pieces of 1½-inch pipe, set vertically on either side of ladders or stirrups, afford excellent hand holds. They should be firmly set and extend 30 inches above the dock platform.

Chute Pens and Chute Alleys. Truck chute pens should be of sufficient size to hold a trailer truck load of livestock. Separate facilities for unloading small trailers should also be provided.

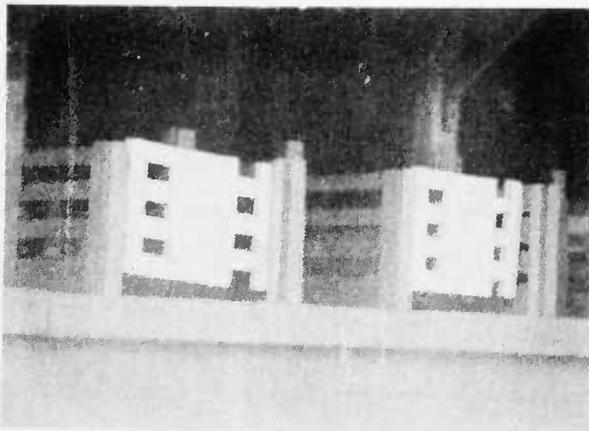


Figure 12.--Telescoping chute gates painted and single-rung step to platform.

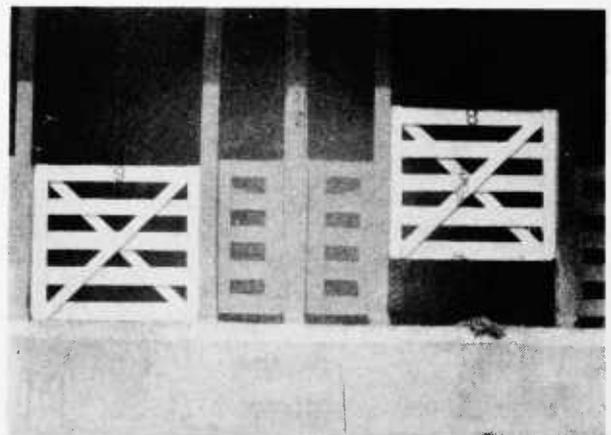


Figure 13.--Lift chute gates painted and exterior steps to platform.

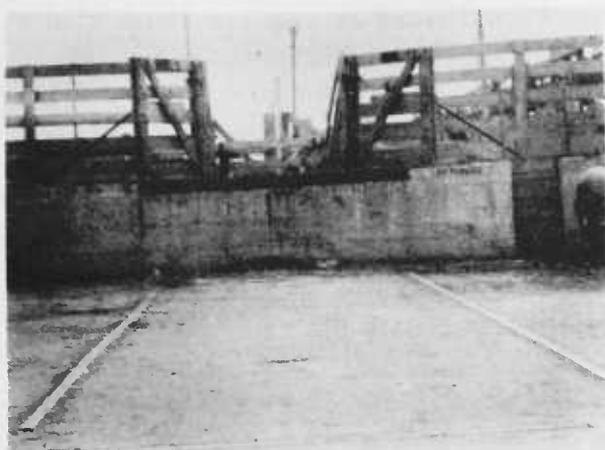


Figure 14.--Rail guide lines and ladder to platform.

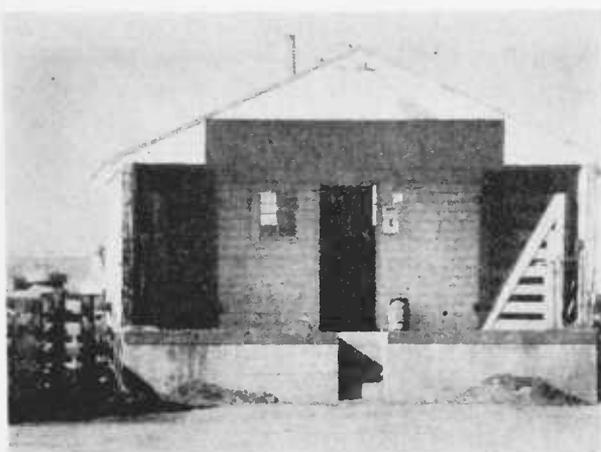


Figure 15.--Interior steps to platform.

Catch pens back of the truck chutes are often necessary to insure prompt unloading and receiving. They provide the reservoir for holding livestock during peak hours of receipts and for assembling livestock for delivery to sales pens. Catch pens should be provided at each truck dock and sorting pens at those markets receiving a considerable number of multiple consignments or "jack pot" loads. Separate catch pens should be provided for bulls, and all bulls should be yarded in these pens at time of unloading.

Catch pens with separate ingress and egress alleys permit simultaneous receiving and driving to the sales division without interference. They are strongly recommended.

Double-chute alleys are desirable at some markets. Their use should receive careful consideration.

Truck receiving facilities should connect with blind drive alleys leading as directly as possible to commission sales pens. These drive alleys should be well-lighted, and be designed to prevent cross flows of livestock and interference with market operations.



Figure 16.--Catch pens at truck docks.

Auxiliary Facilities. The entire truck facilities should be well-lighted for night operations, with particularly good lighting over the chute pens and sorting arrangements. In the rainfall belt and in locations subject to severe weather, the platform, chutes, and chute pens should be covered. The roof should extend at least 4 feet beyond the edge of the platform.

Crippled and dead livestock should not be unloaded at regular truck chutes. Separate facilities for the humane unloading and handling of cripples and a separate unloading platform or pen for dead livestock should be provided at each truck dock.

Gate houses, at which all trucks stop and where all truck slips are filled out by company ticket writers, are used by some yards where the number of trucks arriving per hour is relatively small. At yards having large volumes and high hourly peaks the use of gate houses may create problems of labor distribution.

TRUCK SHIPPING

Separate truck-loading facilities are desirable at all yards and essential where the volume of truck shipments is large or loading out interferes with receiving.

Use of shipping pens or divisions for assembling and holding prior to loading facilitates yarding from scale holding pens and reduces interference and delays in moving livestock to the truck-out dock. The pens or division should be located adjacent to the docks.

Truck shipments generally move by large trucks and semitrailers. The outbound docks should be 48 to 50 inches high and the pens of a size to hold a semitrailer load. Fixed-height double-deck loading chutes can be used.

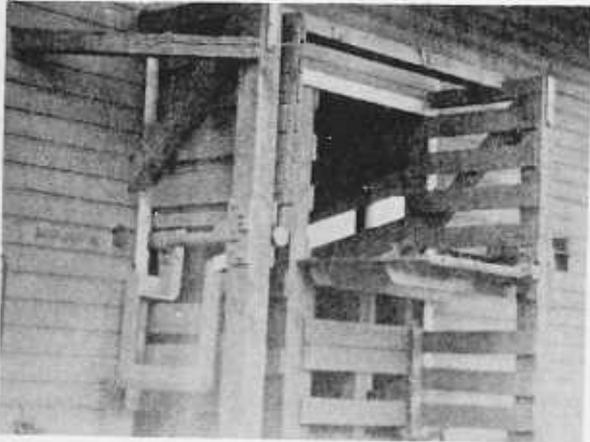


Figure 17.--Jackknife double-deck chute.

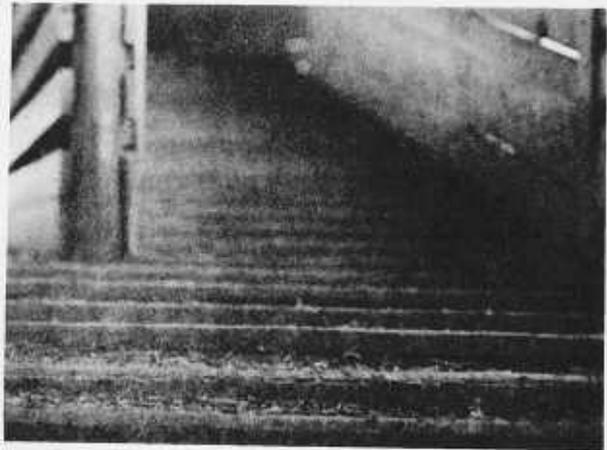


Figure 18.--Steps on double-deck loading incline.

RAIL RECEIVING

The need for rail facilities has diminished as a result of the very pronounced increase in the transportation of livestock by truck. Rail facilities at the older yards are generally excessive for present-day needs.

The rail receiving facilities should be located so that delivery to the pens of the consignee will fit the present planned flow of livestock with a minimum of interference.

The number of single-deck and double-deck chutes should be determined by the normal peak demands and all chutes should be spaced to accommodate 40-foot cars.



Figure 19.--Sliding double-deck rail chute on mono rails.

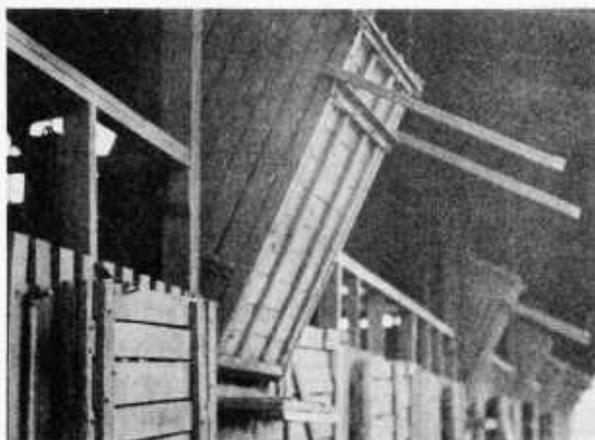


Figure 20.--Double-deck rail chute hinged and counterweighed.

The dock platform should be of concrete and at least 4 feet wide. Where ramps are required in the chutes they should be constructed with steps of the dimensions recommended under Docks and Chutes.

Pens for servicing through livestock shipments (stopping for feed, water, and rest) should be convenient to the rail facilities. At some yards, where the volume of such shipments is not large, the chute pens can be equipped with feed and water facilities and used for such shipments.

RAIL SHIPPING

The livestock received and shipped by rail at many yards can be loaded and unloaded at one dock. Where separate shipping chutes are required, it will prove advantageous to provide shipping pens adjacent or adjoining the dock for holding and assembling the livestock prior to loading.

PLANS

Figure 21 shows typical arrangements and dimensions for straight and angle truck docks. The angle dock requires less depth and greater length for the same number of chutes.

Figure 22 shows suggested arrangements of typical catch and sorting pens at receiving docks.

Figures 23-25 show typical single- and double-deck truck and rail chutes and their appurtenances. The wing gates of the hinged double-deck platform are attached to the chute supports and swing back into the chute. The truck chute platform, which is equipped with sliding flaps to fit any location and width of truck door, rests on the supporting posts.

The hinged rail-chute platform is similar in operation to the hinged double-deck platform but is designed to be supported by the car deck. The narrow platform readily fits into the car doorway and the side gates are hinged to the dock posts.

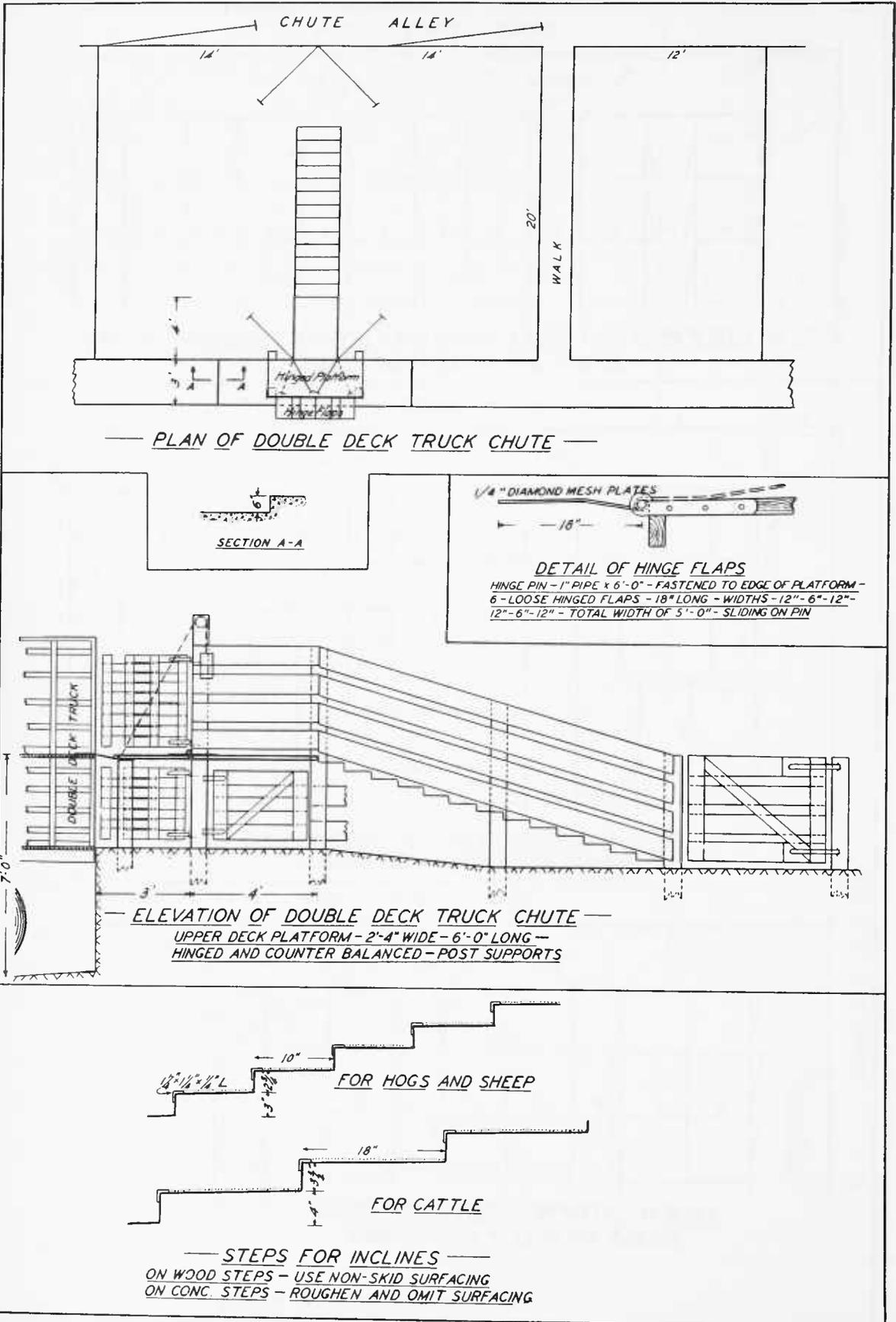


Figure 23...Truck chutes.

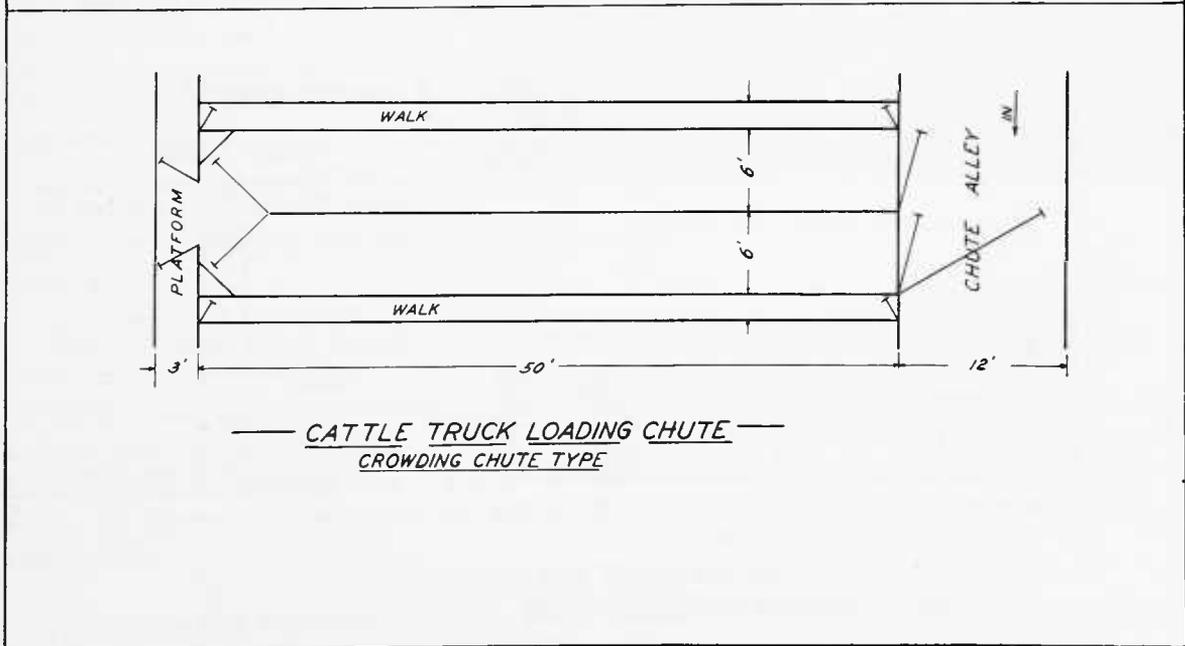
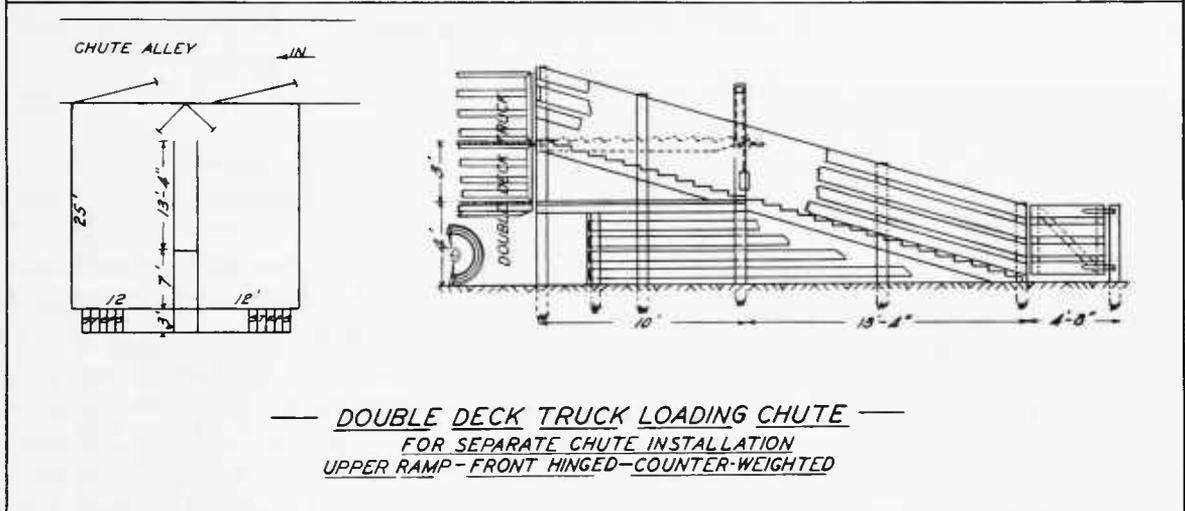
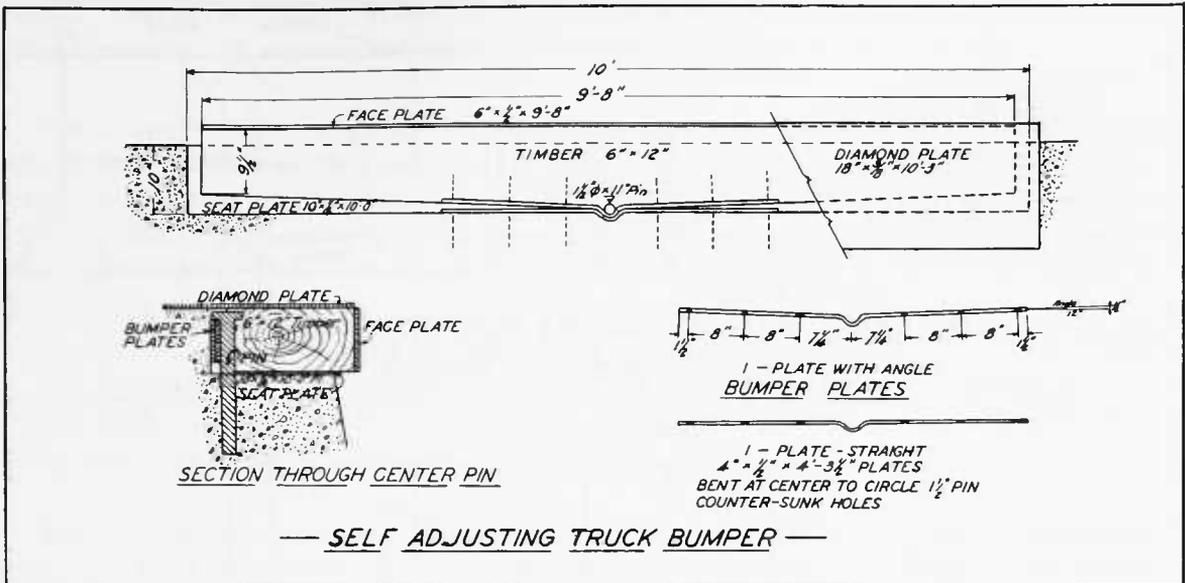


Figure 24.--Truck chutes.

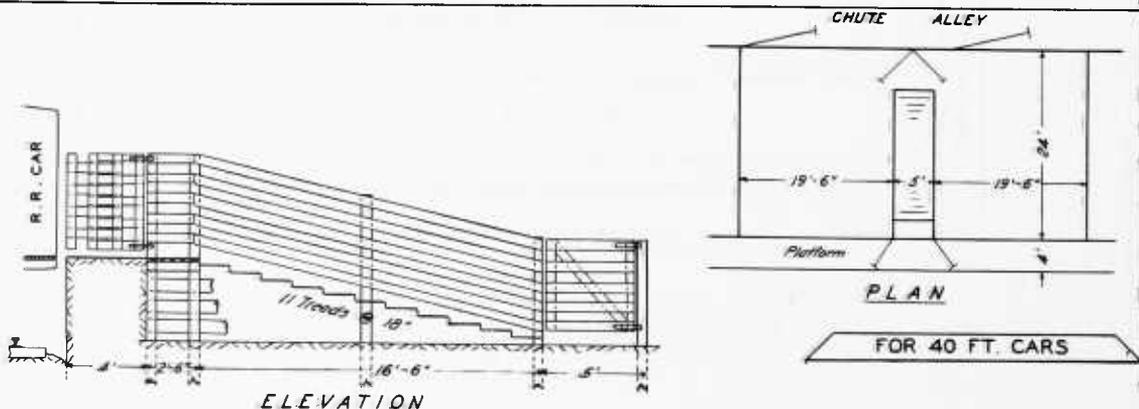
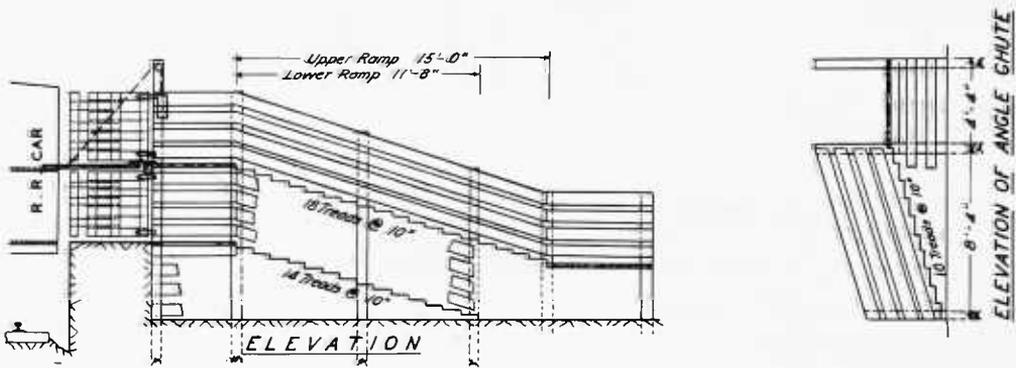
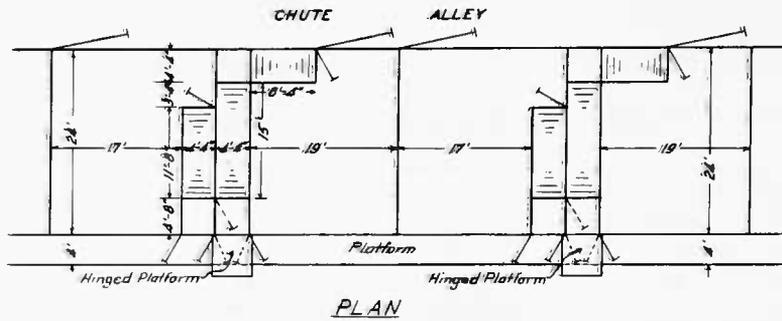
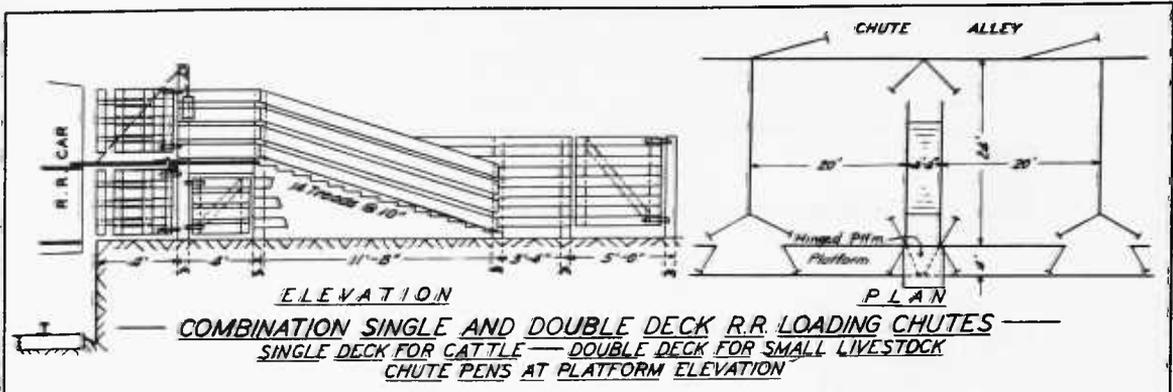


Figure 25.--Railroad chutes.

