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STANDARDS FOR

WAR

TRAILER PROJECTS

NATIONAL HOUSING AGENCY

~~FEDERAL~~ PUBLIC HOUSING ~~AUTHORITY~~

SEPTEMBER 1942

F O R E W O R D

Trailers are used in a complete war housing program for the special purpose of supplying homes for a short period of time only. They can be provided more quickly than any other form of dwelling. When more adequate housing facilities are available, these trailers may be transferred to other locations where housing facilities are insufficient.

This set of standards is issued as a guide to the planning of trailer projects for which trailers will be provided. Since the projects are to be used only temporarily, construction shall be held to the minimum necessary for adequate living conditions.

STANDARDS FOR

WAR

TRAILER PROJECTS

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SITE SELECTION

Sites for trailer projects should be selected with care. Consultations should be had with local housing authorities, planning agencies, municipal officials, military authorities, industrial experts, and other persons in a position to give information and advice. Such negotiations, carried through at the time of site selection, will insure public support and prevent later delays.

Relation to War Activity - The prime consideration in the selection of a site is its relation to the war activity which is to be served by the project. It must have convenient access to such war activity and preference shall be given to sites requiring the minimum of daily travel for prospective tenants. The site should, where possible, be located within walking distance, normally defined as not more than 2 miles for men and 1 mile for women. Where it is not possible to locate the project within walking distance, adequate public transportation service must be assured either through present services or guaranteed extensions. Where public transportation is relied on, the site must be within easy walking distance of such service.

Area required should be calculated upon the basis of the proposed number of units. The "property density" appropriate to trailer projects should approximate 12 to 18 trailers per acre of usable land. "Property density" is based on the land purchased, minus areas unfit for trailer sites or for playgrounds or other project use.

Improved property (such as unbuilt land subdivisions) should be considered if its use will expedite development of project, save critical materials, offer satisfactory living conditions, and meet other requirements.

Paved highway access must be good but a location a short distance from a main highway has advantages. The site should preferably permit development of two access points, where practicable, on different roads.

Local plans for highways through or near the site, or other proposed public works, should be considered in order that the project may not interfere with, or be undesirably affected by, these developments.

Municipal services should if possible be available: fire and police protection, street maintenance and lighting, health and welfare services, refuse removal, libraries, recreation facilities, etc.

Public school facilities should exist within a reasonable distance or be contemplated for immediate construction.

Commercial facilities should be available or capable of being satisfactorily supplied.

Utility services must be adequate. Investigate fully the availability of water, electricity, and sewer facilities. To conserve critical materials, favor sites not requiring long connections to utilities.

Utility rates should be investigated and agreements as to rates and services should be made before final determination of site.

Sanitary conditions of site must be good. Avoid swamps, flooded areas, and nuisances such as smoke, noise, noxious fumes and exceptional accident hazards. Favorable exposures to sun and wind are desirable.

Soil conditions should be favorable to low grading and maintenance costs and good livability. The presence of rock close to the surface will add materially to the cost of utilities.

Shape of site preferably should be compact, but practicability of laying out economical streets and utilities takes precedence over regularity of outline.

Hilly sites imply higher development costs; these rise sharply when grades exceed 8%.

Wooded sites are preferred especially in locations where the project might be an air raid objective.

Cost of land shall be considered along with the other factors influencing the total cost of the project and the general disirability of the site. As a basic policy, land should be leased rather than purchased.

SITE PLANNING

General

In preparing preliminary studies of the trailer site plan, members of the FPHA staff and project designers should consult with local housing and planning officials. They should secure full information concerning zoning ordinances, subdivision and trailer park codes, and proposed plans for streets and other public improvements. Further, they should discuss fully the need for speed and economy and the great importance of the site and utility plans in this connection. Existing utility installations should be used as effectively as possible. New installations should be given maximum efficiency by the fullest practicable application of modern planning technique.

Air Raid Protection

In the critical areas within 200 miles of the Atlantic and Pacific Coasts and 100 miles of the Gulf of Mexico, projects should be planned with a view to protection against enemy aerial attack. Local designers should communicate with the District Engineer (U. S. Engineer's Office) responsible for dispersion, camouflage, and concealment of military establishments adjacent to War Housing Projects. Pending more detailed investigation of protective measures, the following recommendations should be used as a guide in site planning:

a) The Site plan preferably should be so arranged so that there is more than one means of vehicular access to the project area.

b) The extent of pavement and other hard surfaces which will tend to stop bombs at the surface should be minimized.

c) Natural camouflage, such as trees, woods and foliage, forms a highly desirable type of protection and should be considered in site selection and preserved in site planning.

The above recommendations concerning air raid protection should be followed as closely as possible, but the specific conditions of each project must be considered.

Density

Unless justified because of favorable or unfavorable conditions, the property density should approximate 12 to 18 trailers per acre. Densities should be neither so high as to cause disturbance from noise and normal activities of living; nor so low as to require a large amount of critical materials for utilities, nor cause high site improvement costs, high project and municipal maintenance costs, inconvenient walking distance to project center and ground areas greater than can be well maintained.

Property density, used for rough calculations of capacity of sites before planning, is the number of trailer units per acre of land purchased, minus areas unfit for trailer sites or for playgrounds or other project use.

Lot Sizes

The following sizes are recommended:

Standard trailer lots	1250 sq. ft. min.	25' x 50'	preferred.
Expansible " "	1500 " " "	30' x 50'	"

Spacing

The following minima are recommended:

Side to side spacing	10 feet
End to end spacing	14 feet

Staggering adjacent rows of trailers within the trailer block increases livability and provides greater privacy. End lots at street intersections should be somewhat increased in width (by about 5 feet) to insure reasonable privacy.

Set-backs from adjacent buildable property should be great enough to afford protection from serious loss of livability. In general, a protective belt of 50 to 100 feet wide is recommended.

Relation to Topography

All physical features of the site must be considered in making the site plan. Existing trees have considerable camouflage value and insofar as practical should be incorporated in the design.

For economy and speed of construction the layout should be adapted to conform as closely as practicable to the natural contour of the site. Trailers should not be so located as to obstruct swales which may serve as drainage channels. Preliminary site plan studies should be correlated with drainage studies to assure adequate drainage and to avoid, where possible, the necessity for storm drain construction.

Existing utility lines should be used as fully as possible.

Street Plan

The street plan should require the minimum construction of pavement and sidewalks. Access to the project, when possible, should be from secondary streets. More than one point of access is preferred. (See "Air Raid Projection", p-3). A main traffic street forming a boundary of a project should be kept a freeway, when possible, by avoiding connections with the project. Streets traversing the project should be planned to reduce their use for through traffic, if possible.

As a normal standard a two-land roadway will be adequate for arterial streets.

Roadway Cross Sections.

The sections must be determined at an early stage of the site plan studies, since they influence the spacing between street lines and building lines. Roadway widths from edge to edge of pavement are:

Two lanes (main access driveway; parking provided elsewhere)	18 to 20 ft.
Two traffic lanes, plus parallel parking on one side or one free lane and parallel parking on both sides	26 ft.
Two traffic lanes, plus parallel parking on both sides	32 ft.
Two traffic lanes, plus perpendicular parking on one side	40 ft.
Two traffic lanes, plus perpendicular parking on both sides	60 ft.

In regions of heavy snowfall a two-lane access driveway should be 20 feet.

