

A Thesis

An Architectural Thesis

In Partial Requirement of

A Bachelor of Architecture

Degree

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Site Consideration

Convenience is of major importance in the consumer shopping habits today. This is also true for lumber yards and it should be placed in the best possible location in terms of convenience to the people you want to serve. The site should, therefore, be related to major traffic arteries, residential growth patterns, freeway access points, or in the vicinity of a large shopping center development which assures a heavy concentration of retail trade. Industrial districts and deteriorating neighborhoods should be avoided as they discourage the patronage of customers.

Materials handling plays an important role in the decision on the location of a site. The site, ideally, should be served by rail and by truck. Sites served by and those not served by rail should objectively be weighed. The physical operation, manual or mechanical, to unload a distant rail car versus unloading from a yard spur is relative. The unloading facilities might seem to be equal, but they are not. Unloading at a distant rail site may be difficult due to many cars being unloaded simultaneously and this may cause confusion and congestion and waste time. There is then a differential in cost from unloading at a distant site and unloading at the yard, this being the cost of transferring of materials. Other elements which should be considered in the rise of cost at a distant site include a manpower loss to the service of the yard, pilferage

and theft at the rail site, supervision, and a duplication of of equipment.

The use of truck transport is being used more and more often and most items that are delivered by rail can also be transported by truck. Since rail sites are not always available at convenient locations the use of truck transport can be stressed. For convenience to the truck traffic the site should be located near a freeway and related to a major traffic artery.

A large site consisting of three to five acres is necessary. The site needs to be relatively flat, as the balance of materials on any part of the site is necessary. Too much of a slope can shift the materials, but a slight slope is necessary for drainage.

The site will have to be surfaced to withstand extremely heavy loads, up to ten tons. The surface should be smooth so as not to shift the loads on fork lifts or trucks. The cost of surfacing is important and the use of more than one type of surface should be considered.

Landscaping is more often than not completely ignored in lumber yards, but it is important in setting up the atmosphere in which people will come to buy. The materials used in landscaping should be those that require little or no upkeep.

The cost again is important and a minimum amount of money should be spent on landscaping the site.

The Site

The lumber yard is to be located in Sherman, Texas. Sherman is located in Grayson County in north central Texas, sixty-five miles north of Dallas and twenty miles from the Texas-Oklahoma border. The population is estimated at 31,000 and it has increased by nine thousand in the last ten years. Sherman covers an area of 9,712 square miles and is 728 feet above sea level with the mean average temperature being 64.2°F. and the average rainfall is 37.5 inches.

The Sherman-Denison area comprises one of the twenty-three metropolitan areas in Texas. The surrounding area is rapidly growing and construction is on the increase. From January to December 1970, \$18,633,137 in construction costs were spent in this area. Out of this 683 dwelling units were built costing \$8,880,000. Due to this growth, Sherman needs another lumber yard. The four already established can not handle all the business, and they can not expand.

The site chosen is located on Farm-to-Market Road 1417 and Taylor Street. Since truck traffic is vital to receiving goods in a lumber yard, the site is located on a farm-to-market- road which is a major artery from two highways--Highway 82 running east and west and Highway 75 running north and south. Both intersect this road, FM 1417. This road goes through Denison and Lake Texoma which this yard will serve. Lake Texoma is developing

exclusive residential sites with homes costing between \$25,000 and \$80,000. Naturally, lumber is necessary and since no yards are located at the lake, this lumber yard would supply this area.

A rail siding cannot be located in this area. The closest siding is two and a half miles from the site. Since most things can be delivered by truck this site is chosen for primarily truck traffic.

Since most of the newer developments are located in the northwest corner of the city, the site was chosen to be in this general area.

Three major streets intersect FM 1417 and they are Washington, Lambrath, and Taylor. At present Taylor Street is not a through street completely across town, but a bridge is proposed and will be finished by the time the yard is finished.

The site is relatively flat and sloping to the rear. Directly to the rear of the site is a 200 feet right of way for high power lines so nothing can be built closer than this. This area affords protection for the yard. Utilities are extended to FM 1417.



- L** **E** **G** **E** **N** **D**
- R-A SINGLE FAMILY AGRICULTURAL
 - R-1 SINGLE FAMILY
 - R-2 SINGLE FAMILY
 - R-3 MULTIPLE FAMILY
 - C-1 RETAIL BUSINESS
 - C-2 GENERAL COMMERCIAL
 - M-1 LIGHT MANUFACTURING
 - M-2 HEAVY MANUFACTURING
 - Corporate Limits
 - General Business Area
 - Zoning District Boundary

THE CITY OF SHERMAN, TEXAS, HAS ADOPTED THIS ZONING MAP AS PART OF ITS CITY PLAN AND AS A CONDITION OF THE GRANTING OF SUBDIVISION PLATS AND PLATS FOR THE CONVEYANCE OF REAL ESTATE IN THE CITY OF SHERMAN, TEXAS.

APPROVED:

BY _____

DATE _____

ZONING DISTRICT MAP

SHERMAN URBAN PLANNING
 1001 N. J. WALKER BLVD. SHERMAN, TEXAS 79151
 SHERMAN, TEXAS 79151

FOWLER G. GRAPE, INC.
 1001 N. J. WALKER BLVD. SHERMAN, TEXAS 79151

The Operation

The operation of a lumber yard is very systematic, but yet unpredictable. In essence it is a never ending fight to keep the entire yard stocked as the materials are sold.

To the customer there is not much to a lumber yard because he simply buys some goods or has them delivered and that is all there is to it, but once the order is taken things begin to happen at the yard. The order is taken by any number of people, from the manager down to the yardman. The order is then written on a numbered ticket (which must be accounted for at the end of the day) and given to the yard foreman. He in turn gets the yardman to help him fill the order and the yardman delivers it. Their experience on loading trucks is important as it will save time as well as money. This cycle continues daily.

Naturally, it would not take long for the yard to become completely void of all materials, and a running inventory is necessary. This is simply spot checking the amounts of different materials daily and recording the items that are low. A minimum of four salesmen visit the yard weekly and the materials will be ordered from them. Three different warehouses make weekly runs to Sherman. Two are located in Dallas and they both make 2 runs to Sherman a week. One weekly run is made from Lubbock. The items from these trucks primarily stock

Employees

the sales area and the warehouse. The stocking of the rest of the yard is unpredictable since as there is no regular run from the large manufactures. Lumber is the most unpredictable of all, however, and can require up to two months to be delivered. Sheetrock, roofing, windows, and the likes can get service rapidly, with a maximum of two weeks but no set date for delivery. This can cause great problems on a busy day and five trucks drive in to be unloaded. This must be considered so as not to get too congested and run off the customers.

Further information on the operations of the employees is discussed in another section (The Employees).

