Bulletin No. 63 December 30, 1943

Operation and Maintenance Handbook

U.S.
Federal Public Housing Authority - National Housing Agency

FPHA-1749 1-7-47 MANUAL AND HANDBOOK TRANSMITTAL	BULLETIN 63	Transmittal NO. 1 V 1-15-47

REMOVE: Exhibit 1 of Section 1.41, dated 1-15-45.

INSERT: Exhibit 1 of Section 1.41, dated 1-15-47.

EXPLANATION: Form FPHA-837 has been revised. The revisions, which are minor, occur in Sections I and VII of the form.

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BULLETIN NO. 63 ..... NO. 2

3-18-47

1. REMOVE: Section 1.11, Standards of Maintenance of Temporary War Housing, pages 3 and 4, dated 1-20-45.

INSERT: Section 1.11, pages 3 and 4, dated 3-17-47.

EXPLANATION: Page 3 has been revised to change the criteria for need of painting on temporary war housing projects, to conform to the continued occupancy of these projects.

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BULLETIN NO. 63 ..... Transmittal NO. 3

3-27-47

1. REMOVE:

2. INSERT: Section 10.93 of Bulletin #63, "Training-Installation of Fuses," dated 4-7-47.

3. EXPLANATION: This release has been made necessary by the number of fires which it is believed have resulted from tenants' tampering with fuse boxes. It is important that the program outlined in this Section be initiated at once. Copies of this section shall be distributed to the regional utilities adviser in addition to personnel already scheduled to receive it.

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BULLETIN NO. 63 ..... NO. 4

5-15-47

REMOVE: Section 2.49, dated 12-30-43, "Suggested Substitutes for Pyrethrum in Household Pest Control."

INSERT: Section 2.41, Vermin Control - General; Section 2.42, Vermin Control - Programming; Section 2.43, Vermin Control - Insects: dated 5-15-47.

EXPLANATION: These sections supply information on the several types of household insect pests, means of identification, life habits, and methods, materials and equipment for use in their control. They also include methods and procedures for establishing control programs at pr jects.

Simultaneously with the issuance of this material circulars dated 5-15-47 are being issued to regional officials and local management which contain instructions for intensified action during the next six months on all projects in order to determine the amount of infestations. Regional officials to whom the circulars are addressed shall assume responsibility for following through to assure the success of this program.

Section 2.49 is no longer applicable.

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BULLETIN # 63 ..... NO. 5

6-15-47

1. REMOVE:

INSERT: Part 4, Section 4.12, "Repainting of Frame Structures in Fungus or Mildew Susceptible Areas", dated 6-15-47.

EXPLANATION: This section contains instructions for repainting outside frame structures in fungus or mildew susceptible areas.

The procedure given in this section shows the most promise at this time. However, studies are being continued and the results will be covered in subsequent releases. Should any housing manager or local authority have had experience with the prevention of fungus using the treatment outlined in this release or a similar treatment it is requested that detailed information be submitted to the Central Office of FPHA through the regional maintenance engineer.

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BULLETIN 63 ..... NO. 6

7-9-47

1. REMOVE:

INSERT: Section 1.61, Bulletin #63, "Costs-Operating Services and RM&R" dated 7-10-47.

EXPLANATION: The PUM costs for Operating Service and RM&R accounts given in the attached release have been developed from a study of the operating costs of 253 aided and FHA developments, from end of initial operating period (EIOP) to date.

The information on average experience is given as a guide only and not as criteria of desirable operating costs for specific developments.

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BULLETIN NO. 63..... NO. 7

7-15-47

1. REMOVE:

INSERT: Section 4.11, Part 4 of Bulletin #63, "Exterior Painting - Effect of Interior Condensation", dated 7-7-47.

EXPLANATION: This release describes the effect of condensation in frame structures on the exterior paint. Several means of correction are given together with a caution concerning exterior painting under the above conditions.

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2. REMOVE:

INSERT: Section 3.31 of Bulletin No. 63, "Condensation in Dwellings - General", dated 7-7-47.

EXPLANATION: This is a general statement of the causes of condensation and is issued as a preliminary statement of the problem, to be followed from time to time by more detailed information and instructions.

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BULLETIN NO. 63 ..... NO. 8

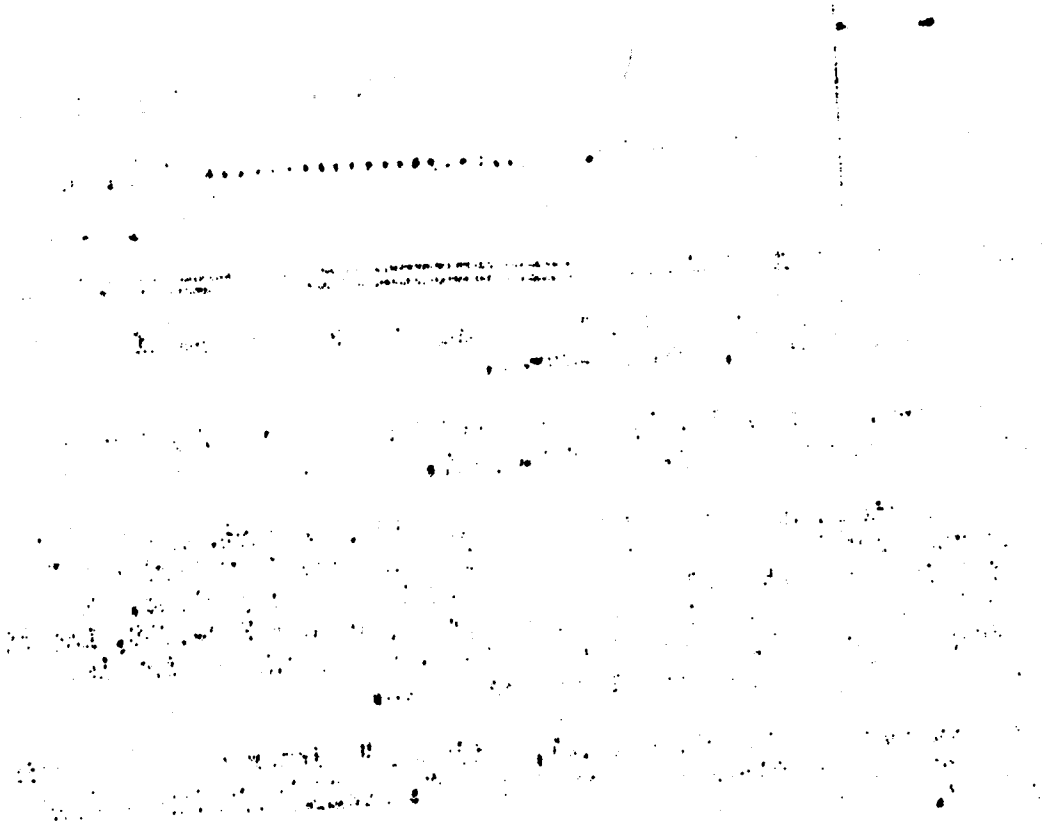
8-15-47

REMOVE: Pages 1 and 2, Section 10.21, Testing and Maintenance of Building Fire Alarm Systems, dated 7-25-45.

INSERT: Pages 1-6, Section 10.21, Testing and Maintenance of Interior Fire Detecting Systems, dated 7-31-47.

EXPLANATION: This section has been revised and expanded. A portion of the new material has been taken from a Supplement issued by Region VII which it was felt would be of value to the other regions. The section now includes instructions for using Form PHA-1788, Log of Weekly Tests of Fire Detecting Systems, which will be furnished all directly operated and leased projects.

Present page 3 of Section 10.21, entitled "Maintenance and Testing of Type I Automatic Fire Alarm Systems", shall be renumbered as Page 7.



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BULLETIN NO. 63..... NO. 9

9-24-47

1. **REMOVE:** Section 4.12, "Exterior Painting - Repainting to Prevent Fungus Growth." Date 6-15-47.

INSERT: Above Section revised and dated 9-24-47.

EXPLANATION: This section has been revised to conform to Federal requirements regarding purchasing. Technical names have been used in the description of materials, with trade names used in a secondary manner and emphasizing the phrase "or equal." Applicable Federal Specifications have been referred to by number, and when they have not been available and circumstances require, a specification has been supplied.

This method of describing materials is a departure from previous practice, which has been to indicate materials and equipment as simply as possible, by trade name where available, so that they may be readily recognized and identified by project personnel.

It has been suggested that a release of this kind be divided into two parts. One would contain instructions stated simply and briefly. The other part would be an appendix containing specification numbers and/or technical descriptions of materials, equipment, etc.

Comments on the above suggestion by users of Bulletin 63 are requested, bearing in mind that Bulletin 63 is written primarily for the Maintenance Superintendent of a housing development and should also be understandable to the mechanic.

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BULLETIN NO. 63.....NO.10

9-24-47

1. REMOVE:

INSERT: Bulletin No. 63, Part 4, Section 4.32, Paint Brushes - Care, dated 9-24-47.

EXPLANATION: This release gives for project employees simple instructions on methods of maintaining paint brushes.

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BULLETIN NO. 63 .....

Transmittal
NO. 12
10-24-47

REMOVE:

INSERT: Bulletin No. 63, Part 5, Section 5.12 - Water Systems - Corrosion Control - Pages 14 to 16, Dated: 10-24-47.

EXPLANATION: This Bulletin is being distributed to furnish operating personnel at Regional Offices, Local Housing Authorities and at projects the latest current information on Corrosion Control. Informational Bulletins, such as these, will be transmitted from time to time.

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BULLETIN 63.....NO. 13

1-7-48

Correction: The check list dated 6-21-45 gave instructions to recode Section 3.51 Structural Timber-Framing dated 9-25-44, to 3.31. This was in error. This section should remain 3.51.

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BULLETIN NO. 63.....NO. 13

3-14-49

REMOVE: Section 12.42, Automotive Operation and Care, dated 5-30-44.

INSERT: Section 12.42, Automotive Operation and Care, dated 3-14-49.

EXPLANATION: The Bureau of Federal Supply has requested all government agencies to conform to the practices recommended by the Technical Committee for Lubricants and Liquid Fuels, Federal Specifications Board, for the conservation of automotive engine oils. This release has been revised to include a recent information bulletin on the subject issued by the Committee.

PUBLIC HOUSING ADMINISTRATION
HOUSING AND HOME FINANCE AGENCY WASHINGTON 25, D. C.

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11-14-50 Bulletin 63 Transmittal No. 23

INSERT: Section 5.31, Part 5, Ball Cock Repairs, dated 11-7-50.

NHFA
FHA

CIRCULAR
6-3-49

TO: Central Office and Field Office Holders of Bulletin No. 63
Housing Managers of Directly Operated Low-Rent Projects

SUBJECT: Bulletin No. 63, Part 00, Section 00.12

The attached section sets forth instructions, suggested procedure, inspection forms and supporting check lists for use by local authorities and housing managers of directly operated projects in making inspections of the physical plant in the Aided Program.

The information is presented in this form following requests for such information by both local authority and PHA personnel. The procedure suggested may be used as presented or as a guide to local authorities in developing their own procedure.

Marshall W. Annis
Acting Commissioner

PHA-1749
8-1-47

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BULLETIN NO. 63.....NO. 14

3-31-49

REVISION NOTICE:

Bulletin 63, Section 00.11, paragraph III-e, "The development as a whole" should be deleted.

EXPLANATION: The Requirement for an over-all project rating has been omitted from the procedure on the inspection of physical plants of projects by field office engineers.

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8-1-47

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Transmittal

BULLETIN 63
OPERATIONS & MAINTENANCE HANDBOOK . . . . NO. 15

6-10-49

1. REMOVE:

INSERT: Chapter 13.41, Page 1, Exterior Television Antennas, dated 6-10-49.

EXPLANATION: (1) This transmittal establishes a new Chapter 13.41, Tenant Alterations and Appurtenances, in Part 13, Tenant Maintenance, of Bulletin 63, Operations and Maintenance Handbook. This new chapter number and title should be entered in the index to the handbook under Part 13, Tenant Maintenance.

(2) The attached release sets forth PHA policy governing installation of exterior television antennas on dwelling units in locally and Federally owned housing projects.

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BULLETIN 63

OPERATIONS AND MAINTENANCE HANDBOOK.....NO. 16 ~~15~~

12-1-49

1. REMOVE: Page 5 of Part 10, Section 10.21 of Bulletin 63, dated 8-15-47.

EXPLANATION: The information with respect to the regional fire and safety engineer's assistance to local management is now inaccurate. Information on this subject will be incorporated in the appropriate manual section.

2. CORRECTION NOTICE: Part 00, Section 00.12, "Inspection of Physical Plant of PL 412, 671 and PWA Projects by Project Personnel".

The numbering of this section should read Part I, Section 1.21 "00.12" was a typographical error.

Holders of Bulletin 63 are requested to make the above correction on their copies.

HOUSING AND HOME FINANCE AGENCY
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2-15-50 BULLETIN 63 Transmittal No. 17 ~~16~~

1. REMOVE: Section 4.12, Sheets 1, 2, 3 and 4 - Exterior Painting-Repainting to Prevent Fungus Growth - Dated 9-24-47.

INSERT: Section 4.12, Sheets 1, 2, 3 and 4 - Exterior Painting-Repainting to Prevent Fungus Growth - Dated 2-15-50.

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3-8-50 Bulletin 63 Transmittal No. 18

1. REMOVE: Section 4.32 - Paint Brushes and Their Care - Dated 9-24-47.

INSERT: Section 4.32 - Paint Brushes and Their Care - Dated 2-20-50.

2. CORRECTION NOTICE:

Transmittal No. 15, dated 12-1-49 should be renumbered No. 16.
Transmittal No. 16, dated 2-15-50 should be renumbered No. 17.

[illegible]

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6-15-50 Bulletin 63 Transmittal No. 19

1. INSERT: Section 4.21, Part 4, Preparation of Interior Surfaces for Repainting, dated 6-15-50.

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7-14-50 Bulletin 63 Transmittal No. 20

1. INSERT: Section 4.18, Part 4, Exterior Painting - Glazing, dated 7-14-50.

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10-26-50 Bulletin 63 Transmittal No. 22

1. INSERT: Part 3, Section 3.12, Structures - Concrete Coal Box, dated 10-25-50.

2. INSERT: Part 3, Section 3.13, Precast Concrete Stoop, dated 10-25-50.

NOTE: Transmittal No. 21 was distributed to Local Authorities only. Other holders of this Bulletin will not receive a Transmittal No. 21.

FOREWORD

All standards, methods and techniques concerning the physical operation and maintenance of projects will be issued in this bulletin, with the exception of material concerning trailer maintenance which is contained in Bulletin No. 58. The different aspects of maintenance have been divided into chapters and sections as shown in the Table of Contents. All material issued will be numbered in accordance with this breakdown.

This handbook is intended to be a practical and useful aid to those concerned with project operation and maintenance so that they may do a more effective job under present difficult conditions. This can be accomplished only by making use of actual operating experience. Therefore, although the Central Office will issue much of the material, this handbook will also serve as a medium of exchange of operating experience gained in the field. Regional, local authority and project personnel are urged to contribute articles concerning methods, techniques and equipment devised, substitute materials used, and any other ideas which would be of value or of use to others.

Material should be sent through the regional office to the Management Review Division, attention "Maintenance Handbook". No particular form is required but the subject should be carefully described and supplemented by sketches or diagrams if needed to give full explanation. The material will be edited and recast by the Central Office for presentation in this bulletin. Credit will be given to those submitting the material.

OPERATION AND MAINTENANCE HANDBOOK

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1/ This page supersedes page iv of Bulletin No. 63, dated 12-30-43. Chapter 14.00 has been added to the Table of Contents.

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PART 2-Operating Services	
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PART 4-Painting & Decorating	
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PART 5-Plumbing	
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Section 7.42 Hot Water Heating Systems-Hazards and Safeguards Page 1-2 6-20-45	No Change
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Section 7.91 Equipment-Vacuum Cleaners Page 1 10-28-44	No Change
	PART 10-Fire & Safety
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Section 10.11 Fire Fighting-Fire Extinguishers Page 1-6 12-15-44	No Change
Section 10.12 Fire Fighting-Water Supply and Hydrants Page 1-5 12-1-44	No Change

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Section 10.91 Training-Project Fire Fighting Organizations Page 1-3 1-25-45	No Change
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Part 11-Interior Furnishings & Equipment

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INSPECTIONS OF THE PHYSICAL PLANTS OF PL-412, PL-671, AND PWA DEVELOPMENTS BY PHA FIELD OFFICE PERSONNEL

This Section sets forth procedures for making periodic inspections of the physical plants of all PL-412, PL-671, and PWA developments, whether locally or Federally owned or operated, as provided by Section 3644:12 of the Manual of Policy and Procedure.

I. General. The purposes of the inspection are (1) to appraise the results of the operation and maintenance of the development in relation to PHA standards; (2) to assist local management and PHA in developing and perfecting a program of preventive maintenance, including development inspections; (3) to provide information and data on difficult or widespread operating and maintenance problems requiring investigation and study for solutions, and (4) to provide information on the condition of the physical plants of developments for use of PHA in processing average annual estimates, budgets and other documents.

The inspection should be made without reference to known problems and the solution of special or difficult problems should not be attempted during the inspection. Such problems should be reported to the PHA field office, with information as to their nature, their probable causes and effects, and any steps already taken toward solving them. The inspector may, however, suggest ways of solving routine problems.

The inspections should be made in company with the housing manager, maintenance superintendent, or other responsible employee familiar with the operation and maintenance program.

Only a spot inspection is to be made. It should cover (1) a sampling of dwelling units, structures, grounds, and other multiple facilities, and (2) all single facilities such as central heating plants, sewage or water treatment plants, and management and maintenance buildings. Inspections of developments of 250 units or less should be completed in 2 man-days. Developments of larger size may require more time unless inspected by teams of two or more inspectors of different skills.

For use in making inspections, a Check List has been prepared. (See paragraph IV.)

II. Inspection Procedure. Preliminary to an inspection, the inspector should study pertinent records available in the field office. These would include: (1) operating budgets, (2) data on operating improvements (constructed, approved, or contemplated); (3) physical characteristics sheets (See Section 3644:12 of the Manual of Policy and Procedure);(4) quarterly operation and maintenance reports; (5) RM&R survey reports; (6) reports of previous inspections made by field office or local management personnel; and (7) information on the

composition and methods of the operating group. Information obtained in the field office should, if possible, be supplemented by information at the development. Such supplemental material may be obtainable from reports of inspections made by local management personnel or from other local sources.

Following is a suggested inspection sequence. A sampling percentage is given for each type of facility for which a sample is to be taken:

a. A quick tour of the entire development;

b. Dwelling Structures (10% but not fewer than 5);

c. Dwelling units (2% but not fewer than 5);

d. Group heating plants (25% but not fewer than 2 nor more than 5 plants);

e. Grounds (25% of areas and appurtenances); and

f. All other facilities.

III. Items to be Evaluated. Evaluation is to be made and ratings given for:

a. All RM&R items (supervision and overhead, grounds, structures, painting and decorating, plumbing and gas system, electrical system, heating and ventilating system, elevators, ranges, refrigerators, and other equipment);

b. Janitorial service;

c. Extermination service;

d. Over-all RM&R, and operating services; and

~~e. The development as a whole.~~

deleted per Trans. 3-31-49

The items should be considered in terms of the maintenance standards set forth in Section 1.13 of this Bulletin. However, since any such standard cannot be rigidly applied because of factors influencing the application of the standard, the inspector should keep in mind such variables as construction, environment, climate, and other local conditions which might affect operation and maintenance.

IV. Check List. A Check List for use in inspections has been prepared and is attached as Exhibit 1. The list is not all-inclusive but is to serve as a guide. Under each of the headings (such as grounds, structures, painting and decorating, and so on) are listed items to be looked at and defects to be looked for. For example, in "Structures", "built-up roofing" should be inspected for "blisters, fish mouths, bare or dried out areas, etc."

V. Reporting. At the conclusion of an inspection, the inspector may tell local management the trend of his findings, but it should be emphasized that the report will be made to the PHA field office director who will advise local management of the findings.

Following the inspector's return to the field office, he should discuss with the several specialists questions in their respective fields on which he desires guidance before making his evaluation.

He shall then prepare a report of his findings in accordance with instructions in 3644:12. The report form PHA-1839 carries the summary of the evaluations, and is the basic portion of the report. Under "Evaluation" should be written the term applicable to the determination made, i. e. "above standard", "standard", or "below standard". The "Supporting Comments" should be brief and should be limited to those necessary to explain or justify the evaluation. However, sufficient information should be given to permit the report, as made on the form, to stand alone. There will, of course, be instances in which a more complete statement than normally considered necessary will be advisable.

The narrative statement which comprises the second portion of the report should be brief and concise. Only those normal activities which constitute a real problem should be reported. Novel or ingenious solutions should be reported. In some instances, in relation to a problem of general interest, the solution should be fully reported apart from the inspection. Problems which are outside the skill of the inspector, or those requiring more time for collection of data or for solution, should be referred to the appropriate specialists. Difficult problems, and frequent problems for which adequate solutions are not available and whose study cannot be accommodated in the work schedule, should be referred to the Central Office Plants and Structures Branch. Appropriate notation should be made in the statement of all problems referred for further study. Where appropriate specialists are not available in the Field Office, important questions should be referred to the Central Office.

The memorandum transmitting the report to the field office director should concisely high-light the report. Of particular importance are items requiring immediate or early attention by the local authority or project maintenance staff.

CHECK LIST

INSPECTION OF THE PHYSICAL PLANT OF PL-412, PL-671 AND PWA PROJECTS

Look At	Look For
A. Grounds	
1. Lawns (Turf Areas)	Density of grass; relative coverage of desirable to undersirable growth; bare spots; adequacy of drainage; degree and quality of maintenance such as mowing, watering, fertilizing, repair and rehabilitation by (a) project, (b) tenants.
2. Plants (Trees, Shrubs, Hedges, Vines, Ground Cover)	Character of growth, shape and structure; injuries; disease and insect infestation; degree and quality of maintenance such as pruning, repair, cultivation, fertilizing, protection and spraying.
3. Paved Areas a. Streets, roads, drives b. Walks c. Play, sitting, and drying d. Signs, curbs and gutters.	Cleanliness; failures in the surface and base; adequacy of drainage facilities; degree and quality of maintenance.
4. Yard Drainage Catch basins Inlets Ditches & pipe lines	Clearance; stoppage by rubbish and silt; adequacy as to capacity to meet peak demand; degree and quality of maintenance.
5. Yard Appurtenances Benches, clothes posts, fences, guard rails, retaining walls, steps, etc.	Worn out and damaged parts; failure of paint or other surface covering; degree and quality of maintenance and services; corrosion at the ground line of metal posts; rotting of wood members.
B. Structures	
1. Pent house Walls (exterior and interior)	Leaks, cracks, bad mortar joints.
Flashing & caulking	Looseness, shrinkage or other failures.
Door and window frames	Rot, warping, poor paint cover and other deterioration; rust, etc., metal and metal-clad; thresholds, sills.

2. Parapet Walls, and Coping Cap and base flashing	Poor bedding and end joints; Defective mortar joints. Looseness or other defects.
Anchors-Radio aerials	Nails through flashing; attached to soil pipe.
3. Roofing	
a. Built-up	Blisters, fish mouths, bare or dried out areas, standing water.
(1) Gravel Stop	Deterioration or damage; rust
(2) Flashings	Looseness or damage; condition of paint
(3) Insulation	Indication of disintigration; condensation
b. Shingle, Slate, etc.	Looseness, breakage, dislocation, rotting.
(1) Framing	Rotting or other deterioration.
(2) Flashing	Looseness or damage.
c. General	
(1) Gutter and downspouts Roof Drains	Damage or deterioration; loose anchors, Flashing breaks of clamp ring. blockage
(2) Chimneys and vents	Looseness or damage in mortar joints.
4. Attic Space	Dampness from condensation or leaks.
a. Framing	Mold, decay and other deterioration.
b. Insulation	Poor coverage.
c. Louvers and vents	Adequacy for proper ventilation.
5. Walls	
a. Masonry	Cracks due to expansion or settlement; Poor mortar joints; Spalled Bricks; Effloresscense Damage from leaks in downspouts and gutters or from broken or misplaced splash blocks.
b. Frame	Damage from weathering of shingles, stucco or other siding; looseness of nailing or rotting of wood members; peeling or other failure of paint due to condensation, poor lumber or workmanship.
c. Eaves and Verge Boards	Rotting or other deterioration; warping, paint failure.
6. Windows and Doors	Rusting, rotting, sagging, binding.
a. Putty, caulking	Looseness, shrinkage or other failure.
b. Weatherstripping and hardware	Breakage or other damage.

c. Sills and Linterls	Cracking, looseness, rotting, spalling or other deterioration.
d. Mailboxes or slots	Breakage or other deterioration.
e. Guides, ropes, etc.	Breakage or other deterioration.
7. Screens	
a. Frames	Rusting, rotting, paint failure, looseness; adequacy of locks and checks.
b. Wire and Hardware	Rusting, damage.
8. Porches, Balconies, Steps, and	Settlement and rotting.
a. Canopies & Flashing	Leaks, hazards, deterioration
b. Handrails	Safety, damage, paint failure.
c. Flooring	Rotting, sagging, deterioration.
d. Posts	Rusting, or rotting, especially at contact point at floor or masonry; failure of paint.
9. Foundations	Cracks, leakage of soil water, settlement, termite infestation; rain water accumulation against wall.
10. Crawl Spaces	Dampness, corrosion of pipes and hangers, molding or rotting of floors and joists, adequacy of vents, infestation of vermin, adequacy of drainage facilities; sealing of pipe chases against vapor to upper floors; accessibility of meters and other utilities; pipe covering.
11. Basements	Ventilation, dampness, condensation, vermin infestation, drainage and floors,
a. Walls and Floors	Leaks, cracks and other failures in walls.
b. Heating and Water Heating Plant	Degree and quality of maintenance.
c. Vents	Adequacy.
12. Interiors	
a. Trim (doors, windows and frames, cupboards and closets)	Rotting, cracking, warping, binding or other failures. Condition of painted surface and hardware.
b. Floors	
(1) Wood	Looseness, rotting, warping,
(2) Concrete	Dusting, cracking, settling.
(3) Linoleum	Tearing, wearing, looseness
c. Plaster	Cracking, mold, dampness, efflorescence, damage to finish and other failures. Condition of paint.

