

Technical Information Notes



U. S.
Federal Public Housing ^{Administration} ~~Authority~~ - National Housing Agency

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FOREWORD

This Bulletin No. 19, "Technical Information Notes", will include material of general technical interest to the development branches of the regional offices. These notes are not to be construed as instructions, since their purpose is to make available advisory information or clarification of items in the Bulletins, specifications or drawings. The notes should be kept in loose leaf form, filed in the order of release.

BOILER WATER

ANALYSIS AND TREATMENT

The question has been raised relative to the service available in Washington for the analysis of boiler feed water and the recommendations for its treatment in plants of the various housing projects.

In checking with the Bureau of Mines, Geological Survey and the National Bureau of Standards, we find that services connected with water analysis and treatment are available for such plants owned and operated by Federal agencies. Therefore, FPFA-aided projects apparently cannot avail themselves of these services.

It is accordingly suggested that:

1. For Federal Owned and Operated Projects - the Bureau of Mines should be consulted. Samples should be submitted in standard-sized containers procurable from the Bureau. Address all communications to: Bureau of Mines, Fuel Economy Service, Washington, D. C. (Attention Mr. J. F. Barkley). The questionnaire and data sheet, forwarded by the Bureau with the container, should be properly completed.
2. For FPFA-aided Projects -
 - (a) Consult with local utilities and others operating boiler plants in the area in which the project is located, concerning their experience in analysis and treatment of local waters; or
 - (b) Utilize the services of an independent laboratory experienced in water analysis.

3-19-43

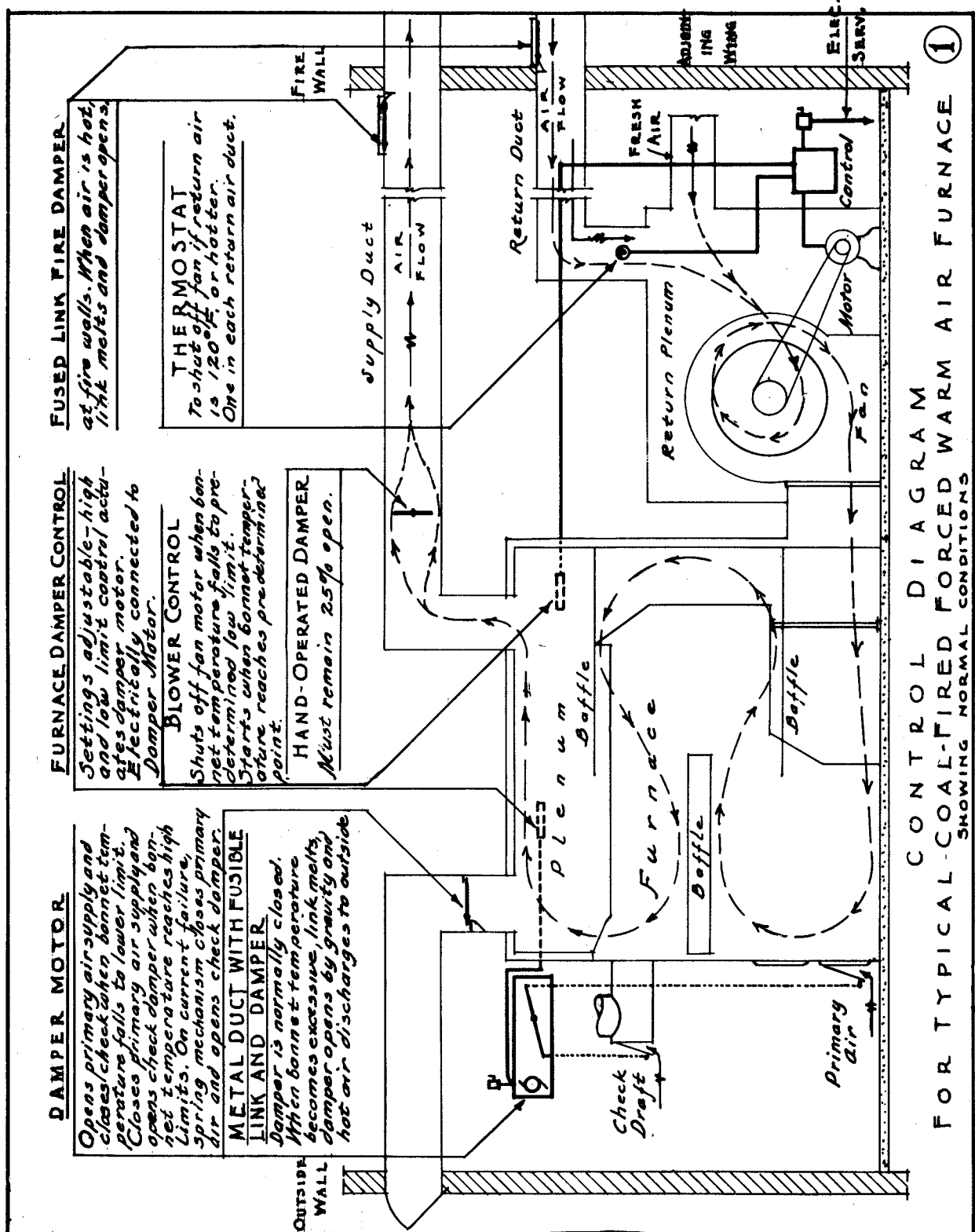
OPERATION OF CONTROLS FOR
COAL-FIRED FORCED WARM AIR FURNACES

Recent fires in housing projects have been traced, in some cases, to a lack of understanding of the functions of control devices, and to faulty installation of these devices, in connection with coal-fired forced warm air furnaces.

To clarify the operation of control devices for use in connection with such furnaces, two diagrams are attached. No. 1 indicates normal operation. No. 2 indicates control action on current failure and with a fire in the adjoining wing. These diagrams illustrate conditions in connection with dormitories wherein air is recirculated. However, in the case of the TDU-2 series, wherein the air is not recirculated, the arrangement is similar except for the omission of return ducts and the thermostat located in the return air stream.

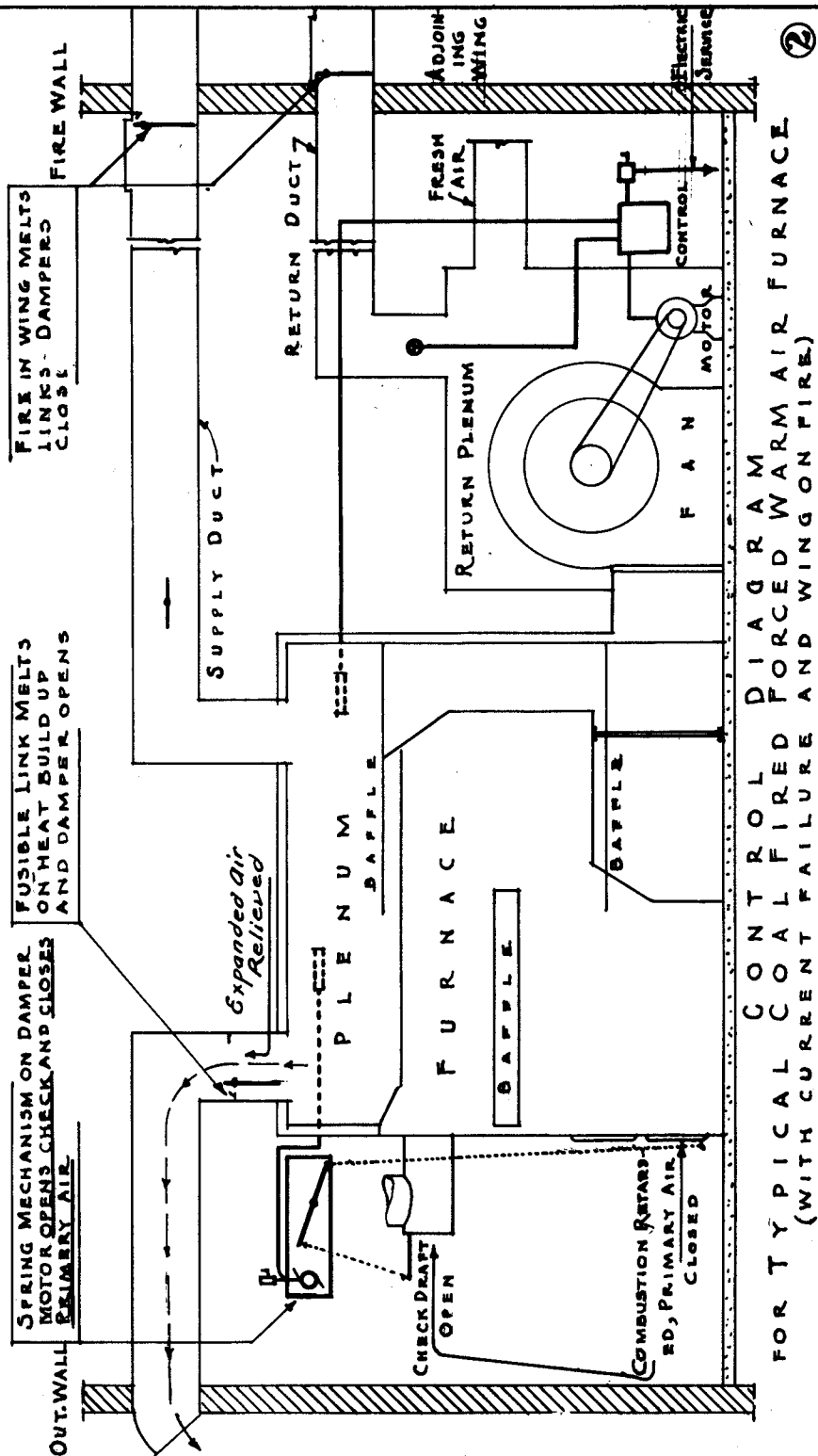
It is important that electrical equipment, such as automatic controllers and protective devices, be installed remote from the furnace and located where the room temperature is normal. The wiring should comply, insofar as installation is concerned, with the National Electrical Code.

All of the controls indicated are incorporated in the War Dormitory and Temporary Housing ('WD' and 'T') Specifications, with the exception of the mechanical closing action on the damper control and operation of the blower control. Specifications are being modified accordingly, and amendments will be issued to incorporate these features.



AUTOMATIC CONTROL ACTS TO:-

1. RETARD COMBUSTION
2. RELIEVE EXPANDED AIR



②

March 25, 1943

No. 3 Page 1

CEMENT WATER PAINT OR GROUT COATINGS

FOR MASONRY WALLS

Regional Office specifications have shown considerable variation with respect to this item. In most instances Regions follow the grout specifications contained in the Central Office Masonry Specification. In others, Regions call for cement paint TT-P-21 or use trade names.

Because of these variations and because all commercial brands of cement paint are not of equal value the Technical Division has re-examined the use of cement grout mixed on the job vs. the use of proprietary paints for coating masonry units.

An examination was made of exposure panels erected in 1940 and conferences were held with persons familiar with research in the materials entering into formulation of cement water paint and grout.

The following statements concerning TT-P-21 and the materials other than cement, sand, and water included in its formulation represent the conclusions reached by the research specialists after examination of the panels, and express the attitude of the American Concrete Institute Committee's Report on cement water paint of June 1942:

1. Hydrated lime is cheaper than Portland cement and, if of early plasticity, will slightly improve brushing qualities and reduce settling in bucket.
2. Carbonates are too small in quantity to have any influence.
3. Titanium dioxide or zinc sulphide improves the whiteness.
4. Water repellents are too small in quantity to have any observable practical effect. The quantity specified somewhat increases cost of application by making thorough mixing with water more difficult.
5. Hygroscopic salts are too low in quantity to have any practical effect in attracting water for hydration; but have some adverse effect because they prolong the wet appearance after rains and somewhat reduce wearing qualities.

In brief, the attitude of the experts and of the A.C.I. Committee report appears to be that the admixtures in the quantities specified will do no harm but will accomplish no significant benefit.

March 25, 1943

RECOMMENDATION:

In FPFA construction, with open textured walls (such as cinder blocks), the following requirements should be stipulated:

1. Equal parts by volume of white or gray Portland cement, depending on color desired, sand and water thoroughly mixed and kept well stirred during application, scrubbed in with stiff fiber brush. A paint brush is not satisfactory.
2. Walls to be cleaned of adhesions which would show through the coating, and thoroughly wetted before application, and after the coating is hard, by a mist spray of water.
3. Sand to pass a #20 sieve and be retained on a #100 sieve.
4. Water proportion may be varied slightly according to wetness of the wall to prevent running. The mixture should have the consistency of rich cream.
5. Lime proof pigments may be added up to 5% by weight of the dry ingredients, either titanium dioxide to strengthen the white or improve wet opacity, or other pigments to obtain desired tints.
6. Labor and supervision must be performed by personnel skilled in the use of cement.
7. A contractors option to use material complying with the requirement of Federal Specification TT-P-21 rather than the usual cement sand mixture may be included, but no increase of cost allowed, or the requirements of expert workmanship relaxed.

For smooth masonry, where there is no need to fill voids, the sand may be omitted and application made with painters brushes.

The following quotation from Federal Specification TT-P-21 is significant:

"It should be noted that the composition of the cement-water paint powder is secondary to the condition of the painting surface, the method of application, and the curing of the paint film as factors in determining the durability of the coating."

4-12-43

No. 4 Page 1

EXTERIOR FIBERBOARD SIDING

When $7/8$ " mineral surfaced fiberboard siding is used for exterior siding, and the vapor seal membrane on the inside surface of the stud wall is applied with enough slack so that a second air space of $3/4$ " thickness is obtained, the requirement of the standards that the "U" factor for frame walls should equal 0.20 may be considered as fulfilled.

May 6, 1943

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No. 5 Page 1

PLYWOOD FOR DOOR PANELS

Plywood is extremely critical at this time, due primarily to the enormous quantity required for packing and shipping of materials abroad. There is no indication that the situation will be relieved to any great extent in the near future.

In order to conserve the small quantity made available for civilian use for war housing construction purposes, the specifications for Temporary Housing and for War Dormitories have been written to permit the use of any stock door, No. 3 or better of National Door Manufacturers Association or Grade C or better of Fir Door Institute. Panels may be flat or raised, solid or laminated. The only restriction is that only one pattern of doors may be used in any one dwelling unit.

Consequently, it is suggested that:

1. Solid wood panels be used for panels on exterior doors.
2. Design of doors be changed where necessary to five cross panel or to six panel colonial in order to utilize smaller pieces of plywood.
3. Plywood made from other species of wood than fir be used for panels in interior doors.
4. Interior doors of five panel or six panel have panels made of plywood rejects or of $3/8$ " solid pine or of $5/8$ " raised panels.

The use of Prest wood, Masonite or other hard composition material is not recommended since this material is as critical as the plywood.

Shop lumber of Douglas fir for rails and stiles also is difficult to obtain and pine or other softwood substitutes should be used where feasible.

5-26-43

LIGHTING FIXTURE BASE - EXPOSED WIRING

A combination terminal block and lighting fixture base has been developed, for use with exposed wiring, by wiring device manufacturers.

The porcelain base is approximately 5" in diameter, 1/2" deep and will receive nonmetallic cable from four directions (90 degrees apart) and the back.

Pass and Seymour, Inc., Syracuse, New York, and John I. Paulding, Inc., New Bedford, Massachusetts, plan early production of this item.

Further information is available from the Technical Division.

LIGHTING FIXTURES FOR DORMITORIES

Numerous inquiries have been received regarding construction details of electrical fixtures shown on Drawing No. 104, Series WD-1. This drawing is intended to convey the idea of simplicity. Details of construction, dimensions and materials have, as far as practicable, been eliminated to permit the contracting officer to accept standard fixtures and finishes, manufactured in accordance with rules of the WPB. Deviation from the exact shapes shown should be permitted where necessary to meet the exigencies of manufacturing by substitution, wherever possible, of noncritical materials for critical materials formerly used.

WPB Limitation Order L-212, dated March 31, 1943 restricts the ferrous metal in residential fixtures, such as Types A, B and F, to not more than six ounces, and restricts ferrous metal canopies and globe holders for utility fixtures to six inches in diameter; but does not preclude manufacture of the Type G fixture of noncritical materials. If metal is used in the globe holder, glassware must fit a six inch holder.

Drawing No. 104 has been reviewed by the Lighting Fixture Branch of the Building Materials Division of WPB, and no objection has been raised. It is our understanding that they consider fixture Types A, B and F as residential types, and the others shown as utility types.

5-18-43

PRESSURE CONNECTORS - ELECTRICAL

A communication from the General Industrial Equipment Division of the WPB has been received, which, in part, reads:

"A considerable number of the manufacturers of service entrance devices and panelboards use solderless connectors in which the set screws bear directly on conductors. These devices, however, all carry an Underwriters' Laboratories label which, of course, indicates that the solderless connectors have Underwriters' Laboratories approval. We feel that, especially at the present time, manufacturers of these devices should not be required to furnish special connectors to meet your specifications, and that it is satisfactory if your Field Inspectors will interpret your specifications so that any panelboards or service entrance switches bearing Underwriters' Laboratories label will be acceptable."

We are revising the Interior Wiring Specifications, Division T-18 and WD-22, to clarify the subject of solderless connectors; and recommend that electrical equipment using solderless connectors, such as control devices, panelboards, etc., which comply with the Standards of the Underwriters' Laboratories, be accepted on FPFA war housing projects.

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5-26-43 -----

GAS REFRIGERATORS - - INSTALLATION

Regional directors were notified, in Mr. Agle's memorandum of April 6, concerning relaxed restrictions affecting the procurement of mechanical refrigerators.

Approximately 20 percent of the quantity available are gas refrigerators manufactured by Servel, Inc., Evansville, Indiana.

To assure efficient operation and satisfactory performance of gas refrigerators, proper installation of the refrigerator and its gas regulator and correct adjustment of the equipment is essential.

A recognized Servel service outlet generally the local utility company should be engaged to make final adjustments.



6-2-43

PLASTIC TUBING FOR INTERIOR WATER LINES

A report covering tests, usages and specifications on "Saran" tubing as manufactured by the Dow Chemical Company was prepared and forwarded to the regional directors with Mr. Seaver's memorandum of May 12. In this memorandum, the use of plastic tubing on projects was suggested, not required.

There are several reasons why it is advisable to consider the use of this material:

1. A situation may present itself where steel pipe is more difficult to secure than at present.
2. The use to some degree of plastic tubing would help to justify our claim that we are working toward the saving of all the critical materials we can.
3. Where corrosive action of water causes steel pipe to deteriorate rapidly, it may be necessary to replace it before the project has served its purpose.
4. As plastic tubing may get into general use as a permanent substitute for steel pipe, some record of experience as to installation and performance would be helpful.

The reaction of bidders and contractors to the use of this material as well as the names and locations of projects on which "Saran" tubing is proposed for installation would be helpful information. It is, therefore, requested that the regional offices keep the Central Office advised accordingly.

MAIL BOX

A mail box constructed with vulcanized fiber for front and top, and wood for back and bottom, has been submitted.

- (a) The top is hinged to provide a full opening for newspapers and magazines. Consequently no spring holder is necessary.
- (b) A hole in the bottom of the box to provide drainage would be an improvement, and has been suggested to the manufacturer.

For temporary housing, this box appears to be an adequate substitute for those made of glass, wood or plywood, as described in FPHA Temporary Housing Specification..

The manufacturer (Nutone, Inc., Third and Eggleston Avenue, Cincinnati, Ohio) has been requested to send, for consideration and approval, a sample to the regional offices which they desire to interest.

6-1-43

PREFINISHED GYPSUM BOARD SIDING

Attention is directed to the prefinished gypsum board siding manufactured by the U. S. Gypsum Company under the name of "Triple Sealed Sheetrock Siding" and a similar product manufactured by the National Gypsum Company as "G.X. Exterior Gypsum Siding":

- (a) The boards are manufactured in 24 inch widths and in two thicknesses, 1/2 inch and 1 inch laminated of two 1/2 inch thicknesses. The 1/2 inch boards have tongue and groove or V-jointed long edges and the 1 inch boards have a shiplap edge with the edge of the board on the exterior side slanted for greater resistance to water penetration through the joints.
- (b) The siding is finished with green or gray paper. Both surfaces and all edges are sealed with a weatherproof treatment, which penetrates through the face, ends, back and edges into the core of the board and which should prove effective for at least 2 to about 5 years. After 2 years' exposure, this material may be painted if necessary.

For temporary war housing projects 1/2 inch prefinished gypsum board siding as named and described above (or its equivalent) appears to be an acceptable substitute for painted gypsum siding or other materials specified for exterior siding and may be so used.

Regional comments and reports (when available) on the performance of such siding are requested by the Central Office Technical Division.

6-12-43

SPACE HEATERS FOR PROJECT FACILITIES

A method of heating project facilities buildings by the use of gas fired, vented space heaters has recently been called to our attention by one of the regional offices. This method is acceptable where the project design temperature is ± 20 degrees F. or higher, if the weights of critical materials are less than those used for forced warm air.

Oil or coal fired vented space heaters may also be used. Gas fired equipment, however, is more practical than either oil or coal, from an operation standpoint.

The use of a particular fuel will depend upon its availability and applicable WPS Limitation Orders and rulings. Reference should be made to Bulletin No. 2, Part I-B, "Utility Selection."

It is anticipated that standards for vented space heaters will be issued in the near future.

GAS LAUNDRY STOVES

We have been informed that gas laundry stoves, with petcock controls, have been installed in central laundry rooms which are easily accessible to children and the general public. Such stoves are not contemplated by FPHA standards for laundry facilities. Since petcocks may be readily opened without the gas being ignited, a very hazardous condition may result.

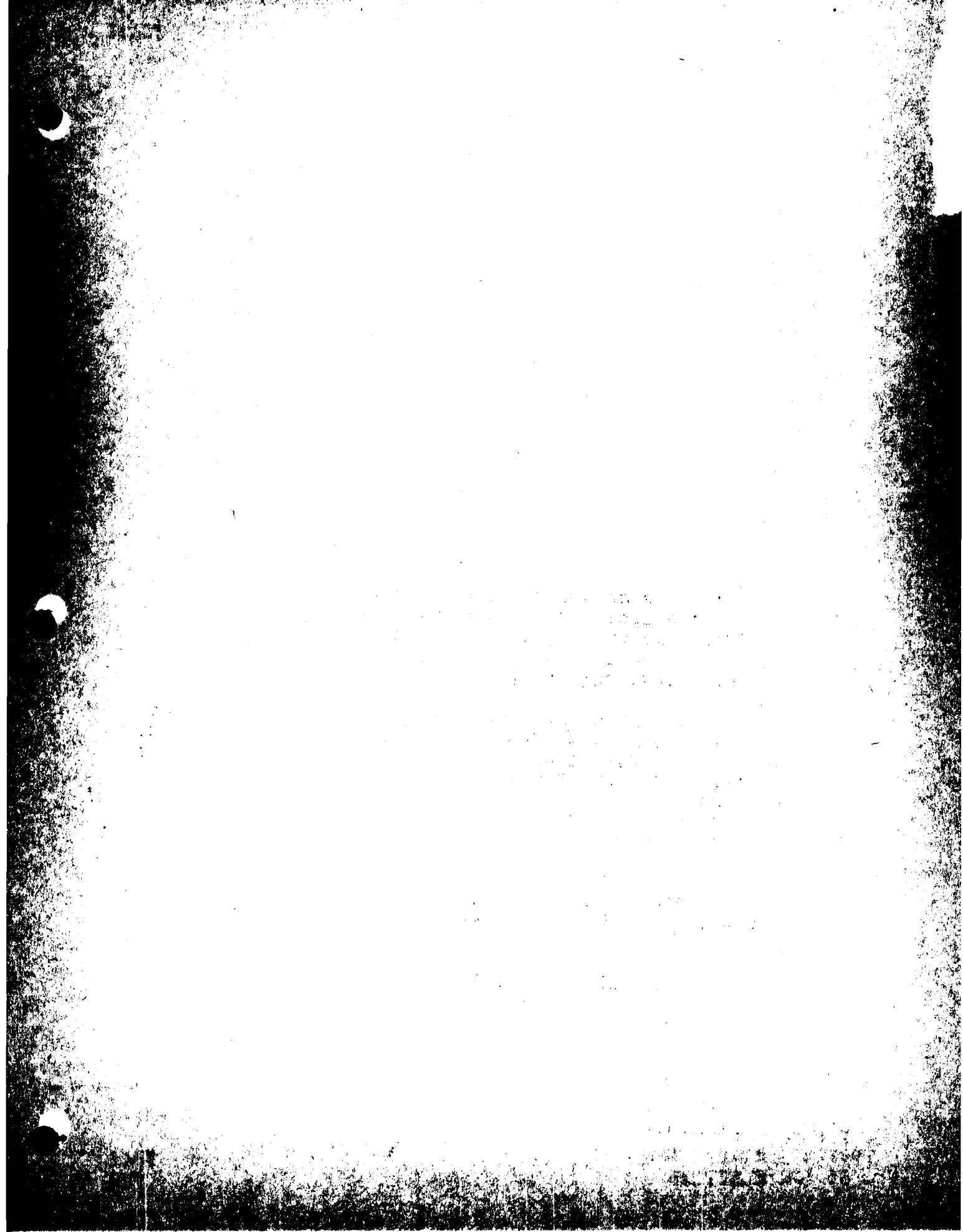
Due regard for safety factors requires that each burner of such stoves should have a self-latching safety type gas cock as prescribed in the latest "American Emergency Standard Approval Requirements for Domestic Gas Ranges" of the American Gas Association.

7-22-43

TILE LINED AND CONCRETE PLUMBING FIXTURES

The possibility of pathogenic bacteria and fungi being transmitted from person to person in the use of concrete plumbing fixtures has been considered and the conclusions drawn are:

1. Concrete Bathtubs: Research work with respect to the survival rate of bacteria on concrete surfaces indicates that common skin pathogens apparently survive for reasonably long periods of time, even on smooth concrete. Therefore, concrete tubs, unless fully lined with glazed or other impervious material, should not be installed in housing projects under the jurisdiction of the FPHA.
2. Concrete Receptors (Shower Stalls): The fact that only the soles of the feet come in contact with these surfaces and that the receptors are flushed by the shower spray, tends to limit the possible hazard of skin infection. Therefore, concrete receptors may be used for shower stalls.



ELECTRICAL OUTLET BOXES

Frequently outlet boxes are not installed flush with the finished wall or ceiling as required by FPHA Standard Specifications and the National Electrical Code. In numerous cases the boxes are installed behind the gypsum board walls and ceilings and the practice is to break through the gypsum board with a hammer to expose the boxes and the wires. This results in many broken boxes which cannot be replaced without tearing off and replacing the wall board.

Care should be taken to set boxes flush with wall or ceiling surface, or back not more than 1/4". Screws furnished with fixtures are sized for flush boxes. Boxes installed incorrectly constitute not only a Code violation, but a fire hazard.

RATING ON SNAP SWITCHES

Switches intended for use with surface cable wiring are not readily available with "T" rating as required by the Standard Specifications. Therefore, it is desirable to accept switches that comply with NEC Interim Amendment No. 57 as follows:

a. For non-inductive loads other than tungsten-filament lamps, switches should have an ampere rating not less than that of the load.

b. For tungsten-filament lamp loads, and for combined tungsten-filament and non-inductive loads, switches should be "T" rated, except where the three following qualifications are satisfied:

1. If switches are used in branch circuit wiring systems in private homes, in rooms of multiple-occupancy dwellings used only as living quarters by tenants, in private hospital or hotel rooms, or in similar locations but not in public rooms or places of assembly; and

2. Only when such a switch controls permanently connected fixtures or lighting outlets in one room, in a continuous hallway where lighting fixtures may be located at different levels, on porches or in attics or basements not used for assembly purposes; and

3. When the switch is rated at not less than 10A,125V; 5A,250V; or for the 4-way types, 5A,125V; 2A,250V.

c. Switches controlling inductive loads should have an ampere rating of at least twice that of the load, unless they are of a type approved as part of an assembly or for the purpose intended.

d. Switches for signs and gas-tube lighting should comply with NEC 6005.

e. Switches for motors should comply with NEC 4383.

This information is furnished for necessary action. The Standard Specifications are being revised in accordance with the foregoing.