The cattle truck-loading chute, figure 24, shown on page 19, greatly facilitates loading. The narrow chute keeps the cattle headed one way and the foot walks serve the dual purpose of access and space for prodding.

The essential features of a variable-height chute are a suitable combination platform and incline moving vertically in fixed guides in the front and rolling or sliding in the rear, and a mechanism for readily and easily raising and lowering the platform. The length of the platform must be sufficient to provide a gentle incline to the upper deck. One type of single-deck and three types of double-deck variable-height chutes are shown.

The "jackknife" double-deck chute has the disadvantage of not being accessible from the dock platform after the truck is in position. Truck gates must be removed and the platform lowered from the inside of the chute.

The illustrations show two types of fixed-height, double-deck, rail-loading chutes, both of which are giving satisfactory service. The hinged and counter-weighted chute can be swung on an arc of several feet.

FENCES

Cattle fences 5 feet in height are recommended, except at yards where wild cattle are predominant. This height, which can be built with posts 8 feet long and an economical number of rails, has been satisfactorily used by a number of yards over a period of years. Fence rails should be either five pieces of 2 by 6 inches or four pieces of 2 by 8 inches, and hip rails either two pieces of 2 by 6 inches or one piece of 2 by 12 inches.

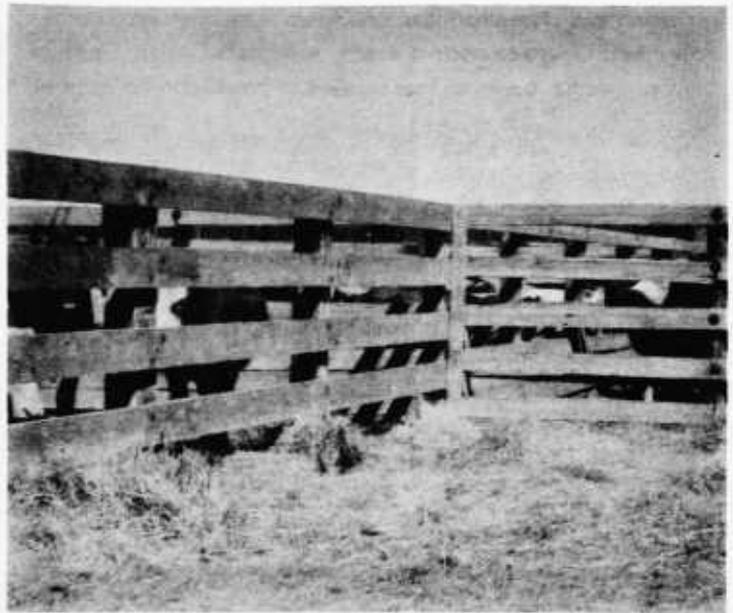


Figure 26.--Wood cattle fences.

A height of 36 to 48 inches, is recommended for hog and sheep fences.

Typical wood-fence construction and rail spacings are shown in figures 33 and 34.

In the hog and sheep division the sizes and spacings of fence posts should be based on the column spacing. Posts of 2 by 4, 4 by 4, 4 by 6, or 6 by 6 spaced 4 to 6 feet are in general use. Posts should be either supported on the top of the paving, as shown in figure 49 or set 24 inches deep. Cedar or treated posts are recommended.

In the cattle division the line posts should preferably be spaced 5 to 6 feet--but never more than 7 feet--and set 30 to 36 inches deep. Increased breakage in

rails results from wider spacings. Round posts having a 6-inch top or squared posts, 5 by 5 inches or 6 by 6 inches, of cedar or treated pine, have proved satisfactory. Squared or faced posts provide additional nailing area. Precast concrete line posts are subject to cracking at the ground upon impact.

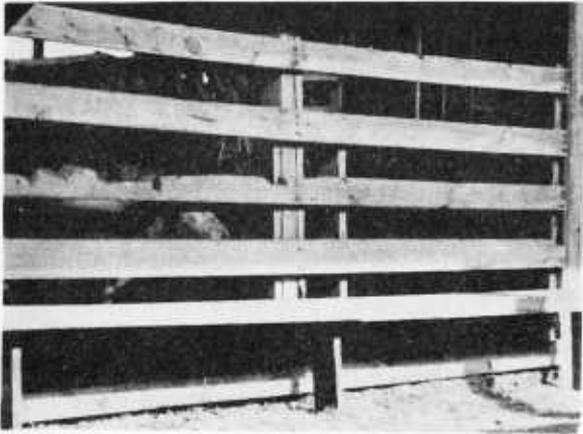


Figure 27.--Excessive height of fences.

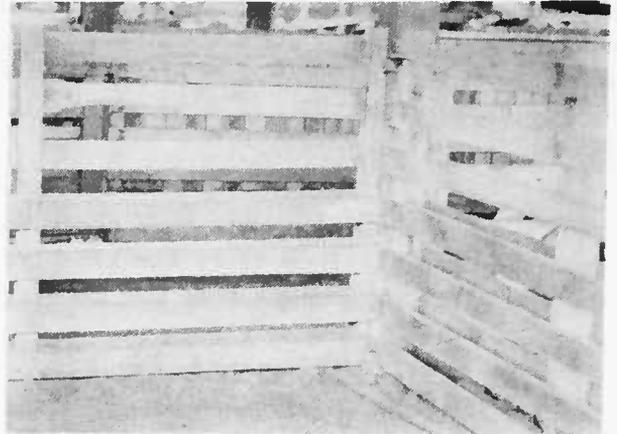


Figure 28.--Excessive fence construction.



Figure 29.--Fence-post setting; iron strap set in concrete.

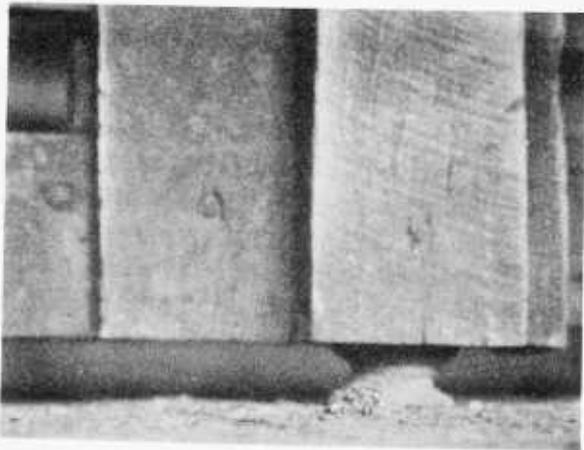


Figure 30.--C.I. Ogee washers and dowel.

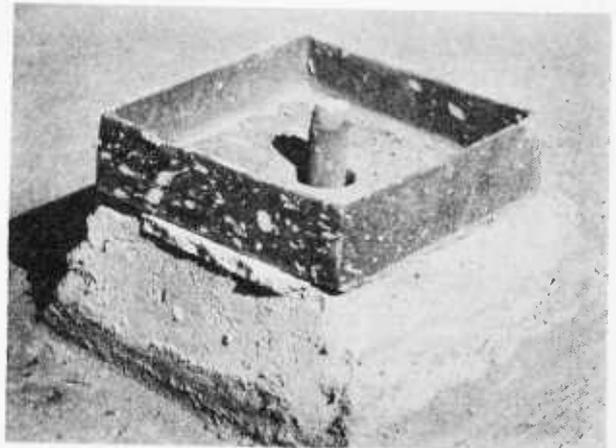


Figure 31.--C.I. base plate and dowel.

Corner and gate posts should be not less than 8 by 8 inches in section and set 42 to 48 inches deep. Cypress, white oak, treated pine, and precast concrete give good service. Well-made concrete posts are recommended for long life and low maintenance. Additional stability can be secured by setting all posts in 4 to 6 inches of concrete in the bottom of the post hole and by using a top concrete collar in unpaved areas.

Ample space for drainage and for cleaning should be provided beneath all fences. The lower fence rail should be 8 inches above the top of the paving for cattle fences and 4 inches for hog and sheep fences.

PENS

The intensity of use of pen space is tied directly to the kind and class of receipts and dispositions, hours of arrival, etc. It will show wide ranges between individual firms on a given market and individual markets. Standards of reasonable use must be developed at each market.

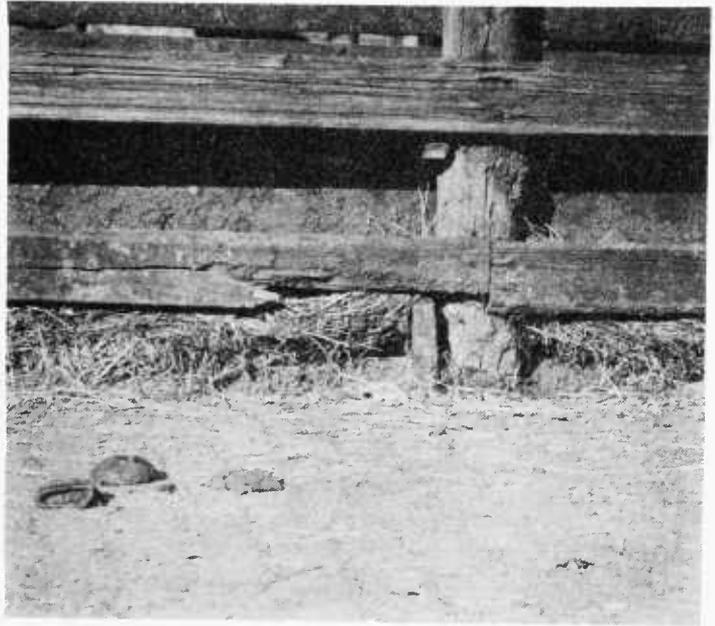
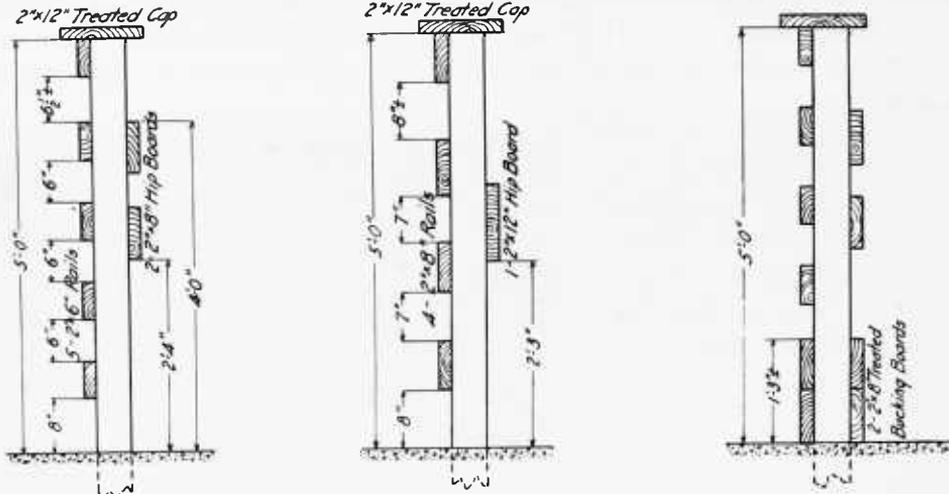


Figure 32.--Accumulated manure under low bottom rail.

There should be sufficient pens for all marketing operations and they should be of varied sizes to fit the needs of each operation, such as receiving, selling, weighing, holding, and shipping. The sizes of the pens must be suitable for local conditions and should be determined by a study of the sizes of consignments and scale drafts and the needs of the sellers and buyers.

The following number of square feet per head of livestock is recommended as providing adequate pen space for proper showing and selling, holding after sale, and holding and feeding:

	Sq. ft.
Cattle and calves	
Sales and holding and feeding	
750- to 900-lb. cattle	16
1,000- to 1,200-lb. cattle	25
All weights	25
Holding only	23
Hogs	
Sales and holding and feeding	6.25
Holding only	6.00
Sheep	
Sales and holding and feeding	5.50
Holding only	4.60



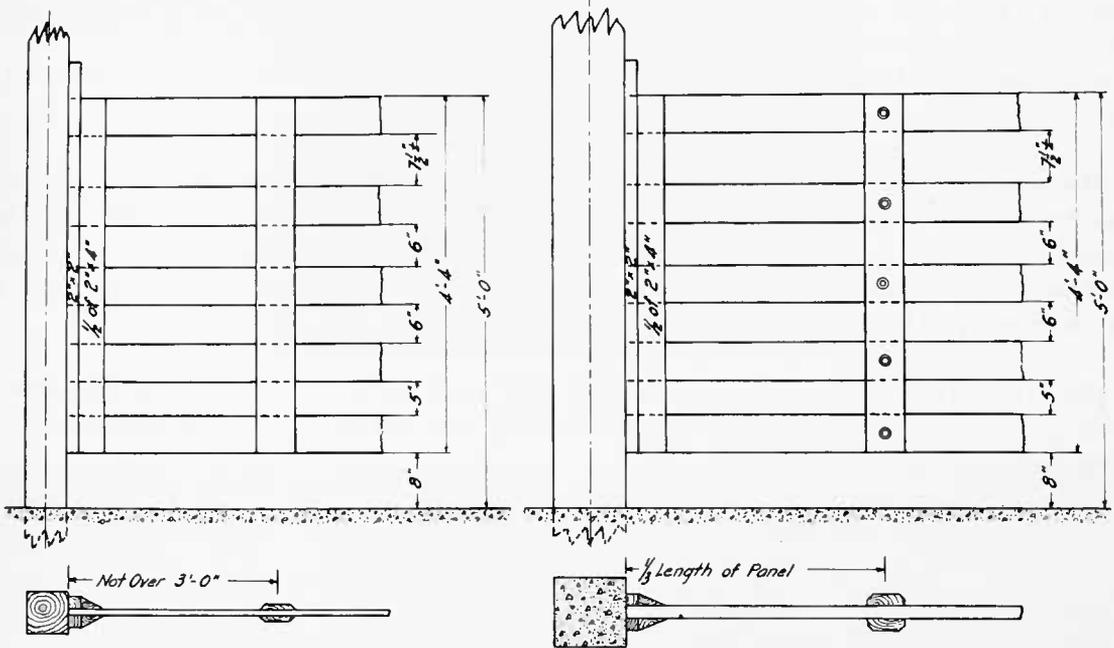
— FIXED CATTLE FENCES — 5 FT. HIGH —

POST SPACING - NOT MORE THAN 7 FT. — DEPTH OF SETTING-LINE POST-30 TO 36 IN.-GATE OR CORNER POST-48 IN

— TYPE - A —
 5- 2x6 RAILS
 2- 2x8 HIP BOARDS
 2x12 TREATED CAP - WHEN
 NECESSARY

— TYPE - B —
 4- 2x8 RAILS
 1- 2x12 HIP BOARD
 2x12 TREATED CAP - WHEN
 NECESSARY

— TYPE - C —
 2- 2x8 TREATED BACKING BOARDS
 ONE OR TWO SIDES
 FOR USE WITH EITHER TYPE A OR
 B FENCES

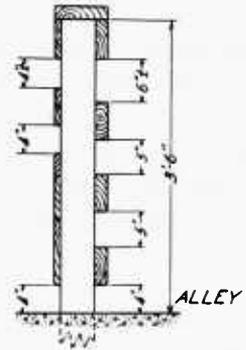
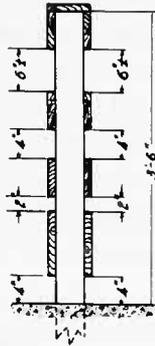
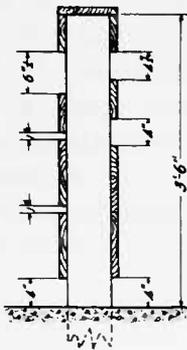


— REMOVABLE CATTLE FENCE PANELS — FOR 5 FT. FENCE —

PANEL — 5.2 IN. HIGH —
 5 FT. TO 8 FT. LENGTHS
 5- 1x6 RAILS
 DOUBLE 1x6 STIFFENERS
 NAILED OR BOLTED

— SPIKED OR BOLTED TO SUPPORTS —
 8 FT. TO 12 FT. LENGTHS
 5- 2x6 RAILS
 DOUBLE 2x6 STIFFENERS - BOLTED

Figure 33.--Wood cattle fences.



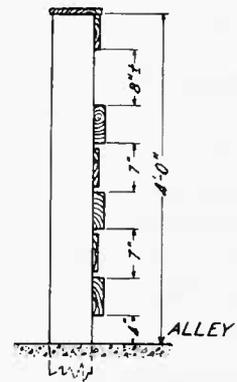
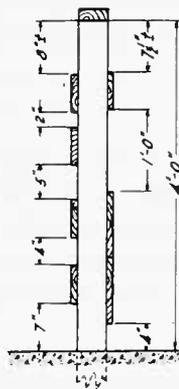
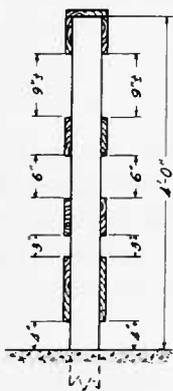
WOOD HOG FENCES - 42 INCHES HIGH

POST SPACING - NOT MORE THAN 5 FT. 3 IN. - DEPTH OF SETTING - LINE POST - 24 TO 30 IN. - GATE POST - 36 IN.

TYPE A
RAILS - 2-1x10 AND
2-1x6 EACH SIDE
CAP - 1 IN. LUMBER

TYPE B
RAILS - 1-1x10 AND
3-1x6 EACH SIDE
CAP - 1 IN. LUMBER

TYPE C
ALLEY FENCE
RAILS - 2-1x10 AND
2-1x6 PEN SIDE -
4-2x6 ALLEY SIDE
CAP - 2 IN. LUMBER



WOOD SHEEP FENCES - 48 INCHES HIGH

POST SPACING - NOT MORE THAN 5 FT. 3 IN. - DEPTH OF SETTING - LINE POST - 24 TO 30 IN. - GATE POST - 36 IN.

TYPE A
RAILS - 1-1x10 AND
3-1x6 EACH SIDE
CAP - 1 IN. LUMBER

TYPE B
RAILS - 4-1x6 ONE SIDE AND
2-1x10 - 1-1x6 OTHER SIDE
CAP - 2 IN. LUMBER

TYPE C - ALLEY FENCE
RAILS - 3-2x6 AND
3-1x6 ONE SIDE ONLY
CAP - 1 IN. LUMBER

Figure 34.--Hog and sheep fences.

These are net areas and do not include the space occupied by mangers, water troughs, and other pen appurtenances.

Well-lighted and -ventilated covered cattle pens should be provided in both the commission sales and dealer sections where climatic conditions or the customs of the producers and trade require such facilities. Those in the commission sales section should be readily available to all shippers requesting such facilities and those in the dealer section should be assigned according to the needs and the class of cattle handled. It has been observed that under average conditions, the fences, gates, mangers, etc., under roofs, will last from two to three times as long as those in the open, that maintenance and repair costs are correspondingly reduced, and that the cost of cleaning covered pens is about one-half that of open pens. These economies should be weighed against the initial cost and maintenance of the roofed structures.

Large pens should be rectangular in shape and planned for future division into smaller sizes with additional alleys when necessary.

Feeding and watering facilities should be provided in all pens in the commission and dealer sections and in those holding-pens where animals are held overnight or longer.

In pen areas where mechanical manure loaders are used in the regular cleaning operations, two 2- by 8-inch bucking boards are recommended at either the rear or one side of the pen. These should be set on top of the pavement.

Careful attention should be given to the shape of the pens; the location and swing of pen and alley-gates; the arrangement of pens so that all pen gates open on sorting alleys; and the location of pen appurtenances.

FOOTWALKS AND VIADUCTS

The arrangements of footwalks and foot viaducts for the use of employees and patrons, and the use of livestock viaducts or subways when necessary to avoid serious interferences in operation should receive careful attention. The cost of livestock viaducts and subways is relatively high and their construction is not recommended unless there is a definite indication that they will effect worth-while economies in operation.

Adequate provisions must be made for inspections by State and Federal authorities and by brand inspectors. The Bureau of Animal Industry of the U. S. Department of Agriculture instructs its inspectors to make their inspections of cattle from the top of the fences wherever possible. Adequate caps or walkways, not less than 12 inches wide, should be provided in the cattle divisions on the fences of all pens in which incoming cattle and outgoing stockers and feeders are inspected. Hogs and sheep can be readily inspected from the ground, therefore walks for inspection purposes are not necessary in these divisions, although they may be desirable there for the use of patrons and employees.

ALLEYS

Operating alleys should be of sufficient width for ease in driving livestock and for the ready maneuvering of loaders, trucks, and other mechanized equipment. The clear width of catch-pen alleys should be 8 feet; that of sorting or pen alleys

10 feet; and that of drive alleys 12 feet. Operating alleys of 14 feet and wider should be avoided. They are too wide for easy driving and sorting, require large gates that are costly to build and maintain, are too wide for the average pen gate to close the alley without the use of wing gates or "A" frames, and unnecessarily reduce the pen areas.

The width of alleys used for fire lanes should be based on local requirements. Widths of 14 and 16 feet are commonly used.

All alleys should be unobstructed. Cutting back the block corners for 3 feet or more, except in the catch- and sorting-pen areas, will permit the ready turning of mechanized equipment and facilitate the movement of livestock. "A" frames and wing gates should be avoided and those in use eliminated.

Pen or sorting alleys should be at right angles to the drive or delivery alleys. The drive alleys, scale alleys, and main alleys serving as fire lanes should be free of pen gates. Where possible, the troughs and mangers should be located so as to provide a clear side of the pen for sorting, showing, and selling livestock and for unobstructed movement in and out of the pen. This is especially important in the sales sections.