To prevent damage by (and to) car and truck overhangs, street and parking pavements should clear obstructions (as buildings, walls, poles, trees) by 2' - 6" unless the topographic or plan conditions make a reduced clearance necessary.

Servicing

Paved street frontage for each trailer lot is not required. The site plan, however, must provide adequate facilities for carrying out the contemplated scheme of servicing. Definite plans should be established at an early stage. Municipal regulations should be ascertained and, where practical, agreements should be made with the local officials concerned to insure the collection of refuse and garbage.

The type of heating affects the arrangement and cost of site development. Where coal must be used, central storage bins should be provided, one for approximately 12 trailers, and where practicable, adjacent to Service Trailers or Buildings or Collection Stations. Capacity for 3 to 4 tons of coal, should be adequate for 12 trailers. Pavement should be within the distance locally practicable for the economical delivery of the fuel to the bins. Walking distance from trailer to bin should not exceed 150 feet.

In unrestricted areas, where oil may be used, tenants normally supply fuel for their own use. It is essential, however, to provide access for oil truck service to Service Trailers or Buildings. Local oil delivery limit from truck to storage tanks should be checked. It is usually between 100 and 200 feet less 10 feet for handling hose.

Parking

Parking for 75 percent car ownership shall be used as the normal standard. Of this, 50 percent shall be surfaced for immediate use. In all cases, however, the site plan shall permit the future development of the full 75 percent. Parking on perimeter streets shall not be included in the calculations. Offstreet parking is preferred.

Providing parking space by widening project streets at intervals or by numerous "turn-ins" from streets and drives, should be avoided since such irregularities complicate drainage design and add to construction cost.

Walks

In the walk plan, the emphasis should be on a logical system of main through walks. The walk surface should be distributed where it will be most used, entrance walks, where required, being made narrow to permit public walks to be wide. Walks or other pavement must be provided to facilitate transportation of waste and fuel by tenant, or waste collection by others.

Walk widths

Public walk	normal standard	4 feet wide
Public walk	serving large area (approximately 100 trailers)	5 feet wide
Public walk	small number of trailers (approximately 25 trailers)	3 feet wide
Entrance walks		2 feet wide

In projects above or below the ordinary range of size, the walks should be sized to meet the specified conditions of the project.

All public walks should clear obstruction (as poles and planting) by two feet; entrance walks by one foot.

Avoid steps in walks. Single risers should never be used. A 10 percent to 15 percent gradient is preferred to steps.

Service Trailers or Buildings (Community Toilets and Laundries).

Space, well correlated with the rest of the site arrangement, should be provided for Service Trailers or Buildings as required in the section on "Community Facilities". Walking distances from trailers to Community Toilets should not exceed 200 feet; to Community Laundries, 300 feet.

Collection stations for refuse, garbage, sink waste, water supply, and ashes should be provided as necessary, one station for not more then 12 trailers. Walking distance from trailer to collection station should not exceed 150 feet. Convenient vehicular access should be provided to each collection station.

Outdoor Laundry Drying Yards.

Provide laundry drying yards (preferably wood fenced) adjacent to laundry trailers or buildings. Based on use five days a week allow 12-15 feet of line per trailer. Supports for clothes lines should be of wood construction.

Lighting

Outdoor lighting to supplement street lighting should be effectively related to toilet and laundry trailers or buildings, play areas, planting, walks, steps, and ramps. The illumination provided should be of conservative intensity, but sufficiently distributed to eliminate dark areas especially at steps. Control switches should be conveniently located in order to make it possible to readily "blackout" the project.

Flagpoles

Provide a thirty foot wood flagpole at management office or community building, preferably near the play area for convenience in patriotic ceremonies, etc.

Street signs

All streets shall be clearly marked by street name posts. Traffic control and other signs as required shall be included.

Lawns and Planting

The work of lawns and planting shall be limited principally to providing grass. A few trees and shrubs may be used in connection with the community buildings, service trailers or buildings, and entrance roads. No attempt should be made to plant trees or shrubs in individual trailer lots except in the critical areas upon the specific request of the District Engineer (See Air Raid Protection, p-3).

In order to protect the project site from water and wind erosion and to provide an earth surface on which people can walk, all disturbed land (including disturbed or trampled areas, outside the contract limits, resulting from the contractor's work) which is not to be otherwise surfaced should be planted with grass. Areas not actually required for contract operations should be reserved and protected in order to preserve as much as possible of the existing surface soil and natural growth. Topsoil shall not be brought in for the work of lawns and planting.

Trailer Blocking

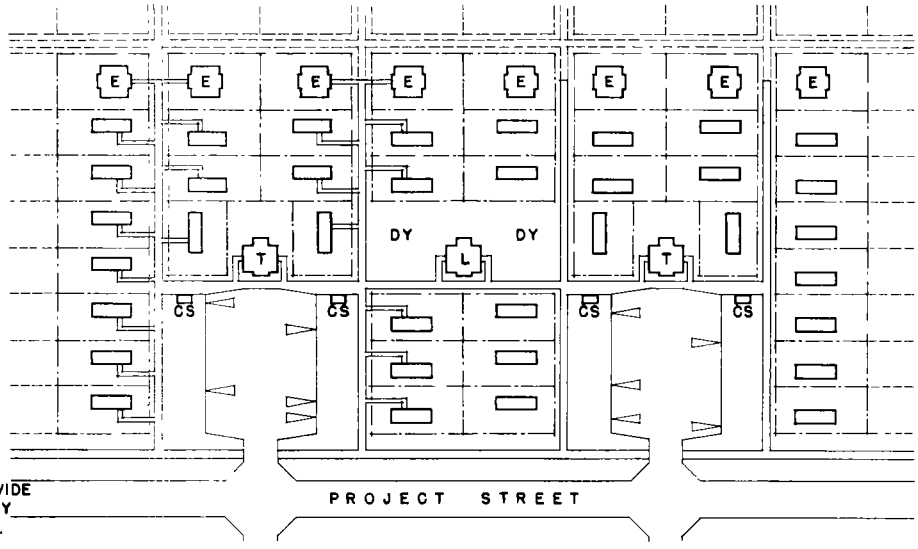
All trailers shall be blocked up so that the tires clear the ground by at least 2 inches. Blocking bents, designed to support securely the weight of the trailer and keep the floor level and firm are supplied by the trailer company. See drawing No. SP-3 for type of support and method of placing it in the field. Running gear will be returned to the trailer company.

TRAILER SCHEDULE FOR
PATTERN "A"

TYPE	NO.	PERCENT.	NO. PERSONS (ESTIMATED)
E	8	18.2%	36
S	36	81.8%	108
TOTAL	44	100.0%	144

PARKING FOR 36 CARS--82%

NOTE:
IF COAL IS USED AS FUEL, PROVIDE VEHICULAR ACCESS TO LAUNDRY TRAILERS IN PATTERNS "A" & "B".