8-3-43

DEFICIENCIES IN ELECTRICAL INSTALLATIONS

Information received in the Central Office indicates that completed electrical wiring installations fall short, in many cases, of compliance with minimum standards of the National Electrical Code. This Code has been accepted as a minimum standard for war housing. Some of the deficiencies may be the result of improper design while others may stem from lax or inadequate inspection. In any event every effort must be made to correct all defects. This information is for your guidance and necessary action. All deficient electrical installations should be brought promptly to the degree of safety indicated herein. A partial list of the defects and suggested remedies follow:

<u>Defects</u>	<u>Remedy</u>
1. Weatherproof wire in contact with building.	Install on insulators or use SE cable.
2. Improvised service equipment. Equipment not protected from weather.	Use Underwriters' approved equipment installed in accordance with NEC 230.
3. Receptacles of several kitchens on a single circuit.	Provide a separate circuit for each kitchen.
4. Unused holes open in outlet and junction boxes.	Close unused holes with material equal to box construction.
5. Too many wires crowded into small box, resulting in damaged insulation.	Box should be as large as required by NEC 3705, or circuiting arranged so as to reduce number of wires per box.
6. Insufficient or no grounding provided for system and equipment in each building.	Provide grounding in each building as required by NEC 250.
7. Neutral conductor bare or not properly covered; not in same metal enclosure with live wires.	Comply with NEC 300 and Interim Amendment No. 44, for insulation, and install all wires of a circuit in same metal box, trough, conduit or armor.
8. Wood boxes used as panel boxes for cut-outs.	Use code grade steel cut-out boxes.
9. Inside wiring used where exposed to weather.	Install weatherproof wiring in an approved manner.

PLUMBING

1. Revisions to Specifications

The following items are brought to the attention of regional offices prior to incorporation in forthcoming revisions of the plumbing specification, T-16, Temporary Housing, and WD-19, War Dormitories. In the meantime, it is recommended that you include these items in current specifications:

2. Drainage: Waste and Vent Pipe

To conserve critical material and to comply with the standard material lists, limit the use of steel pipe to 1-1/2 inch size and smaller, in lieu of 2 inch size and smaller as now stipulated. Waste and vent lines of 2 inch size should be of cast iron hub and spigot type.

3. Temperature Relief Valves

To afford additional protection against overheating of domestic water, temperature relief valves should be included for the following:

- a. Water storage tanks (project operated systems - all fuels).
- b. Range boilers (tenant operated systems - connected to coal-fired ranges).

The temperature relief valve is in addition to the pressure relief valve now required, and shall be of the reseating type, actuated by a bellows or bimetallic element, designed to open at 200 to 210 degrees F. and close at approximately 160 degrees F. Size should be not less than 3/4 inch for project operated systems, and not less than 1/2 inch for tenant operated systems.

Under item (a) above, all equipment must be furnished and installed complete by contractor. He shall include separate pressure and temperature relief valves or, if he elects, a combination pressure and temperature relief valve.

Under item (b) above, since range boilers and pressure relief valves are to be furnished by Central Procurement for installation by the contractor, it is necessary that the contractor provide the temperature relief valve only.

In each case, valve outlets should be piped to within 12 inches of the floor. Whether in combination with a pressure relief or a separate valve, they may be installed on tank or range boiler within 6 inches from top, or on hot water line not over 6 inches from the tank or range boiler.

KNOB AND TUBE WIRING WITH THERMAL INSULATION

The following requirements should be observed, and covered in current specifications, pending receipt of standard specifications which are being revised in accordance therewith.

Where conductors of "knob and tube" systems are installed in the hollow spaces of walls and ceilings in which thermal insulation is used, each conductor should be separately encased in a continuous length of flexible tubing extending from one support to the next or to an outlet box. When practicable, conductors should be run singly on separate timbers or studding. Conductors not enclosed in flexible tubing should be kept at least one inch away from thermal insulation material. Tubing must comply with standards of Underwriters' Laboratories, Inc.

August 12, 1943

THE EFFECT OF FUEL OIL LIMITATION ORDER (PETROLEUM DISTRIBUTION ORDER NO. 13) ON SPACE AND DOMESTIC WATER HEATING INSTALLATIONS

The office of Petroleum Administration for War in the interest of national defense and to assure adequate fuel oil supply for military and other essential uses, issued "Petroleum Distribution Order No. 13", dated June 23, 1943, incorporating and amending the previously issued "Limitation Order L-56", as amended February 5, 1943.

The effect of Order No. 13 on the present FPHA housing program is as follows:

- 1.) The oil limitation order has been extended to the entire United States.
- 2.) The utility functions affected are space heating and domestic water heating. 1/
- 3.) Projects under construction, for which foundations were completed prior to July 22, 1943 and were not subject to Limitation Order L-56, as amended February 5, 1943, are exempted from the provisions of this Order.
- 4.) Projects located in areas, where an alternate fuel is not available, are exempted from the provisions of this Order.

The "Petroleum Administration for War" advised the National Housing Agency that in southern California, Nevada and western Arizona domestic sized coal is not available. Therefore, the use of fuel oil for space and/or domestic water heating is permitted, provided the net output capacity of the equipment does not exceed 400,000 Btu.

- 5.) House trailers are not affected by this Order.

1/ Although the use of oil or kerosene for cooking is not restricted in Order No. 13, the installation of cooking equipment using kerosene is restricted to areas where the use of fuel oil for space and water heating is permitted.

August 16, 1943

GROUNDING OF INTERIOR ELECTRICAL CONDUCTORS TO METAL BOXES

Paragraph 2 of Division E-18, Temporary Housing Specification reads as follows: "Where metal boxes are used in conjunction with covered neutral cable, each such box shall be grounded to the neutral conductor of the circuits contained within the box." This paragraph has been misinterpreted in some cases to mean that metal outlet boxes, used in connection with standard non-metallic sheathed cable, are required to be grounded to the circuit neutral conductor.

The grounding specified refers to metal distribution cabinets from which branch "covered neutral cable" circuits are run. Interim Amendment No. 43 to the NEC and Standard Specifications require the use of non-metallic outlet boxes, junction boxes and switch and receptable plates with such cable.

Non-metallic sheathed cable (covered neutral type), having one circuit conductor without individual insulation but assembled with an insulated conductor enclosed in an over-all fibrous covering, may be used in "defense emergency buildings" of occupancies other than listed as 1 to 7 in section 3362, NEC. This cable should not be confused with cables having one conductor insulated with type SBW, WP, EG or EI insulation, as permitted for wiring methods described in NEC Articles 320 to 364 inclusive, for the neutral conductor only, by Interim Amendment No. 44 to the NEC. Nor should this cable be confused with cables having all conductors insulated with type EI insulation, as permitted for exposed wiring, by Interim Amendment No. 69 to the NEC.

Metal and non-metallic outlet boxes are permitted by the NEC for non-metallic cable wiring, except that non-metallic outlet boxes must be used with "covered neutral cable" as mentioned above.

In general, NEC 2523 prohibits any grounding on the load side of the service equipment, the exceptions being master services, ranges and metal boxes used with "covered neutral cable" as mentioned above.

Grounds should, therefore, be eliminated from the inside wiring system except as outlined above.

Figure 1

AVAILABILITY OF FERTILIZERS

Food Production Order No. 5 Revised, issued July 3, 1943 by the War Food Administration, permits the manufacture, in limited quantities, of "Specialty Fertilizer" which, according to the WFA, may be used in the construction and maintenance of the grounds of housing projects. This order controls the manufacture and use of all types of fertilizer except animal and poultry manure, peat and humus. Only one grade of specialty fertilizer may be produced by each manufacturer and the total plant food content must consist of at least 16 units, as 4-10-2.

Victory Garden fertilizers may be manufactured under the new order; but these are for food production only and should be used solely for that purpose. Agricultural fertilizers are manufactured in certain approved grades; but these are not available for our use.

Suggested specification. The most economical method of obtaining a suitable planting soil will, in some cases, necessitate the use of fertilizer. In such instances, the specification should define the fertilizer as follows:

"Fertilizer shall be a specialty fertilizer of an acceptable grade as defined by paragraph (c) (1) of Food Production Order No. 5 Revised, issued July 3, 1943, by the War Food Administration."

Food production requirements make it imperative that the use of fertilizers be restricted. In the maintenance of the grounds, specialty fertilizers should be used only when necessary to preserve an adequate cover or to prevent serious loss of plant materials.

December 6, 1943

SITE PLANNING FOR PROJECTS ON PLATTED PROPERTY

The improper design of site plans for projects on platted property continues, in spite of directives, technical standards, and advice concerning this extremely important matter. Site planners are apparently not aware of the legal and financial difficulties which can be expected when these projects are liquidated, after the war. Suits for damages and disputes with local officials, possibly necessitating congressional appropriations or corrective legislation and creating public opinion unfavorable to FPHA, will probably occur, if platted properties are developed without special attention to the difficulties involved:

In most cases these difficulties can be avoided or greatly reduced by the application of good judgment in site planning. The attached sheet, dated 11-25-43, illustrates the correct and incorrect technical approach to this problem. The site, which is leased, is a land subdivision in which the platted streets, though rough graded, are not physically open; sewers had been installed in most of them. The property was in approximately 60 ownerships, ranging from single lots to large blocks of lots.

SITE PLAN A shows the layout made by the project architect-engineer. While no buildings are located over platted streets, several 26' project streets are unrelated to the platted streets. In the opinion of the Legal Branch this type of planning can be a definite handicap in terminating the government's occupancy of the property. Incidentally, this plan employs spacings between buildings considerably above the minimum standards under which the plan was made, thus requiring a greater land area than was necessary.

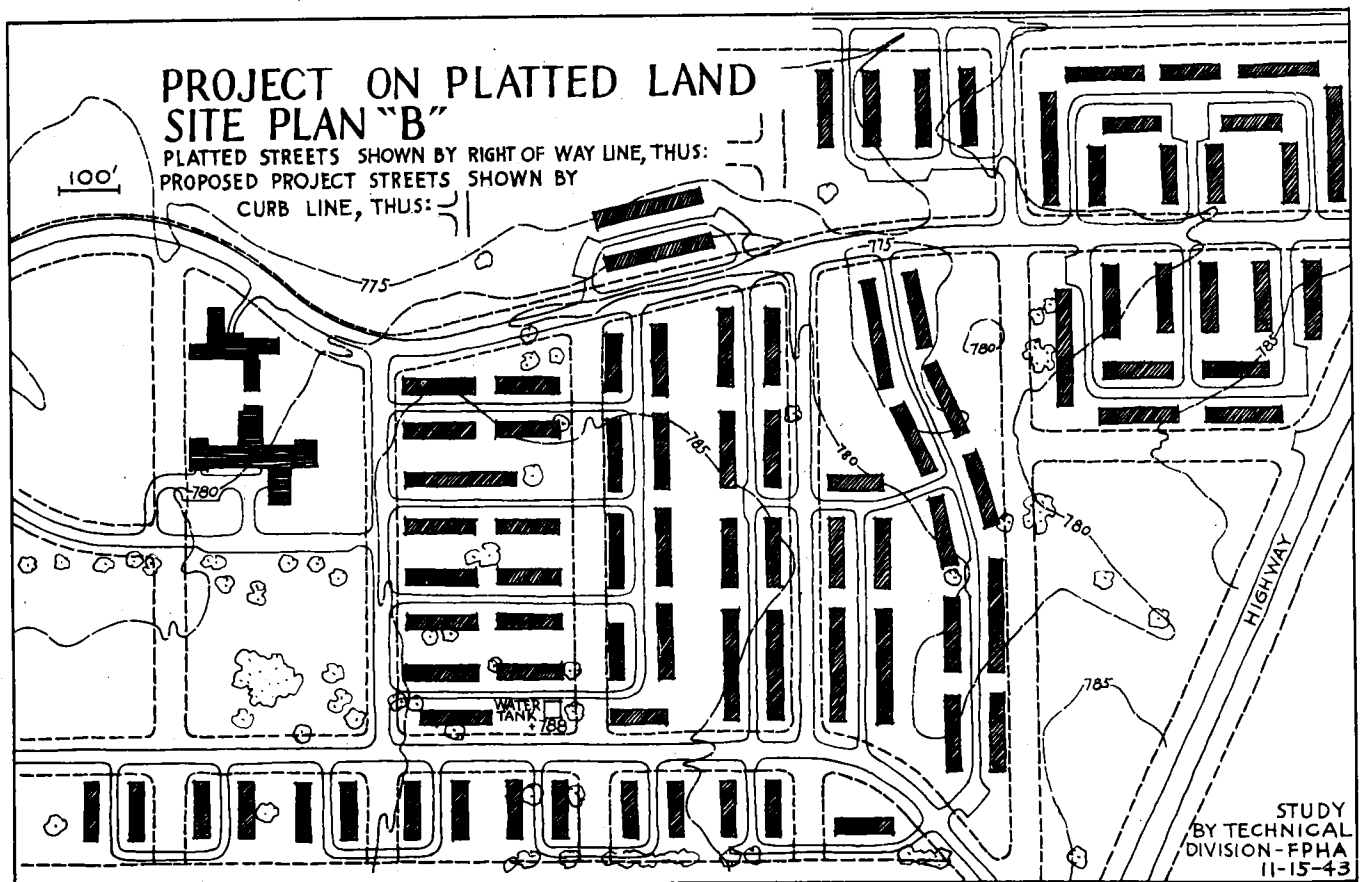
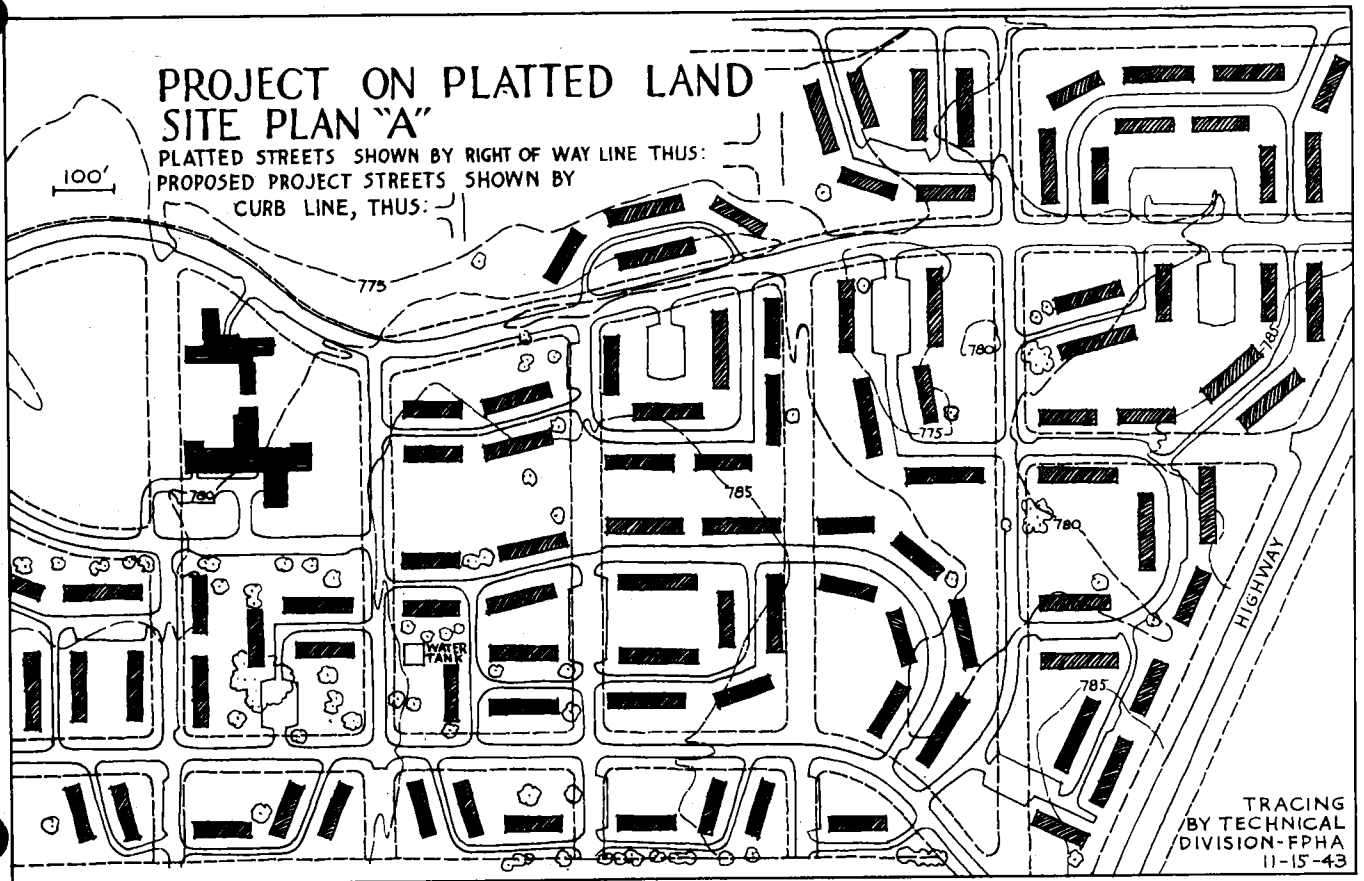
SITE PLAN B shows a preferable arrangement, with no project streets that do not follow the platted street lines. Further, the locations of the buildings and service drives adhere in almost all instances to the alignment of the platted streets and lots, with the result that a more orderly arrangement has been achieved, and the removal of improvements will disfigure the property much less than would be the case with a more irregular location of buildings and pavements. By making more frequent use of minimum standard spacings and by using a few longer buildings, Plan B requires for the housing an area nearly 20% less than Plan A, thus reducing the number of lots subject to damage. The total area of surfaced streets and service drives is 15% less than indicated on Plan A.

December 6, 1943

Plan B does not remove all of the disadvantages inherent in the use of platted property held by several owners but it does indicate an approach to site planning that recognizes these disadvantages and aims at following the spirit of the manual releases and standards related to the use of platted property.

This revised plan was prepared to illustrate the specific points discussed above, particularly conformity of project site plan to platted streets. No effort was made to revise the basic provisions of the plan such as the location of the community group. It is probable that a radical reduction in the street construction around this group could be effected.

Attachment



SOUND REDUCTION

Partitions between dwelling units should be such as to insure transmission loss of at least 45 decibels, which figure is derived from a consideration of the difference in noise levels between a quiet apartment and one with a noisy radio.

Noise Frequencies. There is a variation in the effectiveness of any partition, when noises of different frequencies (cycles per second) are encountered. The frequencies of ordinary noises are:

Female voices	196 - 1046 cycles
Male voices	82 - 466 cycles
Piano (instrument with widest cycle range ordinarily encountered)	27 - 4186 cycles

Since the commonest offender against quietness, the radio, will cover this whole range, it is necessary to provide against frequencies of from at least 100 cycles to 4186 cycles.

Partition constructions which will provide at least the desirable transmission loss - 45 decibels - are shown in BMS 17, the supplement to BMS 17, in recent tests of plaster partitions at the Bureau of Standards, and are as follows:

- A. Wood studs, fiber lath, gypsum plaster
- B. Wood studs staggered, plywood with 1/2" gypsum board
- C. Wood studs, spring clips, gypsum lath, gypsum plaster
- D. Wood studs staggered, metal lath, gypsum plaster
- E. 4" brick partitions, plastered both sides
- F. 8" tile or masonry unit partitions, plastered both sides

The efficiency of any commercial thickness of single tile or block partition unplastered is doubtful.

There are no available test records on wood studs staggered with plaster on gypsum lath or wood studs staggered with wallboard, but the Technical Division considers that such partitions would be reasonably effective when plastered on gypsum lath, or when two layers of wallboard (approximating the weight of the plaster) are used.

Sound transmission laterally through floors can be reduced by providing a complete break in the floor construction under the party wall partition in frame constructions, permitting only the minimum necessary contact between the joists and floors. No laboratory tests have been made on such construction and no apparatus exists at the Bureau of Standards for making such tests. Experience and theory in this case, however, appears to be sufficiently established to justify the use of completely separate floor constructions to reduce the telegraphic effect of continuous floors.

Effect of cracks or holes. No matter what type of construction is used to minimize noise transmission, results will be seriously deficient if cracks or holes in the wall or partitions exist where sound waves can pass through. This condition is very apt to occur in wood partitions after shrinking of the wood floor joists, and it may be necessary to reset wood base boards and carpet strips in such cases after buildings are well dried out.

NHA
FPHA
5-3-44

✓
Bulletin No. 19
Tech. Info. Notes
No. 25
Supplement No. 1

Reference to partitions having wall board secured by floating wall nails was omitted from TIN No. 25 because there were conflicting results in two different tests. One test resulted in an average sound transmission loss of 47.7 decibels, and one in an average loss of only 42.0 decibels.

Further tests are programmed which will require two months' time. Pending the results of these check tests, regions may accept stud and plaster partitions using National Gypsum Company's floating wall nails for securing lath as a means to provide sound reduction for partitions between dwelling units.

APPLICATION OF SITE PLANNING STANDARDS

The accompanying studies were prepared by the Site Planning Section, Central Office Technical Division, to illustrate (a) application of site planning standards, (b) plan organizations appropriate to temporary war housing, and (c) reasonable balances between practical and aesthetic factors. They are not presented as standard or ideal or perfect plans.

Distribution Schedules. Plans 1, 2, and 3, dated 11-29-43, in which the housing is WDU-10, are based on the old schedule, 10-30-40-20. In No. 1 the average number of units per building is 6; in 2 and 3 the average is 5 units. Plan No. 4, dated 11-29-43, is based on the new schedule, 25-50-25, with WA-20 building assemblies.

Construction materials. In plans 1, 2, and 3, building spacing is based on the assumption that exterior surfaces are of combustible material except opposed end walls less than 50' apart, which are of fire resistive construction. In plan No. 4 an incombustible exterior surface is assumed.

Project streets. Following the superbloc principal, all plans show a clear distinction between traffic streets and service drives. Traffic streets form simple, direct patterns. They are located for good fire protection and for good access during construction. They could be built as an initial operation without seriously inconveniencing utility installations. Traffic streets are not used for servicing units.

Servicing arrangements. The one-story projects (plans 1, 2, 3) are planned for individual coal heat with direct pickup of wastes from each unit. All units are therefore serviced by drives. These are one lane wide, except where standards require two lanes. Project No. 4 is heated by group plants using coal. Waste collection is from stations at heating plants.

Heater rooms should be paired, when practicable, to reduce operating labor. In plan 4 it is assumed that breaks in grade occur at both side walls of most heating rooms, facilitating the use of long buildings. In one case a break in alignment is shown at the heater room, to fit topography. Near this building, two heater rooms are reversed to permit coal delivery from up side.

Service drives are planned for efficiency in servicing (as by the use of loop drives) when this can be done without excessive paving. Section and material of drives are assumed to permit their use as walks.

(Cont'd)

Firebreaks, setbacks. For economy, firebreaks usually follow streets or playgrounds. Protective setbacks along property lines and public streets are ample in most cases, this space causing little increase in site improvement costs.

Parking. Mainly on project streets, but all plans contain some off-street parking and space for extension.

Community buildings have good pedestrian access from all parts of the project. In plans 1 and 2, a majority of the tenants can walk to the community building without crossing a traffic street.

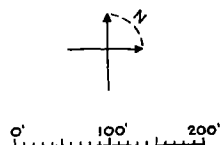
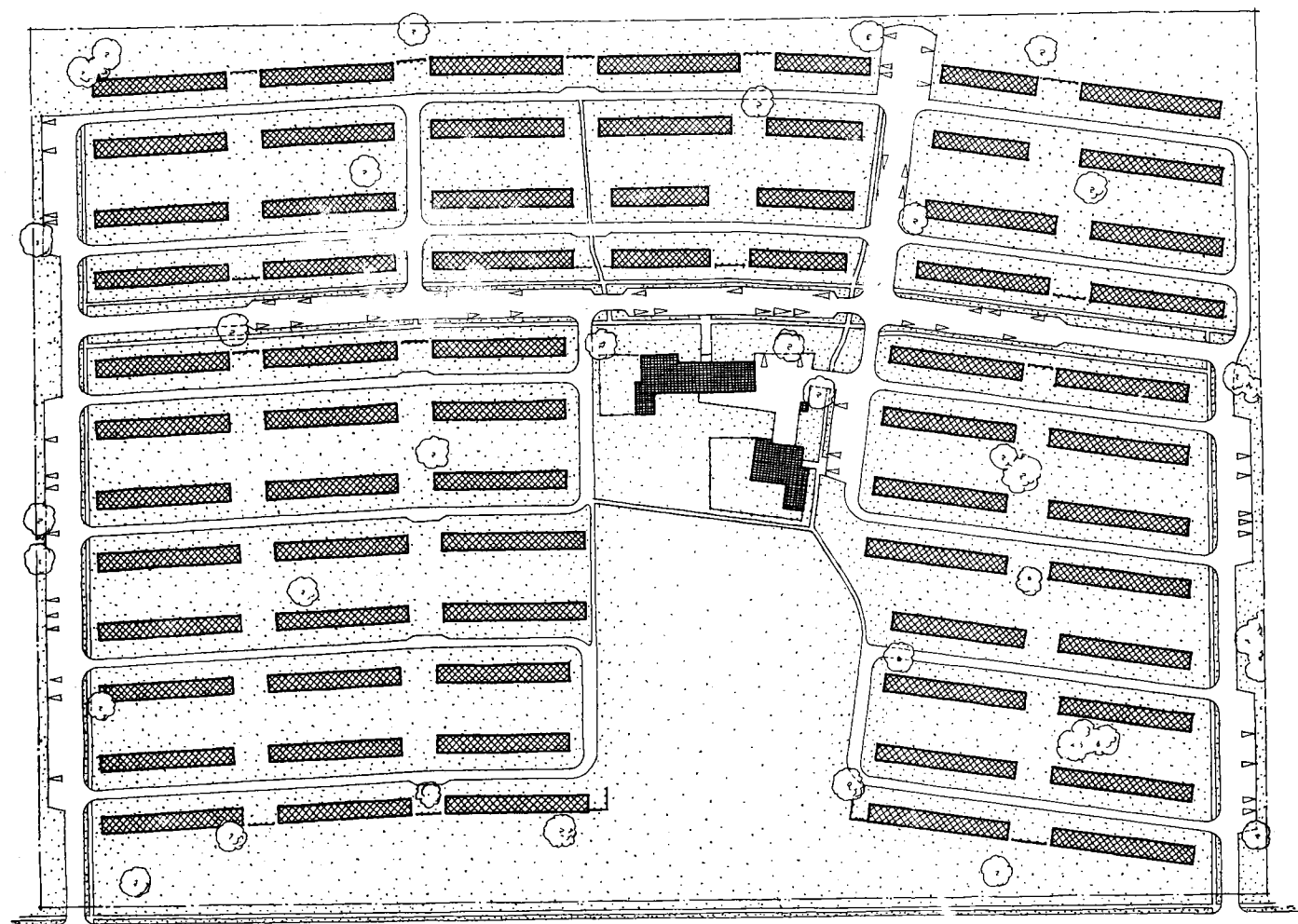
Child service buildings are located to give good orientation and convenient access for coal delivery, waste removal and janitor service. Good walk access to these buildings is provided.

Site for possible future building, as required by Bulletin No. 2 "Standards for Temporary War Housing" Appendix 3 "Standards for Project Facilities," is provided but not shown on the plans. Though it is not required that this site be adjacent to the community group, such a location is preferable.

Aesthetic effect. In plans 3 and 4, correlation with topography is the plan-motive, although the details have been studied to assure a smooth flow in the rows of buildings. In No. 1 the changes of alignment are introduced for aesthetic effect. In No. 2 the rows are bent but there is variety of alignment between blocks of buildings, these blocks being large enough to avoid a restless appearance and to avoid excessive site costs. In No. 1 the variation in front setback and the recessed playground location produces a good view of the project from the highway. In plans 1 and 2, division of the projects into defined blocks would facilitate an effective painting scheme.

Interpretations of Standards. Site standards cannot cover every plan relationship; it is therefore assumed that exceptional features will be subject to a reasonable interpretation of standards. In No. 2, for example, the diverging buildings (at bend in project street) have a minimum spacing, where they are closest, equal to the "narrow" spacing (in this case 50') because the average spacing exceeds the standard "wide" spacing. Passing places in one-lane drives are designed in various ways, as by widenings at bends. A back-in drive is used as a spur from a parking area in plan No. 2, it being assumed that the parking area will permit turning.