The personnel at this lumber yard is to consist of a yard manager, assistant manager, sales clerk, clerk-stenographer, yard foreman, and four yard men.

The yard manager is the overseer of the lumber yard. His main duty is the purchasing of materials and setting the prices at which they are to be sold. He is to be able to perform any of the duties that the other employees perform. His other duties will be discussed in detail with the other personnel duties.

The yard assistant manager is a direct assistant to the manager and he performs specific duties assigned to him by the manager. He does not have an office, but he can use the manager's office. He has a desk located in the check-out counter area.

His responsibilities include the following:

Assist the manager in the general administration of the lumber yard operations.

Marks or supervises the marking of the store merchandise.

Places or supervises the placing of items in proper storage and display areas.

Maintains inventory control systems.

Sees that customers are properly served.

Sees that the "housekeeping" duties of the yard are performed properly.

Serves store and yard customers.

Reviews drawings and prepares bids on specific materials.

Works with the contractors and makes jobsite visits to develop sales and to make adjustments.

The sales clerk serves as a counter clerk in the waiting of customers in the sales area of the yard. He has his desk located at the check-out counter. His duties include:

Weights, counts, measures, cuts, or otherwise prepares the bulk products to meet the customer's specifications.

Wraps or packs articles selected by the customer.

Prepares sale-tickets and makes change for customers from the cash drawer.

Checks incoming merchandise orders to determine if they are properly shipped.

Performs a variety of related duties to facilitate sales in the sales area.

The clerk-stenographer performs the duties of a clerk with his desk located at the check-out counter. His duties are:

Maintains files.

Prepares credit reports.

Serves as a bookkeeper.

Must at the end of the day balance the days activities.

The yard foreman directs the receiving, storing, and shipping of the yard and warehouse merchandise stocks. Other duties include:

Plans and excutes materials storing procedures.

Informs manager of stock needs.

Directs and assists work force in loading and unloading trucks and rail cars.

Directs the assembling and filling of orders.

Operates fork lifts and other materials handling equipment.

Serves customers in the yard and warehouse.

The yardmen are the labor force of the lumber yard. Their duties include:

Unloading of incoming merchandise from trucks and rail cars.

Loads trucks with lumber and other merchandise.

Drives trucks and operates fork lifts.

Serves customers.

Cleans yard, sales, and warehouse areas.

Performs a variety of general maintenance and other yard duties as assigned.

Layout

There is no set layout for a lumber yard, but the key word is "flow". Distance means time and time means money. Amounts of times unnecessarily spent in maneuvering the trucks or fork lifts could result in large sums of money wasted.

Yard aisles and driveways facilitate the flow of material handling equipment. These aisles should be wide enough for two loaded carriers to pass one another easily. It could be widened when congestion is likely to occur, such as the door of the warehouse. They should be kept to a minimum width so as not to waste space. The number of intersections within the yard is to be kept at a minimum to avoid congestion and dead ends should be avoided.

Gates and entrances should reflect a maximum flow of incoming and outgoing traffic. If a single entrance is used, it should be large enough to permit the passage of two vehicles simultaneously. These should be placed so that a minimum amount of driving is required through the yard. Too many entrances or entrances without gates, invite theft, therefore some means of protection for the yard is necessary. Easy access to all points of the yard should be provided so that fire fighting equipment can move in the yard at the quickest possible time. The flow of the traffic within the yard is determined by the management of the aisles, gates, and buildings.

The yard revolves around the sales area and all parts should be related to this area. The size of the site will be a determinate of how the layout is to be arranged.

Parking

The customer parking should be located at the front or the side of the store. Ideally, the store should face this area. Sufficient parking must be planned for peak trading hours during the summer, plus an allowance for extra traffic during major promotions, as well as customer growth. As a rule of thumb, consider five parking spaces for each thousand square feet of sales and display area. The use of off street parking should also be considered.

The parking area should be hard surfaced with painted markers separating individual cars spaces. Individual spaces should measure ten feet wide by twenty feet deep plus the driveway. For ninety degree parking the minimum width is twenty-six feet.

Space must also be provided for the customer for loading materials in his car in the yard proper. This space does not have to be marked, but should be free of any materials which could damage the car or the customer.

The employee parking should be separate from the customer parking. There is no set place for this parking area but it should be located near some type of entrance to the yard. This area does not have to be marked.

The only other required area is that of the movable equipment of the yard, this being the fork lifts and trucks.

These must be protected from the elements as well as from theft. This equipment is normally driven into the warehouse and locked, but if a warehouse is not adequate for this a shed must be provided.

Sales Area

The sales area of a lumber yard is where all of the business transactions occur and is also a place where most of the products are displayed. In this area a contractor should be able to buy all the materials for a house while some other customer is merely buying a hammer. This area is then used by different people looking for different things and should be designed to suit both types.

The contractors are usually not concerned about browsing around the sales area and normally are not concerned about how this area functions. They are here to talk business with the manager. Often, many people will be waiting to see the manager and the manager will be busy or he will have left the yard. A space is required for the builders to sit down and relax and talk among themselves. This area should have free coffee for all and also could be supplied with various vending machines. A sink is necessary as well as storage for the coffee pot, sugar, cups, etc. The architectural features should lend this relaxed atmosphere and possibly relate new ideas to the contractors. This space should be related to the manager's office or possibly a conference room.

The manager's office should be large enough to accommodate all of the catalogues, ledgers, sales transactions, calculators, as well as provide space for salesmen and contractors. Naturally,

a desk and adequate storage is necessary. Often a manager gets snowed under and his office can quickly become a disaster area not conducive to business transactions. For this reason a conference room is desired. If the designer can design a conference room and a manager's office economically, it is preferred, but normally cost allots it to just one room, that being the manager's office.

The conference room should be related to the manager's office and the coffee room. A table with maximum seating for six is required. Storage space is required as well as a place for salesmen to display or illustrate their new products. Projection space might be necessary for use in the future. This room will also require a relaxed atmosphere.

The coffee room, manager's office, and the conference room should be related to the check out counter. All of the sales tickets are numbered and kept in this space, so all of the selling and credit transactions must occur on these tickets. The manager must have access to this area to carry on business with other buyers.

The sales areas is to be centered around the average customer of a lumber yard. This type of customer is one who may be fixing his house up, building furniture, repairing odds and ends and he needs the materials necessary to do this. The

customer then needs to be able to locate items in the store as he enters. This saves him time and trouble and it saves the clerk time and trouble too. The customer does not want to appear uninformed about the products, so he needs an opportunity to touch, lift, and inspect the items on display. Once the customer finds what he needs, he quickly wants to buy it and leave. Convenience to the check-out counter is a necessity.

The sales area is the center of the lumber yard. It must be directly related to the other areas of the yard. Everything is not found in this area and the warehouse and sheds should be near this area so the customer can see what he is buying. The warehouse is a storage area for the sales area and needs to be very close to it.