13. Public Buildings — Same as for dwelling structures.
    a. Maintenance Space
    b. Community Space
    c. Office Space
    d. Boiler Room

14. Apartment Houses — Same as for dwelling structure.
    a. Stair Halls
    b. Laundry Rooms
    c. Storage Rooms
    d. Basement Playrooms
    e. Incinerator Rooms
    f. Ramp or steps; Guard rails

C. Painting
  1. Paint
    a. Interior
      (1) Trim
        (a) Wood — Flaking, peeling, molding, markings.
        (b) Metal — Flaking, peeling, molding, markings, corrosion
      (2) Walls
        (a) Plaster finish — Cracking, damage, markings
        (b) Paint finish — Flaking, peeling, molding, markings, wear especially at kitchen sinks.
      (3) Window Sash
        (a) Wood — Flaking, peeling, molding, markings
        (b) Metal — Flaking, peeling, molding, markings, corrosion.
      (4) Floors — Scars, need of waxing, polishing, refinishing.
    b. Exterior
      (1) Walls and Trim — Scaling, alligatoring, molding, markings.
      (2) Window Sash
        (a) Wood — " " ", markings.
        (b) Metal — " " ", markings.
        corrosion
        (c) Putty & caulking — Looseness, drying, cracking, missing.
  2. Shades
    a. Sticks — Broken, missing.
    b. Roller — Broken, defective springs.
    c. Fabric — Cracking, tearing, soiling.
  3. Rods - curtain — Missing, rusted, bent.

D. Plumbing and Gas System	
1. Underground	
a. Mains	Quality and condition, corrosion, poor covering
b. Laterals	
(1) Exterior)	Quality and condition; corrosion danger
(2) Risers)	of leaks, explosion and freezing, poor covering
2. Above Ground	
a. Within crawl spaces	Quality and condition; corrosion danger of leaks, explosions and freezing, poor covering.
b. Within structures	(Same as above) Particular attention to corrosion of interior of pipe lines in domestic hot water system.
3. Fixtures and Equipment	
a. Bathroom	Leaky flush valves, ball cocks and faucets; chipped and cracked enamel; sluggish drains
b. Kitchen	Leaky faucets, chipped or cracked enamel; broken or rotted drain boards; stopped drains
c. Laundry	Leaky faucets, cracked tubs, sluggish drains. Drying problems.
d. Hot water tank	Corrosion, scale, sludge, loose insulation, defective safety valves and burners
4. Sewers	
a. Underground	
(1) Mains	Stoppages, repairs, replacements,
(2) Laterals	adequacy as to size, defective manhole covers
b. Above ground	Stoppages, repairs, replacements, adequacy as to size, traps, foul odors
E. Electrical	
1. Distribution system	Local - Utility owned - no inspection necessary except to note quality of service. Project-owned but maintenance under contract - give date of last inspection; date of last test of wholesale meters.

a. Overhead Lines	
(1) Transformers	Check if possible for overloading, age, oil level, paint covering, general condition, loose fastenings, troubles experienced in operation.
(2) Switching and protective equipment	Troubles experienced; operative condition.
(3) Conductors	Frayed insulation; twisted or crossed wires; slack and spacing.
(4) Poles	Splitting; leaning or buckling; corrosion or rotting at ground line.
(5) Guys	Corrosion, broken strands, torn or missing guards.
(6) Cross arms	Splitting, twisting, decay, defective pins.
(7) Insulators	Broken, cracked, missing.
(8) Pole line hardware Braces bolts, Pole steps	Broken, missing, bent
b. Underground Lines	
(1) Transformers	Check if possible for overloading, age, oil level, corrosion, record of failures
(2) Switching and protective equipment	Troubles experienced; operative condition.
(3) Manholes covers) gas kits)	Poor drainage. Tightness, breakage.
(4) Cables	Punctures, cracks, breaks or leaks in sheathing; submergence in whole or in part; corrosion of sheath bands.
(5) Duct entrances	Sufficient slack (about 3"); misplaced duct shields; evidence of shear at point of entry.

(6) Transformer Vaults	Seepage, clearance of drains; adequacy and operative condition of sump pump (if used); use of storage; condition of lock and warning signs.
2. Yard Lighting	
a. Time clocks and switches	Date of last cleaning and overhaul (at least 5-year intervals); operative condition.
b. Fixtures	
(1) Standards (2) Brackets, Fixtures of Flood Lights)	Operative condition, appearance, breakage.
3. Interior Wiring	
a. Service switches and circuit breakers	Operative condition, broken or loose parts.
b. Distribution panels and cabinets	Operative condition, broken or damaged parts.
c. Throw-over switches	Operative condition, broken or damaged.
d. Meters	
(1) Individual (2) Check Meters	Ownership; quantity, reading schedule, date of last test.
e. Wiring	Overloading, appliance load in DU's; semi-permanent or temporary extensions.
f. Fuse or circuit breakers in dwellings	Proper size; evidence of tampering; method of service and control; Frequency of replacement.
g. Local switches and receptacles	Frequency of replacement.
h. Fixtures	Corrosion; broken or loose parts.
F. Heating	
1. Central or Group Plants	
a. General	Cleanliness; degree and quality of maintenance; leaks and joints; defective valve bonnets, pump glands, etc; excessive deposits of fly ash on piping and equipment.

b. Operating Instruments	
(1) Steam flow meters)	Date of last calibration, frequency
(2) Draft gauges)	of servicing; type and quality of
(3) CO_2 Meters)	service; performance.
(4) Flue-gas pyrometers)	
(5) Boiler-feed meters)	
c. Operating Records	Adequacy, use, and effectiveness.
d. Boilers	
(1) Settings	Cracking, warping, etc.
(2) Refractory	Spalling, breakage, evidence of excessive temperatures.
(3) Grates	Defects; burning out; other failures.
(4) Trim	General condition.
(5) Heating surfaces	Soot accumulation, pitting, corrosion.
e. Feed Water	Treatment and methods employed.
(1) Heaters	Operative condition.
(2) Feed Pumps	" "
(3) Regulators	Low-water cut-off; operative condition.
f. Pressure regulators	Operative condition.
g. Steam piping	General condition.
h. Insulation	General condition.
i. Condensate Return System	
(1) Pumps	Operative condition.
(2) Receiver	" " ; corrosion.
(3) Return piping	" " ; corrosion.
j. Combustion controls	" "
k. Fuel burning equipment	" "
l. Fuel handling "	" "
m. Ash handling "	" "
n. Fly ash	Method of handling; disposition.
o. Fuel storage	Problems.
p. Zone control system	Operative condition; methods used.
q. Distribution system	Operative condition; corrosion; expansion of joints, etc.
r. Radiators and convertors	Operative condition; cleanliness; paint covering; defective traps and valves.
2. Individual Heating	
a. Forced and gravity hot water - coal	
(1) Boiler	Defective jackets, broken doors, etc.

(2) Firebox and ashpit	Burned displaced liners; broken or burned-out grates; defective grate shakers.
(3) Smoke pipe and chimney	Cleanliness, accumulation of soot or fly ash; evidence of corrosion; defective cleanout door; check damper, etc.
(4) Compression tank	Tightness.
(5) Controls	Operative condition.
(6) Piping and valves	Tightness, operative condition.
(7) Radiators and valves	Operative condition.
b. Forced Warm Air - Coal	
(1) Furnace	Tightness of jacket; operative condition; broken or cracked doors.
(2) Firebox and ashpit	Burned out or displaced liners; broken or burned out grates; defective grate shakers.
(3) Smoke pipe and chimney	Cleanliness, accumulation of fly ash and soot; corrosion; defective check damper and cleanout door
(4) Blower and motor	Cleanliness; operative condition; poor lubrication; tightness; alignment of belt.
(5) Filters	Tightness and cleanliness.
(6) Humidifier	Operative condition.
(7) Controls	Operative condition.
(8) Ducts and grills	Tightness; corrosion.
(a) Dampers	Operative condition.
c. Oil Burning System-Pressure	
(1) Burner	Operative condition of ignition apparatus, flame adjustment and filters, adequacy of lubrication.
(2) Firebox	Cleanliness; burned out or cracked lining.
(3) Tank and oil lines	Operative condition; tightness of fittings.
d. Space Heaters - Coal	
(1) Boiler	Defective or loose jackets; broken or cracked doors.
(2) Firebox and ashpit	Burned out or displaced liners; broken or burned out grates; defective grate shaker.
(3) Smoke pipe and chimney	Cleanliness; accumulation of fly ash and soot; corrosion; defective damper and cleanout door.

e. Space Heaters - Oil	
(1) Heater	Tightness of jacket; defective doors; rusting, crazing, etc. of enamel.
(2) Burner and fire box	Operative condition of ignition apparatus; flame adjustment and filters; cleanliness; burned out or cracked lining.
(3) Tank and oil lines	Tightness of fittings; operative condition.
f. Space Heaters - Gas	
(1) Heater	Tightness of jacket; defective doors, rusting, crazing, etc. of enamel.
(2) Burner and fire box	Operative condition of ignition apparatus, flame adjustment; cleanliness, burned out or cracked lining.
(3) Fuel lines	Tightness of fittings, operative condition of valves, corrosion of pipes.
(4) Vents	Cleanliness, operative condition.
G. Ranges	
1. Exterior	Rusting, cracking, chipping of enamel.
2. Doors	Broken, warped, missing hardware.
3. Drawers	Bent, rusted.
4. Gas cocks or switches	Broken, missing handles, cleanliness.
5. Burners or elements	Cleanliness, operative condition, cracked, broken or burnt out.
6. Pilot light	Operative condition; inadequacy of adjustment.
7. Oven temp. control	Broken; operative condition.
8. Oven interior	Cleanliness; rusted; chipped enamel.
H. Refrigerators	
1. Cabinet	Rusting, cracked or chipped enamel.
2. Doors	Condition of hardware and gasket sprung or warped doors and hinges.
3. Interior	
a. Shelving	Rusting, cracked, or chipped.
b. Trays	Bent or missing.
c. Dividers	Bent or missing.
d. Evaporator, condenser compressor	Operative condition.

4. Cold control switch	Broken, cracked, missing.
5. General	Cleanliness and care.
I. Other Equipment	
1. Shop	
a. Space and layout	Adequacy and organization
b. Equipment	Adequacy, operative condition, quality, safety.
2. Small Tools	Adequacy as to quantity and type, operative condition; method of storage and issuance control.
3. Large Tools - Power	Adequacy as to quantity and type; operative condition; use control methods; repair records.
4. Automotive	Same as (3) above.
5. Play ground equipment Frames) Chains & Fixtures) Moving Parts)	Operative condition; broken or defective parts; corrosion; safety hazards
6. Office Equipment	Adequacy as to quantity and type; operative condition; repair records.
J. Operating Services	
1. Refuse Collection and Disposal	
a. Household Containers	Adequacy as to sanitation, appearance, serviceability and size; care and maintenance practices such as cleaning, repair and replacement. Note particularly leaks at bottom, missing covers, damaged covers, major dents in side walls, damaged lugs and handles, spillage of refuse due to inadequate size of containers.
b. Collection containers	Same as (1).
c. Collection stations	Adequacy as to sanitation, appearance, location, size and serviceability; care and maintenance practices such as cleaning, organization, repair and replacement. Note particularly spilled refuse, uncovered containers, improperly arranged containers, vermin, foul odors, facilities for washing containers and station, improper drainage of station and protection from high winds.

d. Incinerators	Adequacy as to sanitation, appearance, location, size and serviceability; care and maintenance practices, such as cleaning, operation, repair and replacement. Note particularly spilled refuse, vermin, foul odors, facilities for washing containers and incinerator area, facilities for accomplishing complete combustion for removing ash and for preventing sparks and debris from blowing from the stack. Also note condition of fire box, grates and flue as indicated for the heating plant.
2. Grounds Cleaning	
a. Litter	Evidence of grounds litter; methods of control.
b. Snow	If inspection is made during the season of snowfall, observe clearance from surfaced areas. Otherwise obtain information as to the adequacy of this service from project records.
3. Vermin Control	
a. Dwelling units Bedbugs, roaches, rats, mice, etc.)	Note the degree and extent of vermin infestation from observation and from project records. Control program.
b. Outside Dwellings	Note the degree and extent of vermin infestation with particular emphasis on evidences of rats and other rodents at foundations, refuse stations and incinerators, roaches at refuse stations and incinerators, termites in foundations, crawl spaces and basements. Note also the control program in use. This information should be obtained from observation and from project records.
4. Janitorial Services	
a. Public space (1) Stair halls (2) Community space (3) Recreation space (4) Project office (5) Work space	Adequacy of service as to sanitation, appearance, safety and serviceability.

b. Dwelling units	Adequacy of service as to sanitation, appearance, safety and serviceability. This particularly applies to service at tenant turn-over.
K. Sewage disposal plant	Inspection reports made by the State Municipality or USPHS. Note frequency and date of most recent inspection.
1. General area	Appearance, evidence of flooding about plant, odors, and other nuisance complaints.
2. Control building a. Valves, pumps, motors	Same as for structures. Operative condition, adequacy of maintenance.
b. Other equipment and facilities.	Source of power and operative condition of power plant; safety hazards and their control; gas mask and other safety devices especially in chlorinator room. Ventilation of chlorinating room.
3. Entrance point of sewage	Condition of bar screen; method of storing and disposing of screenings; if plant with comminutor instead of bar screen, note condition, and if slots are open.
4. Tanks	Operative condition of agitators and distributors. Note particularly if holes are plugged and if aerator does not rotate easily and evenly. Also note thickness of scum: is it dry or soaked? are the sides of tanks clean? Evidence of flies and odors.
5. Digestor	Evidence of foaming, explosive gasses, safety hazards, "No Smoking" signs.
6. Sludge Beds	Evidences of flooding. Is sludge disposed of regularly?
7. Effluent	Is it clear, odorless, and free of fine particles? Inspect downstream for signs of scum, sludge and odors.

8. Safety	Are Safety signs adequate and properly posted? Do men work in pairs about the digestor, deep manholes and lift stations?
L. Water Plant	
1. Pumping station	
a. Motors, pipes, pumps	Adequacy as to appearance, operative condition, care and maintenance. Note particular signs of flooding.
b. Standby equipment and auxiliary power	Same as above
2. Standpipe or tank	Corrosion, need of paint, note particularly the condition of foundations and supports for safety hazards.
3. Chlorinator	General condition; note particularly exhaust fans and vents and record of complaints of objectionable tastes and odors.

STANDARDS FOR MAINTENANCE OF TEMPORARY WAR HOUSING

The overall standard of maintenance shall be such as to achieve the livability of the project at the level intended in the original design and construction. Should design and construction be inadequate it is presumed that necessary corrective measures will be taken.

Maintenance shall be planned on the assumption of a five year use-life of a project. When it has been determined through future program action that the project life will be greater or less than five years, the maintenance program shall be altered accordingly.

The standard of appearance shall be such as to provide no reasonable grounds for general adverse criticism.

The project should be kept clean and present evidence of decent housekeeping, safety, and interest in the general welfare of the tenants and community at large.

In applying the standards, the specific requirements of the project should be considered. This involves such items as: type of construction, climate, facilities furnished, kinds of roads, topography, soil conditions, and character of the surrounding community.

In estimating costs for budget purposes the project experience for the first year or more, omitting from consideration construction and operating improvement items, should be used as a guide for determining amounts for subsequent years. In making adjustments, employment conditions and the standard to be achieved should be considered.

It is presumed that tenant and municipal cooperation in the maintenance and operating program will be enlisted to the fullest possible extent. The degree of tenant cooperation will vary widely. This does not, however, relieve the management from its responsibility for adequate maintenance.

The standard of replacement and repair should be such as to achieve efficiency in operation.

Maintenance shall be such as to provide the following:

GROUNDS

Lawns: (Areas of turf consisting of grasses and other vegetation). A turf sufficient to prevent erosion and to present a good appearance, and graded to provide adequate surface drainage.

Comment: This would normally require a fairly uniform stand of grass or other desirable vegetation, bare

spaces constituting not more than 25% of the area, and cut to a height of 2 to 5 inches. Variations from this may be necessary depending on local conditions, or other circumstances.

Planting: (Trees and shrubs. This applies to planting which originally existed on the sites or which was furnished under development.)

Normal growth, safety and satisfactory appearance.

Comment: This would involve an absence of excess growth and dead limbs, protection against physical injury, absence of insect infestation or disease, and the maintenance of the soils in a proper state of cultivation and fertilization.

Walks, Roads, Streets, Sitting Areas, etc., and Garbage Collection Stations:

Prevention of deterioration, provision for safe and uninterrupted passage for traffic; safe, usable and convenient pedestrian passage.

Comment: This requires provision for necessary drainage, cleaning, shaping and compacting, patching, and for the removal of snow.

Streets and House Markers:

Adequate and convenient direction for the orderly and safe movement of normal traffic and reasonable legibility and visibility from the nearest traffic artery.

Comment: This entails cleaning, painting, resetting, or replacing as needed.

Yard Appurtenances: (Fences, clothes posts, flag poles, guard rails, etc.) Maintained in a manner that will not detract from the project appearance and which will provide safe, convenient, and adequate services.

STRUCTURES

Walls, Roofs, Floors, Doors, Windows, Stairs, Stoops, Rails, etc.

Safe, sound, sanitary, water-and-damp-proof and free from excessive air infilteration. Crawl spaces shall

be kept dry, safe and vermin-free.

Painting: (Interior and Exterior)

Adequate protection against wear and weather so as to preserve materials. An appearance of cleanliness and respectability which will obviate undue adverse criticism.

Comment: If painting is needed for appearance or other cause within 18 months of the five year life expectancy, careful consideration should be given before the expenditures are incurred to the probable extension of project life beyond the five year period.

PLUMBING AND GAS

Protection against excessive deterioration of materials and interruption of service and the safe and efficient operation of equipment, in addition to the following:

Sewerage System:

Operation to meet local standards or those of the USPHS.

Water Distribution System:

Operation to supply adequate domestic water of a quality satisfactory to USPHS and adequate water at the proper pressure for fire protection and irrigation.

Fixtures and Trim:

Serviceable condition.

Water Heaters and Controls:

Supply of the quantity and temperature of hot water for which the heaters were designed.

Comment: This entails keeping the heating surfaces free from scale on the water side and from soot on the fire side, also proper repair and adjustment of control devices and the stoppage of hot water leaks throughout the system.

Gas System:

Supply of an adequate quantity of gas and prevention of leaks.

Liquid Petroleum Gas System:

As for other gas systems; also the maintenance and operation shall conform to requirements of the National

Board of Fire Underwriters.

HEATING SYSTEMS

Protection against excessive deterioration and wear; keeping equipment and controls in condition to be safely and economically operated by the project personnel or tenants as the situation may require, and an adequate supply of heat at all times when required.

ELECTRICAL AND OTHER EQUIPMENT

Electrical System,
Ranges, Refrigerators:

Safe, satisfactory, and economical operation condition; protection against excessive deterioration and wear.

be kept dry, safe and vermin-free.

Painting: (Interior and Exterior)

Adequate protection against wear and weather so as to preserve materials. An appearance of cleanliness and respectability which will obviate undue adverse criticism.

Comment: If painting is needed for appearance or other cause within 18 months of the life expectancy, careful consideration should be given before the expenditures are incurred, to the possibility of extension of the life expectancy. By life expectancy is meant terms of occupancy for dwelling purposes prior to demolition or removal from present site.

PLUMBING AND GAS

Protection against excessive deterioration of materials and interruption of service and the safe and efficient operation of equipment, in addition to the following:

Sewerage System:

Operation to meet local standards or those of the USPHS.

Water Distribution System:

Operation to supply adequate domestic water of a quality satisfactory to USPHS and adequate water at the proper pressure for fire protection and irrigation.

Fixtures and Trim:

Serviceable condition.

Water Heaters and Controls:

Supply of the quantity and temperature of hot water for which the heaters were designed.

Comment: This entails keeping the heating surfaces free from scale on the water side and from soot on the fire side, also proper repair and adjustment of control devices and the stoppage of hot water leaks throughout the system.

Gas System:

Supply of an adequate quantity of gas and prevention of leaks.

Liquid Petroleum Gas System:

As for other gas systems; also maintenance and operation shall conform to requirements of the National Board of Fire Underwriters.

HEATING SYSTEMS

Protection against excessive deterioration and wear; keeping equipment and controls in condition to be safely and economically operated by the project personnel or tenants as the situation may require, and an adequate supply of heat at all times when required.

ELECTRICAL AND OTHER EQUIPMENT

Electrical System, Ranges, Refrigerators:

Safe, satisfactory, and economical operation condition; protection against excessive deterioration and wear.

ANTICIPATED LIFE OF MATERIALS AND EQUIPMENT

RM&R factors used for computing Average Annuals for the various maintenance accounts are based upon anticipated life of materials based on experience gathered from various sources. The figures, used in the past, have been reexamined and revised on the basis of more recent FPHA experience.

The purpose of this release is to furnish a guide which will assist those responsible for revisions to Average Annual allotments in applying the factors realistically. It is recognized that climatic conditions and geographical location will cause some variation in the life expectancies of certain items. In such cases careful judgement, based upon local conditions, should be exercised when deviating from the figures shown.

The life assigned to each item represents the period of useful life at which the maximum number of failures may be expected to occur when a large number of the item is involved.

The following assumptions have been made in arriving at these figures;

1. The materials and equipment conform to the FPHA design standards for aided housing developments.
2. The materials and equipment will receive good normal maintenance during their life. Overall economy should be given consideration in this maintenance.

As further experience data becomes available this list will be revised and augmented.

ANTICIPATED LIFE OF MATERIALS AND EQUIPMENT ON AIDED PROJECTS

GROUNDS

	Years of Life
Lawns and Planting	
Lawn Mowers	
Power	6
Hand	3
Garden Hose	3
Wheelbarrow	15
Roller	15
Spray Pump	10
Small Tools	4

Lawn Areas - continuous - Cycles of 15 years allowed for rehabilitation.

GROUNDS (Cont'd)

	Years of Life
Surfaced Areas	
Hard Surface 25% salvage	30
Waterbound 25% salvage	30
Yard Appurtenances	
Fences (Steel post and wire)	25
Fences (Wood)	15
Clothes Posts (Steel)	30
Clothes Posts (Wood)	15
Benches - Concrete or iron frame	15
Flag Pole (Steel)	60
Flag Pole (Wood)	20
Guard Rails (Metal)	30
Play ground equipment(Metal)	15
Play ground equipment (Wood)	10

STRUCTURE

Slate or tile roofing	Life of Project
Asbestos Shingles	30
5 Ply bonded slag or gravel roofing	20
3 or 4 Play bonded slag or gravel roofing	10
Heavy asphalt slate surfaced shingles	15
Wood shingles cypress or cedar (creosoted)	30
Copper gutters and rain leaders	Life of Project
Galvanized Iron gutter and leaders 1/	15
Wood Screen doors	10
Wood Screen Windows (Stored in Winter)	15
Metal Screen Windows	8
Wood Windows) Allow 20% replacement life of Steel Windows) project if painting and leaky walls are taken care of	
Caulking	12
Weatherstripping	20
Finishing Hardware	40
Concrete Floors (If properly maintained)	Life of Project
Wood Floors (If properly maintained)	Life of Project
Mastic Tile Flooring (Best Grade)	25
Battleship Linoleum	20
1/8" Linoleum	8

1/ A great variation of opinions was expressed by the regional engineers as to the life of these items. The variations are due principally to climatic conditions. Regional judgment, based on local conditions, must be exercised in the use of these figures.

STRUCTURE (Cont'd)

	Years of Life
Stair Tread cement fill (If treated with hardener)	40
Stair Tread cement fill (Non treated)	20
Interior Millwork	Life of Project
Kitchen dresser	30
Kitchen work table	20
Medicine cabinet	30
Window Glass - 1 light per annum - per dwelling unit	
Plaster (Pointing covered under painting)	Life of Project
Entrance, Pipe railings	30
Entrance, Doors - well built, white pine, cypress or equal - Under Wood	Life of Project
Entrance, Doors - well built, white pine, cypress or equal - No protection	20
Plywood Panels or Flush veneer	15
Wood verge boards & cornice	50
Wood porch columns	20

(The above six items to be adequately protected with paint at all times)

PAINTING

Window Shades	5
Stain (1 coat)	10
Lead & Oil or Enamel Interior (1 coat)	4
Casein (1 coat)	2
Exterior Lead & Oil (1 coat plus 25% to 50% for rust removal puttying, etc.)	3
Reputting Glass (once in 3 years) Average window labor 12 minutes Putty - 1½ lbs.	

PLUMBING AND GAS

I. Inside Drainage

Soil, Waste, Vent, etc.	60
C. I. House Drains, Inserts, etc.	60
Drains, Floors, Area, Roof	40
Sump Pumps	15

II. Yard Sewers

Manholes, Catch Basins, etc.	60
Tile Sewers	60

PLUMBING AND GAS (Cont'd)

		Years of Life
III.	Outside Water	
	Piping, Valves, Street Washers, etc.	40
	Meters	30
IV.	Gas Distribution	
	Service Piping - Valves	30
	Inside Piping	40
	Hot Plates - Gas	15
	Meters, Valves, Manifolds	30
V.	Inside Hot and Cold Water	
	Piping, Valves	40
	Pipe Covering	30
	Hot Water Generators, Control Valves Small Meters, etc.	20
	Circ. Pumps	12
VI.	Plumbing Fixtures	
	Bath tubs, slop sinks and trim Kitchen Sinks, Closet combination, flush valves	40
	Laundry Trays, Lav. Urinals & All-Trim	30
	Bathroom Accessories	15

ELECTRICAL

I.	Underground	
	Misc. Overhead Wiring	25
	Lamp Standards, subway type outouts subway type metering equipment	25
	Pot heads, Insulator racks, grounding equipment, subway type oil switches, subway type transformers, high and low tension cable.	30
	Manholes, transformer vaults, fibre ducts, concrete envelope	Over 60

ELECTRICAL (Cont'd)

	Years of Life
II. Overhead	
Service drops, W.P. Primary wire W.P. secondary wire, Grounding, guy wires	20
Pole light brackets, Pole type metering equipment, Pole type disconnects, Poles, cross arms, etc.	25
Pole type transformers, hard lighting cable	30
Concrete handholes, fibre ducts, concrete envelope	Over 60
III. Interior	
Project lamps	0.25
Bells, buzzers, signal transformers, push bottons, signal wire	15
Wall switches and plates, Convenience receptacles & Plates, (Underwriter's standard)	20
Lighting fixtures	40
Time Switches, relays, meters, fans	20
Service Switches, Motor Switches	30

HEATING

I. HEATING, CENTRAL AND GROUP PLANTS

A. Boiler Plant

*1.	Foundations - Sleeves, Hangers	60
2.	Boilers and Trim (High Pressure)	30
	(Low Pressure)	25
*3.	Boiler Settings	30
*4.	Boiler Bushings	30
5.	Piping and Fittings	30
6.	Feed Water Heater	20
7.	Blowoff	40
8.	Stoker and Controls	20
9.	Valves, Traps	25
10.	Coal and Ash handling	20
11.	Pumps	25
12.	Meters, Gauges and Regulators	15
13.	Soot Blowers	15
14.	Paint	3

* Will depend upon boiler replacement.