GATES

All pen gates should open on pen or sorting alleys. Wherever possible the pen arrangements should provide gates opposite each other and the pen gates should be of sufficient length to close the alleys. All gates should open on a clear side of the pen and be hung to permit the movement of livestock into the pen. The division of large pens by interior fences does not provide suitable operating facilities.

Gates should be standardized as to design, height, length, and hardware. Cattle gates should be hung 8 inches and hog and sheep 4 inches above paving. Stops having sharp corners should not be used. Pieces of 1½-inch pipe, from 2 to 3 feet long, with flattened ends and bolted to the posts, make excellent bruise-free stops.

Gates should be of a balanced design to prevent twisting and distortion; should provide sufficient strength to hold the various kinds of livestock; and should be lightweight in order to reduce the need for heavy gate posts and hardware.

Wooden gates should be designed with compression braces; have double stiles and braces; and be bolted. Bolt ends should be clipped and other projections removed in order to avoid injury to livestock. Dipping in pentachlorophenol after fabrication is recommended.

GATE HARDWARE

Gate hardware, both hinge and closing, should be of a standard type that is safe for the livestock, can be readily fabricated, and is sufficiently strong. Standardization by the stockyard industry would permit mass production at a reasonable price.

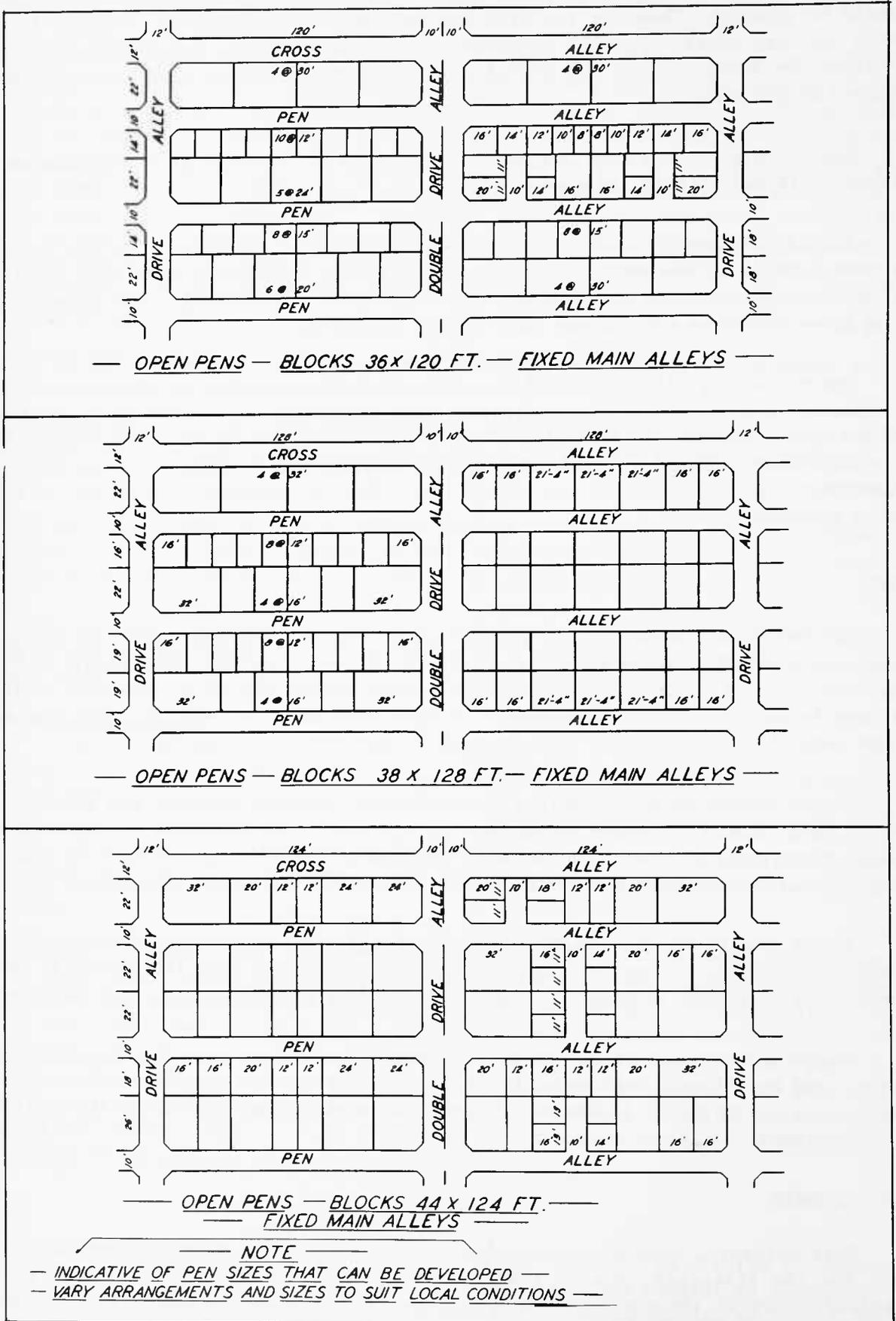


Figure 35.--Pens.

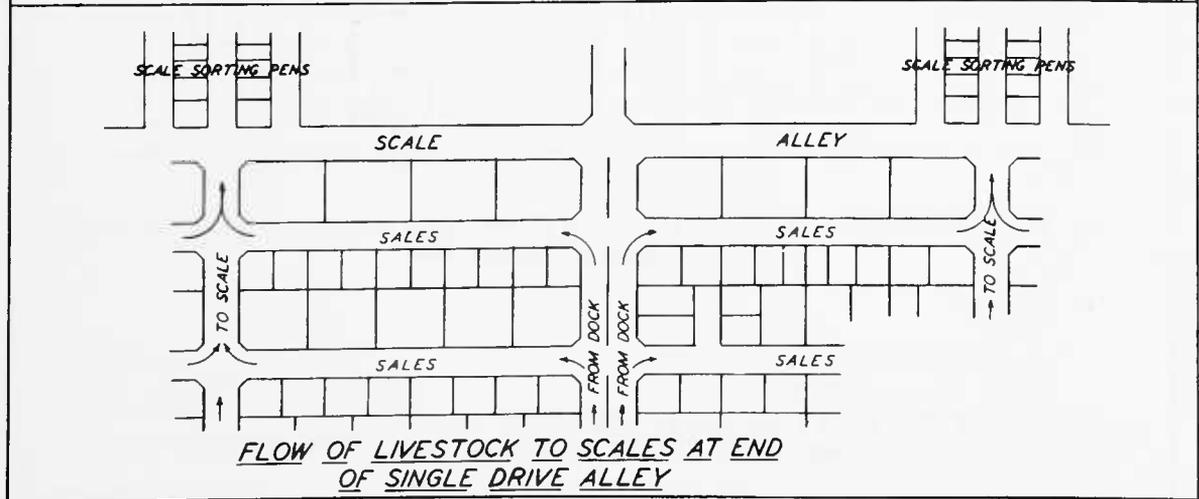
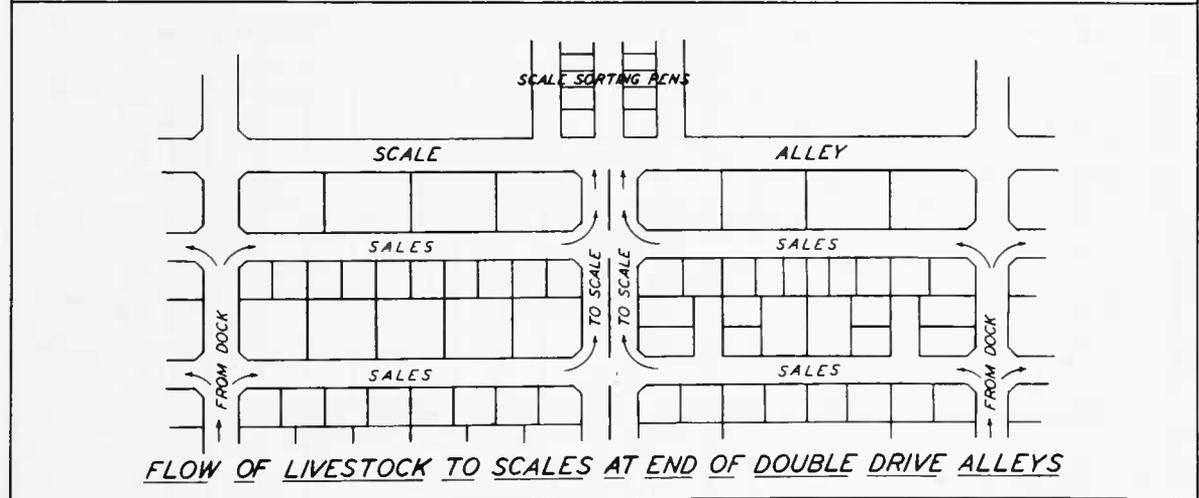
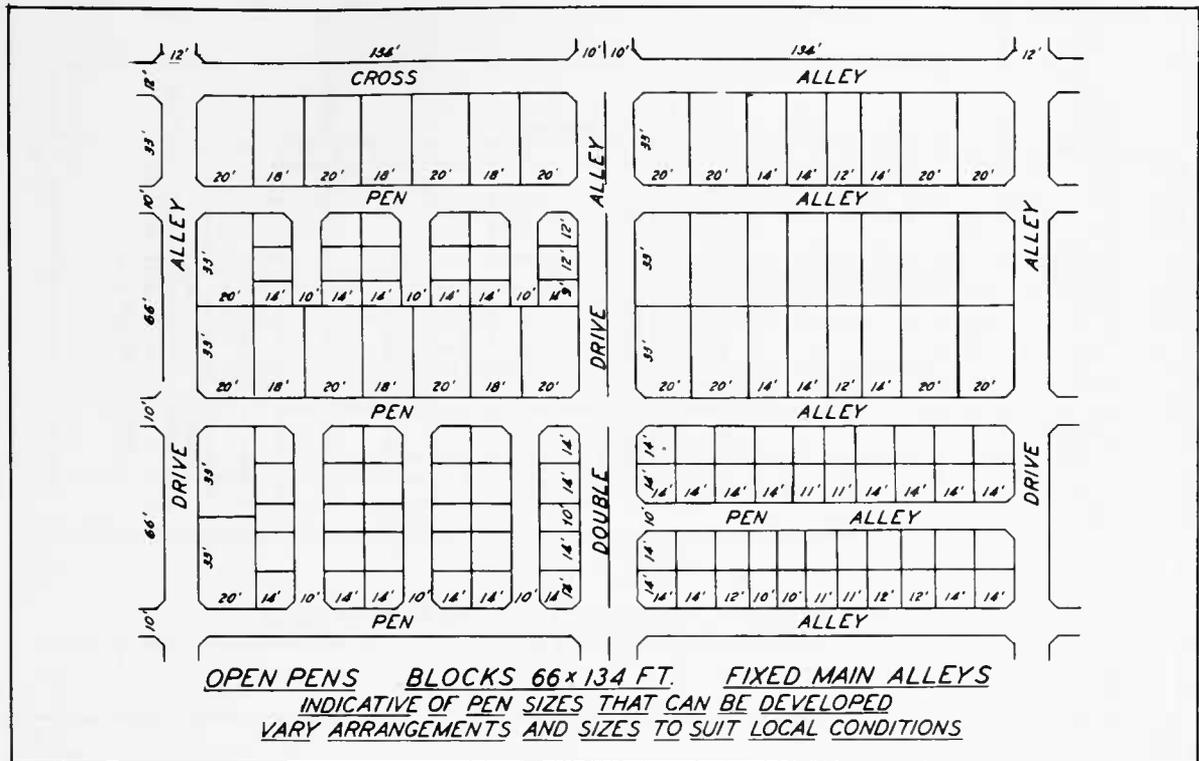
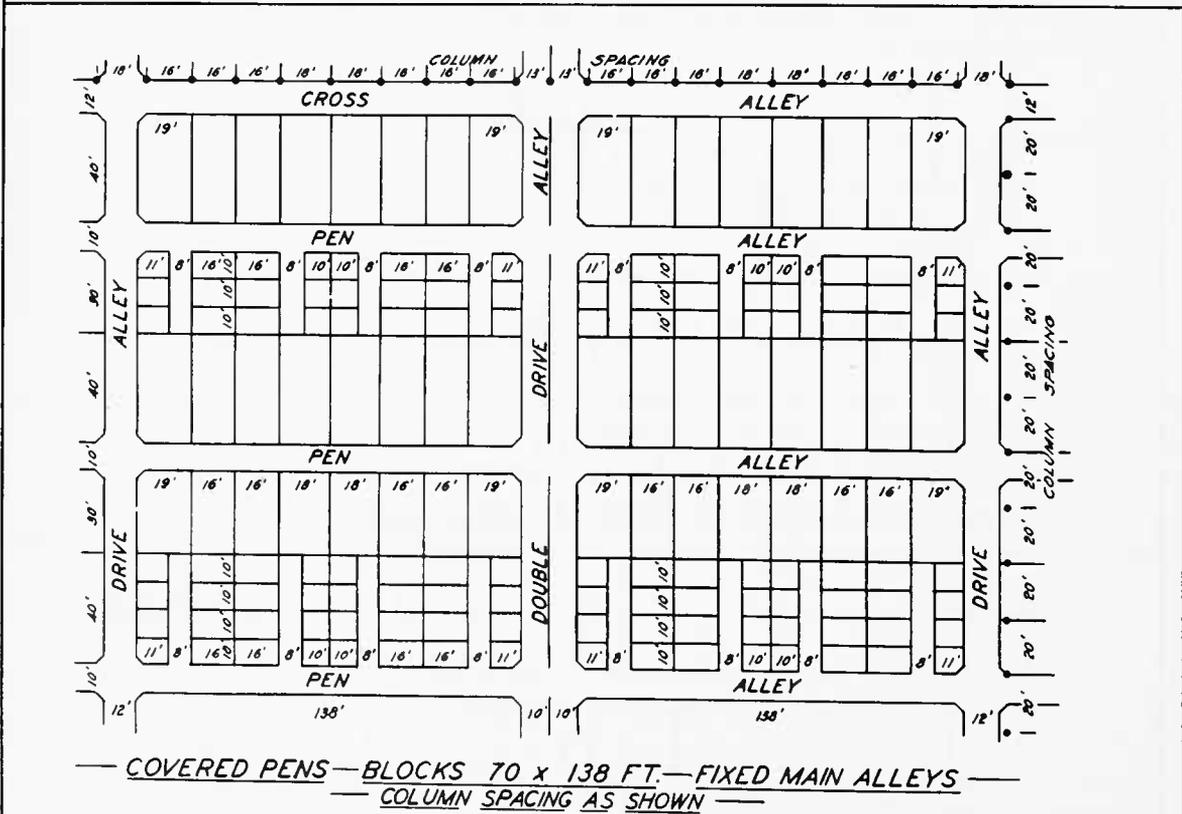
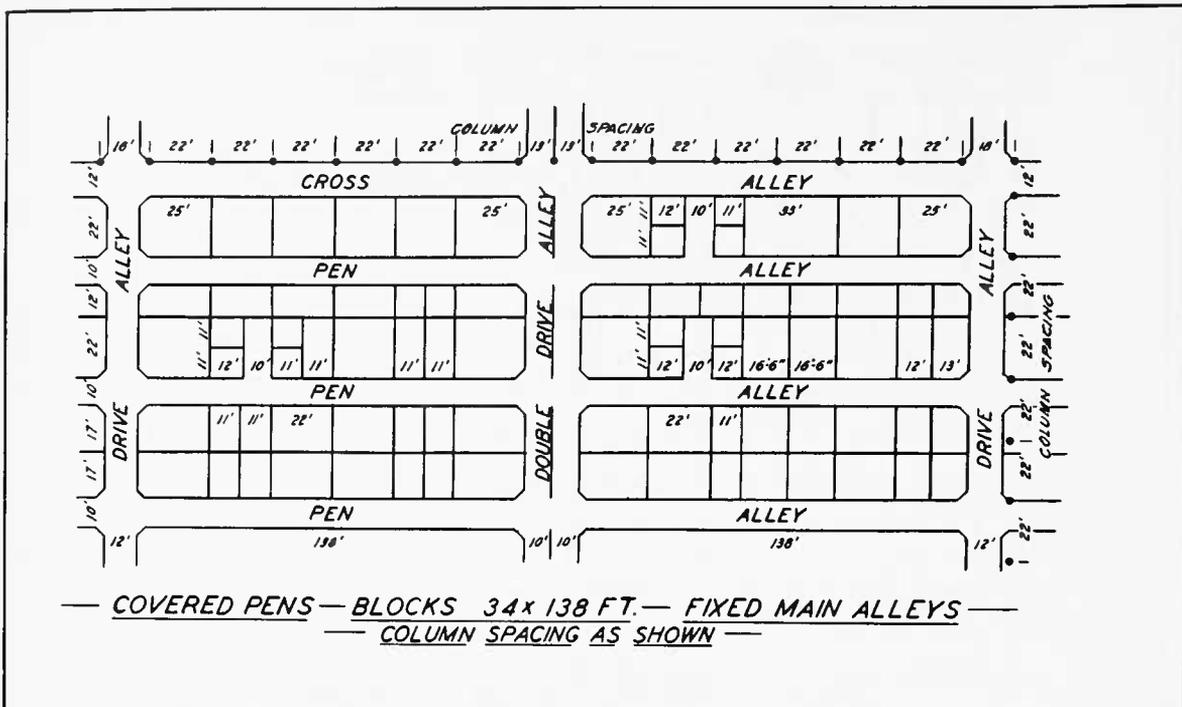


Figure 36.--Pens.



NOTE

— INDICATIVE OF PEN SIZES THAT CAN BE DEVELOPED —
 — VARY ARRANGEMENTS AND SIZES TO SUIT LOCAL CONDITIONS —

Figure 37.---Pens.

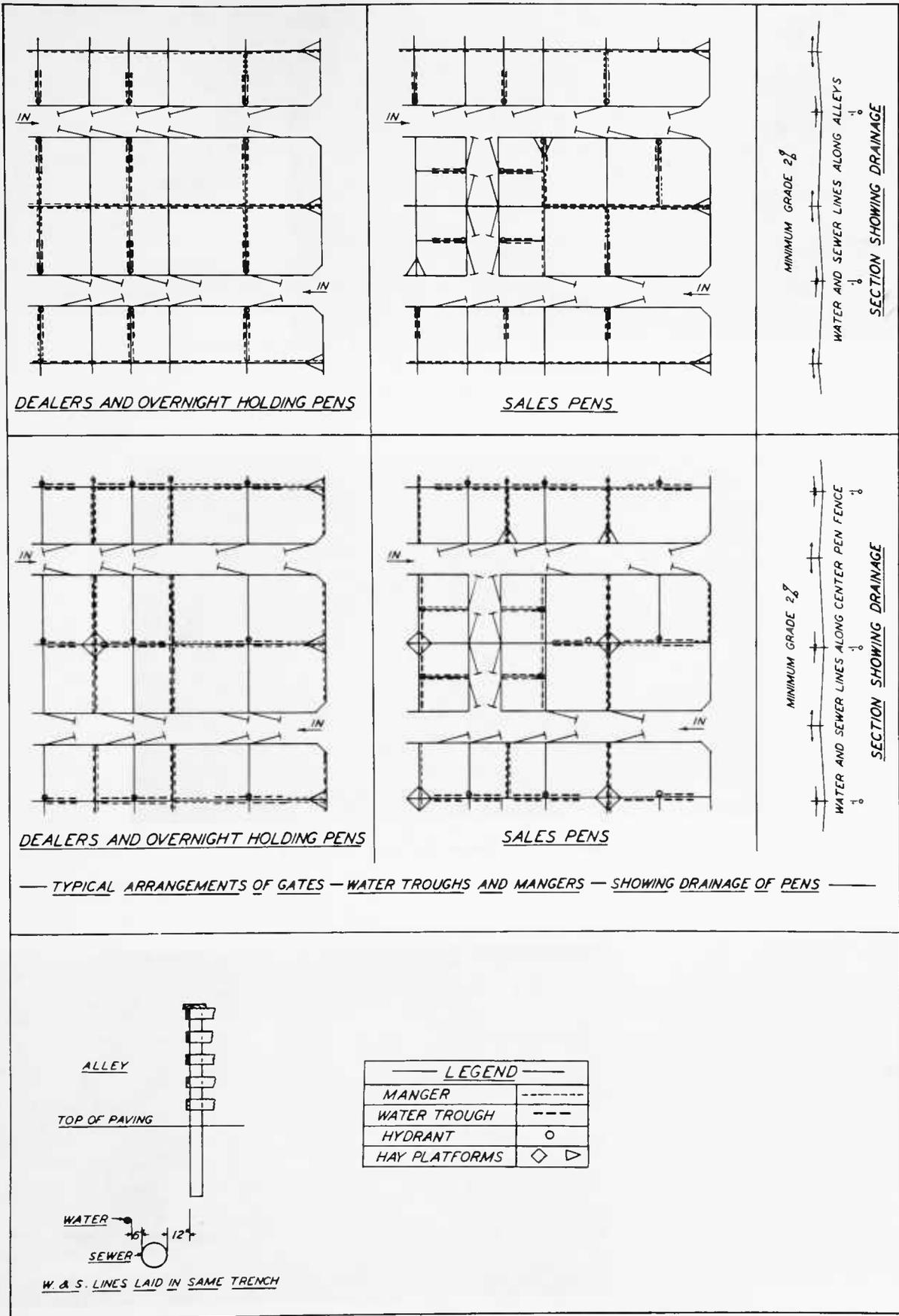


Figure 38.--Pen details.

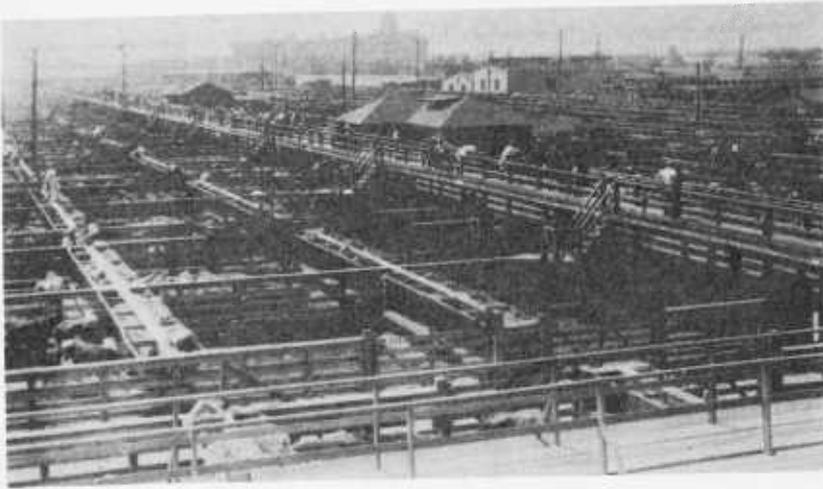


Figure 39.--Foot viaduct.



Figure 40.--Steps to foot viaduct.

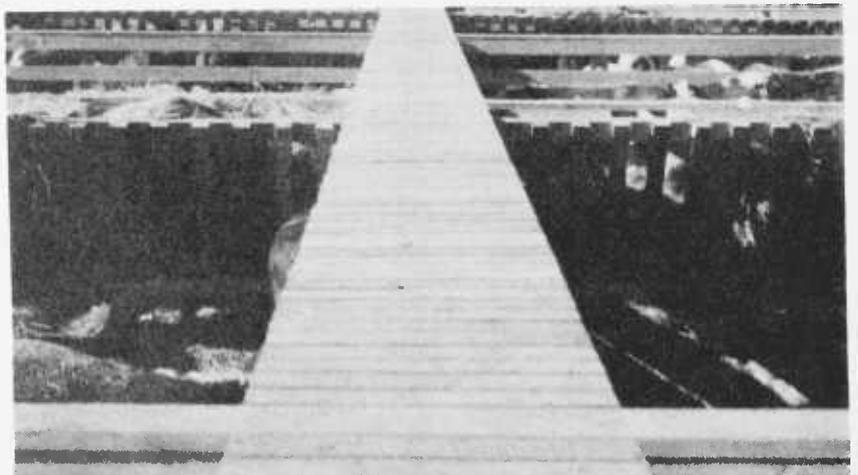


Figure 41.--Footwalk over fences.