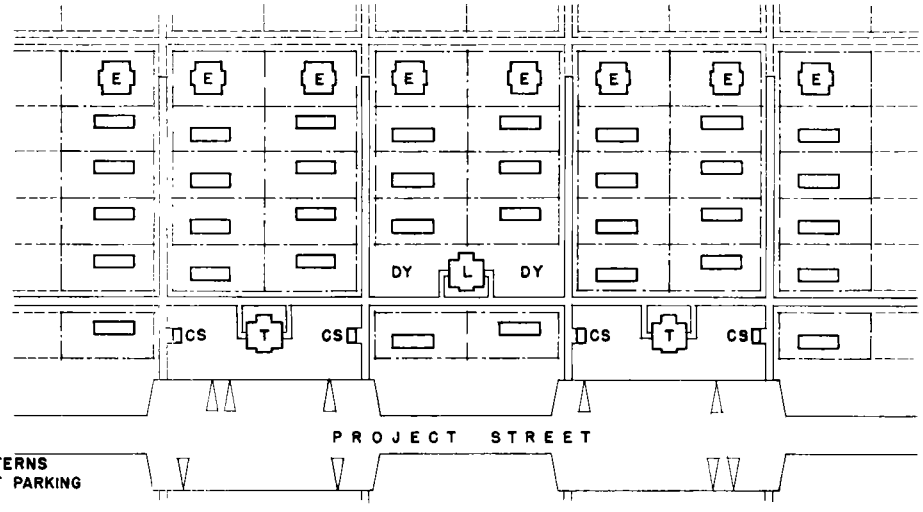


TRAILER SCHEDULE FOR
PATTERN "B"

TYPE	NO.	PERCENT.	NO. PERSONS (ESTIMATED)
E	8	19.0%	36
S	34	81.0%	102
TOTAL	42	100.0%	138

PARKING FOR 30 CARS--72%

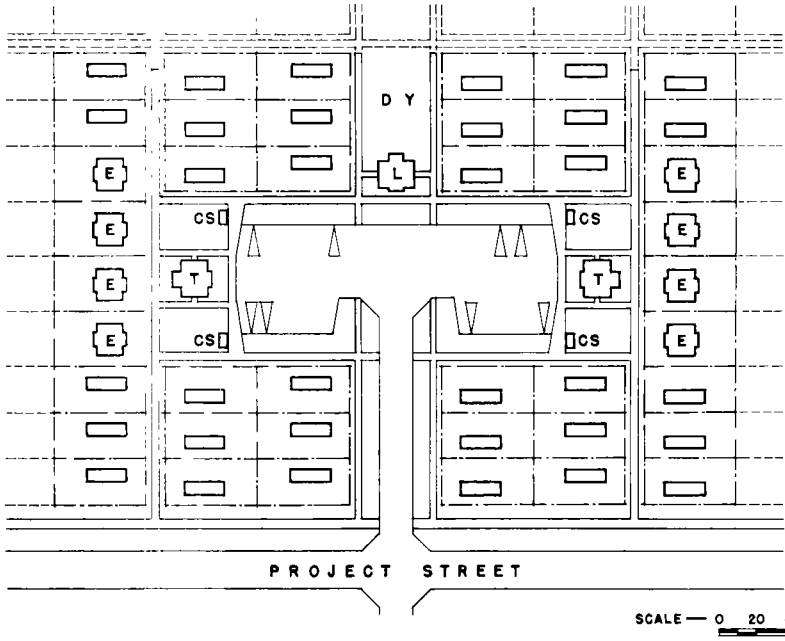
NOTE:
WHERE PRACTICAL, ADJUST PATTERNS "A" & "C" TO TOPOGRAPHY SO THAT PARKING AREAS WILL DRAIN TO STREETS.



TRAILER SCHEDULE FOR
PATTERN "C"

TYPE	NO.	PERCENT.	NO. PERSONS (ESTIMATED)
E	8	19.0%	36
S	34	81.0%	102
TOTAL	42	100.0%	138

PARKING FOR 33 CARS--78%



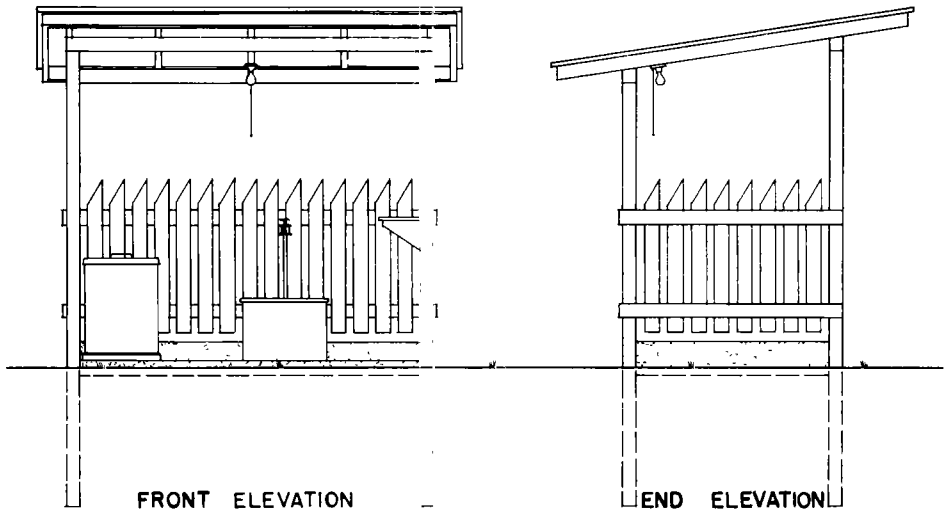
LEGEND.

- E EXPANSIBLE TRAILER
- S STANDARD TRAILER— (ALL UNMARKED TRAILERS)
- L LAUNDRY TRAILER
- T TOILET TRAILER
- CS COLLECTION STATION
- DY DRYING YARD

SCALE — 0 20 40 60 80 100FT.

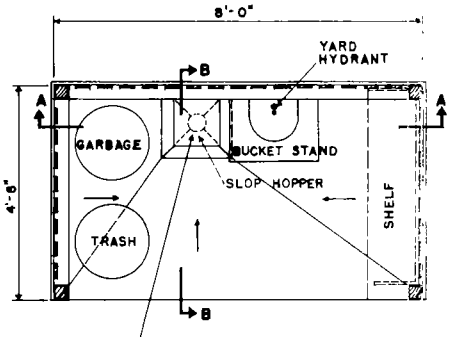
PREPARED BY FPHA NHA	SITE PLAN PATTERNS	SP-1
	WAR TRAILER PROJECTS	8-1-42

FP 44630



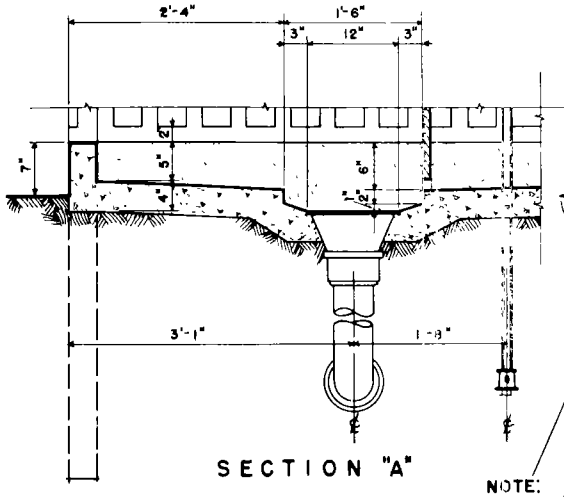
PLAN & ELEVATIONS
0' 1' 2' 3' 4'

SECTIONS
0' 1' 2'