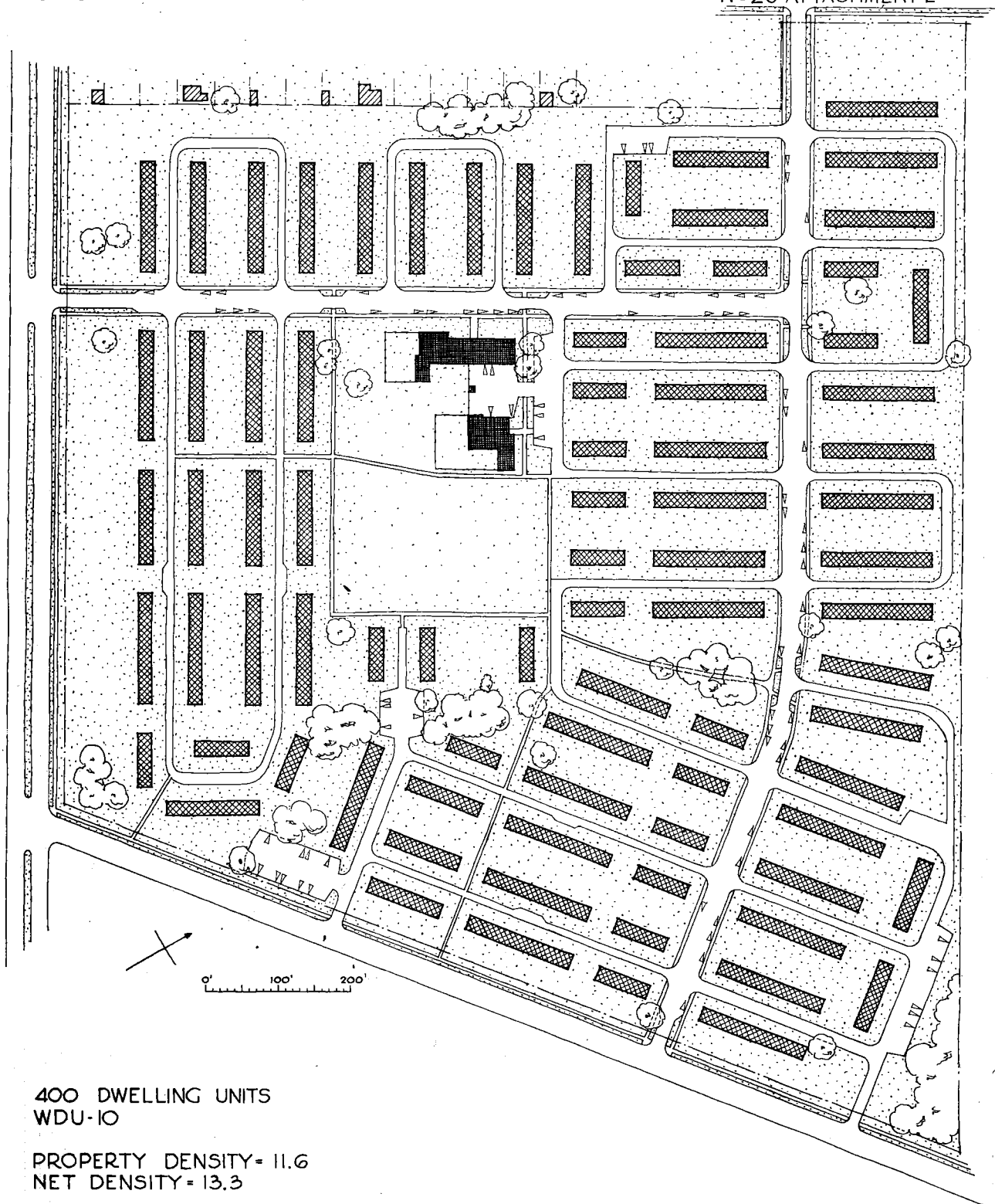
Densities. All the plans show densities near the lower limit of the normal ranges stated in site planning standards. These ranges will be lowered slightly in the next revision of the standards, reflecting the wider frontage of present standard units and the 25-50-25 distribution.



400 DWELLING UNITS
WDU-10

PROPERTY DENSITY = 12.4
NET DENSITY = 15.0

SITE PLAN STUDY FOR A PROJECT ON AN APPROXIMATELY LEVEL SITE
BASED ON SITE PLANNING STANDARDS DATED 9-1-43
SITE PLANNING SECTION, TECHNICAL DIVISION, FPH A



400 DWELLING UNITS
WDU-10

PROPERTY DENSITY = 11.6
NET DENSITY = 13.3

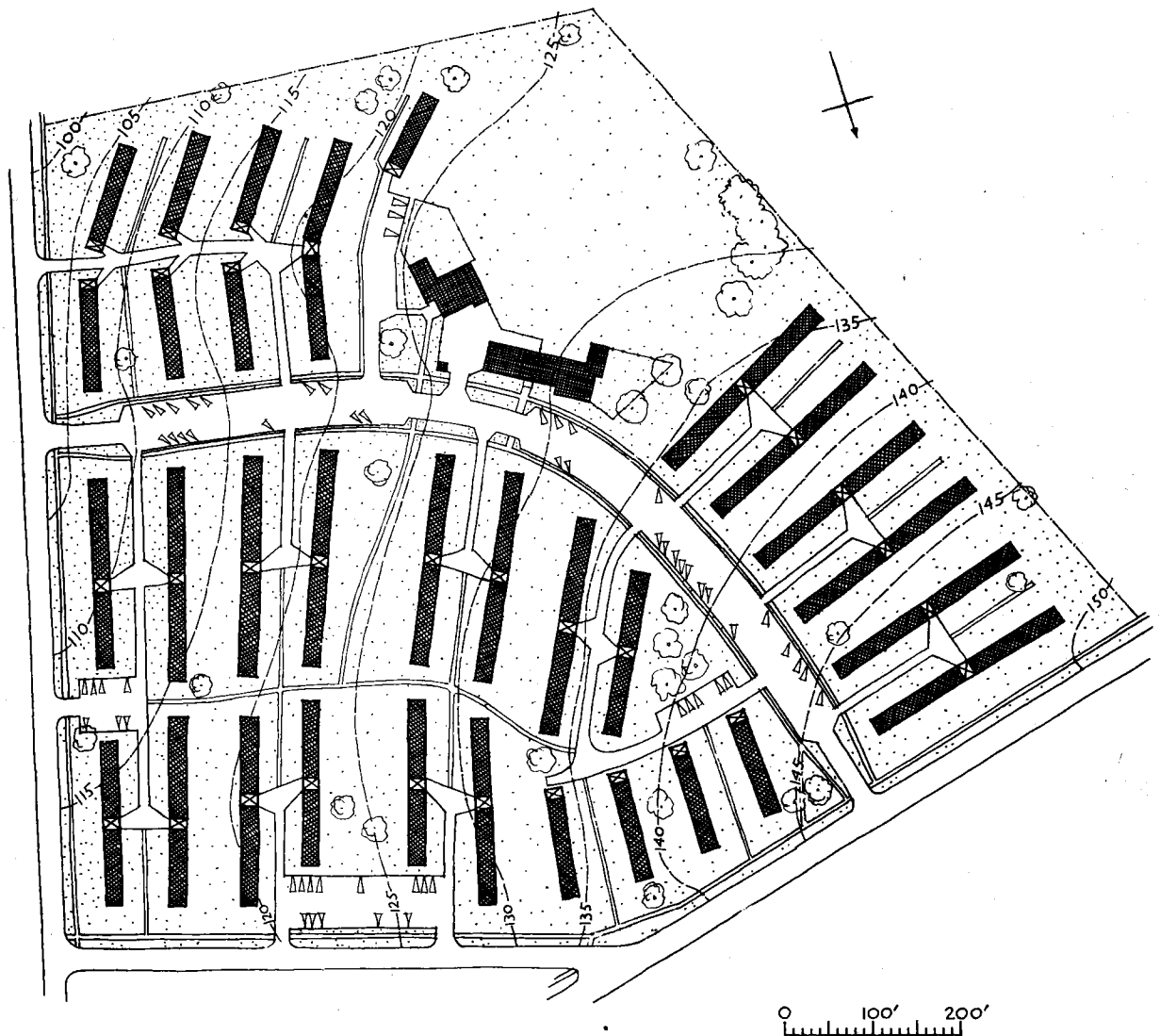
SITE PLAN STUDY FOR A PROJECT ON AN APPROXIMATELY LEVEL SITE
BASED ON SITE PLANNING STANDARDS DATED 9-1-43
SITE PLANNING SECTION, TECHNICAL DIVISION, FPHA



400 DWELLING UNITS
WDU-10

PROPERTY DENSITY = 10.5
NET DENSITY = 12.9

SITE PLAN STUDY FOR A PROJECT ON A SLOPING SITE
BASED ON SITE PLANNING STANDARDS DATED 9-1-43
SITE PLANNING SECTION, TECHNICAL DIVISION, FPHA



400 DWELLING UNITS
WA-20 (TWO STORIES)

PROPERTY DENSITY = 19.5
NET DENSITY = 24.7

SITE PLAN STUDY FOR A PROJECT ON A SLOPING SITE
BASED ON SITE PLANNING STANDARDS DATED 9-1-43
SITE PLANNING SECTION, TECHNICAL DIVISION, FPHA

SUBSTANDARD WOOD FLOORING

Substandard oak flooring, according to advice received in the Central Office, is being offered for sale in considerable quantity. This flooring is often not end matched, not adequately side matched, the backs are not recessed and the material is not kiln dried before manufacture. Notwithstanding the substandard character of this material, it is stated to have been offered for sale at ceiling prices.

Specification requirements should be enforced to insure satisfactory construction, since very unsatisfactory floors would result from the use of substandard flooring. In any instance where such flooring has been used and time or lack of satisfactory material does not permit re-laying the floor, adequate credit should be demanded from the contractors.

Under conditions prevailing through winter months it may be difficult to secure satisfactory floors even with good materials; hence it is not practicable to be handicapped with unsatisfactory materials.

12-31-43

HOUSING ON STEEPLY SLOPING LAND - A CASE STUDY

The project (200 units) is near a northern city. The architects were asked to do a novel solution of the problem presented by steep terrain. The comments below do not question the judgment of the architects or engineers, under the circumstances in which they were working. The project was an experiment, the first results of which can now be analyzed. The buildings are permanent; fuel is gas.

The dwelling type was designed to fit the site. The units are flats arranged in two-story buildings, the ground floor unit being entered from the down hill side, and the upper unit from the up hill side, the grade on the up side being five feet above the floor of the lower flat. Since the windows in the rear wall of the lower flat are necessarily small and elevated, suitable only for halls, storage space and baths, the units can be only one room deep. This plan is inefficient in the 3-bedroom unit; a special building with ells was therefore designed. The floor plan required the ells to be on the up side; as one-story additions to the upper floor.

For site plan see Solution No. 1, attached. A single street, with lateral extensions in the form of parking areas, provides interior circulation. Long narrow buildings contain eight 2-bedroom units; shorter ones contain eight 1-bedroom units; buildings with ells contain two 2-bedroom units and two 3-bedroom units.

Site difficulties - erosion, water pockets, undermining of walks and steps, disintegration of pavements - began to appear before complete occupancy (February, 1942). Late in 1943 plans were made for repairs, regrading, replanting, and various new items of work, estimated to cost approximately \$200,000. Some failures were due to faulty construction, but the corrective items will cost more than the normal per unit site improvement cost for public housing, indicating that circumstances had not permitted a better solution.

Comments on architectural parti. This was based on a cross section through building and site. It has several drawbacks:

- a. It produces a long narrow building, losing in plan more than it gains in section. (This is a basic fault of units in which the building serves as a retaining wall between two levels.)
- b. It is a rigid section; though devised largely to avoid grading, it fits precisely only a few parts of the site, and therefore causes grading as often as it saves it.
- c. It overemphasizes the formation of "level" yards. People housed on steep terrain soon adapt themselves to the use of sloping land and can live comfortably with a very small amount of level yard space.

12-31-43

- d. Difficulties of orientation are inherent in a unit having full windows on one side only. In this case much of the site slopes toward the west, an undesirable exclusive aspect.

Comments on Site Plan. It exaggerates the faults of the dwelling type and unit plans. It is not a logical and complete application of the essential idea of the architectural parti and not a true contour plan. The end-to-end spaces, which require more grading than the building sites, are excessive. Several features, as the small parking courts and several walks, "fight" the topography. In spite of the hillside character of the housing, devised to avoid heavy grading, it was found necessary to cut 14' off the high point. An area suitable for ordinary construction was unused.

Alternative plans. Solution No. 2 illustrates the effect of employing a normal low-cost dwelling type, apartments in two-story buildings. The buildings are based on studies in which the rooms were given the same floor area as the rooms in No. 1. The site plan shows close correlation with topography and relatively few steps in walks. The highest part of the site is reserved for community use. Comparative statistics are:

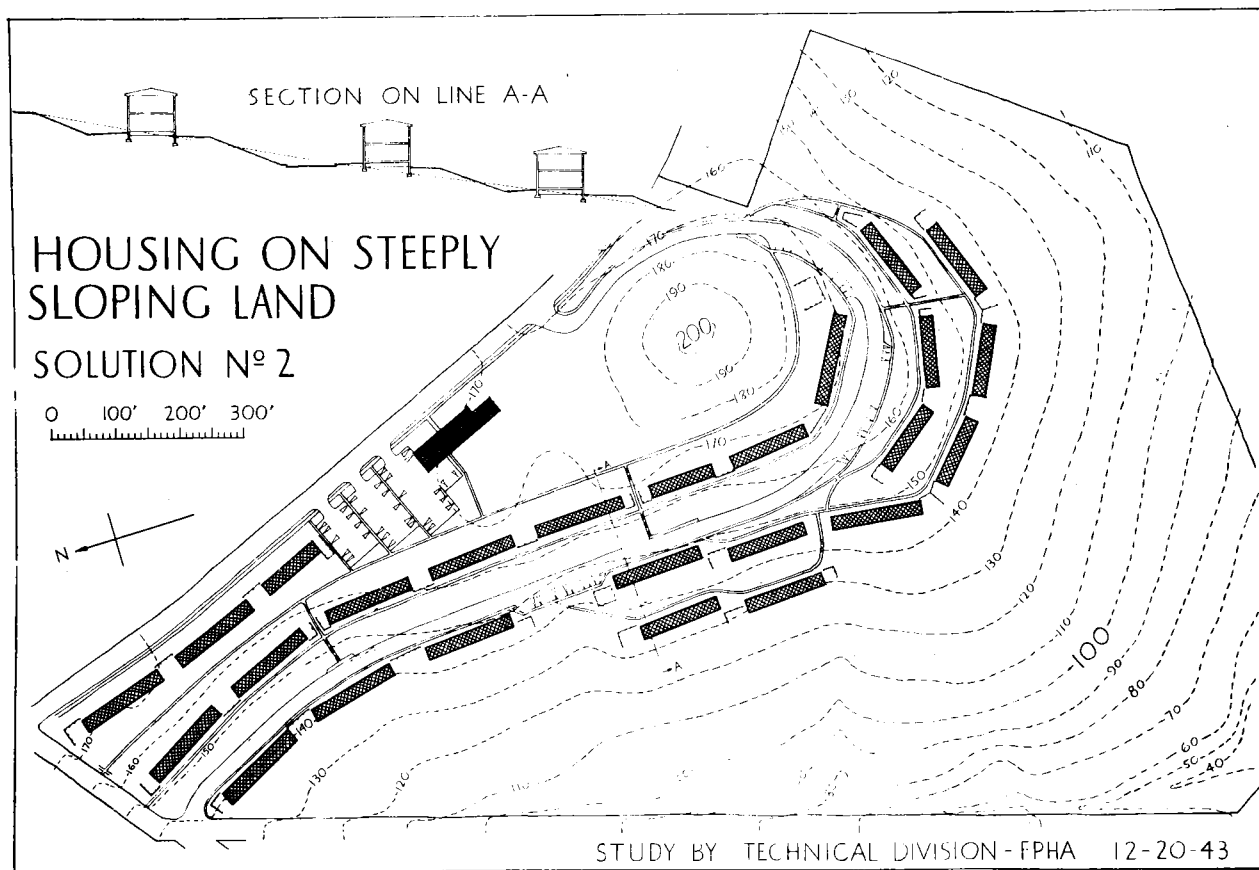
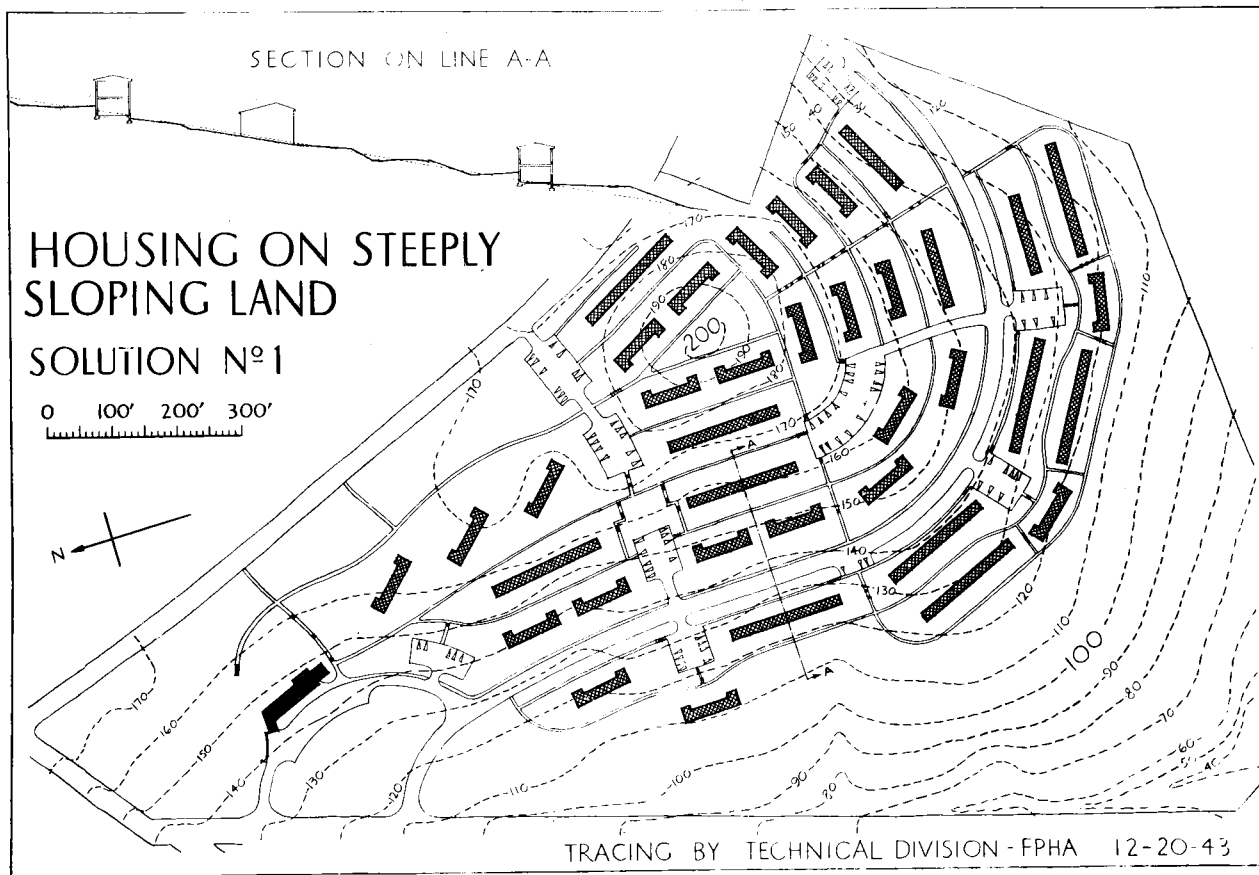
<u>Item</u>	<u>Solution No. 1</u>	<u>Solution No. 2</u>
Number of buildings	37	25
Standard depth of building (outside)	16'-8"	23'-4"
Total length of buildings	4,318 lin.ft.	3,230 lin.ft.
Total building area	78,340 sq.ft.	75,300 sq.ft.
Total net floor area	144,000 " "	141,000 " "
Exterior wall, running feet	10,720 lin.ft.	7,650 lin.ft.

The building area of No. 1 includes about 6330 sq. ft. used in one story only. In No. 2 the floor area is reduced by the saving of hall space required by the elongated unit plans of No. 1, but is increased by the indoor stairs - one per four units.

Other solutions are possible. In two story row houses, 26' deep and about 16' wide, the run of buildings would be about the same as in No. 2; the site plan could be similar to No. 2, but row houses would cost more than flats. If basements were used, with full exposure on the down side, an extremely livable unit would result, but costs would increase.

Summary: In hillside housing, section and plan should be considered together; special hillside units may not be efficient if they increase the running feet of buildings.

Attachment



Hofler
187

USE OF COLOR IN HOUSING PROJECTS

On a trip to the West Coast the Commissioner was favorably impressed with some of the projects visited in the Northwest area and particularly commented upon the selection and use of color in these projects.

The colors used on several projects seen by the Commissioner, were similar to those on the Army Engineers' standard camouflage color chart. They are used chiefly on the wall surfaces, brighter colors being used on such features as cornice, window and door trim, and on doors. Some walls are tinted light green, cornice and trim white, with doors emphasized by the use of reds or blues. Other buildings have earth red walls and white trim; still another variation is obtained by sand colored walls with earth red trim. The roofs are generally of a darker shade of color than that on the walls.

In selecting color schemes for project buildings, it is essential that the architect consider the prevailing conditions and natural features on or adjacent to the site which will in any way affect the desired results. Foliage, background, color of soil, and the relation of building groups to one another all require careful consideration. The absence of trees and attractive backgrounds, the open spacing of units, and similar conditions, make the selection of color all the more important.

Other features used on the projects visited, such as hoods over entrance doorways, decorative lattice panels, fences of simple design to tie in such items as coal boxes have been, to some extent, incorporated in the standard plans for Series WDU-10 and UA-20. These standard plans afford excellent opportunities for the development of interesting color schemes.

The degree of excellence of these projects depends not so much upon individual details as upon well-correlated design, thoughtful selection of materials and judicious use of color in relation to both materials and site.

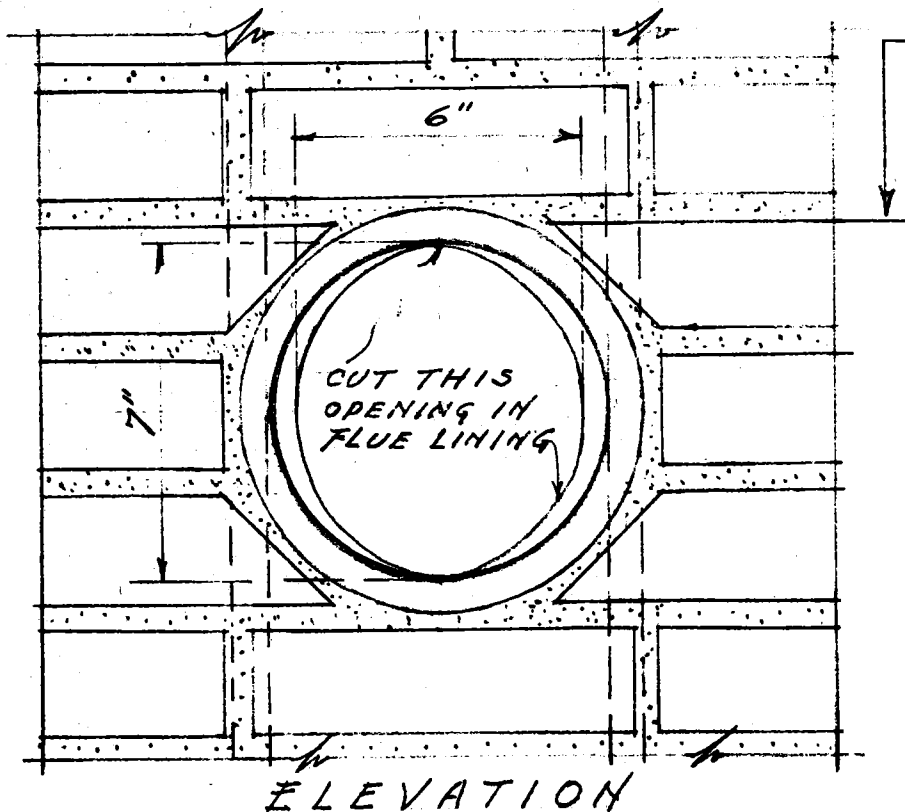
FITTING SMOKE PIPE THIMBLES TO FLUE LININGS

Various FPFA Standard plans require the fitting of smoke pipe thimbles having an overall diameter which is nearly the same as, or larger than, the clear opening of the flue lining. Cutting necessary holes in flue lining has frequently resulted in damage to the flues.

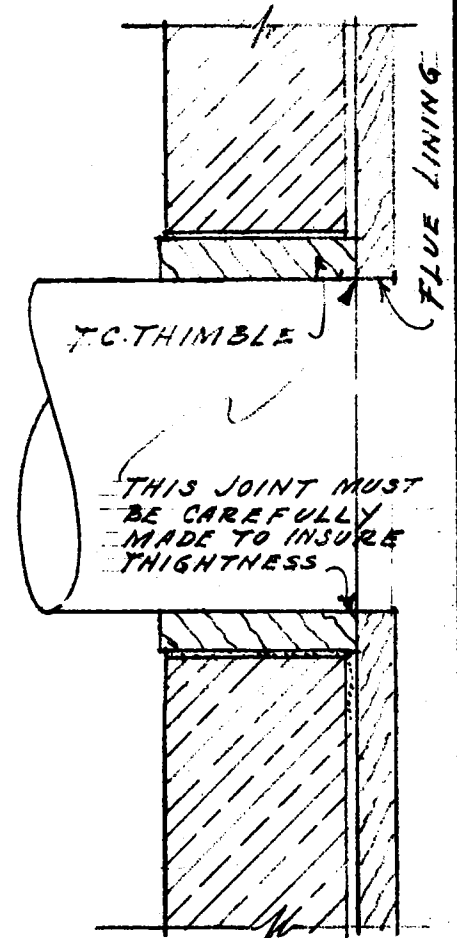
An acceptable method of connecting such thimbles with flue linings, which differs from the standard building practice of building thimbles into the inner face of the linings and reduces the possibility of damage, is illustrated by the attached drawing.

(When the outside diameter of thimbles is smaller than the inside opening of the flue lining, the conventional method of making connections should be employed.)

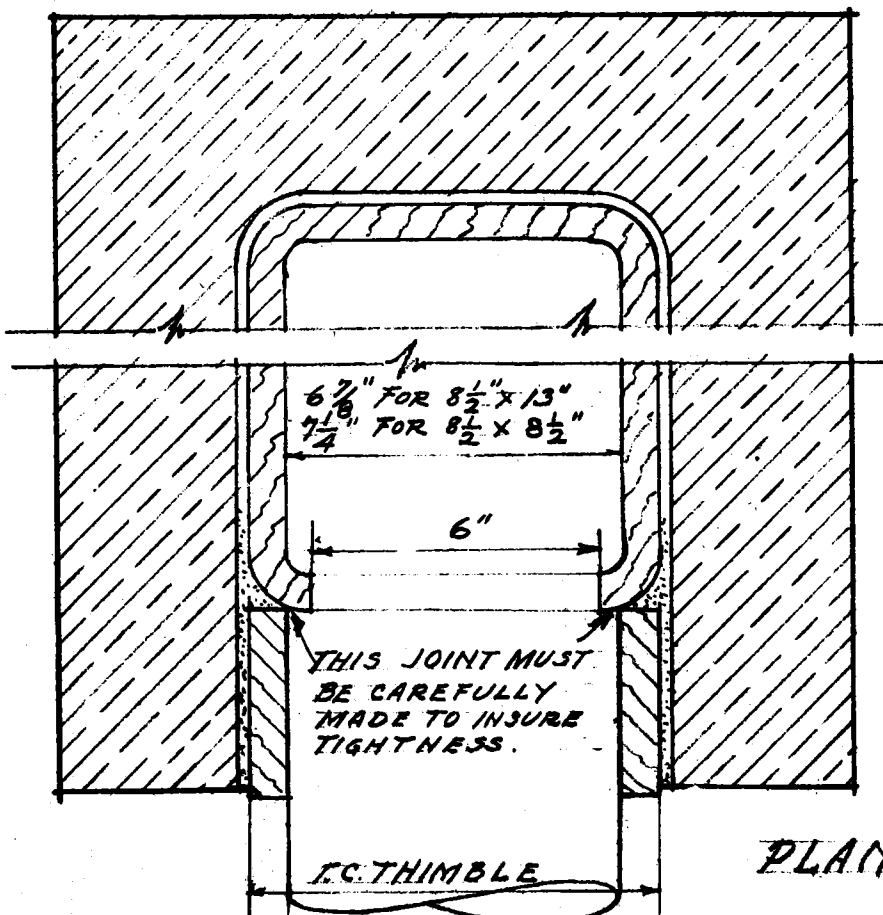
Attachment



NOTE: BUILD IN THIMBLES BEFORE PROCEEDING WITH BRICKWORK ABOVE THIS POINT.