HEATING (Cont'd)

		Years of Life
B.	Distribution Lines	
1.	Concrete Manholes and Pits	60
2.	Hangers and Anchors	60
3.	Excavation and Backfill	40
4.	Conduit and Covering	30
5.	Pipe, Valves and Fittings	40
6.	Wiring	30
7.	Expansion joints (U-bend and piston types)	30
8.	Expansion joints (Packless, bellows type)	3
**9.	Paint	5
C.	Radiation and inside piping	
1.	Sleeves, Inserts and Hangers	60
2.	Radiators, Cast Iron	60
3.	Radiators, Copper	40
4.	Pipe, conduit and fittings	50
5.	Pipe covering	40
6.	Valves, traps and gauges	20
7.	Unit Heaters	20
8.	Pumps, Fans and Motors	20
9.	Zone Control	15
10.	Air Ducts	20
11.	Painting	4

HOT PLATES, HOT WATER HEATERS, RANGES AND REFRIGERATORS

I.	Hot Plates	
	Electric	8
	Gas	15
II.	Hot Water Heaters	
	Electric	15
	Gas	15
	Oil	10
III.	Ranges	
	Electric	15
	Gas	15
	Coal	20
	Oil	10

** More often in damp crawl spaces.

HOT PLATES, HOT WATER HEATERS, RANGERS AND REFRIGERATORS (Cont'd)

	Years of Life
IV. Refrigerators	
Electric	15
Gas	20
Oil	15
Ice	10

OTHER EQUIPMENT

I. Automotive	
Truck	6
Passenger car	6
Tractor	6
II. Shop Tools	
Power	10
Small	5
III. Social Equipment	10
IV. Office Equipment	15
V. Garbage Cans	3
VI. Trash Cans	4

STANDARDS FOR MAINTENANCE OF AIDED PROJECTS (Including PL-671 Projects)

1. The Overall Standard. The overall standard of maintenance shall be such as to:

   a. Realize the objectives of public low rent housing by:

      (1) Providing livability in attractive, decent, safe and sanitary surroundings.

      (2) Providing the required servicability through proper operation and maintenance of the physical plant.

      (3) Protecting and preserving the physical plant which is accomplished by preventing or arresting damage and deterioration before it reaches a point where failure is imminent. The physical plant as used here includes the structures and their equipment, the site and all appurtenances.

      (4) Protecting the initial monitary investment.

      (5) Performing all maintenance and physical operation functions at the lowest cost consistent with low rent housing.

   b. Attain a good appearance. The appearance of a project is a very important factor in evaluating the standard of maintenance. It is the yardstick by which the public in general, and the individual, in particular, measures the performance of management. A good appearance obviously should be a primary objective.

      By "good appearance" is meant that the project, including all appurtenances, is attractive to the average person and presents no grounds for reasonable adverse criticism from the point of view of neatness and orderliness. In no event should a project be maintained as a "show place" nor as an institution, but rather as a normal unit of the community:

      In applying the standard, the characteristics peculiar to the individual project should be fully considered. This will involve such items as: type of dwellings, type of construction, climate, environmental conditions, topography of the site, underlying soil conditions and pattern of the surrounding community.

      It is presumed that tenant and municipal cooperation in the maintenance and operation program will be enlisted to the fullest possible extent.

2. The Standards for Specific Items. The standards of maintenance for specific items are as follows:

a. Grounds.

(1) Lawns. (Areas of turf consisting of grasses and other desirable vegetation). Maintenance shall be such as to provide adequate surface drainage, sufficient turf to prevent erosion, a serviceable ground-cover and a good appearance.

To attain this standard will require the maintenance of a uniform stand of grass or other desirable vegetation. Thin or bare spots in the turf should constitute not more than 20% of the total lawn area and the growth should be maintained at a height of from 1-1/2" to 3".

(2) Plantings. (Trees and shrubs, including all plants which originally existed on the site and those which were furnished under development or management.) Plants shall be maintained in normal growth with full consideration given to safety, serviceability and appearance.

To attain this standard will require:

(a) pruning to maintain the desired shape and character of the plants by eliminating excess growth and dead limbs or branches;

(b) protecting plants against physical injury;

(c) treating plants to control insect infestation and disease;

(d) maintaining the soil in a proper state of cultivation and fertilization; adjusting and replacing plants as may be necessary.

(3) Surfaced Areas. Maintenance shall be such as to prevent deterioration and to provide safe, convenient and uninterrupted service.

To attain this standard will require provision for adequate drainage and for cleaning, shaping, patching and resurfacing.

(4) Yard Appurtenances. (Fences, clothes posts, flag poles, guard rails, etc.) Maintenance shall be such as to provide safe, convenient and adequate service.

Par. 2 (Cont'd)

To attain this standard will require painting, repairing and replacing as may be necessary with full consideration given to appearance.

b. Structures. (Walls, roofs, floors, doors, windows, stairs, stoops, rails, etc.) Maintenance shall be such as to provide safe, sound, sanitary, water and damp-proof shelters free from excessive air infiltration. Crawl spaces shall be kept dry, safe and vermin free.

c. Painting (Interior and Exterior). The painting program shall provide adequate protection of the painted surfaces against wear and weather so as to preserve materials and to provide satisfactory livability and good appearance. It is expected that painted surfaces will be repainted before the paint coating deteriorates to such a point that the entire body of the previous coating is lost.

d. Sewerage System. The maintenance and operation shall provide uninterrupted service and conform to all local codes and local and state health regulations.

e. Water Distribution. The maintenance and operation shall supply adequate domestic water of a quality satisfactory to local and state health authorities and adequate water at proper pressures for fire protection and irrigation.

f. Plumbing Systems. The maintenance shall be such as to provide uninterrupted service, and operation which conforms to all local codes and health regulations. It shall prevent excessive deterioration to the system and keep fixtures and trim presentable in appearance.

g. Gas System. The maintenance shall be such as to furnish uninterrupted service of an adequate supply of gas and to prevent excessive deterioration of the distribution system.

h. Heating System. The maintenance shall be such as to keep the system in a safe and economical operating condition and provide the heat necessary for a healthful degree of comfort consistent with weather conditions of the particular locality.

i. Electrical System. The maintenance shall be such as to keep the system and equipment in safe and economical operating condition and to provide uninterrupted lighting and equipment service.

j. Household Equipment (Ranges, Refrigerators, Water Heaters, etc.) The maintenance shall be such as to provide safe, economical and adequate service of the type for which the equipment was intended and to keep it acceptable in appearance.

INSPECTION OF THE PERSONAL PROPERTY OF FI-412, FI-671 AND FM PROJECTS BY PROJECT PERSONNEL

The most effective maintenance is preventive maintenance. Preventive maintenance is based on a knowledge of the condition of the project. This knowledge is most effectively gained through periodic detailed inspections well recorded and carefully analyzed.

This section presents a suggested method of inspection with forms for recording the results, and supporting check lists. The method and forms may be used as given, or modified or further developed by local management, to best suit their own needs.

I. Purposes of the Inspections

The purposes of the project inspections are to assist the local management in (1) becoming aware of items which require special attention or which may constitute special maintenance problems; (2) ascertaining the standard of operation being achieved; (3) establishing the workload and scheduling an effective maintenance program involving both current repairs and replacements and preventive measures; and (4) collecting data for use in budgeting expenditures.

It is anticipated that the use of this material will also help the local management to attain maximum efficiency and economy and, at the same time, to develop a source of information and data useful for both public and private housing interests.

II. Scope of the Inspections

A complete inspection should be performed at least once each year by qualified project maintenance personnel under the supervision of the housing manager and the maintenance superintendent. It should cover all dwelling units, all dwelling and non-dwelling structures, grounds, and utility systems and should include all RM&R items and operating services such as janitorial services, pest control and refuse collection and disposal.

Since maintenance personnel will be used for the most part in making the inspection, there will arise the question of whether or not certain items of maintenance work should be performed at the time of inspection. This must be a local determination based on urgency of

the item of work, overall efficiency, economy and other factors. It must be remembered that the primary purpose of the inspection is to evaluate the physical condition of the project equipment and facilities to establish the basis of the maintenance program. Should maintenance be included in the inspection schedule it should be limited to emergency items and to minor items that take little time but may save a return trip or an extensive repair later.

III. Scheduling

The over-all inspection should be scheduled to assure that all facilities will be covered within a reasonable time during each year of operation. Proper timing will facilitate the observing of various items at the most appropriate time as, for example, inspection of lawns and plantings during the growing season.

In order that tenants may be prepared for the inspector's visit a schedule of dwelling-unit inspections should be prepared in detail to indicate the time of visit to each dwelling and notices should be sent to the tenants at least three days prior to the visit. The inspection of the dwelling units should obviously follow this schedule very closely, allowances being made for revisions due to absence of tenants and the resultant call-back visits.

The inspection of each dwelling unit should be completed as far as is practicable in one visit. This will include the dwelling unit itself and other related items such as tenant yards, janitorial services, vermin control, and refuse collection. All dwellings within a building should be scheduled in sequence to assure completion of a building in the least number of visits possible, thus minimizing objections from tenants and confusion in performing the work. It is advisable to assign one or more teams exclusively to the inspection of dwelling units until all units are inspected. If sufficient personnel is available to assign a separate team or teams to the inspection of non-dwelling space it is advisable to schedule this inspection simultaneously with that of dwelling units so that the entire inspection of a single dwelling structure can be completed at one time.

Inspection of non-dwelling structures, grounds, and utilities systems may be scheduled simultaneously with that of dwelling units and dwelling structures or they may be scheduled separately depending upon the available personnel, project workload, and other factors. In any event the entire inspection should be scheduled to be completed in the shortest time possible.

IV. Inspection Personnel

Inspectors should be mechanics selected from personnel with experience and familiarity with project maintenance. They should know or be trained to know "what to look at" and "what to look for", and the proper way to evaluate project maintenance and the true condition of the physical plant from an operative point of view. Inspectors should be familiar with the capacity and performance of all equipment and facilities in the overall scheme of operation in order that tests may be made with safety and without disrupting normal operation. This is particularly important with respect to electrical, heating, and plumbing installations.

The number of inspectors required will depend upon the number of dwelling units, type of facilities, and time to be devoted to the inspection. In order that the inspection may be completed within a reasonable time, as many men as can be spared from routine maintenance should be assigned. Inspectors should work in teams of at least two and it is advisable to select men of different skills for each team as, for example, plumber and carpenter, heating engineer and electrician. A team with special skill should be assigned to the inspection of such items as may require special skills.

Training of the group selected as inspectors should include a thorough briefing by a competent person on the overall inspection program, including (1) its purpose or objective, (2) scheduling, (3) techniques and (4) use of forms and reporting.

The briefing should be followed by a demonstration wherein all members of the group participate in the actual inspection of a reasonable portion of a project conducted by a competent member of the staff.

V. Equipment

Each team of inspectors should be provided with all necessary tools, testing devices, and supplies, such as flashlight, small hand mirror, screw driver, pliers, claw hammer, clasp board, daily inspection schedule, inspection forms, etc.

VI. Suggested Inspection Procedure

A. Inspection Report Forms and Check Lists

Prior to the inspection, an adequate supply of the necessary forms and check lists should be prepared. Suggested forms and check lists are shown as Exhibits 1a and 1b, 2a and 2b, 3a and 3b, and 4

of this section. The following quantities of these report forms or check lists are considered necessary:

1a - one copy for each dwelling unit
2a - one copy for each building
3a - one copy for each project
4 - one copy for each project
1b, 2b, and 3b - one copy for each inspector

Project personnel should familiarize themselves with these inspection report forms and check lists, which should be adapted to each project at which they will be used. Any item on the sample forms which is not pertinent to the project should be omitted; likewise any missing pertinent item should be added.

The check lists need only be used for reference to enlighten the inspector prior to and during the inspection.

In the inspection report forms the following major headings are used: Item, Location, Condition, Maintenance Required. The "items" are broken down into separate trade headings. Under the other major headings, the location, condition, and maintenance required should be noted briefly and precisely.

Items found in good operating condition need not be recorded on the report. Report "Condition" and "Maintenance Required" for items requiring same whether they were corrected during the inspection or not. The items which were corrected during the inspection should be identified by a red check mark or other mark of identification so that the item of work will be easily identified and not be duplicated in the subsequent work schedule.

The following examples illustrate how this may be accomplished: Assume that a light switch in Bedroom No. 1 is being inspected. The switch should be tried for operation. If no defects are apparent no maintenance is required and, therefore, this item need not be recorded. If repairs or replacements are necessary and are accomplished during the inspection the item should be recorded as follows:

ITEM :	LOCATION :	CONDITION :	MAINTENANCE REQUIRED
Switches:	BR. #1 :	Loose Plate :	Replaced screw (red check here)

If the necessary repairs or replacements are not accomplished during the inspection the item should be recorded as follows:

ITEM	LOCATION	CONDITION	MAINTENANCE REQUIRED
Switches:	BR. #1	One switch inoperative	Replace

The above illustration may be applied to any item or items. Since the report forms provide good coverage, only a definitive word or two need be recorded as a result of the inspection.

The "Summary Report Form" is provided for use upon completion of the entire inspection for summarizing the findings. Included on the suggested Summary Report Form are illustrations and examples for consideration in its use.

B. Testing

All installations and equipment should be tested in sufficient detail to determine their operative condition and, as far as is practicable, the extent of any defect.

The following examples illustrate a few of the many tests that may be required:

1. Water faucets and valves. Turn on and off to note their operative condition by observing the ease of operation, volume of flow and leaks from defective washers, packing and valve seats. Also note the condition of the drain by observing if the waste flow is free, sluggish, or completely stopped.

2. Toilet. Operate the flushing mechanism and observe particularly the action of the ball cock and ball float for improper operation and for leaks. From the flushing action note whether drainage of waste is free, sluggish, or completely stopped.

3. Gas Range. Light the burners to detect frozen or otherwise defective gas cocks, leaks, clogged burners, and improper mixture of gas and air. Open and close oven door to detect broken or defective hinges, door catch, and oven accessories.

4. Heater. Operate fan and motor of forced warm air heating system, noting quietness of operation, probable condition of bearings, etc. If practicable operate burner to detect defects.

5. Electrical. Operate switches, sockets and receptacles, noting their operative condition. Examine fuse box for fuse size and for tampering by tenants.

6. Structures. Operate door locks, hinges, and other hardware to detect defects. Test vents and louvers as to adequacy and clearance of obstructions.

7. Refrigerators. Turn cold control off and on to observe operation. Observe condenser for cleanliness. Observe cabinet; open and close door to detect broken or defective hinges, gaskets, trays and shelving.

8. Fire and Safety. Observe and note all conditions which may be considered as hazardous to life and property.

VII. REPORTING AND FILING

The inspection report forms, Exhibits 1a, 2a, 3a and 4, should be filled out as suggested above and assembled as a complete report for each inspection of the project. Copies of the summary sheet Exhibit No. 4 should be prepared for the Executive Director, Project Manager, Maintenance Superintendent and others as may be deemed appropriate.

The complete file of the inspection report forms, Exhibits 1a, 2a, 3a and 4, should be maintained for use as a basis for the work program, for reference in developing the budget and otherwise aiding the administration of the operating program and for use in evaluating the physical condition of the project.

INSPECTION REPORT - DWELLING UNIT

_____
(Local Body - Name)

Project Name: _____ No. _____ Location _____

D.U. NO.: _____ No. of Bedrooms _____ Bldg. No. _____

Inspected By: _____ _____
(Date)

_____

ITEM	Location	Condition	Maintenance Required
A. GROUNDS:			
1. Tenant - Yards			
B. STRUCTURES:			
1. Ceilings			
2. Walls			
3. Trim			
4. Windows			
5. Screens - Storm Sash			
6. Doors			
7. Floors			
8. Cabinets - Shelves			
9. Bathroom Accessories			

INSPECTION REPORT - DWELLING UNIT

ITEM	Location	Condition	Maintenance Required
B. STRUCTURES (Cont'd)			
10. Fire Proofing			
C. PAINTING AND DECORATING:			
1. Painting			
2. Shades			
D. PLUMBING:			
1. Sink and/or Laundry Tray			
2. H. W. Heater			
3. Lavatory			
4. Bath Tub - Shower			
5. Toilet - Tank			
6. Pipe - Fittings			
7. System Corrosion			
E. ELECTRICAL:			
1. Fixtures			
2. Switches			
3. Receptacles			

INSPECTION REPORT - DWELLING UNIT

ITEM	Location	Condition	Maintenance Required
E. ELECTRICAL (Cont'd)			
4. Circuit Panel			
5. Ground Clamp			
F. HEATING & VENTILATING:			
1. Radiators			
2. Space Heaters			
3. Forced Warm Air Heater or Boiler			
4. Ducts - Grills			
G. RANGES:			
1. Cabinet			
2. Burner			
3. Vents			
4. Grates - Waterback			
H. REFRIGERATORS:			
1. Cabinet			
2. Ref. Equipment			

INSPECTION REPORT - DWELLING UNIT

ITEM	Location	Condition	Maintenance Required
I. HOUSEKEEPING:			
1. Refuse Control			
2. Vermin Control			
3. Fire and Safety Hazards			
4. General			

GENERAL REMARKS:

CHECK LIST

INSPECTION REPORT - DWELLING UNIT

The following items should be checked and the findings recorded on the appropriate subject Report Form:

A. GROUNDS

- a. Lawns
- b. Plantings
- c. Pavements
- d. Fences
- e. Clothes Posts
- f. Drainage

B. STRUCTURES

1. Ceilings
   - a. Surface
   - b. Subsurface
2. Walls
   - a. Surface
   - b. Subsurface
3. Trim (Wood and Metal)
   - a. Baseboards
   - b. Openings (Doors, Windows, etc.)
   - c. Mouldings
4. Windows
   - a. Frame, Sash and Sill
   - b. Glazing
   - c. Hardware
5. Screens - Storm Sash
   - a. Frames
   - b. Screen Cloth
   - c. Hardware
   - d. Glazing
6. Doors
   - a. Frames - Sills
   - b. Door
   - c. Hardware - Mailbox
   - d. House Numbers
7. Floors
   - a. Joist
   - b. Subflooring
   - c. Flooring
   - d. Covering
8. Cabinets - Shelves
   - a. Interior
   - b. Exterior
   - c. Door
   - d. Hardware
9. Bathroom Accessories
   - a. Medicine Cabinet
   - b. Towel, Paper and Curtain Racks
10. Fireproofing
    - a. Wall and Ceiling Surface
    - b. Smoke Pipe Covering

C. PAINTING AND DECORATING

1. Paint
   - a. Surface
2. Shades
   - a. Roller
   - b. Cloth
3. Curtain Rods

D. PLUMBING

1. Sink and/or Laundry Tray
   - a. Basin
   - b. Faucets
   - c. Drain
   - d. Supports
   - e. Drainboard

CHECK LIST

D. PLUMBING (Cont'd)

2. H. W. Heater
   a. Tank and Frame Assembly
   b. Burner and Adjustment
   c. Controls and Shut-off
   d. Vent
3. Lavatory
   a. Basin
   b. Faucets
   c. Drain
   d. Supports or Hangers
4. Bath Tub - Shower
   a. Tub - Stall
   b. Faucet - Shower Heads
   c. Drain
   d. Caulking
5. Toilet - Tank
   a. Tank and Mechanism
   b. Bowl
   c. Drain
   d. Seat
6. Pipe - Fittings
   a. Pipe
   b. Hangers
   c. Coverings

E. ELECTRICAL

1. Fixtures - Switches - Receptacles
   a. Physical Condition
   b. Operating Condition
2. Circuit and Distribution Panels
   a. Physical Condition
   b. Operating Condition of Switches & Circuit Breakers
   c. Proper fusing
      (1) 15A for Lighting Branch Circuit
      (2) For Others as Required
   d. Condition of Cartridge Fuse Holders
   e. Panel Directors - Proper Designation of Circuits
3. Grounding
   a. Check Ground for Proper Connection to Cold Water Line

F. HEATING AND VENTILATING

1. Radiators
   a. Radiator
   b. Supply Valve
   c. Thermostatic Trap - Relief Valve
   d. Hangers
2. Space Heaters
   a. Frame Assembly
   b. Fire Box - Grate
   c. Draft Controls
   d. Smoke Pipe
   e. Fireproof Mat
3. Forced Warm Air Heater and Boilers
   a. Frame Assembly
   b. Fire Box - Grate
   c. Draft, Bonnet and Temperature Controls
   d. Starter - Motor - Fan
   e. Smoke Pipe
   f. Boiler Accessories, Piping
   g. Burners and Accessories
4. Ducts and Grills
   a. Ducts
      (1) Hangers, Coverings, Joints
   b. Grills
      (1) Deflector - Damper

G. RANGES

1. Assembly
   a. Exterior surface, supports
   b. Oven interior and accessories
2. Burners
   a. Burners and Supports
   b. Cocks, Valves, Pipe, Wiring Switches
   c. Burner adjustments

CHECK LIST

G. RANGES (Cont'd)

3. Vent
4. Grates - Waterback

H. REFRIGERATORS

1. Cabinet
   a. Exterior Surface and Supports
   b. Interior Surface and Accessories
   c. Hardware and Door Gaskets
2. Refrigerating Equipment
   a. Motor and Compressor Unit (If Gas-Burner Adjustment)
   b. Freezing Unit - Evaporator
   c. Condensor
   d. Controls
   e. Fan
   f. Wire - Insulation - Connections - Piping

I. HOUSEKEEPING

1. Refuse Control
   a. Refuse Containers
   b. Cleaning and Sanitation
2. Vermin Control
   a. Infestation
3. Fire and Safety Hazards
4. General
   a. Cleanliness
   b. Habits

INSPECTION REPORT

NON-DWELLING BUILDINGS AND NON-DWELLING SPACE OF DWELLING BUILDINGS

_____
(Local Body - Name)

Project Name: _____ No. _____ Location _____

Dwelling Building No.: _____ Non-Dwell. Bldg. Type _____

Inspected By: _____ Date _____

Item	Location	Condition	Maintenance Required
A. EXTERIOR STRUCTURE:			
1. Roof			
2. Roof Drainage			
3. Walls			
4. Windows			
5. Doors			
6. Screens - Storm Sash			
7. Stoop - Balcony			
8. Stairway - Ramps			
9. Chimneys - Flues - Stacks			
B. INTERIOR STRUCTURES:			
1. Ceilings			
2. Walls			
3. Trim			

INSPECTION REPORT

Items	Location	Condition	Maintenance Required
B. INTERIOR STRUCTURES (Cont'd)			
4. Windows			
5. Doors			
6. Floors			
7. Cabinets - Shelves			
8. Wash Room			
9. Fire Proofing			
10. Basement - Crawl Space			
11 Attic Space			
12. Stairways - Halls			
13. Locker - Storage Space			
14. Group Laundry Facilities			
15. Incinerator Facilities			
16. Fire and Safety Facilities			
C. PAINTING AND DECORATING			
1. Paint			
2. Shades			
3. Curtain Rods			

INSPECTION REPORT

Item	Location	Condition	Maintenance Required
D. PLUMBING:			
1. Sink			
2. Toilet - Tank			
3. Lavatory			
4. Tub - Shower			
5. Laundry Tray			
6. Hot Water (Storage) Heater			
7. Control Valves			
8. Sump Pump			
9. Pipe-Fittings - Hangers			
10. Urinal			
11. Drinking Fountain			
E. ELECTRICAL			
1. Fixtures			
2. Switches			
3. Receptacles			
4. Circuit & Distr. Panels			
5. Disconnects			
6. Starters - Controllers			
7. Motors			

INSPECTION REPORT

Item	Location	Condition	Maintenance Required
E. ELECTRICAL (Cont'd)			
8. Conduits - Fittings Hangers			
9. Junction Boxes			
10. Ground System - Clamp			
11. Fire Alarm System			
F. HEATING AND VENTILAING:			
1. Space Heater			
2. Forced Warm Air Heater (Furnace)			
3. Ducts - Grills			
4. Central or Group Plants			
a. Boiler			
b. Oil Burner			
c. Stoker			
d. Fuel Hdlg. Equipment			
e. Equipment for Operating			
f. Distribution			
G. RANGES:			
1. Cabinet			
2. Burner			

INSPECTION REPORT

Item	Location	Condition	Maintenance Required
G. RANGES (Cont'd)			
3. Vents			
4. Grates - Waterback			
H. REFRIGERATORS:			
1. Cabinet			
2. Ref. Equipment			
I. OPERATING SERVICES:			
1. Janitorial			
2. Vermin Control			
J. FIRE AND SAFETY HAZARDS			

GENERAL REMARKS:

CHECK LIST

NON-DWELLING BUILDINGS AND NON-DWELLINGS

SPACE OF DWELLING BUILDINGS

A. STRUCTURES (Exterior)

1. Roof
   - a. Superstructure
   - b. Insulation
   - c. Roofing
     - (1) Built-up
     - (2) Shingle
   - d. Gravel Stop
   - e. Flushing
2. Roof Drainage
   - a. Gutters
   - b. Downspouts
   - c. Hangers
   - d. Leaders
   - e. Splash Blocks
3. Walls
   - a. Siding
     - (1) Masonry
     - (2) Frame
   - b. Foundations and Pins
     - (1) Footings
   - c. Trim
   - d. Vents - Louvers
   - e. Flashing
   - f. Caulking
   - g. Parapet
   - h. Coping
   - i. Bldg. Numbers
4. Windows
   - a. Frame - Sill - Lintel
   - b. Sash
   - c. Glazing
5. Doors
   - a. Frames - Sill - Lintel
   - b. Door
   - c. Glazing
6. Screens and Storm Sash
   - a. Frames
   - b. Screen Cloth
   - c. Glazing
   - d. Hardware
7. Stoop - Balcony
   - a. Floor
   - b. Guard Rail or Wall
   - c. Piers or Supports
   - d. Canopy or Roof
8. Stairways - Ramps
   - a. Stairs
   - b. Walls
   - c. Guard Rails - Hand Rails
   - d. Drains
9. Chimneys - Flues - Stacks
   - a. Masonry Walls
   - b. Linings

B. STRUCTURES - INTERIOR

1. Ceilings
   - a. Surface
   - b. Subsurface
2. Walls
   - a. Surface
   - b. Subsurface
3. Trim (Wood or Metal)
   - a. Baseboards
   - b. Openings (Doors, Windows, etc.)
   - c. Mouldings
4. Windows
   - a. Frame - Sash
   - b. Hardware
5. Doors
   - a. Frames
   - b. Door
   - c. Hardware
   - d. Glazing
6. Floors
   - a. Joist
   - b. Subflooring
   - c. Flooring
   - d. Covering