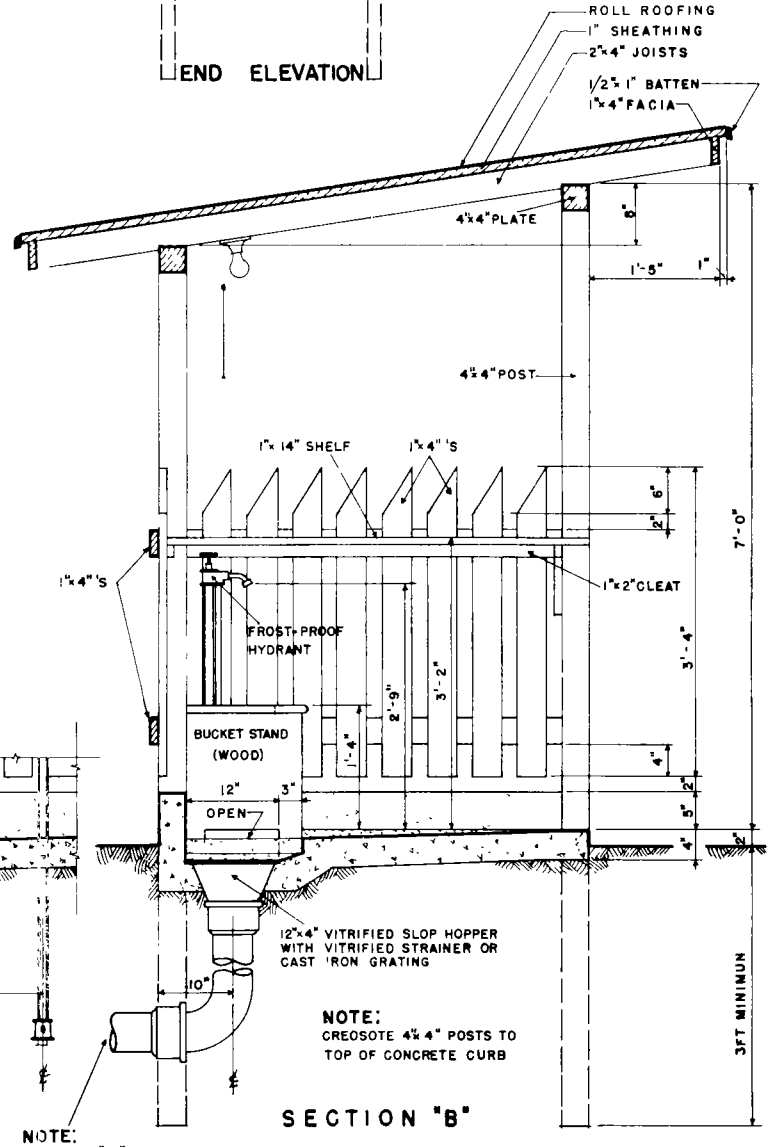


PLAN

NOTE:
REMOVABLE STRAINER TO FIT IN 1'-3"x 1'-6" HOPPER OPENING — 1/4" STEEL WIRE MESH ON 1"x2" WOOD FRAME.



SECTION "A"



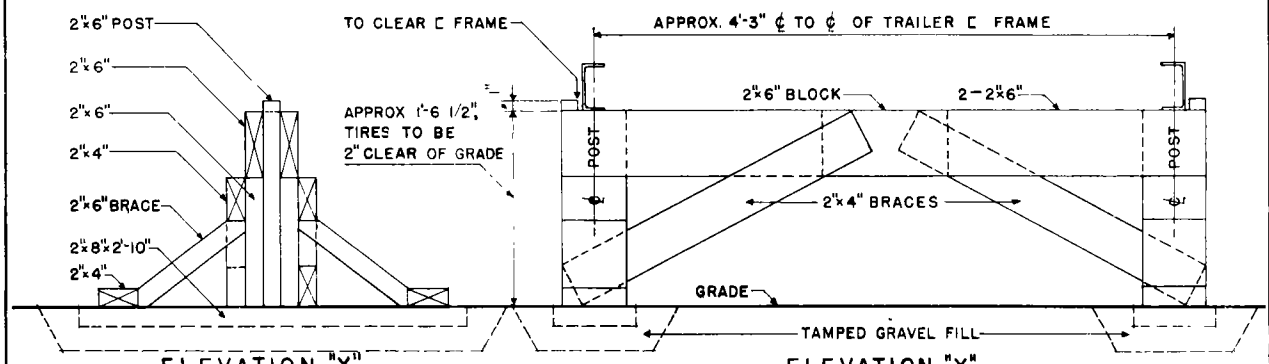
NOTE:
CREOSOTE 4"x 4" POSTS TO TOP OF CONCRETE CURB

SECTION "B"

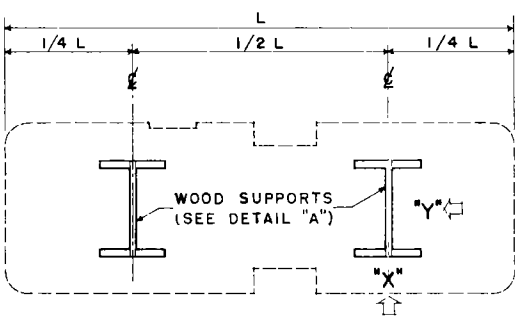
NOTE:
PROVIDE 4"x4" CENTER HAND-HOLE TRAP WITH HAND-HOLE CAPPED.

PREPARED BY FPHA NHA	COLLECTION STATION	SP-2
	WAR TRAILER PROJECTS	8-1-42

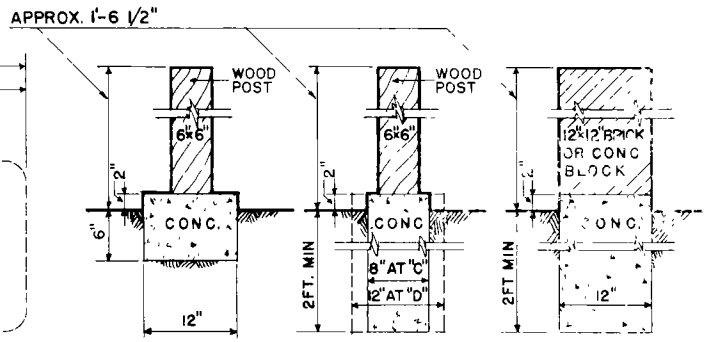
FF 44630



WOOD SUPPORT (DETAIL "A")



FOUNDATION PLAN FOR STANDARD TRAILER



SECTION, PIER "B"

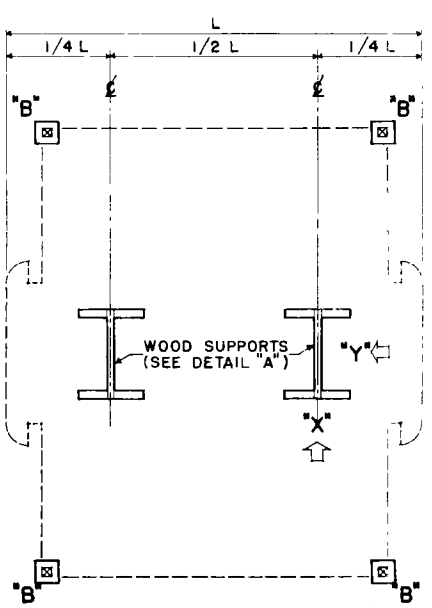
SECTION, PIER "C" & "D"

SECTION, PIER "E"