SECTION



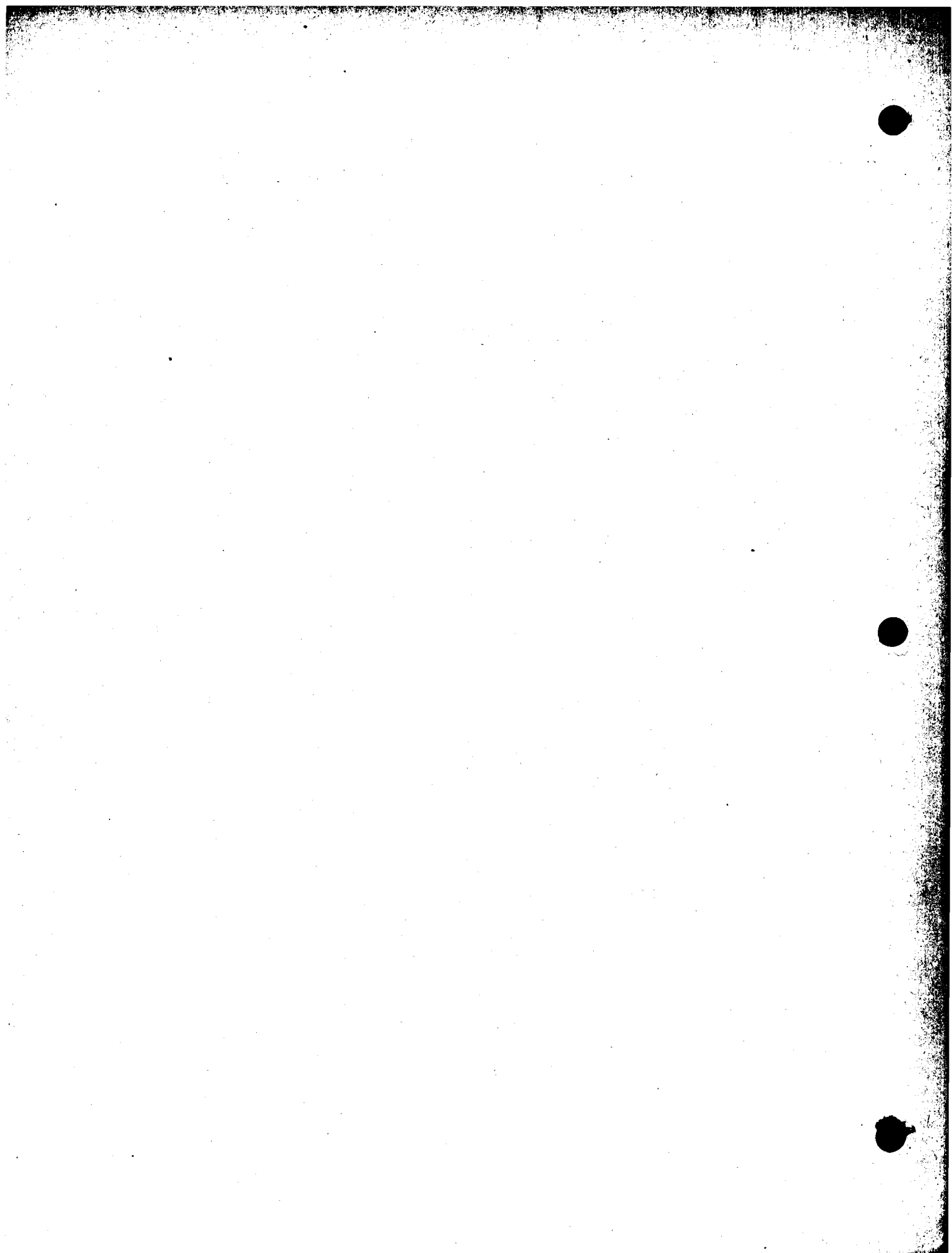
DETAIL SHOWING
FITTING OF 7" T.C.
THIMBLE TO $8\frac{1}{2}"$
FACE OF FLUE
LINING.
(6" THIMBLE SIMILAR)
SCALE 3" = 1'-0"

VENTING AND SERVICING OF EQUIPMENT

Cases of carbon monoxide poisoning as a result of improper operation of gas fired domestic water heaters have been reported. In each case, the water heaters have not been vented. Had venting been installed, such cases of poisoning would not have occurred.

FPHA Standards require the venting of all gas fired domestic water heating equipment. It is therefore urged that venting of such equipment be provided, as soon as possible, in those projects not built according to such Standards.

Your attention is also directed to the memorandum of December 20, 1943, from Mr. Seaver to All Regional Directors, on the subject of "Servicing of Gas and Oil Fired Equipment".



P O R T A B L E S H E L T E R U N I T S
(Color, Grading, Planting and Other Details)

Color.

The effective use of color, especially on the exterior of portable shelter units, is particularly important. Each regional office is urged to require architects for projects comprising such units to submit color studies and specifications for color application for approval.

Color studies, as shown by experience, should be made on the site so that advantage may be taken of existing features in their relation to the project design and its proposed color treatment. Effort should be made to achieve a stimulating effect, avoiding drabness and monotony. A well-coordinated color treatment for groups of these small units may afford not only added interest but a beneficial psychological effect. The construction contract should provide for the modification of the colors by the architect subsequent to preliminary trials on the building themselves.

Grading and Planting.

It is important that portable shelter units and project streets should be adjusted carefully and economically to the ground and that the ground surface of the finished project should be suited to the needs of the tenants. It is essential, therefore, that the natural physical advantages of the site be preserved and used to the greatest possible degree.

Grading should be reduced by attention to such points as the following:

- a) Site Selection. Whenever possible a site should be selected that does not require heavy grading. Soil conditions should be investigated, particularly as to drainage conditions and other factors that may increase grading costs.
- b) Topography. The site plan should be adapted to the topography. On sloping land do not use a pattern which is suitable only to flat land. By careful study of site plan and adjustment of floor elevations, grading may be reduced to a minimum.
- c) Cut and fill. Grading plans should aim at minimum grading operations necessary to insure proper drainage. When buildings are to be erected with floor slabs on the ground, they should be located on cut rather than fill, but preferably on existing grades.

Topsoil. Insofar as possible topsoil should be saved in place; unnecessary surface grading should be avoided; shallow fills should be made with topsoil from building and road sites rather than with subsoil. If such fills are necessary near buildings, they should be made of topsoil, thus forming favorable sites for tenant gardens. Off-site topsoil should not be brought in. Surplus topsoil might be deposited in fire protection belts which may be used for Victory gardens.

Preservation of existing vegetation. Restrictions on tree and shrub planting give added importance to preservation of existing trees and other vegetation. Trees of any kind, that will survive for a year or two without becoming a hazard are worth saving. Trees or other vegetation areas to be saved should be clearly marked on the ground and directions concerning them should appear conspicuously on the site plan. Adjustments of the location of buildings should be made on the ground when necessary to save worthwhile existing trees. Irregularity in the site plan pattern, caused by such adjustment, is often pleasing rather than objectionable.

Planting. As in the case of all other types of war housing projects, no trees, shrubs, or vines may be planted, except as required for soil erosion control purposes. All disturbed land which is not to be otherwise surfaced, or reserved for Victory gardens or similar use, should be planted with grass or other suitable ground cover. The minimum amount of soil conditioning necessary to establish an adequate cover, that is, any growth which will prevent muddy or dusty conditions and on which people can walk, should be provided. Field grasses, crab grass, or even weeds if they can be mowed, will probably be more satisfactory than newly seeded areas. It is, therefore, important that as much of the original cover as possible be undisturbed.

Sodding of tenant yards is highly desirable, as it permits immediate use of the land. Where it can be done at a figure comparable with seeding (including the cost of the initial maintenance period) sodding is advocated. Steep banks, subject to erosion, should always be sodded.

Sample Flower Beds. It is suggested that one or two flower beds be provided in developing each project as a sample and incentive for the tenants to follow

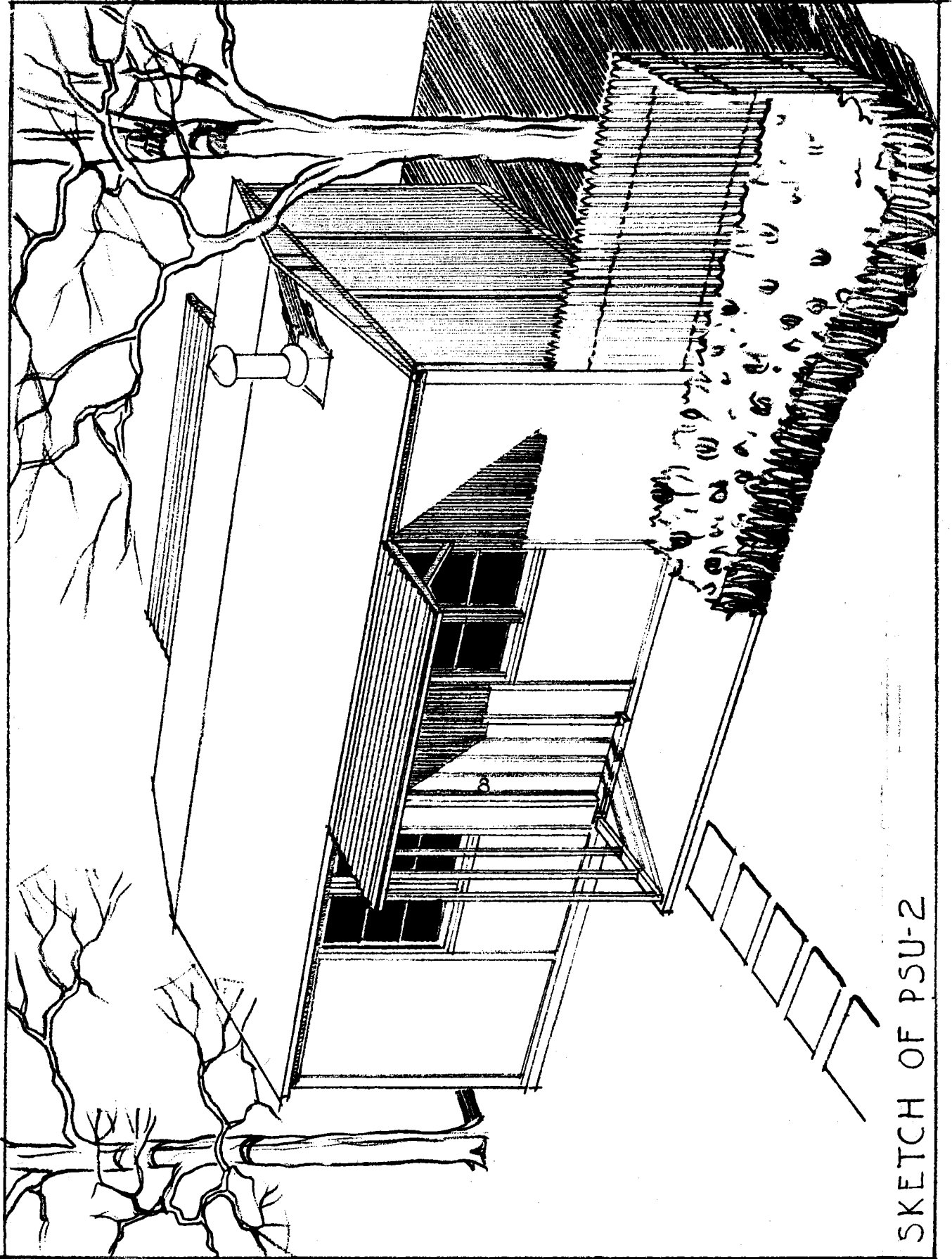
Other Details.

The following inexpensive features are suggested, some of which afford added interest and individuality, (see also suggestions on attached sketch).

- a) A hood of corrugated cement asbestos board extending over the doorway and windows at one side, with a concrete slab of corresponding area forming a porch floor.

In Southern localities, the hood extended over the windows at each side of the door, with similar eave of less projection at the opposite side of the unit, to shield the windows.

- b) A vine trellis at one end of the hood (design varied in different groups).
- c) Wattle or other fence 8 to 10 ft. long as an extension of the front wall of the shorter units to form background for flowers.
- d) Project walks of poured concrete 3 in. thick (1:3:5 mix).
- e) Cement block stepping stones (3 in. thick) for access to entrances cast in place by use of ladder-like form.



SKETCH OF PSU-2

3-15-44

POST AND GIRDER CONSTRUCTION - DEMOUNTABLE

Construction shown on FPHA drawings for "Post and Girder Construction" is not readily demountable. However, adequate modification of these drawings may be made to facilitate demountability of this system of construction.

The Celotex Corporation has submitted and requests approval on a proposed demountable post and girder construction. The essential difference between the proposal submitted and the FPHA "Post and Girder Construction" consists of the use of screws in place of nails in the assembly where necessary to facilitate demountability.

The Central Office has no objection to the use of such a demountable system of construction, provided FPHA drawings for "Post and Girder Construction" are properly modified and the estimated cost of demounting, moving, and re-erecting buildings of such construction is comparable to that based on FPHA drawings and specifications for "Demountable Construction".

3-15-44

STAIN ON GYPSUM BOARD

Irregular, brown stains have appeared, a day or two after painting on some of the gypsum wall board used for interiors. These stains bleed through oil base paints from the paper surfaces of the wall board.

There are caused by material (apparently of an asphaltic nature) present in the salvaged paper stock used as raw materials in the manufacture of the paper covering. This staining material cannot be detected by the usual inspection of the finished gypsum board. Stains appear on the surface only when the board has been painted with an oil base paint, a varnish or with raw linseed oil.

The stain appears to result from a solvent action of paint oils, presumably any of the drying oils will produce stains, which may not appear until after one or more days of drying or ageing of the paint.

The difficulty has been met on some projects by using a paint which is free of the usual paint oils, such as resin emulsion paints. Some of the resin emulsion paints have such covering and hiding power that one coat will produce an acceptable appearance, without primer or sealer. Improved resin emulsion paints have been developed, which meet the following specification:

Resin-Emulsion Paint, for one-coat application, shall be factory prepared only and comply with Federal Specification TT-P-88, except that:

- (a) Under the wet abrasion test, not more than 1/2 of the film shall be removed after 20,000 complete oscillations of the brush.

When the paint manufacturer furnishes an affidavit certifying that material complies with the above specified requirements, such resin emulsion paint may be applied in one coat and accepted as optional to one-coat-flat, oil base, interior paint for interior wall and ceiling surfaces complying with Federal Specification TT-P-47, without change in contract price.

The Central Office recommends that when it becomes necessary to accept such wall board on a project, the Contractor be permitted to use the board provided he accepts full responsibility for providing an acceptable paint finish. The Contractor should be required to submit samples of the defective board bearing several resin paint finishes and such samples should be preserved as standards for reference when accepting the work. The specimens submitted should be aged several days before decision.

Many paint makers can produce an acceptable resin-emulsion paint for one-coat application if they are notified of the conditions to be met; among them are: Cook Paint and Varnish Co., Kansas City, Missouri; Muralo Company, Staten Island, New York; National Gypsum Co., Buffalo, New York; Preskote Paint Co., New York City; Sherwin-Williams Co., Cleveland, Ohio; U. S. Gypsum Co., Chicago, Illinois; Wilber & Williams Co., Boston, Mass; William Zinsser, New York and Chicago.

4-5-44

INFILTRATION OF RAIN AND SNOW THROUGH ROOFS
AND VENTILATING SHAFTS OF WDU-10 UNITS

Some temporary housing projects with kitchen ventilator shafts extending through the roofs have reported difficulties with rain and snow entering the shafts and falling on the stoves. Regional Offices should be alert to discover if any of their projects are experiencing this condition and investigate remedial measures where necessary.

In the instances where leaks were noted the wire insect screen, shown on Central Office plans on the outside of the louvre, has been placed on the inside of the louvre, probably through error. It is obvious that rain striking the screen will have the pattern of rain drops largely broken up into spray. It is expected that such spray will be in considerable measure caught by the louvre and conducted to the outside when the screen is on the outside of the louvre. This could not occur where the wire is inside.

If the screen wire is in its proper place and leaks persist, it is suggested that the windward side of the ventilator be closed with a piece of exterior wall board. The side of the ventilator which is to the leeward under prevailing wind conditions would remain open.

Should leaky conditions continue, both sides of the louvre might be completely closed with exterior wall board until summer heat forces reopening of the ventilators. It is suggested that the wall board be nailed in with duplex headed, or other easily removable nails.

STRUCTURAL CONCRETE AND TILE FLOORS
OVER UNHEATED CRAWL SPACES

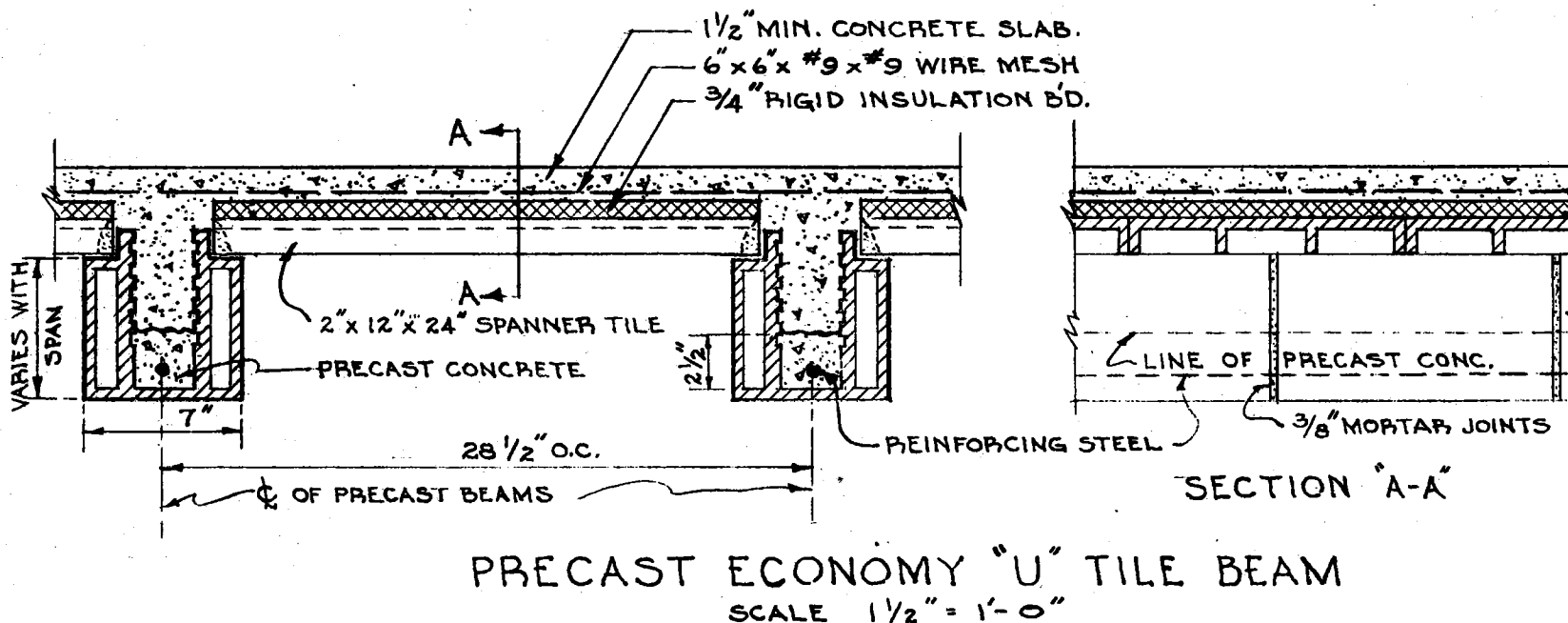
The reinforced concrete and tile floors shown on the six attached sheets can be built with a minimum use of form lumber. When projects now designed with framed wood floors are delayed for lack of lumber, and can not be re-designed with concrete floors on grade, the floors shown herewith may be used.

These floor designs are insulated to a degree estimated to provide an over-all "U" transmission from habitable rooms to exterior air through the floor and 8" foundation walls of approximately 0.13. While this amount of insulation will insure a relatively low heat loss through the floor it will not prevent heat loss through the uninsulated edge of the floor. This edge loss can be provided against when frame walls are used in a manner similar to that used on the WDU-10 Drawing 202 dated 12/9/43.

When masonry walls are used edge loss of heat can be reduced by using a wood block floor over 1/2" fiber board insulation both set in mastic and omitting all other floor insulation. This will raise costs about 30 cents per square foot. Flooring manufacturers do not recommend that strip flooring be laid in mastic because of expansion. Regional offices should consider expending such added funds only when the added comfort of the wood block floor can be justified in preventing tenant turnover and the saving in fuel is an important factor.

Electric work placed in these floors must be located so as to avoid interference with floor reinforcement.

See USHA T.I.N. 44, August 1941, for an earlier discussion of tile floors.



SPECIFICATIONS

Precasting: Use level base. Butter ends of beam tile with not over 3/8" portland cement mortar.

Wet beam tile. Keep sides clean - fill beam tile to not over 2-1/2" height with 1-3 portland cement mortar and bed reinf. steel 1/2" up from bottom.

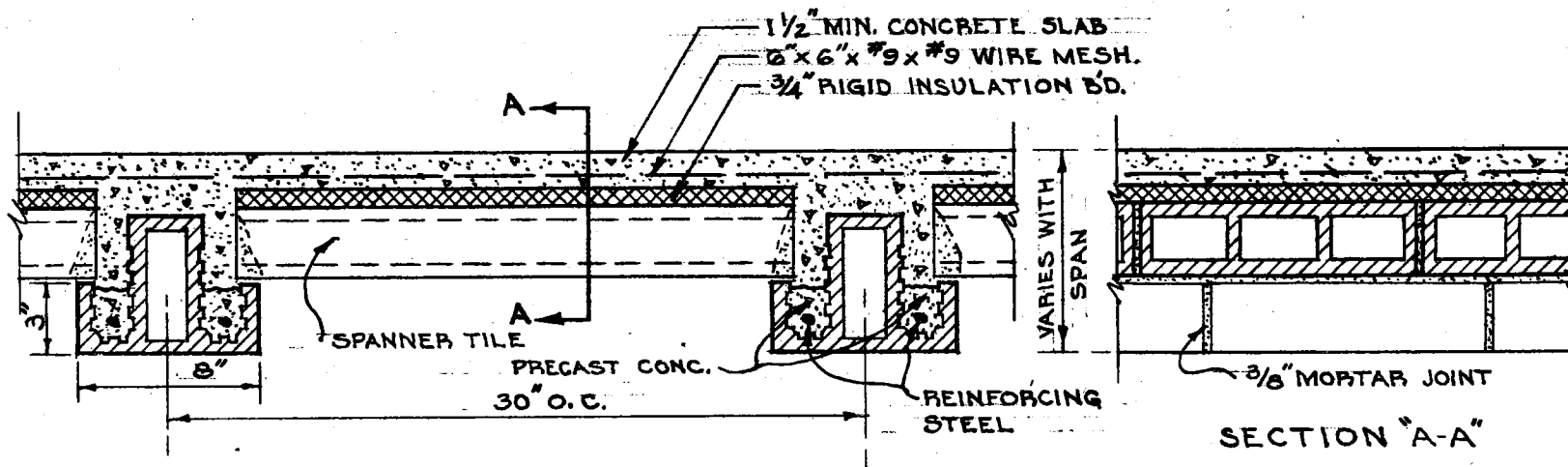
Curing: Keep moist and warm until set up sufficiently to allow handling and to sustain construction loads. Minimum suggested time is 48 hours for high early strength cement & 7 days for ordinary cement.

Setting: Minimum of 3" bearing in 1/2" of mortar for beams. Set spanner tile in 3/8" bed of mortar. Construction loads will probably require beam shoring when span is over 10 feet.

Insulation: Rigid insulation board shall be set in hot bitumen and have all surfaces and edges treated with bitumen to effectively seal them. Rigid insulation board shall be treated for fungus and termite control.

Concrete: Use fine aggregate. Concrete to be at least 2600* p.s.i. strength (28 days). Trowel surface to accommodate flooring (if any) contemplated. Keep concrete moist for at least 4 days.

Source of design information for beam & spanner tile: Structural Clay Products Institute.



PRECAST "T" TILE BEAM
SCALE 1/2" = 1'-0"

SPECIFICATIONS

Precasting: Use level base. Butter ends of beam tile with not over 3/8" portland cement mortar.

Wet beam tile. Keep sides clean - fill beam tile to not over 2-1/2" height with 1-3 portland cement mortar and bed reinf. steel 1/2" up from bottom.

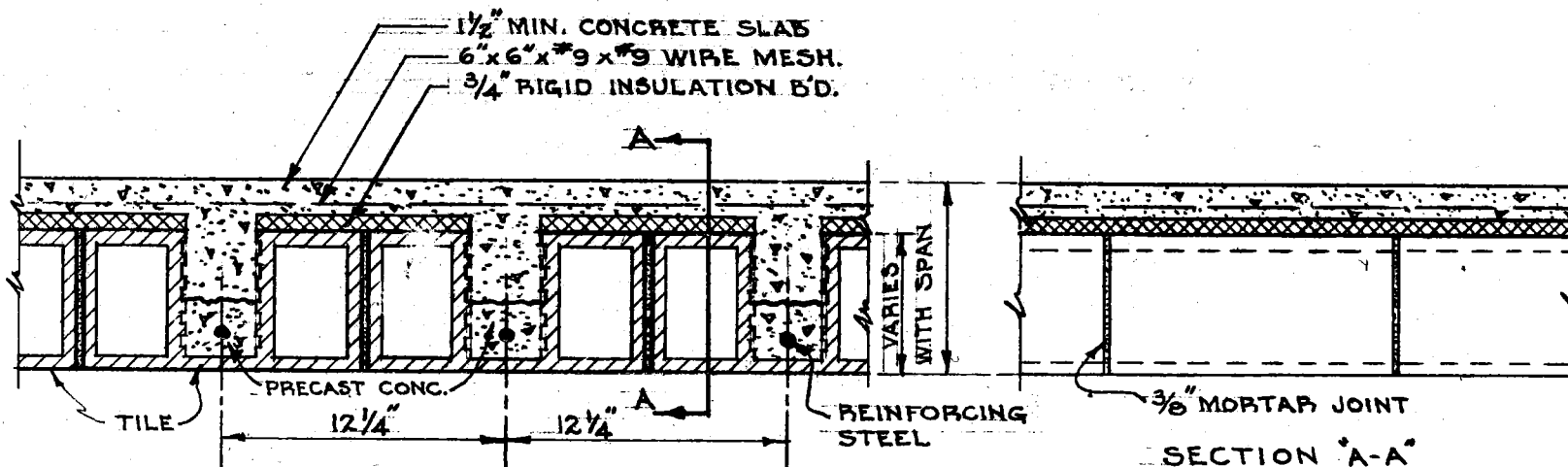
Curing: Keep moist and warm until set up sufficiently to allow handling and to sustain construction loads. Minimum suggested time is 48 hours for high early strength cement & 7 days for ordinary cement.

Setting: Minimum of 3" bearing in 1/2" of mortar for beams. Set spanner tile in 3/8" bed of mortar. Construction loads will probably require beam shoring when span is over 10 feet.

Insulation: Rigid insulation board shall be set in hot bitumen and have all surfaces and edges treated with bitumen to effectively seal them. Rigid insulation board shall be treated for fungus and termite control.

Concrete: Use fine aggregate. Concrete to be at least 2600# p.s.i. strength (28 days). Trowel surface to accommodate flooring (if any) contemplated. Keep concrete moist for at least 4 days.

Source of design information for beam and spanner tile: Structural Clay Products Institute.



PRECAST FLUSH TYPE SLAB TILE BEAM
SCALE 1 1/2" = 1'-0"

SPECIFICATIONS

Precasting: Use level base. Butter ends of beam tile with not over 3/8" portland cement mortar. Wet beam tile. Keep sides clean - fill beam tile to not over 2" height with 1-3 portland cement mortar and bed reinf. steel 1/2" up from bottom.