This area will consist of many parts, but it should flow together and become one. The store is to be designed from the front door. Once a customer enters the door, he should be able to go directly to the check-out counter as well as being able to browse through the store without being trapped in a maze. The spaces within this area are: Manager's office, conference room (optional), coffee room, check-out counter, display area both indoor and outdoor, and restrooms.

The manager's office, conference room, and coffee room have already been discussed. The check-out counter is the busiest

place in the sales area as all customers normally end up here. Included in this area are: three desks for employees, two calculators, counter space for purchasing and displaying, and a minimum of forty-eight linear feet of storage space. An intercom system is to be centered here with connections located throughout the yard.

The restrooms must be located in this area. A womens restroom is a necessity and is to have one water closet and one lavatory. The mens restroom can be located here or in the warehouse. A restroom is required in the warehouse and if it is close enough this can serve both areas. Economically this is a good procedure because the restrooms are not used by the customers that much.

The display area of the lumber yard carries such a variety of products that it has to be broken down into several areas to make it easy to find related items and to strengthen impulse buying.

Paint and related items are to be displayed together. 200 gallons of paint should be stored in this area. All of this will be white paint and will be mixed to satisfy the customer. A rack of twenty-four square feet is necessary to store the mixing ingredients. A mixer and a counter is also required. The following items will be found in this area and require 300

square feet of display area:

Wall paper	Household glue
Paste	Tape
Masking tape	Cement
Steel wool	Scrapers
Sealers	Blades
Waxes	Drop cloth
Cleaners	Buckets
Paint and varnish removers	Rollers and brushes
Brush cleaners	Pans
Fillers	Handles
Metal paint	Topping compound
Spray paint	Joint system
Turpentine	Patching plaster
Linseed oil	Spackling and painter
Shellac	Putty
Contact cement	Masonry sealers
Sand paper	Caulking compound

A decorative items area consists of little things that are needed around the house. Many of these items are carded and frequently pegboard is used. This area requires 400 square feet for display. Items to be found in this area are:

Shutters	Floor tile
Picture frames	Wall tile
Furniture legs	Hardwood shelves
Shelf brackets	Shutter hardware
Ornamental brackets	Tile features
Pilaster kits	How to do it features

An area for the display of tools and hardware should be a flexible space as more and more items are being developed. This area can be extended into the out of doors if necessary. A minimum of 750 square feet is required to accommodate this area. Items to be found in this area include:

Hand and garden tools	Gas and oil cans
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Garden supplies
 Fireplace equipment
 Track and rods
 Cabinet pulls, hinges
 Wood nobs
 Castors
 Wire, cord, twine
 Saw horses
 Dryer vents
 Window hardware
 Screws, nails
 Anchoring devices

Funnels
 Mending and other plates
 Gate and fence hdw.
 Saws, drills, sanders
 Knives, bits, blades
 Thesshold, stripping
 Screen accessories
 Door hardware
 Mail boxes
 Bolt assortment
 Bolt and fasteners
 Dowels

A minimum of 220 square feet is necessary for a display area for electrical items. Four electrical outlets are required in this space. Items likely to be found here include:

Flexible cords on reels
 Fuses, switches
 Outlets, wall plates
 Connectors, taps, plugs
 Lamp holders
 Extension cords

Trouble lights
 Wire, boxes, covers
 Safety switches
 Ceiling light board
 Fans, hoods, chimes
 Inter-coms

The plumbing area will not display all of the items sold by the yard. Bath tubs, showers, furnaces, and hot water tanks will not physically be displayed, but the display area must come across and inform the customer that they are sold here.

A minimum of 200 square feet is needed for the display of these items:

Pumps
 Bath fixtures
 Bath accessories
 Medicine cabinets
 Kitchen sinks
 Disposal, small appliances

Toilet seats
 Faucets
 Repair parts
 Chrome fittings and parts
 Precut pipes
 Large appliances (by order)

A home improvement area is a kind of catch-all department. Items that are found in the hardware, electrical, and plumbing areas can be located here. Many of the newer ideas in home improvement can be displayed here along with "How to Do it Magazines". This area can comprise a maximum of one hundred feet.

The building material catalogue area is necessary for the display of the following items.

Plywood and paneling	Siding
Moulding	Metal parts
Insulation	Guttering
Roofing	Masonry and mix
Flooring	Millwork
Ornamental iron and aluminum	Fencing
Pine mouldings	Hardwood mouldings
Exterior blinds	Ceiling tile
Concrete	Plaster
Ladders	Glass
Screening	Nails
Plastic sheeting	Storm and screen doors
Louver and closet doors	Hardwood
Pegboard	Wallboard
Dimensional lumber	Bow windows
Picture windows	Basement windows
Redi-hung doors	Multiplex doors
Interior and exterior doors	Cafe doors
Patio or sliding doors	Dutch doors

Many of the items will not be displayed in this 2,500 square foot area. Usually, one typical item will be displayed and the rest can be ordered. For instance, a typical window (3X3) can be displayed, but the bow windows will not, but will be ordered when necessary.

Interior displays should be designed to sell merchandise. To be effective, they must attract the eye and turn store traffic into "stoppers"--individuals who stop and examine the goods. Signs can help to do this. Signs do the talking for a display and should give sufficient details about the article, such as size, color, etc. Thus, as a silent salesman, signs answer questions about price, features, and tell where the goods are located in the store.

Lights are the most valuable asset in an effective display. It should make home supplies so visible that the shopper can see what he needs clearly and quickly. Glaring lights do not only take the shopper's attention away from the goods, but can cause him discomfort.

Display lighting should make the merchandise stand out. For example, a concentration of light from incandescent bulbs tend to reveal the form, texture, and polish of surfaces more effectively than diffused lighting, such as fluorescent tubes. However, incandescent lighting tends to create harsh shadows and is a high heat content.

In rendering colors favorably, cool white fluorescent gives light that comes close to the color-rendering properties of natural daylight. Deluxe warm light is more like incandescent. Cost is not the main consideration in lighting goods, but fluor-

escent tubes give twice as much light as incandescent for half the cost of electricity.

Warehouse

The warehouse is in essence a large storage space. It is an area where a quantity of materials will be kept safe from the elements. It is to be directly related to the sales area and in some cases it is separated only by a wall. This relationship is necessary because items in the sales area are stored here. This area is related to the lumber shed also. Normally the larger lumber is loaded on the trucks first and then items found in this area are loaded, so there is a direct relationship.

The layout of the warehouse is extremely important. Much time and money is wasted on a poor layout. The circulation of this area must move freely. Trucks must be able to drive into, if not through, this area. Depending on the size of the warehouse more than one door is necessary. Fork lifts are the major movers in this area. Items must be arranged in such an order that fork lifts will be able to maneuver within this area and not have any obstacles to dodge. Semi-trailor trucks must be able to back into the warehouse. This requires space outside the warehouse (see chart at end of this section), but not much space in the interior is required because it only needs to back up to the door. The truck will then be unloaded at the door by a fork lift or by hand. Now most materials are being shipped on pallets and are unloaded rapidly. There must be adequate

space provided for the fork to unload the truck.