CHECK LIST

B. STRUCTURES (Cont'd)

7. Cabinets - Shelves
   a. Interior
   b. Exterior
   c. Doors
   d. Hardware
8. Washroom Accessories
   a. Medicine Cabinet
   b. Towel Rack, Toilet Paper, Rack, etc.
9. Fire Proofing
   a. Wall Ceiling and Door Surface
   b. Smoke Pipe Covering
10. Basement - Crawl Space
   a. Vents - Louvers
   b. Walls
   c. Floor
   d. Pipe Chases and Covering
   e. Drainage
11. Attic Space
   a. Vents - Louvers
   b. Roof Structures
   c. Ceiling Joists
   d. Insulation
12. Stairway - Halls
   a. Stair Carriage
   b. Treads
   c. Risers
   d. Rail
13. Locker-Storage Space
   a. Partitions
   b. Doors - Grates
   c. Hardware
14. Group Laundry
   a. Drier
15. Incinerator
   a. Firebox - Lining
   b. Grates
   c. Doors
   d. Flues and Linings
   e. Spark Arrester
   f. Burners
16. Fire and Safety Facilities
   a. Hose - Nozzle - Reel

16. Fire and Safety Facilities (Cont'd)
   b. Fire Fighting Tools - Equipment
   c. Fire Extinguishers
   d. Fire Doors - Fuse Links

C. PAINTING AND DECORATING

1. Paint
   a. Surface
2. Shades
   a. Roller
   b. Cloth
3. Curtain Rods

D. PLUMBING

1. Sink
   a. Basin
   b. Faucets
   c. Drain
   d. Supports - Brackets
   e. Drainboard
2. Toilet - Tank
   a. Tank and Mechanism
   b. Bowl
   c. Drain
   d. Seat
3. Lavatory
   a. Basin
   b. Faucets
   c. Drain
   d. Supports or Hangers
4. Bath Tub - Shower
   a. Tub - Stall
   b. Faucets - Shower Head
   c. Drain
   d. Caulking
5. Laundry Tray
   a. Faucets
   b. Basin
   c. Drain
   d. Supports or Hangers

CHECK LIST

D. PLUMBING (Cont'd)

6. Hot Water Heater - Storage
   a. Tank and Mounting
   b. Generator
   c. Generator Pump
   d. Circulating Pump
   e. Temperature Gauge
   f. Controls
   g. Pressure Relief Valve
   h. Covering

E. ELECTRICAL

1. Fixtures - Switches - Receptacles
   a. Physical Condition
   b. Operating Condition
2. Circuit and Distribution Panels
   a. Physical Condition
   b. Operating Condition of Switches and Circuit Breakers
   c. Proper fusing
      (1) 15A for Lighting Branch Circuit
      (2) For Others as Required
   d. Cartridge Fuse Holders
   e. Panel Directors - Proper Designation of Circuits
3. Disconnects
   a. Physical Condition
   b. Fuses - Size and Fuse Holders
4. Starters and Controllers
   a. Physical Condition
   b. Thermal Protection
   c. Adjustments and Cleaning of Contacts
5. Motors
   a. Lubrication
   b. Thermal Protection
   c. Conductor Connections, Splices and Insulation
   d. Conduit or Cable Connections
   e. Commutation and Brushes
   f. Cleaning

E. ELECTRICAL (Cont'd)

6. Conduits, Fittings and Hangers
   a. Continuity
   b. Mountings
   c. Paint
7. Junction Boxes
   a. Cover
   b. Mounting
   c. Conduit or Metallic Cable Locknuts and Bushings
   d. Conductor Connections, Splices and Insulation
8. Ground System - Clamp
   a. Ground Clamp - Ground Electrode - Ground Conductor and Protection
   b. Bonding Jumpers
9. Fire Alarm System
   a. Detectors
   b. Conductors
   c. Alarm Devices
   d. Break Glass Stations
   e. Panels
   f. Source of Electrical Energy
   g. Tests - Test Schedules

F. HEATING AND VENTILATING

1. Space Heaters
   a. Frame Assembly
   b. Firebox - Grate
   c. Draft Controls
   d. Smoke Pipe
   e. Fireproof Mat
2. Forced Warm Air Heater
   a. Frame Assembly
   b. Firebox - Grate
   c. Draft, Bonnet and Temperature Controls

CHECK LIST

F. HEATING AND VENTILATING (Cont'd)
- 2. Forced Warm Air Heater
  - d. Starter - Motor - Fan
  - e. Smoke Pipe
  - f. Filters
- 3. Ducts and Grills
  - a. Ducts
    - (1) Hangers and Coverings
  - b. Grills
    - (1) Deflector
  - c. Damper
    - (1) Heat Balancing Damper
  - d. Safety Devices
    - (1) Relief Damper
    - (2) Fuse Links
- 4. Central or Group Plants
  - a. Boiler
    - (1) Settings
    - (2) Refractory - Firebox
    - (3) Grates
    - (4) Trim
    - (5) Heating Surfaces - Tubes
    - (6) Safety Devices
      - (a) Pressure Safety Valves
      - (b) Soft Plugs
    - (7) Insulation
    - (8) Combustion Controls
    - (9) Smoke Breeching
    - (10) Chimney - Flue - Stack
  - b. Oil Burner
    - (1) Supply Line - Filter
    - (2) Nozzle
    - (3) Motor - Blower - Controls
    - (4) Lubrication
    - (5) Fuel Pump - Gauge
  - c. Stoker
    - (1) Hopper
    - (2) Feeder
    - (3) Motor and Controls
    - (4) Retort - Grates
    - (5) Lubrication
    - (6) Mountings
  - d. Fuel Handling Equipment
    - (1) Storage Facilities
    - (2) Conveyors
    - (3) Ash Lift - Conveyor
    - (4) Firing Tools
  - e. Operating Equipment
    - (1) Boiler Feed Pump
    - (2) Preheater
    - (3) Regulator
    - (4) Gauges
    - (5) Circulating Pumps
    - (6) Motorized Valves
    - (7) Condensate Pumps
    - (8) Sump Pump
    - (9) Steam Flow Meter
    - (10) CO_2 Meter
    - (11) Flue - Gas Pyrometer
    - (12) Boiler Feed Meter
    - (13) Control Valves
    - (14) Thermostatic Controls
    - (15) Zone Controls
    - (16) Heat Balancing System
  - f. Distribution
    - (1) Piping - Fittings - Covering - Hangers
    - (2) Underground Conduit
    - (3) Expansion Joint - Bends
    - (4) Drip Traps, Strainers, etc.
    - (5) Radiators
      - (a) Radiator
      - (b) Supply Valve
      - (c) Thermostatic Trap - Relief Valve
      - (d) Hangers

G. RANGES
- 1. Assembly
  - a. Exterior Surface and Supports
  - b. Oven Interior and Accessories

CHECK LIST

G. RANGES (Cont'd)

2. Burners
   a. Burners and Supports
   b. Cocks, Valves, Pipe, Wiring, Switches
   c. Burner Adjustment
3. Vent
4. Grates - Waterback

H. REFRIGERATORS

1. Cabinet
   a. Exterior Surface and Supports
   b. Interior Surface and Accessories
   c. Hardware and Door Gaskets
2. Refrigerating Equipment
   a. Motor and Compressor Unit (If Gas - Burner Adjustment)
   b. Freezing Unit - Evaporator
   c. Condensor
   d. Controls
   e. Fan
   f. Wiring - Insulation - Connections - Piping

I. OPERATING SERVICES

1. Janitorial
   a. Refuse Containers
   b. Cleaning and Sanitation
2. Vermin Control
   a. Infestation

J. FIRE AND SAFETY HAZARDS

INSPECTION REPORT

GROUNDS, UTILITY DISTRIBUTION SYSTEMS

_____
(Local Body - Name)

Project Name: _____ No. _____ Location _____

Inspected By: _____ Date _____

_____

Item	Location	Condition	Maintenance Required
A. GROUNDS:			
1. Lawns			
2. Plantings			
3. Surfaced Areas			
4. Surface Drainage			
5. Yard Appurtenances			
6. Operating Services			
a. Janitorial			
b. Vermin Control			
7. Fire and Safety Hazards			
B. WATER:			
1. Control and Meas. Equip.			
2. Pipe Lines			
C. SANITARY - STORM WATER			
1. Sewer Lines - Manholes			

INSPECTION REPORT

Item	Location	Condition	Maintenance Required
C. SANITARY - STORM WATER (Cont'd)			
2. Equipment			
D. GAS:			
1. Control and Meas. Equip.			
2. Piping			
E. ELECTRICAL:			
1. Overhead			
2. Underground			
3. Street - Yard Lighting			
4. Measuring Equipment			
F. MAINTENANCE TOOLS AND EQUIPMENT			
1. Automotive			
2. Shop			
3. Grounds			
4. Interior Recreational			
5. Office			
6. Janitorial			

GENERAL REMARKS:

CHECK LIST

GROUNDS, UTILITIES DISTRIBUTION SYSTEM

A. GROUNDS

1. Lawns
   a. Soil
   b. Growth
   c. Grade
2. Plantings
   a. Trees
   b. Shrubs
   c. Vines
   d. Ground Cover
3. Surfaced Areas
   a. Walks - Steps
   b. Streets - Roads - Drives
   c. Parking
   d. Clothes Drying
   e. Recreation
      (1) Play
      (2) Sitting
   f. Grade
4. Surface Drainage
   a. Curbs - Gutters
   b. Catch Basins
   d. Swales - Ditches
5. Yard Appurtenances
   a. Fences
   b. Benches
   c. Clothes Posts
   d. Guard Rails
   e. Signs
   f. Playground Equipment
   g. Drinking Fountain
   h. Retaining Walls
   i. Refuse Collection Stations
6. Operating Services
   a. Janitorial
      (1) Refuse Containers
      (2) Refuse Collections & Disposal Facilities
      (3) Grounds Litter
      (4) Snow Removal
      (5) Street Cleaning
   b. Vermin Control
      (1) Infestation
7. Fire and Safety Hazards

B. WATER

1. Control & Meas. Equipment
   a. Meter
   b. Control Valves
   c. By-Pass
   d. Pressure Regulator
   e. House Cocks
   f. Sillcocks - Yard Hydrants
   g. Sectionalizing
2. Pipe Lines
   a. Pipe
   b. Fittings
   c. Fire Hydrants
   d. Meter - Valve Pits

C. SANITARY - STORM WATER

1. Sewer Lines
   a. Pipes
   b. Manholes
   c. Catch Basins
2. Equipment
   a. Sewage Lift Station
      (1) Pumps
      (2) Motors
      (3) Pit
      (4) Controls
   b. Flow Meters

D. GAS

1. Control & Meas. Equipment
   a. Meter
   b. Valves
   c. By-Pass
   d. Pressure Regulator
   e. Sectionalizing

CHECK LIST

D. GAS (Cont'd)

2. Piping
   a. Pipe
   b. Fittings
   c. Meter Valve Pits
   d. Vents
   e. Drip Pot - (Condensation Traps)
   f. House Stop Cock

E. ELECTRICAL

1. Overhead
   a. Poles - Accessories
      (1) Pole
      (2) Cross Arms
      (3) Cross Arms Braces
      (4) Hardware
      (5) Primary Pins and Insulators
      (6) Secondary Rack and Insulators
      (7) Guys - Anchors - Guards
   b. Transformer
      (1) Primary Cut-Out
      (2) Arrestors
      (3) Hanger - Support or Rack
      (4) Oil Gauge, Thermol Indicator
      (5) Sectionalizing Disconnect
      (6) Ground, Connections, Conductors, Protection & Electrodes
   c. Primary and Secondary Conductors
      (1) Tie Wires
      (2) Insulation - Conductors and Splices
      (3) Clearances
      (4) House Brackets and Insulators
      (5) Entrance Cable, Conduits, Conductors & Head
   d. Capacitors
2. Underground
   a. Transformer Vaults
      (1) Ventilation
      (2) Drainage
      (3) Cleanliness
      (4) Safety Equipment
      (5) Danger Signs (Exterior Door)
      (6) Door Lock
      (7) Lighting
      (8) Grounding Systems
      (9) Primary Conductor Insulation
      (10) Sectionalizing Disconnects
      (11) Secondary Conduits, Conductors, Supports and Hangers
   b. Transformers
      (1) Oil Gauge
      (2) Primary Disconnects
      (3) Primary Rack and Insulators
      (4) Primary Cable
      (5) Primary Duct and Seal

NOTE: Since the transformer vault contains high voltage only qualified and experienced persons should be permitted to enter a transformer vault. This is an extremely dangerous and hazardous place.

   c. Manhole
      (1) Cable, Racks, Splices, Supports and Insulators
      (2) Duct Entrance
      (3) Drainage
   d. Duct System
   e. Capacitor

CHECK LIST

E. ELECTRICAL (Cont'd)

3. Street - Yard Lighting
   a. Fixtures
   b. Standards
   c. Cable, Splices, Connections, Conductors and Insulation
   d. Cable Conductor Protection and Supports
   e. Fuse Protection
   f. Relays
   g. Time Clock
   h. Manual Control
   i. Disconnects
4. Measuring Equipment
   a. Meters

F. MAINTENANCE TOOLS AND EQUIPMENT

1. Automotive
   a. Automobile
   b. Trucks - Tractor
   c. Motor Scooter
   d. Power Mower
2. Shop
   a. Power Tools
      (1) Stationary
      (2) Portable
   b. Small Tools
3. Grounds
   a. Tools
   b. Equipment
4. Interior - Recreational
   a. Games
   b. Gym
   c. Stage
5. Office
   a. Furniture
   b. Machines - Equipment
6. Janitorial
   a. Floor Machines
   b. Hand Cleaning Tools and Equipment
   c. Refuse Containers

SUMMARY REPORT

Project Name: _____ No. _____ Location _____

No. Bldgs. _____ No. DU's _____ No. Rooms _____

Local Body Name _____

Prepared By _____ Date _____

Item	Account No. 4410 - Grounds Maintenance Required
Item	Account No. 4420 - Structures Maintenance Required
Item	Account No. 4430 - Painting and Decorating Maintenance Required
Item	Account No. 4440 - Plumbing and Gas System Maintenance Required
Item	Account No. 4450 - Electrical Maintenance Required
Item	Account No. 4460 - Heating and Ventilating Maintenance Required
Item	Account No. 4470 - Elevator Maintenance Required

SUMMARY REPORT

Item	Account No. 4481 - Ranges Maintenance Required

Item	Account No. 4482 - Refrigerators Maintenance Required

Item	Account No. 4490 - Other Equipment Maintenance Required

Item	Account No. 4200 - Operating Services Maintenance Required

EXAMPLE - For Use In Preparing This Summary Report

Item	Account No. 4430 - Painting and Decorating Maintenance Required
List in this Column the items as recorded in the inspection reports which require Maintenance or Replacement only.	List in this column, maintenance required, as recorded in the Inspection Reports. Only items requiring maintenance or replacement should be recorded.

Item	EXAMPLE Maintenance Required
Paint:	Touchup, paint one coat 20 rooms, paint two coats 10 rooms.
Window Shades:	Replace 60 shades and rollers, replace 10 shades, cloths, replace 10 roller holders, tighten 30 roller holders.
	NOTE: After all "items" and "maintenance required" are listed herein, the total estimated cost for all items should be recorded.

SUMMARY REPORT

VERMIN CONTROL

Summarize: Infestation, corrective steps being taken, further corrective steps necessary.

COMMENTS

Pertinent facts of any unusual condition should be noted here, including the abnormal frequency of maintenance or replacement required by any particular item.

Be brief but give the facts and appropriate comments. List the more important items first in order.

AS BUILT DRAWINGS

1. Definition. As Built drawings are a set of construction drawings of the project as actually constructed. To be complete, all change orders and modifications of the work as contracted for should be indicated and all underground work, sewers, water lines, manholes, septic tanks, etc., should be shown as actually installed. Copies of all shop and change order drawings should be incorporated with the set.

2. Construction Contract Requirements. The construction contract may require that a set of As Built drawings be provided by the contractor. The project engineer is directed to provide the drawings should the contract documents fail to specify As Built drawings as a contract requirement.

3. Local Management Responsibility.

   a. Review of Drawings. The As Built drawings are among the documents to be turned over by the project engineer to the local management on completion of project construction. (Section 6514:1 of the Housing Manager's Manual.) The housing manager or the maintenance superintendent should review the drawings for completeness, noting particularly the underground installations, i.e., sewer, water, gas and steam lines, septic tanks, etc., and should check the actual installations on the ground for the accuracy of the drawings. If drawings have not been turned over to the local management, the local management shall notify the regional management division.

   b. Filing Facilities for Drawings. The drawings should be organized and indexed so as to be readily available for use and for revision, correction and incorporation of additional information. Below is a suggested method to bind and file the drawings, so that each plan and group of plans is clearly identified for easy references:

      (1) Site Plans.
      Underground utilities, streets, roads, and walks: fences and retaining walls; light standard and fire plug locations, etc.
      (2) Planting (landscape) Plans
      (3) Building Plans
      (4) Shop Drawings, (Cross references with (1) and (3))
      (5) As Built Drawings.

4. Corrections and Extensions of As Built Drawings. As Built drawings as received are not always without error. Therefore, all such drawings must be corrected as errors are found. It is also necessary to keep the drawings up to date by indicating on them all new installations and changes made to existing installations.

a. Obtaining Information. The locations of all underground lines should be determined by tracing their courses between surface structures such as manholes, lamp inspection holes, etc. Each such location should be measured from at least two permanent bases, such as building corners. Measurements should be accurate to at least 12".

b. Placing on the Drawing. On the sheet showing the area of the installation to be defined, locate the bases from which measurements have been taken.

Using the scale, describe arcs of the measurements. The point of intersection is the point being defined.

Using white ink or a sharp yellow or bright red pencil, indicate that point. Clearly write or letter the description of the installation. Draw lines from the bases of the installation and clearly indicate the measurement used.

If a sewer or other similar service line location is being shown, connect the several manholes with lines to indicate the course of the service line. Information should also be indicated on the drawing, relative to direction of flow and depth of the service lines. (In making the field observations such information may be obtained by removing manhole covers.)

c. New Work or Alterations. All necessary measurements for location of a construction feature, depth of line or elevation, etc., should be taken and placed on drawing, as described above, before the work is backfilled so that any error may be corrected while the work is open and available for check.

d. Assistance. When doubt exists as to the proper method of placing corrective or new information on the As Built drawings, complete details of the information should be filed until such time as assistance may be obtained from the regional maintenance engineer or other qualified person.

Distribution: All PL-412, PL-671 and PWA Projects

INSTRUCTIONS FOR PREPARING FORM FPHA-837

Local management of all PL-412, PL-671 and PWA projects are required in Manual Section 4644:6, 6644:10 to prepare and submit quarterly Form FPHA-837, Operation and Maintenance Quarterly Report. 1/ This form provides a convenient maintenance record of past performance of the project and is a means by which the maintenance superintendent may inform the housing manager, the local housing authority and FPHA of unusual operating and maintenance problems. From this information the local housing authority and FPHA may compile comparative performance data on a local, regional and national basis. The report will also serve to direct attention to construction deficiencies, which will be of assistance in developing design standards for future construction.

1. Preparation of Form. (See Exhibit 1 at the end of this section) 2/ Below are instructions for filling in Form FPHA-837. Special attention is called to spaces provided for comments and remarks, which are the medium for transmitting information to others or for requesting information. If additional space is required for comments on any items, a supplementary sheet should be added.

   a. Heading of Form.

      Date - Enter the date on which the form is prepared.

      Project No. and Location - Location.

      Occupancy - Enter the percentage of total available dwelling units occupied at the end of the quarter.

      Quarter Ending - Enter the last month in the quarter (March, June September or December).

   b. Body of Form.

      I. Project Heating.

         (1) Fuel - Check type of fuel used by project and in the space following, describe fuel:

            Coal, type and source of supply as: Bituminous, Illinois slack

            Oil, Grade: No. 3, Bunker C., etc.

            Gas, Manufactured or Natural

(Cont'd)

1/ This form replaces FPHA-837, Operation and Maintenance Monthly Report, dated 9-1-41, which was declared obsolete 5-15-44

2/ To be issued shortly.

Par. 1 (Cont'd)

(2) B.T.U. of Fuel - Enter heat value per pound of coal, gallon of oil, cu. ft. of gas. State average for the quarter.

(3) Cost - Enter cost of fuel per unit measure and check unit measure.

(4) Fuel Consumed - Budget - Enter fuel consumed during the quarter and the amount budgeted for the quarter.

(5) Hot Water Av/DU/Day - Enter average hot water consumption per dwelling unit per day. Enter this item only when water is heated by project-operated equipment and the hot water is metered. Estimated quantities should not be reported.

(6) Fuel Consumed During July and August - Enter this item for the third quarter only. (This is necessary for computing cost of heating hot water, boiler plant and distribution line losses. This item must be entered irrespective of whether or not the hot water is metered.)

(7) Hot Water Average /DU/ Day - Enter for the third quarter only fuel consumed for heating water during July and August.

II. Total Project Utility Consumption. Self explanatory

III. Important Mechanical and Electrical Items Worked On. In narrative form, state specifically in detail all mechanical or electrical maintenance work of an unusual character for the quarter. List materials and equipment which have caused unusual maintenance expense or which have had to be replaced. Give causes for failures and where possible methods for correcting them.

IV. Painting.

A. Exterior

1. No. of Dwelling Units Painted - Self Explanatory

2. Approximate Cost - Self Explanatory

B. Interior

1. Enter in columns provided the number of rooms painted (trim and walls) by tenants, management or by contract; the approximate cost per room (walls, trim and walls and trim); and the total management man hours expended by each group.

(Cont'd)

Distribution: All PL-412, PL-671 and PWA Projects

INSTRUCTIONS FOR PREPARING FORM FPHA-837

Local management of all PL-412, PL-671 and PWA projects are required in Manual Section 4644:6, 6644:10 to prepare and submit quarterly Form FPHA-837, Operation and Maintenance Quarterly Report. 2/ This form provides a convenient maintenance record of past performance of the project and is a means by which the maintenance superintendent may inform the housing manager, the local housing authority and FPHA of unusual operating and maintenance problems. From this information the local housing authority and FPHA may compile comparative performance data on a local, regional and national basis. The report will also serve to direct attention to construction deficiencies, which will be of assistance in developing design standards for future construction.

1. Preparation of Form. (See Exhibit 1 at the end of this section) Below are instructions for filling in Form FPHA-837. Special attention is called to spaces provided for comments and remarks, which are the medium for transmitting information to others or for requesting information. If additional space is required for comments on any items, a supplementary sheet should be added.

   a. Heading of Form.

      Date - Enter the date on which the form is prepared.

      Project No. and Location - Location.

      Occupancy - Enter the percentage of total available dwelling units occupied at the end of the quarter.

      Quarter Ending - Enter the last month in the quarter (March, June September or December).

   b. Body of Form.

      I. Project Heating.

         (1) Fuel - Check type of fuel used by project and in the space following, describe fuel:

            Coal, type and source of supply as: Bituminous, Illinois slack

            Oil, Grade: No. 3, Bunker C., etc.

            Gas, Manufactured or Natural (Cont'd)

1/ This page supersedes the corresponding page of Section 1.41, dated 10-5-45. Items I - (7) and II on the reverse have been revised.

2/ This form replaces FPHA-837, Operation and Maintenance Monthly Report, dated 9-1-41, which was declared obsolete 5-15-44.

Par. 1 (Cont'd)

(2) B.T.U. of Fuel - Enter heat value per pound of coal, gallon of oil, cu. ft. of gas. State average for the quarter.

(3) Cost - Enter cost of fuel per unit measure and check unit measure.

(4) Fuel Consumed - Budget - Enter fuel consumed during the quarter and the amount budgeted for the quarter.

(5) Hot Water Av/DU/Day - Enter average hot water consumption per dwelling unit per day. Enter this item only when water is heated by project-operated equipment and the hot water is metered. Estimated quantities should not be reported.

(6) Fuel Consumed During July and August - Enter this item for the third quarter only. (This is necessary for computing cost of heating hot water, boiler plant and distribution line losses. This item must be entered irrespective of whether or not the hot water is metered.)

(7) Hot Water Average /DU/ Day - Enter for the third quarter only average hot water consumption per dwelling unit per day. Enter this item only when water is heated by project operate equipment and the water is metered. Estimated quantities should not be entered. Disregard boxes provided for "tons" and "cubic feet".

II. Total Project Utility Consumption - Self explanatory where water is metered in cubic feet convert to gallons.

III. Important Mechanical and Electrical Items Worked On. In narrative form, state specifically in detail all mechanical or electrical maintenance work of an unusual character for the quarter. List materials and equipment which have caused unusual maintenance expense or which have had to be replaced. Give causes for failures and where possible methods for correcting them.

IV. Painting.

A. Exterior

1. No. of Dwelling Units Painted - Self Explanatory

2. Approximate Cost - Self Explanatory

B. Interior

1. Enter in columns provided the number of rooms painted (trim and walls) by tenants, management or by contract; the approximate cost per room (walls, trim and walls and trim and the total management man hours expended by each group.

(Cont'd)

Distribution: All PL-412, PL-671 and PWA Projects

INSTRUCTIONS FOR PREPARING FORM FPHA-837

Local management of all PL-412, PL-671 and PWA projects are required in Manual Section 4644:6, 6644:10 to prepare and submit quarterly Form FPHA-837, Operation and Maintenance Quarterly Report.2/ This form provides a convenient maintenance record of past performance of the project and is a means by which the maintenance superintendent may inform the housing manager, the local housing authority and FPHA of unusual operating and maintenance problems. From this information the local housing authority and FPHA may compile comparative performance data on a local, regional and national basis. The report will also serve to direct attention to construction deficiencies, which will be of assistance in developing design standards for future construction.

1. Preparation of Form. (See Exhibit 1 at the end of this section) Below are instructions for filling in Form FPHA-837. Special attention is called to spaces provided for comments and remarks, which are the medium for transmitting information to others or for requesting information. If additional space is required for comments on any items, a supplementary sheet should be added.

   a. Heading of Form.

      Date - Enter the date on which the form is prepared.

      Project No. and Location - Location.

      Occupancy - Enter the percentage of total available dwelling units occupied at the end of the quarter.

      Quarter Ending - Enter the last month in the quarter (March, June September or December).

   b. Body of Form.

      I. Project Heating.

         (1) Fuel - Check type of fuel used by project and in the space following, describe fuel:

            Coal, type and source of supply as: Bituminous, Illinois slack

            Oil, Grade: No. 3, Bunker C., etc.

            Gas, Manufactured or Natural (Cont'd)

1/ This page supersedes the corresponding page of Section 1.41, dated 10-5-45 Item on the reverse has been revised.

2/ This form replaces FPHA-837, Operation and Maintenance Monthly Report, dated 9-1-41, which was declared obsolete 5-15-44.