Curing: Keep moist and warm until set up sufficiently to allow handling and to sustain construction loads. Minimum suggested time is 48 hours for high early strength cement & 7 days for ordinary cement.

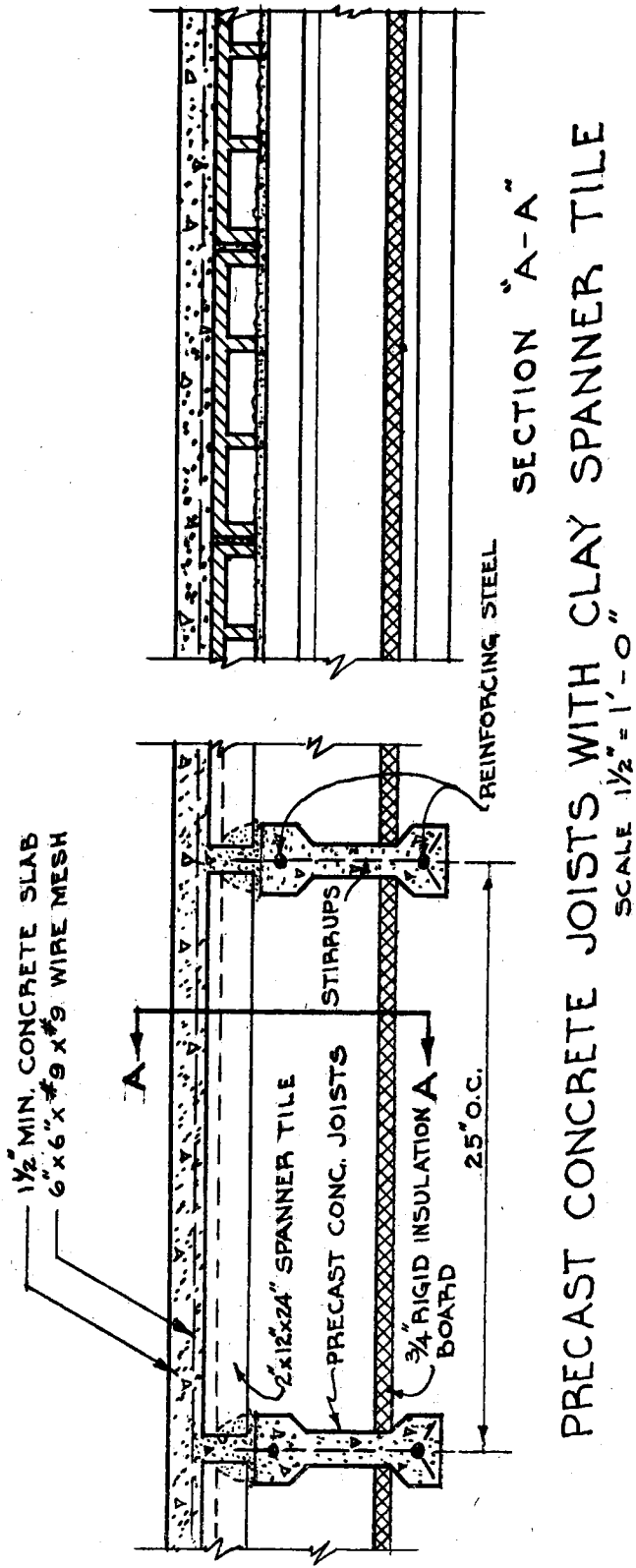
Setting: Minimum of 3" bearing in 1/2" of mortar. Construction loads will probably require beam shoring when span is over 10 feet.

Insulation: Rigid insulation board shall be set in hot bitumen and have all surfaces and edges treated with bitumen to effectively seal them. Rigid insulation board shall be treated for fungus and termite control.

Concrete: Use fine aggregate. Concrete to be at least 2600# p.s.i. strength (28 days). Trowel surface to accommodate flooring (if any) contemplated. Keep concrete moist for at least 4 days.

Source of design information for beam & spanner tile: Structural Clay Products Institute.

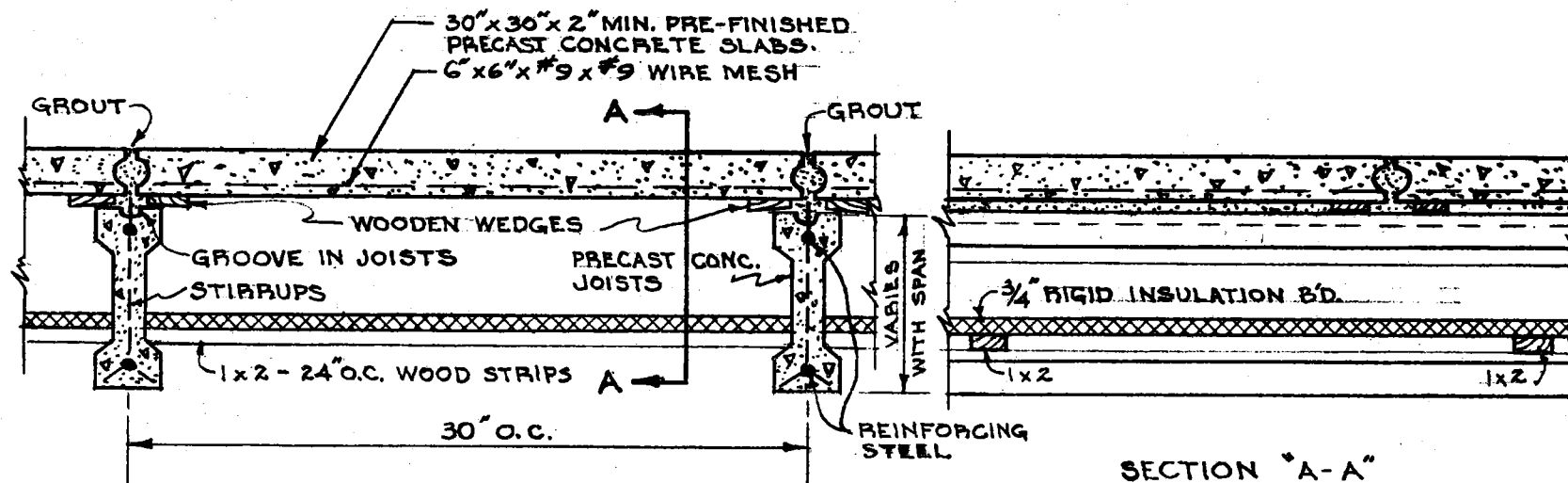
6-1-1-1



PRECAST CONCRETE JOISTS WITH CLAY SPANNER TILE

SPECIFICATIONS

- Precast Joists: Concrete at least 3000# p.s.i. 28 days compressive strength. Stirrups as required by span and load. Joists must be straight, true & uniformly sized. Joists shall be designed as independent beams.
- Setting Joists: Set in 1-3 portland cement mortar with at least 3" bearing. Set true & level with joists sides plumb and uniformly spaced.
- Spanner Tile: 2" x 12" x 24" ribbed tile set in 3/8" bed of 1-3 portland cement mortar.
- Insulation: Rigid insulation board. Treat for fungus and termite control. Treat or dip all surfaces and edges of the finished board with hot bitumen.
- Concrete: Use fine aggregate. Concrete of at least 2600# p.s.i. 28 day strength. Install wire mesh reinforcement as indicated. Trowel surface to desired finish or to receive future covering. Keep slab moist for at least 4 days.
- Source of design information for spanner tile: Structural Clay Products Institute.
- Source of design information for precast joists: Portland Cement Association.



PRECAST CONCRETE FLOOR SLABS ON PRECAST CONCRETE JOISTS
 SCALE $1\frac{1}{2}'' = 1'-0''$

SPECIFICATIONS

Precast Joists: Concrete at least 3000# p.s.i. 28 day compressive strength. Stirrups as required by span and load. Joists must be straight, true & uniformly sized. Joists shall be designed as independent beams.

Setting Joists: Set in 1-3 portland cement mortar with at least 3" bearing. Set true & level with joists sides plumb and uniformly spaced.

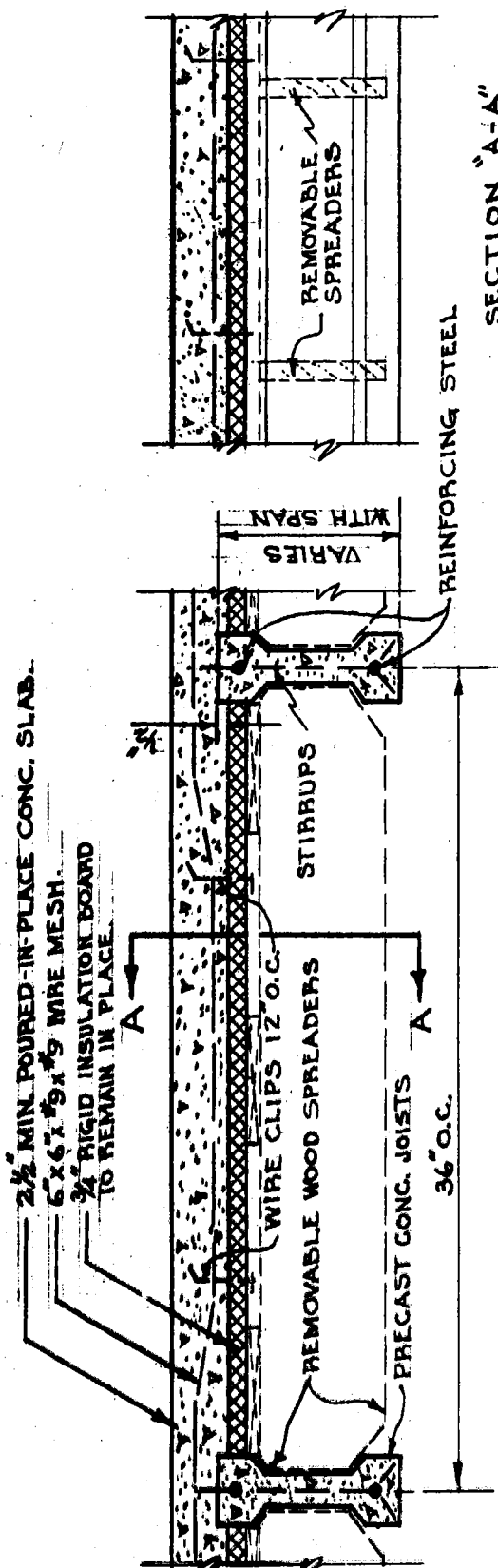
Insulation: Rigid insulation board. Treat for fungus and termite control. Treat or dip all surfaces and edges of the finished board with hot bitumen.

Precast Floor Slabs: 2" thick x 30" x 30" of 3000# p.s.i. concrete shop fabricated with edges as per detail. All slabs true to size with square edges all out of wind. Embed mesh as shown.

Setting Slabs: Set slabs true & level on wooden wedges or blocks at each corner to allow for $\frac{3}{8}''$ mortar bed. Grout and tool joint between slabs. Protect slabs with saw dust or by other means.

On completion of other work grind, wax and polish as desired.

Source of design information for precast joists & slabs: Portland Cement Association.



POURED-IN-PLACE SLAB ON PRECAST CONCRETE JOISTS

SCALE $1\frac{1}{2}'' = 1'-0''$

SPECIFICATIONS

Precast Joists: Concrete at least 3000# p.s.i. 28 day compressive strength. Stirrups as required by span and load to project into concrete slab. Joists must be straight, true and uniformly sized. Joists may be designed as "T" beams.

Setting Joists: Set in 1-3 portland cement mortar with at least 3" bearing. Set true & level with joists sides plumb and uniformly spaced.

Forms: Shape & wedge spreaders, at an angle, between concrete joists. Where rigid insulation board is used provide suitable metal clips, one per 1.5 sq. ft. projecting into concrete slab. Treat insulation board for fungus & termite control. Coat all surfaces and edges of insulation board with hot bitumen.

Concrete: Use fine aggregate. Concrete of at least 2600# p.s.i. 28 day strength. Install wire mesh reinforcement as indicated. Trowel surface to desired finish or to receive future covering. Keep slab moist for at least 4 days.

Source of design information for precast joists: Portland Cement Association

SCREEN DOORS ON DORMITORY & PROJECT FACILITY BUILDING EXITS

Numerous questions have been raised concerning the screening of exit doors. In general these questions can be classified as follows:

- A. Hinderance to exit by in-swing screen doors.
- B. Insufficient depth of door frames for in-swing screen doors when exit doors are equipped with panic bolts.
- C. Desirability of out-swing screen doors on cafeteria and other food buildings.

Screen door requirements.

Standard plans for dormitory buildings, project facility buildings for dormitory projects, and child service buildings require screen doors except for boiler room and assembly room doors.

Standard diagrammatic plans for family dwelling project facility buildings and for commercial facility buildings did not specifically call for screen doors but it was contemplated that such protection would be provided where required.

Dormitory corridors.

In-swing screen doors are considered to be a serious hazard when used on exits from corridors of dormitory buildings containing bedrooms. Revision No. 12 dated 4/28/43 to Series WD-1 drawings provided for the construction of vestibules at each end of dormitory building corridors with out-swing screen doors.

In a number of cases it has been found that these out-swing screen doors have not been installed, and it is most important that prompt, corrective measures be taken in these buildings.

For non-standard dormitory buildings (including FSA dormitories) out-swinging screen doors should be provided. This may involve the provision of interior (or exterior) vestibules.

Assembly Room Exits.

In-swing screen doors constitute a decided hazard when used on principal exit doors from large assembly rooms. Revision No. 11 dated 4/9/43 to Series WD-1 drawings provided for the construction of vestibules with out-swing screen doors at the main exit door at ends of the corridor near the large assembly rooms, in Morale Activity Buildings Nos. 1000, 1500 and 2100. In some localities it has been found necessary to screen direct exit doors from assembly rooms to provide additional summer ventilation. Where this is necessary, vestibules should be constructed to permit out-swing screen doors.

Cafeteria and Kitchen Entrances.

On main entrance doors to cafeterias and kitchens, out-swing screen doors are greatly preferred as they are more effective than the in-swing type in excluding flies, and are more convenient. Revision No. 11 dated 4/9/43 to Series WD-1 drawings provided for the installation of out-swing screen doors to be interchangeable with inner vestibule doors at main cafeteria entrances when these buildings were built as separate units.

Other out-swing screen doors not generally required.

Out-swing screen doors on exits or entrances other than those covered by the above three paragraphs are not required or generally considered necessary.

Special conditions.

At main entrance doors to food stores in commercial facility buildings, the arrangement of entrances in relation to turnstiles or counters may necessitate the installation of vestibules with out-swing screen doors. Installation of out-swing screen doors at main entrances to the community buildings of family dwelling projects, as interchangeable doors for inner vestibule doors, would provide additional convenience at little expense.

Hardware clearance.

For all other entrance or exit doors where in-swing screen doors would normally be installed due to the outward swing of solid doors, the door frames should be arranged or extended to allow screen doors to clear panic type hardware if it is required.

In-swing screen held open when not in use.

Wood chock blocks, wedges, door holders, or hooks should be furnished to hold in-swing screen doors in open position whenever the solid door is closed.

TYPES OF PORTABLE UNITS AND EXPERIENCE IN THEIR USE 1/

Portable Family Shelters: Series PSU-2

Portable family shelters consist of one- and two-bedroom units without bathrooms. They, with family and dormitory trailers, provide accommodations for families in stop-gap housing projects; and can readily be demounted and re-erected. The standards (Bulletin 4, Appendix 1) require that these shelters be arranged in small groups of not more than 25 units, each group separated by protective fire belts. They also require a separate building with common toilet, shower and laundry facilities for each group. This limitation on the size of each group was made to reduce fire risks and to place the toilet, shower and laundry building within reasonable walking distance of the farthest unit.

Drawings for this series were issued to all regions on, 1-18-44, and the latest revision was issued on 6-3-44.

Portable Family Dwellings: Series PFD

Portable family dwellings consist of one- and two-bedroom units with bathrooms. With the exception of the bathroom the unit is similar to Series PSU-2. They, with family and dormitory dwellings, provide accommodations for families in temporary war housing projects. Since toilet and shower facilities are provided in each dwelling the standards (Bulletin 2, Appendix 4) allow more liberal spacing between units of this series. Furthermore, as water is readily available at each unit for fighting fires, the standards permit a maximum of 50 units in each group. Common laundry facilities for each group are provided for in a separate building.

Drawings for this series were issued to Region VI on 7-22-44 and 8-2-44 since, at the time, portable units with bathrooms were being developed in that region only. The attached drawings 2/ for Series PFD are reproductions of a part of those issued to Region VI and include the laundry building.

Portable Family Dwellings: Series PFD-2

This series, which is a modified PFD plan, was developed for Army ordnance housing projects in Regions III, V, and VI. The modifications consist of an increase of 4' 2" in the length of the living room, and an outside storage room combined with a covered entrance porch.

Drawings for this series were issued to Regions III and V, on 9-4-44, to Region VI, on 10-5-44, and to Region IV, on 12-2-44. (See attached reproductions of plans and elevations.) It is unlikely that any more of these PFD-2 units will be constructed, since it has been mutually agreed that future Army Ordnance projects will consist of PFD units only.

1/ See Manual Sections 3401:2 and 3470:6, effective 12-7-44.

2/ Illustrations consist of "Attachments" 1-16 inclusive.
Reproductions of Photo Attachments 10-16 inclusive will be issued shortly.

Experience

The experience of Region VI in the development and operation of numerous projects composed of portable units, Series PSU-2 and PFD is summarized below:

Approximately 4,800 portable units, comprising 21 projects, have been placed under contract in this region. Of these units, 49 per cent are PSU-2's and the balance PFD's. Project tenants are principally industrial war workers and Army and Navy civilian personnel in a wide range of income groups.

The portable units of both series have been generally very satisfactory. On the whole, standard plans have been quite satisfactory, and only minor adjustments in detail of working drawings were found necessary.

Experience in moving projects composed of temporary dwellings (TDU's) in Arizona and Nevada seems to indicate that moving a project composed of portable units of either series would be relatively simple and inexpensive.

PSU-2 Projects. An accurate appraisal of PSU-2's must be deferred until more of them have been completed and occupied; however, the region is finding quite ready tenant acceptance of those which have been completed. Compared with trailers, living amenities are more satisfactory and construction time has not been materially greater.

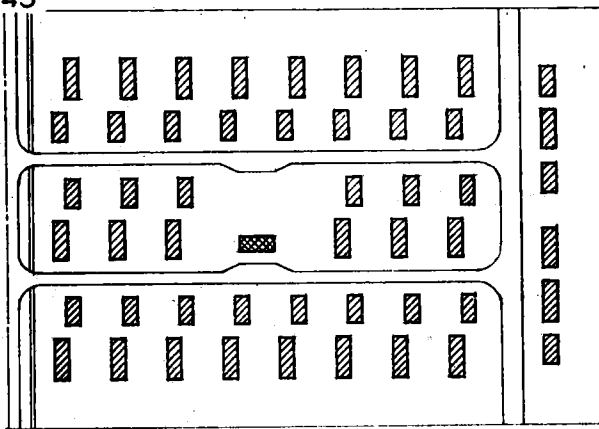
The chief objection to projects of this unit type is that the general appearance is one of excessive crowding. Some architects have not realized the full possibility of color; others by using interesting color schemes have compensated for the tendency to monotony. With exterior finishes of cement asbestos board and mineral-surfaced siding, bright colors have been used on the wood trim to add interest.

PFD Projects. The provision of a bathroom in the PFD units has made these dwellings more acceptable (than PSU-2's) to tenants. This provision permits omission of the central toilet and shower buildings, and has not increased the cost appreciably. The additional spacing allowed between the PFD's by the standards has contributed much to the general appearance of these projects.

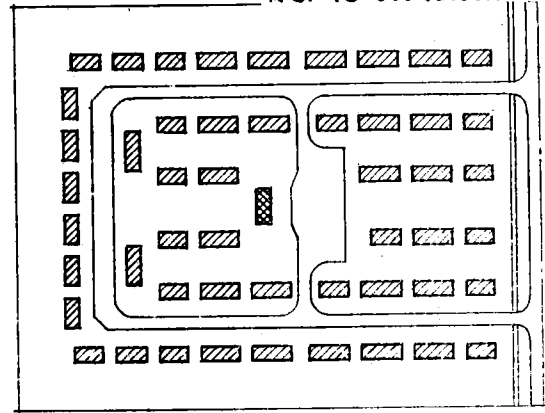
A good example of tenant acceptance of PFD's is in Pittsburgh, California, where TDU project adjoins the PFD's. Some of the tenants would prefer to transfer to the PFD's. It is believed this is due principally to the fact that PFD's are individual dwellings which although smaller in floor area, provide more privacy, light, and air than the TDU's.

It has been found that operating and maintenance costs of central laundries have been high. Some local authorities in this region believe, based on their experience, that they could well be omitted, and a deep sink installed in each kitchen, for laundry purposes. This, they believe, would be generally more acceptable. It will be seen from the attached site plans and photographs that Region VI, in some instances, has omitted community laundry buildings and installed deep kitchen sinks.

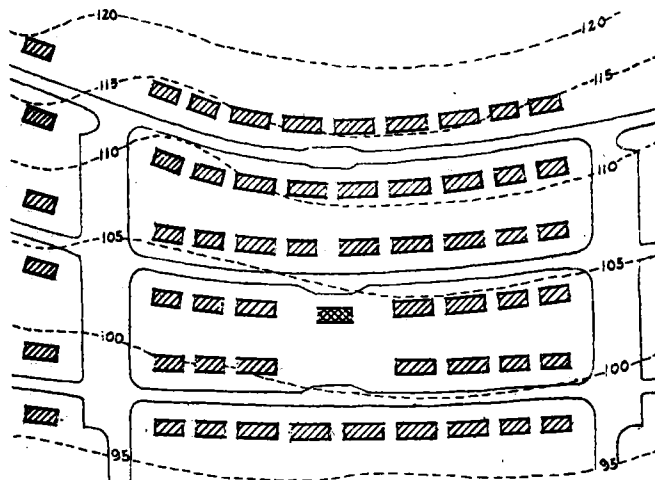
Attachments



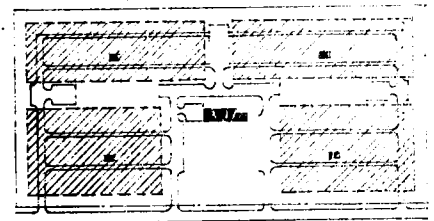
GROUP PLAN A



GROUP PLAN B



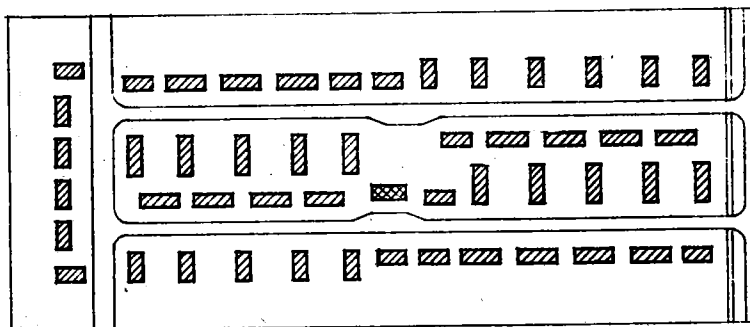
GROUP PLAN C



GROUP PLANS A+D

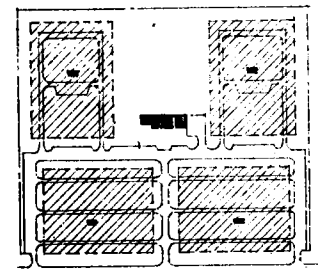
SCHEMATIC PLANS FOR
200 UNIT PROJECTS

0 300 600 900



GROUP PLAN D

0 80 160 240



GROUP PLANS B+C

NOTES

FIRE PROTECTION BELTS AS REQUIRED FOR OTHER TYPES OF TEMPORARY FAMILY DWELLINGS SHALL BE PROVIDED EXCEPT THAT THE PROTECTED GROUPS SHALL NOT AVERAGE OVER 50 DWELLINGS AND ONE LAUNDRY BUILDING. SPACE BETWEEN SUCH GROUPS SHALL NOT BE LESS THAN 80'.

MINIMUM SPACING: FRONT TO FRONT 40'; FRONT TO REAR 35'; REAR TO REAR 30'; END TO REAR OR FRONT 15' AND END TO END 10'.

GROUP PLAN BUILDING SPACINGS USED ARE RECOMMENDED FOR THE CONDITIONS SHOWN.

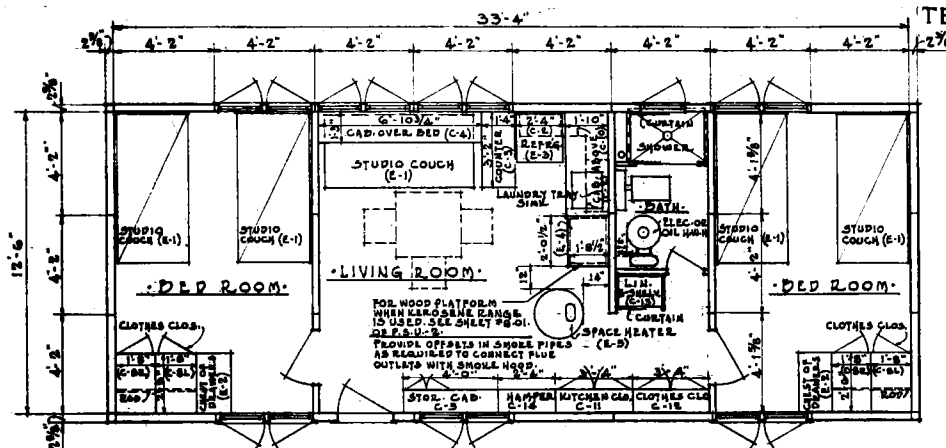
GROUP PLANS SHOULD BE VARIED AS NECESSARY TO MEET SITE CONDITIONS.

SERVICE BUILDING (ALL GROUPS): LAUNDRY BUILDING, PLAN SHEET NO. 2000.

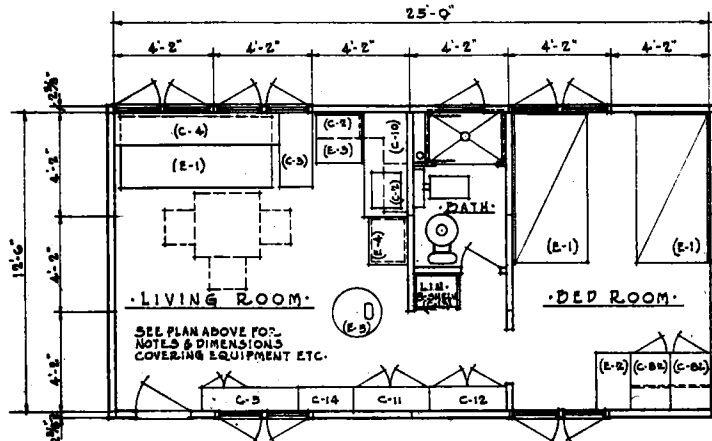
FUEL: DWELLING UNITS - OIL; LAUNDRY BUILDING - OIL

IT MAY BE REDUCED BY NOT MORE THAN 10' PROVIDED THE SPACE ON THE OPPOSITE SIDE IS INCREASED BY AT LEAST AN EQUAL AMOUNT.