Every square foot of the warehouse that is not used properly is simply wasted and therefore lost money. Advantage must be taken of surface footage as well as air rights. With the use of fork lifts it is possible to stack as high as twenty feet. Aisle space should be kept to a minimum of ten feet. If columns are used as a structure in this area they must be carefully planned as to not interfere with the circulation of this area.

An area outside the doors of the warehouse should be kept free of any materials. This area is to be used for stacking of items after unloading a truck when one cannot enter the warehouse for some reason. Related to this area is a stack straightener. This is a device which the fork lift operator may drive up to and force against his load in order to straighten up a load that has shifted on the fork.

A restroom is required in this area for the employees. A water fountain is required every two hundred feet. If there is a second floor to this area a railing is necessary to keep materials from falling to the bottom floor.

The following items and amounts of each are likely to be found in this area:

Sheetrock- 4'X8' sheets. 300 sheets of one fourth and three eights inch sheetrock. Minimum of 750 sheets of 1/2".

100 sheets of 5/8 inch sheetrock as well as the same amount of 5/8 inch fireguard. 250 sheets of prefinished sheetrock should also be stocked. Each stack averages around two feet in height and can be stacked as high as twenty feet.

Moulding takes up an amount of space because it is displayed and stored in this area. 125 types of moulding at 70,000 board feet is required. One fourth of this must be in a rack on display, this rack also make is easier to find desired amounts. When large quantities are ordered they are taken from the stored moulding. The maximum length will not exceed twenty feet.

Plywood is a big seller in lumber yards. All wallboards are stored in this area.

Type	Amount
3/8" AC fir	100 sheets
1/4" AD "	100 "
1/2" AC "	50 "
3/4" AB "	50 "
3/4" AD "	25 "
3/4" BC "	50 "
3/4" AB "	50 "
1/2" BC "	25 "
3/4" AD "	50 "
3/8" CD "	200 "

Other types of hardboard to be included in the warehouse are prefinished paneling, V-grooved ash, birch and walnut. Also flakeboard, pegboard, masonite, celotex, shina, cedar and various types of siding all totaling some 1,200 sheets. Plywood

racks are often used to stack more of the demand plywoods. These racks allow a fork lift to drive up to and then remove the plywood without having to move other plywood to get to it. Racks should hold up to fifty sheets of plywood or hardboards.

Cement, lime, and types of this material are stored on pallets, twenty-five sacks to a pallet. Fifty bags each of sand mix, mortar mix, and concrete mix are required along with 200 bags masonry cement, 150 bags white portland cement, 200 bags plain portland cement, 150 bags each of fifty pounds and ten pounds sacks of lime. Pallets are not to be stacked more than three high.

Nails are usually located near the front of the warehouse near the sales area. Sixty types of nails will be in stock at all times. This totals to 5,000 pounds of nails and staples. A display area is necessary and it will hold fifty pounds each of the sixty types of nails. The rest of the nails should be stored near the display area.

A space is required in order to stock doors. A normal stock will consist of 2'6"X6'8", 2'8"X6'8", 3'0"X6'8" in shina, pine, mahogany, and ash. Five of each will be stocked. Fifty storm doors will also be stored in this area.

Insulation can be stored here or outside in a shed de-

pending on how large the warehouse is. These are rather bulky items and should be stored horizontally. Twelve bags require an area of 4'X6' and 40 bags will be stocked.

Sheet metal and wire mesh should be located near a door so they can be loaded by hand if a fork lift is being used. 60 linear feet of space is necessary for the wire mesh. The corrugated iron should be stored in a rack so it can be stacked with the use of a fork lift. 50 sheets each of iron in lengths of 6,7,8,9,10,11,and 12 feet will be stocked.

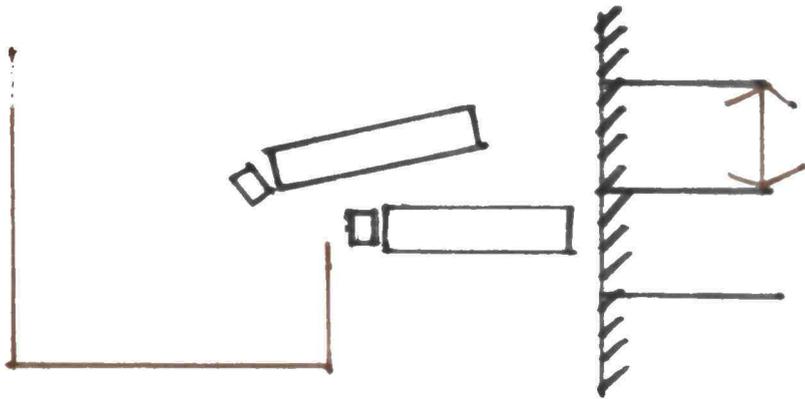
A saw for cutting moulding and plywood is necessary in the warehouse. The saw should be located near both of these items. A glass cutter and a storage space of twelve square feet is necessary for cutting glass for the customers.

The warehouse is, indeed, a busy place. The structure of this building and the height of it are important. Make the best use out of every inch of this building.

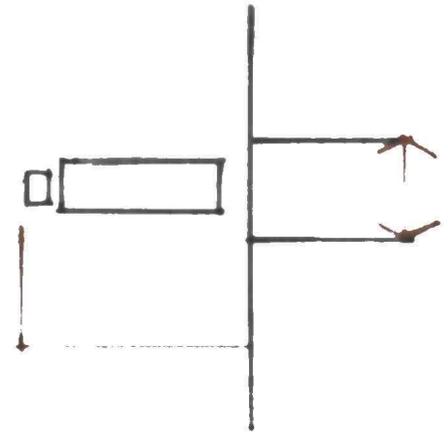
MOTOR VEHICLE DATA

Loading apron space required

Multiple Stations



Single Station



Tractor- Trailer Length	Width of Position	Apron Space Required
35	10	46
	12	43
	14	39
40	10	48
	12	44
	14	42
45	10	57
	12	49
	14	48

Lumber Sheds

The term lumber shed is misleading in the sense that not only is lumber stored here, but lumber does not take up a majority of space. These sheds are used primarily for storage and afford little protection from the elements. The two inch lumber is mainly stored in these sheds. The lumber, with few exceptions, is to be worked from these areas as well as stored. This simply means that orders will be filled with this supply.