Par. 1 (Cont'd)

(2) B.T.U. of Fuel - Enter heat value per pound of coal, gallon of oil, cu. ft. of gas. State average for the quarter.

(3) Cost - Enter cost of fuel per unit measure and check unit measure.

(4) Fuel Consumed - Budget - Enter fuel consumed during the quarter and the amount budgeted for the quarter.

(5) Hot Water Av/DU/Day - Enter average hot water consumption per dwelling unit per day. Enter this item only when water is heated by project-operated equipment and the hot water is metered. Estimated quantities should not be reported.

(6) Fuel Consumed During July and August - Enter this item for the third quarter only. (This is necessary for computing cost of heating hot water, boiler plant and distribution line losses. This item must be entered irrespective of whether or not the hot water is metered.)

(7) Hot Water Average /DU/Day - Enter for the third quarter only average hot water consumption per dwelling unit per day. Enter this item only when water is heated by project operated equipment and the water is metered. Estimated quantities should not be entered. Disregard boxes provided for "tons" and "cubic feet".

II. Total Project Utility Consumption - Self explanatory where water is metered in cubic feet convert to gallons.

III. Important Mechanical and Electrical Items Worked On. In narrative form, state specifically in detail all mechanical or electrical maintenance work of an unusual character for the quarter. List materials and equipment which have caused unusual maintenance expense or which have had to be replaced. Give causes for failures and where possible methods for correcting them.

IV. Painting.

A. Exterior

1. No of Dwelling Units Painted - Self Explanatory

2. Approximate Cost - Enter in spaces provided the total cost of material and labor for the work done by contract and/or by project employees.

B. Interior

1. Enter in columns provided the number of rooms painted (trim and walls) by tenants, management or by contract; the approximate cost per room (walls, trim and walls and trim and the total management man hours expended by each group.

(Cont'd)

Par. 1 (Cont'd)

2. % Painted - In the blank space following "1 coat" enter the approximate percentage of the rooms painted which received 1 coat of paint. In the blank space following "oil," enter the percentage which were painted with oil paint. In the blank space following "other" enter the percentage on which other types of paint were used and enter the kind of paint in the space following. It should be noted the sum of the percentages in the spaces following "oil" and "other" should equal the percentage shown as "1 coat." The line relative to "2 coats" should be filled in in a similar manner.

C. Comments. Describe any unusual characteristics of the project or condition which affect painting costs such as sand-finished walls, leaking walls, condensation, poor initial paint job, etc.; qualities of paint - good, fair, or poor; whether interior of windows are included with interior trim.

V. Structures. State important structural items worked on during the quarter. In narrative form, describe any unusual maintenance problems or expenses which occurred during the quarter involving such items as:

(1) Roofing repairs and replacements.

(2) Fractured or leaky masonry walls.

(3) Condensation within the dwelling units.

(4) Steel sash deterioration.

(5) Exterior doors

(6) Others

On the above items, state corrective or preventive measures which have proved effective.

VI. Grounds.

A. Paved Areas - Self Explanatory

B. Lawns.

1. % of Total Lawn Area - Of total lawn area, enter approximate percentages reseeded, fertilized or rebuilt during quarter.

Par. 1 (Cont'd)

2. Percent of Tenants Participating in Lawn Maintenance - Enter the percentage of the total number of families who participate in lawn maintenance.

C. Trees and Shrubs - Of total number of trees and shrubs, enter percentage fertilized, pruned or cultivated.

D. Comments - Describe any unusual maintenance problems, corrective measures used, and expense which have been experienced during the quarter, such as:

(1) Rehabilitation of lawn areas

(2) Pest infestations

(3) Erosion control

(4) Correction of storm damage

(5) Repairs to benches, fences and other yard appurtenances.

VII. Labor Distribution - Man Hours - In boxes provided, enter the number of man hours charged during the quarter to each of the accounts listed.

VIII. Items of Repairs and Replacements Anticipated to be Done and When - Describe the outstanding repairs and maintenance items which will have to be done and when it is expected to do them.

IX. Items of Maintenance (Other than Lawns and Yards) Tenants Have Participated In - Describe what tenant participation other than in lawn and yard maintenance is being obtained in the maintenance program, such as; painting, washing of walls, handling of window screens, etc. Describe any plan or ideas that have proved successful or are of special interest in this regard.

X. Items of RM&R To Be Discussed with Regional Maintenance Staff - Self explanatory.

2. Submittal of Form. Instructions for the submittal of Form FPHA-837 are contained in Manual Sections 4644:6 and 6644:10.

Par. 1 (Cont'd)

2. % Painted - In the blank space following "1 coat" enter the approximate percentage of the rooms painted which received 1 coat of paint. In the blank space following "oil," enter the percentage which were painted with oil paint. In the blank space following "other" enter the percentage on which other types of paint were used and enter the kind of paint in the space following. It should be noted the sum of the percentages in the spaces following "oil" and "other" should equal the percentage shown as "1 coat." The line relative to "2 coats" should be filled in in a similar manner.

C. Comments. Describe any unusual characteristics of the project or condition which affect painting costs such as sand-finished walls, leaking walls, condensation, poor initial paint job, etc.; qualities of paint - good, fair, or poor; whether interior of windows are included with interior trim.

V. Structures. State important structural items worked on during the quarter. In narrative form, describe any unusual maintenance problems or expenses which occurred during the quarter involving such items as:

(1) Roofing repairs and replacements.

(2) Fractured or leaky masonry walls.

(3) Condensation within the dwelling units.

(4) Steel sash deterioration.

(5) Exterior doors.

(6) Others.

On the above items, state corrective or preventive measures which have proved effective.

VI. Grounds.

A. Paved Areas - Self Explanatory

B. Lawns.

1. % of Total Lawn Area - Of total lawn area, enter approximate percentages reseeded, fertilized or rebuilt during quarter.

1/ This page supersedes the corresponding page of Bulletin No. 63, Section 1.41, dated 10-5-45. The instructions on page 4 for completing Part VII of Form FPHA-837 have been revised.

Par. 1 (Cont'd)

2. Percent of Tenants Participating in Lawn Maintenance - Enter the percentage of the total number of families who participate in lawn maintenance.

C. Trees and Shrubs - Of total number of trees and shrubs, enter percentages fertilized, pruned or cultivated.

D. Comments - Describe any unusual maintenance problems, corrective measures used, and expense which have been experienced during the quarter, such as:

(1) Rehabilitation of lawn areas

(2) Pest infestations

(3) Erosion control

(4) Correction of storm damage

(5) Repairs to benches, fences and other yard appurtenances.

VII. Labor Distribution - Man Hours - In boxes provided, enter the number of man hours charged during the quarter to each of the accounts listed. In addition, enter in each box (in the space below the number of man hours), the total labor cost chargeable to each account for the quarter. (Do not include in this item costs for materials.) 1/

VIII. Items of Repairs and Replacements Anticipated to be Done and When - Describe the outstanding repairs and maintenance items which will have to be done and when it is expected to do them.

IX. Items of Maintenance (Other than Lawns and Yards) Tenants Have Participated In - Describe what tenant participation other than in lawn and yard maintenance is being obtained in the maintenance program, such as; painting, washing of walls, handling of window screens, etc. Describe any plan or ideas that have proved successful or are of special interest in this regard.

X. Items of RM&R To Be Discussed with Regional Maintenance Staff - Self explanatory.

2. Submittal of Form. Instructions for the submittal of Form FPHA-837 are contained in Manual Sections 4644:6 and 6644:10.

1/ Part VII of Form FPHA-837 (10-5-45) does not indicate that labor costs are to be included in filling out this portion of form. Future revision of the form will include this item.

FPHA-837
10-5-45

BUDGET BUREAU NO. 65-R160.1
APPROVAL EXPIRES: 6-30-47

NATIONAL HOUSING AGENCY
FEDERAL PUBLIC HOUSING AUTHORITY

OPERATION AND MAINTENANCE QUARTERLY REPORT

(See Bulletin No. 63, Section I.41 for instructions)

PROJECT NO.	LOCATION (CITY AND STATE)
Ohio 15-2	Smithtown, Ohio
NO. OF DWELLING UNITS: 900	OCCUPANCY (%): 96.5
QUARTER ENDING: March 31, 1945	DATE: April 6, 1945

I. PROJECT HEATING:

1. FUEL: [X] COAL [ ] OIL [ ] GAS DESCRIBE: Bituminous - Screenings
2. B.T.U. OF FUEL: 11500 a. COST: 3.72 PER [X] TON [ ] GAL. [ ] 1000 CU.FT. [X] TONS [ ] GAL. [ ] CUBIC FT.
3. FUEL CONSUMED: 900 BUDGETED: 830
4. HOT WATER AVERAGE/D.U./DAY: 64 GALLONS
5. FUEL CONSUMED: JULY X AUGUST X [ ] TONS [ ] GAL. [ ] CUBIC FT.
7. HOT WATER AVERAGE/D.U./DAY: JULY X AUGUST X [ ] TONS [ ] GAL. [ ] CUBIC FT.

II. TOTAL PROJECT UTILITY CONSUMPTION:

UTILITY	QUANTITY BILLED	QUANTITY BUDGETED	UNIT
STEAM			
WATER	5910 M	6150 M	GALLONS
GAS	753 M	775 M	CUBIC FT.
ELECTRIC	90400	90000	K.W. HRS.
ELEC. DEMAND	999		K.W.

III. IMPORTANT MECHANICAL AND ELECTRICAL ITEMS WORKED ON:

PLUMBING - Replaced pump shaft on sewage ejector - Bldg. - G-7
RANGES - Replaced 21 gas temperature controls. This control manufactured by X Company has been unsatisfactory.
REFRIGERATORS - Cleaned condensors and contact points on 36 units, replaced one door handle - door gaskets are failing after 6 years.
HEATING SYSTEM - Replaced 3 steam reducing valve diaphrams.
Summer maintenance schedule being prepared.
See attached sheet.

IV. PAINTING:

A. EXTERIOR — 1. NO. DWELLING UNITS PAINTED: 82 — 2. APPROXIMATE COST: PROJECT LABOR $ 3120 CONTRACT $ - TOTAL $ 3120

B. INTERIOR

	NO. OF ROOMS: Trim	NO. OF ROOMS: walls 1/	APPROXIMATE COST PER ROOM: walls 1/	APPROXIMATE COST PER ROOM: Trim	APPROXIMATE COST PER ROOM: walls 1/ and Trim	TOTAL MAN HOURS
a. Tenants		84	4.30			21
b. Management	328	244	15.20	4.50	19.45	2772
c. Contract	-	-	-	-	-	-

ROOMS: 1 COAT 100 $ OIL 100 $ OTHER - $ - KIND -
PAINTED: 2 COATS $ OIL $ OTHER - $ - KIND -

C. COMMENTS:

Paint in use is good quality and should stand up for the 3 year cycle.
Approximately 1 hour of management supervision is devoted to each tenant doing painting.
Oil paint only is used on this project. Other proved unsatisfactory. Interior sides of windows is included in the painting of trim.

1/ Include ceilings.

V. STRUCTURES: (IMPORTANT STRUCTURAL ITEMS WORKED ON)

Settlement and Expansion Wall Cracks
Caulking Doors and Windows
Repairs to 150 screen doors
Replacing 200 exterior doors.

1/ This supersedes Exhibit I, dated 10-20-45. Errors in the exhibit have been corrected.

VI. GROUNDS:

A. PAVED AREAS (STREETS, ETC.) 1. HAVE REPAIRS BEEN MADE? [X] YES [ ] NO; ARE ADDITIONAL REPAIRS NECESSARY? [X] YES [ ] NO

2. DESCRIBE CHARACTER AND EXTENT OF REPAIRS AND COSTS INVOLVED:

Repaired with outback asphalt patching mixture, 200 sq. yds. of bituminous paving in parking areas and service drives in Blocks A & B at $.60 per sq. yd. Raised 15 slabs of concrete walks at buildings #1, 3 and 5 with mudjack at $1.00 per slab.

B. LAWNS:
1. % OF TOTAL LAWN AREA: RESEEDED 25 FERTILIZED 50 REBUILT 10
2. % OF TENANTS PARTICIPATING IN LAWN MAINTENANCE 40 (Row House Units Only)

C. TREES AND SHRUBS: % OF TOTAL NUMBER
FERTILIZED 30 PRUNED 30 CULTIVATED 40

D. COMMENTS:

This completes the scheduled three-year cycle of reseeding and fertilizing lawn areas (total of 800,000 sq. ft. @ $3.00). Replaced 20 trees at $15.00. Adjusted 200 shrubs at doorways at $.50. Replaced 150 shrubs about play areas at $1.50. Borers in Oaks reported last summer now under control.

VII. LABOR DISTRIBUTION - MAN HOURS:

JANITORIAL 5210	EXTERMINATING 5220	HEATING LABOR 5350	SUPERVISION AND OVERHEAD 5001	GROUNDS 5430	STRUCTURES 5420	PAINTING AND DECORATING 5430	PLUMBING AND GAS 5600
4212	500	5148	520	2000	1000	2795	550
$2950	$375	$4633	$780	$1500	$900	$3491	$550

ELECTRICAL SYSTEM 5260	HEATING & VENTILATING SYSTEM 5260	RANGES 5281	REFRIGERATORS 5282	OTHER EQUIPMENT 5290
350	2600	75	200	100
$315	$2600	$60	$200	$85

VIII. OUTSTANDING REPAIR AND REPLACEMENT ITEMS ANTICIPATED TO BE DONE AND WHEN:

All bituminous paving to receive a seal coat of asphalt and limestone in April or May estimated at 2000 sq. yds. @ $.54.

IX. ITEMS OF MAINTENANCE (OTHER THAN LAWNS AND YARDS) TENANTS HAVE PARTICIPATED IN:

Removal and storage of window screens.

X. ITEMS OF WORK WHICH YOU WISH TO DISCUSS WITH THE REGIONAL MAINTENANCE STAFF:

Boiler settings showing cracks - Condensation in crawl spaces. - Tenant Maintenance in grounds areas of apartment units.

MAINTENANCE SUPERINTENDENT: John Smith

DATE: 4-7-45

FPHA-837
12-20-46

NATIONAL HOUSING AGENCY
FEDERAL PUBLIC HOUSING AUTHORITY

BUDGET BUREAU NO. 65-R160.3
APPROVAL EXPIRES: 12-31-47

OPERATION AND MAINTENANCE QUARTERLY REPORT

(See Bulletin No. 63, Section 1.41 for instructions)

PROJECT NO.	LOCATION (CITY AND STATE)
Ohio 15-2	Smithtown, Ohio
NO. OF DWELLING UNITS: 900	OCCUPANCY (%): 96.5
QUARTER ENDING: March 31, 1945	DATE: April 6, 1945

I. PROJECT HEATING:

1. FUEL: [X] COAL [ ] OIL [ ] GAS DESCRIBE: Bituminous - Screenings
2. B.T.U. OF FUEL: 11500 3. COST: 3.72 PER [X] TON [ ] GAL. [ ] 1000 CU.FT.
4. FUEL CONSUMED: 900 BUDGETED: 830 [X] TONS [ ] GAL. [ ] CUBIC FT. [ ] GALLONS
5. HOT WATER AVERAGE/D.U./DAY: 64
6. FUEL CONSUMED: JULY X AUGUST X [ ] TONS [ ] GAL. [ ] CUBIC FT. [ ] GALLONS
7. HOT WATER AVERAGE/D.U./DAY: JULY X AUGUST X

II. TOTAL PROJECT UTILITY CONSUMPTION:

UTILITY	QUANTITY BILLED	QUANTITY BUDGETED	UNIT
STEAM			
WATER	5910 M	6150 M	GALLONS
GAS	753 M	775 M	CUBIC FT.
ELECTRIC	90400	90000	K.W. HRS.
ELEC. DEMAND	999		K.W.

III. IMPORTANT MECHANICAL AND ELECTRICAL ITEMS WORKED ON:

PLUMBING - Replaced pump shaft on sewage ejector - Bldg. - G-7
RANGES - Replaced 21 gas temperature controls. This control manufactured by X Company has been unsatisfactory.
REFRIGERATORS - Cleaned condensors and contact points on 36 units, replaced one door handle - door gaskets are failing after 6 years.
HEATING SYSTEM - Replaced 3 steam reducing valve diaphrams.
Summer maintenance schedule being prepared.
See attached sheet.

IV. PAINTING:

A. EXTERIOR — 1. NO. DWELLING UNITS PAINTED: 82 — 2. APPROXIMATE COST: PROJECT LABOR $ 3120 CONTRACT $ - TOTAL $ 3120

B. INTERIOR

	NO. OF ROOMS		APPROXIMATE COST PER ROOM			TOTAL MAN HOURS
	Trim	Walls 1/	Walls 1/	Trim	Walls 1/ and Trim	
a. Tenant		84	4.50			21
b. Management	328	244	15.20	4.50	19.45	2772
c. Contract	-	-	-	-	-	-

$ ROOMS PAINTED: 1 COAT 100 $ OIL 100 $ OTHER - $ - KIND -
2 COATS $ OIL $ OTHER - $ - KIND -

C. COMMENTS:
Paint in use is good quality and should stand up for the 3 year cycle.
Approximately 1 hour of management supervision is devoted to each tenant doing painting.
Oil paint only is used on this project. Other proved unsatisfactory. Interior sides of windows is included in the painting of trim.

1/ Include ceilings.

V. STRUCTURES: (IMPORTANT STRUCTURAL ITEMS WORKED ON)

Settlement and Expansion Wall Cracks
Caulking Doors and Windows
Repairs to 150 screen doors
Replacing 200 exterior doors.

VI. GROUNDS:

A. PAVED AREAS (STREETS, ETC.) 1. HAVE REPAIRS BEEN MADE? [X] YES [ ] NO; ARE ADDITIONAL REPAIRS NECESSARY? [X] YES [ ] NO

2. DESCRIBE CHARACTER AND EXTENT OF REPAIRS AND COSTS INVOLVED:

Repaired with cutback asphalt patching mixture, 200 sq. yds. of bituminous paving in parking areas and service drives in Blocks A & B at $.60 per sq. yd. Raised 15 slabs of concrete walks at buildings #2, 3 and 5 with mudjack at $1.00 per slab.

B. LAWNS:
1. % OF TOTAL LAWN AREA: RESEEDED 25 FERTILIZED 50 REBUILT 10
2. % OF TENANTS PARTICIPATING IN LAWN MAINTENANCE 40 (Row House Units Only)

C. TREES AND SHRUBS: % OF TOTAL NUMBER FERTILIZED 30 PRUNED 30 CULTIVATED 40

D. COMMENTS:

This completes the scheduled three-year cycle of reseeding and fertilizing lawn areas (total of 800,000 sq. ft. @ $3.00). Replaced 20 trees at $15.00. Adjusted 200 shrubs at doorways at $.50. Replaced 150 shrubs about play areas at $1.50. Borers in Oaks reported last summer now under control.

VII. LABOR DISTRIBUTION - MAN HOURS AND COSTS:

ACCOUNT	JANITORIAL 6210	EXTERMINATING 6220	HEATING LABOR 6350	SUPERVISION AND OVERHEAD 6401	GROUNDS* 6510	STRUCTURES 6520	PAINTING AND DECORATING 6530	PLUMBING AND GAS 6540
HOURS	4212	500	5148	520	2000	1000	2793	550
COSTS	$2950	$375	$4633	$780	$1500	$900	$3491	$550

ACCOUNT	ELECTRICAL SYSTEM 6450	HEATING & VENTILATING SYSTEM 6460	RANGES 6481	REFRIGERATORS 6482	OTHER EQUIPMENT 6490
HOURS	350	2600	75	200	100
COSTS	$315	$2600	$60	$200	$85

VIII. OUTSTANDING REPAIR AND REPLACEMENT ITEMS ANTICIPATED TO BE DONE AND WHEN:

All bituminous paving to receive a seal coat of asphalt and limestone in April or May estimated at 2000 sq. yds. @ $.54.

IX. ITEMS OF MAINTENANCE (OTHER THAN LAWNS AND YARDS) TENANTS HAVE PARTICIPATED IN:

Removal and storage of window screens.

X. ITEMS OF INTEREST WHICH YOU WISH TO DISCUSS WITH THE REGIONAL MAINTENANCE STAFF:

Boiler settings showing cracks - Condensation in crawl spaces. - Tenant Maintenance in grounds areas of apartment units.

MAINTENANCE SUPERINTENDENT John Smith

DATE 4-7-45

USE OF PROJECT "WORK ORDER," FORM FPHA-1176,
ON DIRECTLY OPERATED PROJECTS

This section contains the procedures for preparing and processing Form FPHA-1176 (5-15-46), Work Order, (Exhibit 1). This form is provided for recording all work done by the project maintenance force, however initiated, and as a "tenant or service request."

1. Work Covered. All work shall be covered by a work order so that orders will reflect a true summary of the entire work of the maintenance force. Routine items such as lawn mowings and garbage station clean up should be covered. This may be done by filling out one order for each such routine item to serve for a week, month or season. Proper entries for labor can be made from time sheets or other reports and material and supplies can be entered from other forms.

2. Number of Copies Prepared. This form shall be prepared in triplicate for each item of work. The distribution of the copies, each of which is identified by a color, shall be in accordance with the uses of the form as outlined below.

3. Use of Form as Tenant Service Request.

   a. Initial Preparation and Distribution of Form by Management Office.

      (1) Preparation. The form shall be filled out in an original and two copies at the management office by a project employee as follows:

      Order No.: Insert order number assigned in numerical sequence in the lower right corner of the form.

      Originated By.: Check box marked "Tenant."

      Project No.: Required only when the work for more than one project flows through one management or maintenance office.

      Date Received.: Insert date request is received.

      Location: Insert address of dwelling in which work is required.

      Unit No.: Insert number of dwelling unit.

      Occupant: Insert name of tenant making request.

      Work to be Done: Insert work to be done, defining it clearly but briefly. When practicable, give the maintenance force sufficient information for it to be able to complete the job in one visit.

Par. 3 (Cont'd)

NOTE: It is recommended that each item of work be carried on a separate work order. Some projects may find it advisable when the form is used as a tenant request, to carry more than one item of work when reported by one tenant. Care should be taken, however, to limit the items of work to not more than two account or work classifications, as but two copies of the order are available for filing in the classification file. (see paragraphs 3d(3) and 5).

Approved By: If the request must be approved by the housing manager, he shall sign or initial the form in the upper right corner. (If the responsibility is that of the maintenance supervisor, the space shall be left blank.) This approval may be omitted from the procedure if the project organizational setup does not require it, or if other scrutiny by proper authority is provided before work is assigned.

(2) Distribution. Upon completion of the form as outlined above, the following distribution shall be made.

1st (white) and 2nd (pink) copies - to maintenance supervisor.

3rd (blue) copy - retained in management office as a record until work is completed.

b. Action by Maintenance Supervisor.

(1) The following items shall be filled in by the maintenance supervisor on the white and pink copies:

Approved By: If approval is the supervisor's responsibility, he shall sign or initial in the upper right corner.

Assigned To: Insert name of employee or foreman who is to perform the work or is responsible for its performance.

Date and Time: Insert date and time of assignment. (Those projects which do not keep a time check on the progress of the jobs may omit the "time" under this and similar items.)

(2) The maintenance supervisor shall then forward the white copy to the employee or foreman assigned and shall retain the pink copy until the work is completed.

Par. 3 (Cont'd)

c. Action by Employee Assigned.

(1) Upon completion of the work, the employee assigned to the job shall fill out the following items:

Work Done: Remarks: Insert work actually done in sufficient detail to properly identify it for classification, and to show extent of the job. Additional remarks such as the conditions causing the request or other comments as they may apply should also be indicated here.

Tenant Signature: Have the tenant sign on completion of the work.

Cost Summary (Reverse of Form): Fill in class of labor (mechanic, carpenter, etc.), hours, and rate if known. Itemize materials used and insert unit price, if known. 1/ In the date column, no insertion is needed if work is completed in one day. If work runs over one day, the date the work is done should be inserted. If store room orders are in use on the project reference should be made by number to the appropriate order, or if sufficient copies are available, those pertaining to the job may be clipped to the order.

Work Completed: The employee should sign his name and insert date and time work is completed in the block provided in the lower left corner.

(2) The employee or foreman shall then return the copy to the supervisor.

d. Completion of Form.

(1) The maintenance supervisor shall review the white copy and shall complete the form by inserting the following items:

Cost Summary (Reverse): Insert rate and unit price if not already inserted. Insert labor costs, 2/ materials costs and complete cost summary 3/.

Account No. (Face): Insert account number(s) to which charge is to be made. 3/

Tenant Charge: Insert tenant charge, if any. 3/

1/ In general cost columns will be filled in by supervisor or management office.
2/ Labor cost includes supervisory costs directly attributable to the job.
3/ Responsibility for filling in these items (total cost of job, tenant charges, or account numbers) may vary between projects. When necessary, this procedure should be changed to conform to project policy.

Par. 3 (Cont'd)

Work Approved: The maintenance supervisor shall sign or initial in this box and insert the date.

(2) The white and pink copies shall be forwarded to the management office.

(3) In the management office, the forms shall be completed, if necessary, (see footnote 3/) conformed 1/ and routed as follows:

1st (white copy) - to the bookkeeper or accountant who shall post the tenant charge, if any, enter it on the Dwelling Unit Record if required, and initial in space marked "Posted." This copy shall then be filed in a numercial file in the management office.

2nd copy (if more than one item of work) and 3rd copy - to the maintenance supervisor for filing in a Work Classification File, set up in accordance with Paragraph 5.

4. Use of Form as Project Initiated Work Order. The procedures set forth in paragraph 3 above shall be followed with the following modifications:

a. The form may be prepared either at the management or the maintenance office.

b. Under Originated By, check the box marked "Management."

c. No tenant signature is required, even if work is done in a dwelling unit. The name of the occupant, however, may be inserted in the space provided.

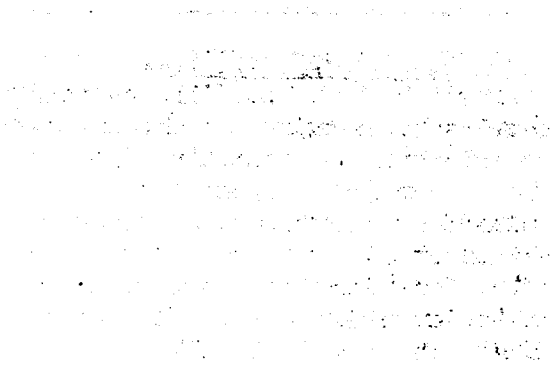
d. Location - should be used to show location of the work such as building number, or street or yard location or address.