DIAGRAMMATIC SITE PLAN STUDIES							
PORTABLE FAMILY DWELLING							
<p>REVISIONS</p> <p>NATIONAL HOUSING AGENCY</p> <p>FEDERAL PUBLIC HOUSING AUTHORITY</p> <p>PHILIP M. KLUTZNICK COMMISSIONER</p> <p>LONGFELLOW BUILDING, WASHINGTON, D.C.</p> <p><i>Robert L. Rodin</i></p> <p>F.P.H.A. TECHNICAL DIRECTOR</p>							
SERIES	SR	DE	ME	MS	ADDP	S	AKR
RED	1000	002			REJ		
							0.11

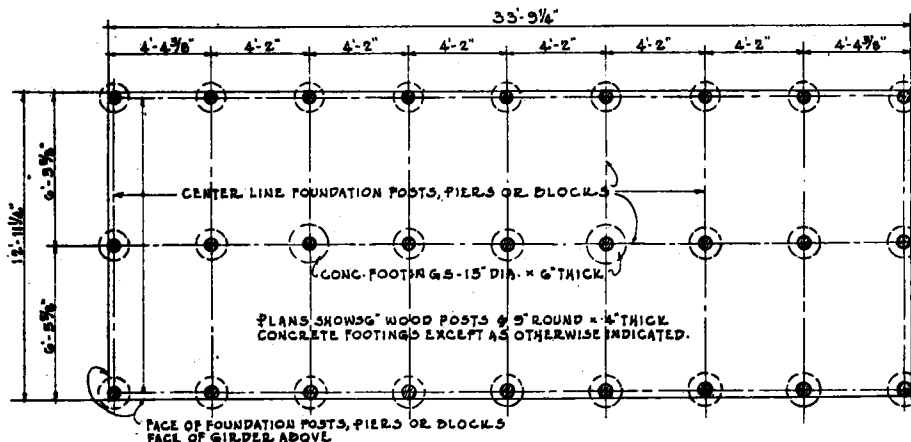


FLOOR PLAN
SCALE 1/4" = 1'-0"

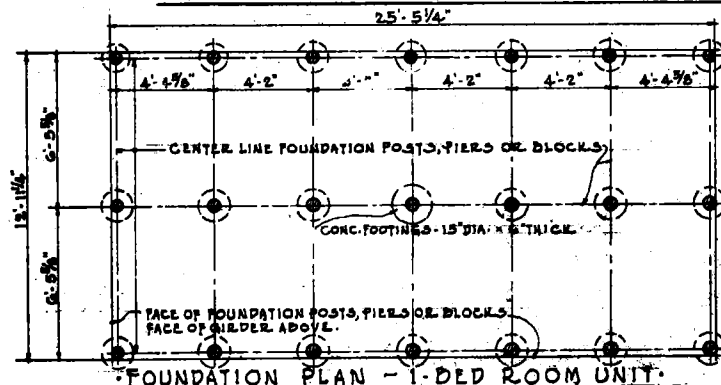


FLOOR PLAN
SCALE 1/4" = 1'-0"

SCHEDULE OF EQUIPMENT	
E-1	STUDIO COUCH (5'-0" WIDE)
E-2	CHEST OF DRAWERS
E-3	REFRIGERATOR
E-4	KEROSENE RANGE
E-5	SPACE HEATER



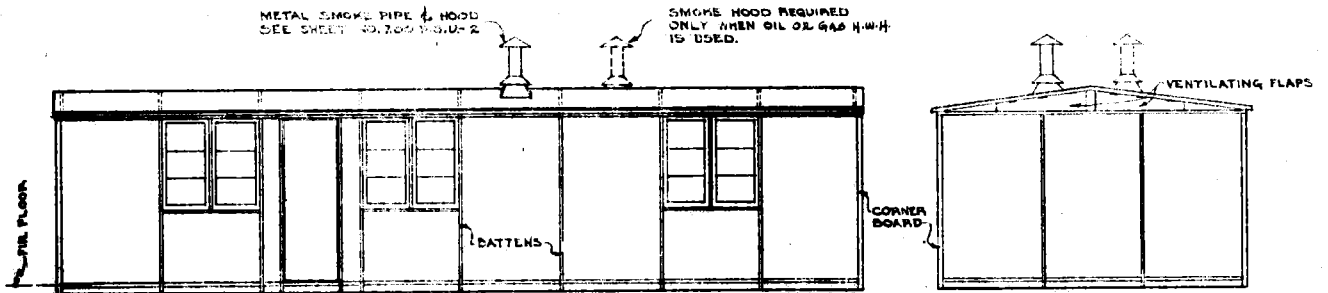
FOUNDATION PLAN - 2-BED ROOM UNIT



FOUNDATION PLAN - 1-BED ROOM UNIT

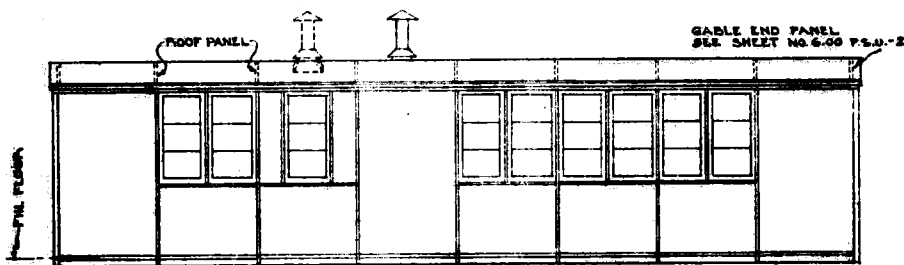
NOTE:
FOR COMPLETE DRAWINGS
FOR SERIES RFD INCLUDE
THE FOLLOWING:
SERIES RFD DRAWING NOS.
11.00, 12.00, 14.00, 15.00,
18.01, 19.00, 20.00 &
20.01 (REFER TO LAUNDRY BLDG.)
SERIES RFD-2 DRWG. NOS.
0.00, 0.02, 3.00, 4.00,
4.01, 5.00, 6.00, 7.00,
8.01, 8.02, 8.03 & 9.00
SERIES W.D.U.-10, DRWG. NO.
5.00

FLOOR PLANS WITH BATH AND FOUNDATION PLANS									
PORTABLE FAMILY DWELLING									
REVISIONS		NATIONAL HOUSING AGENCY FEDERAL PUBLIC HOUSING AUTHORITY PHILIP M. KLUTZNICK-COMMISSIONER LONGFELLOW BUILDING - WASHINGTON, D.C.							
		<i>Robert L. Bell</i> R.H.A. TECHNICAL DIRECTOR							
SERIES	S.P.	S.E.	M.S.	M.S.	ADTS	S.	TECH.	SHEET NO.	
RFD								11.00	
DATE: 5-1-46									



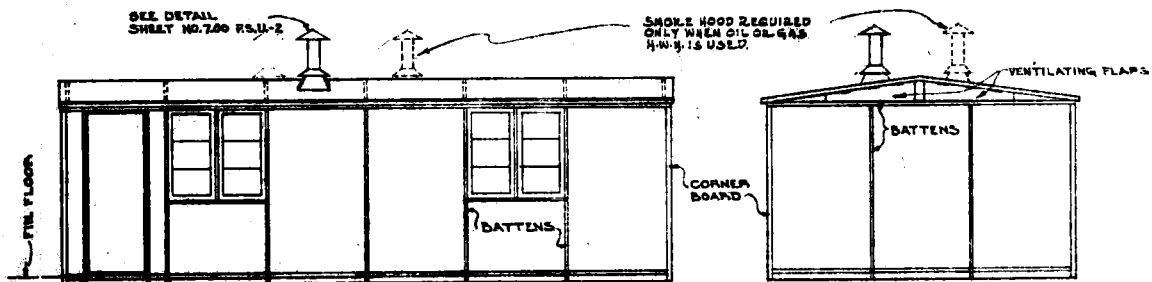
FRONT

END (RIGHT)
(LEFT SIMILAR)



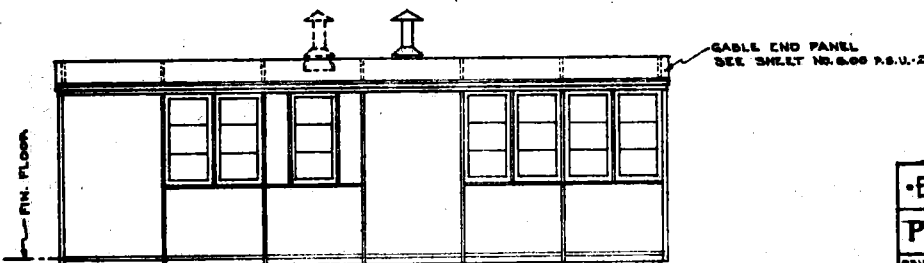
REAR

- ELEVATIONS - TWO B.R. UNIT -
SCALE 1/4" = 1'-0"



FRONT

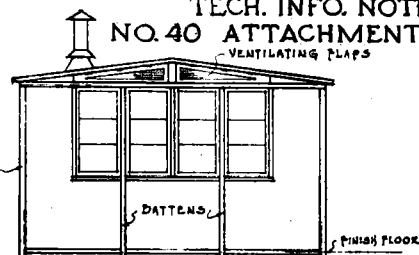
END (RIGHT)
(LEFT SIMILAR)



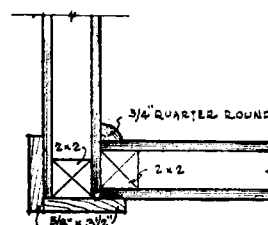
REAR

- ELEVATIONS - ONE B.R. UNIT -
SCALE 1/4" = 1'-0"

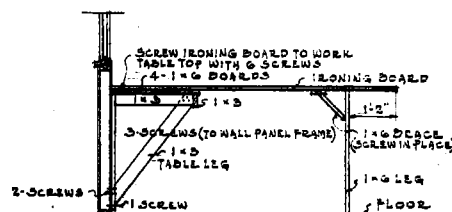
- ELEVATIONS - 1 & 2 B.R. UNITS -									
PORTABLE FAMILY DWELLING									
NATIONAL HOUSING AGENCY FEDERAL PUBLIC HOUSING AUTHORITY PHILIP M. KLUTZNICK - COMMISSIONER LONGFELLOW BUILDING WASHINGTON, D.C.									
<i>Philip M. Klutznick</i> FPHA - TECHNICAL DIRECTOR									
REVISIONS	S.R.	S.E.	M.E.	M.S.	W.F.S.	S.	ARCH	SHEET NO.	
								12.00	
DATE: 6-1-48									



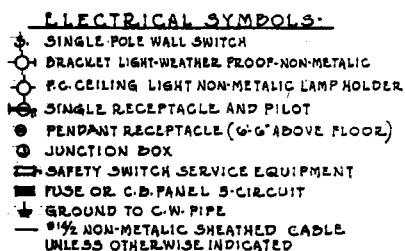
END ELEVATIONS.



SECTION A-A.



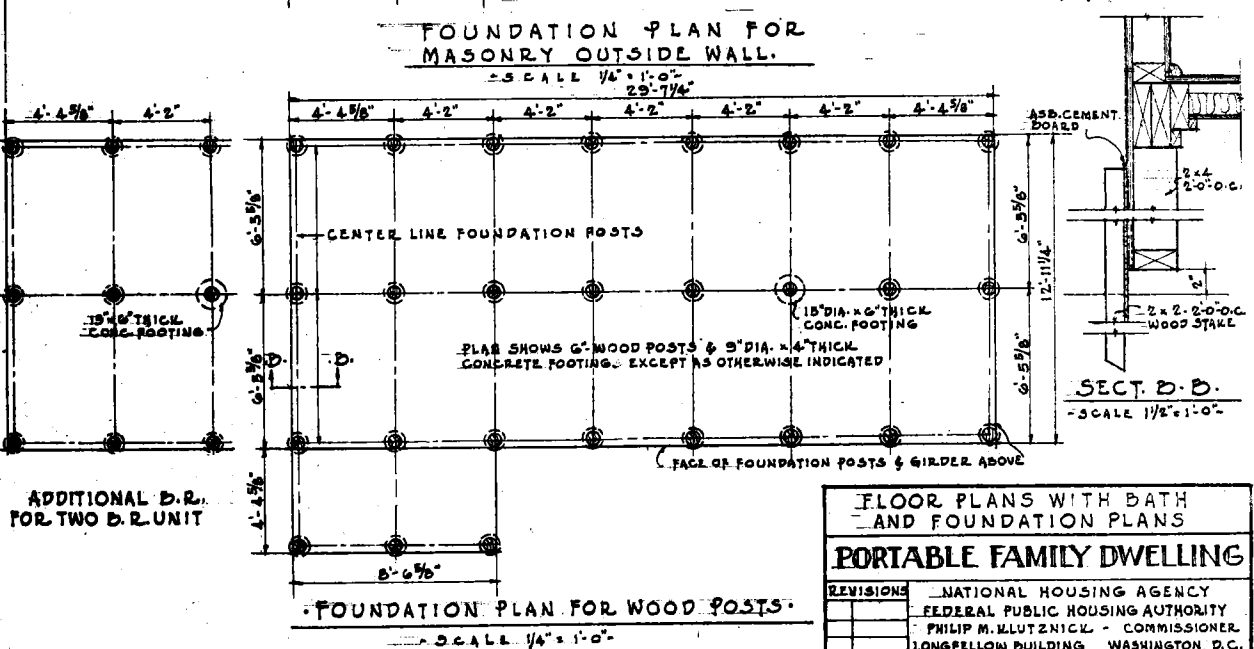
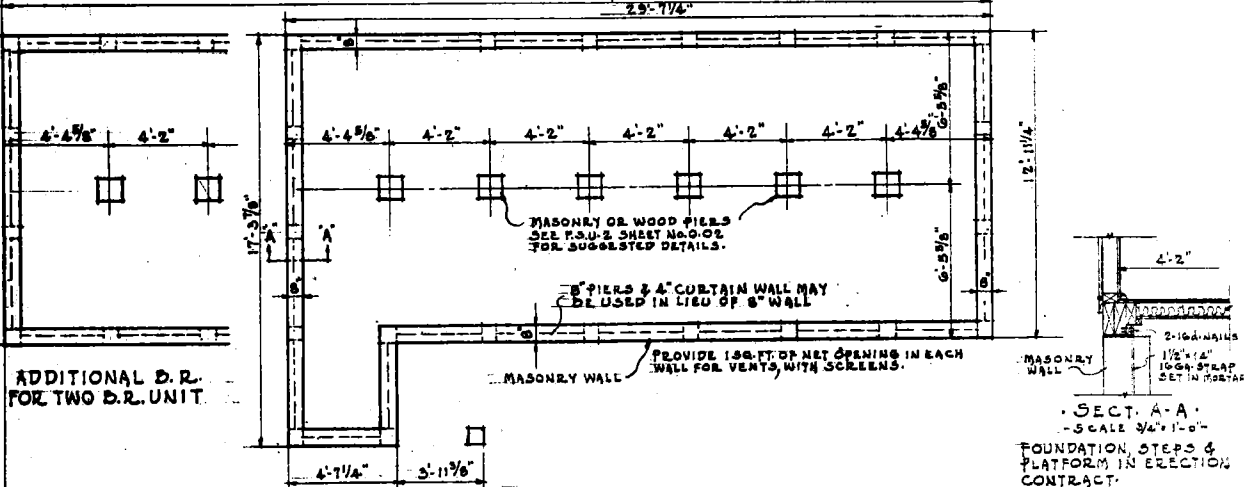
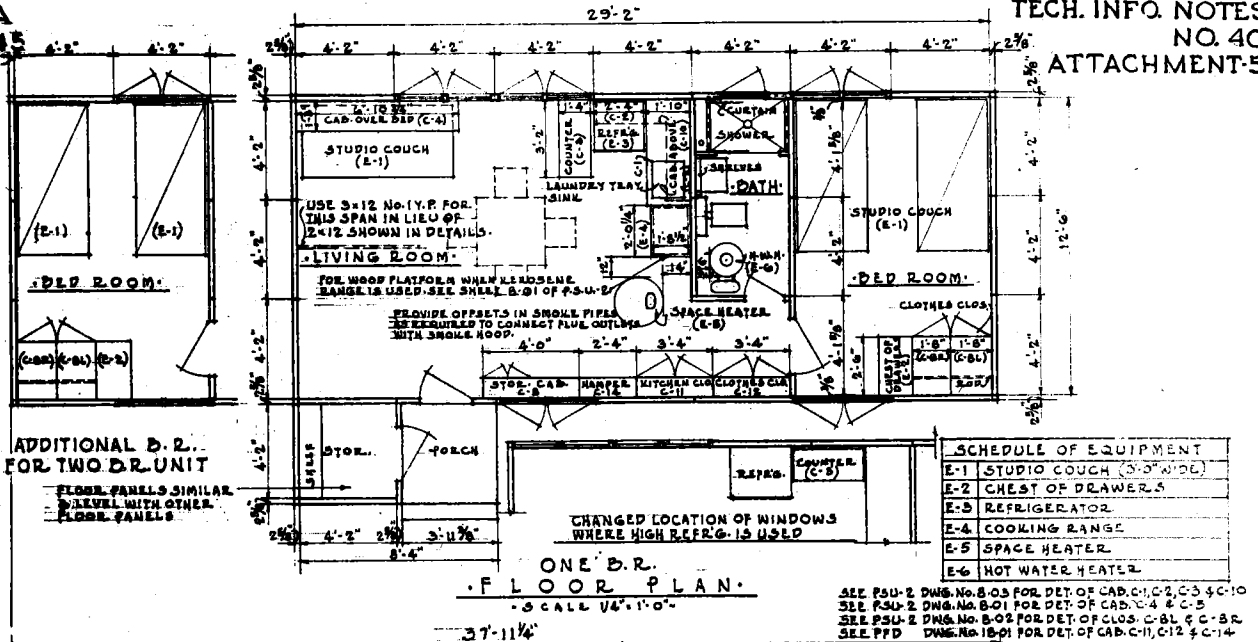
DETAIL OF WORK TABLE



SCALE 1/4" = 1'-0"

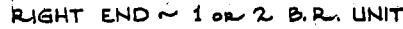
LAUNDRY BUILDING PLAN
PORTABLE FAMILY DWELLING

REVISIONS		NATIONAL HOUSING AGENCY FEDERAL PUBLIC HOUSING AUTHORITY PHILIP M. KLUTZNICK - COMMISSIONER LONGFELLOW BUILDING WASHINGTON, D.C.							
		<u>Richard E. Polier</u> FRHA TECHNICAL DIRECTOR							
SERIES	S.P.	S.E.	M.E.	M.S.	DATA	S.	ARCH	SHEET NO.	
P.F.D.				CST.	R.V.	7/10	7/9	2000 6/14	

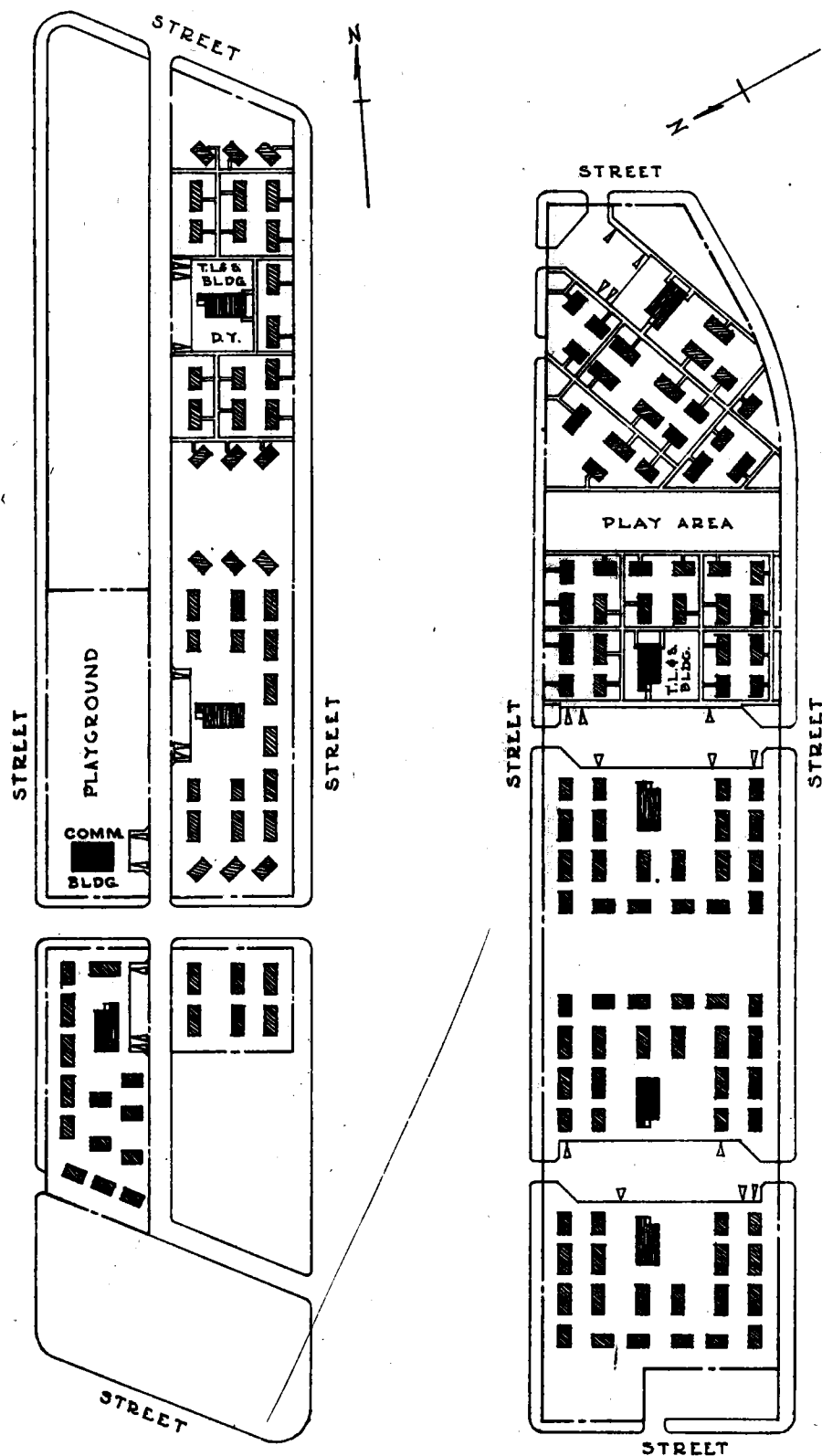


SEE COVER SHEET FOR LIST OF DRAWINGS REQUIRED

FLOOR PLANS WITH BATH AND FOUNDATION PLANS				
PORTABLE FAMILY DWELLING				
REVISIONS	NATIONAL HOUSING AGENCY FEDERAL PUBLIC HOUSING AUTHORITY PHILIP M. BLUTZNICK - COMMISSIONER LONGFELLOW BUILDING WASHINGTON, D.C.			
SERIES	S.P.	S.E.	M.E.	M.S. & A.D.A.
PFD-2			RJW	21.00
				DATE: 9-2-44



ELEVATIONS ~ 1 & 2 B.R. UNITS									
PORTABLE FAMILY DWELLING									
REVISIONS		NATIONAL HOUSING AGENCY							
		FEDERAL PUBLIC HOUSING AUTHORITY							
		PHILIP M. KLUTZNICK - COMMISSIONER							
		LONGFELLOW BLDG. WASHINGTON, D.C.							
		<u>Gilbert C. Robier</u> F.H.A. - TECHNICAL DIRECTOR							
SERIES	S.P.	S.E.	M.E.	M.S.	ASBTD	S	ARCH	SHEET NO.	
P.F.D-2					R.N.			11-2-52 9:45 AM	2200
								DATE	

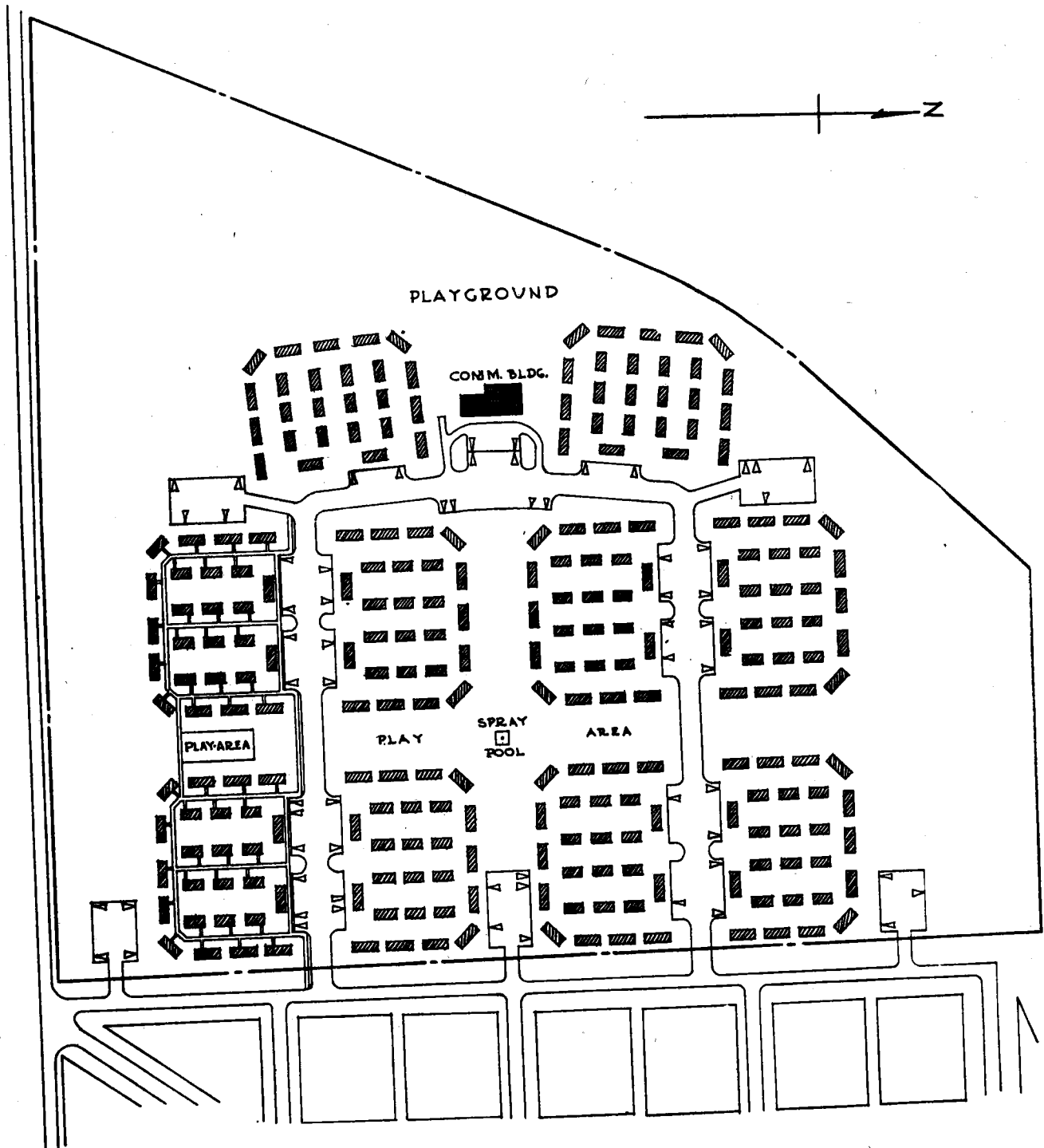


PROJECT CAL. 4827A (60 UNITS)

PROJECT CAL. 4832 (100 UNITS)

TWO PROJECTS COMPOSED OF PSU-2'S

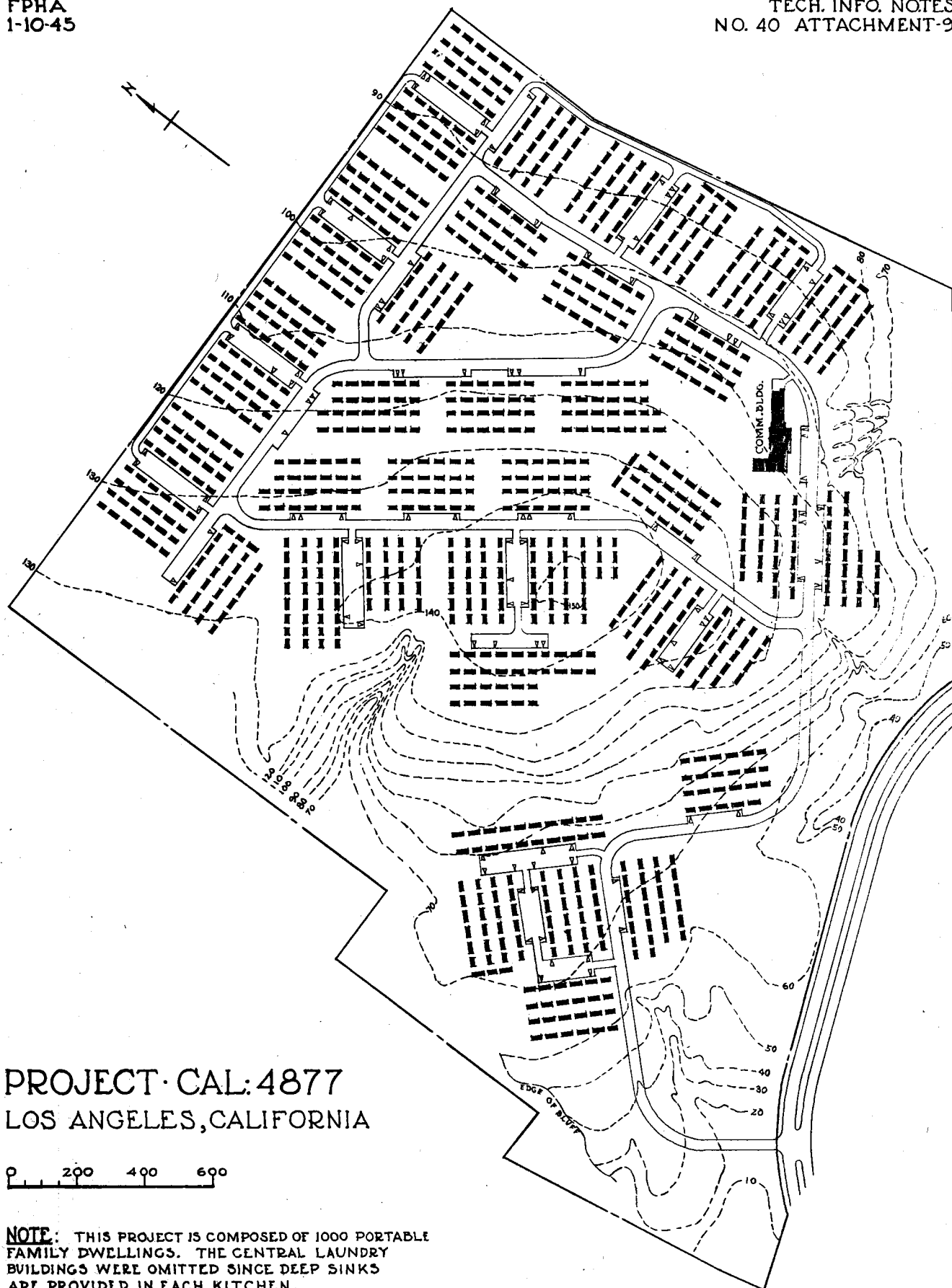




KNOX PARK PROJECT CAL 4848
CONTRA COSTA COUNTY
CALIFORNIA

NOTE: THIS PROJECT IS COMPOSED OF 250 PORTABLE FAMILY DWELLINGS. THE CENTRAL LAUNDRY BUILDINGS WERE OMITTED SINCE DEEP SINKS ARE PROVIDED IN EACH KITCHEN.