Figure 42.--Excessively wide alleys.



Figure 43.--Cut-off block corners.

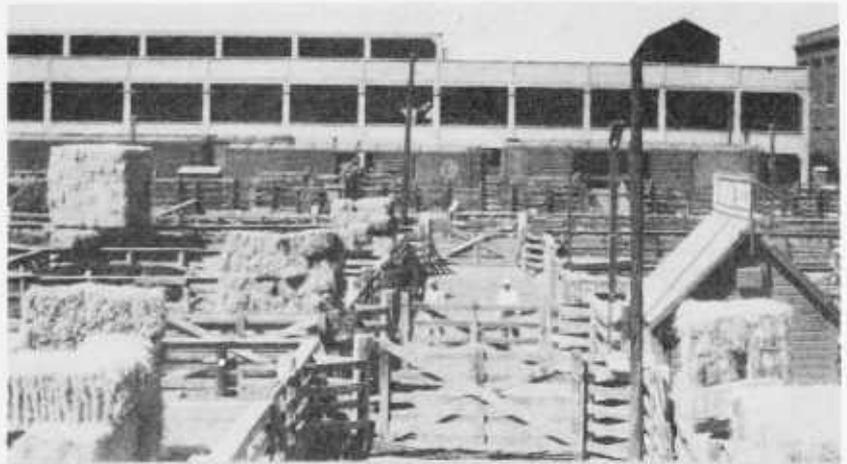
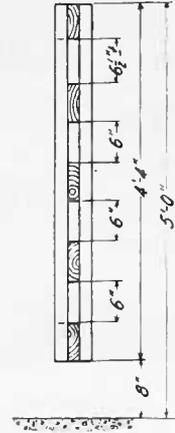
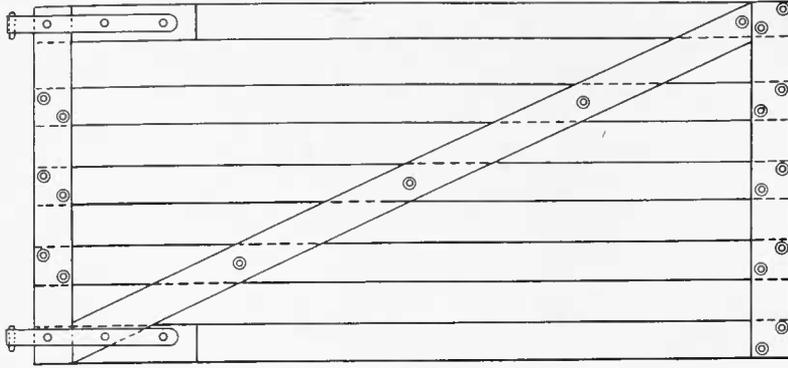
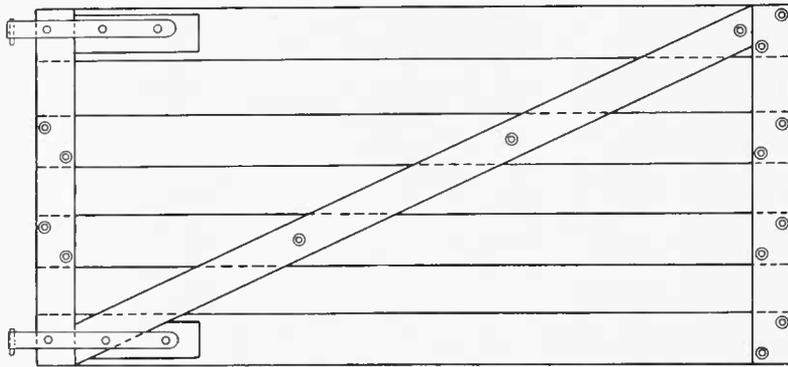


Figure 44.--"A" frames in alleys.



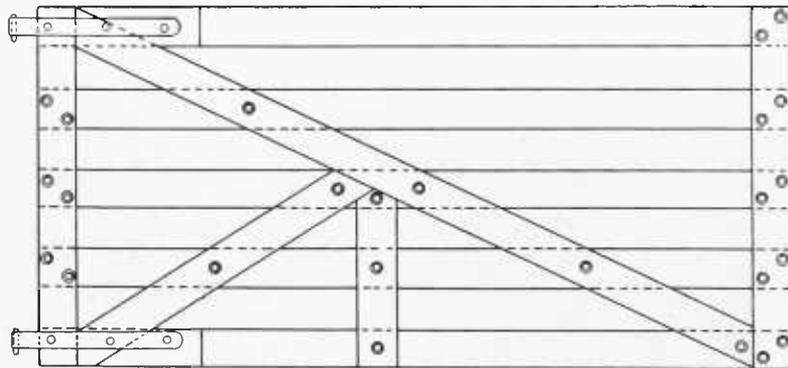
CATTLE GATE FOR 5 FT. FENCES

SINGLE PANEL - COMPRESSION BRACES - LENGTHS TO 12 FT.
5 - 2x6 RAILS - DOUBLE 2x6 STILES AND BRACES - BOLTED



CATTLE GATE FOR 5 FT. FENCES

SINGLE PANEL - COMPRESSION BRACES - LENGTHS TO 12 FT.
4 - 2x8 RAILS - DOUBLE 2x6 STILES AND BRACES - BOLTED

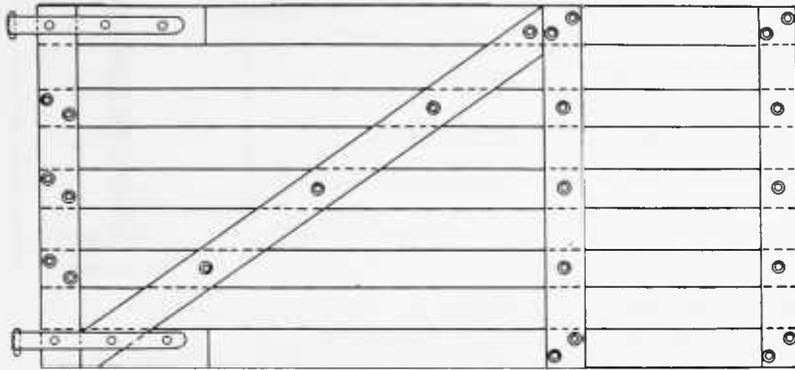


CATTLE GATE FOR 5 FT. FENCES

SINGLE PANEL - TENSION AND COMPRESSION BRACES - LENGTH TO 12'
5 - 2x6 RAILS - DOUBLE 2x6 STILES AND BRACES - BOLTED

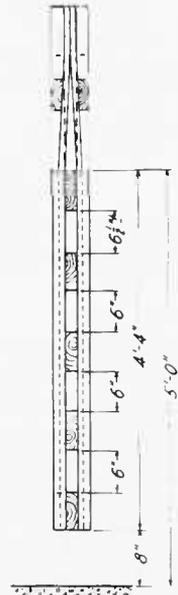
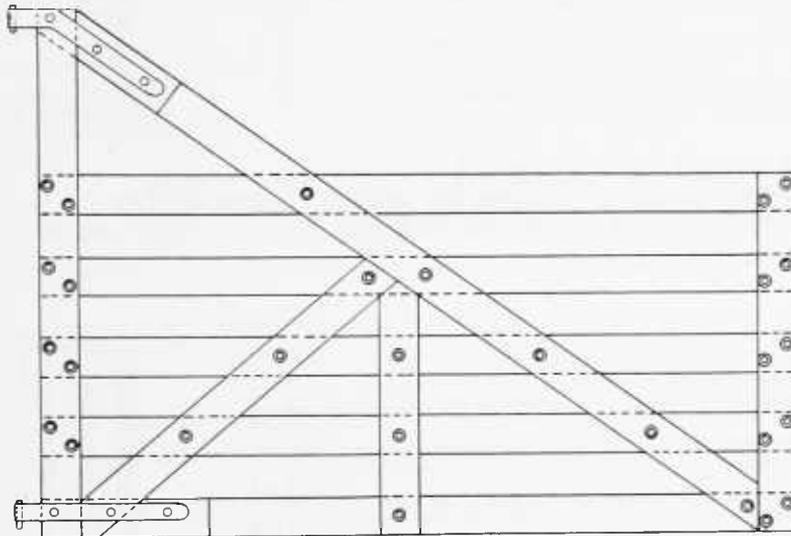
BOLTS - HINGES - 5/8" - ONE LARGE WASHER
OTHERS - 3/8" - TWO LARGE WASHERS

Figure 45.--Wood cattle gates.



CATTLE GATE FOR 5 FT. FENCES

ONE AND ONE HALF PANELS - LENGTHS TO 12 FT.
5-2x6 RAILS - DOUBLE 2x6 STILES AND BRACES - BOLTED

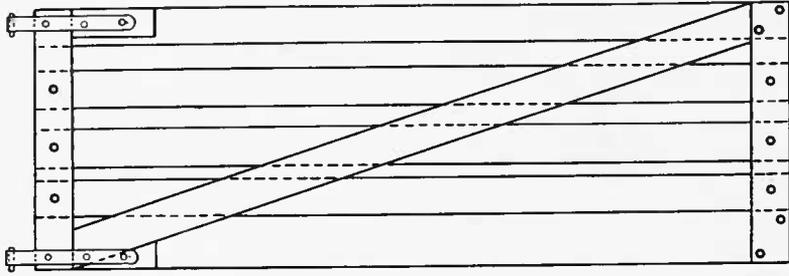


INTERIOR CATTLE GATE FOR 5 FT. FENCES

ONE PANEL - HIGH STILE - LENGTH TO 14 FT.
5-2x6 RAILS - DOUBLE 2x6 STILES - DOUBLE 1x6 BRACES - BOLTED

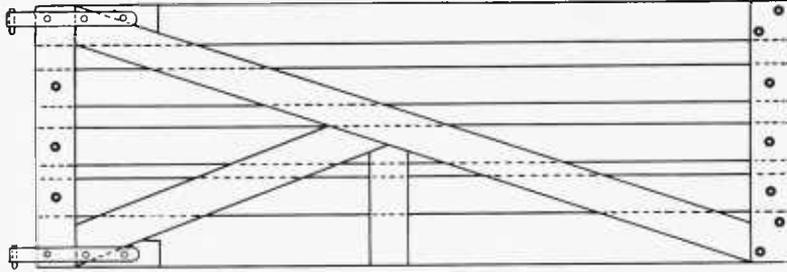
BOLTS - HINGES - 5/8" ONE LARGE WASHER
OTHERS - 3/8" - TWO LARGE WASHERS

Figure 46.--Wood cattle gates.



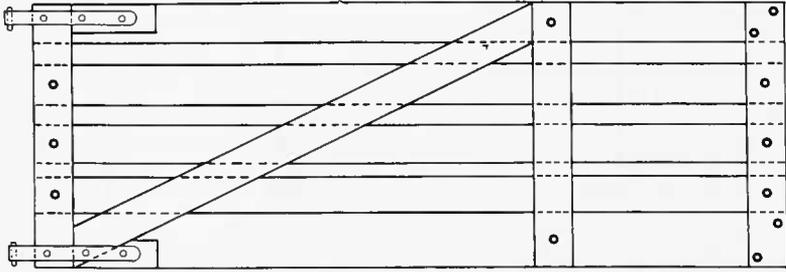
HOG GATE FOR 42 IN. FENCES

SINGLE PANEL - COMPRESSION BRACES - LENGTHS TO 12 FT.
1-1x8 AND 4-1x6 RAILS - DOUBLE 1x6 STILES AND BRACES - PARTIALLY BOLTED



HOG GATE FOR 42 IN. FENCES

SINGLE PANEL - TENSION AND COMPRESSION BRACES - LENGTHS TO 12 FT.
1-1x8 AND 4-1x6 RAILS - DOUBLE 1x6 STILES AND BRACES - PARTIALLY BOLTED

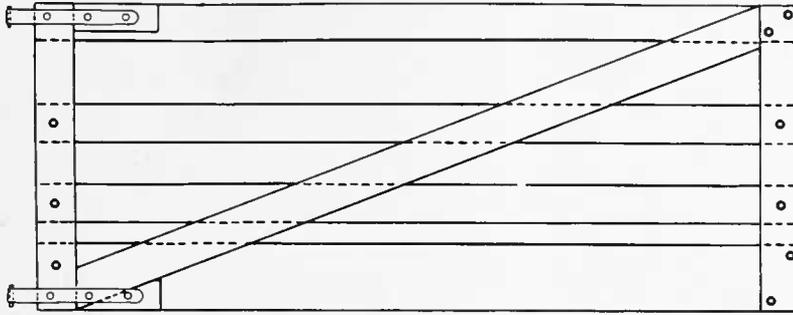


HOG GATE FOR 42 IN. FENCES

ONE AND ONE HALF PANELS - COMPRESSION BRACES - LENGTHS TO 12 FT.
1-1x8 AND 4-1x6 RAILS - DOUBLE 1x6 STILES
AND BRACES - PARTIALLY BOLTED

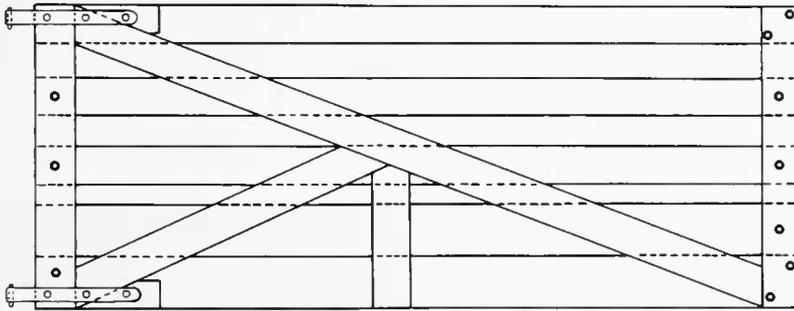
BOLTS - HINGES - 1/2" WITH ONE LARGE WASHER
OTHERS - 3/8" WITH TWO LARGE WASHERS

Figure 47.--Wood hog gates.



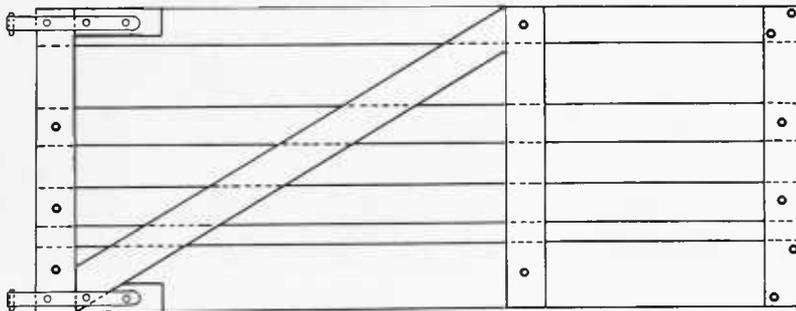
SHEEP GATE FOR 48 IN. FENCES

SINGLE PANEL - COMPRESSION BRACES - LENGTHS TO 12 FT.
1-1x10 AND 3-1x6 RAILS - DOUBLE 1x6 STILES AND BRACES - PARTIALLY BOLTED



SHEEP GATE FOR 48 IN. FENCES

SINGLE PANEL - TENSION AND COMPRESSION BRACES - LENGTHS TO 12 FT.
2-1x8 AND 3-1x6 RAILS - DOUBLE 1x6 STILES AND BRACES - PARTIALLY BOLTED



SHEEP GATE FOR 48 IN. FENCES

ONE AND ONE HALF PANEL - COMPRESSION BRACES - LENGTHS TO 12 FT.
1-1x10 AND 3-1x6 RAILS - DOUBLE 1x6 STILES AND BRACES - PARTIALLY BOLTED

BOLTS - HINGES - 1/2" - WITH ONE LARGE WASHER
OTHERS - 3/8" - WITH TWO LARGE WASHERS

Figure 48.--Wood sheep gates.

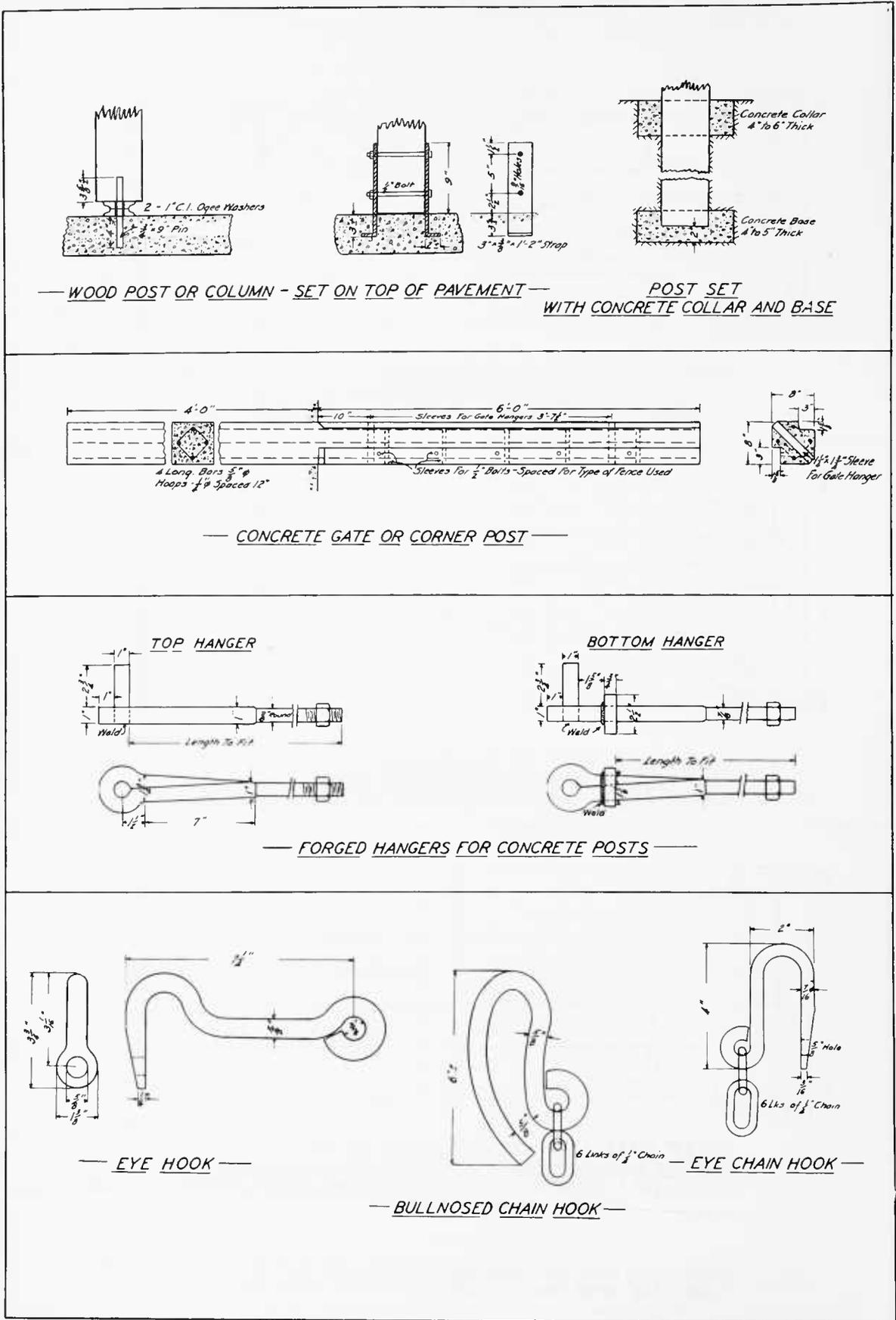


Figure 49.--Posts and hardware.



Figure 50.--Compression braces on balanced wooden gate.

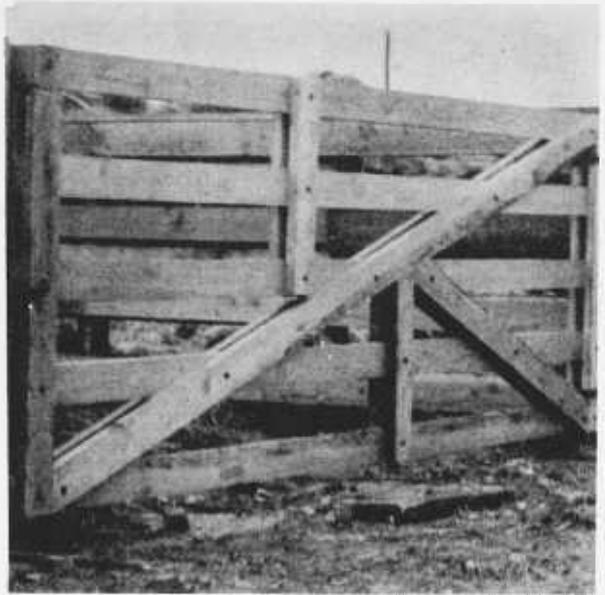


Figure 51.--Compression and tension braces on balanced wooden gate.



Figure 52.--Cast iron butterfly hinges.



Figure 53.--Cast iron hinges.

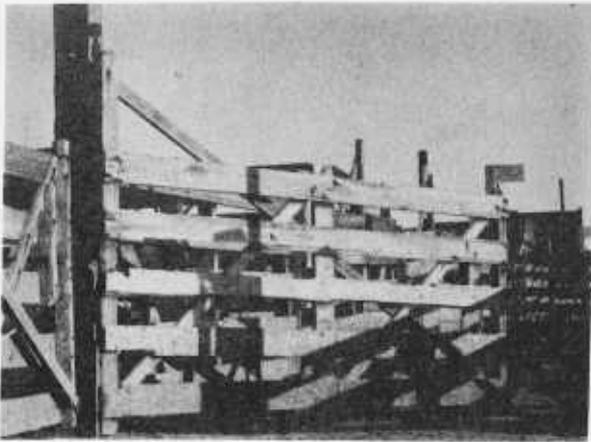


Figure 54.--Cast iron bar hinges on alley gates.

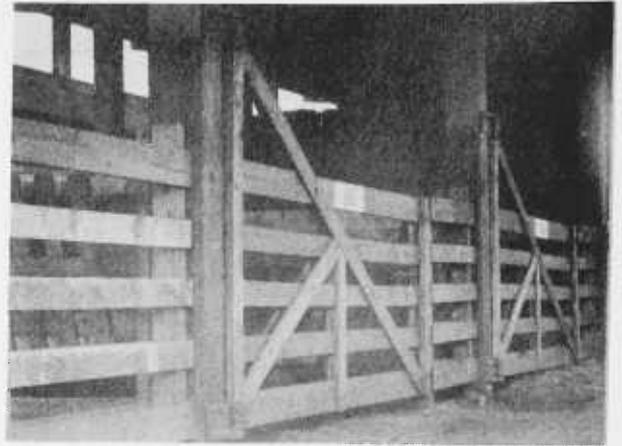


Figure 55.--Cast iron hinges on pen gates.

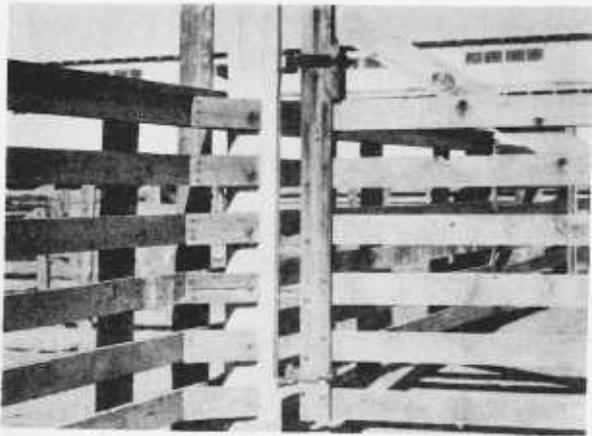


Figure 56.--Clevis hinges and forged pintles.