The following items and amounts of each are likely to be found in these sheds:

#3 Fir	2X4	80,000	Board Feet	Lenghts	8 to 24
	2X6	75,000	" "	"	10 to 26
	2X8	150,000	" "	"	10 to 24
	2X10	15,000	" "	"	10 to 24
	2X12	500	" "	"	10 to 22
#2 Fir	2X4 Studs	2,000	Board Feet		
#2 Yellow Pine					
	2X4	20,000	Board Feet	Lenghts	10 to 20
	2X6	20,000	" "	"	"
	2X8	15,000	" "	"	"
	2X10	7,000	" "	"	"
	2X12	20,000	" "	"	"
Rough Cedar					
	1X12	15,000	Board Feet	Lenghts	10 to 18
	2X4	1,500	" "	"	"
	2X6	15,000	" "	"	"
	4X6	500	" "	"	"
	4X8	1,500	" "	"	"
	4X12	1,000	" "	"	"
Wood Shingles					
	100 squares	@ 4 bundles	to square	#1	
	150	" " "	" "	" "	#2
Hip and Ridge	250	Bundles			
Asphalt Shingles					
	15 Types of shingles	(colored)	300 Square		
	@ 3 bundles	to square	with 100 rolls of		
	colored roofing	to accompany	shingle color,		
	not to be stored	more than 10 squares	to pallet		
	and only two pallets	(preferably)	high.		

Felt 75 Roll #15
75 " #30
Gypsum Board 500 $\frac{1}{2}$ X2X8
Particle Board 250 Sheets @ 3/8 and 5/8

Some of these items could be stored in the warehouse, but this is up to the designer. Space is also required for one inch lumber to be stored temporarily before it can be stocked and also for special ordered items. All of these sheds should be flexible for future growth.

The sheds should have a sloped roof to give some protection to the lumber and should be supported by some type of post or column. This column also serves as an indicator as to how far back the lumber should be placed and whether it is straight. Lumber should not be stored more than five bunks high. Each bunk of lumber is two feet high with six inch "runners" placed between the bunks to provide a space for the forks of the lift to raise the lumber. The length of this shed varies according to the designer.

The storing of lumber parallel to aisles makes it easy to select and lift large loads with a fork lift. Lumber stored at right angles will have to be handled by hand and should be avoided when possible. The aisles must be a minimum of twenty-eight feet in width so a fully loaded fork lift can maneuver between sheds. This also provides enough space for trucks to maneuver.

A lumber bin is also required. This is merely a catch all bin for the slower moving items. This bin should provide more protection from the elements as higher grades of lumber will be stored here. Lumber will be stored at right angles to the aisle and will be unloaded by hand. The bin will be arranged so it can be worked from two or more sides. The minimum length will be twenty feet. Some two inch #2 Yellow Pine is also stored here as well as in the lumber shed. Full banded bunks will be stored in the lumber shed and the rest will be stored in the bin in order to keep the straightness of the lumber.

The following items are to be stored here.

Type	"D" Yellow Pine				
1X4 Flooring	1,500	Board Feet	Lenghts	8 to 16	
1X6 117 Siding					
1X6 116 "	750	"	"	"	10 to 16
1X8 105 "	2,000	"	"	"	10 to 16
1X4	5,000	"	"	"	6 to 20
1X5	200	"	"	"	10 to 16
1X6	10,000	"	"	"	8 to 16
1X8	3,500	"	"	"	8 to 16
1X10	2,500	"	"	"	10 to 20
1X12	7,500	"	"	"	10 to 16
	#2 Yellow Pine				
1X4 Flooring	1,500	Board Feet	Lenghts	8 to 16	
1X6 117 Siding	1,500	"	"	"	6 to 20
1X6 116 "					
1X8 105 "	5,000	"	"	"	10 to 16
1X4	500	"	"	"	10 to 16
1X5					
1X6	1,000	"	"	"	8 to 16
1X8	5,000	"	"	"	10 to 18
1X10	1,000	"	"	"	10 to 18
1X12	1,000	"	"	"	16

Type	#3 Yellow Pine				
1X4	12,000	Board Feet	Lengths	8 to 20	
1X6	23,000	" "	"	8 to 20	
1X8	2,000	" "	"	10 to 20	
1X10	5,000	" "	"	10 to 18	
	#2 Fir				
4X4	3,000	Board Feet	Lengths	12 to 20	
4X6	5,000	" "	"	12 to 20	
	"D" White Pine				
1X12	4,0000	Board Feet	Lengths	8 to 20	
	#3 White Pine				
1X12	1,000	Board Feet	Lengths	10 to 16	
	Redwood				
2X4	1,000	Board Feet	Lengths	10 to 20	
2X6	2,500	" "	"	10 to 20	
2X8	2,500	" "	"	10 to 20	
4X4	1,000	" "	"	10 to 20	
4X6	4,000	" "	"	8 to 20	
1X4 F.J.	1,000	" "	"	12 to 20	
1X6 F.J.	1,000	" "	"	10 to 20	
½X6 Siding	2,500	" "	"	8 to 16	
½X8 "	1,500	" "	"	8 to 20	
Oak	2,500	Board Feet	Various	lengths	
Mahogany	750	" "	"	"	
Ash	500	" "	"	"	
Basswood	2,5000	" "	"	"	

Window and door units are hard to store due to the fact that any number of these units can come into the store at the same time and ample space is necessary to store them. Door units are ordered by the job and normally there is more than one order per week. Upon receiving these orders, the yard will notify the builder and many times he does not need them now, so they have to be stored. It does not take long for these units to pile up and space becomes limited. This applies for windows also with the only exception being that they are ordered several orders at a time because they are not as easy to obtain as the door units are.

The area necessarily does not have to be separated. It is probably more economical to combine these areas with some other structure in the yard. If this is not possible, one can resort to a separate space. Some sort of division is necessary between the windows and door units because the handling of bulky doors can lead to broken windows.

There are times when filling an order that the proper length ordered is not available and another length must be cut to fill the order. In order to do this economically and not waste time with a hand saw a saw shed is required. In this area one must be able to rip and cut lumber at the same time so, two heavy duty saws are needed. These saw should be vented so the saw dust is vented in the direction of a trash receptacle. This area should be covered and enclosed. A large door is necessary to load a fork lift from the interior. The area must be large enough to rip lumber up to twenty-six feet in length. A minimum storage space of 50 square feet is required.

All of the materials in the yard do not have to be covered and some may be left outside exposed to the weather. These materials are those which are usually exposed anyway and no harm is done.

Wire mesh and reinforcing bars are also kept outside. These are related items and should be located in the general area of each other. 100 rolls each of 6X6X6 and 6X6X10 mesh is required. 2,000 pieces each of 3/8 and 1/2 reinforcing bars and 750 pieces of 5/8 bars should be stocked. The rolls of mesh are two feet in diameter and are loaded with a fork. These should be stacked so a fork can go through the center. They can be stacked up to six feet high, but must be braced on the sides. The steel bars should be placed parallel to an aisle so the fork lift can pick them up. Both of these items should be located so that one fork can load the mesh and the other fork can load the steel without any congestion.

