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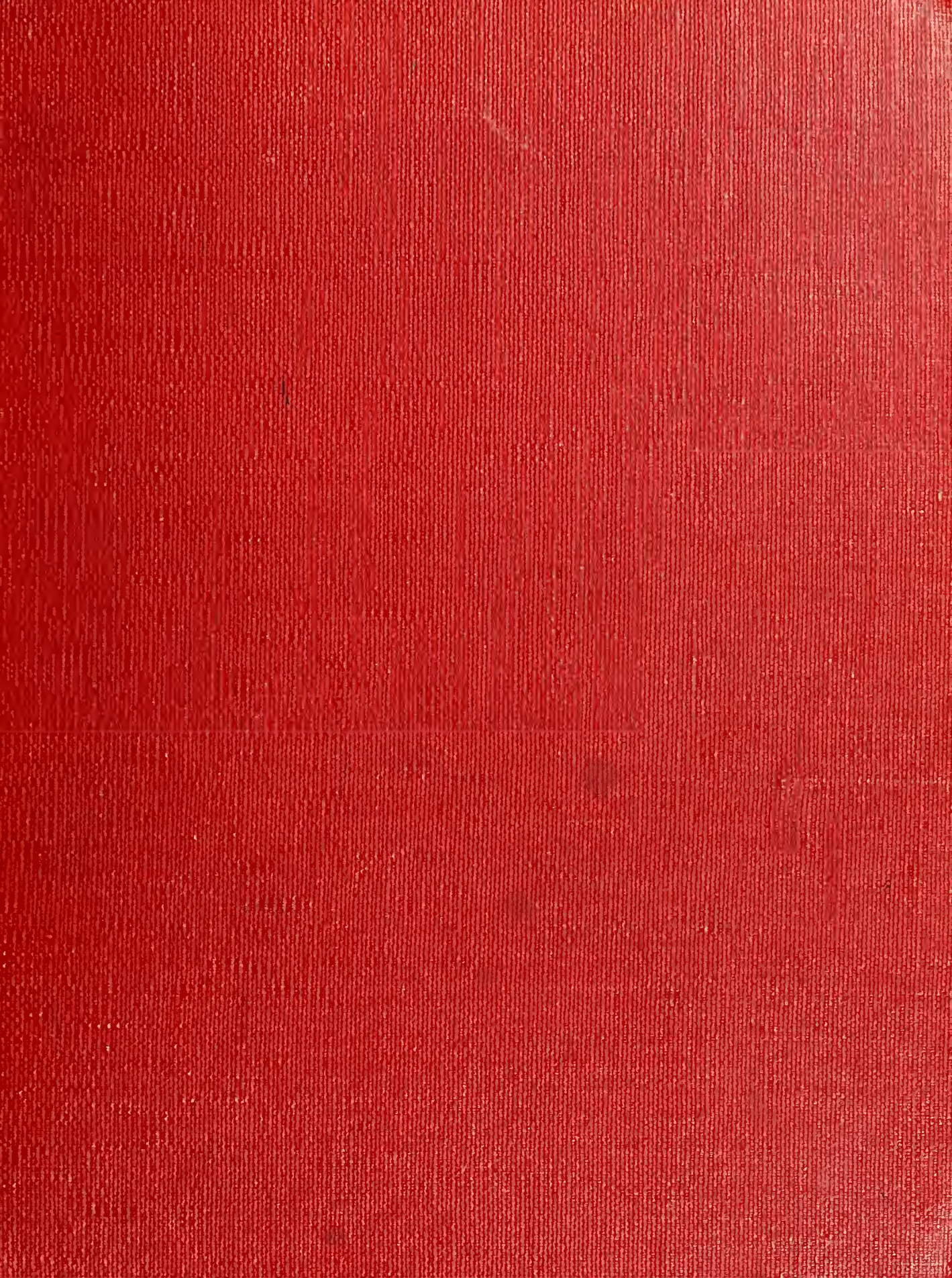
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# LIVESTOCK AUCTION MARKETS

## in the Appalachian Area

• METHODS AND FACILITIES



UNITED STATES DEPARTMENT OF AGRICULTURE  
Agricultural Marketing Service  
Marketing Research Division  
in cooperation with  
Agricultural Experiment Stations  
of Virginia and West Virginia

Marketing Research Report No. 309

Washington, D. C.



## PREFACE

This is the second and final report based upon recent research conducted on livestock auction markets in the Southeastern and Appalachian areas. This report covers the type of livestock auction market operating in the Appalachian area. The first report, Marketing Research Report No. 141, "Livestock Auction Markets in the Southeast--Methods and Facilities," covered three other types of livestock auction markets operating in that area.

This report furnishes data and guidelines which can be used in remodeling existing auctions or in designing more efficient auction market facilities. The study was conducted in cooperation with the Agricultural Experiment Stations of Virginia and West Virginia.

Acknowledgment is made to Jack D. Johnson, formerly of the Virginia Station, and W. S. Hutson, formerly of the West Virginia Station, for their assistance in selecting the markets to study.

Acknowledgment also is made to the market operators for making their facilities available for study and for their suggestions for increasing the efficiency of market operations and facilities.

The study was conducted under the general supervision of George E. Turner, marketing research analyst, Marketing Research Division, Agricultural Marketing Service.

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## SUMMARY

Three market layouts are proposed for a livestock auction market in the Appalachian area that sorts animals into grades and market classes and weighs them as they arrive at the market. Each layout is designed for a different number of animals. The No. 1 type of market is designed to handle 400 cattle, 180 calves, 400 sheep, and 300 hogs; the No. 2 market 350 cattle, 125 calves, and 600 hogs; and the No. 3 market 590 cattle, 245 calves, 315 sheep, and 125 hogs.

The proposed layouts include improved designs and arrangements of the yards, sales barn, market driveways, unloading and loading aprons, and parking areas for market patrons. Specific designs include improved layouts for the receiving-weighing area and the sales barn. For each of the 3 proposed layouts, the suggested lines of flow during the receiving, selling, and loading out cycles are shown.

The estimated costs of constructing the proposed markets, based upon general construction costs in this area in 1957, are: The No. 1 market, \$87,209; the No. 2 market, \$72,893; and the No. 3 market, \$92,330. The cost of the land and the cost of putting the land in condition to build are not included in these estimates.

It is estimated that less labor would be required to conduct a sale with the proposed markets than is now required at typical markets handling similar volumes and species of livestock. The estimated labor savings per sale for the No. 1 market are 52 man-hours. The annual savings are about \$2,600. Most of the savings in this market are in the loading out cycle. The estimated labor savings per sale for the No. 2 market are 23 man-hours. The annual savings are about \$1,150. The estimated labor savings per sale for the No. 3 market are 63 man-hours. The annual savings are about \$3,150. Most of the savings in the No. 2 and 3 markets are in the selling cycle.

Other benefits which should result from the 3 proposed markets are: (1) Reduction in the time sellers spend waiting to unload, (2) faster loading of buyers' trucks, (3) smoother flow of livestock between work stations during the 3 operating cycles, (4) adequate parking areas and better facilities for market patrons, and (5) arrangements which permit additional holding pens to be constructed for one or all species of livestock without materially affecting the efficiency of the market. In addition, losses from bruises and injuries should be minimized.

LIVESTOCK AUCTION MARKETS IN THE APPALACHIAN AREA--  
METHODS AND FACILITIES

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INTRODUCTION

Livestock auction markets in the Appalachian area have had an impressive growth since the first one began operating in 1932. This is one of the few areas in the United States where State agencies have worked with auction markets in sorting consigned livestock into grades and market classes. This has contributed to the overall growth of auction markets, and has been responsible for the development of the type of market that has emerged in this area.

In the Virginia-West Virginia section of the Appalachian area, nearly all auction markets sort livestock into grades and market classes and weigh as they are received those animals that are to be sold by weight. Calves, sheep, and hogs normally are sorted into grades and cattle into market classes. Occasionally, when hog and sheep consignments are small, these species are accepted without being sorted into grades. Other practices at these markets that affect operations include: (1) Marking or tagging animals; (2) yarding the livestock of several consignors in the same pen; (3) returning livestock, following their sale, to the pens in which they previously were yarded; and (4) selling lots of graded livestock either in holding pens or in the sales ring. At these markets, the facilities required for sorting livestock into grades and classes and for weighing must be integrated with other receiving facilities. Moreover, holding pens must be of the proper size and arrangement for handling graded lots.

As described in Marketing Research Report No. 141, the auction markets in the Southeast are of 3 types: (1) Markets that weigh all species of livestock immediately following their sale, (2) markets that sort and weigh hogs on arrival and weigh cattle immediately before their sale, and (3) markets that weigh all species immediately before their sale.

The size, location, and arrangement of yard facilities for an auction market that weighs animals as they are received, such as those in the Appalachian area, set this type of market apart as a distinctly different type from the 3 found in the Southeast.

This report is confined to Virginia and West Virginia because most livestock auction markets in the Maryland section of the Appalachian area operate similarly to the second type of market described for the Southeast. Case studies were made of 11 selected markets and the facilities and operations were observed in 19 others.

Three market layouts are described for a livestock auction market in the Appalachian area that sorts animals into grades and market classes and weighs them as they arrive at the market. Each layout is designed for a different number of animals.

## MARKET OPERATIONS

In the Appalachian area, market operations in moving livestock through auctions that sort livestock into grades and market classes and weigh animals as they arrive at the market are divided into 3 major operating cycles--receiving, selling, and loading out.

The time and labor required for the various handling operations in the 3 cycles vary widely. Individual animals are unpredictable and may react differently in comparable situations. Crew sizes used also vary and are influenced largely by the design and arrangement of the facilities. Furthermore, workers assigned to specific jobs frequently exchange jobs or collaborate with other workers. Therefore, data on specific operations presented in this report should be used only as a general guide.

### Receiving Livestock

Livestock arrive at the markets in trucks, and all species are usually received at the same truck docks. Most markets begin receiving livestock at 7 a.m. and continue until all the livestock are in the market, usually about 3 p.m. The receiving period is about the same for all markets, regardless of volume handled. Generally, receipts are light or even sporadic between 7 a.m. and 9 a.m. Truck arrivals are at their peak between 9 a.m. and 1 p.m. (fig. 1). They usually taper off at 1 p.m., and practically all receipts are in by 3 p.m.

The animals are unloaded from trucks at the market and then they are: (1) Driven to sorting alleys, sorted, marked or tagged; (2) driven onto the scale platform, a scale ticket is prepared, and the animal is weighed; and (3) driven from the scale platform to holding pens in the yards. Most of the time these operations are performed in the indicated sequence, but not always. Regardless of their sequence, a delay in any one of the operations results in a delay in subsequent ones. When livestock are to be sold by the head, the weighing operation usually is omitted.

Some markets use 1 scale in their livestock receiving operations and others use 2. The same operations are performed, regardless of whether 1 or 2 scales are used. It is the policy of most auctions to receive livestock into the market as soon as possible after their arrival.



BN-7324

Figure 1.--Trucks waiting in line to unload livestock at an auction during a peak receiving period.

### Unloading Livestock from Trucks

Frequently, truck lots contain 2 or more species, but in most cases the truck lots comprise only 1 species. At most markets, trucks containing all species are unloaded at the same truck dock. A few markets had 1 truck dock for receiving livestock of 1 species, and another dock for receiving livestock of the other 2 species. Sellers with mixed loads expressed a dislike for this latter arrangement, because it requires time to unload twice.

Typically, the driver of the truck, who usually is the seller, unloads livestock from the trucks into a chute pen at the truck dock (figs. 2 and 3). The market usually provides no labor for the job. Occasionally, however, workers assigned to jobs in the receiving crew will assist with the unloading. The typical market has a dock with 8 truck spaces, but some markets have docks with 10 or more. At the peak of the receiving operations, it is common for trucks to wait at the dock 10 to 15 minutes before the livestock can be unloaded because the other receiving operations cannot be performed as fast as the unloading. Observations of unloading on markets in the Appalachian area, and in other areas, indicate that the average time requirements for unloading pickup and stake body type trucks with small lots of livestock is about 4 minutes. Wide variations are common, and usually more time is required to unload sheep than cattle or hogs.



BN-7318

Figure 2.--Livestock being unloaded from a truck into a chute pen.



BN-7321

Figure 3.--A truck lot of cattle in a chute pen.

## Driving Livestock from Chute Pens to Sorting Alley

The distances involved in driving the livestock from chute pens to sorting alleys vary widely, but in most instances are comparatively short. Either 1 or 2 workers perform this job, and usually the volume handled is the factor determining the number of workers used. The time requirements vary widely and are affected by the species handled. The workers observed were able to keep abreast of their jobs.

### Sorting Livestock

Two workers, 1 of whom is a grader, are the typical crew to sort cattle and calves by market class and grades and to drive the lots to be weighed onto the scale platform and those not to be weighed into a bypass alley or onto the scale platform if no bypass alley is available (fig. 4).

In one observation of 2 workers sorting cattle, the time requirement for each sorting was 0.55 minute. The average consignment sorted contained 3.6 head, and the average number of cattle in each sorted lot was 1.2 head. Indications are that cattle and calves can be sorted by a 2-man crew into market classes and grades as fast as the other receiving operations can be performed. Occasionally, 1 worker, frequently assisted by the tagger, sorts cattle. When sorting is done in this manner, it usually is performed at a slower rate.



BN-7320

No time studies were made of the sorting of hogs. However, observations indicate that 2 workers, 1 of whom is a grader, can sort hogs by grades or market classes about as quickly as cattle and calves.

Three workers (1 a grader) are the typical crew for sorting sheep by grade or market class. The grader marks the sheep as to grade, 1 worker sorts the animals into sort pens and 1 worker drives the animals from the sort pen onto the scale platform. Many factors such as sizes of lots sorted, number of sorts to be made of a lot, and weather conditions affect sorting time requirements. Generally, the time requirements for sorting sheep are greater than those for sorting cattle, calves, or hogs. However, the number of animals in each lot is considerably larger.

Figure 4.--A worker grading calves.



The number of workers in a sorting crew varies widely and usually is dependent on the number of scales used in receiving livestock. For markets using 1 scale, 3 workers usually comprise the sorting crew: One grader sorts sheep, and 2 workers (1 of whom is a grader) sort cattle, calves, and hogs. For markets using 2 scales, the crew usually is composed of 5 workers. Two-scale markets are large-volume markets or those that have a large seasonal run of 1 species. Of the 5-worker sorting crew on these markets, usually 3 workers (1 a grader) sort sheep, and 2 workers (1 a grader) sort cattle, calves, and hogs.

### Tagging and Marking Livestock

For purposes of identification a market may paste a tag on the hip of the animal, clip a tag to the ear, or mark the animal with colored paints. The tagging and marking of livestock varies widely among markets.

Cattle or calves may be tagged while they are on the truck, in the chute pen, in the sort alley, or in the tagging chute (figs. 5 and 6). The time required for tagging cattle is about the same wherever they are tagged. Tagging cattle on the trucks usually keeps the operation well abreast of the other receiving operations but on stake-body trucks this is frequently difficult and hazardous and is not recommended. Tagging cattle in the chute pen or sort alley may be dangerous with nervous animals. Tagging cattle in the tagging chute usually requires more time because of the time required



BN-7322

Figure 5.--A worker placing hip tags on animals on a stake-body truck.



BN-7319

Figure 6.--A worker clipping an ear tag to an animal in a sort alley.

for driving animals into the chute. A tagging chute, however, should be used when tagging nervous cattle. Marking usually is performed in the sorting alley, and time required to perform it is very small. One worker usually performs the tagging and marking operations. Frequently, he assists other workers in performing receiving operations, and other workers may mark or tag cattle. The tagging and marking operations were in pace with the other receiving operations.

#### Preparing Scale Tickets

A scale ticket is prepared for each animal or lot of animals sold at the market. The preparation of the scale ticket includes writing the name and address of the owner, the number and description of the animals in the lot, the pen number to which the animals are assigned, and how the animals are to be sold. The information is obtained from the seller, and after the lot is weighed a copy of the ticket is given to him as his receipt.

A clerk may perform the operation, or it may be performed by the weighmaster in conjunction with the weighing operation. Sellers, after unloading, go to the scale house to provide the information. They may also observe the weighing operation which follows.

The scale ticket is usually prepared by a clerk who begins the ticket while animals are being sorted and completes it as they are driven onto the scale platform or while the weighmaster is making the weight determination and then hands the ticket to the weighmaster (fig. 7). Most clerks observed prepared scale tickets at a comparatively fast rate but there were occasions when preparation of the scale ticket delays the weighing operation. Most of the delays are the result of sellers failing to provide the necessary information promptly.

When a weighmaster prepares the scale ticket, he usually does not start work on it until the animals are on the scale platform. Thus, part of the time that is weighing time when a clerk prepares the ticket is used by the weighmaster for preparing the scale ticket. As a result, more delays are incurred in the weighing operation when the weighmaster prepares the ticket.



BN-7314

Figure 7.--The clerk in the background prepares a scale ticket, while the weighmaster, in the foreground, makes a weight determination.

### Weighing

The weighmaster makes the weight determination of animals, records the weight on the scale ticket, writes the assigned pen number on the scale ticket, and advises a yardman that the animals are ready to be driven from the scale platform.

Generally, it takes more time to weigh hogs and sheep than cattle and calves because of the longer time required to drive hogs and sheep from the scale platform after weight determinations are made. The time required for weighing large drafts of livestock is not much greater than that required for weighing small ones. The average sizes of the drafts weighed on the markets studied were: Cattle, 1.3 head; calves, 1.2 head; hogs, 1.8 head; and sheep, 2.9 head. Wide departures from the average are common. Cattle and calves were noted being weighed at the rate of 0.55 minute per draft, hogs 0.65 minute, and sheep 0.70 minute.

The number of drafts weighed per hour at a scale appears to be somewhat dependent on whether a clerk prepares the scale ticket or the weighmaster

prepares it in conjunction with making the weight determination. Roughly 30 percent more drafts were weighed per hour where a clerk prepared the scale ticket than where the weighmaster prepared it.

### Driving Livestock from the Scale Platform to Holding Pens

After livestock are weighed, they are driven from the scale platform to holding pens in the yards (fig. 8). It is the common practice to drive each lot separately (fig. 9). Few auctions were noted that had catch pens for group movement of livestock to holding pens. The number of workers yarding livestock ranged from 4 to 14 depending on whether weighing was performed with 1 or 2 scales, the general arrangement of holding pens, and the layout of yard facilities. An arrangement of facilities which would provide for a free flow of livestock from the scale platform to holding pens with relatively short drives, and for catch pens near the "off" gate of the scale platform for group movement of livestock to holding pens, should materially reduce the labor requirements.



BN-7300

Figure 8.--A worker driving cattle off the scale platform.



BN-7313

Figure 9.--A worker in the foreground holds a gate open for the worker in the background to drive cattle into a pen.

## Summary of Receiving Operations

The rate at which livestock are received into the market is not only dependent on the performance of individual operations but also on the degree to which the operations are coordinated. Many factors, such as the actions of individual animals, facilities used, and size of work crews affect the performances of individual operations and the degree of coordination among operations. These factors vary widely among auctions in the Appalachian area. Consequently, the receiving operations are summarized on the basis of a selected market receiving livestock using 1 scale and a market using 2 scales. The facilities used and their arrangements for both markets are somewhat above average.

Receiving livestock using 1 scale.--The market receiving livestock using 1 scale handles cattle, calves, hogs, and sheep. All species of livestock are received at the same truck docks.

The receiving crew is composed of 10 workers. One worker drives animals from the chute pens to the sorting alley; 2 workers (1 a grader) sort livestock by grades and market classes and drive animals onto the scale platform; 1 tags cattle and marks hogs; a clerk prepares a scale ticket; a weighmaster makes the weight determinations; and 4 workers drive livestock from the scale platform to holding pens in the yards.

During a 1-hour period when trucks were constantly at the docks unloading, the market received 34 truck lots containing 37 cattle, 45 calves, and 38 hogs for a total of 120 animals. The average number of animals per truck was 3.5 head, and the average time required to receive a truck lot into the market was 1.7 minutes. The 120 animals comprised 110 sorted lots (30 lots of cattle, 45 of calves, and 35 of hogs), all of which were weighed. The average rate of weighing was 0.54 minute per draft. The observation of this operation indicated that the receiving operations were performed with a high degree of efficiency, considering the facilities used and their arrangement.

Receiving livestock using 2 scales.--The market receiving livestock using 2 scales has a receiving crew of 17 workers. However, cattle, calves, and hogs are weighed at 1 scale, and sheep at the other. Thus, the crew is divided into 2 groups--1 group for receiving cattle, calves, and hogs, and 1 for receiving sheep.

The group of workers receiving cattle, calves, and hogs is composed of 9 men. One worker drives animals from the chute pens to the sorting alley; 1 grader sorts and drives animals onto the scale platform (he is assisted part time by the tagger); 1 worker tags and marks; a clerk prepares the scale ticket; a weighmaster makes weight determination; and 4 workers drive animals from the scale platform to holding pens in the yards. During a 1-hour period when trucks were constantly at the docks waiting for the livestock on them to be received into the market, the group of workers received 33 truck lots containing 13 cattle, 37 calves, and 71 hogs for a total of 121 animals.

The average number of animals per truck was 3.7 head. The average time required to receive a truck lot into the market was 1.8 minutes. The 121 animals comprised 97 sorted lots (12 lots of cattle, 37 of calves, and 48 of hogs). The average rate of weighing was 0.62 minute per draft.

The group of workers receiving sheep is composed of 8 men. One worker drives animals from the chute pen to the sorting alley; a grader and a helper sort animals by grades and market class (the grader marks animals); 1 worker drives the animals onto the scale platform; a combination clerk and weighmaster prepares the scale ticket and makes the weight determination; and 3 workers drive animals from the scale platform to holding pens in the yards.

Working under the same conditions as the group receiving cattle, calves, and hogs, this group received 6 truck lots of sheep in 1 hour. The trucks contained 126 sheep, an average of 21 head per truck. The average time required to receive a truck lot into the market was 10 minutes. The 126 sheep comprised 54 sorted lots. The average rate of weighing was 1.11 minutes per draft.

The receiving crew of 17 workers received in 1 hour 39 trucks containing 13 cattle, 37 calves, 71 hogs, and 126 sheep for a total of 247 animals. The average number of animals per truck received by the crew of 17 workers was 6.3 head, and the average time required to receive a truck lot into the market was 1.5 minutes. The total of 247 animals received in a 1-hour period comprised 151 drafts (12 drafts of cattle, 37 of calves, 48 of hogs, and 54 of sheep). The average rate of weighing was 0.79 minute per draft.

The scale used for receiving cattle, calves, and hogs operated with a relatively high degree of efficiency; however, the scale used for receiving sheep was idle about 20 percent of the time because the truck dock was blocked with trucks with cattle, calves, and hogs, and trucks with sheep could not unload.

Comparison of markets receiving livestock using 1 scale and using 2 scales.--At the market receiving livestock using 2 scales 15 percent more truck lots were received per hour, and 37 percent more drafts were weighed per hour than at the market using 1 scale. This situation was further substantiated by observations of 6 other markets using 2 scales and 3 others using 1 scale. However, markets using 2 scales received only a few more truck lots per hour than markets using 1 scale. Furthermore, the number of drafts weighed per hour at each scale for markets using 2 scales generally is less than the number weighed per hour at markets using 1 scale.