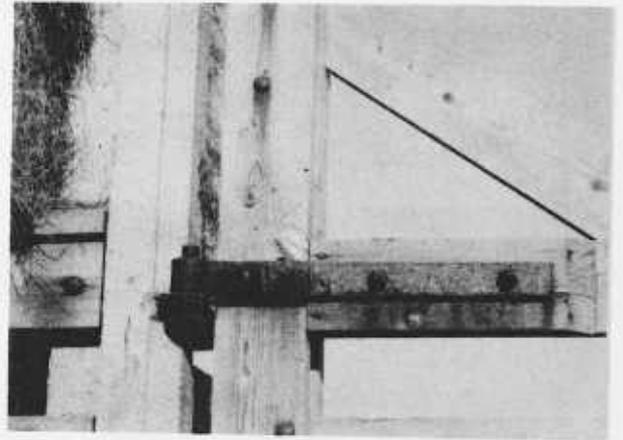


Figure 57.--Strap hinge and upper forged pintle for concrete post.

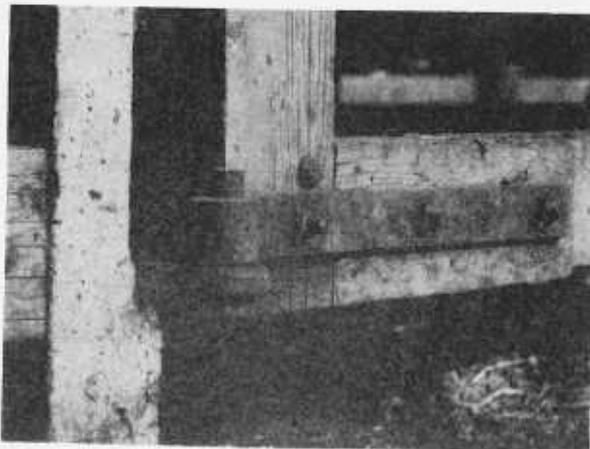


Figure 58.--Strap hinge and lower forged pintle for concrete post.



Figure 59.--Eye gate hook with lock.

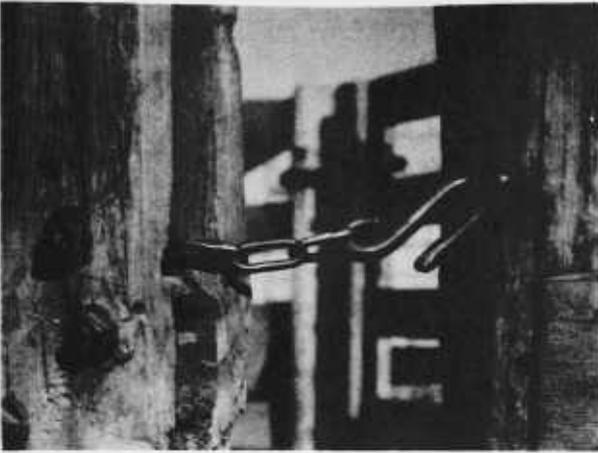


Figure 60.--Chain hook.

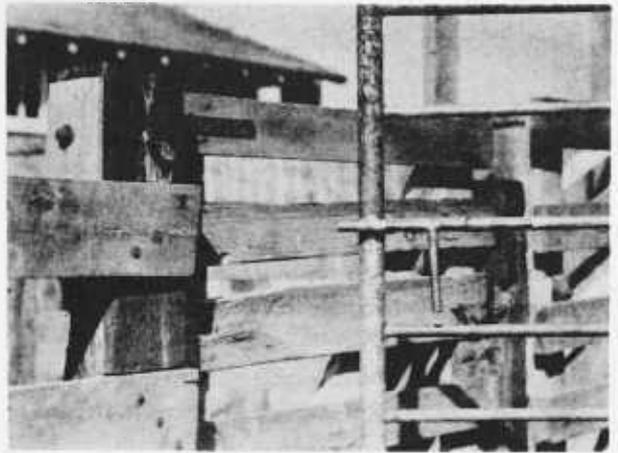


Figure 61.--Slide latch on welded pipe gate.

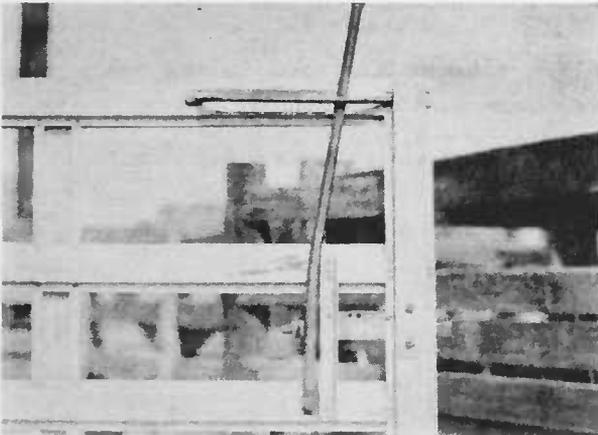


Figure 62.--"Teco" latch.

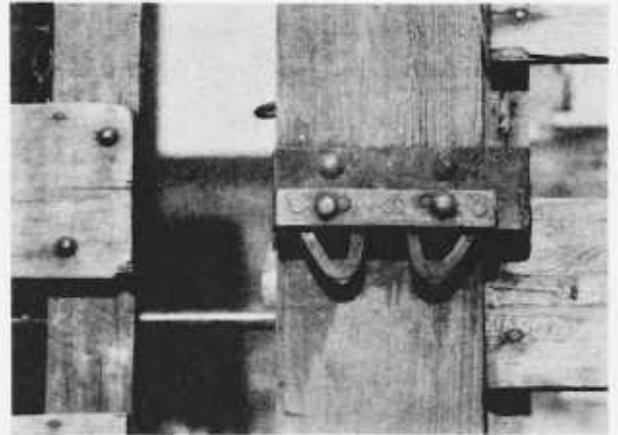


Figure 63.--Hand-forged ring latch.

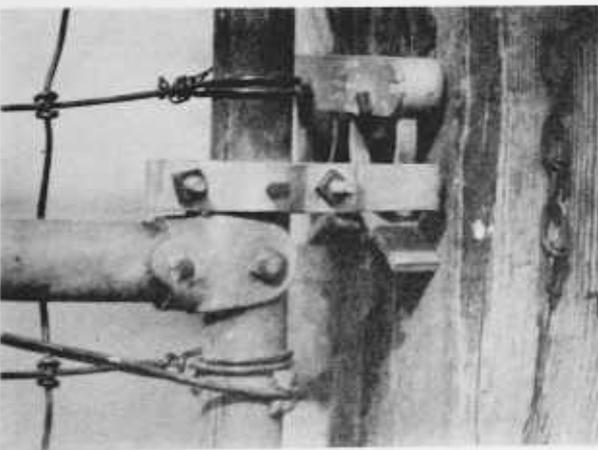


Figure 64.--Gielow ring latch.

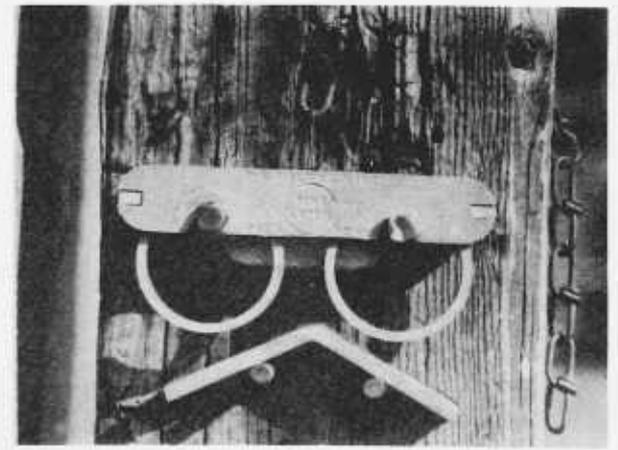


Figure 65.--Gielow ring latch.

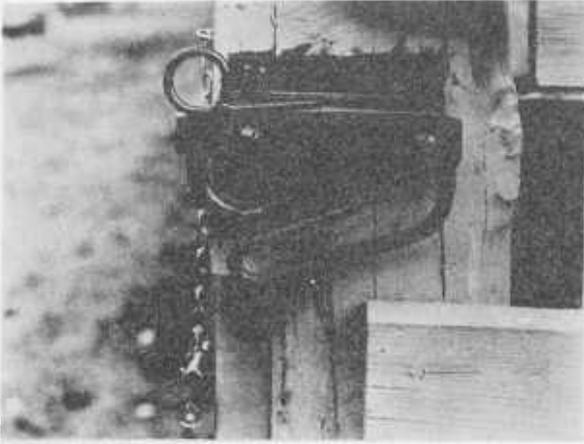


Figure 66.--Kingdon ring latch.

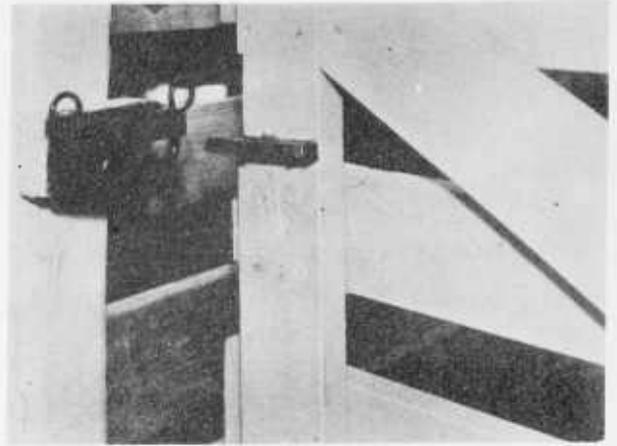


Figure 67.--Kingdon ring latch.

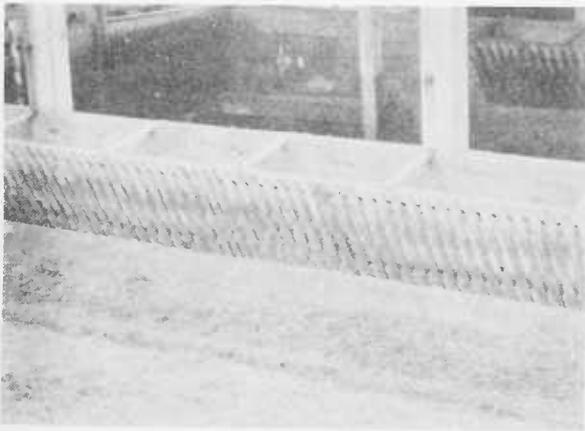


Figure 68.--Wood Slat manger for sheep.

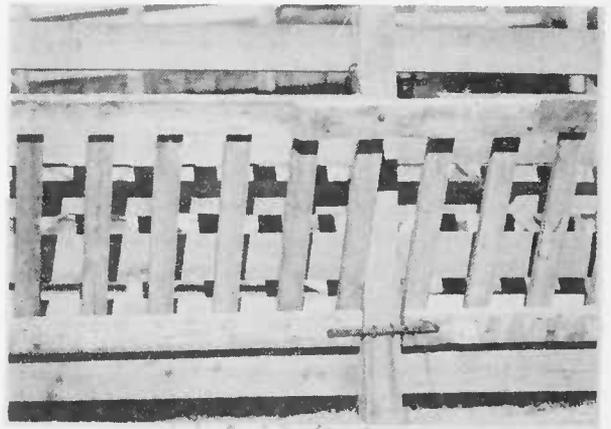


Figure 69.--Hinged wooden slat manger.

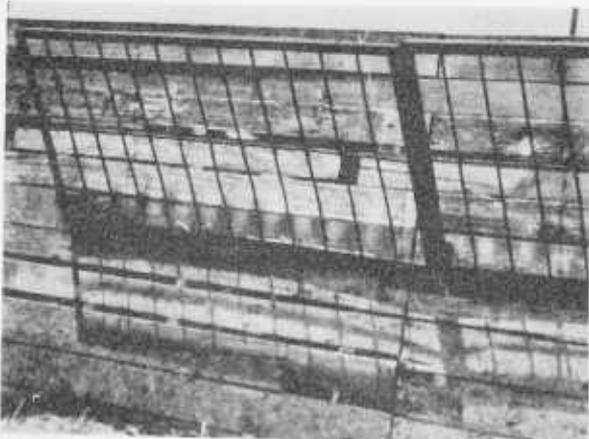


Figure 70.--Hinged steel slat manger.

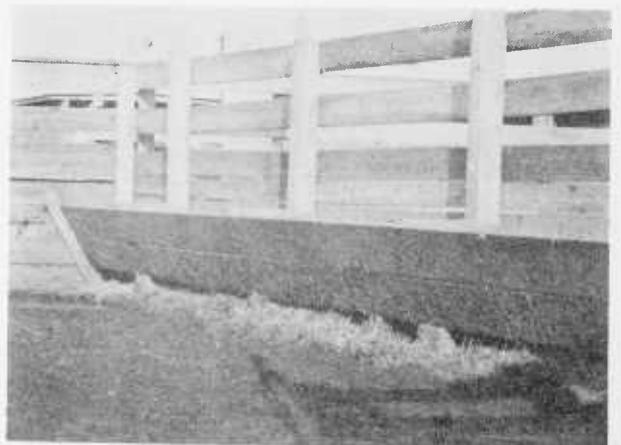


Figure 71.--Accumulated manure under box manger.

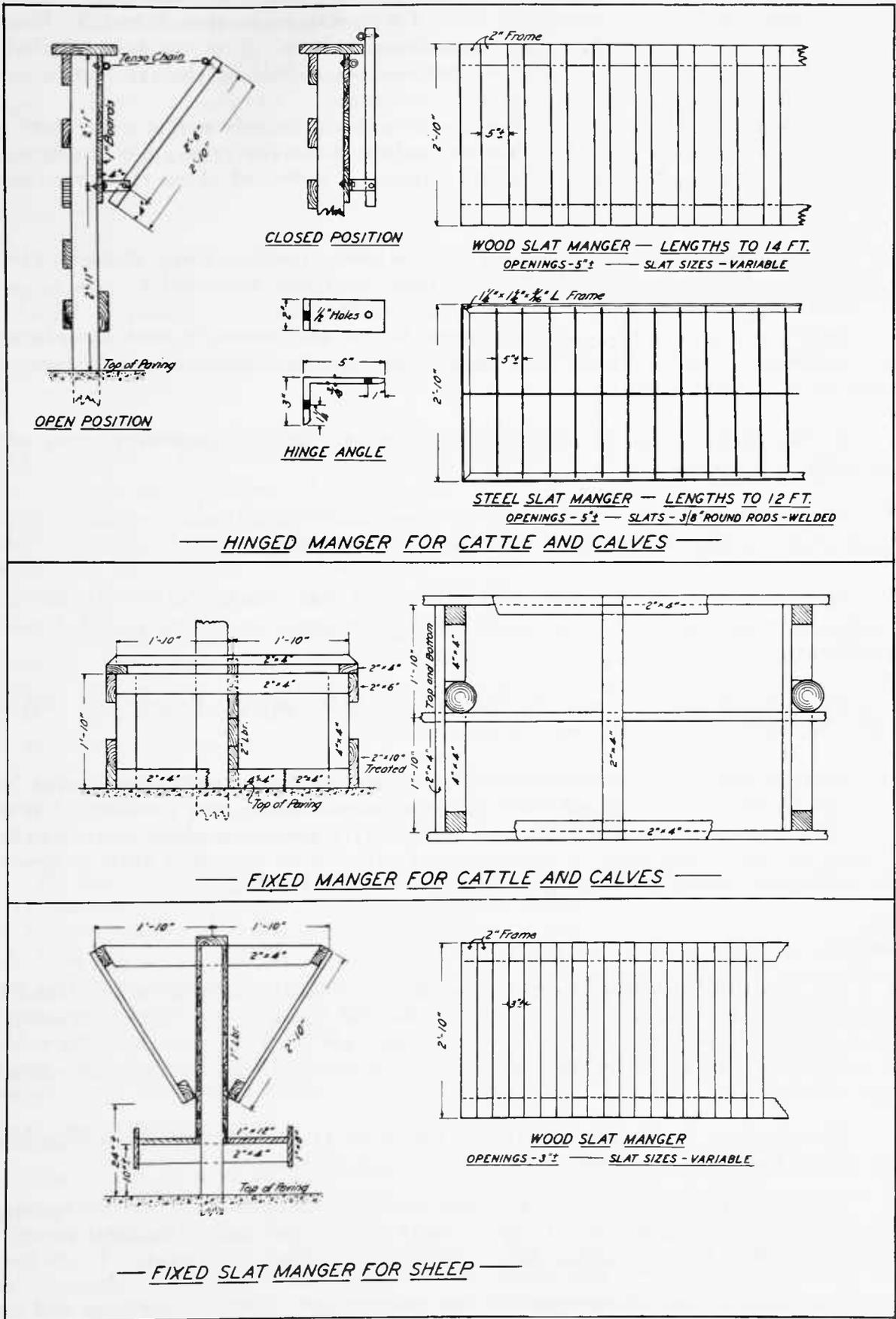


Figure 72.--Mangers.

Stockyard gates receive rough handling and heavy hinges are necessary. Commercial strap hinges are generally too light for wooden gates over 8 feet in length. Round screw pintles or hangers have a tendency to turn. This can be corrected by welding a thin strap to the hanger and then nailing or bolting the strap to the post.

Cast-iron and forged hinges have proved satisfactory in most cases; there are several types of each. Cast-iron hinges include butterfly types, top brackets and base plates with pins, and heavy cradle types. A number of these types were developed for heavy 14- and 16-foot gates.

Types of forged hinges in common use include: Double-strap, strap or clevis with drive or bolt hangers, eye bolt and clevis, and double-eye bolts.

Double-strap or strap and bolt hanger hinges are generally most satisfactory and economical. The strap and bolt hanger has adjustment and take-up features not found in the double strap.

Welded hardware has proved very satisfactory. Welding generally saves metal and labor and reduces cost.

Closing hardware includes plain and eye hooks, chain hooks, chain links and pins, slide latches, ring latches, and patented closures.

Eye hooks, eye chain hooks, and bull-nosed chain hooks, used with Jay-bolt staples, are very satisfactory. Bull-nosed chain hooks cannot be jarred loose by livestock.

Slide latches are strongly recommended for alley gates. Projections that may bruise or injure livestock should be avoided.

Ring latches have a number of excellent features. Hand-forged ring latches have given good service on alley and scale gates at several yards over a number of years. Heavy duty types are now being produced commercially and are readily available. Ring latches are not recommended for sorting gates owing to the necessary rigid projection and consequent danger of bruising and injury to the livestock.

MANGERS

The need for long mangers has decreased. Standards for mangers developed for rail receipts are now excessive in length for the needs of trucked-in livestock. Under average conditions, 2 feet of manger space per head for one-third the number of animals will be ample for feeding livestock arriving from a distance of not more than 100 miles.

Slat mangers in the sheep division should be fixed, and have 3-inch openings and a feed box below the manger. Wooden slats are recommended.

Slat mangers in the cattle division should be hinged, have 5-inch openings between slats, and where grain is fed, should have a feed trough beneath it, 12 to 16 inches wide and 2 to 4 inches deep. Slats may be of wood or metal.

Slat mangers are recommended for low maintenance, ease of cleaning, and non-interference with the use of manure loaders.

Box mangers constructed with bottoms several inches above the paving are subject to rapid rot and decay owing to the accumulation of waste hay inside and the manure beneath the manger. They are costly to maintain and repair. Box mangers constructed with open sides and without bottoms are satisfactory.

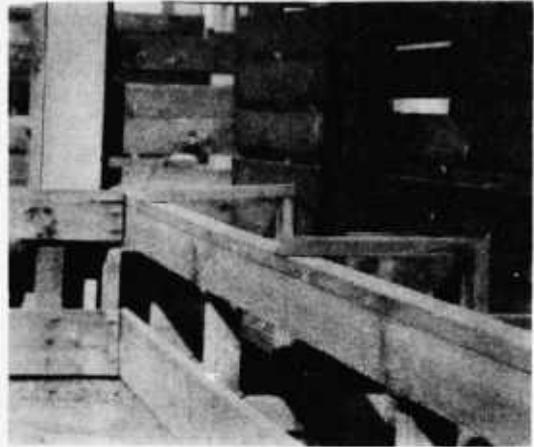


Figure 73.--Bottomless box manger.

TROUGHS

The dimensions and capacity of water troughs should provide adequate watering facilities in proper relation to the sizes and uses of the pens, to avoid undue use of water. Troughs and trough hydrants should be located for ready accessibility.

Water troughs of a standard design and 10 feet long are recommended for the cattle division. Under average conditions a trough of this type will be sufficient to water a large truckload of cattle arriving from a distance not more than 100 miles from the yard. Pens used for the feeding and watering of rail shipments should be equipped with two or more 10-foot troughs. Round troughs are very satisfactory for small pens. Sections of 18- to 30-inch concrete pipe, provided with false bottoms to give a 10- to 12-inch depth of water, have been successfully used.

Troughs of elliptical shape permit easy cleaning and are not easily damaged by freezing. The trough drain should be located at the opposite end from the hydrant for ease of cleaning by flushing. Overflow pipes provided with slots approximately 1/2 by 1 inch at the top of the pipe have proved effective in preventing clogging by hay and other debris.

Watering facilities for hogs and sheep will vary widely with climatic conditions. The design of the troughs should be suitable for the conditions, and the lengths should fit the needs and the pen. Plans of typical troughs are shown in figure 76.

The top of the cattle troughs should be not less than 16 inches nor more than 26 inches above the pavement. Concrete hog and sheep troughs ordinarily should be set directly on the pavement or on a full concrete base in order to prevent rats and mice from hiding or nesting beneath them. The bottoms of sheet metal troughs for hogs and sheep should be at least 6 inches above the pavement. Where a large number of sheep are received, fed, and watered, the sheep troughs should be set on an earth fill about 12 inches above the pavement elevation, with a paved incline to the trough. Sheep readily drink from such a trough and the incline reduces the contamination of the water and facilitates the cleaning.

SCALES AND APPURTENANCES

The key facilities of a terminal stockyard are the livestock scales with their accessory pens and alleys. Adequate weighing facilities contribute directly to economical and efficient yard operation and accurate weights are important to the prestige of the yard as a reputable market. Essential facility requirements are that the scales be consistently accurate, of proper size and weighing capacity, and that the number, location, and sorting and yarding facilities be adequate to accommodate the flow of livestock with minimum delay and congestion.



Figure 74.--Precast circular concrete trough.



Figure 75.--Overflow and solid rubber trough plugs.

Correspondingly, one of the most important functions which a terminal yard performs in the interest of livestock owners, buyers, and market agencies is to provide accurate, impartial, and efficient weighing service. The principal service requirements are that weighing be performed accurately by reliable and well-trained weighing personnel and that true weight values be recorded in permanent form on scale tickets; a secondary requirement is that livestock be weighed with minimum delay following sale.

Accurate recorded weights should be the controlling factor in all weighing operations.

Number and Layout. The number of scales provided should be sufficient to assure that during periods of normal heavy receipts, all weighing can be completed within a reasonable time after trading ends. The number of scales to be operated on a given day should be according to a known schedule based on the estimated salable receipts. Estimates of the Department's local market news service are recommended as guides.

Adequate weighing facilities for dealers and for weighing direct shipments to packers should be provided by either separate scales or regular turns at commission scales as conditions warrant.

Scale locations should be adapted to the planned movement of livestock through the yard. Arrangement of scales in a straight line across a species division has proved desirable. The location of the commission scales used by dealers should be suitable for the joint use.

Scale layouts should provide suitable sorting pens or facilities in front, and adequate catch or yarding pens in back of the platform. The catch pens and their alleys should be designed and arranged for the prompt and efficient yarding of livestock after weighing.