Others items to be located outside that have no particular location are:

Posts 50 each of 6 1/2" and 10"

Common brick 2,500

Fire brick 1,500

Fire flutes 12 13X13

The trash collection of a lumber yard is important in the upkeep of the yard. Trash receptacles that can be picked up

by a fork lift and hauled off to a dump if necessary. These receptacles are to be located outside, one at a door of the warehouse, one at the saw shed, and one near the center of the yard.

Since desiel fork lifts are being used a desiel fuel storage tank is necessary. The base of the tank will take up an area of 3'X6' with the tank placed on the top of this. The height of the bottom of the tank should be a minimum of four feet. This area should be away from the major traffic flows. The trucks are gasoline operated and gas stations offer a discount to trucks, therefore it is easier to buy gas on a delivery than to have a gas pump located on the yard. The money spent on excavation of a tank and the area required for this does not merit building one in the yard.

Equipment

Three gasoline powered delivery trucks are necessary. These should be equipped with 16 foot beds.

One pick-up truck is necessary for small orders which need delivering. The truck should be equipped with a carrying rack for long lengths of lumber.

Two fork lifts are necessary for a yard of this size. One should be a small fork with a minimum of two tons. The other should be a large fork for a very heavy load with minimum of eight tons. Both should be diesel powered. These forks save many man hours and are a necessity.

All storage racks need to be movable when not in use. This is also true for nail bins.

The saws in the saw shed and warehouse should be movable as well as the glass cutter.

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architectural thesis.

Noel Barrick

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A LUMBERYARD for SHERMAN, TEXAS

I would like to make a few general comments regarding my thesis before I discuss the solution to the problem.

I chose to design a lumberyard for my thesis knowing that it would not be as glamorous a project as a school or a courthouse, but after working in a lumberyard I saw many operational drawbacks and a complete lack of design. It was for these reasons that I chose to do a lumberyard for my thesis. This proved to be a challenge for me because not only did I have to create an operational yard, I had to design it economically because the taxpayers were not paying for this, but rather an individual or group of individuals.

CONCEPT

My basic approach to this program has been through that of an operational standpoint. The basic reasoning for this being that no matter what the lumberyard looks like (good or bad) if the yard does not operate efficiently it will not last for a very long period of time. I stressed this point in my program as well as throughout the solution.

My concept of the project was to create a pleasant place in which to sell lumber goods, and in this space emphasize the use of lumber. As far as the exterior of the complex I wanted to create a pleasant, conservative view. Sherman is a conservative town and I feel that a conservative design would have a better chance of being accepted.

I am the first to realize that the design solution to this problem will not go down as one of the greats in the 20th century, but I believe that this is a start in the right direction. I believe that once lumberyards break away from the false facade buildings into something like I propose then after that they will open up into a free design, but at this stage I feel that mine is the correct solution.

SITE SELECTION and DEVELOPMENT

The reasoning behind the selection of the site has previously been discussed in my program, but I will briefly mention some of these considerations. Convenience is naturally important and the site should be related on or near major traffic arteries. The site should be located near residential growth patterns, and industrial districts should be avoided. Material handling to the site is important and again it should be located near major traffic arteries.

I chose a site that is situated on a major artery, that being F.M. 1417. This road intersects with two major highways as well as three major streets of Sherman.

I chose this particular site rather than some other site near here because it has streets on three sides and this helps the circulation considerably. Pedestrian traffic is ignored because of the type of business.

The site is sloped eight feet at its highest point. This is more

than desired, so I will move three feet of earth and use this soil to construct several berms on the site. The site will then have a five foot slope which will drain the site adequately.

The circulation of the yard was a major factor in determining the function and the placement of the buildings on the site. Poor circulation slows the yard down and proves to be very costly. In order to get the best circulation and cut out congestion I have separated the users of the site.

The first attempt I made was to separate the customer parking from the rest of the site. I have two parking areas, both located on Taylor street. The larger area is off F.M. 1417 on Taylor. This area accomodates 24 cars and also has a drive to pick up orders from the warehouse. Two doors are provided to pick up items that are too bulky to carry through the sales area. The other parking area off Taylor accomodates a total of six cars, thus bringing the total to 30 cars on the site. Adequate parking on the street is provided for over flow.

The only time the customers will be allowed in the yard is normally when they have a carrier large enough to carry lumber that cannot be brought up through the warehouse.

One of the major contributors to congestion on the site is the smaller daily delivery trucks. They always tie up the warehouse by blocking one of the entrances. I have solved this problem by giving them a separate entry. This entry is located off Skvline Drive. Two docks

are located at the front of the warehouse. If more than two trucks are on the site at one time they must simply wait their turn.

The only traffic on the yard proper will be large trucks bringing supplies, the yard delivery trucks and forklifts, and an occasional customer picking up some lumber.

I felt that a drive-through yard would lessen any possibility of congestion in the yard, and would be helpful for getting firefighting equipment on the site with ease. The only drawback to this is the aspect of control, but with the placing of a foremans office in this area it can be controled.

The arrangement of the forms on the site is based on three reasons, visual effect, circulation, and protection. The major influence as already mentioned was that of circulation on the site. The visual massing was the next concern. This was difficult because of the difference in heights of the buildings. I solved the problem between the sales-warehouse by elevating the sales area on a berm. The rest of the buildings were separate from the building and the height difference was not to much of a problem.

Finally after getting the forms arranged I fenced up the rest of the site with a wood fence. This was kept to a minimum because of the placement of the forms. The fence also provides a barrier to keep from seeing the normal messiness of a lumberyard.

Landscaping was kept to a minimum as programmed. Earth berms are the main forms of the landscape, the reasoning for this is two fold.

As I have already mentioned I am leveling the site three feet in one area and this soil is to be used for the berms since it is available. The other reason being that a berm system will provide somewhat of a buffer from the surrounding housing neighborhood. The berms also might help keep the noise down, but not very much.

The rest of the landscaping consists of grass and a total of 16 trees, the majority of them being placed around the sales-warehouse area.

FUNCTIONAL REQUIREMENTS and RELATIONSHIPS

The lumberyard I have proposed has five major areas; sales, warehouse, lumber shed, lumber bin, and outdoor storage. All of these areas are related in some form to make up the whole lumberyard complex. It would be impossible to discuss all of these areas as a whole so I will break these areas down to better understand the relationship between other parts of the yard as well as the intrarelationship.

SALES AREA RELATIONSHIP BETWEEN OFFICE SPACE

Included in this area is; manager's office, accounting office, coffee room, conference room, and restrooms.

The manager's office is directly and visually related to the display area, the reasoning being so the manager can see what is happening in this area and see if he is needed. His office is also visually related to the warehouse, but not to the extent of the display area. The office is also related to the accounting office so he can check the books at ease.