0 100 200 300



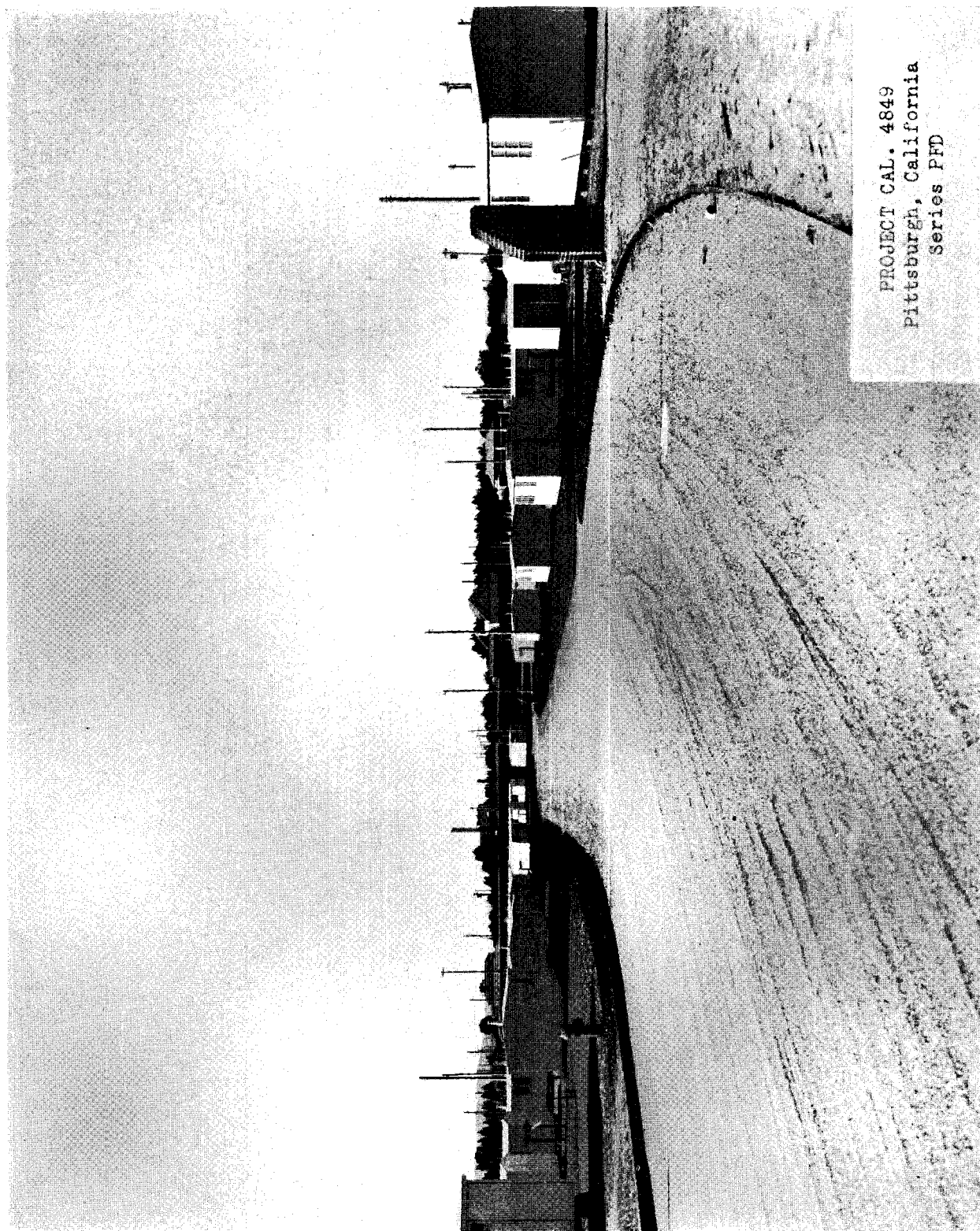
PROJECT CAL: 4877
LOS ANGELES, CALIFORNIA

0 200 400 600

NOTE: THIS PROJECT IS COMPOSED OF 1000 PORTABLE FAMILY DWELLINGS. THE CENTRAL LAUNDRY BUILDINGS WERE OMITTED SINCE DEEP SINKS ARE PROVIDED IN EACH KITCHEN.

NHA
FPHA
1-10-45

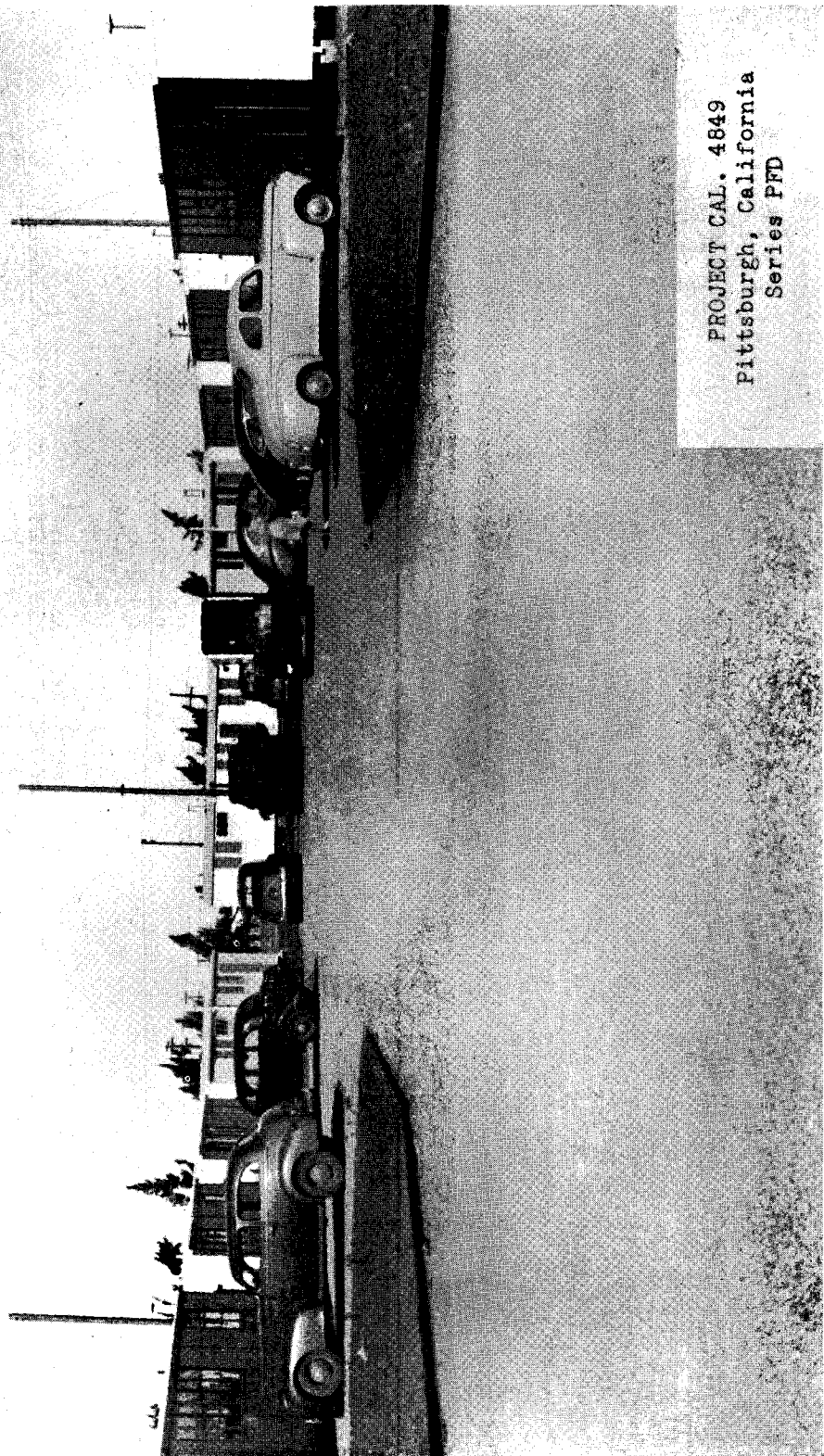
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TECH. INFO. NOTES
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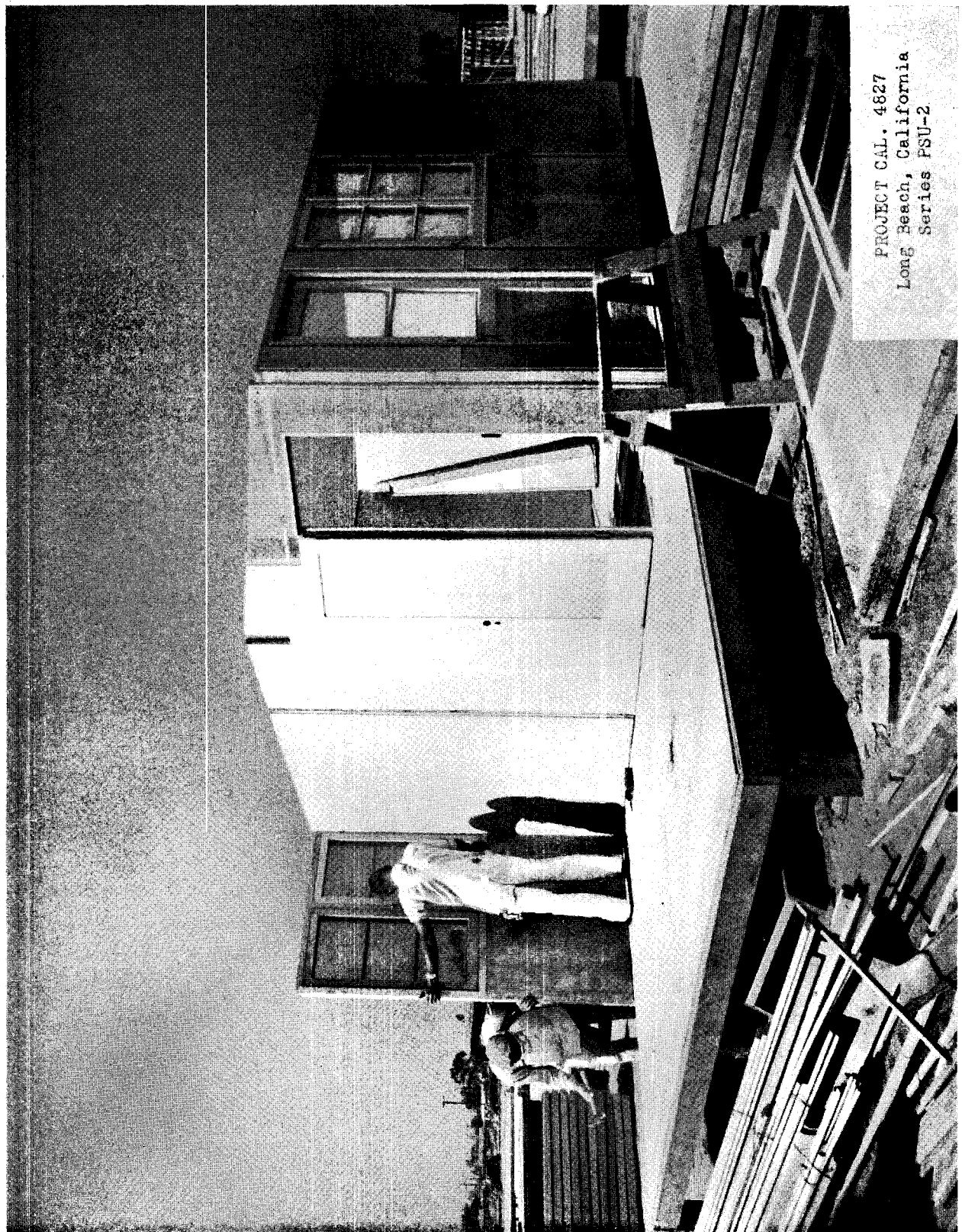
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Pittsburgh, California
Series PFD

NHA
FPHA
1-10-45

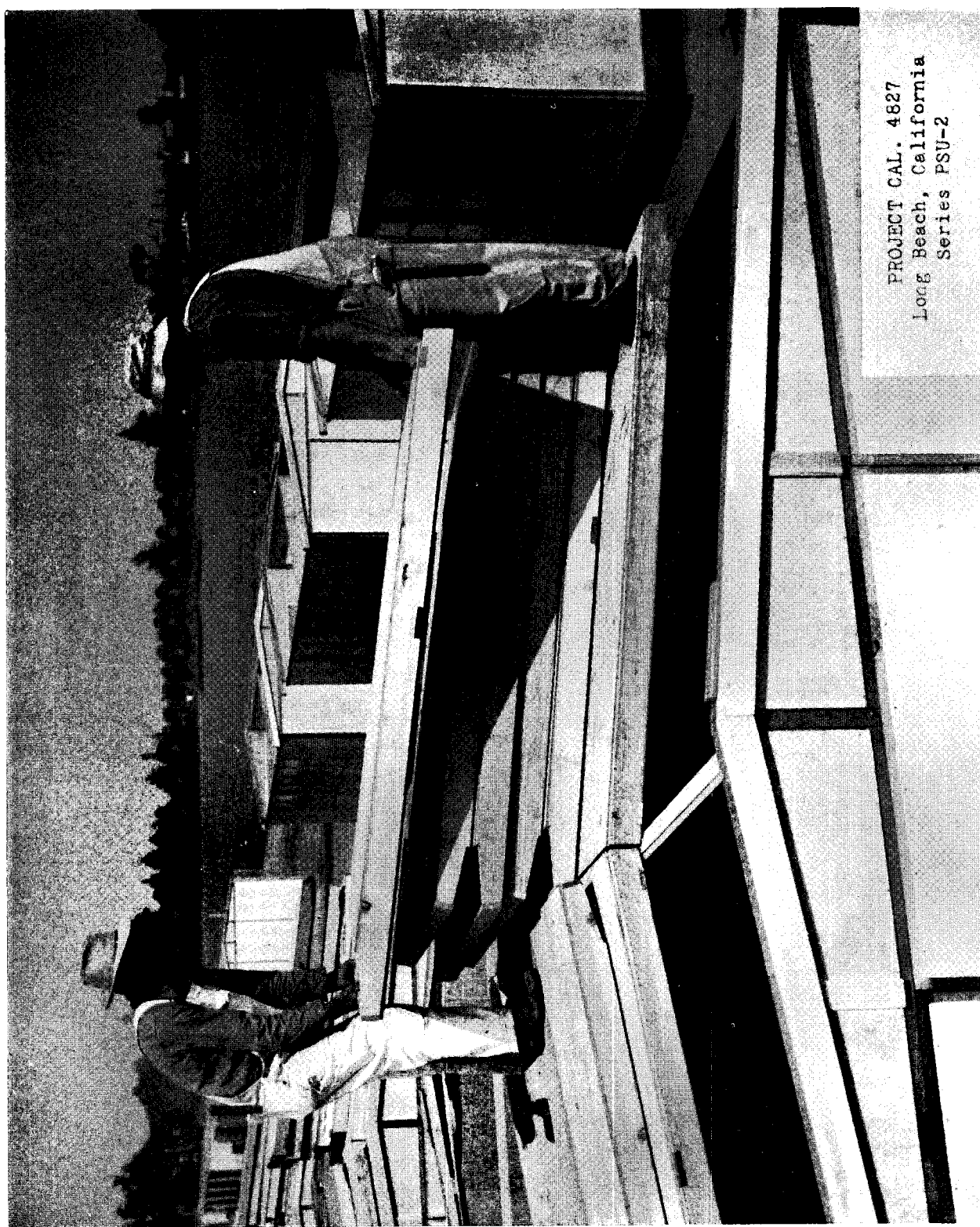
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No. 40 ATTACHMENT 11



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Series PFD



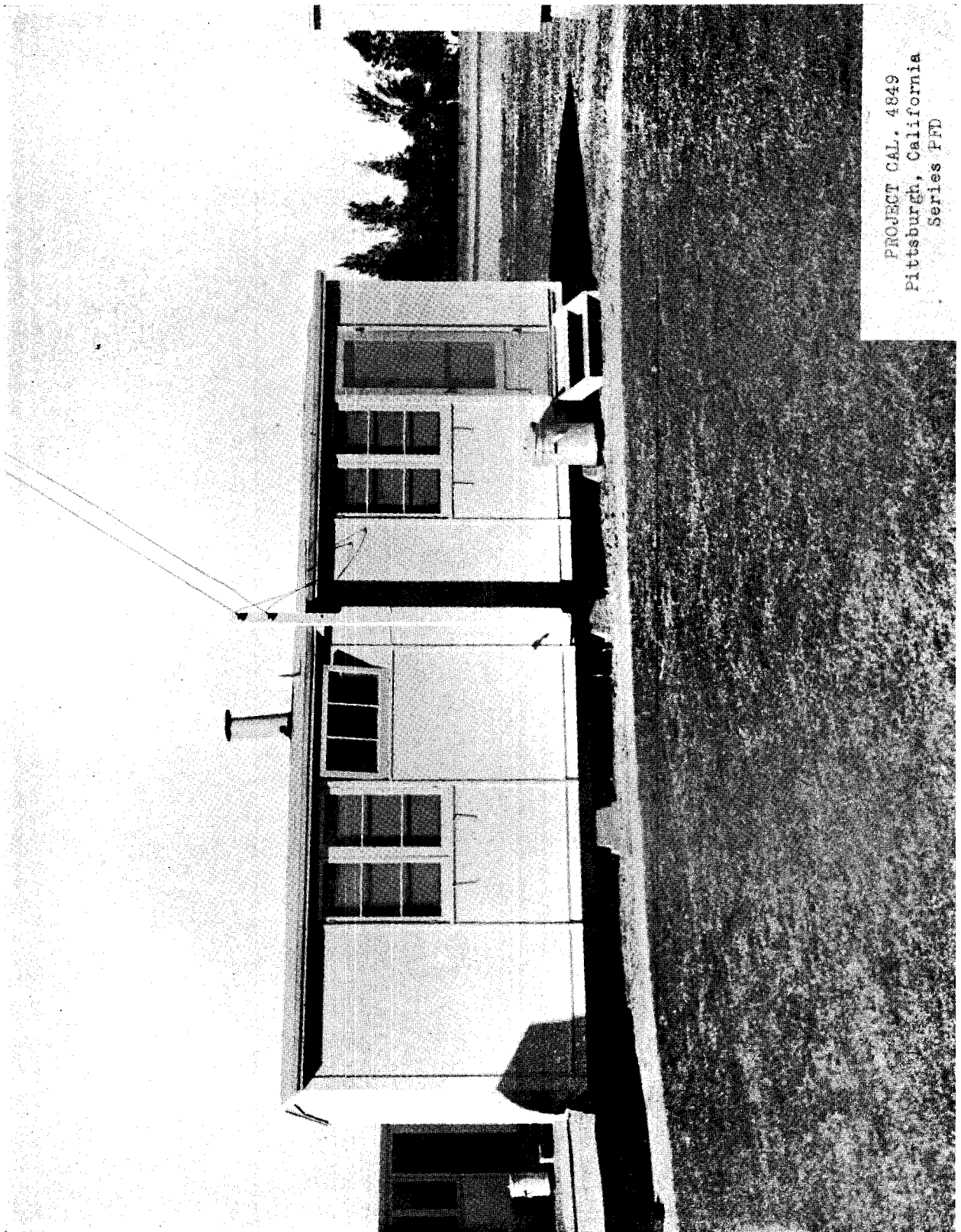
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Long Beach, California
Series PSU-2



PROJECT CAL. 4827
Logg Beach, California
Series PSU-2

NHA
FPHA
1-10-45

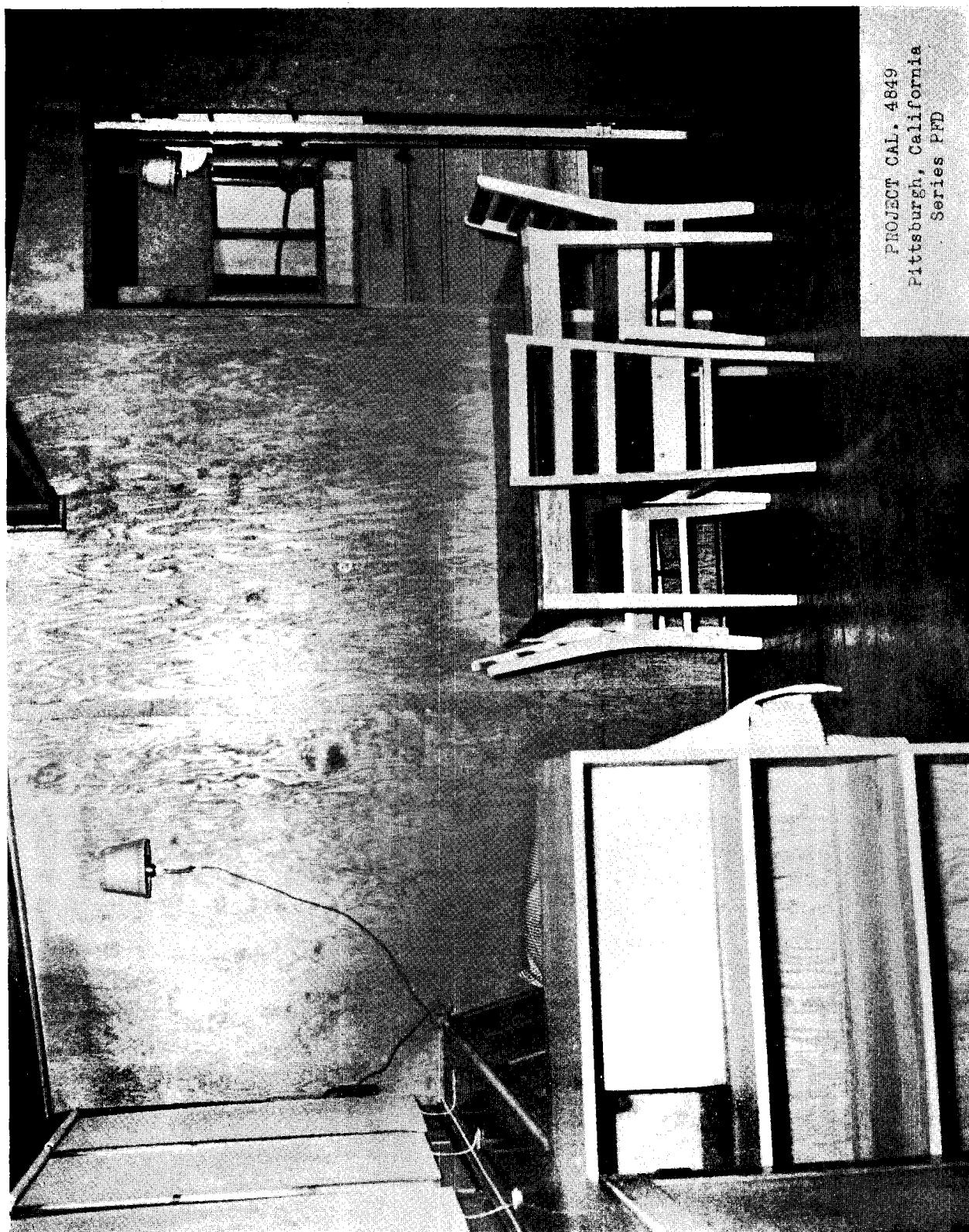
BULLETIN No. 19
TECH. INFO. NOTES
No. 40 ATTACHMENT 14



PROJECT CAL. 4849
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Series PFD

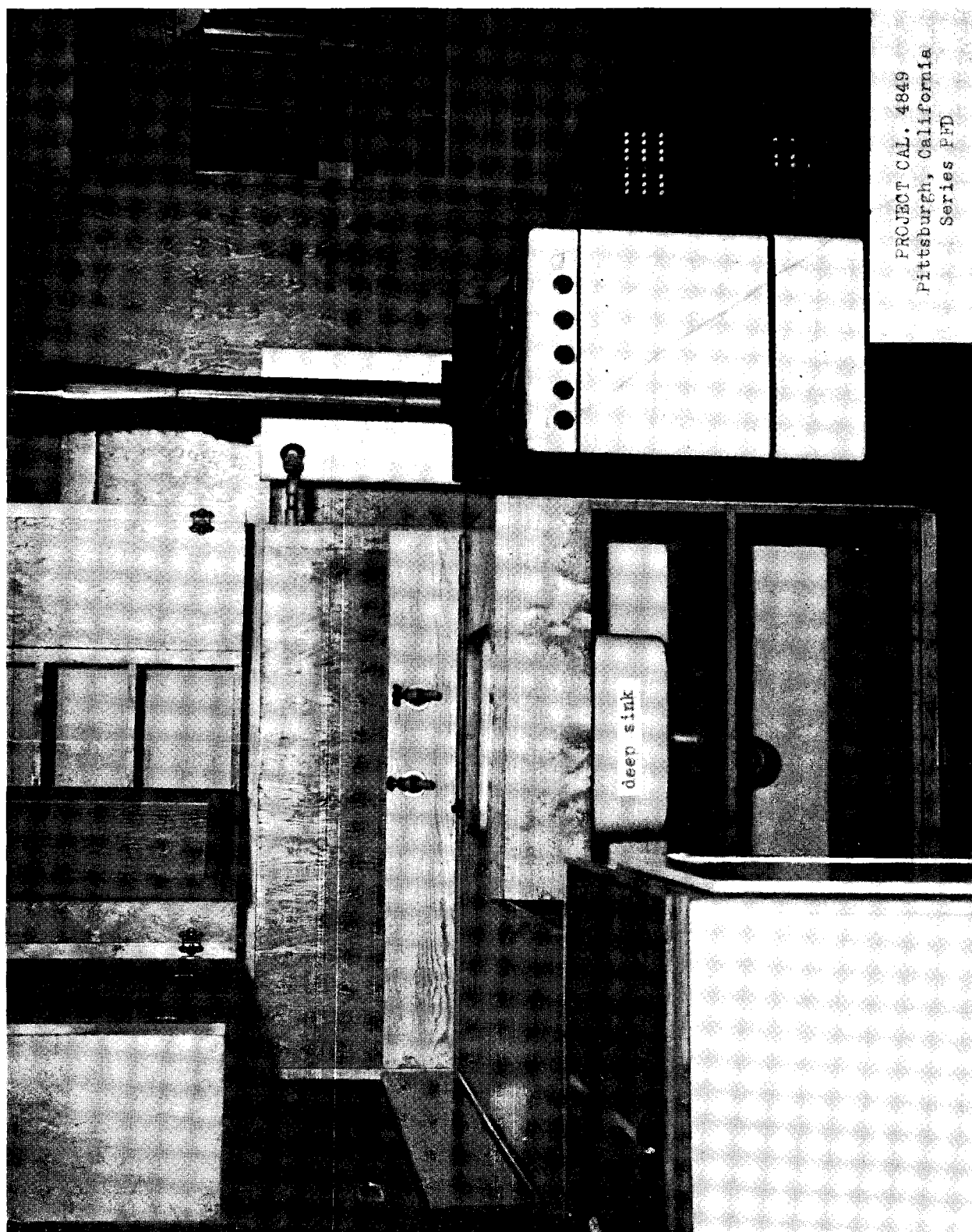
NHA
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BULLETIN No. 19
TECH. INFO. NOTES
No. 40 ATTACHMENT 15



NHA
FPHA
1-10-45

BULLETIN No. 19
TECH. INFO. NOTES
No. 40 ATTACHMENT 16



TESTS ON STANDARD FPHA ROOF TRUSSES

In an effort to save lumber in our temporary war-housing program, special standard roof trusses were designed. Because questions bearing on the stability of these trusses have arisen from time to time, the following information is presented.