Markets using 2 scales in receiving livestock usually have several problems not encountered by the markets using only 1 scale. The major problem is due to the location and arrangement of the 2 scales and the practice of dividing by species the livestock for weighing. When a division is made by species, markets rarely have enough livestock of the divided species available in the chute pens to permit the work crews at both scales to work continuously at peak efficiency. If markets using 2 scales had

facilities arranged so as to permit all livestock being received to be weighed over either scale, then the number of drafts being weighed at each scale should be increased. Furthermore, the rate for receiving truck lots into the market should be increased.

### Selling Livestock

The selling of livestock at most auctions in the Appalachian area begins about 2 p.m. Most auctions attempt to receive most of the livestock into the market before selling starts because labor used in the receiving cycle is shifted into jobs in the selling cycle. Once selling begins, it continues until all the animals in the market are sold.

Auctions have an order of sale for their livestock. A common order of sale is cattle and ungraded calves, graded calves, graded sheep, ungraded sheep, graded hogs, and ungraded hogs. Frequently graded calves, sheep, and hogs are sold in the pen. In some instances, a few head of each grade are driven into the sales ring as a sample and the entire grade is sold on the basis of this sample. In other cases, all the animals in a grade are driven into the sales ring and sold. All ungraded animals are driven into the sales ring for selling. The operations performed in the selling cycle are the same for all markets. These are: Bringing up livestock from holding pens in the yards to a catch pen near the sales ring, driving animals into the sales ring, displaying, driving animals from the sales ring, auctioneering, recording sales data, and yarding livestock in holding pens after their sale. Some of the operations are performed in sequence, and others are performed simultaneously. Displaying, driving animals from the sales ring, and auctioneering are performed simultaneously. Recording the sales data is usually performed while the animals are being driven from the sales ring. A delay in any one of the selling operations usually results in a delay in all the operations.

#### Bringing Up Livestock for Sale

Livestock are brought up in pen lots from the holding pens to a catch pen near the sales ring. The time requirements vary widely and are influenced by layout and general arrangement of the yards and by species. Usually less time and effort are required to bring up a pen lot of cattle than a pen lot of sheep. In some markets delays in the bring-up operations are frequent as a result of a crossflow of livestock in the market or 2 or more operations being performed in the alley used to bring up animals. Bring-up crews range from 1 to 6 workers. The typical crew is 2 workers.

#### Driving Livestock into the Sales Ring

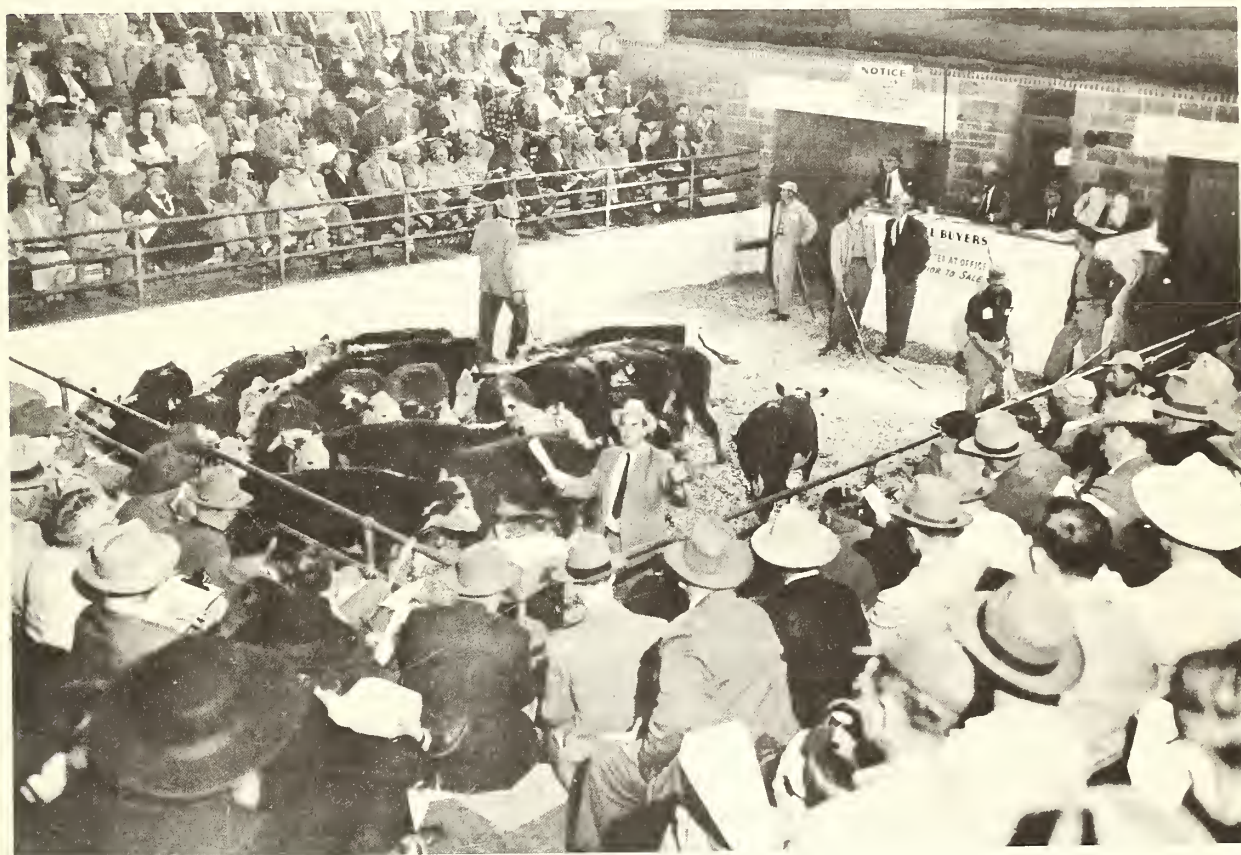
From the catch pen near the sales ring, livestock are sorted into salable lots (the salable lot is the lot for which the scale ticket was prepared) and driven into the sales ring. The number of workers sorting animals into salable lots and driving animals into the sales ring ranges from 1 to 4. The typical crew is 2 workers. The time requirement for this operation varies widely and is influenced largely by the facilities employed. Delays in driving livestock into the sales ring were noted on all markets.

## Displaying and Driving Livestock from the Sales Ring

As the animals enter the sales ring, ringmen immediately begin to drive them around the ring to display them to prospective buyers while the auctioneer is soliciting bids. The time of the display period is dependent upon the auctioneering time and is usually comparatively small. After the auctioneer sells the animals, they are driven from the sales ring. The number of ringmen displaying and driving animals from the sales ring ranges from 2 to 4. Most markets have 3 workers performing the operation. Frequent delays are incurred in selling livestock at most markets because unusually large sales rings necessitate excessive time and labor for driving animals from them. Square "rings" provide corners for the animals to crowd in which prevent them from being driven from the sales ring promptly.

### Auctioneering

The auctioneer solicits bids and sells livestock as they are being displayed in the sales ring (fig. 10). Most auctioneers sell animals promptly.



BN-7323

Figure 10.--Selling a graded lot of calves in the sales ring.



The efficiency of the auctioneer in some instances is hindered by the arrangement of the auctioneer's box and seating area. The auctioneer must rely on ringmen to obtain bids from the buyers seated behind him and, as a result, bids occasionally are missed. Delays in driving animals in and out of the sales ring also result in delays in auctioneering. Some auctioneers report that these delays hinder their efficiency considerably because with each delay they lose the attention of the buyers, and when the sale starts again, they have to exert considerable effort to regain buyer attention.

#### Recording Sales Data

The name of the buyer and the selling price for each animal or lot of animals is recorded immediately after the auctioneer completes the sale. Markets have 1 or 2 clerks performing this job. Based on observations, it appears that 1 clerk could perform the operation without causing delays in the sales, even in markets selling at a very fast rate. At various intervals, usually after a pen lot of animals is sold, the clerk transmits the sales data to the office by means of a carrier system.

#### Yarding Livestock in Holding Pens after Their Sale

As the salable lots of animals from each pen lot are sold and driven from the sales ring, they are retained in the alley or in a catch pen adjacent to the "out" gate of the sales ring until the entire pen lot is sold. The lot is then driven back to the same pen it was in before its sale. Crews yarding livestock in holding pens after their sale range from 2 to 6 workers. The typical crew is 3 workers. Usually 1 worker collects the animals in the alley or in the catch pen after their sale and the others drive the animals to holding pens. The time and labor requirements for these operations vary widely among markets and are influenced by the same factors that influence the bringing-up operation.

#### Summary of Selling Operations

A comparison of the selling operations for ungraded livestock at 5 selected auctions in the Appalachian area is shown in table 1. The sale of graded animals is omitted from the table because of the large sizes of the lots sold, the irregular manner of sale, and the small number of lots of graded animals sold.

The data in this table show the wide variation in crew sizes, time required per lot sold, and the labor used per lot. The average size of the lots of different species sold on the market is comparatively small. However, a higher degree of consistency exists in the size of the lots of cattle and calves sold than in the size of the lots of hogs and sheep sold. Generally, the wide variation in the performance of the selling operations among markets is due largely to the design and arrangement of facilities used. Frequently, delays are incurred in the selling operations because of inadequate facilities for driving animals into the sales ring quickly, large and improperly designed sales rings which hinder the movement of animals around and out of the ring,

Table 1.--Comparison of the selling operation for ungraded livestock at 5 selected auctions in the Appalachian area 1/

Market	Workers	Live-	Average:	Total	Average :	Labor used
	in crew	stock sold	size lot of live-stock sold	lots of livestock sold	time per lot of livestock sold	per lot of livestock sold
	Number	Number	Head	Number	Minutes	Man-minutes
<b>Market 1</b>						
Cattle.....	11	238	1.2	204	0.70	7.70
Calves.....		39	1.0	39	.56	6.16
Sheep.....		102	4.2	24	.79	8.69
Hogs.....		76	1.5	49	.59	6.49
Total or average:		455	1.4	316	.67	7.37
<b>Market 2</b>						
Cattle.....	9	364	1.1	337	.30	2.70
Calves.....		289	1.0	280	.23	2.07
Sheep.....		33	3.3	10	.70	6.30
Hogs.....		45	7.5	6	.83	7.47
Total or average:		731	1.2	633	.28	2.52
<b>Market 3</b>						
Cattle.....	10	176	1.2	149	.58	5.80
Calves.....		41	1.1	39	.46	4.60
Sheep.....		10	2.5	4	.50	5.00
Hogs.....		176	1.8	99	.63	6.30
Total or average:		403	1.4	291	.58	5.80
<b>Market 4</b>						
Cattle.....	15	187	1.1	166	.54	8.10
Calves.....		19	1.2	16	.56	8.40
Sheep.....		28	2.0	14	.78	11.70
Hogs.....		72	1.9	38	.55	8.25
Total or average:		306	1.3	234	.56	8.40
<b>Market 5</b>						
Cattle.....	8	296	1.6	189	.71	5.68
Calves.....		12	1.0	12	.75	6.00
Sheep.....		99	3.0	33	.94	7.52
Hogs.....		166	7.2	23	1.43	11.44
Total or average:		573	2.2	257	.81	6.48
<b>All Markets</b>						
Cattle.....	10	252	1.2	209	.57	5.70
Calves.....		80	1.0	77	.51	5.10
Sheep.....		54	3.2	17	.74	7.40
Hogs.....		107	2.5	43	.81	8.10
Total or average:		493	1.4	346	.59	5.90

1/ The sale of graded livestock is omitted because of the large size of the lots sold, the small number of lots sold, and the irregular manner of sale.

and inadequate alleys for moving the animals away from the ring after their sale. It is estimated that improved facilities could, in many cases, reduce the time for performing the selling operations by 25 percent.

### Loading Out Livestock

Soon after the start of the sale 2 to 4 workers begin the loading out operations. After the sale, crew sizes range from 8 to 20 workers, averaging about 12 workers.

When animals are yarded, after their sale, in the same pen in which they were yarded before the sale, animals of each buyer are usually in several different pens. The operations performed in loading out livestock are: Locating the pens in which the buyer's animals are yarded, separating the buyer's animals out of the pen lot, checking the number and description of animals against the number and description shown on the buyer invoice, driving the animals to the truck dock, assisting in loading the truck, and obtaining the purchaser's signature on the market's copy of the buyer's invoice.

Usually, 2 workers collaborate in loading out a buyer's livestock but there is not a clear division of responsibility for this operation. The time required for loading out after the sale is affected by the volume to be loaded out and the general arrangement of the yard. It is estimated that loading out time could be reduced by about 40 percent if individual buyer pens could be assigned to the larger buyers at the market.

### MARKET LAYOUTS

Three suggested layouts are presented for the type of auction market found in the Appalachian area. Each layout is designed for handling a different number of each of the species of livestock sold, and is discussed in terms of: (1) Kinds and amounts of facilities needed, (2) arrangement of facilities, (3) amount of land needed for market site, (4) estimated costs of construction, (5) how the proposed facility should operate, and (6) labor requirements.

The recommended designs for truck docks, chutes, pen, gates, and most of the other component facilities proposed in these layouts are described in Marketing Research Report No. 141, "Livestock Auction Markets in the Southeast--Methods and Facilities," and in Agriculture Handbook No. 36, "Suggestions for Improving Services and Facilities at Public Terminal Stockyards."

Both Virginia and West Virginia have statutes designed to prevent the spread of livestock diseases, some of which affect the layout of auction market facilities. As these statutes may be changed from time to time, market operators who plan to build new facilities or remodel old ones first should check their State laws.

The principles that should be used in developing improved work methods and in designing market layouts are listed below for each major division of a market. Most of these principles also should be applicable to livestock auction markets in other areas.

### Yard Facilities

Yard facilities should have the following characteristics:

- (1) They should have all the needed component facilities, of adequate size or amount, based on market practices, to handle the typical volume of business with a high degree of efficiency and to render reasonable services on peak volume days.
- (2) They should be arranged to provide for a direct flow of livestock into, through, and out of the yards, with short drives between work stations.
- (3) They should provide ready access to and through the yards for people, vehicles, and livestock with minimum delay.
- (4) They should be arranged so that appropriate drive alleys connect with the auction barn to insure a one-way flow of livestock into and out of the sales ring with short drives.
- (5) They should permit the combining of small lots of livestock whenever practical for movement between work stations and for yarding.
- (6) They should be arranged so they can be expanded for a larger volume of business and maintain the same direct flow of livestock into, through, and out of the yards.

Overall planning of yard facilities and operations must take into consideration the relation of each part of the yards to all other parts and to the sales barn.

### Sales Barn

The sales barn should be designed to meet these requirements:

- (1) Accommodations for an audience of fluctuating size.
- (2) A seating arrangement which permits buyers, sellers, and spectators to have an unobstructed view of the sales ring and auctioneer's box.
- (3) A sales ring that permits a free flow of both single animals and groups of animals into, through, and out of it with a minimum of delay and labor.
- (4) Market offices arranged for easy accessibility to buyers and sellers, and to facilitate the exchange of records with the auctioneer's box.

(5) A lunch room, telephone booths, and toilet facilities.

(6) Minimum construction and maintenance costs.

### Market Site

The market site should be of adequate size to provide for the proposed market facility, principal driveways and wide aprons for ready access to the market, parking area for market patrons, and possible market expansion. It should meet these requirements:

(1) It should be easily accessible by public highways (rail connections may also be desirable in some instances).

(2) It should lend itself to low-cost drainage for economical market operations.

### PROPOSED LAYOUT FOR A NO. 1 MARKET, DESIGNED TO HANDLE 400 CATTLE, 180 CALVES, 400 SHEEP, AND 300 HOGS

The proposed layout for a market designed to handle 400 cattle, 180 calves, 400 sheep, and 300 hogs is shown in figure 11. The layout provides for sorting cattle, calves, and sheep by grade or market classes and weighing all livestock as they arrive on the market, except those animals to be sold by the head. Hogs would be accepted without sorting. Cattle, calves, and sheep would be yarded in holding pens according to grade or class and the animals of several sellers might be in the same pen. Individual pens are provided for each seller's lot of hogs. Pens are provided for the cattle of some of the buyers. Part of the cattle and other animals sold by market classes would be yarded after their sale in the same pens they were yarded in before the sale. The layout permits graded livestock to be driven to the sales ring.

### Facilities Needed

The facilities needed for the market are grouped and described on the basis of: (1) Facilities for receiving livestock, (2) facilities for moving and holding livestock in the yards, (3) facilities for driving livestock into the sales ring, (4) sales barn, (5) facilities for loading out livestock, and (6) other facilities.

#### Facilities for Receiving Livestock

The facilities proposed for receiving livestock into the market consist of a truck dock with 6 chute pens, 2 sorting alleys, 6 sorting pens, 2 tagging chutes, 2 scale pockets, 2 scale platforms, 2 scale houses, 2 alleys, 6 catch pens, and walkways. The arrangement of the receiving facilities is shown in figure 12.

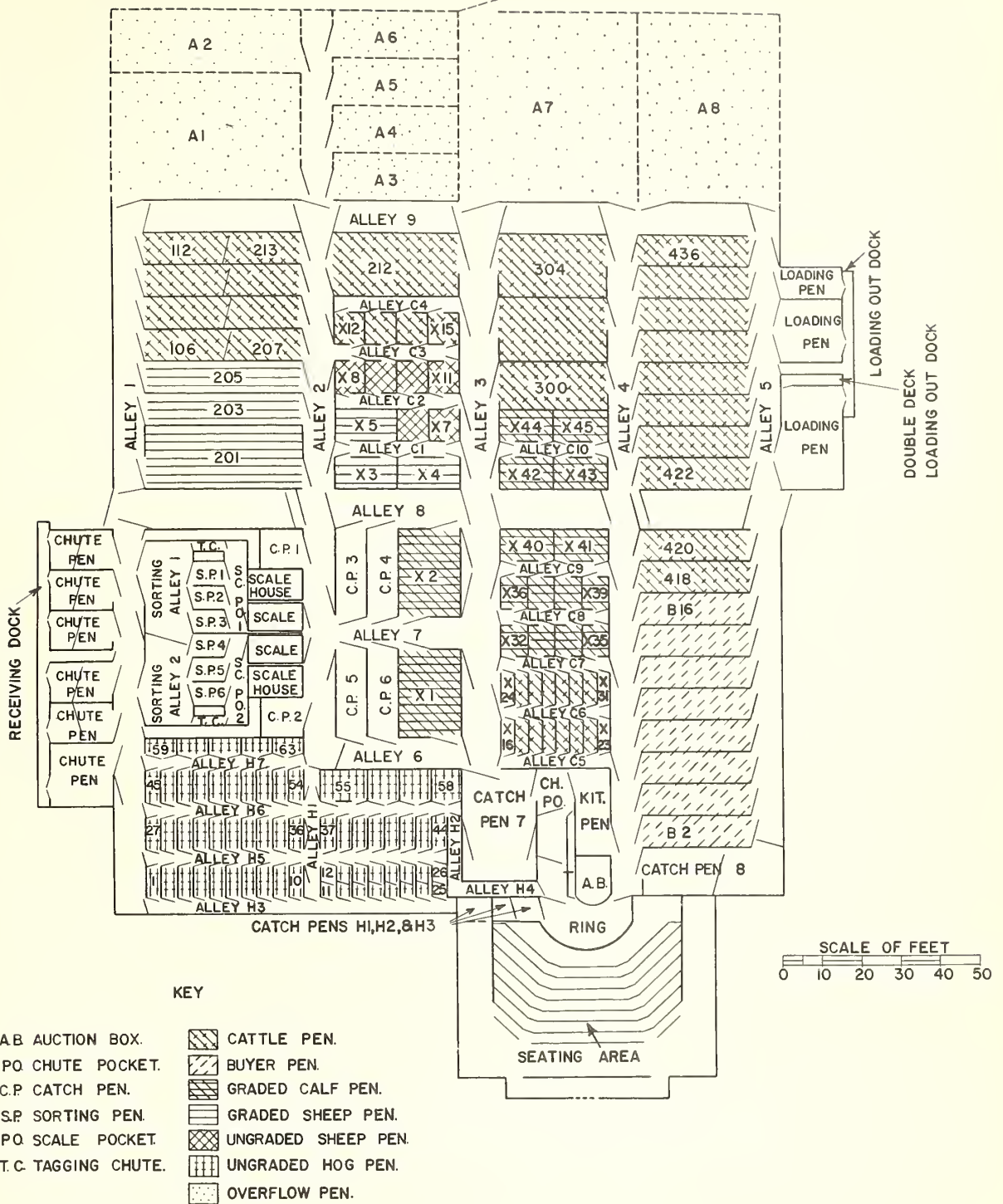
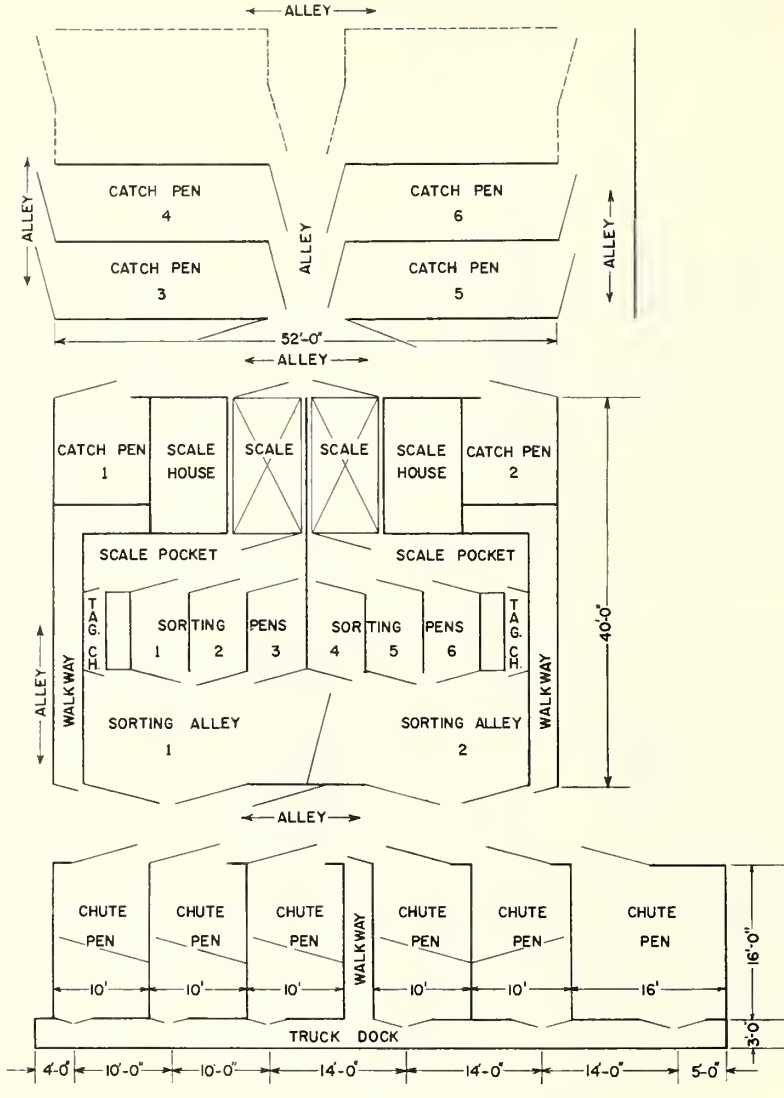
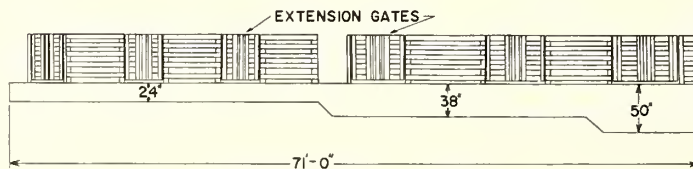
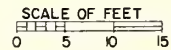


Figure 11.--Proposed layout for a No. 1 market, designed to handle 400 cattle, 180 calves, 400 sheep, and 300 hogs.