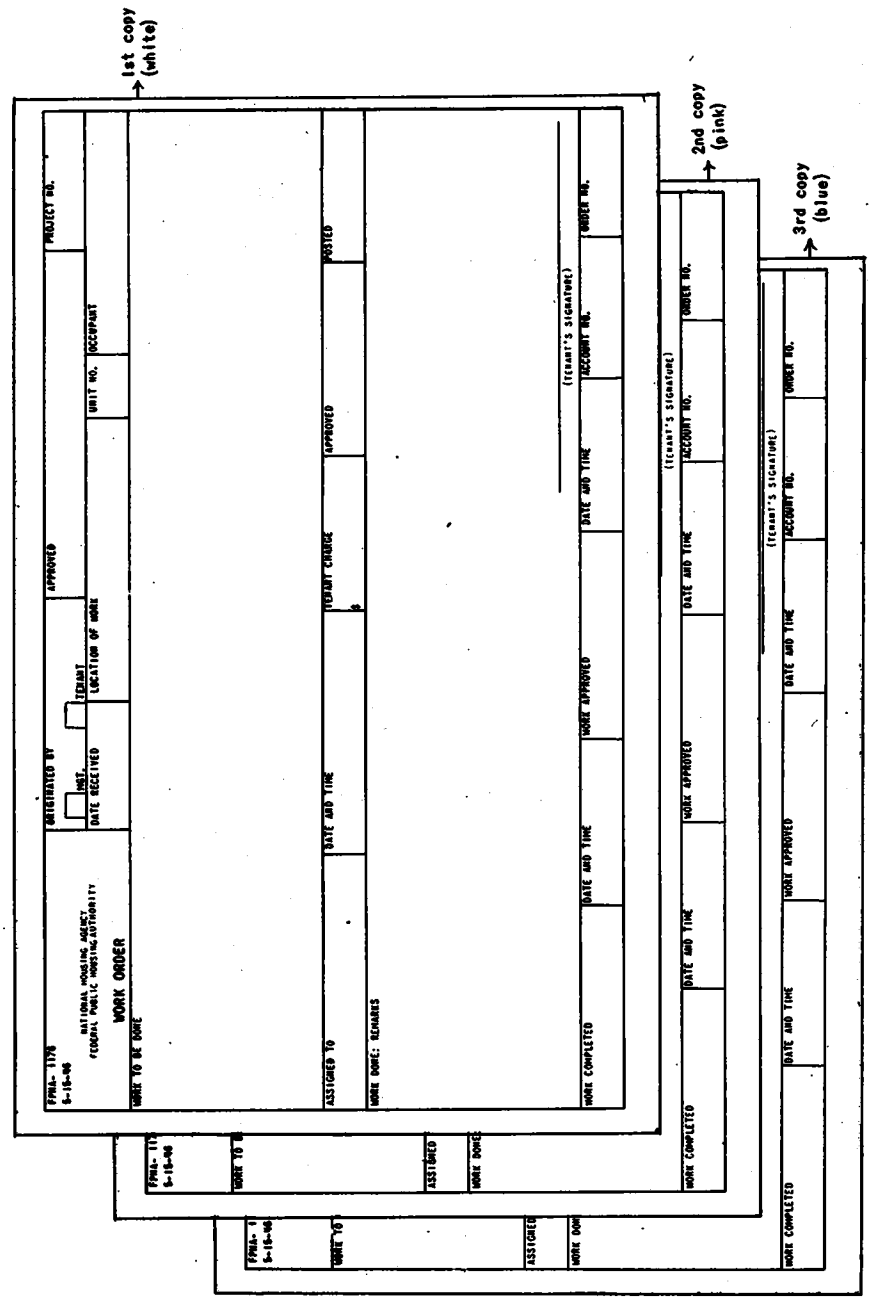
e. A tenant charge may be required depending on circumstances and project policy.

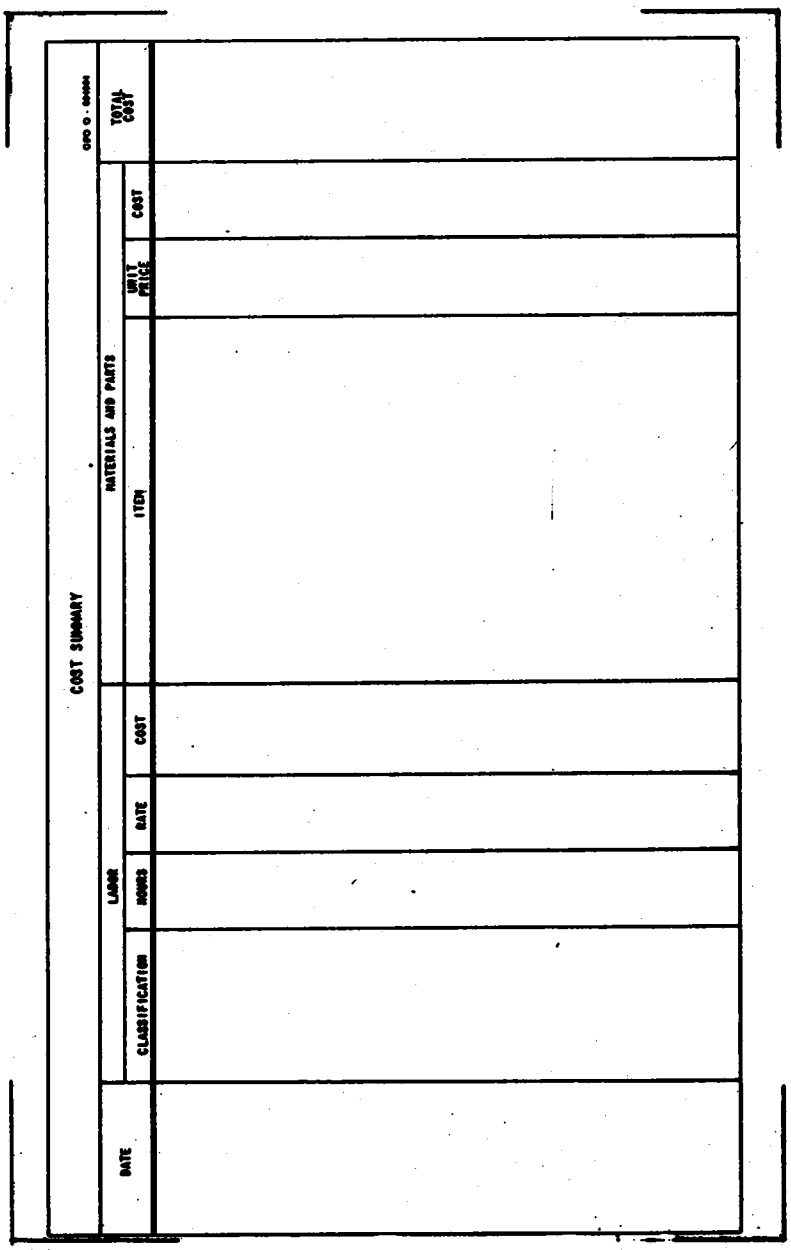
f. When a job of long duration requires additional space for Cost Summary an additional form shall be appended.

1/ If but one item of work is carried on one order, the 2nd copy need not be conformed and may be destroyed by the maintenance superintendent after the return of the 1st copy, following classification of the work.

5. Work Classification File. The maintenance supervisor shall maintain a work classification file containing all work orders. This file shall have several major breakdowns corresponding to those operating services and maintenance accounts listed in Bulletin No. 52 as are applicable to the project. Each of these should be broken down into several major subheads to permit easy review and analysis. The subheads for "Structures," as an example, may be screens and screen doors, hardware, roofs, floors, etc; for "Plumbing," the subheads may be hot water heaters, fixtures, interior piping, etc. Items not covered by a subhead may be filed under the major account.




1st copy (white)
2nd copy (pink)
3rd copy (blue)
FPHA- 1170
6-15-46
NATIONAL HOUSING AGENCY
FEDERAL PUBLIC HOUSING AUTHORITY
WORK ORDER
ORDERED BY
MAINT.
TENANT
DATE RECEIVED
LOCATION OF WORK
APPROVED
PROJECT NO.
UNIT NO.
OCCUPANT
WORK TO BE DONE
ASSIGNED TO
DATE AND TIME
ESTIMATED CHARGE
$
APPROVED
POSTED
WORK DONE: REMARKS
WORK COMPLETED
DATE AND TIME
WORK APPROVED
DATE AND TIME
(Tenant's Signature)
ACCOUNT NO.
ORDER NO.


COST SUMMARY
DATE
LABOR
CLASSIFICATION
HOURS
RATE
COST
MATERIALS AND PARTS
ITEM
UNIT PRICE
COST
TOTAL COST

PUM COSTS FOR OPERATING SERVICES AND RM&R ACCOUNTS - AIDED AND PWA HOUSING DEVELOPMENTS

Guides are a most important tool in evaluating a job or the efficiency of an organization. Such a guide is the per dwelling unit per month cost (PUM) as applied to the several accounts used in public housing.

The PUM figures for operating service and RM&R accounts contained in this section have been developed from the records of 253 developments of from 4 years to 9 years of age representing all regions, and the operating costs cover the period from the end of the initial operating period (EIOP) to fiscal years ending up to March 31, 1947. Certain items, notably those on plumbing and heating, have been broken down into categories which permit of more accurate use. The items, "Janitorial", "Exterminating" and "RM&R Supervision", in general, include only the last three years of operation.

The figures are given to aid housing manager and local authority personnel in evaluating operations as reflected in actual costs. In using these figures it should be strongly borne in mind that they are guides only. It is not to be presumed that in any one instance the figures, especially the averages, are directly applicable. No development is "average". The many variables such as; type of construction, layout, location, management practice and age of the development, are all factors which influence the actual costs for the individual development.

The guides should be used to determine whether the actual per unit per month costs require a further check to justify them. A major factor which should always be borne in mind is the relationship of costs to the standard of operation or of maintenance at a particular development. Low costs may reflect a low standard and high costs may indicate too high a standard. Tenant participation in maintenance will particularly affect the "Grounds" and "Painting" Accounts.

The columns of the tables are explained as follows:

1st Column. Account Number. This is the number of the Expense Account as given in Bulletin No. 52, "Classification of Project Management Income and Expense Accounts".

2nd Column. Title. This is the title of the account as given in Bulletin 52.

3rd Column. No. of Dev. This column gives the number of developments, the operating costs of which were used in developing the results for the specific account or sub-account.

4th Column. No. of Unit-Months. The number of unit-months applicable to the several accounts is the total number of units applicable to the account multiplied by the number of months of operation, for which figures are available.

5th Column. The highest cost per dwelling unit per month for any one development.

6th Column. The average cost per dwelling unit per month using the total cost of all developments involved and dividing by the total unit-months.

7th Column. The lowest cost per dwelling unit per month for any one development.

The following code applies to the characteristics of Plumbing and Heating systems as given in the tables on the succeeding pages:

Plumbing:

(All apply to domestic hot water supply)

P.P. -	Central or group project heating plant
I.G.H. -	Individual Gas Heaters
I.C.H. -	Individual Coal or Wood Heaters
I.E.H. -	Individual Electric Heaters
I.O.H. -	Individual Oil Heaters
I.S.H. -	Individual Solar Heaters

Heating:

CP-PS	Central Plant, Purchased Steam
CP-C-SHW	Central Plant, Coal Fuel-Steam or Hot Water
CP-O-SHW	Central Plant, Oil Fuel-Steam or Hot Water
CP-G-SHW	Central Plant, Gas Fuel-Steam or Hot Water
CP-CO-SHW	Central Plant, Coal and Oil Fuel Steam or Hot Water
G-C-SHW	Group Plants, Coal Fuel-Steam or Hot Water
G-O-SHW	Group Plants, Oil Fuel-Steam or Hot Water
G-G-SHW	Group Plants, Gas Fuel-Steam or Hot Water
G-CO-SHW	Group Plants, Coal and Oil-Steam or Hot Water
I-C-SHW	Individual, Coal or Coke Fuel-Steam or Hot Water
I-G-SHW	Individual, Gas Fuel, Steam or Hot Water
I-C-FWA	Individual, Coal or Coke Fuel-Forced Warm Air
I-G-FWA	Individual, Gas Fuel-Forced Warm Air
I-C-GWA	Individual, Coal Fuel-Gravity Warm Air
I-C-SH	Individual, Coal or Wood Fuel, Space Heaters
I-O-SH	Individual, Oil Fuel-Space Heaters
I-G-SH	Individual, Gas Fuel-Space Heaters

THE COUNTRY AS A WHOLE

Acc't. No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	253	3439459	$2.31	$ .82	$ .02
4220	Exterminating	253	3441169	.24	.07	.00
4401	RM&R Supervision	253	2791959	1.03	.33	.00
4410	Grounds	253	6487866	2.95	.64	.16
4420	Structures	253	6487866	1.96	.47	.09
4430	Painting	253	6487866	3.46	1.48	.11
4440	Plumbing (PP)	118	3770868	.67	.34	.07
"	" (IGH)	107	1966638	1.12	.34	.08
"	" (ICH)	16	191328	1.16	.34	.08
"	" (IEH)	2	68559	.12	.12	.12
"	" (IOH)	7	159459	.44	.21	.08
"	" (ISH)	1	24840	.23	.23	.23
4450	Heating (CP-PS)	6	270366	.19	.15	.09
"	" (CP-C-SHW)	61	2025682	1.30	.58	.12
"	" (CP-O-SHW)	6	174496	.44	.14	.07
"	" (CP-G-SHW)	9	198657	.87	.39	.02
"	" (CP-CO-SHW)	8	212476	1.10	.46	.14
"	" (G-C-SHW)	18	728517	1.10	.53	.20
"	" (G-O-SHW)	5	119397	.51	.24	.13
"	" (G-G-SHW)	3	70683	.61	.47	.24
"	" (G-CO-SHW)	1	213780	.27	.27	.27
"	" (I-C-SHW)	7	82785	.41	.21	.09
"	" (I-G-SHW)	1	5184	.30	.30	.30
"	" (I-C-FWA)	5	52605	.21	.16	.13
"	" (I-G-FWA)	4	56208	.26	.23	.15
"	" (I-C-GWA)	1	25284	.14	.14	.14
"	" (I-C-SH)	13	227666	.12	.06	.001
"	" (I-O-SH)	19	453744	.30	.12	.01
"	" (I-G-SH)	67	1141409	.27	.06	.00
"	Desert Coolers	1	5832	.30	.30	.30
4460	Electrical	253	6487866	.48	.13	.01
4470	Elevators	1	213780	.18	.18	.18
4481	Ranges (Electric)	32	1255188	.64	.14	.06
"	" (Gas)	207	4957261	.17	.04	.003
"	" (Oil)	3	98816	.28	.10	.04
"	" (Coal or Wood)	10	164993	.33	.18	.06
4482	Refrigerators (Electric)	149	4607413	.26	.08	.01
"	" (Gas)	45	927156	.17	.07	.0015
"	" (Ice Boxes)	11	78192	.07	.017	.001
"	" (Coolers)	1	18144	.01	.01	.01
4490	Other Equipment	253	6487866	.70	.16	.05

REGION I

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	13	189174	$1.79	$1.21	$ .46
4220	Exterminating	13	189174	.23	.15	.09
4401	RM&R Supervision	13	160122	.89	.45	.00
4410	Grounds	13	353362	1.64	.67	.31
4420	Structures	13	353362	1.32	.66	.22
4430	Painting	13	353362	3.24	1.78	.84
4440	Plumbing (PP)	12	92278	.51	.28	.13
"	" (IGH)	1	23496	.31	.31	.31
"	" (ICH)	0				
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	0				
"	" (CP-C-SHW)	7	185358	.89	.68	.12
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	0				
"	" (CP-CO-SHW)	5	144508	.60	.43	.36
"	" (G-C-SHW)	0				
"	" (G-O-SHW)	0				
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	1	23496	.32	.32	.32
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	0				
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	0				
"	" (I-C-SH)	0				
"	" (I-O-SH)	0				
"	" (I-G-SH)	0				
"	Desert Coolers	0				
4460	Electrical	13	353362	.30	.16	.07
4470	Elevators	0				
4481	Ranges (Electric)	2	88318	.21	.08	.06
"	" (Gas)	11	265044	.12	.04	.003
"	" (Oil)	0				
"	" (Coal or Wood)	0				
4482	Refrigerators (Electric)	7	172432	.12	.05	.02
"	" (Gas)	5	168906	.05	.025	.0015
"	" (Ice Boxes)	1	12024	.07	.07	.07
"	" (Coolers)	0				
4490	Other Equipment	13	353362	.27	.13	.07

REGION II

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	39	764901	$2.44	$1.10	$ .24
4220	Exterminating	39	764901	.19	.07	.01
4401	RM&R Supervision	39	621182	.86	.35	.00
4410	Grounds	39	1422658	1.54	.55	.20
4420	Structures	39	1422658	1.41	.47	.15
4430	Painting	39	1422658	3.46	1.93	.23
4440	Plumbing (PP)	35	1352314	.61	.23	.08
"	" (IGH)	3	66024	.64	.54	.38
"	" (ICH)	1	4320	.11	.11	.11
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	0				
"	" (CP-C-SHW)	17	430422	1.12	.51	.12
"	" (CP-O-SHW)	5	162127	.16	.11	.07
"	" (CP-G-SHW)	0				
"	" (CP-CO-SHW)	0				
"	" (G-C-SHW)	11	521619	1.10	.59	.20
"	" (G-O-SHW)	1	24366	.13	.13	.13
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	1	213780	.27	.27	.27
"	" (I-C-SHW)	0				
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	1	4320	.16	.16	.16
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	1	25284	.14	.14	.14
"	" (I-C-SH)	0				
"	" (I-O-SH)	0				
"	" (I-G-SH)	0				
"	Desert Coolers	0				
4460	Electrical	39	1422658	.37	.14	.05
4470	Elevators	1	213780	.18	.18	.18
4481	Ranges (Electric)	7	381054	.27	.14	.09
"	" (Gas)	32	1041604	.08	.03	.007
"	" (Oil)	0				
"	" (Coal or Wood)	0				
4482	Refrigerators (Electric)	29	1186665	.26	.09	.02
"	" (Gas)	1	2400	.11	.11	.11
"	" (Ice Boxes)	1	4800	.01	.01	.01
"	" (Coolers)	0				
4490	Other Equipment	39	1422658	.34	.12	.06

REGION III

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	20	279192	$1.59	$ .99	$ .23
4220	Exterminating	20	279192	.24	.08	.01
4401	RM&R Supervision	20	238032	.90	.45	.00
4410	Grounds	20	710083	.98	.57	.29
4420	Structures	20	710083	1.66	.71	.17
4430	Painting	20	710083	3.25	2.26	.34
4440	Plumbing (PP)	12	632632	.67	.34	.16
"	" (IGH)	6	64248	.60	.33	.19
"	" (ICH)	2	13203	.36	.20	.15
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	1	62084	.13	.13	.13
"	" (CP-C-SHW)	10	543284	.76	.54	.19
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	0				
"	" (CP-CO-SHW)	0				
"	" (G-C-SHW)	1	27264	.31	.31	.31
"	" (G-O-SHW)	0				
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	4	42543	.41	.18	.10
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	1	8064	.13	.13	.13
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	0				
"	" (I-C-SH)	1	16044	.07	.07	.07
"	" (I-O-SH)	2	10800	.16	.12	.09
"	" (I-G-SH)	0				
"	Desert Coolers	0				
4460	Electrical	20	710083	.48	.20	.03
4470	Elevators	0				
4481	Ranges (Electric)	2	118546	.17	.13	.08
"	" (Gas)	18	591537	.09	.04	.01
"	" (Oil)	0				
"	" (Coal or Wood)	0				
4482	Refrigerators (Electric)	17	691219	.18	.09	.02
"	" (Gas)	0				
"	" (Ice Boxes)	0				
"	" (Coolers)	0				
4490	Other Equipment	20	710083	.36	.13	.06

REGION IV

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	47	550713	$1.04	$ .33	$ .02
4220	Exterminating	47	550713	.15	.05	.00
4401	RM&R Supervision	47	443274	.51	.23	.00
4410	Grounds	47	1227228	1.21	.50	.16
4420	Structures	47	1227228	1.21	.25	.09
4430	Painting	47	1227228	2.04	1.05	.12
4440	Plumbing (PP)	10	437847	.35	.20	.12
"	" (IGH)	22	404959	.54	.22	.08
"	" (ICH)	3	62508	.74	.32	.08
"	" (IEH)	2	68559	.13	.12	.11
"	" (IOH)	7	159459	.44	.21	.08
"	" (ISH)	1	24840	.23	.23	.23
4450	Heating (CP-PS)	2	111592	.19	.15	.09
"	" (CP-C-SHW)	6	222095	.81	.41	.24
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	2	104160	.58	.49	.42
"	" (CP-CO-SHW)	0				
"	" (G-C-SHW)	0				
"	" (G-O-SHW)	0				
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	0				
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	0				
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	0				
"	" (I-C-SH)	4	113615	.05	.04	.01
"	" (I-O-SH)	11	216690	.25	.13	.01
"	" (I-G-SH)	15	265536	.17	.09	.03
"	Desert Coolers	0				
4460	Electrical	47	1227228	.22	.09	.01
4470	Elevators	0				
4481	Ranges (Electric)	10	409168	.25	.16	.06
"	" (Gas)	30	644638	.13	.05	.02
"	" (Oil)	3	98816	.28	.10	.04
"	" (Coal or Wood)	3	62528	.25	.14	.07
4482	Refrigerators (Electric)	33	843321	.18	.10	.01
"	" (Gas)	8	252036	.12	.08	.03
"	" (Ice Boxes)	3	37440	.006	.004	.001
"	" (Coolers)	0				
4490	Other Equipment	47	1227228	.27	.13	.05

REGION V

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	42	549354	$1.04	$ .42	$ .11
4220	Exterminating	42	551064	.16	.04	.01
4401	RM&R Supervision	42	473338	.47	.20	.00
4410	Grounds	42	907589	1.12	.47	.17
4420	Structures	42	907589	1.96	.47	.13
4430	Painting	42	907589	1.96	.56	.11
4440	Plumbing (PP)	4	84831	.48	.37	.32
"	" (IGH)	37	813983	1.12	.30	.12
"	" (ICH)	1	8775	.26	.26	.26
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	0				
"	" (CP-C-SHW)	1	20256	.31	.31	.31
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	2	27405	.87	.77	.56
"	" (CP-CO-SHW)	0				
"	" (G-C-SHW)	0				
"	" (G-O-SHW)	0				
"	" (G-G-SHW)	1	37170	.61	.61	.61
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	2	6891	.16	.16	.16
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	0				
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	0				
"	" (I-C-SH)	1	8775	.04	.04	.04
"	" (I-O-SH)	4	186654	.08	.07	.06
"	" (I-G-SH)	27	483416	.08	.03	.00
"	Desert Coolers	0				
4460	Electrical	42	907589	.18	.09	.04
4470	Elevators	0				
4481	Ranges (Electric)	0				
"	" (Gas)	41	898814	.11	.05	.02
"	" (Oil)	0				
"	" (Coal or Wood)	1	8775	.33	.33	.33
4482	Refrigerators (Electric)	20	547463	.18	.08	.03
"	" (Gas)	12	219066	.13	.08	.03
"	" (Ice Boxes)	0				
"	" (Coolers)	0				
4490	Other Equipment	42	907589	.51	.18	.05

REGION VI

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	26	295566	$1.96	$1.10	$ .19
4220	Exterminating	26	295566	.23	.06	.00
4401	RM&R Supervision	26	231648	1.03	.42	.00
4410	Grounds	26	403770	2.95	1.66	.53
4420	Structures	26	403770	.77	.46	.11
4430	Painting	26	403770	3.17	1.43	.16
4440	Plumbing (PP)	5	69967	.41	.34	.30
"	" (IGH)	21	337803	.78	.41	.12
"	" (ICH)	0				
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	0				
"	" (CP-C-SHW)	0				
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	0				
"	" (CP-CO-SHW)	0				
"	" (G-C-SHW)	0				
"	" (G-O-SHW)	0				
"	" (G-G-SHW)	2	33513	.34	.31	.24
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	0				
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	0				
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	0				
"	" (I-C-SH)	0				
"	" (I-O-SH)	1	3600	.30	.30	.30
"	" (I-G-SH)	23	366657	.27	.06	.02
"	Desert Coolers	1	5832	.30	.30	.30
4460	Electrical	26	403770	.25	.12	.04
4470	Elevators	0				
4481	Ranges (Electric)	0				
"	" (Gas)	26	403770	.17	.06	.01
"	" (Oil)	0				
"	" (Coal or Wood)	0				
4482	Refrigerators (Electric)	5	76860	.14	.09	.02
"	" (Gas)	11	179307	.09	.07	.05
"	" (Ice Boxes)	1	3600	.001	.001	.001
"	" (Coolers)	1	18144	.01	.01	.01
4490	Other Equipment	26	403770	.64	.38	.07

REGION VII

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	16	179544	$2.31	$ .88	$ .21
4220	Exterminating	16	179544	.13	.07	.00
4401	RM&R Supervision	16	130152	.62	.45	.00
4410	Grounds	16	223264	1.33	.93	.32
4420	Structures	16	223264	.83	.50	.15
4430	Painting	16	223264	2.44	1.73	.52
4440	Plumbing (PP)	2	41664	.28	.22	.20
"	" (IGH)	7	92388	.90	.61	.29
"	" (ICH)	7	89232	1.16	.41	.16
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	0				
"	" (CP-C-SHW)	0				
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	0				
"	" (CP-CO-SHW)	2	41664	.16	.15	.14
"	" (G-C-SHW)	0				
"	" (G-O-SHW)	0				
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	0				
"	" (I-G-SHW)	1	5184	.30	.30	.30
"	" (I-C-FWA)	0				
"	" (I-G-FWA)	3	25404	.19	.18	.15
"	" (I-C-GWA)	0				
"	" (I-C-SH)	7	89232	.12	.10	.001
"	" (I-O-SH)	1	36000	.23	.23	.23
"	" (I-G-SH)	2	25800	.25	.19	.08
"	Desert Coolers	0				
4460	Electrical	16	223264	.26	.12	.01
4470	Elevators	0				
4481	Ranges (Electric)	5	50946	.64	.18	.10
"	" (Gas)	7	92388	.14	.09	.02
"	" (Oil)	0				
"	" (Coal or Wood)	4	80400	.21	.19	.06
4482	Refrigerators (Electric)	9	128868	.21	.04	.001
"	" (Gas)	1	5184	.12	.12	.12
"	" (Ice Boxes)	1	6000	.05	.05	.05
"	" (Coolers)	0				
4490	Other Equipment	16	223264	.70	.25	.09

REGION VIII

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	39	539626	$2.20	$ .87	$ .12
4220	Exterminating	39	539626	.23	.06	.01
4401	RM&R Supervision	39	415686	.75	.41	.01
4410	Grounds	39	1085652	1.64	.65	.18
4420	Structures	39	1085652	.91	.47	.14
4430	Painting	39	1085652	3.28	1.58	.36
4440	Plumbing (PP)	33	978549	.48	.26	.07
"	" (IGH)	6	107103	.57	.41	.20
"	" (ICH)	0				
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	3	96690	.17	.15	.14
"	" (CP-C-SHW)	20	624267	1.30	.70	.13
"	" (CP-O-SHW)	0				
"	" (CP-G-SHW)	5	67092	.16	.10	.02
"	" (CP-CO-SHW)	0				
"	" (G-C-SHW)	5	161052	.83	.39	.29
"	" (G-O-SHW)	2	67500	.24	.19	.15
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	1	9855	.09	.09	.09
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	0				
"	" (I-G-FWA)	1	30804	.26	.26	.26
"	" (I-C-GWA)	0				
"	" (I-C-SH)	0				
"	" (I-O-SH)	0				
"	" (I-G-SH)	0				
"	Desert Coolers	0				
4460	Electrical	39	1085652	.27	.15	.05
4470	Elevators	0				
4481	Ranges (Electric)	5	180852	.31	.13	.09
"	" (Gas)	34	904800	.08	.04	.01
"	" (Oil)	0				
"	" (Coal or Wood)	0				
4482	Refrigerators (Electric)	28	934281	.10	.05	.01
"	" (Gas)	7	100257	.17	.07	.02
"	" (Ice Boxes)	2	14328	.007	.007	.007
"	" (Coolers)	0				
4490	Other Equipment	39	1085652	.26	.13	.05

GENERAL FIELD OFFICE

Acc't No.	Title	No. of Dev.	No. Unit Months	P. U. M. High	P. U. M. Av.	P. U. M. Low
4210	Janitorial	11	91389	$1.79	$ .63	$ .17
4220	Exterminating	11	91389	.14	.06	.01
4401	RM&R Supervision	11	78075	.40	.21	.09
4410	Grounds	11	154260	1.01	.71	.42
4420	Structures	11	154260	1.27	.65	.48
4430	Painting	11	154260	2.32	.99	.43
4440	Plumbing (PP)	5	84786	.48	.32	.25
"	" (IGH)	4	56184	.62	.41	.33
"	" (ICH)	2	13290	.19	.17	.15
"	" (IEH)	0				
"	" (IOH)	0				
"	" (ISH)	0				
4450	Heating (CP-PS)	0				
"	" (CP-C-SHW)	0				
"	" (CP-O-SHW)	1	12369	.44	.44	.44
"	" (CP-G-SHW)	0				
"	" (CP-CO-SHW)	1	26304	1.10	1.10	1.10
"	" (G-C-SHW)	1	18582	.70	.70	.70
"	" (G-O-SHW)	2	27531	.51	.48	.41
"	" (G-G-SHW)	0				
"	" (G-CO-SHW)	0				
"	" (I-C-SHW)	0				
"	" (I-G-SHW)	0				
"	" (I-C-FWA)	3	40221	.21	.16	.13
"	" (I-G-FWA)	0				
"	" (I-C-GWA)	0				
"	" (I-C-SH)	0				
"	" (I-O-SH)	0				
"	" (I-G-SH)	0				
"	Desert Coolers	0				
4460	Electrical	11	154260	.38	.14	.05
4470	Elevators	0				
4481	Ranges (Electric)	1	26304	.15	.15	.15
"	" (Gas)	8	114666	.08	.035	.01
"	" (Oil)	0				
"	" (Coal or Wood)	2	13290	.29	.27	.26
4482	Refrigerators (Electric)	1	26304	.09	.09	.09
"	" (Gas)	0				
"	" (Ice Boxes)	0				
"	" (Coolers)	0				
4490	Other Equipment	11	154260	.26	.18	.12

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FLOOR FINISHING AND MAINTENANCE MACHINES

Regional requests indicate a growing need for this type of equipment and recent negotiations with the War Production Board have resulted in a limited number of these machines being made available to this Authority.