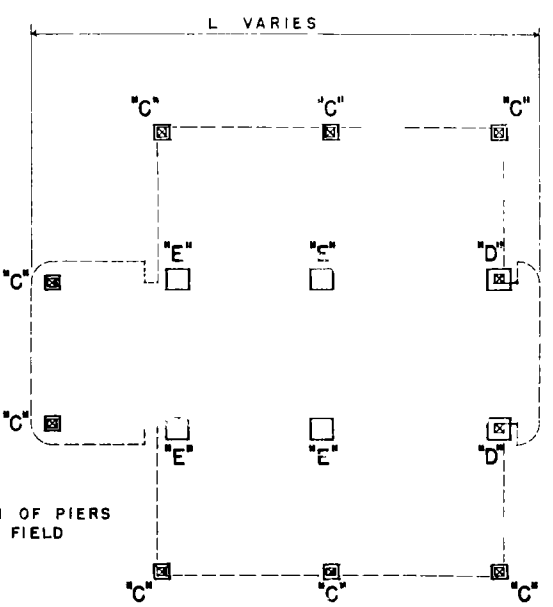
PLANS: 0' 1' 2' 3' 4' 5' 6' 7' 8'

DETAILS: 0' 1' 2'

NOTE:
BOTTOM OF FOOTINGS FOR PIERS "C", "D", & "E" TO EXTEND TO FROST LINE



FOUNDATION PLAN FOR EXPANSIBLE TRAILER



NOTE:
EXACT LOCATION OF PIERS DETERMINED IN FIELD

FOUNDATION PLAN FOR TOILET, LAUNDRY, & OFFICE TRAILERS

BASED ON F.S.A. DESIGN STANDARD, NO. S-110

PREPARED BY FPHA NHA	FOUNDATION PLANS FOR TRAILERS	SP-3
	WAR TRAILER PROJECTS	8-1-42

FP 44630

COMMUNITY FACILITIES

General

Facilities for community toilets and showers, community laundries, management and maintenance services, social or tenant activities (in projects of 50 dwelling units or more), outdoor recreation areas, health services, and commercial facilities shall be provided in all projects. Such facilities, however, may be reduced or omitted, with the approval of the Washington office, to the extent that satisfactory off-site facilities are conveniently accessible and in part or in whole meet the requirements of these standards.

Requests for reduction or omission of community facilities shall state the type, location, and adequacy of off-site facilities and the basis on which they will be available to tenants. Prior to submission of such requests the adequacy of off-site facilities should be evaluated by the Regional Management Office in cooperation with local recreational and other officials.

Space requirements for commercial facilities are stated in "Standards for Commercial Facilities" August 1942. Space requirements for all other facilities are set forth below.

Number of persons for whom facilities are to be provided should be calculated on basis of 3 persons per standard trailer and 4.5 persons per expansible trailer.

Community building. When the project exceeds 100 units and when management, maintenance and social space are to be provided, they usually should be incorporated in one community building, with outdoor areas serving such building.

When the project does not exceed 100 units, one expansible office trailer may be used in lieu of constructing office space.

Location of the Community Building (or management and maintenance space or expansible office trailer) should preferably be near the principal point of entrance to the project for general control of project area.

Construction of all buildings shall be temporary in character and demountable insofar as practicable. Whenever practicable, the Community Building (or Management and Maintenance Building) shall be built and used for the field construction offices of the Government and contractor.

Public telephone pay stations on projects are essential. Provide convenient locations, one for each 250 trailers or less.

Cost of social or tenant activity space and equipment and of commercial facilities on all projects constructed from Lanham Act funds is subject to a limitation of 3% of the cost of all projects. This limitation does not apply to the cost of other community facilities on Lanham Act projects or to community facilities on projects constructed under other appropriations.

Community toilets, showers, and laundries.

Community toilets, showers, and laundries, should be provided in service trailers or, where circumstances warrant, in temporary buildings. For maximum walking distances, see section on "Site Planning".

Trailers. Provide one Expansible Toilet and Shower Trailer for not more than 70 persons (One expansible trailer provides for men, 4 toilet fixtures, 4 lavatories, and 2 showers; for women, 3 toilet fixtures, 4 lavatories, 1 tub and 1 shower). Provide one Expansible Laundry Trailer for not more than 140 persons (one expansible trailer provides 8 tubs). On the basis of a project composition of 20% expansible trailers and 80% standard trailers (a normal distribution) two toilet trailers and one laundry trailer are necessary to serve approximately 40 trailers.

Buildings. Where service trailers are not available, provide service buildings, containing toilets, showers, and laundry, providing fixtures on basis stated under Trailers.

Management, Maintenance, and Social Space.

Minimum space required for management maintenance, and social space shall be in accordance with the following tabulation:

No. of D. U.	Minimum Gross Area (square feet) Management	Maintenance	Social	Total
50	250	200	450	900
100	350	350	900	1600
200	500	600	1800	2900
300	600	700	2700	4000
500	800	900	4500	6200
750	1000	1150	6750	8900
1000	1200	1400	9000	11600

Management Space

Subdivisions of management space commonly required are waiting room, general office or work space, manager's office, vault or storage closet, coat and office supply closets, and toilets.

Maintenance Space

Vehicular access to maintenance space is required, preferably from main project street via service court. Court should permit truck turning, parking of staff cars, and storage of materials.

Closed garage (area included in tabulation above) shall be provided for one maintenance car or truck for projects from 200 to 1,000 units.

Subdivisions of maintenance space shall include repair shop (may be partly garage space) and storage room. Storage space should be separated from repair shop by light partition, and should be so planned that it may be locked. Storage space should not be used for circulation.

Social space

General. In war trailer projects, no matter how temporary, it is essential that space should be available for civilian defense activities, child care, and other tenant activities of a social, recreative, and eductional nature. In trailer projects most tenants will be newcomers to the community, without local social ties, and their contentment (which is the best assurance against costly labor turnover) will depend to a large extent on new friendships. Where existing buildings or neighborhood facilities will meet the space requirements for tenant activities in whole or in part, their availability should be considered in the design of the community building and the play areas associated with it.

Subdivisions of social or tenant activity space commonly provided are lobby, community hall, kitchens, toilets, and playroom for small children. Minimum required playroom area (planned for group of 30 children) is 500 square feet. For all day nursery program including lunches and naps, provide approximately 800 square feet, preferably in two adjoining rooms, near kitchen. Provide direct access to play area. Toilets should be accessible from all social rooms through lobby or corridor and directly accessible from play ground.

Recreation area

General. Properly located and designed play areas tend to prevent accidents to children and to reduce damage to spaces not intended for play.

Space Requirements. A recreation area shall be provided for each project in accordance with the following tabulation of minimum areas required:

No. of Units	Minimum Area (Sq. ft.)
50	10,000
100	45,000
200	55,000
300	70,000
500	90,000
750	115,000
1000	140,000

For projects of an intermediate number of dwelling units not shown in tabulation, adjust recreation area proportionately. For purposes of preliminary studies and estimates, area required for community building, service court, etc., may be considered as approximately two and one-half percent of the recreation area.

Location. The recreation area should be near the community building or management and maintenance building. Extensive frontage on project streets should be avoided.

Clinic and Infirmary

General. Provide clinic and infirmary in connection with all trailer projects unless such facilities are otherwise available to project families. Where a trailer project is located near a dormitory project, the clinic and infirmary facilities required for the two projects may be combined in one building.

Clinic. The clinic should include a waiting room, examining and first-aid room, consultation office, and, where investigation indicates the need for it, a dentist's office. Locate toilet facilities off corridor which is accessible from waiting room, examining room, and office. Provide lavatory in connection with office and examining room.