PLAN VIEW



FRONT VIEW

Figure 12.--Facilities for receiving livestock into the market.

The arrangement of the receiving facilities permits lots of animals to be driven from the chute pens to the sorting alleys with short drives. The sorting alleys proposed are flexible and can be used for sorting, regardless of species. Two sorting alleys permit 2 owners' lots of animals to be sorted at the same time. Sorting pens would be common for all species, and any species could be weighed at either scale. This arrangement should eliminate the practice of dividing between scales the different species for sorting and weighing and permit both scales to weigh at equal rates. Thus, the rate for receiving truck lots of livestock into the market should be increased. The side-by-side arrangement of the scale platforms should eliminate the delays caused by the crossflow of animals as they are driven off the scale platform and through the alleys. The alleys and catch pens provided should materially reduce the number of drives in yarding livestock by permitting the group movement of some classes of animals from the catch pens to the holding pens.

Truck dock and chute pens.--The truck dock is 3 by 71 feet. Its length provides space for unloading 6 trucks--3 pickup trucks, 2 farm stake-body trucks, and 1 tractor-trailer truck. The height of the dock for pickup trucks should be 24 inches, for farm stake-body trucks, 38 inches, and for trailer trucks 50 inches. This dock would be designed so that the dock platform would be at the same level as the yard floor.

Chute pens for the 3 pickup trucks and 2 farm stake-body trucks are 10 by 16 feet. The chute pen for the tractor-trailer truck is 16 by 16 feet. Each of the chute pens should have double extension gates opening onto the dock platform. Gates for chute pens should be 2 feet long for pickup trucks, and 3 feet long for farm stake-body and tractor-trailer trucks. Each of the chute pens for pickup trucks and farm stake-body trucks should be equipped with an interior gate so that 2 pens may be formed. Thus, 2 owners' lots of livestock can be held in each chute pen. Each of the 6 chute pens has an 8-foot gate opening onto an 8-foot drive alley.

A 3-level fixed height dock, similar to that described for market No. 2, may be used with the proposed market if it is desirable to construct the dock at a higher level than the yard floor.

Sorting alleys, sorting pens, and tagging chutes.--Two sorting alleys and 6 sorting pens are suggested for sorting livestock by grades or classes. Two tagging chutes are provided for tagging animals that cannot be tagged safely elsewhere.

Sorting alleys 1 and 2 are each 12 by 23 feet and are formed from an area 12 by 46 feet, using a 12-foot gate. When this gate of the sorting area is closed, 2 sorting alleys are formed. Each sorting alley has two 8-foot gates opening into the drive alley serving the chute pens, three 6-foot gates serving 3 sorting pens, and one 30-inch gate serving a tagging chute.

Sorting pens 1 through 6 are each 8 by 6 feet, and are in a row between the sorting alleys and the scale pockets. Each has a 6-foot gate opening into a scale pocket and a 6-foot gate opening into a sorting alley.



A single-lane tagging chute 8 feet long and 30 inches wide is located at each end of the row of sorting pens. Each tagging chute would have a 30-inch gate opening into a scale pocket at one end and a 30-inch gate opening into a sorting alley at the other. A work platform 8 feet deep, 30 inches wide, and 22 inches above the floor would be located adjacent to each tagging chute.

Scale pockets, scale platforms, and scale houses.--Two scale pockets, 2 scale platforms, and 2 scale houses are suggested. The scale pockets are for driving livestock from the sorting pens or tagging chutes onto the scale platform. Each scale pocket is 6 by 23 feet and serves 3 sorting pens, a tagging chute, and a scale platform. The scale platforms are side by side, are 14 by 7 feet, and are equipped with cattle racks. The scales are of the weigh-beam type, with a 10,000-pound capacity, a 5-pound minimum graduation, and a printing attachment. Each scale house is 14 by 8 feet and would house a scale weigh beam. Each scale house also would provide space for a clerk and a weighmaster.

Alleys and catch pens.--Two alleys and 6 catch pens are provided to reduce the number of drives and eliminate the delays encountered in yarding livestock from the 2 scale platforms to the assigned holding pens in the yards.

One of the alleys would be perpendicular to the market drive alley in front of the scale platforms and would be centered in front of the "off" gates of the 2 scales. This alley would allow cattle to be driven off either scale platform and into 1 of the 4 catch pens provided for temporary holding of cattle by market class. This alley also would serve 2 holding pens, and provide a shorter drive to some of the holding pens in the yards. The second alley, parallel to the first alley, would provide an exit for pen-lot movement of cattle from 2 catch pens without delaying the yarding of animals from the scales and into the 4 catch pens. Both alleys are 8 by 32 feet.

Catch pens 1 and 2 each have an 8-foot gate opening into the market drive alley which serves the "off" gates of the 2 scale platforms. These 2 catch pens are provided for temporary holding of a 1-scale draft of any species until it is convenient to move the draft to the assigned holding pen. Each catch pen is 10 by 11 feet.

Catch pens 3 to 6 are 8 by 22 feet. Each catch pen has an 8-foot gate opening into the alley centered in front of the "off" gates of the 2 scale platforms. Catch pens 3 and 4 each have an 8-foot gate opening into a market cross alley, and catch pens 5 and 6 each have an 8-foot gate opening into the 8-foot-wide by 32-foot-long alley previously discussed. These 4 catch pens are provided so that 4 market classes of cattle could be yarded after they are weighed into temporary holding pens close to the 2 scales and then moved by pen lot to an assigned holding pen in the yards--thereby reducing the number of drives.

Walkways.--Two 3-foot wide walkways connect the truck dock with each scale house so that market patrons may go to the scale houses to provide

necessary market information and observe market weighing without interfering with other market operations.

### Facilities for Moving and Holding Livestock in the Yards

Facilities for moving and holding livestock in the yards include alleys, block gates, catch pens, and holding pens. A proper arrangement of these is mandatory for a free flow of livestock into, through, and out of the yards (fig. 11).

Alleys.--The number of alleys in the yards should be adequate to provide for a one-way flow of livestock between work stations for each major operation performed. Alleys should be wide enough to permit a free flow of all size groups. The alleys, if possible, should be the same width as the pen gates opening into them so that, when opened, a pen gate will completely block the alley.

Five major drive alleys and 2 cross alleys are suggested for the market. Five of these alleys are 8 feet wide and 2 are 10 feet wide. However, where fire lanes are required, the width of alleys must conform to local ordinances. The two 10-foot wide alleys are necessary to provide an access for vehicles to all major parts of the yards.

Alleys should be 4 feet wide in the hog pen section, in the bull pen section, and in the section where small pens for calves, sheep, and cattle are located.

All the alleys in the cattle and sheep section of the market should be paved with either concrete or black-top on a compacted base. The alleys in the hog pen section should be of roughened concrete and a part of a continuous slab suggested for the hog area.

Block gates.--Block gates to control the movement of livestock in the alleys are provided at the intersections of all alleys where they are used for keeping livestock in the same alley by closing off the intersecting alley, to change the direction of the livestock by blocking 1 or more aisles of the 2 intersecting alleys, and to close off a section of an alley for temporarily holding animals in the alley.

Catch pens.--A total of 11 catch pens are suggested to hold livestock temporarily between operations to minimize delays, to decrease the amount of labor required to perform jobs, and to increase the rate in which a job or jobs can be performed at the market.

One catch pen, 19 by 28 feet near the sales ring, is suggested for holding pen lots of animals brought up to the ring for sale to insure a continuous supply of animals for the sale. This catch pen would have a 9½-foot long gate centered on each of the 28-foot sides so that when the 2 gates are brought together the area in the catch pen will be reduced by half and small numbers of animals could be handled easier. Three catch pens, 4 by 7 feet,

are suggested for holding hogs near the sales ring. Another catch pen, 12 by 36 feet, is located near the "out" gate of the sales ring to catch the animals not to be penned in buyer pens. After a pen lot is sold the animals in this catch pen are moved back to the holding pen they were in before their sale. This catch pen has an interior gate 12 feet long which allows the catch pen to be divided into 2 pens, 12 by 18 feet. The 6 remaining catch pens have already been described in connection with the receiving facilities.

Holding pens.--The types, size, and number of holding pens needed are dependent on such factors as: (1) The volume handled per sale, (2) species of livestock sold, (3) pen space requirements for the different species, and (4) penning practices.

Because of the seasonal variation in the marketing of livestock the volume of business handled may be twice as large for some sales as others. To minimize the number of specially designed pens needed, overflow pens are suggested for handling the volume when sales are heavy (fig. 13).

The varying proportions of the different species handled for individual sales make it impractical to design special pens for each species. Better utilization of pen space can be obtained and fewer pens are required when one or more species can be yarded in the same type pen. It is suggested that cattle pens be used for holding cattle, calves, and sheep. Specially designed



BN-7325

Figure 13.--Cattle yarded in an overflow pen at a typical market.

pens, however, are suggested for hogs and bulls. Although the market would likely handle a few horses, mules, or goats, the number would be comparatively small, and it is suggested that these species also be held in cattle pens.

Pen space requirements for the various species handled should be based on such factors as: (1) Length of time animals are held in pens, (2) climate of the area, and (3) weight of animals. It is estimated that, on an average, livestock would be held in holding pens about 6 hours. More pen space would be needed in hot, humid weather than in cooler weather. Based on these factors, the following number of square feet of pen space per head of livestock is suggested:

Cattle and Calves	Square Feet
1,000 lb.-up cattle.....	20
700 to 1,000 lb. cattle.....	18
500 to 700 lb. cattle.....	16
300 to 500 lbs. slaughter calves.....	14
180 to 240 lb. calves.....	10
All weights.....	16
Sheep	
Graded or ungraded sheep.....	5
Hogs	
Ungraded hogs.....	6
Graded hogs.....	5

For the proposed market, cattle and calves would be penned by grade and class (fig. 14). It is assumed that cattle are sorted into at least 4 classes, and calves into 6 grades. Calves not sold by grade would be handled similar to cattle. Sheep also would be penned by grades, and it is assumed that sheep would be sorted into 6 grades. Those not to be sold by grade would be yarded in pens designated for ungraded sheep. Cattle, calves, and sheep belonging to different owners are yarded in the same pen; however, an allowance should be made for providing a small number of sellers with individual pens for their cattle. Hogs would be penned by ownership and separate pens would be needed for each seller's lot. Separate pens also are suggested for bulls (fig. 15). For the assumed market, a small number of buyer cattle pens are proposed for yarding cattle purchased by the larger buyers after their sale. Most of the livestock, however, would be yarded in the same pen they were yarded in before their sale.

Based on the major factors to be considered in determining the types, size, and number of pens needed, 66 pens are suggested for handling 580 cattle and calves, 12 pens for 400 sheep, and 55 pens for 300 hogs. In addition, 8 overflow pens are suggested for peak volume days. A total of 141 pens containing 21,984 square feet of space are proposed for the market (table 2).



BN-7326

Figure 14.--Pen lots of graded calves at a typical market. Note the grading operation in the background.



BN-7315

Figure 15.--Individual bull pens at an auction market.

Table 2.--Dimensions and number of holding pens for cattle, calves, sheep, and hogs for market No. 1

Type of pen and dimension	Pens Number	Pen area Square feet
Cattle and calf pens:		
Cattle pens:		
16 by 32 feet . . . . .	1	512
16 by 28 feet . . . . .	2	896
12 by 28 feet . . . . .	1	336
8 by 40 feet <u>1/</u> . . . . .	4	1,280
8 by 28 feet <u>2/</u> . . . . .	18	4,032
8 by 8 feet . . . . .	4	256
Total . . . . .	30	7,312
Graded calf pens:		
16 by 22 feet . . . . .	2	704
8 by 14 feet . . . . .	6	672
7 by 8 feet . . . . .	8	448
Total . . . . .	16	1,824
Bull pens:		
3 feet 6 inches by 8 feet . . . . .	16	448
Catch pens: 8 by 22 feet <u>3/</u> . . . . .	4	704
Total cattle and calf pens . . . . .	66	10,288
Sheep pens:		
Graded sheep pens		
16 by 40 feet . . . . .	1	640
8 by 40 feet . . . . .	2	640
8 by 14 feet . . . . .	3	336
Total . . . . .	6	1,616
Ungraded sheep pens:		
8 by 8 feet . . . . .	6	384
Total sheep pens . . . . .	12	2,000
Hog pens:		
8 by 12 feet . . . . .	1	96
8 by 8 feet . . . . .	3	192
4 by 8 feet <u>4/</u> . . . . .	51	1,632
Total hog pens . . . . .	55	1,920
Overflow pens:		
46 by 48 feet . . . . .	1	2,208
36 by 48 feet . . . . .	1	1,728
32 by 48 feet . . . . .	1	1,536
16 by 48 feet . . . . .	1	768
12 by 32 feet . . . . .	4	1,536
Total overflow pens . . . . .	8	7,776
Grand total . . . . .	141	21,984

1/ Each pen has a center gate and can be divided into two pens.

2/ Eight pens containing 1,792 square feet would be used for yarding buyer cattle.

3/ These pens also are used for receiving cattle.

4/ Eight pens have a center gate and can be divided into two pens.

Sixteen of the cattle and calf pens would be used for yarding graded calves. These pens would have a capacity for 182 calves. Eight of the 50 cattle pens would be used for yarding buyer cattle, and their space is not considered in determining the holding capacity of the market for cattle since they would be empty at the start of the sale. The 42 pens used for yarding seller cattle would have a capacity for 405 head, including bulls.

The 6 graded and 6 ungraded sheep pens would have a capacity for holding 400 sheep. The 55 hog pens would hold approximately 320 hogs.

The 8 overflow pens could be used for holding either cattle or sheep. On peak volume days, the calves would be yarded in cattle pens, and cattle would be yarded in the overflow pens. Assuming that 2 of the overflow pens containing 3,936 square feet would be used for holding cattle and that the proportion of cattle and calves would remain the same, an additional 189 cattle and 90 calves could be handled. Therefore, the market could handle about 594 cattle and 272 calves. Assuming that 6 of the overflow pens containing 3,840 square feet would be used for holding sheep, an additional 768 sheep could be accommodated. Thus, the market could handle about 1,168 sheep.

Under peak sales conditions, the market could, therefore, provide for 594 cattle, 272 calves, 1,168 sheep, and 320 hogs. However, the market could not be operated as efficiently when this volume is handled as when the numbers do not exceed about 400 cattle, 180 calves, 400 sheep, and 300 hogs.

#### Facilities for Driving Livestock into the Sales Ring

Facilities for driving livestock other than hogs into the sales ring consist of a chute pocket, a feeder chute, and a feeder alley (fig. 11). The chute pocket is 10 by 12 feet and it has three 8-foot gates, one opening into the catch pen for holding livestock prior to their sale, one opening into the kitchen pen, and one opening into the feeder alley. The feeder chute, for driving cattle singly into the sales ring, is 24 inches by 20 feet. It has a 24-inch gate opening into the sales ring and a 4-foot gate opening into the chute pocket. The feeder chute is equipped with a 2-foot slide gate, located 6 feet to the rear of the ring gate, to hold a single animal in a position to enter the sales ring. The feeder alley, for driving small lots of livestock into the sales ring, is 8 by 20 feet, has a 7-foot gate opening into the sales ring, and an 8-foot interior gate 10 feet to the rear of the sales ring gate. Thus, the feeder alley could hold 2 separate lots of livestock in readiness to enter the sales ring.

The facilities for driving hogs into the sales ring include 3 catch pens, previously described, which are formed by gates in an alley leading from the hog holding pen area to the sales ring, and which should be capable of holding an adequate supply of hogs in readiness to enter the sales ring.

## Sales Barn

The sales barn includes the auctioneer's box, sales ring, seating area, standing area, office, lobby, lunch room, and toilets (figs. 16 and 17). The suggested arrangement of the sales barn in relation to the yards proper is shown in figure 11. To provide floor area for the components of the sales barn, the barn proper should be 66 by 45 feet. The overall height of the barn should be 20 feet at the eaves.

At the rear of the barn an attached covered annex 9 by 10 feet should provide adequate space for the auctioneer's box. The side of the auction box facing the sales ring should be curved and project about 3 feet into the sales ring at its base. This side should be at least 6 feet high and slanted 1 foot. The slanted side allows the auctioneer to see small animals when they are adjacent to the base of the box. The floor of the box should be about 3 feet above the ring floor and the front of the box should have a curved 12-inch counter (fig. 18).

The suggested sales ring is semicircular. The base of the semicircle should be  $23\frac{1}{2}$  feet, and from the face of the auctioneer's box to the widest point should be  $9\frac{1}{2}$  feet. Safety islands are provided on each side of the ring. Each island should be 18 inches from the ring fence and should consist of 2 posts, 6 inches in diameter and 5 feet high, constructed on 16-inch centers. Entrance and exit gates for livestock are located on each side of the auction box.

As shown in figure 16, the main entrance to the suggested barn leads into an 8-by 12-foot lobby on the first floor. To the right and left of the main entrance are stairways leading to the sales barn auditorium on the second floor. The suggested barn seats 213 people. The floor of the seating area rises from an elevation of about 12 inches at the ring at the rate of 15 inches for each row of seats (fig. 18). An 8-foot wide balcony directly to the rear of the seats is suggested. About 2 feet of the balcony directly behind the seats would be used for standing room for approximately 200 people.

The barn provides office space 27 by 12 feet, and a similar area for a lunch room and kitchen. Two toilets are provided on one side of the barn.

## Facilities for Loading Out Livestock

A truck dock 37 feet in length, with 3 truck spaces, 1 for a pickup truck, 1 for a stake-body truck, and 1 for a tractor-trailer truck, is suggested for loading out livestock. The height of the dock is the same as that previously described for receiving livestock. A loading pen is suggested for each truck space for holding livestock prior to loading them onto trucks. The pen for the pickup truck is 8 by 16 feet, for the farm stake-body truck 16 by 16 feet, and for the tractor-trailer truck 16 by 26 feet.



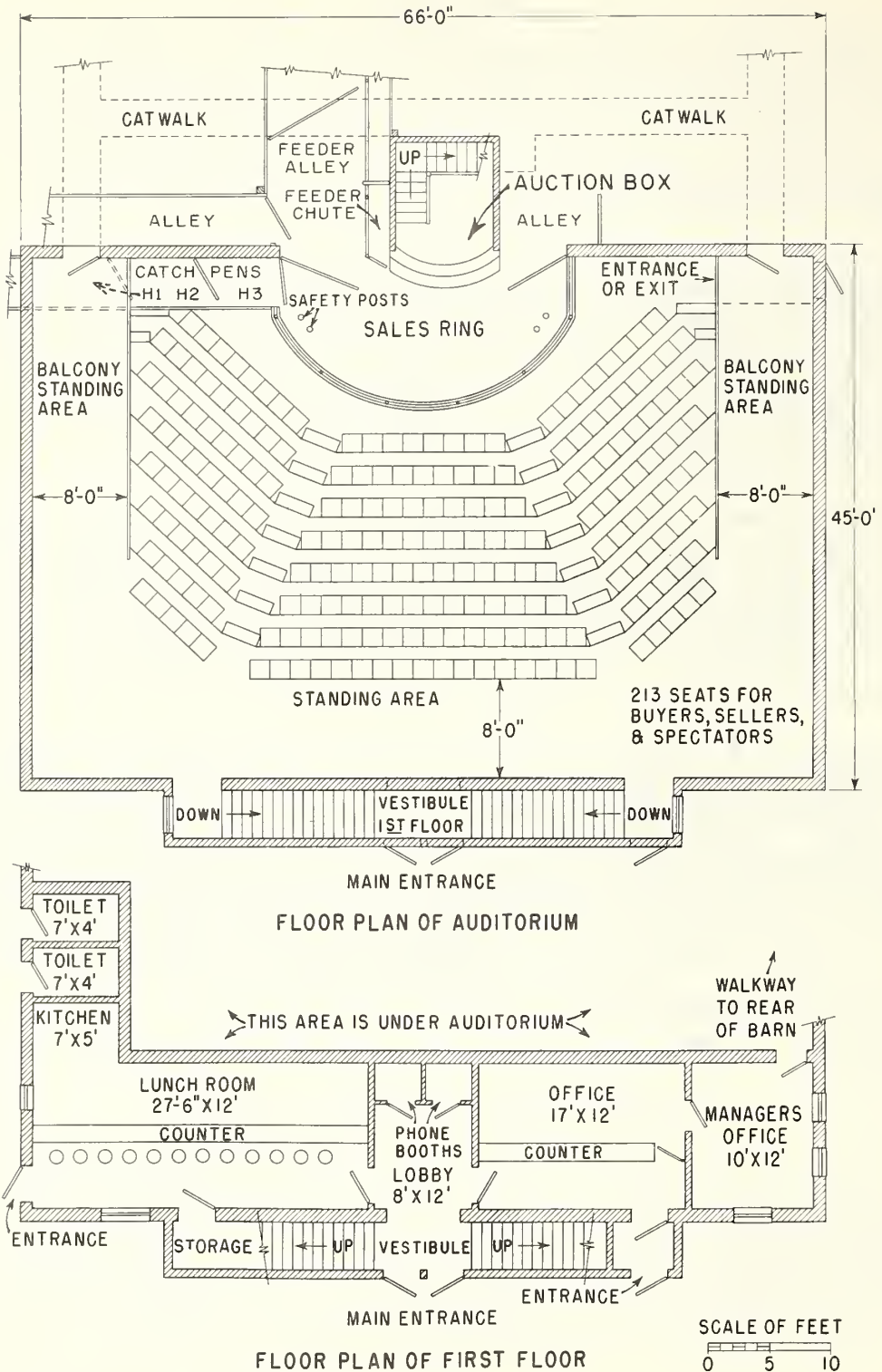


Figure 16.--Floor plan of the proposed sales barn for livestock auction markets in the Appalachian area.



BN-7317

Figure 17.--An office in a livestock auction market.