The scale platform and contiguous parts of the entrance and exit pocket should be under roof, and provisions should be made for effective protection from wind and weather, which might affect weighing accuracy or damage scale parts. Sufficient

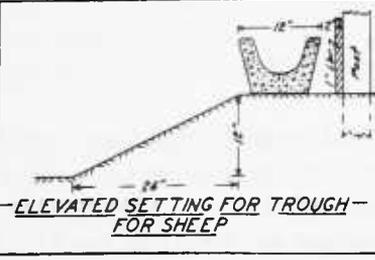
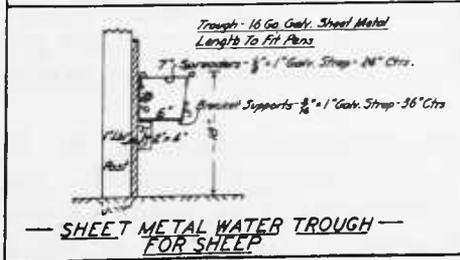
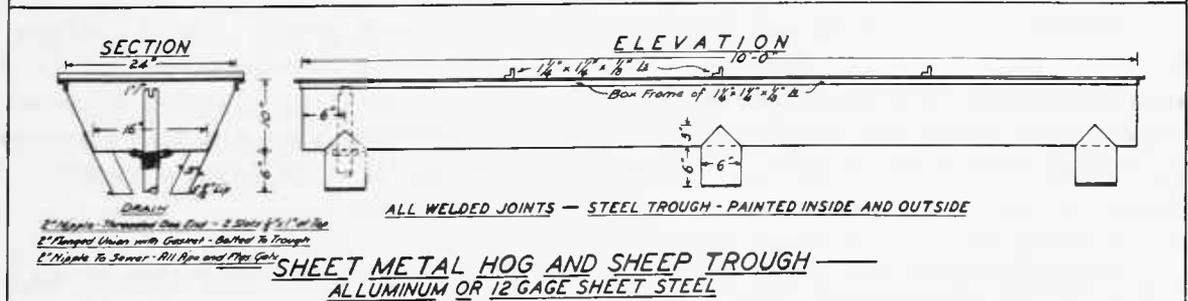
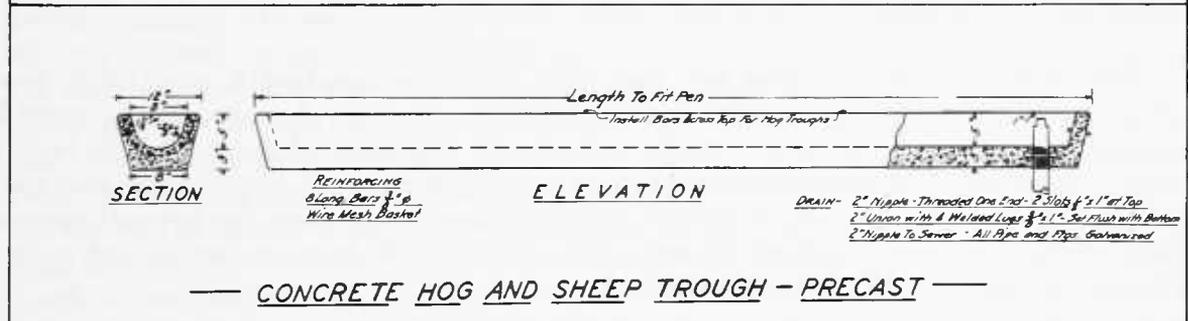
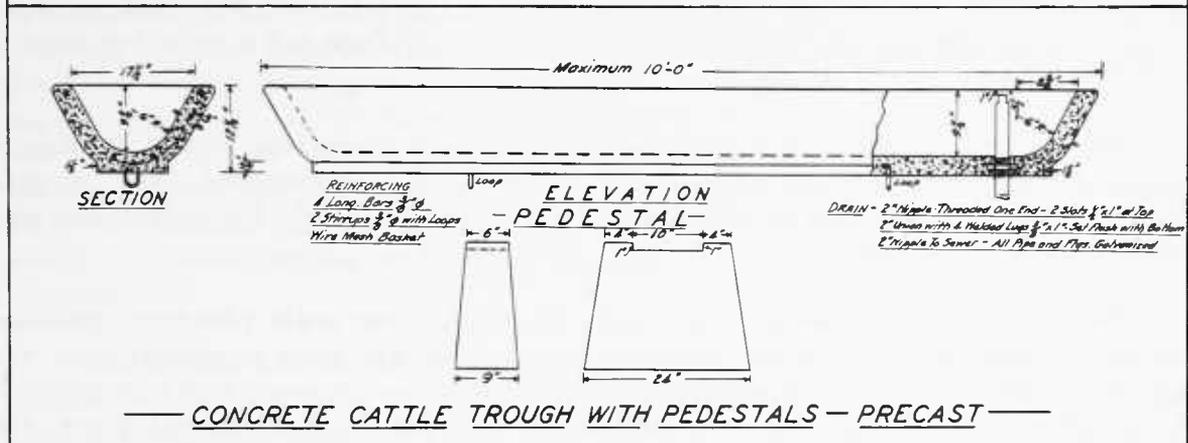
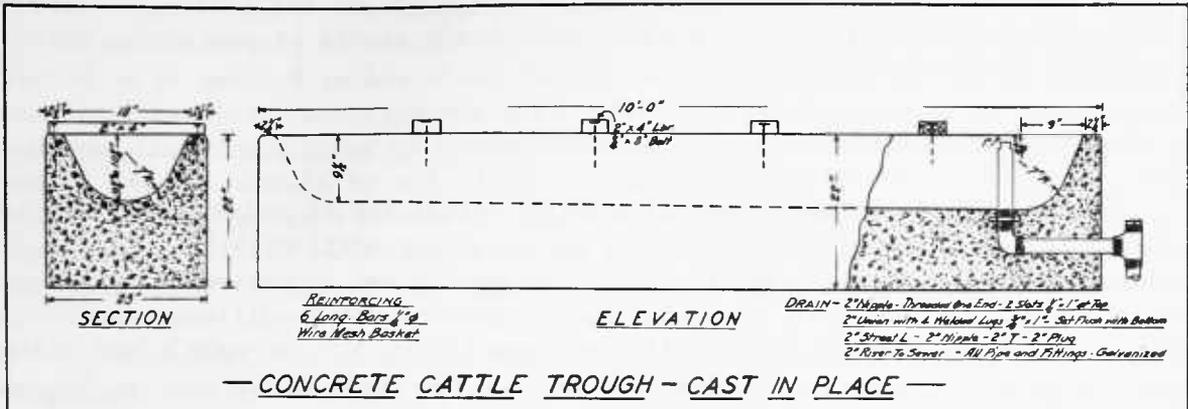


Figure 76.--Water troughs.

electric lights for the adequate illumination of the entire scale area, sorting and catch pens, counting-off facilities, and scale house should be provided. Blinding floodlights should be avoided.

Scale platforms should have nonslip surfaces.

Capacity. The platform sizes and weighing capacities of scales needed for rapid and efficient weighing of livestock under present-day conditions differ greatly from those required when the bulk of livestock consignments was in carload lots. Studies made at representative yards show that, under present-day conditions, the average number of head weighed per draft will vary from 1.5 to 4.5 for cattle and calves, from 5.5 to 18.0 for hogs, and from 8.5 to 34.5 for sheep. Further, it has been computed that at least 95 percent of the drafts weighed at most terminal yards can be accommodated on a scale having a 12- by 24-foot platform and a weighing capacity of 30,000 pounds.

The weighing capacity of a scale and the platform dimensions should be directly related to the size of the average draft weighed. The recommended scale capacity per square foot of platform is 110 pounds for cattle, 70 pounds for calves and hogs, and 50 pounds for sheep.

The number of drafts weighed per hour, depending upon scale platform dimensions, the draft sizes and efficiency, and the number of scale crew personnel will vary from 30 to 80. A rate of 60 drafts per hour can be maintained under proper conditions when the platform size is commensurate with the draft sizes and where other conditions are favorable.

The average number of head per hour that can be weighed with a suitable scale and pen arrangement during regular operating hours on days of normal heavy receipts is estimated to be 150 head of cattle and calves; 525 head of hogs, or 675 head of sheep. Studies of representative weighing performances of both large and small scales, having good and poor locations and appurtenances, show the present average number of head weighed per hour during normal runs is 100 head of cattle and calves; 350 head of hogs, or 450 head of sheep.

Construction. Design and construction of livestock scales should conform to the basic principles and features adopted by reputable manufacturers of large-capacity scales. Scales of two-section design, with cast-iron levers, suspension bearings, and structural steel weigh-bridges are recommended when platform dimensions are greater than 9 by 18 feet. For smaller sizes an "A"-type lever system may be used.

Installation of the scale levers should be performed or supervised by an experienced and competent scale erector, preferably by one representing the scale manufacturer. The lever stands should be mounted upon substantial concrete piers having adequate foundations. The use of extra extension levers should be avoided.

Scale pits should be of waterproof construction, preferably of concrete; have steel angle copings at the top of the walls; and be paved and well drained. Sumps and sump pumps are recommended instead of sewer connections in order to avoid flooding through the clogging or backing up of the sewers. The depth of the pit will vary with the size and type of platform and weighbridge girders and should not

be less than 6 feet. The preferred design calls for the lever bearings and pivots to be approximately 60 inches above the floor. The top of the scale pit walls should be at least 8 inches above the surrounding pens and alleys in order to prevent surface waters entering the pit. All scale pits should be so constructed and equipped that inspections of the lever systems can be made while the scale is being used. The pit should be well lighted with permanent electric lights and have a suitable entrance which should be readily accessible at all times without interfering with either the weighmaster or the weighing operations. Definite provisions should be made to prevent rats and cats entering the pits or getting on the levers.

Scale platforms should be waterproof. Concrete platforms, scored or well roughened, are recommended. At several markets the use of sand or screened cinders as substitutes for cleats on wooden platforms has been found to provide adequate traction for the livestock and to facilitate cleaning and testing operations. The platforms should be supported on structural steel weighbridges and edged with steel angles, channels, or "Z" bars. All platforms should have a clearance of not less than 3/4 inch from the pit wall and be constructed to prevent loose material from lodging between the platform and the walls. The use of "Z" bar copings on the platform accomplishes this purpose and also provides a suitable member for attaching the stock rack. Undercutting or beveling the sides of the platform is also a recommended practice.

Stock racks should be of substantial wooden or steel construction, be firmly anchored to the platform, and well braced. They should have a clearance of 3 inches from all adjacent structures and have adequate side protection to prevent interference during the weighing. Rack gates should be designed for rapid and easy operations and equipped with rugged positive latches. Entrance and exit gates at the ends of the rack are preferred, although entrances at one end and side exits at the other end are giving satisfactory service. Gates at the ends allow a straight line flow of livestock across the scale. This arrangement requires a minimum of labor in driving livestock on and off the platform and provides adequate protection for the scale on the sides. Scale entrance or exit gates in the central part of the rack are not recommended. Such a location often results in the pocketing of livestock at one end of the platform; requires additional labor in driving on and off; and creates problems in protecting the weighing accuracy from interferences from wind and weather and from the operators and spectators on the market.

Scale houses should be constructed and arranged to provide a heated and well-lighted working space and a clear view of the scale platform and end gates for the weighmaster, when in his normal working position, and to provide a well-lighted shelter for the count-off man from which he has an unobstructed view of the scale platform and exit pocket. Adequate and suitable furniture and equipment should be provided for both the weighmaster and counter, including revolving metal stools with backs, desks, ticket racks, and supply storage. The design and arrangement of these appurtenances should be similar at all scales so as to promote the efficiency of weighmasters under a rotation system.

A dependable communication system between the commission men, the weighmaster, and the counter should be provided. A modern two-way public address system that can be cut in and out, with an additional loud speaker back of the scale to aid in yarding, is strongly recommended. Pipe speaking tubes generally provide inadequate communication and their use is not recommended. An electric signal bell with push

button control should be installed at each scale so that the weigher may conveniently signal the scale crew when each draft has been weighed and when the scale should be cleared for balancing.

Types. Older scales of the four-section type, with long platforms, large-capacity weigh beams, and 10-pound minimum weigh beam graduations are not well suited for weighing the numerous small drafts common to modern yard operations, because their use requires excessive time and labor for driving livestock on and off the platforms and because they are less sensitive and precise in their weighing performance. Modern scales of the two-section type, with small platforms, low-capacity weigh beams, and 5-pound minimum weigh beam graduations yield more precise, accurate and prompt weighing service and contribute to economy of operation through reduced operating, maintenance, repair, and testing costs.

Automatic indicating scales of the dial type, equipped with electrically operated ticket printers, have been employed with satisfactory results at some terminal yards. Being relatively complex and delicate mechanisms, these require particularly careful installation and the services of an expert scale mechanic for cleaning, adjusting, and general servicing at regular intervals. They are not recommended for use at markets where the services of a competent scale service and repair agency are not continuously available.

Development of an electronic scale for weighing livestock has been the subject of recent study and experimentation. Trial use of a pilot model at two yards demonstrated need for improvement of some mechanical components but proved the electronic weighing principle to be practicable and, in several respects, advantageous. Trials with an improved model are to be resumed shortly.

One recent installation of special interest is a lever scale of the automatic indicating type, with the dial, printer, and operating controls in the far end of the scale house where the weigher is enabled to function also as the count-off man. Push button controls and special security features are provided to balance the scale, to print scale tickets, to prevent printing of a weight unless the scale was correctly balanced when empty, and to prevent printing of a weight until movement of the indicator has been reduced to the practicable minimum.

Scale Devices. Weighbeams equipped with type bars are the simplest and most common form of device for indicating and printing weight values. They should be securely mounted on rigid supports that are independent of the scale house structure, and they should be so located that they can be conveniently operated by the weigher. An enclosure separating the weigher and weighbeam assembly from the main part of the scale house is desirable. All weighbeams should be of the type-registering style. For all scales not used exclusively for weighing carload lots or crippled or dead animals, the weighbeams and type bars should be graduated in 5-pound intervals. Weighbeams with multiple notch engagement of the poise reduce notch wear, improve weighing accuracy, and are recommended.

Balance indicators of approved type, corresponding to those in common use at many terminal markets, are recommended as aids to accurate and rapid weighing with weighbeams.

"Tell-tale" dials are used at some yards to expedite weighing. The dial assembly connected with the lever system independently of the weighbeam, provides a visible indication of the approximate weight and thus enables the weigher to set the poise with minimum delay. An additional advantage is the visible indication of any zero load balance change when loads are removed from the scale. The final weight determination is made by balancing the weighbeam.

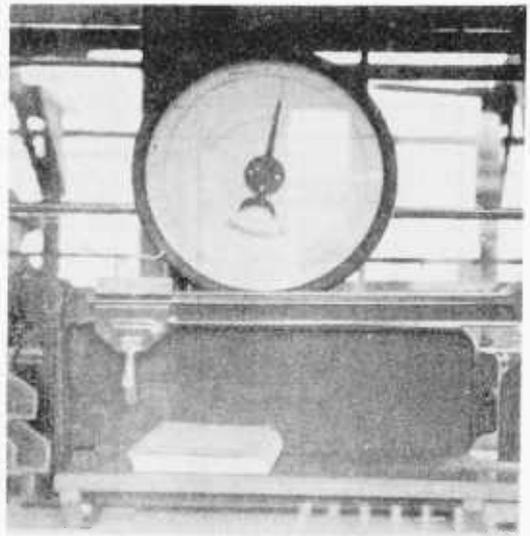


Figure 77.-- "Tell-tale" scale.

Plans. Figures 78, 79, and 80, show typical scale houses and typical arrangements of sorting and catch pens at cattle and hog scales. Pits and platforms are not shown, as their design will vary with the size and type of scale and local ground conditions.

YARD UTILITIES

An adequate supply of good water, suitable for both human and livestock consumption, should be readily available in the pen areas and structures at all times.

Many yards are finding it necessary to provide an independent water system for fire protection only. Such systems are directly connected with the city mains and do not serve pens or structures.

Where the water pressure is inadequate for the flushing of the pens, the use of an engine-driven fire pump unit, mounted on a truck body, should be considered. Such a unit will also serve as auxiliary fire-fighting equipment.

Electrical distribution lines and their accessories should provide ample lighting for night operation of the yards and should provide electric current for the use of motor-driven tools used in repair, maintenance, and construction operations. Electrically driven tools, both portable and stationary, are economical for maintenance and repair work and can be used profitably at most yards. Adequate lighting for operations on dark days and at night is essential to the efficient operation of any stockyard.

Sewers or drains should be designed, located, and constructed with sufficient size and grade to carry the run-off from ordinary anticipated rains and the water and manure when the yards are cleaned by flushing. They should require a minimum of cleaning and maintenance. A minimum grade of 3 inches per 100 feet is recommended in order to provide self-cleaning velocities. In those yards where adequate natural fall is not available, the use of sewer pumping plants should be given careful consideration. All pens should be reasonably dry under normal conditions.

The minimum size of the sewer pipe leading to trough and pen drains should be 8 inches and that of sewer laterals 10 inches. Smaller sizes are subject to frequent clogging by hay, manure, and other debris.

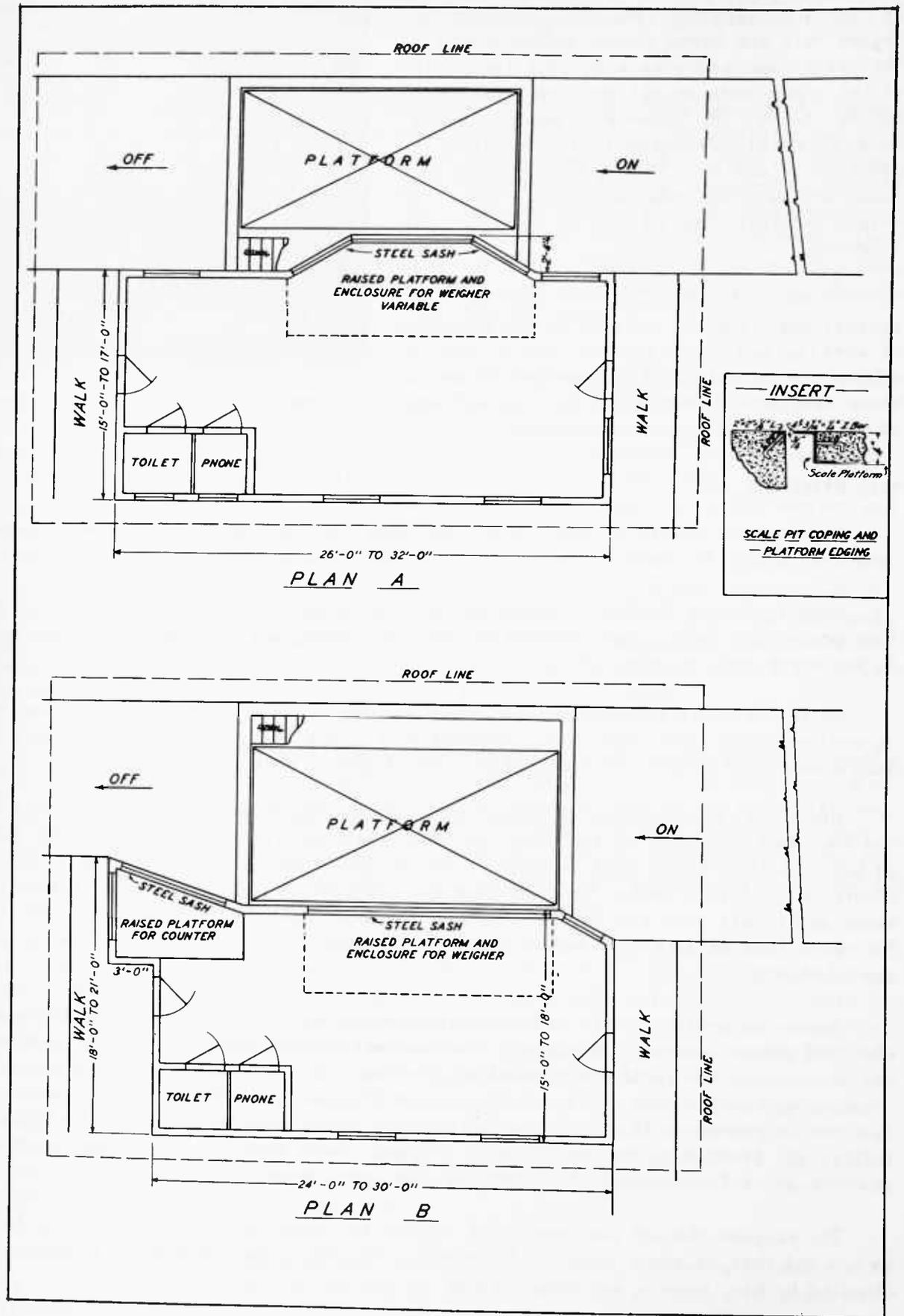


Figure 78.--Scale houses.

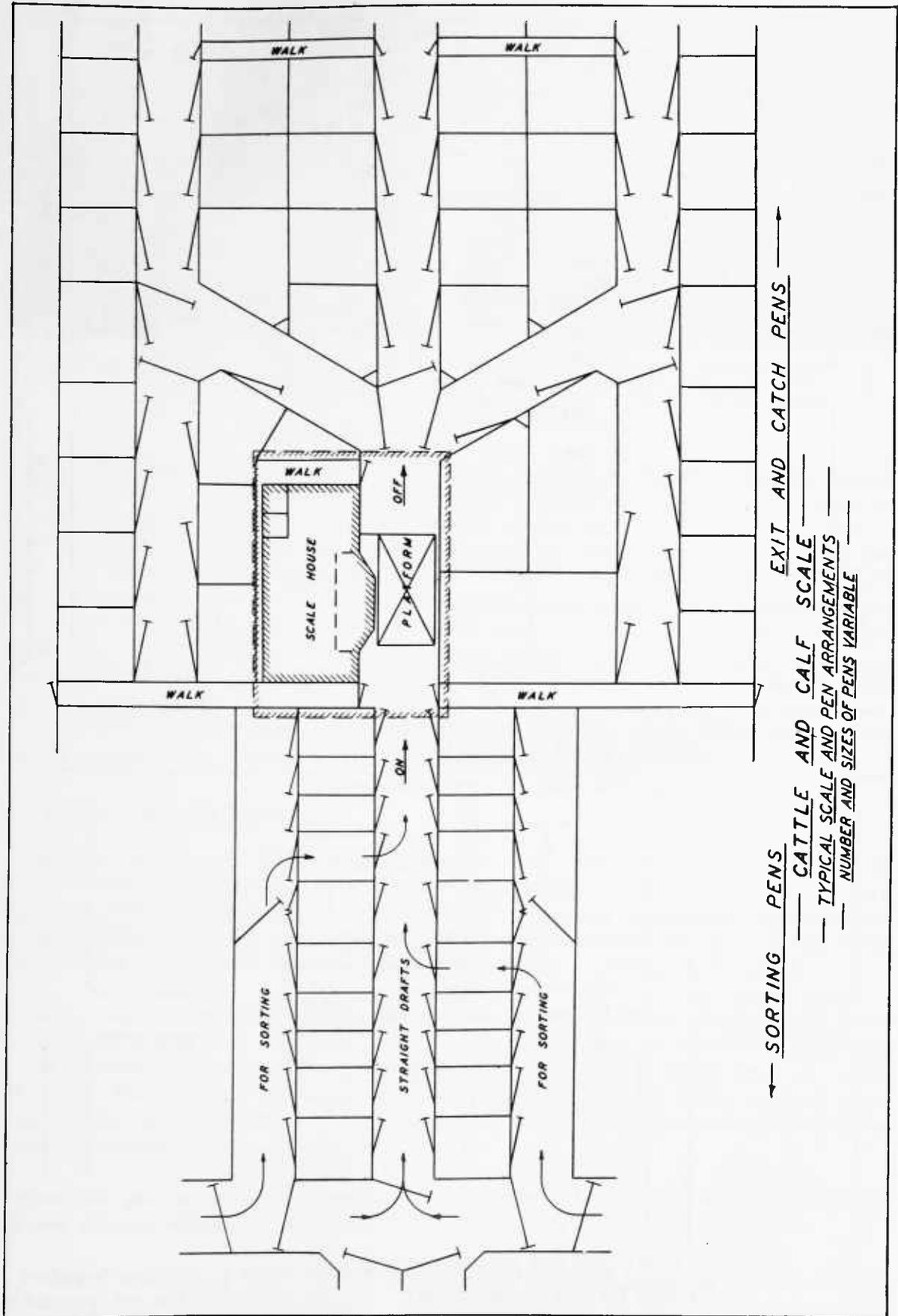


Figure 79.--Scale pens.