Infirmary. The infirmary shall include nurse's station, diet kitchen, toilet and bathing facilities, one or more isolation rooms, and one or more wards for 2 to 4 beds. Necessary storage and utility space should be provided. A private lavatory and toilet shall be provided in connection with each isolation room.

Trailer projects consisting of 100-300 trailers require an infirmary with one isolation room and one two-bed ward. These facilities may be provided in expansible trailers. For larger projects add one isolation room and one two-bed ward for every 300 trailers.

SITE ENGINEERING

Critical Materials

Make the conservation of critical materials the foremost consideration in site engineering design. To this end, sacrifice economy in construction and maintenance wherever necessary and in every detail of design be prepared to lay aside "standard practice." Disregard these standards insofar as they may prove at variance with rulings of the War Production Board or the Petroleum Coordinator for National Defense.

Grades and Surface Drainage

Site grading should be limited generally to the shaping of roadways and roadside ditches, to levelling around collection stations, service and community buildings, and to other changes essential to site drainage. Where feasible, yard areas around trailers should be left at existing grades.

Surface drainage should be carried off in roadside ditches, existing water courses, swales, etc., in order to obviate any need for storm sewers.

Show finished grades (spot elevations) in the detail required for construction purposes. Show floor elevations for service and community buildings.

Project Streets, Drives, Parking Areas

Roadway drainage should be effected generally by proper crowning and by roadside ditches (usually shallow depressions), with tile pipe or wood box culverts where necessary. Construction such as concrete curb or rolled bituminous gutter is too costly to be considered for trailer projects. Under favorable conditions - including a durable surfacing material, e.g., crushed rock - roadway drainage may be permitted to flow along the edges of the surfacing, confining it by means of wood curbs or low banks. Wood curbs should protrude only 3 or 4 inches; experience to date indicates that they may be expected to serve satisfactorily for only a few months.

The roadway surfacing should consist generally of a relatively light, dense base course and a dust preventive or bituminous surface treatment. Take into account in each case the season or seasons during which the project will probably be occupied; if the roadways must stand up during severe winter weather and spring thaws, or for an indefinite period, they must obviously be better constructed than if they may be used during summer months only. Following are surfacing types to be considered:

(a) Bank-run gravel (with clay binder), crusher-run stone, sand-clay, etc., calcium chloride treated.

(b) Gravel, water-bound macadam, sand-clay, slag, etc., with bituminous surface treatment.

Note: While recent orders restrict the wide use of bituminous materials, it is to be noted that in some instances the PRA may certify the use of tar when the use of asphalt could not be certified; further, that under certain conditions set forth in Lanham Development Manual (LD-216), the PRA may certify the use of limited quantities of asphaltic material.

(c) Gravel, water-bound macadam, sand-clay, slag, cinders, etc., untreated.

(d) Soil-cement. - Best adapted to roadways laid out in uniform width, permitting convenient operation of heavy road-building equipment; bituminous topping unnecessary.

The choice of surfacing material will be governed to a large extent by the materials locally available. Where practicable, refer to State Highway Department specifications for standards of materials and workmanship for the type of surfacing to be employed.

Parking area surfacing should be similar to that for roadways but should usually be somewhat lighter. In regions where the use of tar and asphalt is restricted, no bituminous surface treatment can be applied to parking areas.

Walkways

Use the least expensive type of walkway which will be reasonably satisfactory in service. Alternate materials include the following:

(a) Gravel, cinders, decomposed granite, etc. - Suitable principally for projects in mild climates.

(b) Plank or board walks. - Well suited where lumber is available for the purpose; convenient for spanning roadside ditches.

(c) Stepping stones (concrete blocks or natural stone). - Well adapted to laying to natural grade; material easily salvaged.

(d) Monolithic concrete walks. - Use only where required for sidewalks along public streets.

Sewage Disposal

Sanitary sewage should be disposed of by gravity connection to an existing sewer system when by any means practicable. (Sites to which such connections are not feasible, or where soil and other local conditions will not permit employment of the simplest type of sewage disposal works, are

definitely unsuitable for trailer projects.) Sewage disposal works, if any, should be provided only to the extent essential for the protection of public health, as determined in collaboration with local health authorities. They should be of simple, temporary construction, designed to be built quickly and with an absolute minimum of critical materials. Septic tanks with tile beds should be used only where percolation tests and local experience indicate definitely that this method of sewage disposal should prove successful.

Liquid waste from kitchens should generally be disposed of (by tenants) in slop hoppers located in the collection stations. Exception may be made in the case of sites on which there is very porous soil (percolation of 1 inch in not more than 5 minutes); in such cases, the drain from each kitchen sink may be connected to a dry well, located at least 2 feet below the ground surface and containing approximately 5 cubic feet of coarse gravel or broken stone). However, even when dry wells are constructed, slop hoppers should be provided in collection stations or elsewhere, so as to be available - for use in case of stoppage of dry wells - at a distance of not more than 150 feet from any trailer.

Sewers

Sanitary sewers for trailer projects should be installed to service trailers (or buildings), collection stations, and community buildings. They should be designed for a maximum flow, with sewers flowing half full, of approximately 300 gallons daily per trailer.

Storm sewers should be omitted from trailer projects. The storm water run-off from the site will be increased but little by project construction and if the site was free from flooding prior to construction, no underground storm drains (excepting roadway culverts) should be necessary.

Sewer manholes may be spaced up to at least 500 feet. Clean-outs consisting simply of plugged wyes should be substituted for manholes at the upper end of lines. In lieu of cast iron manhole frames and covers, use reinforced concrete in street areas and creosoted wood in lawn areas.

Water Distribution

Water lines should be provided to service trailers (or buildings), collection stations, and community buildings, and to yard hydrants, if any, apart from collection stations. The layout should be designed for minimum material. It is not at all necessary that lines follow streets or drives.

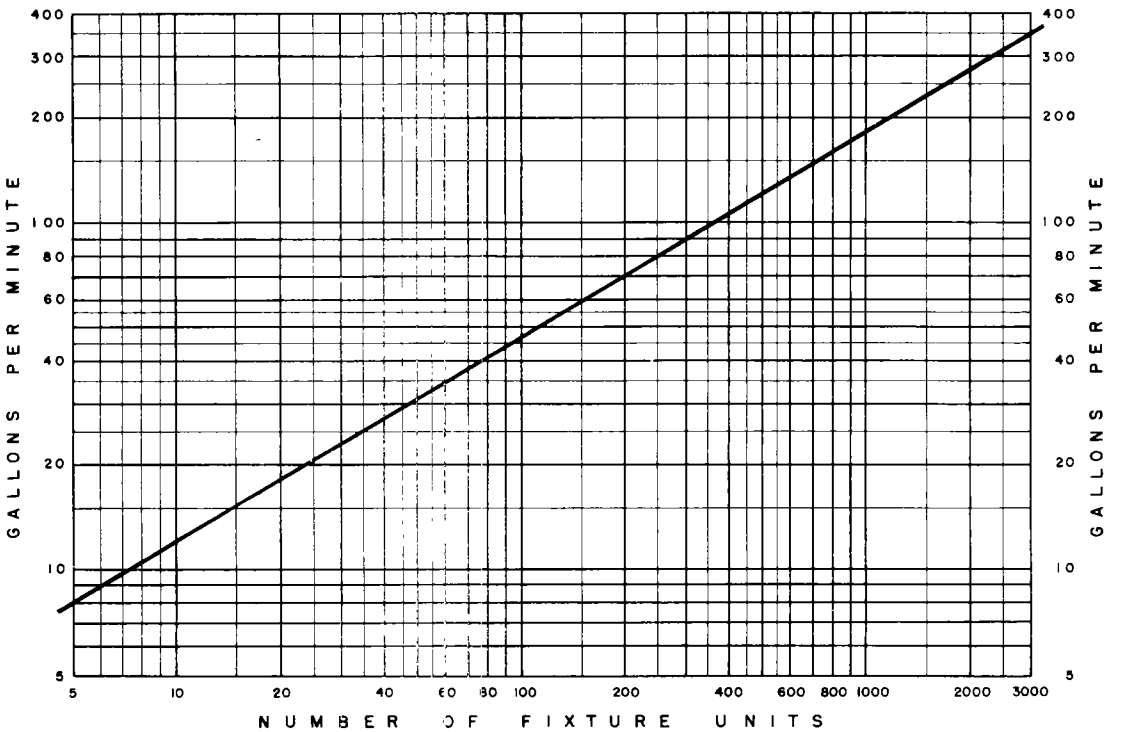
Water pipe sizing should be based on maximum demands derived from Figure SE-1.