Three trusses of 20'-0", and three of 24'-0" spans, were tested at the National Bureau of Standards to obtain factual data on their performance as used for our TDU-1, TDU-2 and TDU-3 units, and also to determine their safety factors. The actual spans used were 20'- $\frac{11}{2}$ " for "A" trusses and 24'- $\frac{11}{2}$ " for "B" trusses, corresponding to the maximum clear spans for buildings using 8" masonry bearing walls. (See appended detail.)

Materials and Fabrication.

The trusses were built at the Eisinger Mill and Lumber Company Plant, Bethesda, Maryland, by their carpenters; but no mill machinery was used for cutting bevels, etc., and no jig was used in their assembly. The lumber was stock #2 common yellow pine with average defects, such as knots and checks, also considerable moisture content. Between the time they were made (September 1943) and tested (July 1944), considerable warping of the members was noted. They were purposely made to be no better in workmanship and materials than the poorer trusses built by contractors on our projects.

Design.

The trusses were designed to carry 20 pounds per square foot live load (horizontal projection) on the top chord and a nominal dry ceiling finish loading on the lower chord of 2-1/2 pounds per square foot. For test purposes, however, this ceiling load was increased to 7 pounds per square foot, comparable to a plastered ceiling. The trusses were spaced 24" o.c., as used on our buildings. The average weight of the 20'-0" trusses was 68 pounds, and 92 pounds for the 24'-0" trusses.

Test Loading.

The lower chord was first loaded to 14 pounds per linear foot (7 pounds x 2' spacing of trusses), weights being hung by ropes spaced 12" apart. Then the top chord was loaded in increments approximately equivalent to 10 pounds per square foot of roof load, by attaching weights to other ropes spaced 13" apart. Three trusses were set up 24" on centers, the middle truss being the one under test. The other two guide trusses were supported laterally by the screws of the testing machine and by wood 1" x 4" boards nailed to their top chords. To each of these 1" x 4" boards were nailed two wood blocks which acted as a lateral support for the top chord of the truss under test. This was done to prevent the test load from being transmitted to the adjacent guide trusses. The lower chords were braced laterally by continuous 1" x 4" wood strips located at the two panel points.

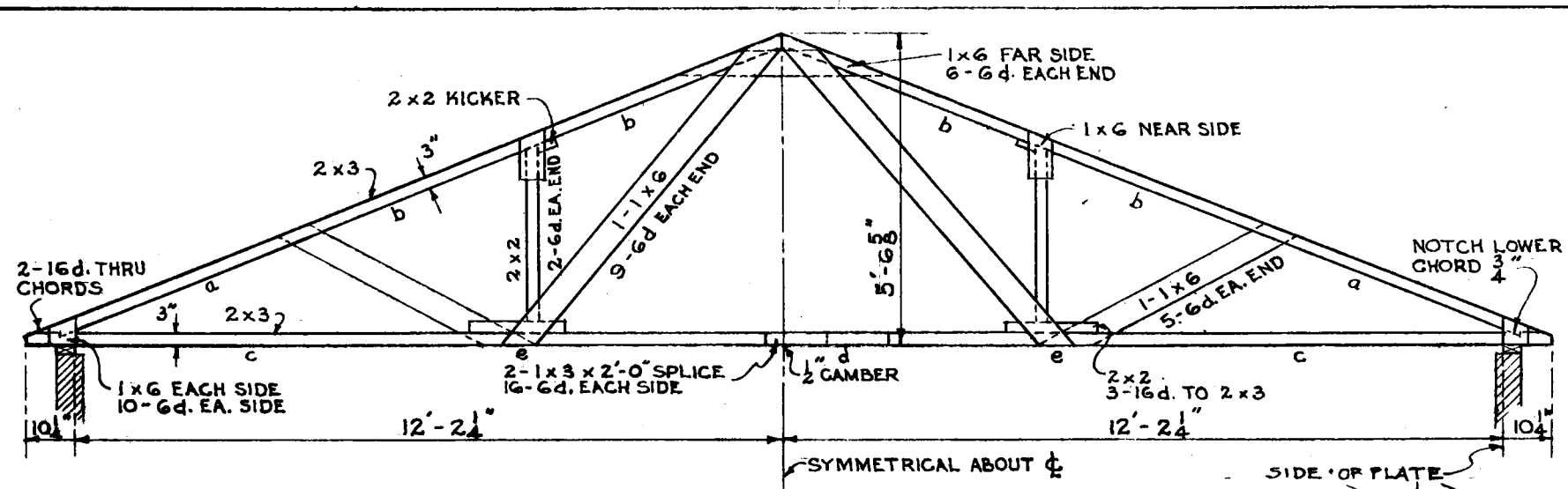
Test Results.

The average ultimate load carried on the top chords of the "A" trusses was 3115 pounds and 4252 pounds on the "B" trusses. The loading of the bottom chord was considered to be a fixed ceiling load. Deducting the weight of a roof deck from the above ultimate top chord test loadings, gives an average safety factor of 3.57 on the "A" trusses and 4.10 on the "B" trusses, based on a 20 pound design live load. The maximum ultimate load variation was 2% on the former and 13% on the latter. The 13% was largely due to an abrupt failure of one truss from large knots in both the top and bottom chords. If the above 4.10 factor of safety is reduced by 13% there still remains 3.57 as a minimum value for these trusses. The following deflections in inches were noted first at design loading then just before failure:

<u>"A" Truss</u>	<u>"B" Truss</u>
(a) .18 and .99	(a) .15 and .62
(b) .11 and .68	(b) .34 and 1.37
(c) .20 and .65	(c) .27 and .92
(d) .24 and 1.21	(d) .54 and 1.89
(e) .21 and 1.03	(e) .34 and 1.14

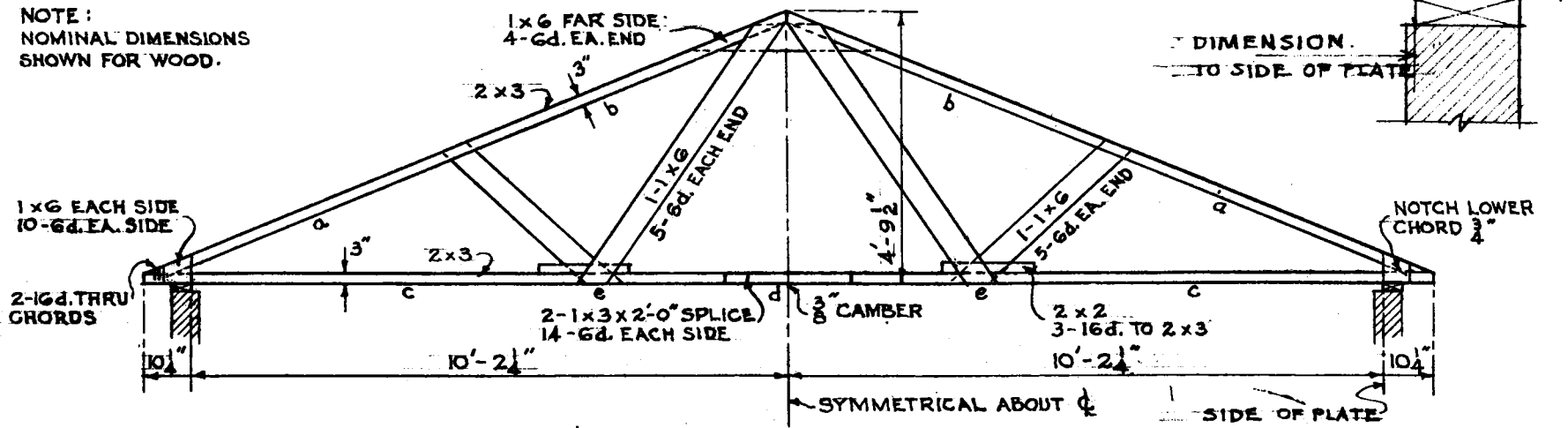
Remarks.

The most common failure came from knots in the 2" x 3" chord members. There was no prevailing type of failure. One 1" x 6" web member also split badly and in two cases the end nailings of the web members meeting at the top of the truss came loose. No defects occurred at the heels of the trusses where the shearing stresses are highest. Considering the quality of the lumber used, its moisture content, and the average workmanship employed, the performance of these trusses under load was generally consistent and justified their design.

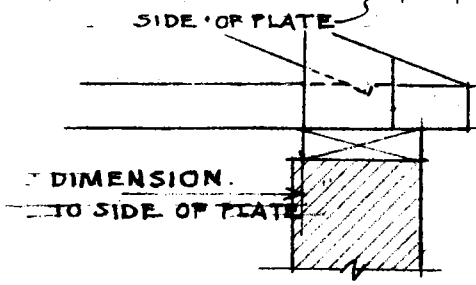


TDU-3 CLEAR SPAN TRUSS 'B'

NOTE:
NOMINAL DIMENSIONS
SHOWN FOR WOOD.



TDU-1 & TDU-2 CLEAR SPAN TRUSS 'A'



LIGHT WOOD STUD WALL AND BEARING PARTITION

In a further effort to reduce the amount of lumber in frame construction, light wood wall and bearing partitions were designed for a recent FPHA assignment. To obtain data on the performance of such walls and partitions three panels were built at the Eisinger Mill and Lumber Co., Bethesda, Md., and tested at the Bureau of Standards. The design loading required was approximately 1250 pounds per 4'-0" panel width.

Materials and Framing.

The panels were 4'-0" wide and 7'-0" high. Four 1" x 3" (nominal) studs were spaced 16" on center. Top and bottom plates were 2" x 3" with two 8d nailing into the studs and 1" x 3" bridging at mid-height. The facing material on both sides was 1/2" fiberboard (celotex) nailed with 4d lath nails, 6" o.c. at all edges and 12" on the intermediate studs. Lumber was stock, southern pine of average #2 common grade. The moisture content was not determined, but it appeared to be higher than average for this grade of wood.

Test Method.

The panels were placed in a vertical position in a standard testing machine with a heavy steel beam transmitting the vertical loading uniformly along the top plate.

Test Results.

The following table gives the average lateral deflections for the various loadings:

Load Lb.	Panel-1	Panel-2	Panel-3
	Average Deflection		
	In.	In.	In.
1866	0.00	0.00	0.00
3366	.01 N*	.01 N	.02 S*
4866	.02 N	.01 N	.04 S
6366	.02 N	.02 N	.10 S
7366	.04 N	.02 N	.15 S
8866	.07 N	.01 N	.23 S
10366	.13 N	.03 N	.44 S
11866	.31 N	.26 N	-
12866	.54 N	-	-
Maximum load Lb.	13090	12090	11020

* N - indicates that the average deflection of the studs at mid-height was toward the North; S - toward the South.

Failure for each panel was due to the combined actions of crushing of the plates at the stud ends and of excessive bending at mid-height. A knot in an end stud of panel No. 3 localized the failure of that panel, resulting in a tensile failure at the knot. When the loading was released the partitions recovered about 50% of their deflections. Based on our design requirements the average factor of safety for these panels is 9.6.

REFLECTIVE INSULATION

The withdrawal of restrictions on the use of metal has resulted in the reappearance of reflective surfaces manufactured for use as thermal insulation. The expanded facilities for production of such reflective insulation will undoubtedly result in considerable sales pressure tending to increase the use of thermal insulation consisting of metallic foils or metallic coatings or reflective paints on metal or paper sheets.

Insulation of this character has had very little use in public housing and its use in any kind of building has not been extensive. The problems which may develop around these new materials have not yet been determined by use or by trial and error. This paper is meant to point out some of the problems which theoretical considerations indicate will arise in the use of reflective insulation, unless adequate care is taken in the design of the structures using such insulation.

Permanence. We have no long term records of the use of aluminum foil. Letter Circular LC-535, October 15, 1938, of the Bureau of Standards states:

"While there is limited information as to the permanence of the reflective surfaces of aluminum under various conditions of use, such information as is available indicates that under normal conditions the reflectivity is likely to be reasonably permanent. Installations are reported where no appreciable deterioration of the aluminum has occurred over a considerable period of years. Thin layers of dust readily visible to the eye do not cause any very serious lowering in the reflecting power. If aluminum is wetted over considerable periods of time, there is possibility of corrosion, particularly if the water is alkaline. The appearance of the surface is not a reliable guide as to its reflectivity for radiant heat, and foil which appears dark or discolored may have lost little in insulating value if the surface film is thin."

Professor Gordon B. Wilkes of M.I.T. stated in an article in Industrial and Engineering Chemistry of July, 1939, that foil under dry conditions showed little change after ten years, but that salt and alkalies will attack aluminum foil.

Conductance. Empirical information concerning the conductances of double or triple air spaces faced with one reflective surface is given in the 1945 edition of the guide published by the American Society of Heating and Ventilating Engineers, but the information contained in the Guide for single air spaces faced with reflective insulation is not so complete, particularly as to heat flow upward and downward. To supply this deficiency and to furnish information for varying temperature differences across the air spaces, the conductance values for single air spaces faced with reflective insulation shown on Chart A attached were computed at the Bureau of Standards.

Conductance values obtained by calculation instead of observation were chosen because they fell intermediately among various experimental results indicating reasonable agreement with such experimental results. The use of a formula permits the construction of a table giving consecutive values better than scattered experiments by various investigators who may have used varying materials.

The values shown on the attached Chart A are for a mean temperature of 40°F. The variation in conductance value for mean temperatures of from 10°F to 80°F (not shown on the chart) are within 4% of the values for 40°F mean temperature. Consequently the values shown on the chart are considered accurate enough for temperatures encountered in buildings. These values have been compared by the Bureau of Standards with values quoted by the Guide and other authorities, and in cases where comparisons seemed legitimate, agreement within 10% was obtained. The data in the tables and shown by the graphs on Chart A is believed to represent the best estimate of conductance values for single air spaces, 3/4" thick to 3-5/8" thick, faced with one reflective surface, that can be made with existing information. The values can be used for multiple air spaces by multiplying the resistances by the number of air spaces.

When any air space is faced with two reflective surfaces the resistance will be equal to those shown for one reflective surface plus 5%.

Design. When reflective materials are used as insulation, consideration must be given in the design to the temperatures and possible vapor concentrations within the construction, as well as to the thermal resistance. A failure to keep temperature and vapor concentration within safe limits will result in destructive condensation just as has sometimes occurred in structures insulated with other insulating materials.

Reflective insulation, when used in the form of large sheets, is of itself an efficient vapor barrier. Vapor pressures on the warm side of the insulation will therefore tend to equal the vapor pressure in the house. Condensation will occur on the foil when the temperature at the foil is below the dew point for the humidity existing in the house. The problem is to provide enough insulation on the cold side of the vapor barrier to keep the vapor barrier warmed above the dew point for the air in the dwelling. Condensation on the foil may result in loss of reflectivity, and continued condensation will result in dampness and rotting of the wood structure. The effect of continued condensation on the durability of reflective surfaces is not known for all materials but can be serious for some reflective surfaces.

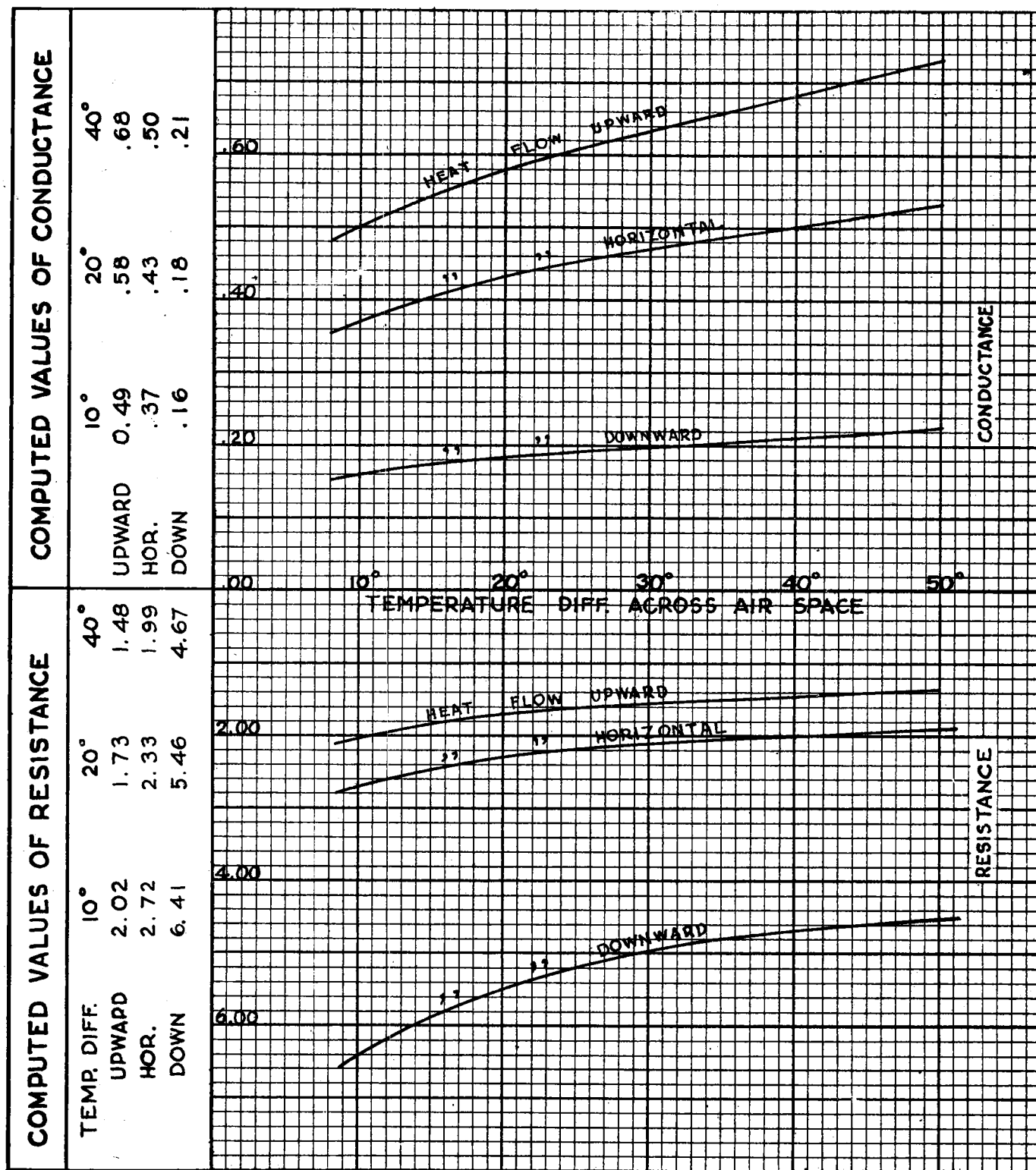
Chart B, attached illustrates six frame walls with reflective insulation built in. A method of computing the temperatures at the foil is shown. Expected temperatures at the foil and at the surface of single windows and windows with storm sash are computed for the exterior temperatures stated. The wall sections on Chart B show locations at which reflective insulation may be located but does not attempt to show methods of maintaining the insulation in place or of maintaining the width of air spaces.

The temperature difference across an air space should be roughly approximated and the resistance read from the curves on Chart A. After determining total resistance R for the wall the temperature difference across a space can be quite accurately estimated as the temperature drops through various elements of the wall are proportional to the corresponding thermal resistance of the elements.

The following paragraphs illustrate some of the problems which will be encountered in using reflective insulation:

- (a) Reflective sheets should be securely stapled to the building frame tight enough to maintain their position.
- (b) Reflective sheets consisting of metal foil cemented to lath or wallboard would fill the requirements indicated for walls 1 and 4. Special consideration must be given to any joints in vapor barriers.
- (c) Evaluation of the expected temperatures at the vapor barrier and at the inner surface of the window glass indicates that for walls 2, 3 and 6 the temperature at the vapor barrier may be about as cold or colder than on the inner glass in double windows. These three designs should, therefore, never be used with storm windows. Walls should be designed so that the vapor barrier will, under winter conditions, always be warmer than the inner surface of the window glass. Any condensation will then occur on the window glass.
- (d) Whether one or more reflective surfaces are used the one on the warm side must act as the vapor barrier, and the construction on the cold side of the vapor barrier, including any reflective surfaces, should be five times as permeable to water vapor as the vapor barrier. If necessary to that end any secondary reflective surfaces should be perforated. Such incidental perforations will not seriously reduce the insulation values.
- (e) When walls 1 or 4 can be constructed with continuous reflective surfaces as vapor barriers they are more safe against condensation than any other type illustrated in Chart B.
- (f) The temperature drop from interior to exterior, indicated on Chart B as 80°, is excessive for some localities but the relative values will not change for other temperature ranges.
- (g) There are two other points concerning the use of practically impervious vapor barriers and metallic foils which should be emphasized. First, plaster backed up by impervious vapor barriers should not be painted with glossy oil paints until the plaster is thoroughly dry because blistering will result if moisture is sealed between two nearly impervious films. Second, metal foil enclosing a house should be grounded to prevent radio static.

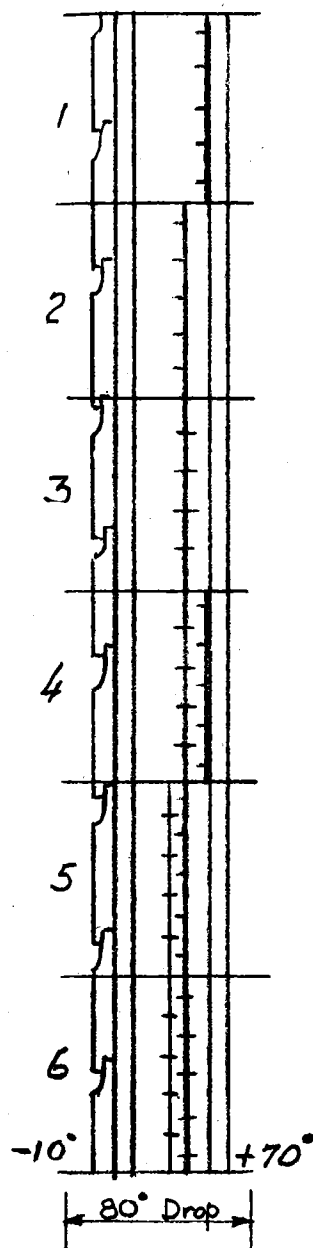
CHART A



CONDUCTANCE AND RESISTANCE VALUES FOR SINGLE
AIRSPACES FACED WITH ONE REFLECTIVE SURFACE $E=0.05$
MEAN TEMPERATURE $=40^{\circ}$

CHART B

Thermal Characteristics Of Six Frame Walls And Two Types Of Windows



Wall No.	1	2	3	4	5	6
$1/f_1$	.61	.61	.61	.61	.61	.61
Lath and Plaster	.42	.42	.42	.42	.42	.42
Air Sp. No. Foil	-	1.00	-	-	1.00	-
Air Sp. with Foil	2.10	2.15	4.50	4.62	4.72	7.02
Sheathing	.98	.98	.98	.98	.98	.98
Siding	.87	.87	.87	.87	.87	.87
$1/f_o$	.17	.17	.17	.17	.17	.17
R	5.15	6.20	7.55	7.67	8.77	10.07
U	.19	.16	.13	.13	.11	.10

Temp. Fraction	1.03/5.15	2.03/6.20	3.28/7.55	1.03/7.67	2.03/8.77	3.33/10.07
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Temp. Drop to Foil	16°	26°	35°	11°	19°	26°
Temp. at Foil	54°	44°	35°	59°	51°	44°

Single Glazed Window
Window with Storm Sash

$1/f_1$	.61	.61
Glass	.10	.10
Air Space	-	.85
Glass	-	.10
$1/f_o$	.17	.17
R	.88	1.83
U	1.14	.55

Temp. Fraction to Glass	.61/1.14	.61/1.83
Temp. Drop to Glass	43°	27°
Temp. of Glass	27°	43°

One Reflective Surface
Two Reflective Surfaces
 $1/f_1$ Inside Surface Resistance
 $1/f_o$ Outside Surface Resistance











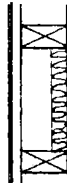
R Total Resistance Air to Air
U Total Conductance Air to Air




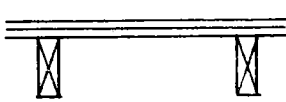

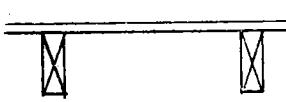
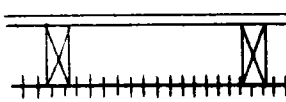


U values used to determine overall heat losses will not agree exactly with the values shown because they should allow for studs, framing and for stiles and rails of wood sash and storm sash.

(CHART B)

VETERANS' TEMPORARY HOUSING
INSULATION FOR FLOOR, WALL & CEILING
BARRACKS, FSA DORMITORIES & QUONSET HUTS

Since Standards for Title V Temporary Housing Program state that construction will be such that heat loss will not exceed approximately 55 BTU per square foot per hour, it may be necessary in some cases to modify the present construction. Construction frequently found in barracks, FSA dormitories and quonset huts is shown in the left hand column below, together with the "U" factor resulting from such construction. The right hand column indicates the decrease in "U" factor resulting from various types of insulating materials. This information is given as a quick guide in determining the best and least expensive means for meeting the requirements as to heat loss established by the Standards.

$\frac{3}{8}$ " GYPSUM CEILING	U FACTOR	$\frac{3}{8}$ " GYPSUM + 2" BLANKET	U FACTOR
	.77		.12
$\frac{1}{2}$ " INSULATION BOARD CEILING		$\frac{1}{2}$ " INSULATION BOARD + 2" BLANKET	
	.40		.10
1" INSULATION BOARD		1" INSULATION BOARD + 1" BLANKET	
	.25		.13
1" INSULATION BOARD		1" INSULATION BOARD + 2" BLANKET	
	.25		.10
TAR PAPER SHEATHING STUD		TAR PAPER SHEATHING STUD + $\frac{3}{8}$ " GYPSUM BOARD	
	.53		.33
		TAR PAPER SHEATHING STUD + 1" BLANKET + $\frac{3}{8}$ " GYPSUM BOARD	
			.15

	SIDING SHEATHING STUD	U FACTOR		SIDING SHEATHING STUD + 3/8" GYPSUM BOARD	U FACTOR
		.36			.25
				SIDING SHEATHING STUD + 1" BLANKET + 3/8" GYPSUM BOARD	.13
	SINGLE GLASS DOOR OR WINDOW	.13		SINGLE GLASS DOOR OR WINDOW + STORM DOOR OR STORM SASH	.45
	DOUBLE WOOD FLOOR			* DOUBLE WOOD FLOOR + DOUBLE FACED REFLECTIVE INSULATION	
		.32			.105
	SINGLE WOOD FLOOR			* SINGLE WOOD FLOOR + DOUBLE FACED REFLECTIVE INSULATION	
		.42			.11
	1/2" PLYWOOD FLOOR			* 1/2" PLYWOOD FLOOR + DOUBLE FACED REFLECTIVE INSULATION	
		.45		6" CONT. STRIP ROOFING FELT	.12

For effective reduction in heat losses through the floor and for reasons of comfort, crawl spaces should be enclosed.

* Foil should be punctured with nail holes approximately 1 foot apart centered between joists.