The following are Standards necessary to obtain approval of priority applications:

Use. The use of such equipment is limited to cleaning and renovation of dwelling unit floors on turnover, and the rehabilitation of floors of public spaces such as cafeterias, community spaces, offices, foyers, child care centers, infirmaries, etc.

Allotment.

1. One machine for each project of 300 DU or over.

2. One additional machine for each increment of 300 DU over the initial 300 DU.

3. In addition the project shall require the services of the first machine for the cleaning and/or rehabilitation of floors in public spaces of approximately 60,000 ft. per month.

Justification. War Production Board approval will be based primarily on estimated labor savings in critical labor areas and the necessity for sanitary conditions within the units. Therefore the following items of justification must accompany application form WPB-1319 in order to expedite approval:

1. Name and location of project.

2. Number and type of dwelling unit and kind of floors.

3. Public spaces, stating types, sizes and kinds of floors.

4. Renovation and cleaning program.

5. Estimated labor savings.

6. Special or unusual need for the machine in the specific instance.

All applications shall be placed through Priorities Division of the Central Office.

STANDARDS AND RESPONSIBILITIES

I. Standard. All structures, grounds and other facilities shall be kept free of vermin.

II. Scope and Responsibilities. The term vermin includes all such household pests as insects, spiders and rodents.

The presence of vermin in one form or another is a constant menace to the health, property and livability of the entire community. The control of these pests is essential to the provision of "decent, safe and sanitary housing" and requires the attention and cooperation of everyone. While the control of vermin concerns both management and tenants alike, the overall responsibility must rest with the local management who should:

A. Disseminate pertinent information among tenants and maintenance personnel concerning preventive and exterminating measures, and take appropriate action to enlist and insure their full participation in vermin control.

B. Conduct a periodical survey of all dwelling units and other facilities to determine the type and location of vermin infestations.

C. Diagnose the causes of infestations and see to it that these causes are eliminated.

D. Maintain an effective follow-up program of treatment to assure complete control.

E. Enlist the assistance of the local or state Health Department, or the United States Public Health Service in severe cases where infestations are found to be out of local control.

NOTE:

At this time, Sanitary Engineers of the U. S. Public Health Service are detailed to the F.P.H.A. Washington Office and to each of the F.P.H.A. Regional Offices as consultants. Full advantage should be taken of this service to determine and initiate a local program as well as to advise on situations out of control.

CONTROL MEASURES

In order that the control of vermin may be most effective, measures must be taken not only to exterminate infestations as they occur, but to prevent infestations. The subject of control measures is therefore divided into two main topics;

(1) Preventive Measures or those directed against the causes of infestations and

(2) Exterminating Measures or those directed against infestations as they occur. These measures go hand in hand in any well planned program of control.

I. Preventive Measures. These measures by their nature can be most effectively accomplished directly by the tenants. With the possible exception of the last four items listed below (k,l,m and n), which are primarily management functions, the tenants should be expected to take most of the responsibility. Management should see to it that tenants follow through and should lend assistance where necessary to prevent infestations. The chief elements of an effective preventive program are as follows:

A. Develop and maintain good housekeeping habits. Cleanliness and the practice of fundamental rules of sanitation are pre-requisites to pest-free dwellings.

B. Inspect premises frequently for the presence of pests.

C. Store all foodstuffs in vermin-proof receptacles.

D. Store organic refuse in tight covered clean containers.

E. Eliminate conditions favorable to the harborage and breeding of pests by:

1. Removing litter and other trash and keeping it under control at all times.

2. Cleaning, ventilating, draining or otherwise treating all spaces or areas where pests are likely to find harborage.

F. Examine deliveries of foodstuffs, clothing, furniture and other household furnishings and exclude all infested materials from dwellings until the materials are adequately treated.

G. Store all woolens in moth proof storage.

H. Clean and expose frequently to fresh air all carpets, rugs, bedding and other similar furnishings.

I. Clean and treat pets frequently and expose their sleeping quarters to fresh air at least once weekly.

J. Maintain a complete and clean cover and a smooth washable surface on interior walls.

K. Screen all doors, windows, vents and other means of entrance for pests to structures.

L. Fill or clean all cracks and crevices in floor boards, around plumbing fixtures, behind baseboards and all other places where lint and dirt may collect and where pests may find refuge.

M. Provide adequate regulations to prevent infestations by movement of tenants and others and their furnishings from infested to pest-free dwellings.

N. Use DDT for treatment of new dwellings and for regular treatment of community facilities, such as refuse and garbage storage facilities, to prevent infestations.

II. Exterminating Measures. The application of these measures requires some technical knowledge of (1) the vermin to be destroyed; (2) exterminating materials and their adaptability; (3) methods and techniques; and (4) equipment. Some tenants can be trained to recognize the common pests and to apply the appropriate treatment for light infestations. Experience has proven, however, that the project management must guide the tenants, inspect all dwellings periodically for infestations, and treat all infestations found as a result of the inspection. Management should train and interest tenants in exterminating measures as well as preventive measures in order that tenants may perform treatments in their own dwellings. This will reduce the work load for management and result in lower operating cost. Where tenants are charged for treatment by management, they can reduce their expense if they are trained to eliminate the pests from their own dwellings. The frequency of inspections may vary from quarterly to annual periods, depending on the percentage of infested units. Where the services of commercial exterminating companies are used, their inspections, treatments, and costs should be checked at least annually for compliance with the contract, satisfactory work and appropriate cost for work performed.

A. Use of Liquid Insecticides.

1. Advantages. Liquid insecticides are the most practical and satisfactory means of insect control because:

a. It can be applied with comparative ease and safety.

b. It is very effective in destroying insect life when thoroughly and properly applied.

c. It can be used in places and under conditions where poisonous gas is dangerous or impractical.

d. It does not require complete evacuation of dwellings for long periods as is the case with fumigation by poisonous gases.

e. It can be applied effectively by anyone who is careful, thorough and attentive to a few simple instructions.

f. It leaves no unsightly deposits to annoy tenants.

2. Methods of Application. Liquids must be sprayed, painted or atomized, wherever insects are present. Good materials of proper killing power for the insects involved, the use of appropriate equipment, and care and thoroughness of application are the chief essentials for success. With the advent of new materials in the insecticide field, two basic methods for use of liquid insecticides have been developed, residual and contact treatments.

a. Residual treatments. These are used when the insecticide, after application, retains its killing effect on insects for several weeks or months. With this treatment, it is unnecessary to reach each insect with the spray particles. Instead the insecticide is used to coat hiding, resting or walking places where the insect will contact it.

At the present time, DDT and a chlorinated Hydrocarbon (C_{10} H_6 Cl_8) commonly called 1068 are the most widely used insecticides for residual spraying since they will retain their killing effect many months after they are applied. These sprays should not be atomized into rooms but should be applied as a wet spray on the room surfaces where insects rest, travel or hide. All such surfaces should be sprayed so they are wet but the liquid does not run. A little practice may be required to learn to apply the correct amount. Preparation for residual spraying should be as follows:

(1) Remove house plants, fish bowls, birds, pets and children from the room or apartment and remove dishes and food stuffs from the spray area.

(2) Ventilate the room during the spraying operation but do not have a breeze strong enough to deflect the spray.

(3) Have on hand all necessary materials and equipment to complete the operation at one time. To completely spray an average size room with these materials, about 1 quart is needed for cockroaches and ants and about 1 pint is needed for flies, mosquitoes, fleas and bedbugs.

b. Contact treatments are made with insecticides that kill quickly but lose their killing power soon after they are applied. With

this method, it is important to contact all bugs with the spray particles during the treatment process. This method of treatment is not generally recommended for public housing work because it has little permanent effect and is expensive. (See Aerosol Treatments in C below).

B. Use of Insect Powders. The use of insect powders is a very effective means of controlling roaches, ants, fleas, body lice, ticks, moths and carpet beetles.

1. Advantages. Powders are not hazards to human life if simple precautions are taken. They do not require the evacuation of dwellings. They can be applied by anyone with comparative ease and convenience, although their application requires more time than spraying with liquids. Powders are visible however, and may be deemed unsightly, so many housewives will clean them up before the insects are all eliminated.

2. Methods of Application.

a. Best results are obtained when the powder is blown by force into all cracks and crevices where the insects hide and on all surfaces over which they travel.

b. Powder may be applied by dusting with a hand duster or by placing it by hand in the hiding places of the insects.

c. Before applying, all foods must be properly covered or removed. Some powders are very poisonous while others will contaminate foods to the point of spoiling it for use.

d. If, after using DDT, PCH or Boric Acid Powders, all the pests are not gone in two weeks, repeat the application.

C. Use of Aerosols. The use of aerosols is an effective means of control of adult, exposed insects such as flies, mosquitoes, gnats, etc.

Aerosol "bombs" are convenient to use and can be operated safely by anyone who follows instructions. They are comparatively ineffective against insects such as ants, bedbugs and cockroaches that are protected from the mist or vapor which cannot penetrate readily into their hiding or breeding places. They are chiefly used as contact treatment. They may be used in some instances as a residual treatment but such use is extremely expensive and therefore impractical for public housing. While residual spray or dusting treatments are recommended for public housing, situations may arise where rooms are infested with adult insects such as flies, mosquitoes, moths and gnats. In such cases, a quick and effective elimination of such insects can be accomplished with the aerosol

"bomb" treatment. Directions of the manufacturer of the "bomb" should be followed. This treatment will not kill hidden insects or have any residual effect.

D. Fumigation with Poisonous Gases. Fumigation is an effective means of destroying all types of vermin because gases penetrate and are deadly.

Due to the extremely dangerous nature of this process, its high cost, and inconvenience to tenants, fumigation with poisonous gases is not recommended in public housing. When fumigation is contemplated, however, it should be administered only by experienced licensed operators. It is also advisable to have the work done under contract by commercial exterminating companies who should be required to furnish performance and liability bonds. Local codes and other municipal or state regulations must be strictly followed where any poisonous gas is used.

E. Super heating. The super heating of structures is an effective means of control where it is practical.

This method requires the maintenance of a constant high temperature of from 120° to 140°F for periods of from 6 to 12 hours, during which time the occupants obviously must evacuate the structure. It requires the services of experienced operators and extreme care with respect to prevention of fire and damage to structures and furnishings by excessive heat. While there have been a few instances in public housing where super-heating was used it has now been generally discarded as difficult and inconvenient.

F. Poisoning by use of poison baits. This is one of the most effective and most widely used means of destroying rats, mice and other rodents. It may also be used to a limited extent in destroying such insect pests as roaches, ants and crickets.

Success in poisoning depends primarily on the selection of an effective poison and proper bait, the method and technique of mixing the poison and bait and the manner in which the bait is distributed to lure the pest. Materials and methods will be discussed more at length elsewhere in this chapter of the bulletin.

While poisoning is very effective, there are certain objections to its use which should be fully considered. Most poisons used to kill pests are also toxic to human beings and domestic animals. With few exceptions, the use of such poisons should be confined to those experienced in handling highly toxic materials. A second objection is that after taking the poison, rodents may die in inaccessable places where their decomposing bodies may cause obnoxious odors. This objection can generally be overcome by using poisons that cause the rodents to go outdoors to die.

G. Trapping. This method is employed chiefly in the control of rats, mice and other rodents. It is considered as effective as poisoning and is generally used to augment a control program of poisoning. It is recommended especially where the use of poison seems inadvisable.

Success with trapping depends largely upon the skill and resourcefulness of the operator. The selection of the proper type of trap, the bait, and the setting of the traps in the most strategic locations are of major consideration. This subject will be discussed in detail in the section on control of rodents.

H. Vermin-proofing of Structure. Infestations of vermin can usually be traced to some condition or combination of conditions favorable to the pests. The removal or elimination of these conditions will assist greatly in the reduction or complete elimination of vermin. We have touched on some phases of this point under "Preventive Measures". The control of vermin is materially aided by the proper construction, repair and maintenance of buildings and surrounding premises. Unless attention is paid to blocking out pests and eliminating favorable places for them to breed and find shelter and food, all other means of control will be found futile from the point of view of permanent control. Since vermin vary considerably in their habits of life and environmental likes and dislikes, this subject will be treated specifically for the control of each of the major groups of pests such as insects, rodents and termites in other sections in this chapter.

CONTROL MATERIALS

I. Insecticides.

A. Liquid Insecticides for Spraying.

1. Definition. Liquid insecticides are solutions designed for the extermination of insect pests consisting of:

a. A base or solvent, and

b. A suitable active ingredient or ingredients known as the "Killing Agent"

2. General Requirements. A good liquid insecticide when used as directed should:

a. Have positive long lasting killing power

b. Consist of a satisfactory solvent or carrier such as refined kerosene (known as "water white"), and a suitable killing agent in proper proportions to produce satisfactory residual effect.

c. Be free of offensive odor

d. Not stain fabrics, woodwork, paint or other household furnishings and fixtures

e. Not be poisonous or irritating to human beings

f. Not be explosive or highly inflammable

g. Not corrode metals

h. Not soften or damage asphaltic floor materials

i. Not contaminate foodstuffs

3. Selection of Solutions. Liquid insecticides may be purchased ready-mixed or the ingredients may be purchased separately and mixed by the operator. In either case, it is important to know the performance of each ingredient and the proper concentration of the killing agent necessary to produce the desired results.

a. Ready-mixed or Commercially Prepared Solutions. These are prepared and distributed under many trade names which are too numerous to describe in detail here. They may be designed for specific purposes or they may be designed as dual or all-purpose spray solutions. When purchased from reliable concerns,

reasonable assurance may be placed in their effectiveness against the insects for which they are prepared. However, ther is no assurance that any one of them will be effective against all kinds of pests under all conditions. In purchasing these materials, conformance with the following directions will assi in procuring satisfactory material:

(1) Purchase only from reliable suppliers.

(2) Secure a guarantee of performance either by an authentic label on the package or by a statement from a reliable supplier.

(3) Secure full directions for the product's use and information as to its effectiveness against the specific pests to be destroyed.

(4) Secure full information relative to the dangers involved in its use and the precautions to be taken to avoid accidents or damage.

b. Home or Operator-mixed Solutions. These may be used where sufficient knowledge of the subject is at hand to assure succes Otherwise, reliance should be placed on a good ready-mixed solution. In many instances, suppliers will prepare the killin agent in concentrated solutions to be further prepared by the operator by diluting the concentrate with a solvent carrier such as "water white" kerosene. The following directions are offered for guidance in preparing these solutions:

(1) Select only those ingredients known to be satisfactory for the intended purpose.

(2) Know the expected performance of each ingredient selected.

(3) Know the proper concentration of the killing agent (the proportion of killing agent to the solvent or carrier).

(4) Be prepared with all necessary containers, mixing apparatu and storage facilities.

c. Ingredients.

(1) The base or solvent is that part of the spray solution which carries the killing agent in solution or suspension. In order to satisfy the general requirement of a liquid spray solution and to effect economy, it is of the utmost importance that careful consideration be given to the base or solvent. Experience indicates that most difficulties are experienced with a poor selection of the solvent.

Some of the most satisfactory solvents are: water-white (a refined non-staining) kerosene, Deobase, AFCO 467 and mineral spirits.

Caution: Spray solutions in which water-white kerosene or other petroleum products are used are inflammable. The flash point of solutions purchased should be above 160°F and care should be taken in their use so that they do not come in contact with open flame.

(2) Active or Killing Agents compose that part of the spray solution designed to destroy the pests. Many types are used, the most common being:

(a) DDT, which has recently had wide usage in public housing and elsewhere. DDT is one of the most effective and practical of all known killing agents for household use. It is also inexpensive. It is extremely deadly to most insect life and contrary to popular impression, it is effective in killing the German cockroach. It does not lose its effectiveness for long periods. Experience indicates that it will retain its killing power against bedbugs for at least six months and against cockroaches for about three months.

Large quantities are toxic to human beings and animals but in a 5% spray or a 10% powder, it can be used safely for household treatments.

It is readily soluble in water-white kerosene at room temperature to make a 4 to 5% solution. Concentrates may be purchased which can be diluted with any of the above solvents to the desired strength. For a 5% solution, add one part of 40% DDT concentrate to seven parts of solvent.

DDT should not be applied on foods or dishes. Pets, including birds, and fishes, and house plants should not be exposed to the spray.

Under continuous daily use, as with project maintenance personnel, users should wear rubber gloves to prevent accumulated absorption of DDT through the pores of the skin.

The spray does not have to be directed on the insects as with a contact spray, but is effective if applied as a residual spray to resting places, runways or hiding places.

In the procurement of DDT for vermin control work, costs may vary from 35¢ to $1.00 per gallon for 5% solutions. 5% DDT solutions in oil costs approximately $1.00 per gallon in 55 gallon drum lots. This method of purchase is not recommended except where one drum will represent a year's supply. For general use, it is recommended that a 40% DDT concentrate be made or purchased and diluted with a base at the project where it is to be used. 40% DDT concentrate can be made by adding 3.3 lbs. of DDT (Technical Grade) to a gallon of Velsicol AR-50. By diluting 40% concentrate to a 5% DDT solution with water-white kerosene, the per gallon cost is about 50¢ per gallon. A higher flash-point, less odorous spray may be made by diluting with Deobase, APCO 467 or mineral spirits which results in a final cost of about 70¢ per gallon. Some projects make their own 5% DDT sprays by simply adding 1 lb. of DDT (technical grade) to 3 gallons of water-white kerosene with a resultant per gallon cost of about 35¢, not including labor of handling and mixing. There is some sludge that does not dissolve which must be kept out of sprayers to prevent clogging. To prevent this, the solution must be filtered through fine cloth or made in a large 55 gallon drum equipped with a draw-off faucet about six inches above the bottom.

(b) Chlordane. A chlorinated hydrocarbon insect toxicant with the formula $C_{10}H_6Cl_8$ is another killing agent which exhibits a high order of toxicity to many insects. In a 2% solution of one of the solvents mentioned above, this material has produced quick, effective elimination of roaches and prevented infestation for several weeks. The application of Chlordane is similar to that described for 5% DDT residual spraying, with greater emphasis on driving the spray into the cracks and crevices where the roaches hide. A jet type nozzle is generally used to obtain the desired results and a rather heavy application is recommended. Chlordane and DDT seem to be relatively similar in toxicity to warm-blooded animals so the precautions in the use of DDT will apply to Chlordane. Several experimental programs at projects are being run with Chlordane to determine relative costs for its use on a practical basis. Present data appears to indicate that it will be equal in per unit cost to DDT and somewhat faster in killing roaches.

(c) Pyrethrum, Rothane, Lethane 384 and Thanite have been widely used as contact sprays. Since the advent of DDT and Chlordane their use in public housing is not considered satisfactory and economical for vermin control since they do not produce long lasting killing power.

B. Powders for Dusting. Solid insecticides or insect powders are quite commonly used primarily because of their convenience in applying. They are effective in the control of such pests as roaches, ants, fleas, and body lice. Toxic powders are those which are unsafe if taken internally and should not be issued by management to tenants for general use. Non-toxic powders may be issued to tenants for them to use as an aid to the management program.

1. DDT. Insect powders containing 10% DDT as the killing agent have proved most successful in the control of cockroaches, body lice, ants, fleas and other pests. This powder gives residual effect against cockroaches for several weeks, as long as the powder remains undisturbed. DDT powder may be applied to the backs of dogs to kill fleas but should not be put on cats. It may be applied to a cat's bed or resting place to kill cat fleas. It should not be applied on foodstuffs or dishes. It is also useful as a supplement to a residual spray treatment with 5% DDT solution in oil, since the dust can be driven into hiding places which sprays do not penetrate. This powder should not be issued by management to tenants because of its toxicity if used carelessly.

2. PCH. Insect powders containing 1½% piperonyl cyclohexenone, (PCH) 0.16% pyrethrins and 25% boric acid are very effective against fleas, roaches, ants and other pests. It has been observed that residual effect is obtained from these powders against roaches for approximately 90 days. If pests are noted within two weeks after applications, a second treatment should be applied. These powders are non-toxic to human beings and animals for ordinary treatment of a household and are considered safe for issuance by management to tenants. Under frequent repeated exposure to the dust, sufficient boric acid may be inhaled to cause toxic accumulation in the lungs of the users and therefore operators who use the powder daily should wear dust respirators.

3. Boric Acid Dusts. For a number of years, boric acid powder has been known as an effective roach killer and recently roach dusts have appeared on the market containing as high as 90% boric acid. Adequate testing of this material to determine its suitability for public housing work has not been feasible to date.

The high prices charged for the powders named above are unwarranted if plain boric acid will do the job at a lower price. It should be noted that boric acid is highly toxic to warm-blooded animals and humans if taken internally and regular inhalation of the dust may be harmful to humans.

While these materials will kill roaches, the general adoption of boric acid dusts for exterminating work is not recommended until more information on costs and toxicity can be learned through controlled tests.

4. Others. Insect powders such as Sodium Fluoride, Pyrethrum, Rotenone, Paradichlorbenzene, Lethane A-70 have been used in public housing and found less effective than DDT or PCH powders. Since Sodium Fluoride is highly toxic to human beings and animals, it should not be issued by management to tenants.

II. List of Manufacturers and Suppliers.

The following list is presented here for the convenience of regional and project offices merely to indicate some of the many satisfactory sources of supply. It should not be construed as an approval for exclusive use of any of the products represented.

A. Bases and Solvents.

The materials listed as 1, 2 and 3 are recommended as suitable for dissolving 5% DDT into solution or diluting higher concentrates of DDT or Chlordane to desired spray strength.

APCO - 467
D.H. Litter & Co.
242 West 55th Street, New York 19, New York

Deobase
L. Sonneborn & Sons, Inc.
New York 16, New York

Water-white kerosene may be purchased from most distributors of petroleum products.

The following material is used for making DDT concentrates since it will dissolve up to 40% of DDT by weight:

Velsicol AR-50
Velsicol Corporation
120 East Pearson Street, Chicago, Illinois

B. Killing Agents.

1. DDT (Technical Grade).

Geigy Company, Inc.
89-91 Barclay Street, New York, New York

Chapman Chemical Company
330 N. Michigan Avenue, Chicago, Illinois

E. I. du Pont de Nemours
Wilmington 98, Delaware

Monsanto Chemical Co.
Organic Chemical Division
1700 So. Second Street, St. Louis 4, Missouri

2. Prepared Concentrates and Emulsions.

DDT

Fumol Corporation
Van Dam Street & Borden Avenue, Long Island City, N. Y.

Watson - Park Company
Franklin Street, Boston, Massachusetts

E. I. du Pont de Nemours
Wilmington 98, Delaware

CHLORDANE

Chapman Chemical Company
330 N. Michigan Avenue, Chicago, Illinois

Julius Hyman & Company
Denver, Colorado

Seaboard Manufacturing Laboratories, Inc.
Tulip & Dauphin Streets, Philadelphia 25, Pennsylvania

3. Prepared Insect Powders.

DDT (10% DUST)

Fumol Corporation
Van Dam Street & Borden Avenue, Long Island City, N. Y.