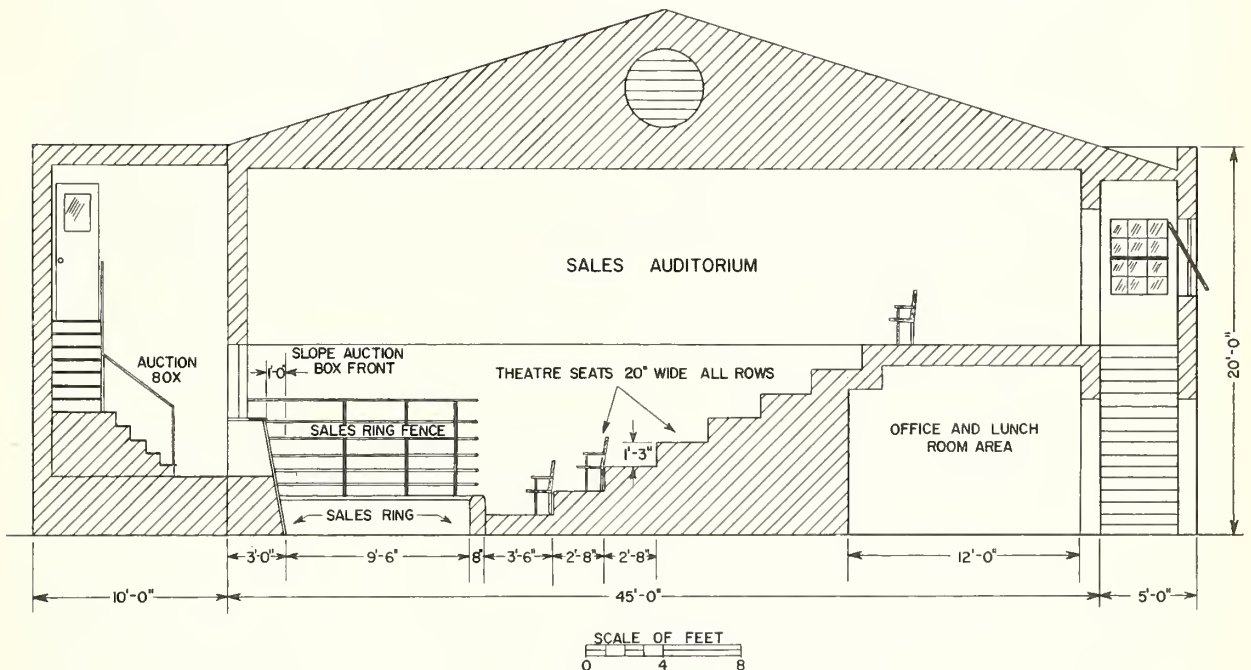


Figure 18.--Cross section of the proposed sales barn for livestock auction markets in the Appalachian area.

A double deck chute is located inside the tractor-trailer loading pen for loading out sheep and calves onto the double deck trailer trucks. A suggested design for this dock is shown in figure 30, Marketing Research Report No. 141.

### Other Facilities

Other facilities include water troughs, hayracks and grain troughs, a catwalk, yard lights, kitchen pen, yard roof, ticket carrier system, market driveways, and parking areas.

Water troughs.--The number of cattle, sheep, and hog holding pens which would have water troughs will depend upon the need for them. Thus, the water troughs provided on the suggested layout would be the minimum number required at most markets. The 2 overflow pens for cattle would each have two 10-foot water troughs. The 6 overflow pens for sheep would have a total of nine 10-foot water troughs, with 4 pens having 1 trough each, 1 pen having 2 troughs, and 1 pen having 3 troughs. For hogs, a total of 68 linear feet of trough to serve 12 of the hog holding pens is provided. In addition to the water troughs for hogs, hydrants with threaded hose connections should be provided to wet down the hogs in hot weather and for washing out the pens. Suggested designs for water troughs are shown in figures 37 and 38, Marketing Research Report No. 141.

Hayracks and grain troughs.--The 2 overflow cattle pens would have a double combination hayrack and grain trough 30 feet long for serving both pens. Facilities for feeding sheep and hogs were not provided on the suggested market, since these species usually are loaded out within a short period after their sale. A suggested design for combination hayrack and grain trough is shown in figure 39, Marketing Research Report No. 141.

Catwalk.--A catwalk constructed over the yard area to allow buyers, sellers, and visitors an opportunity to view the livestock within the pens without having to walk through the alleys, needs to be 625 feet long to form a complete loop over the yards with connections to the auction barn and 2 truck docks (figs. 19 and 20).

Yard lights.--To provide the necessary lighting, a string of 100 watt lights about 20 feet apart should be centered over the alleys, and another string of 100 watt lights about 40 feet apart should be centered over each row of pens. The lights should be about 12 feet above the yard floor, in shallow reflectors, and well insulated against the weather. Floodlights should be provided at both truck docks.

Kitchen pen.--A small holding pen, sometimes called the kitchen pen, is located at the rear of the auction box and between the facilities for feeding livestock into the ring and the alley used for yarding livestock after they leave the sales ring. The kitchen pen is used to hold temporarily livestock which either cannot be identified as to ownership or which enter the ring out of turn. The livestock can be moved from this pen through a gate back into



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Figure 19.--A catwalk above pens and alleys at a livestock auction market.

the facilities for driving livestock into the sales ring. The kitchen pen would be about 9 by 22 feet, with an 8-foot gate opening into the pen back alley and an 8-foot gate opening into the chute pocket.

Yard roof.--All the yard facilities, with the exception of the 8 overflow pens, would be under cover. A gable roof, with a monitor extending the entire length of the ridge is suggested (fig. 20). The roof eaves should be about 12 feet above the pen floor. Either corrugated metal or asphalt-type roofing material could be used as the roof covering. About 35,120 square feet of roof would be needed.

Ticket carrier system.--A ticket carrier system, connecting the auctioneer's box in the sales barn to the market office, is suggested for conveying sales data to the office at frequent intervals while the sale is in progress. The dual overhead wire or pneumatic tube system is suggested because of the comparatively low initial investment required and the relatively small operating cost.

Market driveways.--The principal market driveway, connecting the sales barn with the public highway and providing access to the aprons adjoining the receiving and loading out docks should be not less than 40 feet wide.

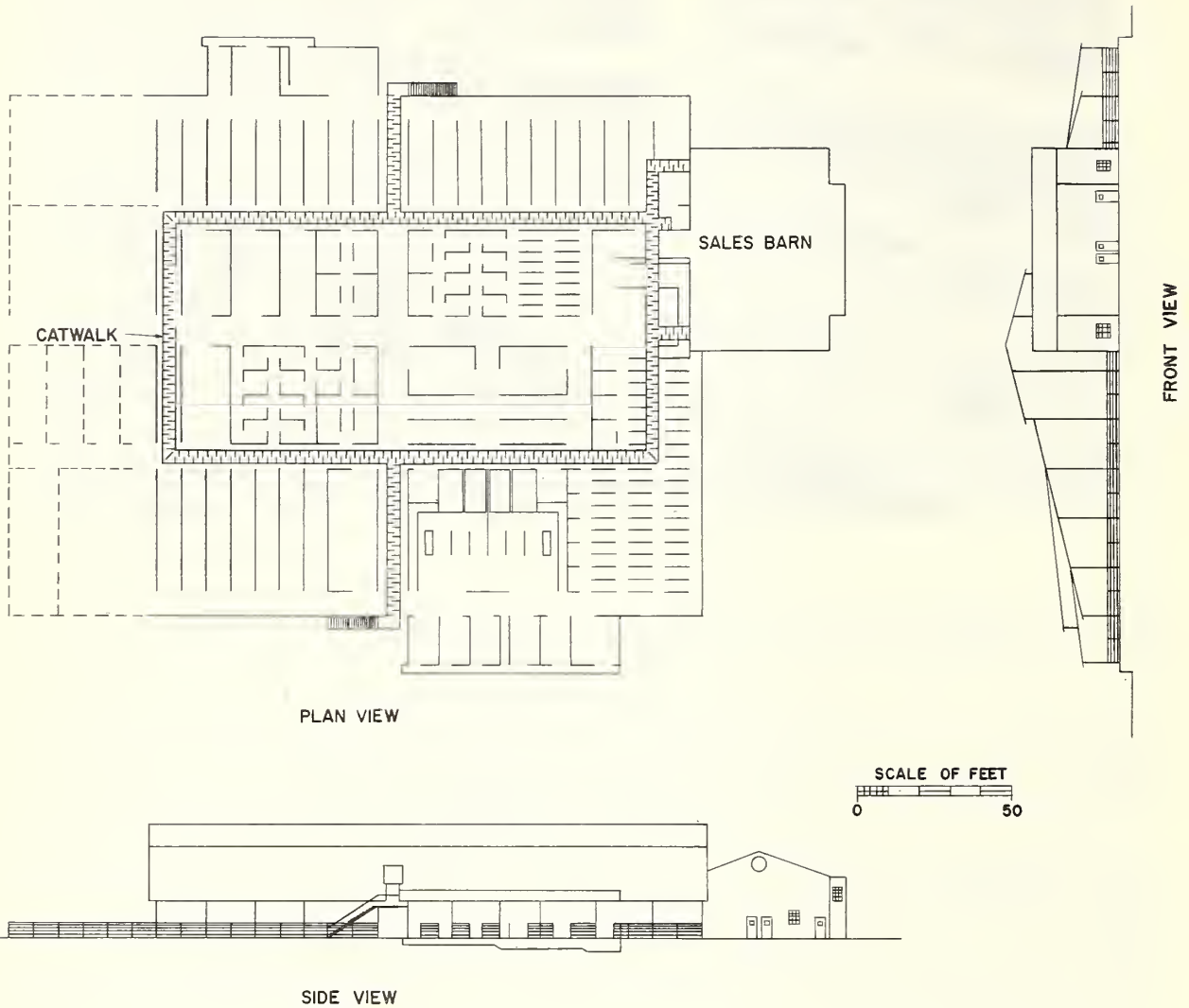


Figure 20.--Suggested arrangement of the catwalk over the market yards and the design of the yard roof.

Aprons or driveways serving the 2 docks should be 100 feet wide. Both should have a rolled gravel surface.

Parking area.--Well-defined off-street parking areas should be provided at the market for about 280 motor vehicles. These areas should be out of traffic lanes but easily accessible from them. The parking areas should be gravel surfaced, well drained, and with plainly marked individual spaces 10 feet wide.

### Arrangement of Facilities

The layout for a No. 1 market is shown in figure 11. The market encompasses an area of 43,665 square feet. Yard facilities, including the receiving and loading out docks and overflow pens, occupy 40,480 square feet of space, and the sales barn, 3,185 square feet. The sales barn faces and is connected with a public highway by a 40-foot driveway. This driveway enters the market site on one side, curves around to the front of the barn and leaves on the opposite side. This curved driveway connects with 100-foot service driveways on each side of the sales barn which, in turn, provide access to each side of the yards.

The rear of the sales barn adjoins the market yards, and the sales ring is connected to the yards by the feeder alley and feeder chute and by the alley used for penning livestock after their sale. When the market yards are viewed from the sales barn, the truck dock for receiving livestock is located outside, to the front and on the left side of the yards. The truck dock for loading out livestock projects outward from the yards on the right side of the yards. By having the truck docks outside the yard proper, holding pens can be added and alleys can be lengthened without affecting the flow of the livestock through the market or the efficiency of performing market operations. Generally, this arrangement provides for a flow of livestock from the left side to the right side of the market.

In the layout shown, the facilities for sorting, marking or tagging, weighing, catch pens, graded sheep pens, ungraded sheep pens, graded calf pens, bull pens, cattle pens, and cattle buyer pens have been grouped in 4 rows. Each row is separated by a drive alley. Thus the market would have 5 drive alleys. The market also has 2 major cross alleys; one in the center of the yards, and the other in the rear of the yards separating the specially designed pens from a row of overflow pens. Two additional alleys were discussed as a part of the receiving facilities since their use would be limited in other market operations. Ten small cross alleys opening into drive alleys are located in the 2 center rows so that small size pens may be provided.

The area for sorting, marking or tagging, and weighing livestock is located to the rear of the truck dock for receiving livestock. This location should permit livestock to be received into the market with a minimum distance of travel.

Two catch pens are located on alley 2, and 4 on alley 7 near the "off" ends of the 2 scale platforms. The latter 4 provide for group movement of cattle to holding pens in the yards and can also be used for holding the last group of cattle arriving on the market. Catch pen 7, located near the sales barn, is for holding pen lots of animals temporarily before their sale. Catch pen 8, located near the "out" gate of the sales ring, can be made into 2 pens by closing the interior gate. This pen is for holding lots of livestock after their sale and before they are yarded back in holding pens.

Holding pens for graded and ungraded sheep are located on the left side of the yards, adjacent and to the rear of the sorting and weighing area. This location provides for short drives in yarding sheep in holding pens after they are weighed. Holding pens for graded calves are located to the center and front of the yards. Bull pens are located in the front center of the yards. Buyer cattle pens are on the right side of the yards adjacent to the alley for yarding livestock after their sale. Overflow pens are located in a row across the rear of the market.

Hog holding pens are grouped along 4 drive alleys at the front of the market near the sales ring. Two cross alleys also are provided in the hog area of the yards.

The arrangement of the yard facilities in relation to drive alleys and cross alleys permits livestock to be moved between the numerous work stations with minimum distance drives and a minimum amount of labor. The arrangement also provides for the flexibility needed in markets yarding most of the livestock sold in the same pens they were yarded in before the sale and also yarding part of the cattle sold in buyer pens.

If it becomes necessary to increase the number of holding pens: (1) New pens and alleys for hogs could be constructed to the front of the yard area with the holding pens perpendicular to alley H 3 and additional drive alleys parallel to this alley; (2) additional holding pens and alleys for sheep could be constructed in the area now occupied by cattle pens adjacent to the sheep pens or in the sheep overflow pens, and new overflow pens could be constructed to the rear; and (3) more holding pens and alleys for cattle could be constructed in the overflow pens and new overflow pens could be constructed to the rear of the new holding pens and alleys. If the expansion of the yards were carried out in the manner just described, there would be very little, if any, change in the flow of livestock into, through, and out of the yards.

#### Amount of Land Needed for Market Site

The market site should be adequate in size to provide for the market proper, market driveways, ample parking area for market patrons, and future market expansion. A suggested market site should be 600 by 600 feet, containing about 8-1/4 acres, and preferably located on a main highway.

The arrangement of the market proper, proposed driveways, and parking areas is shown in figure 21. The length and depth of the site cannot be materially reduced without adversely affecting the expansion area and number of parking spaces suggested.

#### Estimated Costs of Construction

The estimated costs of the facilities proposed for market No. 1 are shown below. These costs are based on general construction costs in the Appalachian area during 1957 and are presented only as a guide for use by

### PLOT PLAN

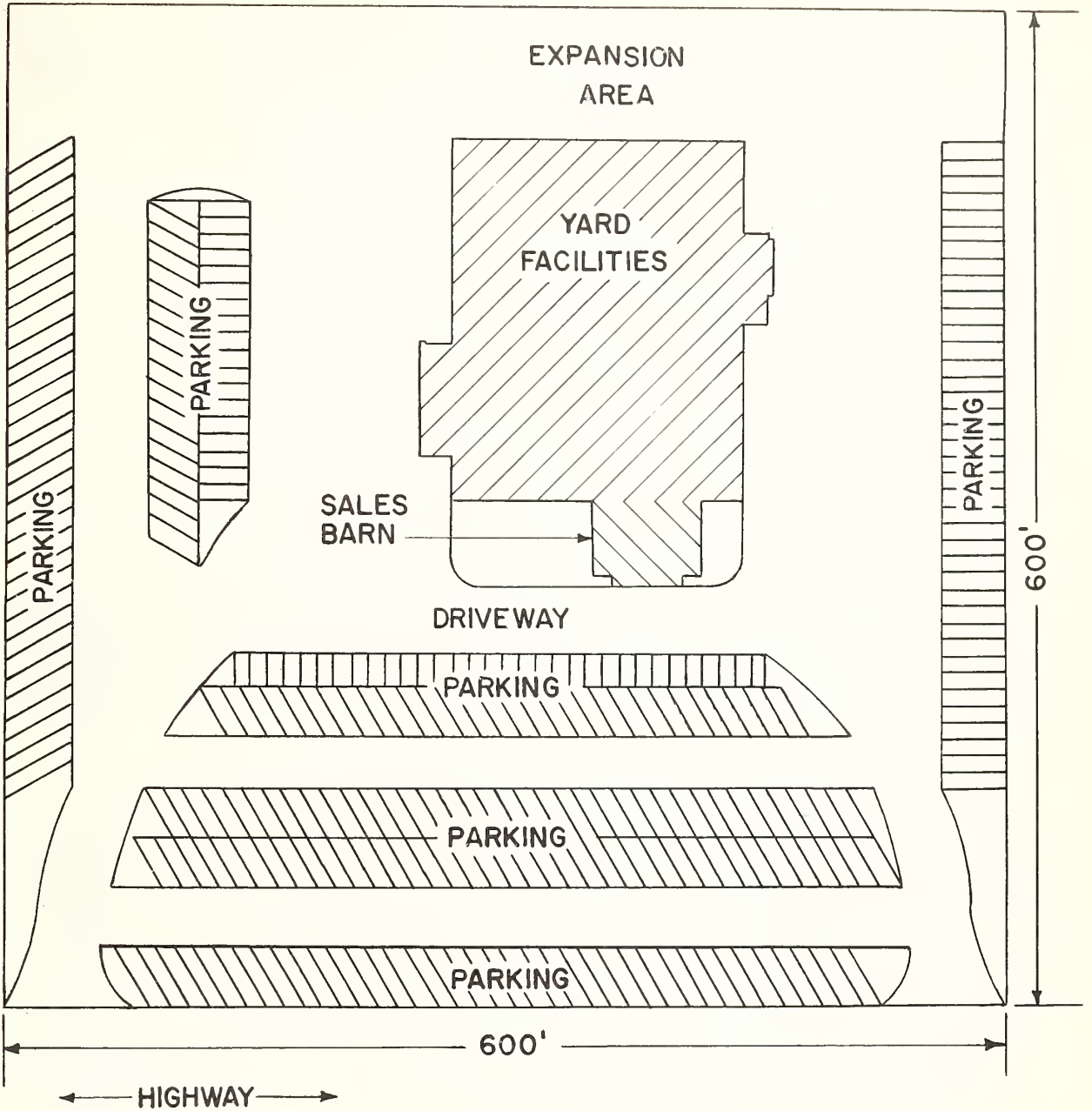


Figure 21.--The proposed site for market No. 1 with the arrangement of the market proper, the driveways, and the parking area shown.



market operators in estimating the total market cost and the prospective investment that might be required to construct a facility of the kind and size suggested. They are not intended to replace the estimates of local contractors at the time and place of construction.

The cost of the land placed in condition to build must be added to the estimated cost of constructing the facilities to determine the total market cost. Because of variations in land costs, these estimates are not included in the estimated costs of construction.

<u>Item</u>	<u>Estimated Costs</u>
	<u>Dollars</u>
Docks, chute, and chute pen . . . . .	2,300
Cattle, calf, and sheep pens:	
Fences and gates 5 feet high	
5,010 linear feet @ \$2.80 per foot . . . . .	14,028
Hayracks and feed troughs - 30 linear feet @ \$2.10 per foot . . . . .	63
Water troughs - 13 troughs @ \$28.75 each. . . . .	374
Paving alleys (black top)	
1,185 square yards @ \$2.60 per square yard . . . . .	3,081
Hog pens:	
Fences and gates 3 feet - 6 inches high	
1,080 linear feet @ \$2.50 per foot . . . . .	2,700
Water troughs - 68 linear feet @ \$2.60 per foot . . . . .	177
Paving pens and alleys (concrete)	
364 square yards @ \$3.10 per square yard . . . . .	1,128
Scales, (2), 7-by 14-foot platforms and 2 scale houses . . . . .	5,600
Roof over yards - 35,120 square feet @ \$0.60 per square foot. . . . .	21,072
Catwalk over yards, including 2 stairways	
625 linear feet @ \$2.90 per foot . . . . .	1,813
Yard lighting . . . . .	675
Sales barn, wood frame construction -	
Includes stairs on front, auction box, offices, restaurant	
and toilets, 3,060 sq. ft. @ \$3.50 per square foot <u>1/</u> . . . . .	10,710
213 theater-type seats @ \$5.50 each . . . . .	1,172
2 public address systems @ \$600 each. . . . .	1,200
Ticket carrier system . . . . .	1,000
Water lines in cattle, sheep, and hog pens, cafe, and toilets . . . . .	1,350
Sanitary sewers (inside market area). . . . .	750
Paving (rolled gravel):	
Driveways, truck dock approaches, roads, and parking areas	
21,800 square yards @ \$0.60 per square yard. . . . .	<u>13,080</u>
Subtotal. . . . .	82,273
Engineering fees @ 6 percent. . . . .	<u>4,936</u>
Total cost of market. . . . .	<u>87,209</u>

1/ Estimate includes all electrical work, lighting fixtures, plumbing, and toilet facilities, but does not include office and restaurant equipment.

## How Proposed Facility Should Operate

The various components of the market are arranged so that definite flow lines must be observed during the receiving, selling, and loading out of live-stock, if the facility is to operate efficiently. These lines are shown by flow diagrams (figs. 22 and 23). Other lines of flow would be possible by swinging some of the pen gates differently. If the basic layout is revised to fit a special tract of land, or for other reasons, the most efficient lines of flow should be determined before deciding on the arrangement of the various components of the market.

### Receiving Livestock

The flow of cattle, calves, sheep, and hogs during the receiving cycle to holding pens is illustrated in figure 22. The flow lines indicate the lots are unloaded at the truck dock from pickup, farm stake-body, and tractor-trailer trucks into chute pens. Each owner's lot of livestock, regardless of the species in the lot, is driven into sorting alley 1 or 2, where it is sorted by grade or market class into sorting pens. Most livestock is marked or tagged in the sorting alley while they are being sorted. Nervous cattle, which are to be tagged, would be driven from the sorting alleys into the tagging chute and tagged. Hogs are accepted without sorting and would be driven from the chute pen through the sorting alley and into a sorting pen.

Each lot is driven from a sorting pen or the tagging chute into and through the scale pocket and onto the scale platform. A scale ticket is prepared for the lot while it is being moved onto the scale platform, before the weight determination is completed. When a lot is to be sold without being weighed, a ticket is prepared and the lot is moved across the scale platform.

Cattle are driven off either scale platform and into alley 2. From alley 2 cattle are driven into alley 7 and then into catch pens 3, 4, 5, or 6, or into and through appropriate alleys to an assigned holding pen in the yards. Cattle are driven in groups from catch pens 3 and 4 into and through alleys 8 and 2 to holding pens 106 to 112 and 207 to 213, through alleys 8 and 3 to holding pens 300 to 304, or through alleys 8 and 4 to holding pens 418 to 436. They are driven in groups from catch pens 5 and 6 into and through alleys 6, 3, 8, and follow the same course to holding pens described for cattle from catch pens 3 and 4. The cattle that are not yarded into the 4 catch pens move through alleys 2 and C 3 to holding pens X 12 to X 15, or through alley 2 to holding pens 106 to 112 and 207 to 213, or through alleys 2, 7, 3, 8, and other alleys to holding pens following the course described above.

Graded calves are driven off either scale platform and into alley 2. From alley 2 they are driven through alley 7 to holding pens X 1 and X 2, or through alleys 7, 3, and C 8 to holding pens X 32 to X 39, or through alleys 7, 3, and C 9 to holding pens X 40 and X 41, or through alleys 7, 3, and C 10 to holding pens X 42 to X 45.