Noel Barrick

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drink coffee, but it serves as a space for customers to do the same. Included at the back of this area besides free coffee are vending machines and a sink. Seating for eight is provided.

The Conference room is indirectly related to the coffee room. The function of this area is a space provided for the contractors to bring their clients for consultation. Desks for two contractors and a waiting area is provided. There is a dropped ceiling in this area for more privacy.

A woman's and man's restrooms are related to the coffee room for obvious reasons. They are located just off this coffee area.

SALES AREA RELATIONSHIP BETWEEN DEPARTMENTS

Included in this area is; electrical, plumbing, home decoration, tools and hardware, building materials, and the check out counter.

There is really no set relationship between any of the various departments, but all are related to the check out counter.

The check out counter is the hub of the sales area. All of the business transactions in the display area occur here. Control in this area revolves around the check out counter, so I arranged the departments for easy control.

I have placed the electrical, plumbing, and home decoration departments toward the front of the store because they require less help from the sales clerk. The electrical department is situated so a fixture display can be seen from the south and west sides of the sales area. A plumbing cabinet and fixture display can be seen from the west side of

the building. The home decorations department is located near the main entry of the sales area, the reason for this being that it will introduce new items to one as they enter the store.

The three main departments are the largest and require more help from the sales clerk, these are the tool-hardware, building materials, and the paint department.

I have separated somewhat the tool-hardware department. I have introduced a garden area for the display of garden tools during the summer season, and during the off season other displays will be used. The majority of the items in this area will be displayed on typical counters, the exception being bolts, hinges, etc, which will be displayed on the wall opposite the garden area.

Many of the items found in the building materials section will be displayed by hanging them from the trusses. This allows the customers to turn the item to look at it rather than having to walk around it. Pre-cut lumber and paneling are displayed on the back wall of the area. This is related somewhat to the lumber bin because the lumber is stored in that area prior to cutting. Adequate counter space is provided to display all of the items in this area.

The paint department is located near the check out counter because a sales clerk is necessary for mixing the paint. This department has a tunnel effect for different displays. The left side of the tunnel will display wallpaper while the right hand side displays paint brushes and

polls. The paint display is located at the end of the tunnel. The rest of the area is for the display of paint related items.

The typical counter display as seen in the presentation consists of adjustable shelves on either side of the counter with a pepboard center located just above a small storage space. The opposite side of the counter is identical.

SALES AREA RELATIONSHIP BETWEEN OTHER MAJOR AREAS

There is a indirect relationship with the sales area to all parts of the yard, but a direct relationship to the warehouse.

The major relationship to the warehouse being that the warehouse is the storage space for most items found in the sales area. Many items that will be ordered in the sales areas will have to be cut to ordered size and then given back to the customer in the sales area or through the pick up area in the warehouse.

WAREHOUSE RELATIONSHIP TO OTHER AREAS

As previously mentioned the warehouse is directly related to the sales area. It is also directly related to the open loading space outside and to the trash collector. There is some indirect relationship to the lumber shed, this being the place where overflow from the warehouse can be stocked.

WAREHOUSE RELATIONSHIP BETWEEN INTERIOR SPACE

Inside the warehouse there is no particular relationship between the items stocked here, items are placed purely for function. The function of this area is merely to provide protection from the elements

of the items stored in this area. To best function these items should be situated to afford easy movement of the goods. I have arranged the the items as they are for the following reasons: circulation, ease of loading, use of available air space.

I have arranged the items so two trucks can enter the warehouse, one in each of the two aisles. They cannot drive through the area for reasons of better control. At the opposite end of the warehouse are docks for unloading of supplies. This separation controls congestion and the flow in the area proves for a more efficient operation. The foreman's office is located on the yard side of the warehouse for better control of the warehouse and lumber shed.

The items located off the two aisles are placed so a man can drive his truck in and completely load it by hand if necessary and cause him little discomfort.

Nearest to the yard doors I have placed the foreman's office, sheet-rock, cements, and mouldings. The office is located here for control of the yard. The sheetrock is situated near the door because normally large amounts of this are sold at one time. The trucks will then be loaded outdoors because there is more space to manauver in. The sheet-rock needs to be located near the door for that reason. I have situated the cements and powdered materials near the door because these are usuàly items that are brought in on a flat bed and it is convenient to locate them near this unloading area. The moulding is located in this area because these items can be loaded onto a truck easily if another

is obstructing the entry.

Near the center of the building I have placed the items that are related in some form to the sales areas. A saw is situated for ease of cutting plywood as well as other 4X8 foot materials and moulding. The plywood rack is freestanding and will hold 24 types of the faster moving 4X8 materials.

The slower moving items are located closer to the dock area. These 4X8 materials are stored on an adjustable rack which can be loaded or unloaded from the two aisles. Other items located in this area are those items most often delivered by the smaller delivery trucks, those items being nails and window and door units.

A restroom is located nearer the dock area to serve the incoming drivers as well as those in the accounting office.

A bunk straightener is located outside the warehouse to straighten up bunks of plywood or sheetrock before stacking them in the warehouse.

I used as much air space as possible for stacking. On the items that did not require much stacking height(10 feet or less) I placed a wood deck over them. A deck runs from the saw to the nails . Decks are also over the door and window storage as well as the slower moving 4X8 materials. These areas will be used for various types of storage. The deck running from the saw to the nails will house the mechanical system.

LUMBER SHED RELATIONSHIP TO OTHER PARTS of the YARD

The relationship between the other parts of the yard has already

^{been}
~~be~~ mentioned in the discussion of the other parts.

The function of the lumber shed is to provide some protection of the lumber from the elements. I have completely covered the lumber shed however. This is not normally done, but I wanted completely protect the lumber from the elements as well as from vandalism. I believe the better shape the lumber is in, the better the customer likes it and he is more likely to come back for more. This area is sprinkled for fire protection.

The main goal in this building is to move lumber as fast and easy as possible. The arrangement of the materials is then very important.. For added ease and speed I have used two types of stacking - rack and stud. Stacking on studs is merely placing a 2X4 between bunks of lumber so the fork of a lift can pass under it to pick it up. The only drawback to this is if various lengths of lumber are stacked together one might have to remove the other bunks of lumber to get the desired item on the bottom. This is time consuming and time is money in this business. The use of a metal rack speeds up the operation considerably. This rack allows one to stack any length or width of lumber in this rack, and it is independent of all the other lumber stacked above and below it. The 2X4 and 2X6 fir are stacked on studs because they are stacked according to length and are faster moving items. The 2X8,10, 12 are slower moving and will be stacked together in these racks. The racks are very flexible and any type of lumber can be stacked on them.