Yard hydrants, installed at collection stations or elsewhere, should be 3/4-inch. of the "skeleton body", frost-proof type.

Fire hydrants are not essential in trailer projects and should be omitted unless they can be connected directly to existing mains or to new domestic-supply mains which will require very little or no increase in size to provide the requisite hydrant supply. Where installed, 4-inch hydrants may be used.

Valves should be provided on water lines only where indispensable as insurance against serious interruption of supply.

Water lines and sewers may be laid in the same trench provided there is ample width to install each properly on undisturbed ground. However, water and sewer systems should not be specially designed for this method of installation when the depth of trenching will be materially increased thereby or greater quantities of critical materials will be required.



FIXTURE UNIT RATING
FOR ESTIMATING
MAXIMUM WATER SUPPLY DEMAND

FIXTURE TYPE	NUMBER OF FIXTURE UNITS
LAVATORY	2
WATER CLOSET-FLUSH VALVE	20
WATER CLOSET-FLUSH TANK	5
URINAL-FLUSH VALVE	10
URINAL-FLUSH TANK	3
BATHTUB OR SHOWER	4
SERVICE SINK	3
LAUNDRY TRAY	3
YARD HYDRANT	6

PREPARED BY FPHA NHA	MAXIMUM MOMENTARY DEMAND FOR DOMESTIC WATER SUPPLY	SE-1
	WAR TRAILER PROJECTS	8-1-42

TP 44630

ELECTRICAL DISTRIBUTION

Codes - Regulations

The National Electrical Code and the National Electrical Safety Code, latest issues, shall govern design except that any orders issued by the Federal Agency controlling priorities affecting these codes shall take preference.

The standard practice with respect to arrangement of service equipment and distribution of electrical energy on project site promulgated by the local utility companies shall be followed except where such practice is contrary to the national codes or to the orders issued by the Federal Agency controlling priorities.

System

Primary voltage should be 4.5 KV preferably using four wire, Y connected, where three phase is served, permitting use of nominal 2400 volt circuits and apparatus, or using nominal 2400 volt two wire where single phase is served.

Provide a radial type of overhead distribution system. Distribution should be accomplished by stringing primary and secondary conductors on poles with portable service drops to trailers.

Pole Line

Avoid needless changes in direction of line. Provide means for climbing poles where apparatus requiring periodic servicing is installed on poles.

Place guys so as not to obstruct walkways, play areas, parking areas, etc.

Place transformers in center of loads; limit sizes to 37 1/2 KVA maximum per pole.

Pole Line Design

Total bending moment (ft./lbs) due to wind pressure on pole plus a safety factor of two (2Mp) and the moment (ft/lbs) due to wind pressure on conductors plus a safety factor of two (2Mc) should be equal to, or smaller than, the moment of resistance of the pole (Mr).

Formula 1: $2Mp + 2Mc \leq Mr$

For straight line construction, apply the following formulae in determining "bending moment."

Formula 2: (Heavy loading district)

$$2Mp = \frac{H_1^2 (D_1 \div 2D_2)}{4.5}$$

$$2Mc = \frac{H_2 \, n \, (d \div 1) \, S_1 \div S_2)}{1.5}$$

Formula 3: (Medium loading district)

$$2Mp = \frac{H_1^2 (D_1 \div 2D_2)}{4.5}$$

$$2Mc = \frac{H_2 \, n \, (d \div 0.5) \, S_1 \div S_2)}{1.5}$$

Formula 4: (Light loading district)

$$2Mp = \frac{H_1^2 (D_1 \div 2D_2)}{3}$$

$$2Mc = H_2 \, n \, d \, (S_1 \div S_2)$$

Wherein:

Mr = Resistance moment at ground line (ft/lbs)

Mp = Bending moment at ground line (ft/lbs) due to wind pressure on pole

2Mp = Bending moment at ground line (ft/lbs) due to wind pressure on pole (safety factor 2)

Mc = Bending moment at groundline (ft/lbs) due to wind pressure on conductors

2Mc - Bending moment at ground line (ft/lbs) due to wind pressure on conductors (safely factor 2)

H_1 = Height of pole (ft) above ground line

H_2 = Height of conductors (ft) above ground line

D_1 = Diameter of pole (inches) at 6' -0" from butt (see Table E-1)

D_2 = Diameter of pole (inches) at top (see Table E-1)

n = Number of conductors

d = Diameter of conductors (inches)(See Table 81, NESC)

S_1 = (
(Adjacent spans (ft)
S_2 = (

Apply the following formula in determining pole resistance:

Formula 5:

$Mr = 0.000264\ f\ c^3$

Wherein:

Mr = Resistance moment of poles (ft/lbs)

f = Allowable fibre stress (lbs/sq.in.)(See Table E-2)

c = Circumference of pole 6 feet from butt (inches). (See Table E-1). Multiply diameter given by 3.1416.

Table E-1, Minimum Diameters of Wood Poles

Top Diameter	Class: (In.):	1 8.6	2 8.0	3 7.3	4 6.7	5 6.1	6 5.4	7 4.8
Pole Length (ft)	Ground from butt (ft)	Diameter 6 ft. from butt (in)						
Southern yellow pine, creosoted								
25	5	10.9	10.3	9.5	8.9	8.3	7.6	7.0
30	5½	11.9	11.1	10.3	9.5	8.9	8.3	7.6
35	6	12.7	11.9	11.1	10.2	9.5	8.8	8.1
40	6	13.4	12.6	11.8	10.8	10.0	9.2	8.6
45	6½	14.0	13.2	12.2	11.5	10.5	9.7	9.1
Chestnut								
25	5	11.8	11.0	10.3	9.5	8.9	8.1	7.6
30	5½	12 7	12.1	11.1	10.3	9.5	8.9	8.3
35	6	13.5	12.7	11.9	10.9	10.2	9.5	8.8
40	6	14.3	13.5	12.6	11.6	10.8	10.0	9.4
45	6½	15.1	14.2	13.2	12.2	11.5	10.5	9.9

Table E-1, Minimum Diameters of Wood Poles
(Continued)