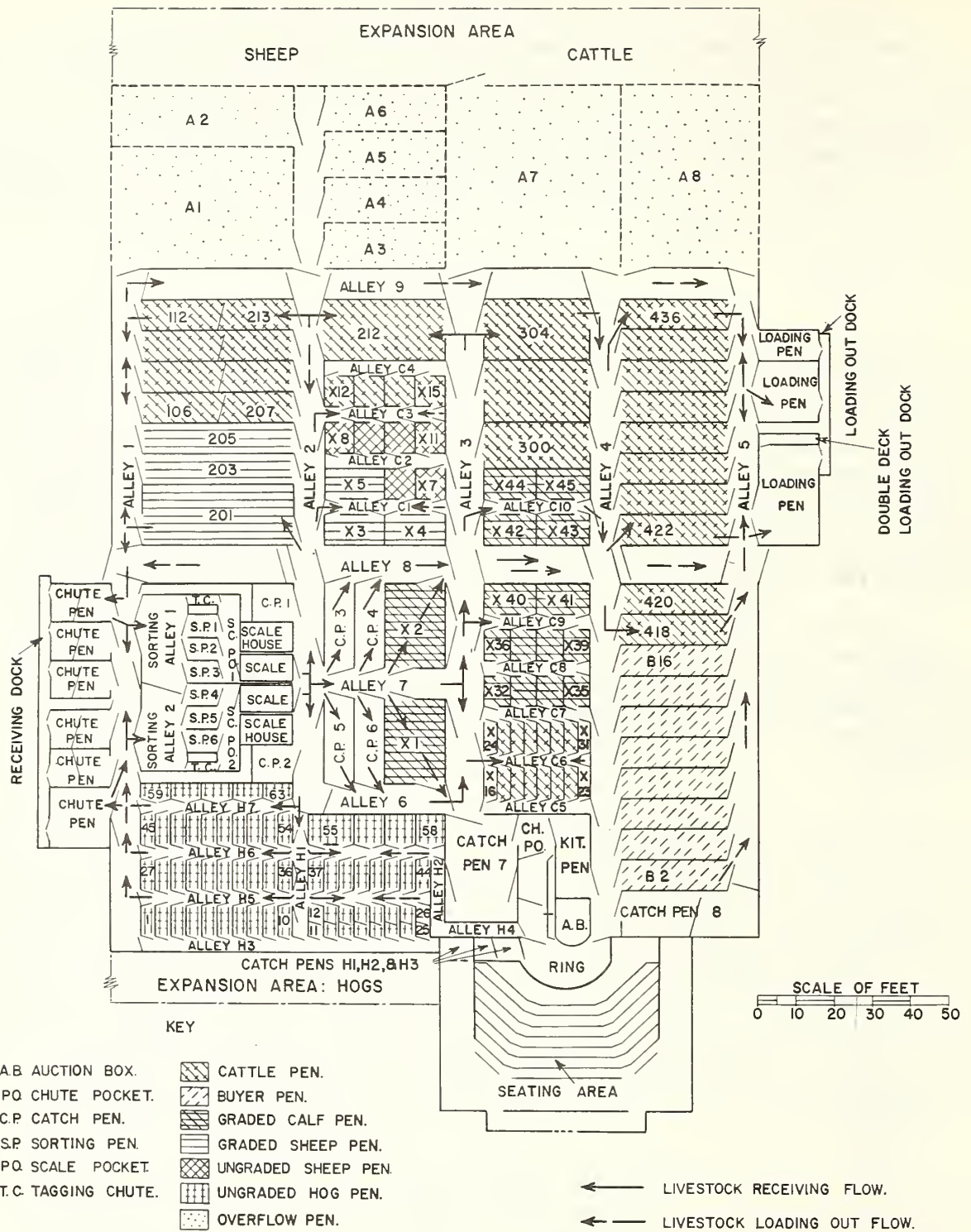


Figure 22.--The flow of livestock during the receiving and loading out cycles on the proposed No. 1 market. Also, the suggested expansion areas are shown.

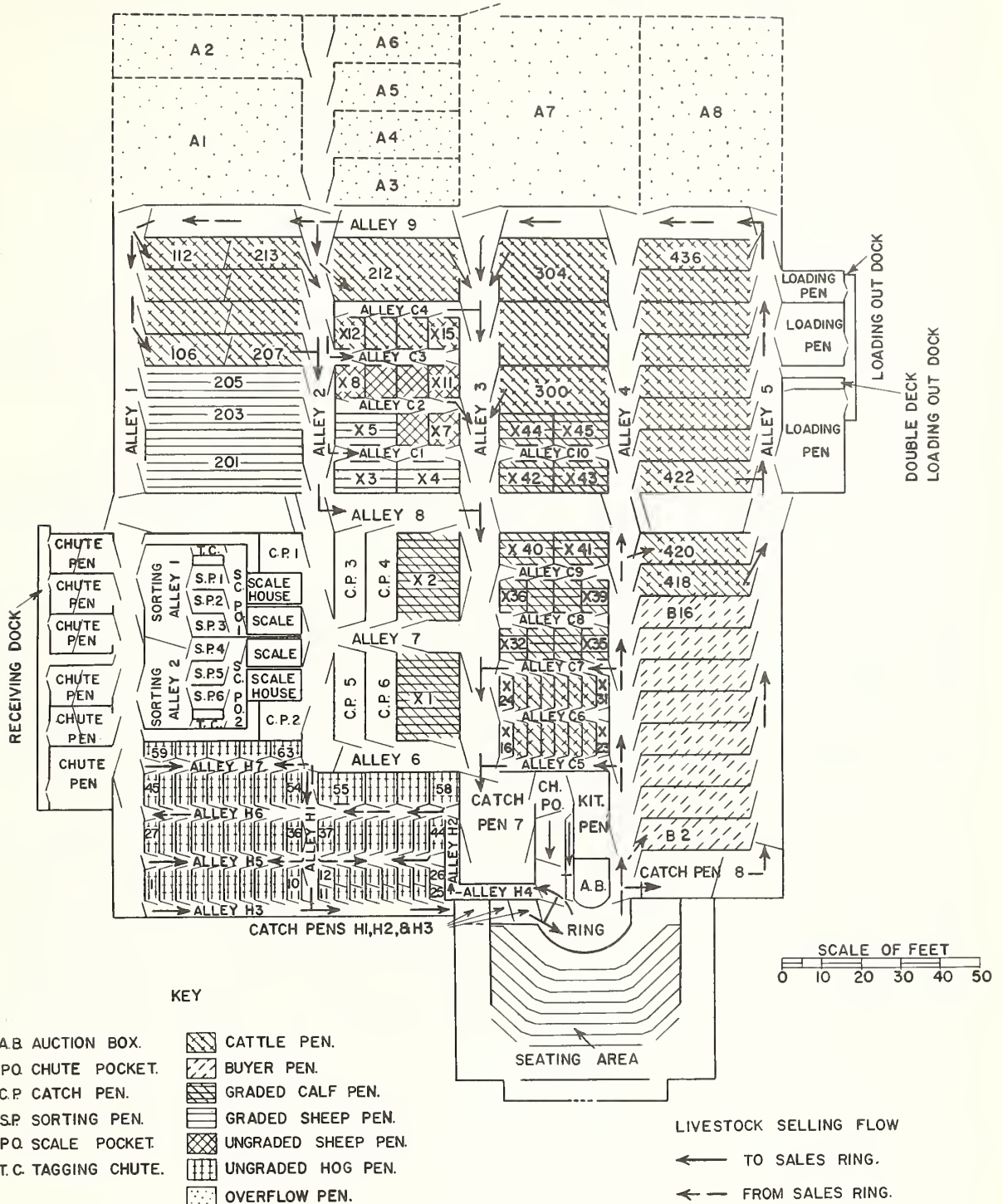


Figure 23.--The flow of livestock during the selling cycle on the proposed No. 1 market.

Sheep are driven off either scale platform and into alley 2. Graded sheep are driven down alley 2 to holding pens 201 to 205 or through alleys 2 and C 1 to holding pens X 3 to X 5. Ungraded sheep are driven through alley 2 and into alley C 1 to holding pens X 6 and X 7, or through alley 2 and into alley C 3 to holding pens X 8 to X 11.

Hogs are driven off either scale platform and into and through alley 2 to alley H 1. Hogs in alley H 1 are driven into alley H 5 to holding pens 1 to 44, or through alley H 6 to holding pens 45 to 58 or through alleys X 7 to holding pens 59 to 63.

### Selling Livestock

The flow of livestock on the market during the sale is shown in figure 23. As the flow lines indicate, operations in connection with the sale involve the most extensive movement of animals required at any stage of the marketing process. All operations in this cycle must be keyed to the rate of sale.

For the purpose of illustrating the flow of livestock during the selling cycle an order of sale of cattle, graded calves, sheep, and hogs is assumed. Actually, the order of sale could vary without affecting the lines of flow.

Cattle in holding pens 418 to 436 should be sold first so that these pens can be used as buyer cattle pens if the need arises. Cattle in these pens would be driven through alleys 5, 9, and the major bring-up alley 3 to catch pen 7. Cattle in pens 300 to 304 move through alley 3 to catch pen 7. Bulls yarded in pens X 16 to X 31 move through alleys C 5, C 7, and alley 3 to catch pen 7. Cattle yarded in pens X 12 to X 15 move through alleys C 4, and 3 to catch pen 7. Cattle yarded in pens 106 to 112 and 207 to 213 move through alleys 2, 8, and 3 to catch pen 7.

Lots of cattle in catch pen 7 are sorted into smaller lots and driven into the chute pocket. Cattle to be sold singly are driven into the feeder chute, and cattle to be sold in group lots are driven into the feeder alley. From the alley and chute they are driven into the sales ring, sold, and driven out of the ring. Cattle purchased by major buyers are yarded through alley 4 into buyer pens B 2 to B 16. Cattle purchased by other buyers are assembled in catch pen 8 and driven from the pen in pen lots through drive alley 5 back to other cattle holding pens in the yards, usually the pen the animals were yarded in before their sale.

Graded calves and sheep are sold in holding pens. The arrangement of the facilities, however, provides for a free flow of graded calves and sheep to the ring and back to their pens, if it should be desirable to sell these animals in the sales ring.

Ungraded sheep would be driven from pens X 6 to X 11 through alleys C 2 and 3 to catch pen 7. Lots of sheep in catch pen 7 are sorted into

smaller lots and driven into the chute pocket. Single and groups of sheep are driven from the chute pocket into the feeder alley, and from the feeder alley to the sales ring where they are sold. After their sale, sheep are assembled in catch pen 8. From catch pen 8 sheep are driven through alleys 5, 9, 2, and C 1 or C 3 back to the same pen they were yarded in before their sale.

The last species to be sold is hogs. Hogs yarded in pens 1 to 26 are driven through alley H 3 to catch pen H 1. Hogs yarded in pens 27 to 44 are driven through alleys H 5, H 1, and H 3 to catch pen H 1. Hogs yarded in pens 45 to 58 are driven through alley H 6, H 1, and H 3 to catch pen H 1. Hogs yarded in pens 59 to 63 are driven through alleys H 7, H 1, and H 3 to catch pen H 1. Hogs are driven from catch pen H 1 to catch pen H 2, and from catch pen H 2 to catch pen H 3 and into the sales ring where they are sold. From the sales ring, they are moved through alleys H 4, H 2, and into alley H 6 and back to the pens where they were yarded before their sale.

### Loading Out Livestock

The flow diagram of loading out operations is shown in figure 22. Loading out begins shortly after the start of the sale. Cattle loaded out during the sale are assembled from pens throughout the yards and driven through alleys 1, 2, 3, 5, and 9 to the loading out docks. Graded calves are moved through alleys 6, 8, C 8, C 9, and C 10 to alleys 3, 9, and 5 to the dock for loading double deck trucks. Graded sheep are moved through alleys 1, 2, 9, and 5 to the dock for loading double deck trucks. Since hogs are the last species sold, they are loaded out after the sale is over.

After the sale, cattle are loaded out at both the docks for receiving and loading out. The dock used would depend primarily on the location of the holding pen. Cattle in pens on the right side of the market would be driven through 4, 8, 9, and 5 to the loading out dock. Cattle yarded in pens on the left side would move through alleys 2, 8, 9, and 1 to the dock used for receiving. Graded calves and sheep would be loaded out in the same manner they are loaded out during the sale.

Ungraded sheep would move through alleys C 1 or C 3, 2, 8, 9, and 1 to the dock used for receiving.

Hogs would move through alleys H 5, H 6, or H 7 to 1 and to the dock used for receiving.

### Labor Requirements

Because of the 1 day a week operation, markets in the Appalachian area usually employ most of their workers for the duration of the sale--rather than for any specified number of hours. When the sales volume is unusually large, long hours are required of workers. On sale days when the volume is light, the hours are comparatively short. It is estimated that 16 workers, other than the office force, would be required to operate the proposed market

when the volume handled is about 400 cattle, 180 calves, 400 sheep, and 300 hogs. The crew would consist of an auctioneer, 2 weighmasters, a grader, 2 clerks, 2 ringmen, and 7 yardmen supervised by a foreman.

The volume of livestock handled by markets in the Appalachian area varies widely, and the labor requirements also vary to some extent. On peak volume sale days it is estimated that the sale would be conducted with an additional grader. One scale could be cut during the season when the volume is light and the market should, therefore, be able to operate without 1 weighmaster, 1 clerk, and 2 yardmen. For the purpose of this analysis, it is assumed that the volume for which the market is designed and the labor force established to handle it represent the average requirement during a typical year.

The proposed market requires 2 less workers than are required by the typical market in the area handling the same volume. The labor requirements for the proposed market, as compared with those of the typical market in the area, are discussed by major operating cycles.

### Receiving Operations

A crew of 14 workers is required for receiving livestock. The crew consists of 2 weighmasters, 2 clerks, 1 grader, and 9 yardmen. In receiving livestock, the weighmasters, clerks, and grader are usually fixed to their jobs. The jobs performed by the 9 yardmen are as follows: One assists the grader and also brings animals from the chute to the sorting alleys, 1 tags or marks cattle, 1 assists the tagger and brings animals from the chute pens to the sorting alleys, two yardmen, 1 on each scale, drive animals from the sorting pens and tagging chute onto the scale platform, and 4 drive animals off the scale platforms and yard them into holding pens. The yardmen are usually assigned to a specific job; however, they frequently change jobs and collaborate with one another in performing specific jobs. They frequently perform jobs of short duration in the selling and loading cycles, when activities in all these are going on at the same time.

Livestock is received from 7 a.m. to 3 p.m.; however, the receipts within this period vary widely and hours of the workers are staggered to meet this variation. Between the hours of 7 a.m. to 9 a.m. the receiving crew would be comprised of 10 workers--a weighmaster, a clerk, a grader, and 7 yardmen. At 9 a.m. an additional clerk, weighmaster, and 2 yardmen report for duty. Thus, 14 workers would receive livestock until 2 p.m., or the start of the sale. At the start of the sale 10 workers are shifted to operations in the selling cycle and 4 would continue to receive livestock until 3 p.m. At 3 p.m. the job of the grader and 1 weighmaster are terminated, and the other 2 workers perform operations in the loading out cycle. The total labor requirements for receiving livestock at the proposed market, based on the above hours of work, are 94 man-hours.

The typical market in the area now uses 11 workers between 7 a.m. and 9 a.m., 16 between 9 a.m. and 2 p.m., and 6 between 2 p.m. and 3 p.m. for a total of 108 man-hours, excluding the labor of the foreman. Thus, when

compared to existing markets, the labor requirements for receiving livestock on the proposed market are reduced by 14 man-hours. The reduction in labor requirements for receiving livestock is the result of providing catch pens for group movement of livestock to holding pens, and an arrangement of receiving facilities that permits a free flow of livestock into the market.

### Selling Operations

At the start of the sale 10 workers are shifted from the receiving to the selling operations. Four workers continue to receive livestock while the sale is in progress; they also may load out livestock.

The crew performing the selling operations is comprised of 11 workers--an auctioneer, a clerk, and 9 yardmen: One yardman to bring up pen lots of animals for sale, 3 to sort animals into salable lots and drive them into the sales ring, 2 to display and drive the animals out of the sales ring, 3 to yard animals after their sale, an auctioneer to sell the animals, and a clerk to record the sales data.

The estimated duration of the selling cycle is 4 hours, from 2 p.m. to 6 p.m. Excluding the labor of the auctioneer and foreman, 40-man hours would be required for selling.

The same size selling crew is used on the typical market in the area now but some of the job assignments are different. Many of the present markets have 3 ringmen and only 2 workers yarding back after sale. The proposed sales ring would require only 2 workers while the proposed buyer pens would necessitate an additional worker for yarding livestock after their sale. It is estimated, however, that a typical market would require 5 hours to sell the same volume of livestock because its arrangement of facilities would prevent livestock from being brought up, driven into and out of the sales ring, and yarded back as fast as they could be sold. Thus, the labor requirements for selling in a typical market, excluding the labor of the auctioneer and foreman, are 50 man-hours. The labor requirements for selling livestock at the proposed market would be reduced by 10 man-hours.

### Loading Out Operations

Loading out livestock would begin shortly after the start of the sale and continue until all livestock are loaded out of the market. The loading out period is considered to be from 3 p.m. to 8 p.m. Between 3 p.m. and 6 p.m., 2 workers from the receiving cycle would perform the loading out jobs and at 6 p.m., when the sale is over, 10 workers from the selling crew would be added to the loading out crew. The total labor requirements for loading out would be 30 man-hours.

The typical market in the area now handling the same volume loads out until 10 p.m. The longer loading out cycle is caused by the lack of buyer cattle pens and the general arrangement of the yard facilities which prevent a free flow of livestock from holding pens to truck docks. Four workers would



load out from 3 p.m. to 7 p.m. and 14 would load out from 7 p.m. to 10 p.m.-- for a total of 58 man-hours. Thus, the labor requirements for loading out at the proposed market would be reduced by 28 man-hours.

### Summary of Labor Requirements

Two fewer yardmen would be required to operate the proposed market than are now required of markets handling the same volume. The estimated total labor required to conduct a sale with the volume for which the proposed market is designed is 164 man-hours as compared with 216 man-hours for a typical market in the area, a reduction of 52 man-hours. On the basis of an assumed wage rate of \$1 per hour, the labor savings would amount to \$52 per sale or, with 50 sales annually, an annual savings of \$2,600. Part of the reduction in the labor requirements is a result of the elimination of 2 workers, and part is due to improved facilities which permit operations to be performed more promptly, thereby shortening the time required for the selling and loading out cycles.

### PROPOSED LAYOUT FOR A NO. 2 MARKET, DESIGNED TO HANDLE 350 CATTLE, 125 CALVES, AND 600 HOGS

The proposed layout for a market designed to handle 350 cattle, 125 calves, and 600 hogs is shown in figure 24. The layout provides for sorting calves and hogs into grades and cattle into market classes. All live-stock, except those animals to be sold by the head, would be weighed on arrival. Provisions are made in the layout for tagging cattle. Cattle of several owners would be yarded in the same holding pen. Graded calves and graded hogs would be yarded by grade irrespective of ownership. Hogs not meeting grade specifications would be yarded in pens according to ownership. The layout permits graded livestock to be driven to the sales ring for sale. Part of the livestock would be yarded after their sale in the pens they were yarded in before their sale, and part would be yarded in buyer pens.

### Facilities Needed

The major facilities needed for the market are similar to those listed for the No. 1 market but the amount needed varies. The No. 2 market would receive livestock with only 1 scale, 1 scale house, 1 sorting alley, 3 sorting pens, and 1 tagging chute. This market also would have graded pens for hogs. No special facilities would be needed for sheep.

### Facilities for Receiving Livestock

The facilities proposed for receiving consist of a truck dock with 4 chutes, 4 chute pens, a sorting alley, 3 sorting pens, a tagging chute, a scale pocket, a scale platform, a scale house, 5 catch pens, and a walkway.

Truck dock, chutes, and chute pens.--A 3-level, fixed-height truck dock is proposed for receiving livestock. A suggested design for this dock is

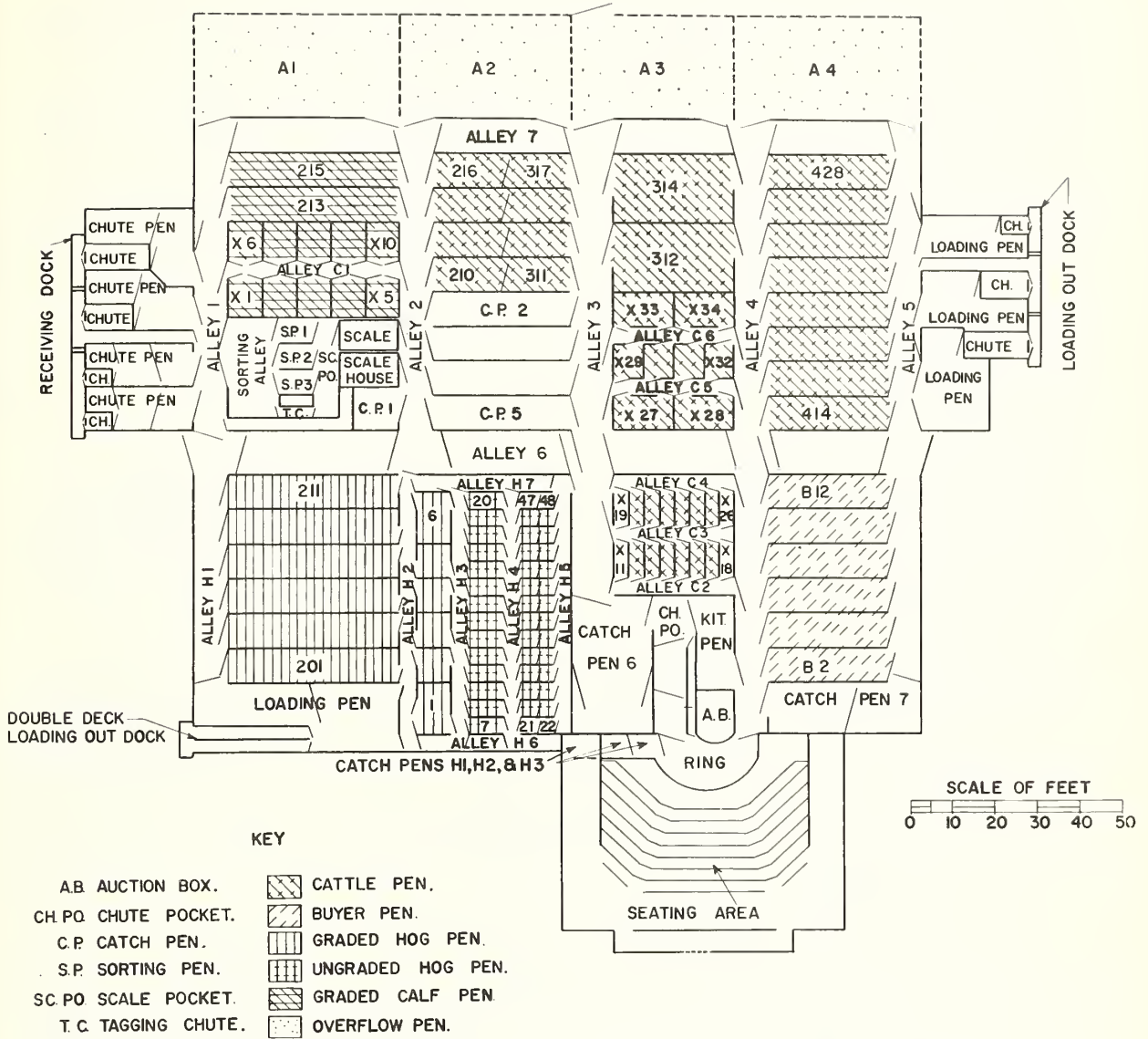


Figure 24.--Layout of the proposed No. 2 market, designed to handle 350 cattle, 125 calves, and 600 hogs.

shown in figure 28, Marketing Research Report No. 141. This type of dock is suggested when it is desirable to construct a market with yard floor at one level and the top of the dock at a higher level. However, a dock platform at the same level as the yard, similar to that described for the No. 1 market, may be used for this market if it is desired.