The paving is important in this area. Concrete is used from two feet in front of a rack or stack to the back of the stack, the reason for this

being that when the forklift firsts lifts the bunk of lumber more weight is exerted to the wheels. A lesser quality of paving will buckle under this first stress. Once the bunk is balanced properly the weight is distributed equally . It is at this point that I use asphalt paving, and this is at the point where the two feet of concrete runs into the asphalt paving. Concrete is preferred throughout the site, but because of economic factors asphalt must be used.

The aisle space in this building is adequate for two trucks to pass easily. The minimum door opening is 22 feet and the maximum is 28.

The only problem with this large a building concerns ventilation. Since there are three large doors I felt that if I could get a draft through the building the problem would be solved. In order to do this I opened up the east wall one foot for almost the length of the wall at a height of 17 feet above ground level. If the weather was bad it would not harm anything because only an aisle is located beneath the opened area.

I have located a trash container in front of the shed to hasten clean up. It is located directly in front of the saws so the sawdust can be directly vented into the container.

RELATIONSHIP OF THE BIN TO OTHER MAJOR AREAS

The relationship of the bin to the sales area has been discussed. The bin is indirectly related to the warehouse and the lumber shed purely by the use of the saws in those areas. The function of the bin is to store slower moving lumber items, these are usually one inch lumber. The shed is designed so that it can be used from both sides. By alter-

nating lengths on either side(20' lengths on one side and 10' lengths on the oppsie side) the bin could work to the best efficientcy. To save time and man power I proposed using a roll-in type system in the bin. An entire bunk of lumber can be rolled in rather than having to place it in the bin piece by piece.

RELATIONSHIP OF OUTDOOR STORAGE TO OTHER AREAS OF THE YARD

There is little relationship of this area to anv of the other areas. The function of this area is a storage space for those items that will not be effected by the weathering elements. Such items as fire bricks, concrete blocks, and chimney flutes are stored in this area.

THE STRUCTURAL SYSTEM

My main idea on the structure of the building was to use an economical and a proven type of system. The esthetics of the system was not considered with the exception being the sales area. The sales area is the main building to be viewed by the customer, but the rest of the buildings on the site will not and the most economical system is used in these areas.

Both the warehouse and the lumber shed are supported by open webbed steel joists. This system is the best for these buildings because it opens up the ceiling and skylights can be effectively used. Also lines can be run through the joists to supply gas to the heaters which are dropped down from this joist system.

The largest span in the lumber shed is 45 feet. This can easily be spanned by a 24LJ09 joist. The joist will rest on steel columns 4' o.c.

Columns are used at this spacing rather than beams because they serve as an indicator as to how far back the lumber can be stacked and if it is being stacked straight. In some cases the columns help to structure the stacking racks. The first six feet of the walls of the building surrounded by the berm are retaining walls constructed of concrete.

The warehouse also has a steel joist system for reasons already discussed. I placed the columns 4' o.c. to give added support to the concrete panel walls. In two cases the wall is extended out by the use of a vertical wood beam attached to the column and then attached to the concrete panel. This is done to break up the rather dull wall as well show another use of wood in construction. The 70 foot width of the area is spanned by a 36LJ12 joist.

The sales area is spanned by a wood truss system supported on wood beams and columns. The system is based on 20 foot bays. This system is not the most economical system, but esthetics play an important part in this area. The two foot trusses are oversized so they can support the mechanical load as well as display items that will be dropped from them.

SPATIAL SIGNIFICANCES

The major space I wanted to really give character to is the sales area. This is where most of the business transactions occur and naturally more people will be using this space. I wanted to create one large space that says that this is indeed a lumberyard as well as smaller areas showing the use lumber. In this area I created a changing space with the

use of displaying items by dropping them from the ceiling.

I felt like a wood structural system with open trusses would give an interesting character to the interior as well as show the use of wood. The mechanical system would be exposed through this , but painting this system with bright colors gives a more exciting atmosphere.

The two separate spaces I have created are a garden and paint department. The garden area is a space that can and will be changed seasonally. The different displays in this area will always be changing and thus the character of the space will change with them. In the paint department I tried to create a colorful space, one which shows what can be done with paint. I created a tunnel effect to show the use of plywood as well as create a fun place to walk through.

The arrangement of the display counters was to add an openness to the areas. The displays run in different directions to break up formality of the space, but yet it does not effect the circulation in a negative manner. The signs denoting the various departments are dropped from the truss and are easy to see and add visual interest to this space.

The space in the display area is very flexible and all counters and signs can be rearranged to add new inovations through the years. This can possibly lead to a more interesting space within this area.

MATERIAL USE AND SELECTION

The main reasoning for selecting the building materials I used was for economical reasons, durability, and upkeep. The economics of the materials was very important because I had to keep the cost down. Dur-

ability of the materials was very important though as well as the upkeep of these materials.

The lumber shed and the warehouse are both built with the use of precasted concrete panels. The panels will be cast in rough wood forms to add texture and also to show another use of lumber. These panels are very durable and require no upkeep. They are also flexible and easy to use for expanding on to a building. They are fire rated.

Concrete block is used as the structural wall in the sales area, the reasoning for this being that it is fire rated and very economical. All other walls in the sales area are stud walls with a sheetrock or a paneled surface. The interior concrete block walls will be painted and they will be more durable than the sheetrock on stud walls and require less upkeep. The exterior of the sales area will be fireresistant pine wood siding. This is fairly durable , but is used mainly for esthetic reasons.

The lumber bin is constructed of construction grade fir. This is economical as well as durable. The bin will need more upkeep than any of the other buildings, but this is merely a coat of paint every two or three years.

MECHANICAL AND ELECTRICAL SYSTEMS

The sales area is the only area that must be heated and cooled. This area will be supplied by two 100,000 btuh "hi box" type furnaces. I used two systems so if one went out the other would supply the area and not make it too uncomfortable to the customers. These units are housed in

the warehouse on a fire resistant deck next to the wall connecting the two buildings. Duct work will run through the truss system and supply the entire area. Separate ducts will supply the manager's office and the conference room because they have dropped ceilings.

The warehouse and the lumber shed will be heated somewhat with the use of gas heaters dropped from the joist system. They cannot be located at a height of less than eight feet from floor height. These areas will no be cooled by any mechanical means.

The lighting in the sales area consists of 96- 4 tube, cool white fluorescent light fixtures. This is more economical than incandescent lighting. I have used incandescent lights in the restrooms only in the sales area. These lights will be located at the base of the truss system.

The warehouse and the lumber shed are both equipped with with skylights. This keeps the electrical use in these areas to a minimum. Additional lights are supplied however because of bad weather and possible night use. The lights are incandesent and produce a diffused point of light.

MODIFICATIONS OF THE ORIGINAL PROGRAM

I did not program an office of any type for the yard foreman, but as I was working on the operation of the yard I found that an office is necessary to provide adequate control of the yard.