Top Diameter	Class: (In.):	1 8.6	2 8.0	3 7.3	4 6.7	5 6.1	6 5.4	7 4.8
Pole Length (ft)	Ground from butt (ft)							
Western red cedar								
25	5	12.1	11.3	10.5	9.7	9.1	8.3	7.8
30	5½	13.0	12.2	11.3	10.5	9.7	9.1	8.4
35	6	13.8	13.0	12.1	11.3	10.3	9.7	8.9
40	6	14.6	13.8	12.9	11.9	11.0	10.1	---
45	6½	15.4	14.5	13.5	12.5	11.6	---	---
Northern white cedar								
25	5	13.8	13.0	12.1	11.3	10.3	9.5	8.9
30	5½	15.1	14.2	13.2	12.2	11.3	10.5	9.7
35	6	16.1	15.1	14.0	13.0	12.1	11.1	10.3
40	6	17.0	15.9	14.8	13.8	12.7	11.8	---
45	6½	17.8	16.7	15.6	14.5	13.4	---	---

Table E-2, Ultimate Allowable Fibre Stresses
(Modulus of Rupture) of Wood Poles

Southern yellow pine - creosoted . . . . . .7400 lb., sq. in.

Chestnut . . . . . .6000 lb., sq. in.

Western red cedar . . . . . .5600 lb., sq. in.

Northern white cedar . . . . . .3600 lb., sq. in.

In straight line construction, only transverse loads generally need consideration; vertical and resultant loads should be determined in sizing transformer and unbalanced pole structures.

Guying

Where loads imposed on poles are greater than can safely be supported, additional strength should be provided by the use of guys. Wherever conductor

stresses are unbalanced and at angle and dead ends, guys should be provided where pole strength is not sufficient.

Stresses due to line angles between 10 and 60 degrees should be supported by a single guy placed to split line angle or resultant load. Angles greater than 60 degrees should be guyed in both directions.

Figure E-1 indicates number and size of guys for varying conditions. To illustrate its use, the following example is given:

Conditions:

a. 3 #4 primary and 4 #1/0 secondary
b. Measured distance (d) - 20 feet
c. Guy attachment height (H) - 36 feet
d. Anchored lead (L) is 18 feet (a lead of 1/2 H or more is recommended)

Solution:

a. $L = \frac{18}{36} = 0.5$ Therefore use column L = 1/2 H

b. Wire equivalent in #1/0

Sec. 4 #1/0	=	4.0
Pri. 3 #4 3x .39*	=	1.17
		5.17

nearest whole number of #1/0 = 5 #1/0

c. Referring to figures opposite 5 #1/0 under Col. "1/2 H" a distance of 22 feet is the next larger figure to be measured distance (d) or 20 feet.

d. Therefore, one 3/8" guy with a 16" cone anchor should be used.

Conductors

Use steel conductors for primary except where voltage spread in using steel would exceed 105 to 125 volts, in which case copper is allowable.

Use copper conductors for secondary and service drops.

Service Drops

Space poles so as to permit service drops coming directly from poles to trailers.

* Ratio of #/ft of conductor used to #/ft. or #1/0 as base.

Demands

In sizing transformers, use the following demands - laundry trailer, 1.5 KW; shower and toilet trailer, 0.75 KW; trailers, 0.2 KW.

Grounds

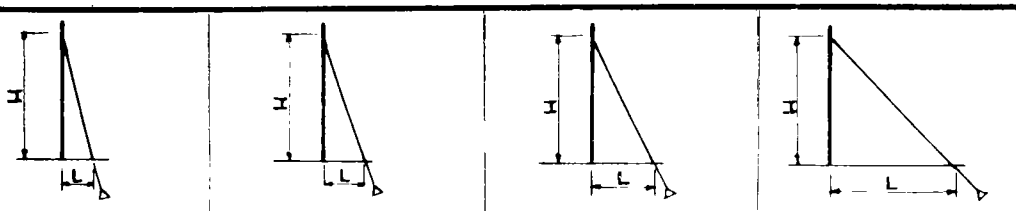
Provide a pole ground for each transformer and at each end of secondary, so that each secondary is grounded at three places.

Clearances

Maintain clearances in accordance with NESC and NEC rules.

Street Lighting

Street and area lighting, shall come within the limitations established by WPB in "Housing Utility Standards" issued June 23, 1942.



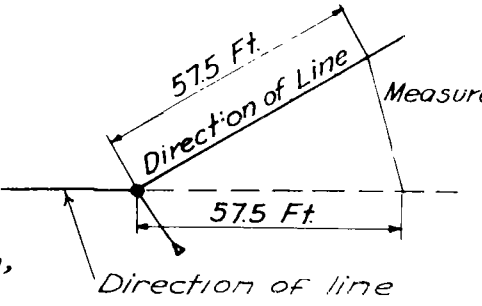
Lead "L"	1/4 H					1/3 H					1/2 H					H				
	Maximum "d" in feet																			
No. of 3/8" Guys	1		2	3	4	1		2	3	4	1		2	3	4	1		2	3	4
Type Anchor	Cone			Log		Cone			Log		Cone			Log		Cone			Log	
	8"	16"	23"			8"	16"	23"			8"	16"	23"			8"	16"	23"		
1	15	Dead End				20	Dead End				28	Dead End				44	Dead End			
2	8	31	Dead End			10	40	Dead End			14	Dead End				22	Dead End			
3	5	20	41	Dead End		7	27	53	Dead End		9	37	Dead End			15	Dead End			
4	4	16	31	46	Dead End	5	20	40	Dead End		7	28	Dead End			11	44	Dead End		
5	3	12	24	37	49	4	16	32	48	Dead End	6	22	50	Dead End		9	36	Dead End		
6	3	10	20	31	41	3	13	27	40	53	5	19	37	Dead End		7	30	Dead End		
7	2	9	17	26	35	3	11	23	34	46	4	16	32	48	Dead End	6	25	51	Dead End	
8	2	8	15	23	31	2	10	20	30	40	4	14	28	42	Dead End	6	22	44	Dead End	
9	2	7	14	20	27	2	9	18	27	35	3	12	25	37	50	5	20	40	Dead End	
10	2	6	12	18	24	2	8	16	24	32	3	11	22	34	45	4	18	36	53	Dead End
11	1	6	11	17	22	2	7	14	22	29	3	10	20	31	41	4	16	32	49	Dead End
12	1	5	10	15	20	2	7	13	20	27	2	9	19	28	37	4	15	30	44	Dead End
13	1	5	9	14	19	2	6	12	18	25	2	9	17	26	35	3	14	27	41	54
14	1	4	9	14	17	1	6	11	17	23	2	8	16	24	33	3	13	25	38	51
15	1	4	8	12	16	1	5	11	16	21	2	7	16	22	30	3	12	24	36	47

Number of #1/0's or Equivalent *

* Equivalents

#6 solid = 0.26 - #1/0's
#4 solid = 0.39 - #1/0's
#2 stranded = 0.64 - #1/0's
#1/0 stranded = 1.0 - #1/0's
#2/0 stranded = 1.23 - #1/0's
#3/0 stranded = 1.54 - #1/0's
#4/0 stranded = 2.0 - #1/0's

For straight line construction, use the "dead end" columns opposite equivalent loads to find anchor and guy sizes.



REVISED 5-42

PREPARED BY FPHA NHA	GUYING OF POLE LINE	FIG. E-1
	WAR TRAILER PROJECTS	FPHA

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