The 3-level, fixed-height truck dock provides 2 spaces for pickup trucks and 1 each for farm stake-body trucks and tractor-trailer trucks. The overall dimensions of the dock platform are 3 by 47 feet; 19 feet along the dock for unloading pickup trucks and 14 feet each for unloading farm stake-body trucks and tractor-trailer trucks. Each truck space at the dock is connected to the floor of the yards by a step-type chute. The chutes at the spaces for pickup trucks are 4 by 6 feet 3 inches. The chute pen with each chute is 10 by 25 feet. The pens are equipped with interior gates so that each pen may be divided into 3 pens. Thus, 3 different owners' lots may be held in each chute pen. The chute at the space for stake-body trucks is 6 by 11 feet 3 inches. The chute pen width varies from 14 feet at the dock to 10 feet at the rear. It is equipped with an interior gate so that the pen may be divided into 2 pens. The chute for receiving livestock arriving by tractor-trailer trucks is 6 by 15 feet. The chute pen width varies from 14 feet at the dock to 18 feet at the rear. It is 25 feet long and is equipped with an interior gate so that the pen may be divided into 2 pens.

Sorting alley, sorting pens, and tagging chute.--A sorting alley and 3 sorting pens are suggested for sorting livestock by grades or classes. A tagging chute is proposed for tagging cattle. The arrangement of the alley, sorting pens, and tagging chute is shown in figure 24. The sorting alley is 23 by 12 feet and serves 3 sorting pens 6 by 8 feet, and a tagging chute 30 inches by 8 feet.

Scale pocket, scale platform, and scale house.--A scale pocket, scale platform, and scale house are suggested for the market. The scale pocket is 23 by 6 feet and would be used for driving cattle, calves, and hogs from the sorting pens and tagging chute onto the scale platform. The scale platform is 7 by 14 feet and would be equipped with a cattle rack. The scale house which shelters the weighbeam and provides space for a clerk and a weighmaster, is 8 by 14 feet. The type of scale and scale weighing capacity would be the same as for the No. 1 market.

Catch pens.--Five catch pens are suggested for receiving livestock into the market: One catch pen, 10 by 11 feet, could be used to temporarily hold 1 scale draft of livestock until it is convenient for the workers to yard the draft into the assigned holding pen; and 4 catch pens, 8 by 32 feet, would be used to assemble groups of similar class cattle so that they can be yarded in pen size groups to the assigned holding pens in the yards.

Walkway.--A 3-foot wide walkway connects the truck dock with the scale house.

## Facilities for Moving and Holding Livestock in the Yards

Facilities for moving and holding livestock in the yards include alleys, block gates, catch pens, and holding pens. The arrangement of these facilities for a No. 2 market is shown in figure 24.

Alleys.--Seven major alleys are proposed--4 drive and 1 cross alleys are 8 feet wide and 1 drive and 1 cross alley are 10 feet wide. Where fire lanes are required, the width of the alleys must conform to local ordinances.

Alleys in the section of the yards where the small size hog, calf, cattle, and bull pens are located are 4 feet wide.

All alleys in the cattle section of the yards should be paved with either concrete or black top on a compacted base. Alleys in the hog section of the market should be of roughened concrete, and a part of a continuous slab suggested for the hog area of the market.

Block gates.--The use and location of block gates on the market would be the same as for the No. 1 market.

Catch pens.--Ten catch pens are suggested for the market. Catch pens 1 to 5 are used to receive livestock into the market and already have been discussed. Catch pen 6, 19 by 32 feet, is located near the sales ring and is used for holding pen lots of livestock brought up for sale to insure a continuous supply available for selling. The catch pen is equipped with 2 interior gates so that the pen size could be reduced by half when small lots of livestock are being handled.

Catch pen 7, 12 by 36 feet, is adjacent to the out gate of the sales ring and is used for temporarily holding animals that are not to be yarded in buyer pens. Animals in this catch pen would be moved in pen lots to the holding pen they were in before their sale. The pen is also equipped with an interior gate so that 2 pens may be formed.

Catch pens H 1, H 2, and H 3, located next to the sales ring are each 4 by 7 feet and are formed by gates in the alley leading from the hog holding pen area to the sales ring. These 3 catch pens should hold an adequate supply of hogs near the sales ring to insure a continuous supply.

Holding pens.--Based on the major factors used for determining the type, size, and number of pens needed for the No. 1 market, 60 pens are suggested for handling 475 cattle and calves, and 40 pens for 600 hogs. In addition 4 overflow pens are suggested for handling cattle and calves on peak volume days. A total of 104 pens containing 15,904 square feet of space is proposed for the market (table 3).

Table 3.--Dimensions and number of holding pens for cattle, calves, and hogs for market No. 2

Type of pen and dimension	Pens	Pen area
Cattle and calf pens:	Number	Square feet
Cattle pens:		
16 by 28 feet . . . . .	2	896
8 by 32 feet <u>1/</u> . . . . .	4	1,024
8 by 28 feet <u>2/</u> . . . . .	14	3,136
8 by 14 feet . . . . .	4	448
8 by 7 feet . . . . .	4	224
Total . . . . .	28	5,728
Graded calf pens:		
8 by 40 feet . . . . .	2	640
8 by 9 feet . . . . .	10	720
Total . . . . .	12	1,360
Bull pens:		
3 feet 6 inches by 8 feet . . . . .	16	448
Catch pens <u>3/</u> :		
8 by 32 feet . . . . .	4	1,024
Total cattle and calf pens. . . . .	60	8,560
Hog pens:		
Graded hog pens:		
8 by 40 feet . . . . .	6	1,920
8 by 12 feet . . . . .	2	192
8 by 8 feet . . . . .	4	256
Total . . . . .	12	2,368
Ungraded hog pens:		
4 by 8 feet <u>4/</u> . . . . .	28	896
Total hog pens. . . . .	40	3,264
Overflow pens:		
24 by 48 feet . . . . .	1	1,152
24 by 44 feet . . . . .	1	1,056
24 by 40 feet . . . . .	1	960
24 by 38 feet . . . . .	1	912
Total overflow pens. . . . .	4	4,080
Grand total. . . . .	104	15,904

1/ Each pen has a center gate and can be divided into 2 pens.

2/ Six pens containing 1,344 square feet would be used for yarding buyer cattle.

3/ These pens also are used for receiving cattle.

4/ Fourteen pens have a center gate and can be divided into 2 pens.

Twelve of the cattle and calf pens would be used for yarding graded calves. These pens would have a capacity for about 136 calves. Six of the 48 cattle pens would be used for yarding buyer cattle and their capacity is not considered in determining the capacity of the market. The 42 pens suggested for yarding seller cattle would hold about 354 head, including bulls.

Twelve of the hog pens would be used for yarding graded hogs. These pens would have a capacity of 473 hogs, based on a pen space allowance of 5 square feet per head and a holding period of 6 hours. The 28 pens suggested for ungraded hogs have a holding capacity for 149 hogs. The total capacity of the market for both graded and ungraded hogs is 622 head.

The 4 overflow pens would give the market additional holding space for cattle and calves on peak volume days. On peak volume days graded calves in excess of the number provided for in holding pens would be yarded into cattle pens and cattle for which pen space is not available would be yarded into the 4 overflow pens. If the proportion between cattle and calves should remain the same on peak volume days, the overflow pens would enable the market to handle an additional 203 cattle and 81 calves. Thus, the market could handle 557 cattle and 217 calves under peak sales conditions; however, the market could not be operated as efficiently as when the volume did not exceed 350 cattle and 125 calves.

#### Facilities for Driving Livestock into the Sales Ring

The facilities suggested for driving livestock into the sales ring are the same as those described for the No. 1 market.

#### Sales Barn

The sales barn suggested is the same as that described for the No. 1 market.

#### Facilities for Loading Out Livestock

The facilities proposed for loading out livestock on the suggested market are a 3-level fixed-height truck dock, and a double deck truck dock. The 3-level fixed-height truck dock provides 1 truck space for pickup trucks, 1 for farm stake-body trucks, and 1 for tractor-trailer trucks. The overall dimension of the dock platform is 3 by 37 feet. Each truck space at the dock is connected to the floor of the yards by a step-type chute which is the same size as those described for receiving livestock for each of the 3 types of trucks. The loading pen for pickup trucks is 10 by 25 feet, for stake-body trucks 13 by 25 feet, and for tractor-trailer trucks 24 by 16 feet. The 3-level fixed-height truck docks would be used primarily for loading out cattle and calves.

A double deck chute and a loading pen are suggested near the graded hog per area, for loading out hogs. The chute to each dock is 3 by 27 feet. The loading pen varies from 10 to 16 feet in width and is 48 feet deep.

## Other Facilities

Other facilities needed include water troughs, combination hayracks and grain troughs, a catwalk, yard lights, kitchen pen, yard roof, ticket carrier system, market driveways, and parking areas. The yard lights, kitchen pen, ticket carrier system, and market driveways are the same as for the No. 1 market.

Water troughs.--A 10-foot water trough is suggested for each of the 4 overflow pens. In the hog section of the market 1 water trough, running the full depth of the pen, should be provided along alternating fence lines of the graded hog pens. Two pens are served by 1 trough. A total of 144 feet of watering troughs would be needed in the graded hog pens, and a total of 32 feet in the ungraded hog pens. In addition, adequate hydrants with threaded hose connections should be provided in the hog section for wetting down the hogs and washing out pens.

Hayracks and grain troughs.--Two 20-foot double combination hayracks and grain troughs would be constructed along alternate fences of the 4 overflow pens. No facilities are suggested for feeding hogs because of the short time they are usually held on the market.

Catwalk.--A 560-foot catwalk is needed to form a complete loop over the yards, with connections to the auction barn and to the 2 truck docks.

Yard roof.--The entire market yards, with the exception of the overflow pens, should be covered. The monitor type roof described for the No. 1 market is suggested. About 29,268 square feet of roofing would be needed.

Parking area.--Off-street parking areas should be provided on the market for a total of 230 motor vehicles. The parking areas should be out of traffic lanes, surfaced, well-drained, and with plainly marked individual spaces 10 feet wide.

## Arrangement of Facilities

The layout for a No. 2 market is shown in figure 24. The market proper contains 34,397 square feet, of which the sales barn occupies 3,185 square feet and the yard facilities 31,212 square feet. The barn faces a public highway, and a 40-foot wide curved driveway provides access from the highway to the truck docks, to the barn, and to the parking areas.

The rear of the sales barn adjoins the market yards in the same manner as at the No. 1 market. Likewise, the truck dock for receiving is located on the left side, the truck dock for loading is on the right side, and both project out from the yards to permit additional holding pens to be added and alleys to be lengthened without affecting the flow of livestock or the efficiency of performing market operations.

The layout has 5 drive alleys which divide the sorting alley, the sorting pens and tagging chute, the scale pocket, the scale platform, the graded calf pens, the catch pens used in receiving, the cattle pens, the bull pens, and the cattle buyer pens into 4 rows. Two major cross alleys are provided, 1 near the center of the yards, and 1 in the rear of the yards separating the specially designed pens from the overflow pens. Six small cross alleys opening into drive alleys are provided to serve small size pens.

The area to the rear of the truck dock used for receiving is used for sorting, marking or tagging, and weighing livestock to minimize the distance of travel from the chute pens to the sorting alley.

Five catch pens are located on alley 2 near the "off" end of the scale platform. Four of these are provided for group movement of cattle to holding pens in the yards and can also be used for holding the last of the cattle arriving on the market. Catch pen 6 is located near the sales ring for temporarily holding a pen lot of animals until they are driven into the facilities for driving livestock into the sales ring. Catch pen 7 is adjacent to the "out" gate of the sales ring and is used to hold lots of animals after their sale and before they are yarded back into holding pens. This catch pen has an interior gate which can be closed to form 2 pens.

The holding pens for graded calves are to the rear and on the left side of the yards adjacent to the sorting and weighing area. The bull pens are to the rear of the facilities used to drive animals into the sales ring. The buyer cattle pens are in the front right side of the yards on the drive alley leading from the "out" gate of the sales ring. The cattle pens occupy most of the space in 3 rows of pens between the 2 cross alleys. The overflow pens are located in a row across the rear of the market.

The hog holding pens are in the front left corner between the receiving area and the sales ring. The graded hog pens are in 2 rows along a drive alley leading from the scale platform. The ungraded hog pens are in 2 rows to the right of the graded hog pens. The hog holding pen area has 5 drive alleys and 2 cross alleys.

The arrangement of the yard facilities provides for short drives between work stations with a minimum amount of labor, as well as the flexibility needed in yarding animals.

If it becomes necessary to increase the number of holding pens for any one or all of the species sold on the market and to add an additional scale to handle the increased volume: (1) New pens and alleys for hogs could be constructed to the front of the yard area and alleys H 2, H 3, H 4, and H 5 could be extended to serve the additional pens; (2) new pens and alleys for graded calves and cattle could be constructed in the overflow pens and new overflow pens could be constructed to the rear of the new pens; and (3) an additional scale platform, scale house, scale pocket, sorting pen, tagging chute, and sorting alley could be constructed adjacent to the first scale in the area now used for graded calf pens. If the expansion of the yards were



carried out in this manner there would be little, if any, change in the flow of livestock into, through, and out of the yards.

Amount of Land Needed for Market Site

The market site, to provide enough space for the market proper, the driveways, the parking areas, and an area for possible future market expansion should be 600 by 500 feet and would contain about 6.9 acres and preferably be located on a main highway. The suggested arrangement of the market proper, driveways, and parking areas is shown in figure 25. The width and depth of the site cannot be materially reduced without affecting adversely the future expansion area and the number of parking spaces.

PLOT PLAN

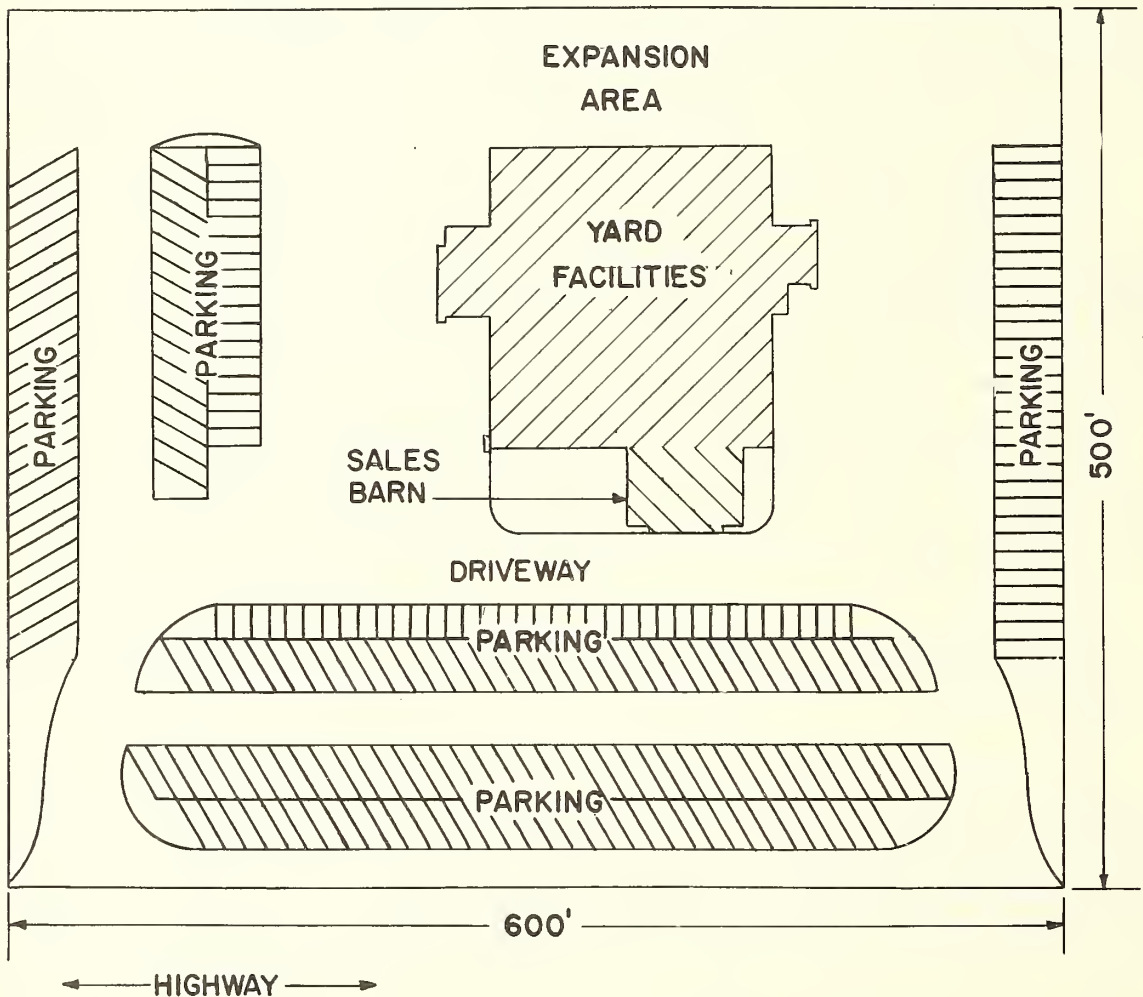


Figure 25.--The proposed site for market No. 2 with the arrangement of the market proper, the driveways, and the parking areas shown.

Estimated Costs of Construction

The estimated costs of the facilities proposed for a market designed to handle 350 cattle, 125 calves, and 600 hogs are shown below. The basis used in determining these costs is the same as that used for determining the costs for the No. 1 market.

<u>Item</u>	<u>Estimated Costs</u>
	<u>Dollars</u>
Docks, chutes, and chute pens . . . . .	1,920
Cattle and calf pens:	
Fences and gates, 5 feet high, 3,677 linear feet	
@ \$2.80 per foot . . . . .	10,296
Hayracks and feed troughs, 40 linear feet @ \$2.10 per foot.	84
Water troughs, 4 troughs @ \$28.75 each. . . . .	115
Paving alleys (black top)	
850 square yards @ \$2.60 per square yard . . . . .	2,210
Hog pens:	
Fences and gates, 3 feet 6 inches high	
1,207 linear feet @ \$2.50 per foot . . . . .	3,018
Water troughs, 176 linear feet @ \$2.60 per foot . . . . .	458
Paving pens and alleys (concrete)	
610 square yards @ \$3.10 per square yard . . . . .	1,891
Scale, 7-by 14-foot platform and scale house. . . . .	2,800
Roof over yards, 29,268 square feet @ \$0.60 per square foot . . . . .	17,561
Catwalk over yards, including 2 stairways	
560 linear feet @ \$2.90 per foot . . . . .	1,624
Yard lighting . . . . .	558
Sales barn, wood frame construction, includes stairs on front, auction box, offices, restaurant, and toilets,	
3,060 square feet @ \$3.50 per square foot <u>1/</u> . . . . .	10,710
213 theater-type seats @ \$5.50 each . . . . .	1,172
2 public address systems @ \$600 each. . . . .	1,200
Ticket carrier system. . . . .	1,000
Water lines in cattle and hog pens, cafe, and toilets . . . . .	1,200
Sanitary sewers (inside market area). . . . .	750
Driveways, truck dock approaches, access roads, and parking areas (rolled gravel) 17,000 square yards	
@ \$0.60 per square yard. . . . .	<u>10,200</u>
Subtotal . . . . .	68,767
Engineering fees @ 6 percent. . . . .	<u>4,126</u>
Total cost of market . . . . .	<u>72,893</u>

1/ Estimate includes all electrical work, lighting fixtures, plumbing, and toilet facilities, but does not include office and restaurant equipment.

### How Proposed Facility Should Operate

Definite flow lines must be followed during the receiving, selling, and loading cycles of operation due to the arrangements of the various components of the market. These lines are shown by flow diagrams (figs. 26 and 27). Other flow lines would be possible by swinging some of the pen gates differently.

#### Receiving Livestock

Livestock are unloaded from trucks at the truck dock into chute pens. Hogs are driven from chute pens across alley 1 into the sorting alley, where they are sorted by grades into sorting pens 1 through 3. Hogs not meeting any of the grade specifications may be handled in the same manner. Hogs are driven from the sorting pens into the scale pocket and onto the scale platform for weighing. While they are being moved onto the scale, a scale ticket is prepared for the lot. Graded lots are driven off the scale platform into and through alleys 2 and H 2 to graded holding pens 1 to 6 and 201 to 211. Hogs not meeting grade specifications are driven from the scale platform into and through alleys 2, H 2, H 7, H 3, and H 5 to holding pens 7 through 20 and 21 through 48.

Calves are driven from the chute pens across alley 1 and into the sorting alley. Calves that meet grade specifications are sorted by grade into the 3 sorting pens. Each grade lot is driven through the scale pocket onto the scale platform for weighing and the preparation of the scale ticket. After weighing, graded calves are driven from the scale platform through alleys 2 and C 1 to holding pens 213, 215, and X 1 to X 10.

Cattle and ungraded calves are driven from the chute pens into the sorting alley, where they are sorted by market classes. Animals to be sold singly are tagged in the sorting alley or driven into the tagging chute and tagged. Animals to be sold in groups are marked and driven into the sorting pens. From the sorting pens or tagging chute cattle and calves to be sold by weight are driven through the scale pocket and onto the scale platform for weighing and the preparation of the scale ticket. If cattle or calves are to be sold by the head, a ticket is prepared and the animals are driven from the sorting pen or tagging chute through the scale pocket and across the scale platform.

From the scale platform animals are driven into catch pens 2, 3, 4, or 5 for group movement to holding pens in the yards. Bulls, milk cows, and baby calves are yarded directly from the scale platform to the assigned holding pens in the yards. Livestock are driven in groups from catch pens 2, 3, 4, and 5 through alley 3 to pens 312 and 314, or through alleys 3, 6, and 4 to holding pens 414 to 428. Animals yarded in pens 210 to 216 and 311 to 317 move directly from the scale platform through alley 2. Bulls to be yarded in pens X 11 to X 26 and animals to be yarded in pens X 27 to X 34 would be driven directly from the scale platform by way of alleys 2, 6, 3, and C 3, C 5, or C 6 to the appropriate holding pen.