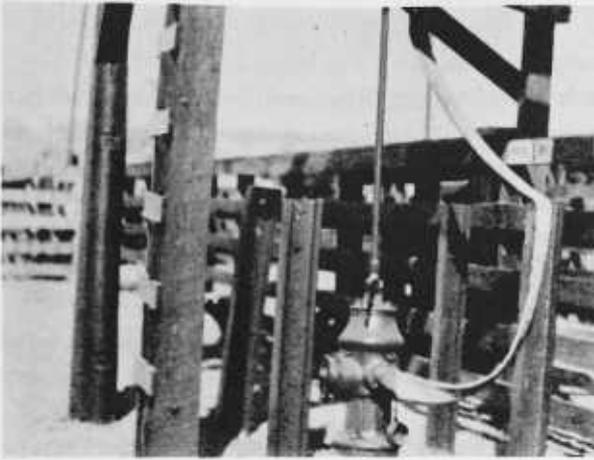


Figure 81.--Fire protection monitor hydrant connection.



Figure 82.--Fire protection monitor head and platform.

The use of open drains at the rear of the pen in the hog division has proved very satisfactory at a number of yards and unsatisfactory at others. Freezing in cold weather and clogging in both summer and winter are the principal causes of complaint. Clogging can be entirely eliminated and freezing minimized by proper design and construction. Open drains should have a top width of from 12 to 18 inches, a semicircular bottom from 6 to 8 inches wide, a fall of 6 to 8 inches per 100 feet, and be equipped with baffles and traps at the outlet to prevent corn entering the sewer. The semicircular bottom is important in increasing the efficiency and reducing cleaning. Either formed concrete or half tile can be used. The use of open drains requires additional area but effects economies in the cleaning of the pens and the maintenance of the sewer system. They are recommended for all yards except those where the winters are long and severe.

ROAD, ALLEY, AND PEN SURFACES

Hard-surface paving should be provided for all roads, streets, and truck dock approaches and for all facilities in the cattle, hog, and sheep divisions. This pavement should be graded so as to drain well, be smooth enough for the efficient use of mechanical cleaning equipment and for cleaning by flushing, and, in the live-stock handling areas, have a surface that affords sure footing for livestock.

Where concrete pavement is used it should be of sufficient thickness to carry the weight of mechanical equipment. This will vary from 4 to 7 inches, depending upon the character of the subsoil and whether used in alleys, large pens, or small catch pens. Where large open areas are paved and subjected to heavy loading, such as truck-dock approaches and hay storage platforms, the paving slabs should be heavier and thickened at the edges.

Concrete paving in the receiving, shipping, and scale areas, as well as in all drive and sorting alleys, should be scored.

V-shaped scoring, 1 to 1½ inches deep, in 6- or 8-inch squares, has proved very satisfactory for all species. Larger and deeper scoring is not recommended because of the danger of breaking the hoofs of livestock and the difficulty in cleaning.

Brick paving is now seldom used for new areas, as the cost generally exceeds that for other types of paving.

Bitulithic pavement should have a 2-inch wearing surface and, where building up is necessary, large-sized aggregates should be used in the base courses.

The placing of pavement can be facilitated by leaving openings for setting posts after the paving is completed. Box forms, approximately 12 by 12 inches and tapered for easy removal, should be placed for each post. These forms also serve as grade lines when substantially set with the tops at pavement grades.

TIME SAVERS

White pen numbers on a black background are easier to read than black on white.

Large, legible signs showing block or alley numbers and the name and pen locations of commission firms and dealers are appreciated by the patrons.

Conveniently located boxes for holding used baling wire are a material help in reducing the hazards resulting from loose wire in the yards and structures, and on the electrical wiring.

Sand boxes for extinguishing cigarettes and cigars, placed waist high at convenient locations, will be used by the majority of people.

Mouse traps, paper clips, or 1½-inch holes drilled in posts at an angle and shielded from rains, are excellent for holding waybills and tickets.

Backing into the truck chutes will be facilitated by painting truck chute gates a light color.

Self-opening gates, using offset hinges, pulleys, and ropes extending some distance ahead, work successfully for drive alleys and reduce labor in driving livestock.

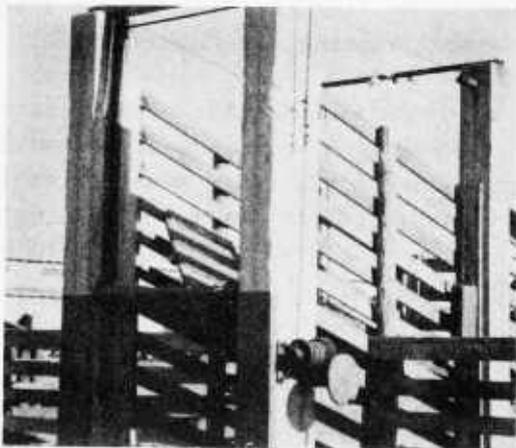


Figure 83.--Counterbalanced screw winch on variable-height chute.

The effectiveness of screw lifts for variable-height chutes can be increased by replacing the conventional handle with a circular steel plate, 1 inch thick and 15 inches in diameter, and welding a handle close to the rim. This provides a simple and effective counter balance.

Leak detectors for water lines are work and time savers.

Portable power-driven sewer cleaners with flexible sewer rods are proving very efficient.

Steam cleaning of mechanized equipment is paying off in reduced repair costs and increased efficiency.

CONSTRUCTION MATERIALS

The facilities should be so constructed as to be suitable for the safe-keeping and handling of livestock without injury or loss and they should be of a type that can be readily maintained and repaired. Fences, gates, gate hardware, troughs, mangers, and other pen appurtenances should, whenever possible, be standardized as to sizes, types, shapes, heights, lengths, and construction details. Construction materials should be selected with the view of long life with minimum maintenance.

Lumber is the principal material now used in pen construction. Concrete has been used for water troughs and posts; steel pipe for gates; sheet metal for water troughs; and brick and concrete for paving.

During the past few years there has been a pronounced increase in the study of substitutes for lumber. A number of producers and fabricators of metal and concrete products have become interested in the problems. This has resulted in experimental installations of steel and aluminum pens, fences, gates, mangers, and water troughs and of precast and prestressed concrete fence panels and posts.

The use of hot-laid asphalt paving in pens and alleys has been studied during recent years. It is now being used by a number of yards.

WOOD

TYPES

Lumber will continue to be one of the major structural materials used for yard construction. Its many good points include an available supply, ease of shaping and placing, strength, flexibility, and adaptability. Lack of durability, loss of strength on exposure to weather, and fire hazards are the principal bad points.

Yellow pine, Douglas fir, and cypress are well suited for open pens and exposed construction. Objectionable characteristics of other commonly used woods are short life, brittleness, low strength, and excessive splitting or splintering.

Oak and other hardwoods give long life and good service when protected from the weather. Their strength is an important consideration.

Wood fence rails and caps for open pen fences, covered pen fences subject to hard usage, and all alley fences should be 2-inch lumber. For other fences under cover the use of full-sawn 1-inch oak or other hardwood lumber for cattle pens and either full-sawn or standard 1-inch lumber for hogs and sheep pens has proved satisfactory.

Cedar fence posts give excellent service but the supply of good posts of this kind is limited. Locust posts are durable but few of them are straight, and it is difficult to drive nails into them or to pull them out.

White oak gate posts have given excellent service but other commonly used oaks are not durable. White oak is now very difficult to obtain. Cypress gate posts are very satisfactory but costly.

Creosoted pine fence and gate posts have given excellent service and are readily available at moderate cost. Creosoted posts that have been faced on 1, 2, or 4 sides prior to treatment, are now available as regular commercial items.

PRESERVATIVES

The present-day lumber is often immature sap wood, cut from second growth, and subject to rapid decay. Treatment with wood preservatives will greatly increase its life and the use of treated lumber, wherever possible, will generally result in substantial savings. Recommended oil- and water-borne wood preservatives are now available at the numerous commercial wood-treating plants in all parts of the country. Studies made by this office lead to the following conclusions:-

1. Wood preservatives increase the life of both exposed and underground lumber.
2. The preservatives, when used in the recommended quantity, are not toxic to livestock.
3. Pressure treatment is necessary to secure adequate penetration.
4. Oil-borne preservatives are best for outdoor unroofed structures.
5. Lumber recently treated with oil-borne preservatives is readily inflammable, but this fire hazard decreases and becomes practically negligible after a time. Stock piling and weathering, prior to use, are recommended.
6. The recommended heavier retentions of water-borne preservatives are effective in exposed conditions although water-borne salts are subject to leaching in varying degrees. The lighter retentions should be avoided for exposed uses.
7. The heavier retentions of water-borne preservatives act as fire retardants, in that they increase the combustion point of lumber by some 200° F.

Coal tar creosote is still the most commonly used oil-borne preservative but the petroleum solutions of pentachlorophenol and copper naphthenate are rapidly increasing in favor.

Creosoted lumber has several disadvantages. Contact with the oils will result in painful burns to livestock and human beings; the fumes will often burn the skin of the face and hands; and the odor is unpleasant and irritating. Freshly creosoted wood can be easily ignited and burns readily, although the fire hazard is reduced with weathering.

Pentachlorophenol shows a high degree of protection against decay, fungi, and termites when wood is properly pressure treated under standard specifications. It does not appreciably alter the natural color of the wood, has little surface residue, and leaves the surface in a paintable condition. Its combustibility is largely dependent upon the properties of the petroleum oil used in treatment. Although pentachlorophenol is irritating to the skin in both the dry form and in solutions, the treated lumber has little surface residue and can be handled without special precautions.

Copper naphthenate gives the lumber a green color but in other respects its properties are generally similar to pentachlorophenol.

Other wood-preserving oils are crystal-free coal-tar creosote, carbolineums (anthracene oils), water-gas tar creosote, wood-tar creosote, tar, and creosote solutions.

The most commonly used water-borne preservatives are chromated zinc chloride and Wolman salt (Tanalith). Zinc chloride, chemonite (ammoniacal copper arsenite), green salt (a mixture of copper, chromium, and arsenic compounds), calcure (acid cupric chromate), and zinc meta arsenite are used to lesser extents.

Water-borne preservatives are employed principally in the treatment of wood to be used where it will not be in contact with the ground or water and where the treated wood requires painting. As a general rule they are less resistant to leaching and do not perform as satisfactorily as do the preservative oils under conditions favorable to leaching. The leaching resistance of some of these preservatives has been developed to the extent that good performance can be expected in ground contact or in otherwise wet installations; but they are still not considered equal in effectiveness to creosote when used under such conditions. On the other hand, water-borne preservatives are generally preferable to creosote for indoor use. They can give indefinitely long life when not subject to leaching.

Water-borne preservatives leave the wood surface comparatively clean, paintable, and free from objectionable odor. Since water is added during treatment, the wood must be dried after treatment to the moisture content required for use. Zinc chloride and chromated zinc chloride are frequently used as fire retardants for wood but at retentions somewhat higher than those used only for wood-preserving purposes.

Treated lumber is not recommended for mangers, feed troughs, or those places where breakage and wear are the controlling factors. Saw cuts and bolt holes should be well painted with preservative.

Creosoted lumber should not be used where either livestock or people can or will come into direct contact with it.

The life of wood gates can be extended a number of years by dipping them in a light oil solution of pentachlorophenol after fabrication. They should be thoroughly dried before hanging.

All lumber used for lower fence rails, bucking boards, and fence caps should be treated.

It is economical to use treated lumber for roof framing and trimming at exposed points.

METALS

Aluminum, steel, and magnesium are being studied as substitutes for wood in gates, mangers, troughs, fences, and posts.

The danger of livestock freezing their tongues or noses to metal mangers, troughs, etc., during severely cold weather has been carefully investigated over a wide area having normal winter temperatures ranging from zero to 40° below. Not a single instance of such freezing could be found and there is ample evidence that this so-called danger has little, if any, substantiation.

MAGNESIUM

Magnesium combines strength with very light weight. It is rather difficult to work, is costly, and is subject to damage or destruction by fire.

ALUMINUM

Aluminum offers light weight, high strength, ease of fabrication, and durability under ordinary conditions of exposure. It is fire resistant but corrodes rapidly in contact with certain alkaline and acid soils and when exposed to air-carrying acid fumes and smoke from industrial plants. Aluminum should not be used in places where conditions are favorable to its rapid corrosion; its suitability for fence posts depends on local conditions.

Aluminum strips, tubes, shaped sheet sections, rounds, and structural shapes of various alloys have been used in fences, gates, and mangers.

A considerable number of gates constructed of shaped sheet aluminum have been installed and tested under practically all stockyard service conditions and their use for general service has not proved satisfactory at most yards. They are, however, giving excellent service in some special installations. The principal objection to this type of gate appears to be caused by certain inherent difficulties in the shaping and fabrication of the material.

Gates constructed of welded tubular aluminum have been developed and are now being tested under service conditions. This gate has distinct advantages over other types.

Experimental fences constructed of woven aluminum strips have developed a number of flaws. Experimental slat mangers, having rather light slats, were damaged by horned cattle, and replacement of the slat presented difficulties. The entire manger must be redesigned with heavier and more substantial parts.

Aluminum shapes for framing variable-height chutes are receiving study.

Various combinations of aluminum, steel, and concrete for use in fence construction are in experimental stages.

STEEL

Steel offers high strength, ease of fabrication, durability under many conditions, and full resistance to fire. Weight and corrosion are its principal drawbacks.

Steel in the form of woven and link mesh fencing, pipes, thin wall tubes, shaped sheet metal, and round, square, and rectangular sections, is receiving considerable study and being used in experimental fences, posts, gates, mangers, troughs, and variable-height loading and unloading chutes.

Steel rod slat mangers and sheet metal water troughs have proved satisfactory.

Gates made of welded steel pipe frames and rails, or of steel pipe frames with aluminum sheet rails, have been in use for some time. They are not entirely satisfactory as their weight requires heavy gate hardware and substantial gate posts.

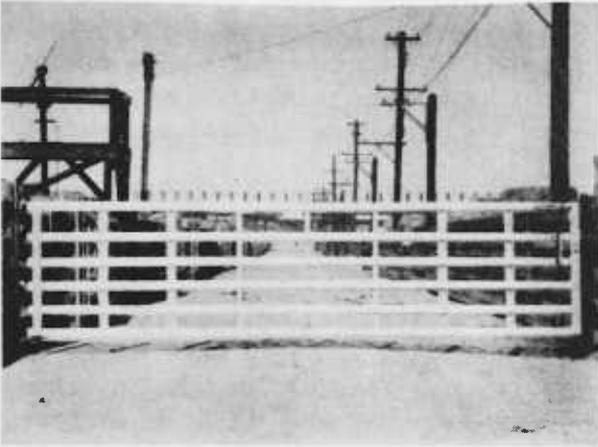


Figure 84.--Aluminum gate, bow-string type.

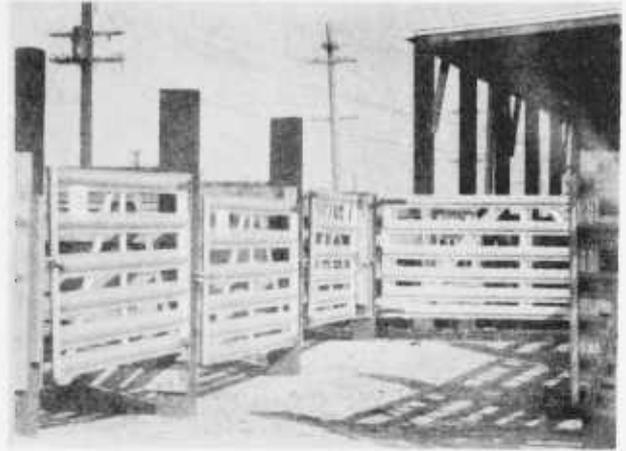


Figure 85.--Aluminum pen and alley gates.

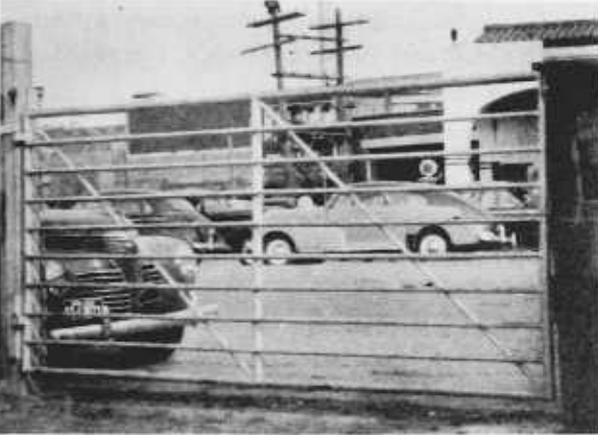


Figure 86.--Welded tubular aluminum gate (May also be made of steel).

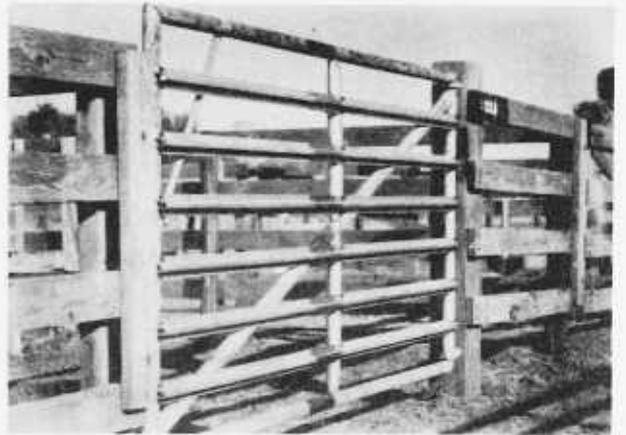


Figure 87.--Aluminum rails and welded pipe-frame gate.

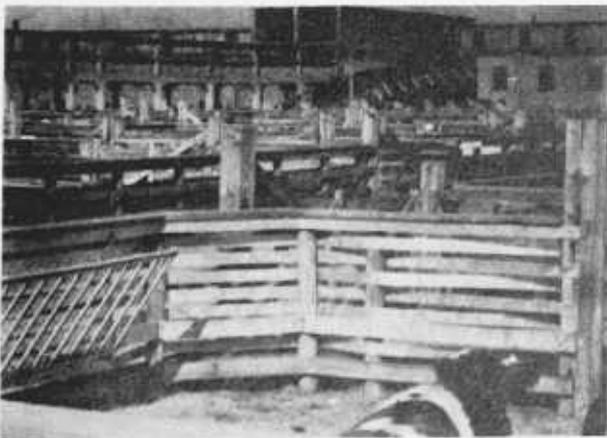


Figure 88.--Experimental aluminum strip fence and aluminum manger.

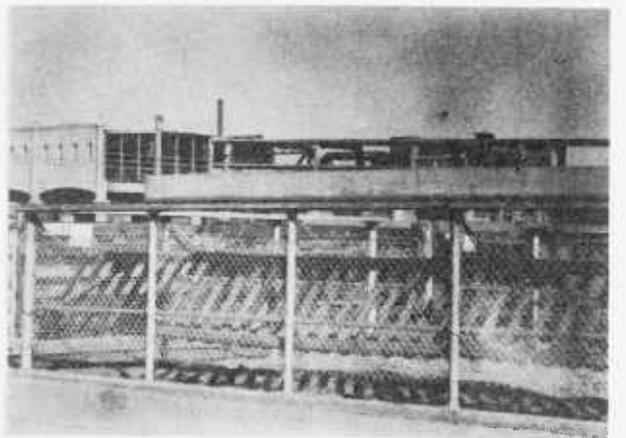


Figure 89.--Experimental wire mesh fence.

The recent development of all steel fences and gates, fabricated from standard galvanized barn door track sections and using small "H" sections for posts, appears to have considerable merit. Experimental pens have been recently installed at several yards and their use should develop the good and bad points of this construction.

War-surplus airplane landing mats have been successfully used in constructing bull stalls. Similar material, such as floor gratings, has merit for use as fence panels back of mangers and water troughs.

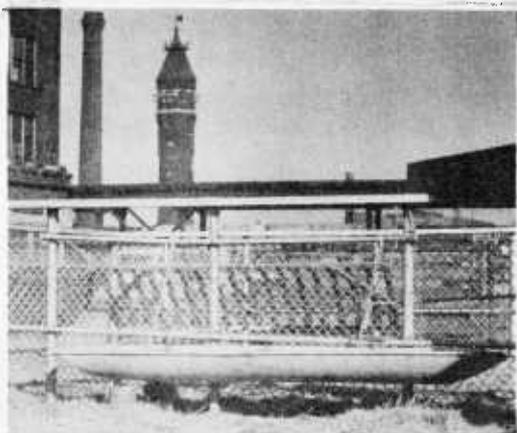


Figure 90.--Experimental metal trough.

possibilities have not been developed. Basically, prestressing is placing and holding the concrete under compression. In precast structural members this is generally accomplished by using numerous small reinforcing rods and wires, rigidly fastened to both ends of the member but free to move within the body, and then stretching and holding the reinforcing at a high tension. It requires special forms and equipment, and some methods and attachments are patented. The concrete used must be very strong and dense.

Prestressed concrete is elastic and shock absorbent. Thin members will deflect, without cracking or injury, to a greater extent than will wood plank, timbers, or poles. It also has high compressive and tensile strength.



Figure 91.--Precast concrete trough.

Sheet metal troughs, well constructed of 16-gage and heavier sheets, have given excellent service. They are easily installed and removed, require much lighter supports than concrete troughs, and are not readily damaged.

CONCRETE

The disadvantages of concrete for pen construction have been its lack of elasticity and heavy weight. Recent developments, such as prestressing and use of pumice aggregates, may reduce these disadvantages.

Prestressed concrete is a very recent development in the United States and its full possibilities have not been developed. Basically, prestressing is placing and holding the concrete under compression. In precast structural members this is generally accomplished by using numerous small reinforcing rods and wires, rigidly fastened to both ends of the member but free to move within the body, and then stretching and holding the reinforcing at a high tension. It requires special forms and equipment, and some methods and attachments are patented. The concrete used must be very strong and dense.

Precast concrete water troughs and gate posts are very satisfactory. The use of Hi-Early strength concrete of at least 3,500 pounds strength is recommended for all precast concrete. The saving in forms and storage space will more than offset the slight additional cost of materials. Air-entraining cements are recommended for severe temperature conditions.

Cast-in-place concrete troughs are suitable for permanent installation but undesirable where changes are apt to be made. Removable troughs with solid bases are preferred, as the latter act as bucking boards for mechanical manure loaders.

Concrete posts less than 8 by 8 inches are difficult to reinforce properly and may crack at the ground line under the impact of livestock or equipment. Prestressed posts should prove more satisfactory.

Concrete made with pumice aggregates is light in weight and can be nailed without cracking. Its use should be considered for special purposes, particularly the development of fence rails using sheet metal shells filled with such concrete.

Concrete has proved to be the most satisfactory paving material up to the present time. It has the disadvantages of wearing smooth, cracking and settling irregularly, being costly to remove and repair, and hampering the detection and repair of breaks in water and sewer lines beneath it.