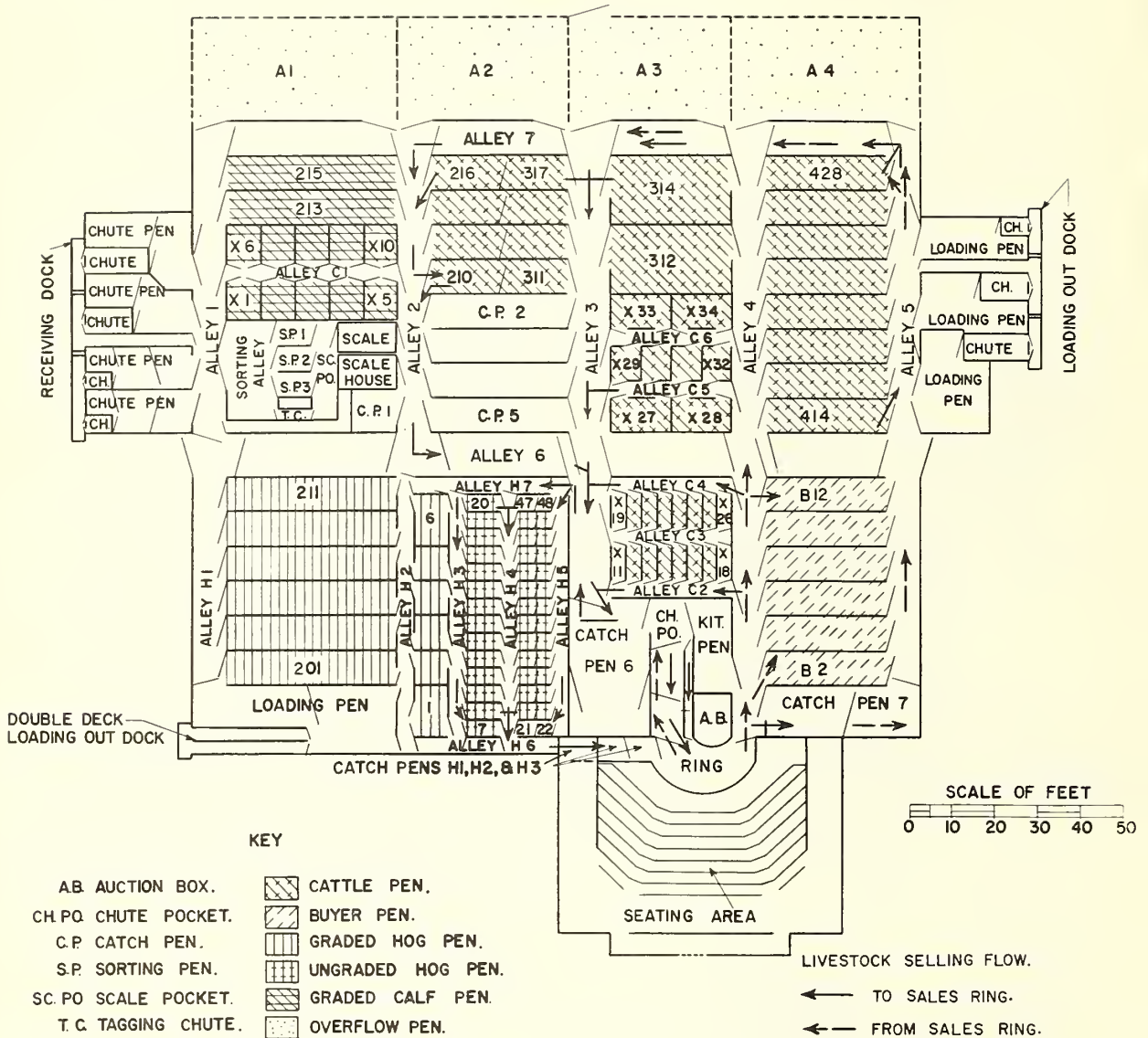


Figure 27.--The flow of livestock during the selling cycle on the proposed No. 2 market.

The flow of hogs, graded calves, cattle, and ungraded calves during the receiving cycle to holding pens is shown in figure 26.

### Selling Livestock

The assumed order in which livestock would be sold at the proposed market is cattle and ungraded calves, graded calves, ungraded hogs, and graded hogs. The order of sale could vary without affecting the lines of flow in driving the various species to and from the sales ring (fig. 27).

Cattle and ungraded calves yarded in pens 414 through 428 should be sold first so that these pens can be used to yard buyer cattle if the need arises. Animals in these pens would be driven through alleys 5, 7, and 3 to catch pen 6. Animals yarded in pens 210 through 216, and 311 through 317 would be driven through alley 3 to catch pen 6. Cattle, ungraded calves, and bulls yarded in pens X 11 through X 34 would move through alleys C 2, C 4, C 5, C 6, and 3 to catch pen 6.

Lots of animals in catch pen 6 are driven into the sales ring in the same manner as that described for the No. 1 market. Animals purchased by major buyers would be yarded through alley 4 into buyer pens B 2 to B 12. Other animals not including bulls, are assembled in catch pen 7 and driven in pen lots through alleys 5, 7, and other appropriate alleys to holding pens in the yards, usually the pen the animals were yarded in before their sale. Bulls are yarded after their sale through alleys 4, C 2, and C 4 to the pen they were in before their sale.

Graded calves would be sold in the holding pens.

Ungraded hogs yarded in pens 7 through 48 move through alleys H 4 and H 6 to catch pen H 1. From catch pen H 1 the hogs are driven into catch pen H 2, from there into catch pen H 3, and then into the sales ring. After the hogs are sold, they are driven out of the sales ring and through the feeder alley, chute pocket, catch pen 6, alleys 3, H 7, and alley H 3 or H 5 to the holding pen they were yarded in before their sale.

Graded hogs would be sold in the holding pens.

### Loading Out Livestock

Cattle, ungraded calves, and bulls loaded during the sale are assembled from pens throughout the yards and driven through alleys 1, 2, 3, 5, and 7 to the loading out dock. Graded calves are moved through alleys C 1 and 1 to the same dock at which they were received. Graded calves loaded out after the sale would move to the dock in the same manner. Hogs are the last species sold and probably would be loaded out after the sale. The flow diagram of loading out operations is shown in figure 26.

After the sale animals would be loaded out at both the receiving and loading out docks. The dock used would depend primarily upon the location of the holding pen in relation to the 2 docks. Animals in pens on the right side of the yards would be driven through alleys 4, 6, 7, and 5 to the loading out dock. Animals yarded in pens on the left side of the yards would move through alleys 2, 6, 7, and 1 to the dock used for receiving.

Graded hogs to be loaded onto double deck trucks would move through alleys H 1, H 2, or H 3 and H 6 to the loading pen for the double deck chutes. Graded and ungraded hogs to be loaded on single deck trucks would be moved through alleys H 3 or H 5, H 7, 2, 6, and 1 to the docks for receiving.

### Labor Requirements

It is estimated that 14 workers, other than the office force, would be required to operate the proposed market when the volume handled is about 350 cattle, 125 calves, and 600 hogs. The workers required would be an auctioneer, weighmaster, clerk, hog and calf grader, 2 ringmen, 7 yardmen, and a foreman to supervise and to assist in the performance of various jobs of short duration.

Fifteen workers, other than the office force, are required by the typical market in the area handling the same volume. The labor requirements for the proposed market, as compared with those of the typical market in the area, are discussed by major operating cycles.

### Receiving Operations

Ten workers are required for receiving livestock. The crew consists of a weighmaster, clerk, grader, and 7 yardmen. The weighmaster, clerk, and grader usually work at the same job during the receiving cycle. The yardmen, while assigned specific jobs, may exchange jobs and may assist one another in performing their jobs. The jobs assigned to the 7 yardmen are as follows: One assists the grader and also brings animals from the chute pens to the sorting alley, 1 tags or marks cattle, 1 assists the tagger as well as drives the animals from the chute pens to the sorting alley, 1 drives animals from the sorting pens and tagging chute onto the scale platform, and 3 drive animals off the scale platform and yard them into holding pens. Livestock are received from 7 a.m. to 3 p.m. Within this 8-hour period the number of receipts will vary widely, so the hours of the workers reporting for work are staggered to conform to this variation. From 7 a.m. to 9 a.m., the receiving crew would consist of 8 workers--a weighmaster, a clerk, a grader, and 5 yardmen. Two more yardmen would report for work at 9 a.m., and the receiving crew would have 10 workers until the start of the sale at 2 p.m. At 2 p.m., 7 workers from the receiving crew of 10 would be shifted to jobs in the selling cycle and 3 workers would receive livestock until 3 p.m. At 3 p.m. the job of the grader and weighmaster are terminated, and the other worker would be available to load out livestock.

The total labor requirements for receiving livestock on the proposed market based on the above hours of work and estimated number of workers are 69 man-hours.

The typical market would use 9 workers between 7 and 9 a.m., 11 between 9 a.m. and 2 p.m., and 3 between 2 and 3 p.m. for a total of 76 man-hours-- 7 man-hours more than are required at the proposed market.

### Selling Operations

Ten workers are required for selling livestock. An auctioneer and 2 workers report for work at the start of the sale, and 7 workers are shifted from the receiving to the selling operation. Three workers continue to receive livestock while the sale is in progress; they also load out livestock.

A crew of 10 performs the selling operations: One yardman to bring up pen lots of animals for sale, 3 to sort animals into salable lots and drive them into the sales ring, 2 to display and drive the animals out of the sales ring, 2 to yard animals after their sale, an auctioneer to sell the animals, and a clerk to record the sales data.

It is estimated that the selling cycle requires 3 hours, from 2 to 5 p.m. The labor requirements for selling livestock, excluding the labor of the auctioneer and foreman, are 27 man-hours.

Ten workers, excluding the auctioneer and foreman, are used on the typical market to sell livestock. It is estimated that the selling cycle lasts from 2 to 6 p.m. for the same volume of livestock. Thus, the labor requirements based upon 10 workers and a 4-hour sale would be 40 man-hours-- 13 man-hours more labor than at the proposed market.

### Loading Out Operations

One worker would be assigned the job of loading out livestock during the sale. For the first hour of the sale he would be on the receiving crew yarding the late arrivals, and would be available to load out livestock after the receiving cycle is completed. He should be able to handle almost all of the load-outs with the assistance of the truck driver. When additional help is needed, the foreman could assist him. At the end of the sale, around 5 p.m., 9 workers from the selling crew would join him. It is estimated that the major portion of the livestock could be loaded out by 7 p.m. Therefore, the loading out cycle is considered to be from 3 to 7 p.m., and 22 man-hours of labor are required.

It is estimated that the typical market, with the same volume of livestock, would load out for 5 hours from 3 to 8 p.m. During the sale, from 3 to 6 p.m., 1 worker would be available to load out and after the sale, from 6 to 8 p.m., 11 workers would load out. The total labor required would be 25 man-hours-- 3 man-hours more than at the proposed market.



## Summary of Labor Requirements

The estimated total labor required to conduct a sale when the volume is 350 cattle, 125 calves, and 600 hogs is 118 man-hours for the proposed market and 141 man-hours for the typical market. The 23 man-hour reduction is due to the elimination of 1 worker from the crew and to the improved facilities and layout which allows operations in the selling cycle to be performed more promptly and with fewer delays. On the basis of an assumed wage rate of \$1 per hour, the labor savings would amount to \$23 per sale or, with 50 sales annually, an annual savings of \$1,150.

### PROPOSED LAYOUT FOR A NO. 3 MARKET, DESIGNED TO HANDLE 590 CATTLE, 245 CALVES, 315 SHEEP, AND 125 HOGS

The proposed layout for a market designed to handle 590 cattle, 245 calves, 315 sheep, and 125 hogs is shown in figure 28. This market would employ the same market practices as the No. 1 market.

This market layout also could be used when either sheep or hogs form the major volume handled. If sheep are the predominant species, then the cattle pens adjacent to the present sheep pens would be used for sheep and the market could handle 470 cattle, 245 calves, 700 sheep, and 125 hogs. When hogs are the predominant species, the cattle pens adjacent to and across the market drive alley from the present hog pens could be constructed as hog pens, the market drive alley would be narrowed, and the market could handle 430 cattle, 245 calves, 315 sheep, and 750 hogs. The market practices for this volume would be the same as those described for the No. 1 market with one exception, hogs would be graded.

Only the market designed to handle 590 cattle, 245 calves, 315 sheep, and 125 hogs will be discussed in the report.

### Facilities Needed

The facilities needed for this market will be similar to those described for the No. 1 market; however, the amount of pen facilities will be greater because of the larger volume.

#### Facilities for Receiving Livestock

A truck dock with 6 chute pens, 2 sorting alleys, 6 sorting pens, 2 tagging chutes, 2 scale pockets, 2 scale platforms, 2 scale houses, 2 alleys, 6 catch pens, and walkways are proposed to receive livestock into the market. The proposed facilities for the market are shown in figure 12.

#### Facilities for Moving and Holding Livestock in the Yards

The arrangement of the alleys, block gates, catch pens, and holding pens is shown in figure 28.

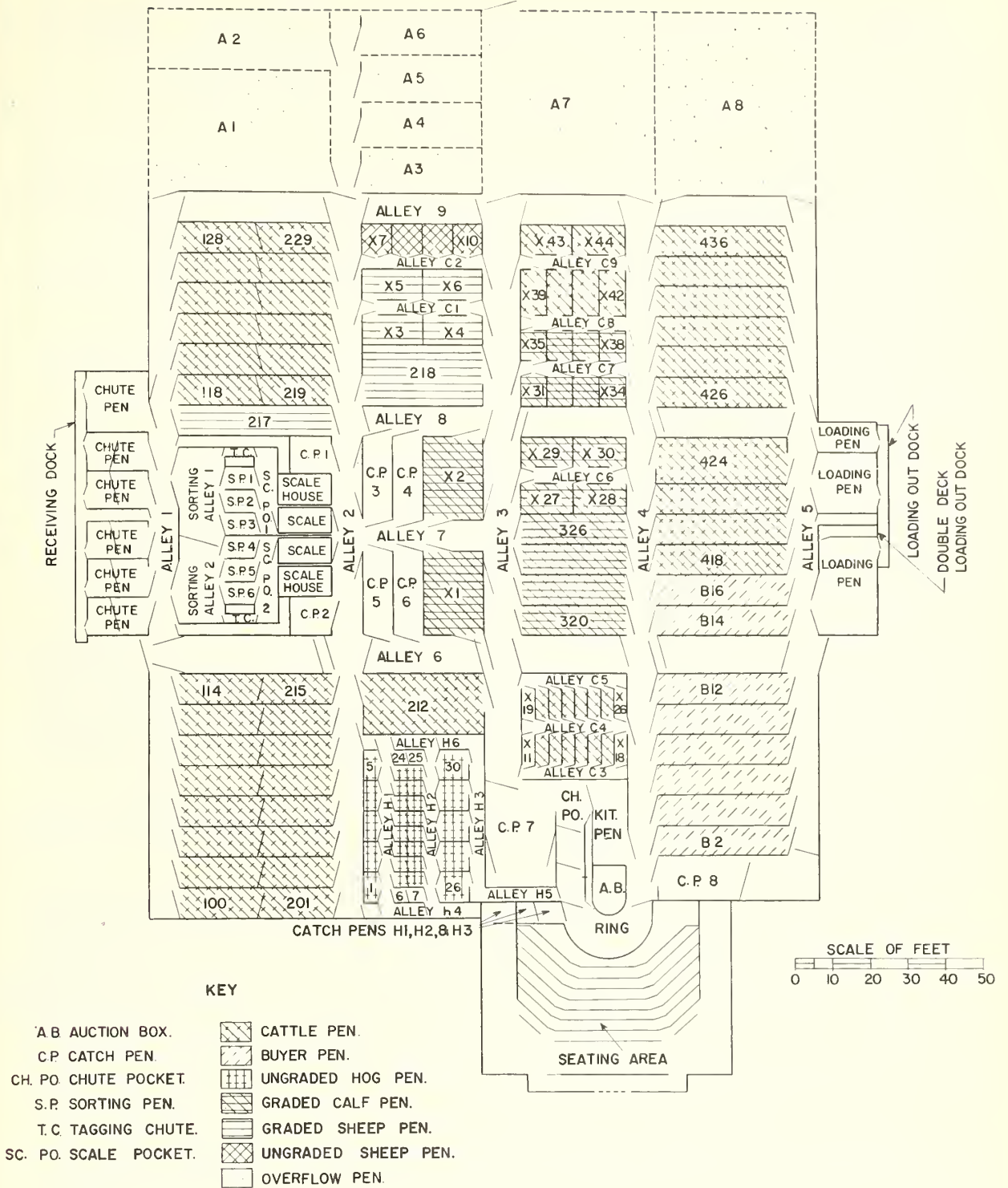


Figure 28.--Layout of the proposed No. 3 market, designed to handle 590 cattle, 245 calves, 315 sheep, and 125 hogs.

Alleys.--Five major drive alleys and 3 cross alleys are proposed for the market. Six alleys are 8 feet wide and 2 are 10 feet wide. The width of alleys must conform to local ordinances whenever fire lanes are required.

Alleys are 4 feet wide in the small size cattle, bull, calf, sheep, and hog pen sections of the yards.

Alleys in the hog section of the market should be of roughened concrete and a part of a continuous slab suggested for the hog area. All other alleys should be paved with either concrete or black top on a compacted base.

Block gates.--The location and use of block gates would be the same as for the No. 1 market.

Catch pens.--Eleven catch pens are suggested for this market. Catch pens 1 through 7 and H 1 through H 3 are the same size as those with the same number on the No. 1 market. Catch pen 8 is 12 by 43 feet.

Holding pens.--Based on the same factors used for determining the type, size, and number of pens needed for market No. 1, 77 pens are suggested for handling 835 cattle and calves, 10 pens for 315 sheep, and 20 pens for 125 hogs. In addition 8 overflow pens are suggested for peak volume days. A total of 115 pens containing 24,892 square feet of space is proposed for the market (table 4).

Eighteen of the cattle and calf pens would be used for yarding graded calves. These pens would have a capacity for 249 calves. Eight of the 59 cattle pens would be used for yarding buyer cattle and their space is not considered in determining the holding capacity of the market for cattle. The 51 pens used for yarding seller cattle would have a capacity for 590 head, including bulls.

The 6 graded and 4 ungraded sheep pens would have a capacity for holding 320 sheep. The 20 hog pens would hold approximately 133 hogs.

The 8 overflow pens could be used for holding either cattle or sheep. On peak volume days graded calves would be yarded in cattle pens and cattle would be yarded in overflow pens. If 2 of the overflow pens would be used for holding cattle and the proportion between cattle and calves remained the same, then an additional 210 cattle and 90 calves could be handled. Therefore, the market could handle about 800 cattle and 339 calves. Assuming that 6 of the overflow pens containing 3,840 square feet could be used for holding sheep, an additional 768 sheep could be handled. Thus, the market could handle about 1,088 sheep.

Under peak sales conditions, the market could provide pen space for about 800 cattle, 339 calves, 1,088 sheep, and 133 hogs; however, the market could not be operated as efficiently as when the volume handled is about 590 cattle, 245 calves, 315 sheep, and 125 hogs.

Table 4.--Dimensions and number of holding pens for cattle, calves, sheep, and hogs for market No. 3

Type of pen and dimension	Pens	Pen area
	Number	Square feet
<b>Cattle and calf pens:</b>		
<b>Cattle pens:</b>		
16 by 32 feet . . . . .	1	512
12 by 35 feet . . . . .	1	420
8 by 40 feet <u>1/</u> . . . . .	14	4,480
8 by 35 feet <u>2/</u> . . . . .	17	4,760
7 by 12 feet . . . . .	4	336
8 by 14 feet . . . . .	<u>2</u>	<u>224</u>
Total . . . . .	39	10,732
<b>Graded calf pens:</b>		
16 by 22 feet . . . . .	2	704
8 by 28 feet . . . . .	4	896
8 by 14 feet . . . . .	4	448
7 by 8 feet . . . . .	<u>8</u>	<u>448</u>
Total . . . . .	18	2,496
<b>Bull pens:</b>		
3 feet 6 inches by 8 feet . . . . .	16	448
<b>Catch pens:</b>		
8 by 22 feet <u>3/</u> . . . . .	<u>4</u>	<u>704</u>
Total cattle and calf pens . . . . .	<u>77</u>	<u>14,380</u>
<b>Sheep pens:</b>		
<b>Graded sheep pens:</b>		
16 by 32 feet . . . . .	1	512
8 by 40 feet . . . . .	1	320
8 by 16 feet . . . . .	<u>4</u>	<u>512</u>
Total . . . . .	6	1,344
<b>Ungraded sheep pens:</b>		
8 by 8 feet . . . . .	<u>4</u>	<u>256</u>
Total sheep pens . . . . .	<u>10</u>	<u>1,600</u>
<b>Hog pens:</b>		
8 by 8 feet . . . . .	5	320
4 by 8 feet <u>4/</u> . . . . .	<u>15</u>	<u>480</u>
Total hog pens . . . . .	<u>20</u>	<u>800</u>
<b>Overflow pens:</b>		
46 by 48 feet . . . . .	1	2,208
43 by 48 feet . . . . .	1	2,064
32 by 48 feet . . . . .	1	1,536
16 by 48 feet . . . . .	1	768
12 by 32 feet . . . . .	<u>4</u>	<u>1,536</u>
Total overflow pens . . . . .	<u>8</u>	<u>8,112</u>
<b>Grand total . . . . .</b>	<b>115</b>	<b>24,892</b>

1/ These pens have a center gate and can be divided into 2 pens.

2/ Eight pens containing 2,240 square feet would be used for yarding buyer cattle.

3/ These pens also are used for receiving cattle.

4/ Ten of these pens have a center gate and can be divided into 2 pens.

## Facilities for Driving Livestock into the Sales Ring

The suggested facilities for driving livestock into the sales ring are the same as those described for market No. 1.

### Sales Barn

The suggested sales barn is the same as the one described for market No. 1.

### Facilities for Loading Out Livestock

The facilities suggested for loading out livestock are the same as those described for market No. 1.

### Other Facilities

The other facilities suggested are water troughs, hayracks and grain troughs, catwalk, yard lights, kitchen pen, yard roof, ticket carrier system, market driveways, and parking areas. The combination hayracks and grain troughs, yard lights, kitchen pen, ticket carrier system, and market driveways are the same as for the No. 1 market.

Water troughs.--A total of thirteen 10-foot water troughs are suggested for the 8 overflow pens placed in the same manner as described for the No. 1 market. Twenty-four feet of water troughs are suggested to serve 5 hog pens. Hydrants with threaded hose connections also should be provided in the hog area to wet down hogs in hot weather and for washing out pens.

Catwalk.--A catwalk 655 feet long is needed to form a complete loop over the yards, with connections to the sales barn and the 2 truck docks.

Yard roof.--The market yards, with the exception of the overflow pens, should be covered. The monitor-type roof described for market No. 1 is suggested. About 38,800 square feet of roof would be needed.

Parking area.--About 290 parking spaces should be provided on the market. The parking spaces should be 10 feet wide, located out of traffic lanes, surfaced, and well-drained.

### Arrangement of Facilities

The layout for a market designed to handle 590 cattle, 245 calves, 315 sheep, and 125 hogs is shown in figure 28. The market proper contains 47,539 square feet, of which the sales barn occupies 3,185 square feet and the yard facilities 44,354 square feet. The arrangement of the sales barn and driveways, the market yards, and the 2 truck docks is the same as for the No. 1 market.

Five drive alleys divide the facilities within the yard area into 4 rows. Three cross alleys divide the 4 rows of facilities into 11 blocks. Two of the cross alleys extend from one side of the yard to the other, and 1 extends from the receiving area to the far side of the yards. An alley used in connection with receiving livestock into the yards is limited in its use for other operations and is not considered a major alley. Nine small cross alleys opening into drive alleys are located in the 2 center rows so that small pens may be provided.

The location and arrangement of the receiving facilities, including the truck dock, the processing area, alleys, and catch pens are the same as for market No. 1. Likewise, catch pens 7 and 8 are located and have the same purpose as on market No. 1.