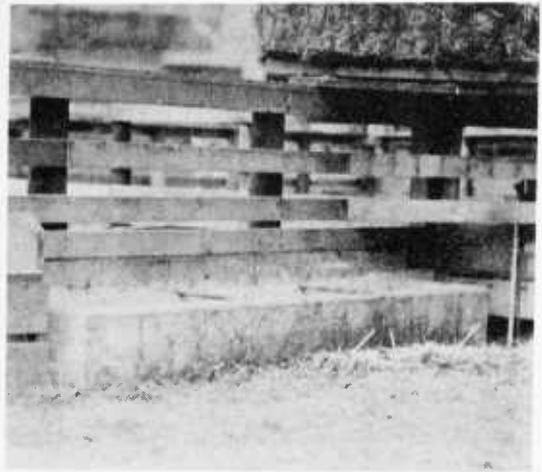


Figure 92.--Concrete trough cast in place.

OTHERS

Asbestos products, and steel and aluminum sheets, should be considered for siding and roofing. Each has a definite place.

Prepared roofing, either roll or built-up and with or without tar and gravel treatment, is most commonly used. Climatic conditions control the type to be used but in all cases the best service is obtained by a regular program of inspection, treatments, and replacements.

Cast iron, genuine wrought iron, or copper pipes have proved most satisfactory for underground use. Galvanized wrought steel pipes may be subject to rapid corrosion under unfavorable conditions and their use under permanent paving is not recommended.

All water pipes should be of ample size to serve the present and contemplated future needs. Hydrant laterals should be at least 1 inch in size. A number of yards have found the use of 2- or 3-inch cast iron pipe to be most economical for this purpose.

Trough hydrants should be constructed of durable and noncorrosive materials and the use of combinations of metals which set up electrolytic action should be avoided. Frostproof hydrants are recommended for the colder climates. A number of efficient frostproof hydrants have been on the market for a considerable number of years and the type used should be suitable for the climatic and installation conditions.

Concrete and brick are most commonly used for paving but bitulithic or asphaltic mixes are coming into use. Brick becomes slippery in wet weather, is subject to uneven settlement, and is costly to lay.



Figure 93.--Asphalt paved alley with center drainage.

Bitulithic or black top paving for stockyards is a recent development that has great possibilities. It affords a sure footing for livestock, is easy on their hoofs, can be readily laid and repaired, is usable within a few hours after laying and, is self healing. It will not stand up unless laid on a firm and substantial base and is well rolled or tamped in place. It has been proved an excellent material for use over old brick or concrete paving and should be given careful consideration.

A number of special or patented asphaltic mixtures for cold patching are now on the market. These can be stock piled and are readily placed and compacted. The use of these mixes for filling holes and depressions in brick or concrete pavements has not been entirely satisfactory.



Figure 94.--Before asphalt paving.

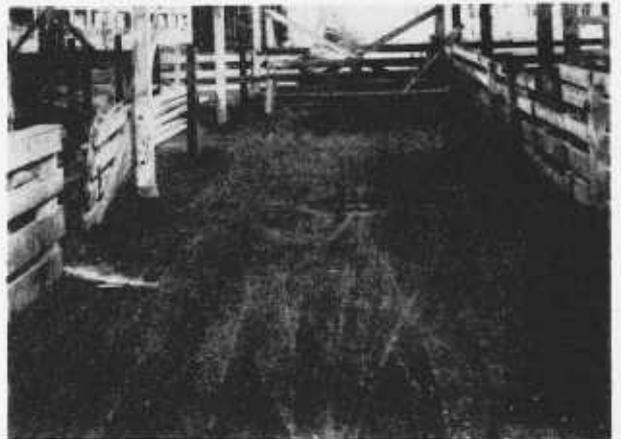


Figure 95.--After asphalt paving.

The local State highway specifications for both concrete and bitulithic paving are excellent guides to follow.

Several yards are experimenting with special and patented nonskid surfacings for use over wooden floors. Such surfacings include compounds both spread and tamped in place and heavy waterproofed sheets having an abrasive surface and held in place with special cements. Further tests of these materials must be made before their worth can be fully determined.

The development and testing of new designs and uses of materials is now very rapid and specific references to locations and suppliers of experimental installations have been purposely avoided. Detailed current information will be made available on request.

SERVICES AND RESPONSIBILITIES OF STOCKYARDS

WEIGHING

SCALE MAINTENANCE AND TESTING

Maintenance of weighing facilities and clean, orderly keeping of the scale houses, where the important weighing functions center, is of particular importance to assure sustained weighing accuracy and prevention of delays in weighing service. Weighbeam notches should be brushed out to remove dirt and dust accumulations and the scale platform, approaches, scale house interior, and scale house windows cleaned daily. Daily inspection of clearances about scale platforms, the pit and levers, stock racks, and gates is advisable.

Tests of scales with standard weights at regular intervals of not more than 6 months are considered essential. The testing and recording procedure defined in instructions of the Packers and Stockyards Division are recommended. Scales which are repaired, overhauled, adjusted, or modified should not be used until tested to verify their weighing accuracy. A thorough inspection of the scale lever system and of all working parts should supplement each test. Scale ticket-printing devices should be maintained so as to produce clear and legible registrations of weight values. Scale-testing and -repairing equipment is desirable at the larger yards. The handling and maintenance of scale test weights should be such as to preserve their accuracy. Provision should be made for handling and transporting these weights. When not in use they should be well housed and protected from the weather.

Figures 96 and 97 show large capacity weights, recommended weight handling carts, and beam testing equipment.

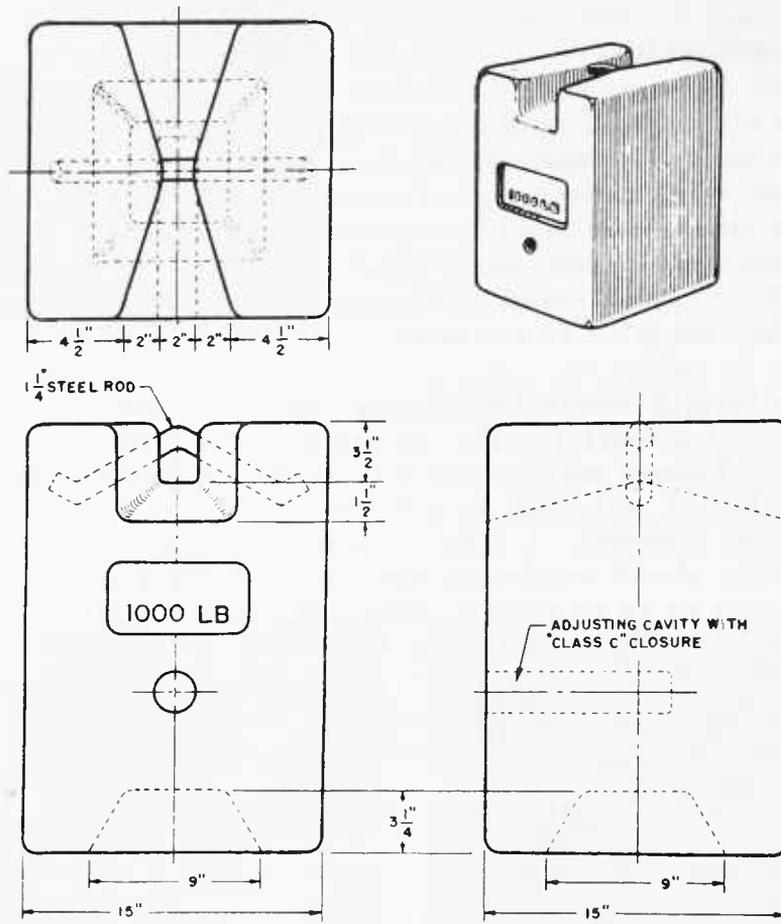
SCALE OPERATION

Weighing services of reasonable quality usually require that commission firms be assigned the use of specific scales, with definite weighing turns arranged according to a known and established schedule which equalizes scale use and assures livestock consignors reasonable, impartial, and equitable treatment. Where commission scales are used for weighing dealers' livestock and packers' direct shipments, definite allotments of scale use for this purpose should be made.

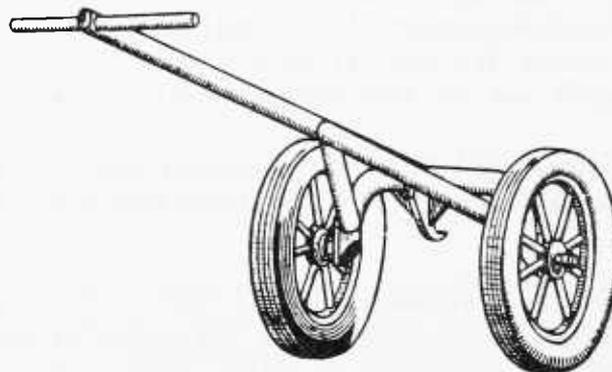
Scale time assignments should be made so as to eliminate long drives, minimize delays, and, insofar as possible, assure the efficient utilization of weighing facilities and personnel.

Weighing turns should be arranged on a time basis. The time allotted should be proportional to the volume of receipts and to the number of head per consignment. Provision should be made for equitable rotation. Such time schedules should be worked out in cooperation with market agencies and controlled by the stockyard company.

Excessive shrinkage results from unnecessary delays and handling in weighing. Livestock should not be held in alleys while waiting for weighing turns and should not be sorted out of the scale pocket. Assignment of weighing turns to each commission firm and use of sorting pens in front of each scale will eliminate these conditions.



"CLASS C" 1000-POUND TEST WEIGHT



HANDLING CART FOR 1000-POUND TEST WEIGHT

Figure 96.--Test weight and handling cart.

Commission firms should be required to furnish such manpower as is needed to expedite driving to and sorting at the scale, and to prevent weighing delays unfavorable to the interests of livestock consignors.

Delays in driving animals from scales to pens are a common cause of delayed weighing service and often a serious bottleneck in yard operations. The efficient use of adequate catch pens provided beyond the scale and the cooperation of livestock buyers are necessary to eliminate weighing delays caused by unnecessary segregation in yarding and holding and by congestion at the scale exits. Trained and supervised crews for yarding off the scales contribute to efficient service.

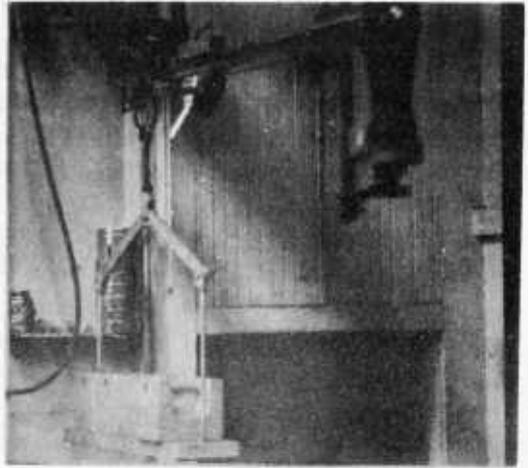


Figure 97.--Scale beam-testing equipment.

A central booking office for the directing and recording of yarding after weighing reduces mix-ups and facilitates yarding at small terminal yards where the scales in a division are closely grouped and where off-scale yarding is directed through one alley.

PERSONNEL

"Turn-on" men and "ticket writers" can be employed to increase the weighing efficiency of scales when the traffic volume justifies their use and where suitable sorting and yarding facilities are available.

Weighers, because of the important nature of their duties, occupy positions of particular responsibility. They should be selected with especial care on the basis of their proved integrity and capability, and should be closely supervised to make certain they perform their weighing and recording duties conscientiously, impartially, and in accordance with the official instructions of the Packers and Stockyards Division. They should be rotated at intervals of from 1 to 3 weeks.

Scale tickets are the formal, original records of livestock weight and count. They should be serially numbered, be of proper size, form, and composition to provide durable and legible records, and should record all data specified by the official regulations. Unused scale tickets should be kept to provide a complete sequence of serial numbers.

FEED FOR LIVESTOCK

Wholesome feed, of the kind and in the quantity ordered, should be supplied promptly. Delays in feeding and low quality of the feed often are causes of complaints by both the shipper and the operators on the market. The solution of the vexatious problem of furnishing adequate feeding services for the numerous small consignments now arriving by truck may require a pronounced change in the methods being used for supplying, distributing, and spreading the feed. Auxiliary feed storage at convenient places in the various divisions, the use of motorized equip-

ment for delivery, and the streamlining of methods for receiving and filling feed orders are recommended to all yards. A number of yards now provide temporary feed storage at each assignment of pens and make bulk deliveries of feed during the slack periods. Each market operator then distributes the feed according to his needs. The size and extent of the auxiliary and temporary feed storage facilities must conform to the requirements of the fire insurance underwriters.

SANITATION AND DISEASE PREVENTION

The entire stockyards should be reasonably clean at all times. Hog pens should be washed daily and cattle and sheep pens cleaned on a regular schedule. At the larger yards, the cleaning should be by regular cleaning crews using mechanized equipment. At smaller yards and at those yards where 1- or 2-day peak runs create problems in labor distribution, the use of hand labor and motor vehicles may prove economical. Truck docks, catch pens, scale pens, and other pens where hay and bedding are not used should be cleaned by flushing. All mechanized equipment should be large enough for the needs, but oversized equipment should be avoided.

Testing and immunization facilities should be of the kinds and sizes necessary to comply with Federal and State regulations. Their location should be one that will minimize interference with the market movement of livestock.

FACILITIES FOR SERVICING EQUIPMENT

A well-equipped and suitable shop should be provided for the maintenance and repair crews. The equipment should include electrically powered stationary and portable hand tools, welding and metal working equipment, and suitable trucks for transporting tools and supplies. The storeroom and principal material storage facilities should be adjacent to the shop.

A garage or service building should be provided for the servicing, repairing, and housing of mechanized equipment. The facilities should include adequate provisions for washing and cleaning.

USEFUL STOCKYARD EQUIPMENT

Mechanized equipment can be used advantageously by most yards. However, much of the equipment now used in the stockyards is that developed for farm and industry and is not entirely satisfactory for stockyard purposes in its present form. Modifications are frequently necessary; a number of manufacturers are now showing an interest in developing special equipment for stockyard use.

The following equipment is being satisfactorily used at one or more stockyards:

TRUCKS

Three-wheel or "tricycle" trucks for sharp turns and ease of maneuvering. Special truck bodies for plumbers, electricians, and carpenters. Special truck bodies of large capacity for hauling manure.

TRACTORS AND TRAILERS

Tractors of various sizes and types, both wheel and caterpillar, with attachments consisting of lifts, scoops, and forks; bulldozer and scraper blades; post-hole diggers, etc. Trailers of various kinds and sizes, including the very low body styles used for handling crippled and dead animals.

MANURE LOADERS

Wheel- and caterpillar-driven manure loaders equipped with cables, hydraulic lifts, scoops, and forks of various designs. Each piece of equipment has desirable features and particular uses. Careful study of local conditions will be necessary to determine the size and type of loader that is best suited to a particular yard.

POWER SWEEPERS

Street sweepers, with or without catching bins, for use in cleaning alleys and runways. The sweepers with catch bins reduce the dust hazard but require rather frequent dumping. Various types of vacuum sweepers have been tried but to date have not proved successful.

HAY LOADERS AND LIFTS

Power-driven hay loaders for stacking hay. Heavy-duty lifts, for handling large volumes of baled hay on pallets, are now used for handling the hay from the truck to the stockpile and from the stockpile to delivery trucks or for direct delivery to the pens. Their use is proving profitable where large quantities of hay are stored and fed.

GRAIN HANDLERS

Grain distributors consisting of a "V" body trailer equipped with a screw feed and air blower. These are very efficient for delivering corn to storage bins in the hog division. Tractors or jeeps, equipped with a power take-off, are used as motive power.

CARTS

Scale test-weight carts have been found efficient in transporting heavy scale test weights.

Cripple carts makes possible quick and humane handling of dead and crippled animals. These carts are especially useful at receiving docks.

SEWER CLEANING

Heavy, flexible, power-driven sewer rods are very efficient for rodding and cleaning.

FIRE HOSE NOZZLES

Fire hose nozzles that are convertible to either a direct stream or low-pressure fog. Low-pressure fog is very effective in rapidly blanketing and extinguishing intense fires and the use of these nozzles is recommended to all stockyards. In addition, the low-pressure fog nozzle has proved very efficient in cleaning pens by flushing.

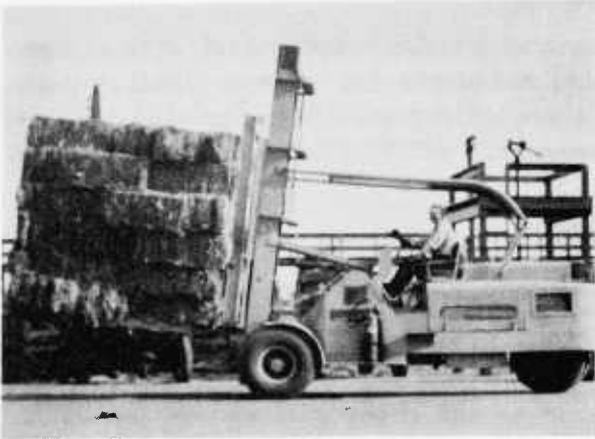


Figure 98.--Hay lift.



Figure 99.--Grain-o-vator with jeep.

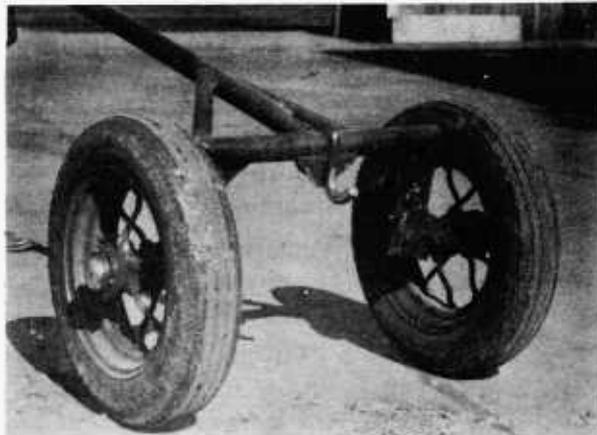


Figure 100.--Scale test-weight cart.

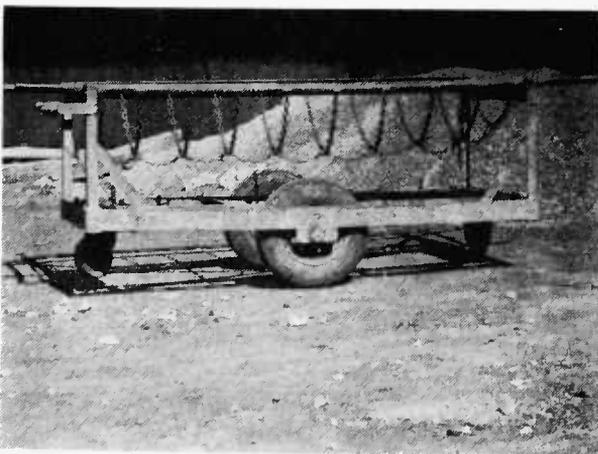


Figure 101.--Chain litter hog cripple cart.

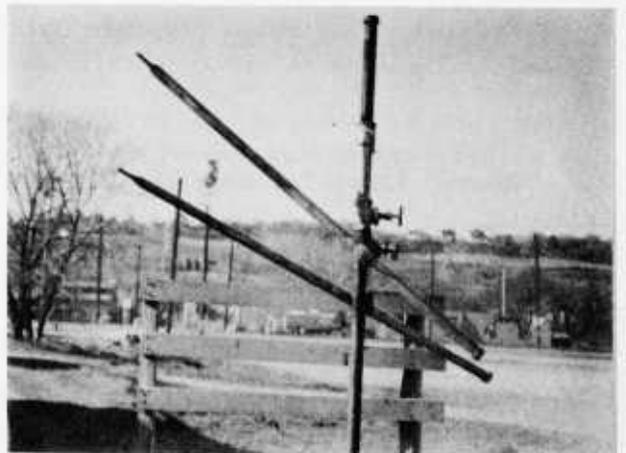


Figure 102.--Hog sprinkler for double-deck cars.

High pressure fog systems are very efficient in controlling fires in buildings and closed structures, but their use in open pen areas is not recommended.

HOG SPRINKLERS

Hog sprinklers for rail cars have been found especially useful for servicing through shipments.

EQUIPMENT CLEANING

Portable steam cleaners have proved particularly useful for cleaning all types of mechanized stockyard equipment. Their use reduces maintenance and repairs, and clean equipment adds to the morale of the operating forces.

PUBLICATION OF CHARGES, FACILITIES FURNISHED, AND SERVICES PERFORMED

The terminology and the description of stockyard services in the published tariffs sometimes are vague; they should be clear and definite. Too often the services are described under the vague general heading of "Privileges of the Market." A study of the services rendered by various stockyards that use similar general descriptions shows wide and extreme variations in both kinds and amounts. This condition often leads to confusion of the shipper and makes direct comparison between yards extremely difficult if not impossible.

It is suggested that the stockyard company clearly state and define the facilities furnished and the services performed by the company in receiving, checking, and delivering livestock to the pens of the consignee; and in feeding, weighing, yarding after weighing, and delivering to the purchaser. This statement should also define the general and specific responsibilities of the company and those which are the functions of the market agencies and other operators on the market.

Auxiliary facilities and services, including the water supply, should be noted.

The charges assessed by the company against the shipper, the market agencies, and others for the use of the facilities should be defined and explained.

The rules and regulations of the company governing the uses of its services and facilities by patrons and operators on the market should be included in the tariffs.

The entire published tariff should be aimed at acquainting the shipper with the services and facilities available at the terminal markets, the charges for the use thereof, and the rules and regulations governing such use. When properly set up, the tariffs should reduce unjust criticism, increase good will, and provide worthwhile advertising for the stockyards.

FORMS AND RECORDS

Forms provided and records kept by the stockyard company should be sufficient for the needs not only of the company, but also of patrons and their agents operating on the market. Their use will result in the proper identification, handling, selling, and accounting for livestock received. They should also provide adequate information for adjudication and settlement of claims and for collection of marketing charges.

Records of receipts, dispositions, and movement of livestock through the market should be in sufficient detail to enable the company to test the efficiency of its present services, facilities, and operating methods, to plan properly for future improvements, and to locate the strong and weak spots in the drawing power and the outlets of the market. To do this, the records should be by species, truck and rail, and salables, direct shipments to packers and through shipments stopping for feed, water, and rest.

Records of dispositions should be by species, account for all receipts, show the number of head driven out on hoof, trucked out, and shipped out by rail, and the destination or class of shipments, that is, shipments to local packers, to other markets and packers, and as stockers and feeders.

Records of the number of trucks, consignments, and head, by species, hours of the day, and days of the week, during the periods of normal heavy marketing, are necessary to test the use and efficiency of the truck docks.

Continuing daily records of scale performances should be kept. These should include opening and closing time, hourly records of drafts and head weighed, and delays and their causes.

Releases and gate passes used should give the company a definite control over and record of all livestock leaving the yards.

SUGGESTIONS FOR BUILDING GOOD WILL

In addition to providing the essential services and facilities, the stockyard companies can provide a number of facilities and services that will improve their relationship with the patron, increase good will, improve the morale of the operating personnel, and increase the efficiency of operations. The worth of these auxiliary services and facilities should not be overlooked.

The yards should reserve parking areas close to the exchange building for visitors and out of town patrons, and provide other convenient parking for the employees and operators on the market. Suitable parking areas for the autos of out-of-town patrons and visitors are very important.

Overhead footwalks are appreciated by the patrons and are time savers to both the company employees and operators on the market. These walks should lead to all scales and connect the various divisions.

Public address systems, for paging in the yards, are great time savers. They are proving very satisfactory to the patrons and the entire market.

Suitable rest and waiting rooms, for both men and women should be provided for the truckers and patrons. They should be well-equipped and maintained. Toilets in the scale houses are very desirable.

Adequate dressing rooms, equipped with lockers and shower baths, should be provided for the employees. They definitely increase the morale.

Restaurants or cafes, operated under sanitary conditions and serving wholesome food at reasonable prices, are an asset to any yard. The lack of such facilities creates dissatisfaction among patrons, truckers, and company employees.

Large electric clocks, well illuminated at night, are an asset at the truck docks.