The holding pens for graded and ungraded sheep are located on the left side of the yards, adjacent and to the rear of the sorting and weighing area. Graded calf holding pens are in the center and to the rear of the yards. The bull pens are adjacent and to the rear of the facilities for driving livestock into the sales ring. The buyer cattle pens are on the right front side of the yards on the alley leading from the "out" gate of the sales ring. The cattle pens are in 3 general areas, the left front, the left rear, and the right rear of the yards. The overflow pens extend across the rear of the yard area. The hog holding pens are in the front of the yards and are served by 3 drive and 2 cross alleys within the hog area.

The arrangement of the yard facilities in relation to drive and cross alleys permits the movement of livestock between work stations with short drives and with a minimum amount of labor. The arrangement also provides the flexibility needed when livestock are yarded back into the same holding pen they were in before their sale.

If it becomes necessary to increase the number of holding pens for any or all of the species sold by the market: (1) Additional pens and alleys for hogs could be constructed both in the cattle pen adjacent to the hog area and to the front of the yards; (2) additional pens and alleys for sheep could be constructed in the area now occupied by cattle pens or in the overflow pens, and new overflow pens could be constructed to the rear; and (3) more cattle holding pens and alleys could be constructed in the overflow pens and new overflow pens could be constructed to the rear of these pens. There would be little, if any, change in the flow of livestock, if the expansion in the yard were carried out in this manner.

#### Amount of Land Needed for Market Site

A market site 600 by 600 feet containing about 8-1/4 acres, is suggested for the market (fig. 29). The arrangement of the market proper, the drive-ways, and parking areas is similar to those suggested for markets Nos. 1 and 2.

# PLOT PLAN

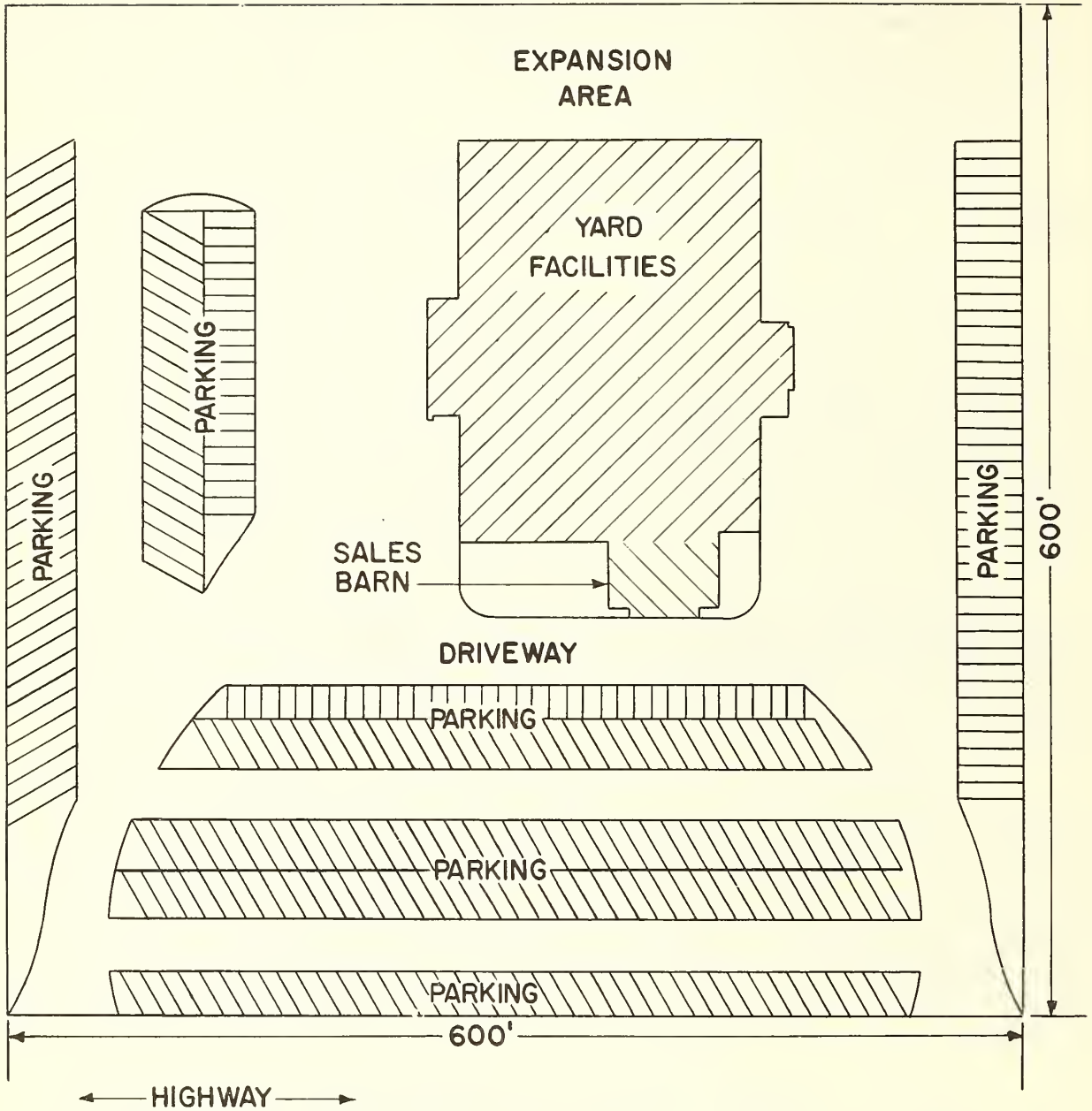


Figure 29 --The proposed site for market No. 3, with the arrangement of the market proper, the driveways, and the parking areas shown.

Estimated Costs of Construction

The estimated costs of the facilities proposed for a market designed to handle 590 cattle, 245 calves, 315 sheep, and 125 hogs are shown below. The basis used in determining these costs is the same as was used for the No. 1 market.

<u>Item</u>	<u>Estimated Costs</u>
	<u>Dollars</u>
Docks, chute, and chute pens. . . . .	2,300
Cattle, calf, and sheep pens:	
Fences and gates 5 feet high, 6,150 linear feet @ \$2.80 per foot . . . . .	17,220
Hayracks and feed troughs, 30 linear feet @ \$2.10 per foot. . .	63
Water troughs, 13 troughs @ \$28.75 each . . . . .	374
Paving alleys (black top) 1,327 square yards @ \$2.60 per square yard . . . . .	3,450
Hog pens:	
Fences and gates 3 feet 6 inches high, 480 linear feet @ \$2.50 per foot . . . . .	1,200
Water troughs, 24 linear feet @ \$2.60 per foot. . . . .	62
Paving pens and alleys (concrete), 180 square yards @ \$3.10 per square yard. . . . .	558
2 scales, 7-by 14-foot platforms and 2 scale houses . . . . .	5,600
Roof over yards, 38,800 square feet @ \$0.60 per square foot . .	23,280
Catwalk over yards, including 2 stairways:	
655 linear feet @ \$2.90 per foot . . . . .	1,900
Yard lighting . . . . .	700
Sales barn, wood frame construction, includes stairs on front, auction box, offices, restaurant, and toilets	
3,060 square feet @ \$3.50 per square foot <sup>1/</sup> . . . . .	10,710
213 theater-type seats @ \$5.50 each . . . . .	1,172
2 public address systems @ \$600 each. . . . .	1,200
Ticket carrier system . . . . .	1,000
Water lines in cattle, sheep, and hog pens, cafe, and toilets .	1,165
Sanitary sewers (inside market area) . . . . .	750
Paving (rolled gravel): Driveways, truck dock approaches, roads and parking areas, 24,000 square yards @ \$0.60 per square yard. . . . .	14,400
Subtotal . . . . .	<u>87,104</u>
Engineering fees @ 6 percent. . . . .	5,226
Total cost of market . . . . .	<u>92,330</u>

<sup>1/</sup> Estimate includes all electrical work, lighting fixtures, plumbing, and toilet facilities, but does not include office and restaurant equipment.



### How Proposed Facility Should Operate

The flow lines that must be observed during the 3 operating cycles, if the facility is to operate efficiently, are shown in figures 30 and 31. If some of the pen gates were swung differently, other flow lines would be possible on the layout.

#### Receiving Livestock

Cattle, calves, sheep, and hogs are unloaded at the truck dock from pickup, farm stake-body, and tractor-trailer trucks into chute pens. From the chute pens and until they are weighed, all livestock are handled on this market in the same manner as was described for the No. 1 market.

Cattle are driven from either scale platform through alleys 2 and 7 and into catch pens 3, 4, 5, or 6 for group movement to holding pens in the yards. Bulls, milk cows, and baby calves would be driven from the scale platforms to the assigned holding pens. Cattle are driven in groups from catch pens 3, 4, 5, or 6 through alleys 6 or 8, and 2, to holding pens 100 to 114, 118 to 128, 201 to 215, 212, and 219 to 229, or through alleys 6 or 8, and 4 to holding pens 418 to 436.

Graded calves are driven from either scale platform through alleys 2 and 7 to holding pens X 1 or X 2, through alleys 2, 7 and 3 to holding pens 320 to 326, or through alleys 2, 7, 3, and C 6 or C 7 to holding pens X 27 to X 38.

Sheep are driven off either scale platform and into alley 2. Graded sheep are driven through alleys 2, or 2 and C 1 to holding pens 217, 218, and X 3 to X 6. Ungraded sheep are driven through alleys 2 and C 2 to holding pens X 7 to X 10.

Hogs are driven off either scale platform and into and through alley 2 to alley H 6. Hogs to be yarded into holding pens 1 to 25 are moved through alley H 1, and hogs to be yarded into holding pens 26 to 30 are moved through alley H 2.

The flow of cattle, calves, sheep, and hogs during the receiving cycle is shown in figure 30.

#### Selling Livestock

The assumed order of sale on the proposed market is cattle and ungraded calves, graded calves, sheep, and hogs. The order of sale could be changed without affecting the lines of flow. Figure 31 shows the flow of livestock during the selling cycle.

Cattle and ungraded calves in holding pens 418 to 436 would be sold first. The animals in these pens move through alleys 5, 4, 8, and 3 to catch pen 7. Cattle, ungraded calves, and bulls in holding pens 212, X 11 to X 26

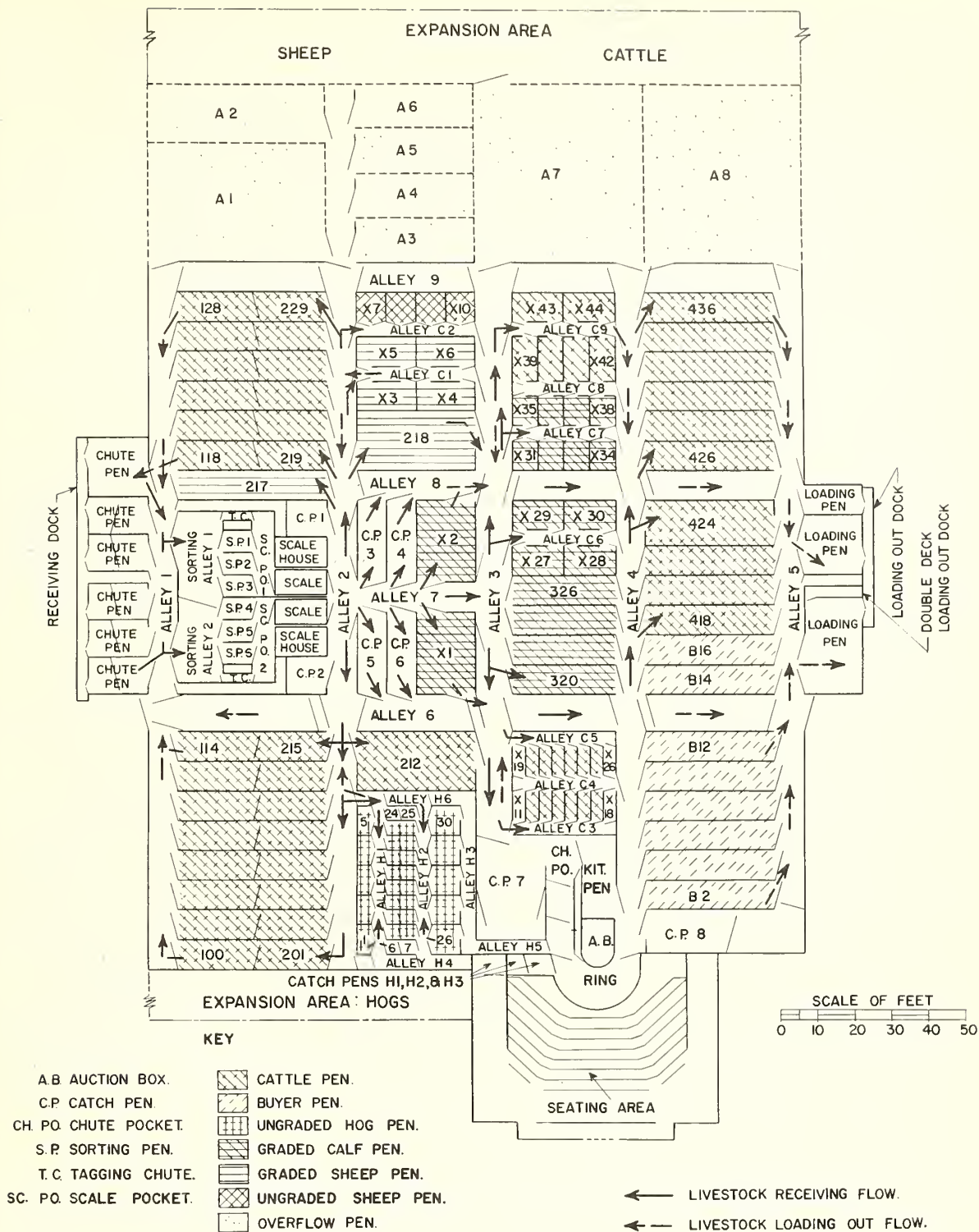


Figure 30.--The flow of livestock during the receiving and loading out cycles on the proposed No. 3 market. Also, the suggested expansion areas are shown.

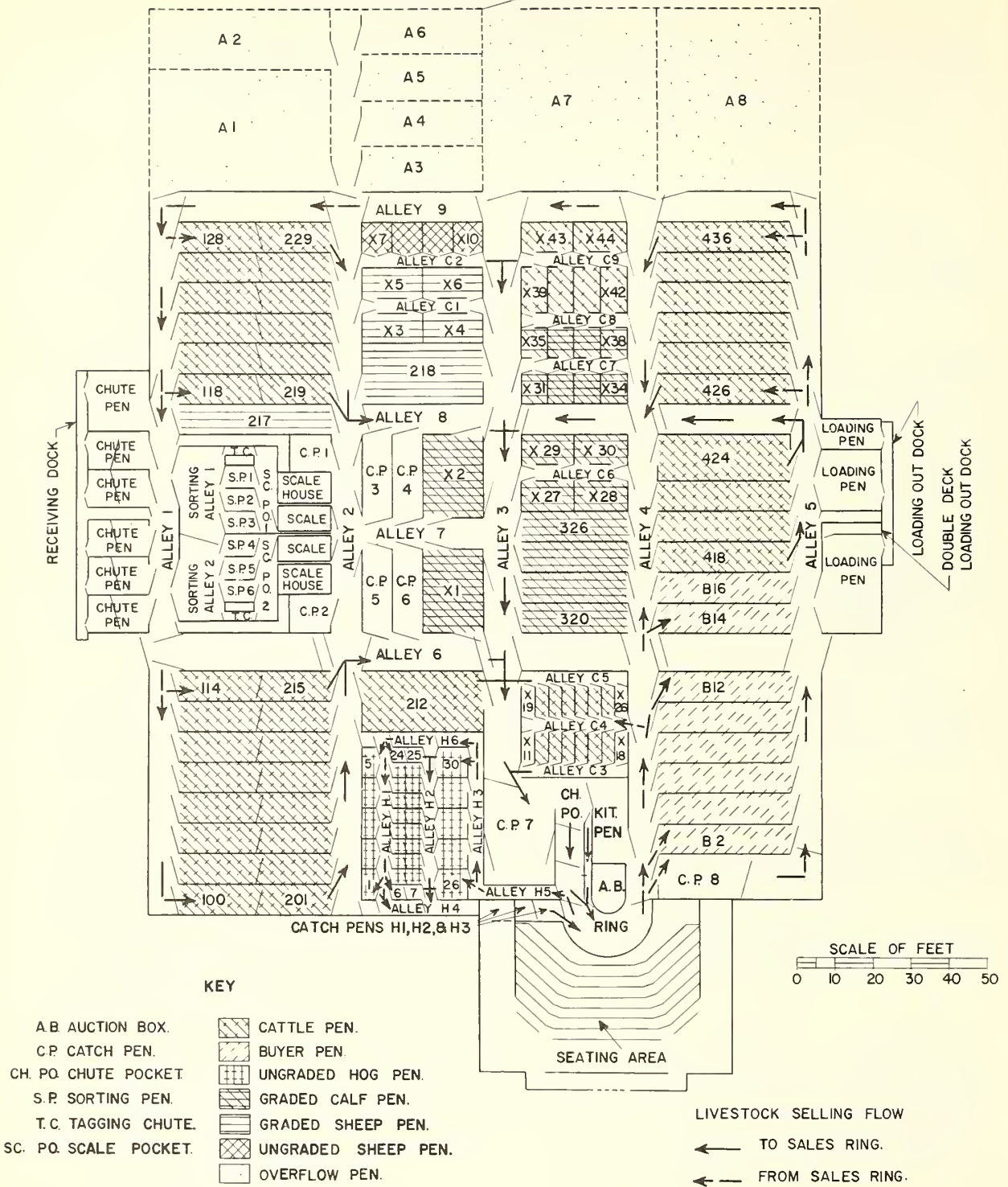


Figure 31.--The flow of livestock during the selling cycle on the proposed No. 3 market.

and X 39 to X 44 move into and through alley 3 to catch pen 7. Animals in holding pens 100 to 114, 118 to 128, 201 to 215, and 219 to 229 move through alleys 2, 6, 8, and 3 to catch pen 7.

The lots of cattle and ungraded calves in catch pen 7 would be moved through the facilities for driving livestock into the ring, through the sales ring, and into catch pen 8 or the buyer pens in the same manner as described for market No. 1.

Both graded calves and sheep would be sold in the holding pens; however, they could be moved through the sales ring if desirable.

Ungraded sheep move from holding pens X 7 to X 10 through alleys C 2 and 3 to catch pen 7. From catch pen 7 they follow the same course described for ungraded sheep on market No. 1.

Hogs move from holding pens 1 to 5 through alleys H 1 and H 4 to catch pen H 1. Hogs in holding pens 6 to 25 and 26 to 30 move through alleys H 2 and H 4 to catch pen H 1. From catch pen H 1 hogs are driven through catch pens H 2 and H 3 and into the sales ring. After their sale hogs are driven through alleys H 5, H 3, H 6, and H 1 to the pens where they were yarded before their sale.

#### Loading Out Livestock

Loading out begins shortly after the start of the sale; however, most of the livestock would be loaded after the sale is over. The flow diagram of the loading out operations is shown in figure 30.

During the sale cattle and ungraded calves would be assembled from pens throughout the yards and moved by way of alleys 1, 2, 3, 4, 5, and 9 to the loading dock. Graded calves are moved through alleys 6, 8, C 6, or C 7, to alleys 3, 9, and 5 to the loading out dock. Graded sheep are moved through alleys 2 or C 1 and 2 to alleys 9 and 5 to the loading out dock. Ungraded sheep are moved through alleys C 2, 2, 9, and 1 or 5 to either the receiving or loading out dock.

After the sale, cattle could be loaded out at either the receiving or loading out dock. Both graded calves and sheep are loaded at the loading out dock. Ungraded sheep are loaded at the receiving dock. Hogs move through alleys H 1 or H 2, H 6, 2, 6, and 1 to the dock used for receiving.

#### Labor Requirements

It is estimated that 16 workers, other than the office force, would be required to operate the proposed market when the volume handled is 590 cattle, 245 calves, 315 sheep, and 125 hogs. The crew would consist of an auctioneer, 2 weighmasters, 2 clerks, a grader, 2 ringmen, 7 yardmen, and a foreman to supervise the activities.

On peak volume sales it is estimated that an additional grader would be required in the receiving crew. During the light run season, only 1 scale is needed and the receiving crew could be reduced by 4 workers. For the purpose of this analysis, it is assumed that the volume for which the market is designed and the labor force established to handle it would represent the average requirement during a typical year.

Twenty workers, other than the office force, are required by the typical market in the area handling the same volume. The total requirements for the proposed market, as compared with those of the typical market in the area, are discussed by major operating cycles.

#### Receiving Operations

Fourteen workers are required to receive livestock: Two weighmasters, 2 clerks, 1 grader, and 9 yardmen. The jobs assigned and the hours worked by the receiving crew are the same as described for market No. 1. Thus, the total labor requirements for receiving livestock, 94 man-hours, would be the same.

A typical market in the area handling the same volume of livestock would use 13 workers between 7 and 9 a.m., 16 between 9 a.m. and 2 p.m., and 4 between 2 and 3 p.m. for a total of 110 man-hours--16 man-hours more than at the proposed market.

#### Selling Operations

At the start of the sale 10 workers are shifted from the receiving to the selling operations. Four workers continue to receive livestock while the sale is in progress; they also may load out livestock.

The crew performing the selling operations is comprised of 11 workers--an auctioneer, a clerk, and 9 yardmen. One yardman to bring up pen lots of animals for sale, 3 to sort animals into salable lots and drive them into the sales ring, 2 to display and drive the animals out of the sales ring, 3 to yard animals after their sale, an auctioneer to sell the animals, and a clerk to record the sales data.

The estimated duration of the selling cycle is 4 hours, from 2 p.m. to 6 p.m. The number of man-hours required for selling, excluding the labor of the auctioneer and foreman, would be 40 man-hours.

The typical market uses 15 men in the selling crew and takes about 5 hours to sell the same volume of livestock. The sales crew have an auctioneer, 2 clerks, and 12 men to move the livestock from the seller pens, through the sales ring and into the buyer pens. Excluding the labor of the auctioneer and foreman, 70 man-hours are required for the sale--30 man-hours more than at the proposed market.

### Loading Out Operations

Loading out livestock begins shortly after the start of the sale, about 3 p.m., and continues until all the livestock are loaded out of the market. Since the majority of the animals would be loaded out by 8 p.m., thus, the loading out period is considered to be from 3 to 8 p.m. Between 3 and 6 p.m. 2 workers from the receiving crew would load out and at 6 p.m., when the sale is over, 10 workers from the sales crew would join the 2 men in loading out. The total labor requirements for loading out would be 30 man-hours.

The typical market loads out livestock until 10 p.m. Between 3 and 7 p.m. 2 workers load out, and at 7 p.m., when the sale is over, 11 workers from the sales crew join the 2 men in loading. Excluding the labor of the foreman, 47 man-hours are required for loading out--17 man-hours more than at the proposed market.

### Summary of Labor Requirements

The estimated total labor required to conduct a sale with the volume for which the proposed market is designed is 164 man-hours as compared with 227 man-hours for a typical market in the area--63 man-hours less labor per sale than the typical market. Part of this reduction is due to the 4 fewer workers required by the proposed market, and part is a result of the improved layout and arrangement of facilities which allow operations in the 3 cycles to be performed in a shorter time. On the basis of an assumed wage rate of \$1 per hour, the labor savings would amount to \$63 per sale or, with 50 sales annually, an annual saving of \$3,150.