Chapman Chemical Company
330 N. Michigan Avenue, Chicago, Illinois

E. I. du Pont de Nemours
Wilmington 98, Delaware

PCH

Fairfield Laboratories, Arfax Division
Plainfield, New Jersey

CONTROL EQUIPMENT

Various pieces of mixing and handling equipment, such as funnels, drums, buckets, etc., are required depending upon which of the above methods are adopted. All of these equipment items may be procured or made locally and no suppliers will be listed. However, some items of equipment which are discussed below will need to be acquired for applying the insecticides. The type to select will depend on the extent and nature of the problem to be controlled.

I. Types of Liquid Spraying Equipment.

A. The knapsack, garden type, pressure sprayer of 3-4 gallon capacity is most satisfactory for residual treatments. The sprayer must have oil-resistant hose, gaskets and washers to prevent excessive replacement and operating trouble. The nozzle for this sprayer should produce a fan-shaped spray at the rate of 0.1 gallon per minute.

B. A small pressure hand sprayer of 1 quart capacity is adequate for residual treatments when only a few dwellings are to be treated at one time. The nozzle on this type of sprayer must produce a coarse spray to prevent excessive loss of spray material in the air. All valves and gaskets must be of oil-resistant type.

C. The electric type sprayer is not recommended for residual treatments. It is most satisfactory for contact or semi-aerosol treatments. The sprayer nozzle is usually adjustable for coarse and fine sprays. This type of sprayer does not have excessive part replacement costs.

D. The "Flit-Gun" type of hand pump sprayer is not generally satisfactory for residual treatments. The most practical use for this sprayer is routine tenant applications such as spraying for flies.

E. A new sprayer for applying contact treatments recently developed and used extensively in the war is the aerosol sprayer. These sprayers are mentioned mainly for the ease with which the treatment can be applied. Since they are not re-fillable by the user, this method of spraying is generally too expensive for public housing work except under conditions mentioned in Section 2.41, II-C, Use of Aerosols.

II. Dusting Equipment.

A. The hand pump duster with a capacity of about 8 ounces is most satisfactory for unit treatment on a large scale. This duster should have an extension tube about two feet long, flattened at the end to produce a thin fan shaped dust pattern. The flattened end makes applications of dust in cracks and crevices more efficient.

B. A bulb type duster is satisfactory for unit treatment but does not blow dust into cracks as well as the hand duster. A small bulb or bellows type duster is particularly applicable for dwelling inspection and treatment by dwelling occupant.

C. The large force duster, operated by hand is used for dusting outside areas or under buildings. It is not suited for dwelling treatments, but is used mainly in vermin control operations such as mosquito, flea, cricket or grasshopper control.

III. List of Manufacturers and Suppliers.

The following list is presented here for the convenience of regional and project offices merely to indicate some of the many sources of supply. It shall not be construed as an approval for exclusive use of any of the products represented.

A. Sprayers - Knapsack Pressure Type.

Lofstrand Sprayer - Model N E R 106
Lofstrand Sprayer Company
959 Selim Road, Silver Spring, Md.

Hudson Sprayer - Model "750 G Industrial Sprayer."
Hudson Manufacturing Company
589 E. Illinois Street, Chicago, Illinois.

Lowell Sprayer - Model "910 Industrial Sprayer."
Lowell Manufacturing Company
589 E. Illinois Street, Chicago, Illinois.

B. Sprayers - Hand Pressure Type.

Milwaukee "Sure-Shot" Model.
Milwaukee Sprayer Manufacturing Company
2437 W. Fond du Lac Avenue, Milwaukee 6, Wisconsin.

C. Sprayers - Hand Pump Type.

Lowell Sprayer - Model "215 G Challenger."
Lowell Manufacturing Company
589 E. Illinois Street, Chicago, Illinois.

Hudson Sprayer - Model "431 Comet."
Hudson Manufacturing Company
589 E. Illinois Street, Chicago, Illinois.

D. Sprayers - Electric Type.

Mistmaster Compressor (1 quart capacity)
Sprayer Corporation of America
1806 W. Winona Street, Chicago 40, Illinois.

Hudson "Wizard No. 300".
Hudson Manufacturing Company
589 E. Illinois Street, Chicago, Illinois.

E. Sprayers - Aerosol Type.

Associated Chemist Inc.
1906 N. Halsted Street, Chicago 14, Illinois.

Velsor Wright Company
8 West 40th Street, New York 18, New York.

The Carroll Company
1323 Wall Street, Dallas, Texas.

F. Spray Nozzles.

Nozzle Number - Type ¼ T 8001
Spraying Systems Company
4093 West Lake Street, Chicago 24, Illinois.

G. Dusters - Hand Pump Type.

Dobbins No. 133
Dobbins Manufacturing Company
700 West Beardsley Street, Elkheart, Indiana.

Hudson "Admiral".
Hudson Manufacturing Company
589 E. Illinois Street, Chicago, Illinois.

H. Dusters - Bulb or Bellows Type.

Antrabulb (4, 8 and 12 ounce capacity).
Central Rubber Products Company
821 Broadway, New York 3, N. Y.

Houchins Duster (4 ounce capacity).
Thomas W. Houchins Company
87-101 Ferry Street, Jersey City, New Jersey

I. Respirators.

Mine Safety - Appliance Company
Braddock, Thomas and Meade Streets, Pittsburgh 8, Penna.

Gloves (Synthetic Latex).

Purchase at local drug stores or rubber products suppliers.

IMPORTANCE OF PROGRAMMING

It is true in vermin control as in other fields, that an intelligent, well-planned program produces more effective results and lower costs than any other handling of the problem. In public housing, there are almost as many variations in vermin control programs as there are housing projects with the results virtually as variable.

When newly-discovered insecticides, such as DDT, PCH dusts, etc., had indicated their effectiveness, experimental project and authority programs in vermin control were established as demonstrations to Management and proving grounds for materials, equipment and procedure. Several of these have been in action over a year and the results have been such that recommendations can now be made for the wide-spread establishment of such programs in public housing.

There are problems in launching of such programs on which assistance may be needed. Problems will develop in determining the funds needed in your budget, selecting personnel for the work, selecting materials and equipment, planning the program and organizing the operation of the program. If you encounter difficulties you can obtain assistance at the regional office from experienced technicians in this field.

The fundamental steps in setting up a program of vermin control are:

A. Inspection of all of the units to determine the extent of the problem.

B. Estimation of cost for the first year. This should be based on the results of the inspections.

C. Procurement of suitable materials and equipment, preferably materials with residual killing powers.

D. Preparation of forms (notices and reports).

E. Selection of suitable and adequate personnel.

F. Initiation of the program.

PROGRAM PLAN

Of all the various programs in operation, the most effective are those involving periodical inspection of all dwelling units and treatment by management of any infestations revealed by the inspection. The policy of making tenants solely responsible for keeping their dwelling units free from vermin is virtually non-effective and definitely not recommended in multiple-unit buildings. The policy of treatment after tenant complaints is effective for satisfying the complaint but does not rid the project of vermin, because only a very few tenants will complain of infestations.

I. Survey of Problem. A policy of periodical inspection by management is necessary to keep the project free from vermin. The preliminary inspection to determine the scope of the problem may be combined with a maintenance inspection by inclusion of the proper items on the maintenance report form. This will be a check on whatever system of vermin control is in use on the project. When all dwelling units on each project are inspected and the percentages of bedbugs and cockroach infestations are known, an approximate estimate of the cost of a suitable control program may be made.

II. Estimate of Cost. To date, the percentage of bedbug infested units in public housing projects has been approximately one-half the percentage of cockroach infested units. As there is a variation in wage rates from locality to locality, the annual cost of the program for the first year will vary according to the wage rate of the crew and the percentage of cockroach infestation.

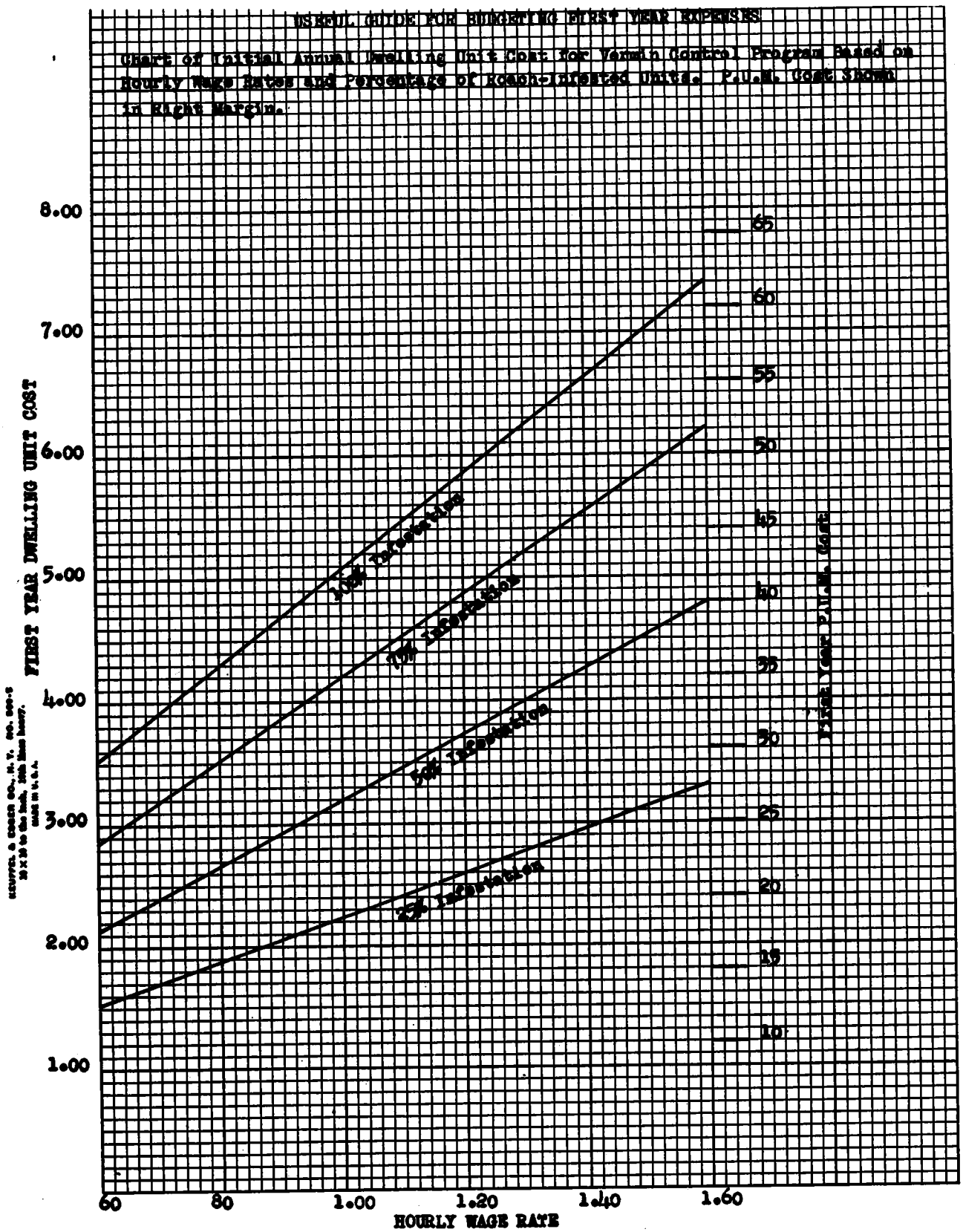
The chart on the following page has been prepared as a guide for estimating the cost of a proper vermin control program during its first year of operation, depending on the above variables. For infestation percentages and wage rates between those indicate on the chart interpolation will provide an estimate that will be sufficiently accurate for budget purposes. As an example of interpolation, if the percentage of cockroach-infested units is 40% and the wage rate of the crew or employee is 80¢ an hour, the chart will show that the budget should provide for a PUM cost of $.20 or annual cost of $2.40, for the first year's expenses. After the first year's operation, one crew member in the average project can inspect 1200 dwelling units and treat all infested dwellings every 3 months. For budgeting purposes beginning in the second year and thereafter, the maximum annual dwelling unit cost should not exceed the following:

Hourly Wage Rate	Annual D.U. Cost	P U M Cost
$ .60	$ 1.32	$ 0.11
.90	1.80	0.15
1.20	2.28	0.19
1.50	2.88	0.24

In all probability, on the average project, the cost will be materially lower than the above figures since these figures are maxima.

USEFUL GUIDE FOR BUDGETING FIRST YEAR EXPENSES

Chart of Initial Annual Dwelling Unit Cost for Vermin Control Program Based on Hourly Wage Rates and Percentage of Roach-Infested Units. P.U.M. Cost Shown in Right Margin.



III. Materials and Equipment. The above costs and the anticipated work and results are based on the use of insecticides with residual killing qualities, such as DDT. The estimates are therefore inadequate when applied to other materials or methods.

In any program involving 100 or more dwelling units, it is more economical to purchase DDT concentrates and proper diluents which can be mixed at the project. Duplicate units of equipment should be purchased for any program up to 1000 dwelling units. For any program substantially over 1000 dwelling units, there should be an additional unit of equipment for each 1000 additional dwelling units.

IV. Notice, Report and Record Forms. Prior to the detail of employees to work on the program, an adequate supply of the necessary notice, report and record forms should be prepared. Sample forms and the number of forms required during the first year are included in this section.

V. Personnel. The provision of personnel to operate a vermin control program has usually proven to be the most difficult problem to work out. The type of employee to obtain is one of the most important considerations.

The number of employees needed depends primarily on the number of dwelling units and the percentage of infested dwelling units. In general, on the average project, one employee can inspect and perform the necessary treatments in 1000 dwelling units. For programs of less than 1000 D.U's., this work is usually a part time job for one person. In programs of over 3000 dwelling units, where over two employees are needed, it may be necessary to have a working foreman well-informed in the methods of controlling vermin and with organizing ability.

Since the inspection of dwelling units and the contacts with tenants reveal personal information about the tenant's family life, the assignment calls for employees who are tactful, honest and reliable. Female inspectors have been very satisfactory in two programs and in one program they do the exterminating work as well. Rates of pay for inspection and treatment work vary from $ .65 to $1.35 an hour in different localities.

VI. Initiating the Program. In a general way, the above information points to the basic preparations that must be made before a vermin control plan can become a program in operation. To initiate and operate the program, the following steps should be taken:

A. Inform the tenants, through notices or other methods, about the program, and the date that their dwelling units will be inspected.

B. Organize the inspector's schedules to inspect dwelling units of tenants who have been notified.

C. Leave notice of a call-back inspection at any units where tenant is absent.

D. Inspect and record what is found.

E. Notify tenants of all infested units as to the date of treatment and how they should prepare the unit for treatment.

F. Perform the treatments on schedule and according to recommended methods for residual treatments.

G. Notify tenants of treated units when the reinspection will occur.

H. Reinspect all treated units about 14 days after the treatment to determine effectiveness of the treatment.

I. Notify tenants of units still infested that a re-treatment will be made.

J. Re-treat all units still infested according to the recommended methods.

K. Compile summary reports of the work done and costs at the conclusion of the above work.

L. Repeat all the above steps at periodical intervals, depending on the infestation percentage found on the last complete inspection.

Recommended intervals for complete inspection of all dwelling units when using residual treatments are as follows:

Percentage of Dwelling Units Infested With Roaches	Interval Between Complete Inspection of All Units
Over 10%	Every three months
Between 5 and 10%	Every six months
Under 5%	Every twelve months

THE INSPECTION PROGRAM

The value of periodical inspection of all dwelling units in a vermin control program for public housing projects is as great as the use of proper materials, equipment and methods for the treatment of infestations. Programs based on locating infestations by inquiry or awaiting complaints of tenants are noted for their failure to find all of the infestations. In multi-family housing, an unreported infestation can infest all adjacent dwellings in the building and it usually does.

I. Inspection Notice. In a Management-Operated inspection, notice must be given the tenants about the purpose of the inspection, indicating the date that the tenant's dwelling unit will be inspected. A form which has been used with good effect and which is recommended for use with any revisions which may be desired locally, is shown on page 9 .

It is important that the inspector make the inspection on the date that is indicated by the notice. In order to schedule the proper number of tenants to be notified, an average of 25 dwelling units can be inspected on the first inspection of the units while 35 dwelling units can be done on subsequent inspections by an inspector in an 8-hour day. Fewer units are inspected on the initial inspection because more time is consumed answering questions of the tenants.

Experience has shown that 5-10% of the tenants will be absent from the dwelling units when the inspector calls, regardless of the notice of inspection. In these cases, it is recommended that the form shown on page 10 be used and the date set for the day following the last day of regular scheduled inspections.

The Call-Back Notice may be attached to or slid under the door of the dwelling unit. This notice indicates that two employees will enter to inspect unless the tenant is in or indicates an objection to the Manager during the interim period. A single employee should not enter a tenant's dwelling unit when the tenant is away to avoid later complications. Without the above procedure, call-backs may be repeated several times, increasing the cost, or the inspections are never made, thus allowing infested units to go undetected.

II. Making the Inspection.

A. Equipment. Inspectors should be provided with a flashlight, small mirror, Daily Schedule, Dwelling Unit Cards for the units on his schedule, a claspboard, a small hand duster filled with PCH powder, and pencils.

B. Outline of Instructions to Inspectors. A daily work plan and precautions for inspectors to observe may be summarized as follows:

1. Address and send or deliver Vermin Control Form No. I (page 9) to as many tenants as you expect to call upon the second day after the letter is delivered. At the same time, list these addresses on Vermin Control Form No. IV (Inspector's Daily Schedule and Work Report, Page 12).

2. Visit the units listed and examine units for signs of roaches in usual places; around sinks, pipes, cupboards, tables, closets, bathroom, etc. A small hand duster filled with a dust irritative to roaches, such as PCH powder, is a valuable aid in this inspection because a few exploratory puffs of the dust in likely hiding places will drive roaches out.

3. Examine the unit for bedbugs by inspecting all beds, mattresses, springs, walls, trim, living-room furniture, etc.

4. Question tenant as to infestation by any vermin. Do not accept the tenant's word that no infestation exists without a personal inspection of the dwelling.

5. The first sight of roaches, bedbugs or signs and stains from them or an infestation reported by the householder is enough to report "Treatment Required". No further time needs to be spent in the dwelling by the inspector.

6. If the tenant is absent when the inspector calls, the inspector should fill out a Vermin Control Form No. II, Call-Back Notice, indicating a date on which he will inspect the unit, accompanied by another project employee.

7. If any extraordinary conditions of poor housekeeping, violations of sanitary code, etc., exist, the inspector should report them to the manager.

8. Courtesy is always required.

9. Fill out the Vermin Control Form No. III, Dwelling Unit Vermin Record Card, (see page 11), indicating under "Comments" the location and degree of infestation.

10. Fill out Vermin Control No. IV, Inspector's Daily Schodule and Work Report, (see page 12) checking the proper column for the unit according to the condition found.

11. When all the units, including the call-backs are inspected, the inspector or his supervisor should fill out Vermin Control Form No. V, Summary Report for Inspection of Dwelling Units, (see page 13) from the completed Inspector's Daily Schedule and Work Report (Vermin Control Form No. IV) and employee's time records for submission to the manager and others concerned.

C. Time Required. During the first round of inspections, many tenants will have questions and a few may object to the intrusion of their dwellings but a brief explanation in a courteous, helpful manner generally wins permission to enter and inspect. If these initial inspections are properly conducted, subsequent entry is rapid and easy. An average of 20 minutes is usually required per dwelling unit on the first inspection of the project to allow for answering questions. Thereafter, an average of 10 to 15 minutes per dwelling unit is usually sufficient.

III. Treatment Program. When the inspection of the project is completed, treatment of the infested dwellings should follow promptly according to the method described in the release entitled Treatment Program which follows. The Dwelling Unit Vermin Record Card (Vermin Control Form No. III) guides the spray crew in its work and should be turned over to the person or persons doing the treatment work.

IV. Reinspection of Treated Units. Fourteen to thirty days after the units are treated, each treated unit should be reinspected to determine the effectiveness of the treatment applied. A small percentage of units will still have infestations and need retreating. Scheduling, inspecting and reporting are conducted the same as the initial inspection, except that only the treated units are inspected. A different form is suggested for the tenant notice, such as Vermin Control Form No. VI (Pre-Reinspection Notice), which is shown on page14 .

Column II of the Vermin Control Form No. III is used to record findings of the reinspections. Vermin Control Form No. IV is used to prepare the schedule and record the day's work. Vermin Control Form No. V can be used for the summary report by adding the prefix "Re" in front of the word "inspection" in the title.

An average of 10 to 12 minutes per dwelling unit is usually required for reinspections. Call-backs are handled as under the initial inspection.

V. Frequency of General Inspection. An over-all inspection of all dwelling units is not necessary oftener than every 90 days, when the insecticides used are those producing residual killing power for that length of time. If contact insecticides are used, a good job of control cannot be done unless inspections are made monthly. Thus, it is far less expensive to carry out an effective program of control with residual insecticides. See page 5 of this section for details of inspection frequency when residual treatments are used.

VERMIN CONTROL FORM NO. I (Sample)

INSPECTION NOTICE

Project Name and No._____

City_____ State_____

Date_____

Dear Tenant:

In the past, the Management Office has received complaints from tenants regarding dwelling units being infested with bedbugs and cockroaches. Although you personally may never have been bothered by the nuisance of these insects, there is a possibility that one apartment in your building may eventually cause others to reach some stage of infestation. Our employees have been trained to use the newly discovered insecticide DDT and other materials which can eliminate these pests. In order to do a thorough job, all apartments must be inspected. One of our employees will visit your apartment for the purpose of an inspection. These employees are thoroughly trained and capable of noting any signs of insect nuisance, which may have resulted from no fault of your own.

The inspection will take place on _____ between _____M. and _____M.
(Day)

It is solely for your protection, benefit and comfort that we urge your fullest cooperation and assistance in this inspection. If you cannot be home at _____M. _____, we would appreciate your leaving this notice on your
(Day)

door, giving our employees authority to enter for the purpose of an inspection, or if for some reason you cannot cooperate to that extent, leave this notice on your door indicating as to what hour on _____ we can find you
(Day)

at home.

Yours very truly,

Housing Manager
Housing Authority of _____

(Required number of inspection notices for a year, 4 x number of D.U.)

VERMIN CONTROL FORM NO. II (Sample)

CALL-BACK NOTICE

Dear Tenant:

In accordance with the notice delivered to you, our exterminating crew called today for (inspection, treatment) of your apartment in our pest control program. Since you were not home and left no instructions for them to proceed with the work in your apartment, they will return on _____, with a member of the Project Staff.

It would be most helpful if you would plan to be at home when this visit is made. If you are not in, the Project Employee, using a master key, will accompany the crew into your apartment for the purpose of (inspecting, treating) it unless you advise the Management prior to that time, of your objections to that procedure, and offer an alternate way of performing this very essential work.

Very truly yours,

Housing Manager
Housing Authority of_____

(Required number for one year - $4 \times \frac{\text{number of dwelling unit}}{10}$)

VERMIN CONTROL FORM NO. III (Sample)

Form No._____ Housing Authority of _____ Project_____

DWELLING UNIT VERMIN RECORD CARD

Inspection and Treatment

Building No. _____ Unit No._____

No. of Bedrooms _____

Inspection Record

Number	I	II	III	IV	V	VI	VII	VIII
Date								
Bedbugs Observed								
Bedbugs Reported								
Roaches Observed								
Roaches Reported								
Other Vermin Observed								
Other Vermin Reported								
Housekeeping								
Comments								
Inspector								

Treatment Record

Crew Number								
Date								
Material - Kind								
Material - Amount								
Unit Prepared by Tenant								
Comments								
Sprayer's Name								

(Required Number - One for each dwelling unit.)

VERMIN CONTROL FORM NO. IV (Sample)

INSPECTOR'S DAILY SCHEDULE AND WORK REPORT

Project _____ Date _____

Dwelling Unit	No Vermin	Bedbugs	Roaches	Bedbugs & Roaches	Other Vermin

(Required Number for 1 year - 4 x No. of D.U's.)

VERMIN CONTROL FORM NO. V (Sample)

Form No._____ Housing Authority of _____ Project_____

SUMMARY REPORT FOR

INSPECTION OF DWELLING UNITS FOR VERMIN No. D.U._____

This form may be used for 14-day Re-Inspection of Treated D.U.'s Summary Report by adding "Re" to above inspection.

Dates	D.U. Inspected	No. Call-Backs	No. D.U. Bedbug Infested Only	No. D.U. Cockroach Infested Only	No. D.U. Infested B.Bugs & Roaches	No. D.U. Not Infested	Hours of Work	Rate per Hour	Total Labor Cost	REMARKS No. Tenant Refusals of Entry No. Vacant Units Average Time per D.U. Average Cost per D.U. Other Notes of Interest

(Required Number for 1 year - 8 x Number of Projects.)

VERMIN CONTROL FORM NO. VI (Sample)

PRE-REINSPECTION NOTICE

Project_____ Date_____

Dear Tenant:

On _____, your apartment was treated to eliminate _____. It is part of our exterminating program to recheck on all treatments approximately 14 days after treating to determine if a complete elimination of the pests was affected. Accordingly, our employee will call at your apartment on _____ during the day to reinspect your apartment for this purpose.

If you cannot be home _____ we would appreciate your leaving this notice on your door, giving our employees authority to enter for the purpose of reinspection. If, for some reason, you cannot cooperate to that extent, leave this notice on your door with information as to the hour on _____ when we can find you at home.
(Day)

Yours very truly,

Housing Manager
Housing Authority of_____

TREATMENT PROGRAM

Organization of the treatment program in infested dwelling units is very essential to obtain efficiency, economy and tenant satisfaction. Adequate and suitable equipment and material should be ready before the work begins. Personnel must be trained in precautions and methods of using insecticides. The infested dwelling units must be located by inspection of all dwelling units. Any other procedure is doomed to wasted time and unsatisfactory results.

I. Preliminary Action. When the above details are arranged, a daily schedule of units to be treated should be arranged for each member of the treatment crew using Vermin Control Form VIII, Treatment Crew Daily Schedule and Work Report, as shown on page 20 . Notices to tenants of the infested dwelling units should then be prepared and delivered to the tenants two days before the treatments are to be made. A sample notice for this purpose is Vermin Control Form No. VII, The Pre-Treatment Notice, on page .

It is important that the treatment be made on the date indicated on the notice. Every effort should be made to require the tenants to prepare the unit for treatment prior to the visit of the treatment crew members. In order to schedule the proper number of tenants to be notified, an average of 12 dwelling units per crew member can be treated in an eight hour day. This average will be lowered considerably if tenants prepare the unit for treatment, since preparation of the room involves as much work time as the treating.

Experience has shown that 5-10% of the tenants will be absent from the dwelling units when the treatment visit is made. As outlined in the inspection program, the Vermin Control Form No. II, Call-Back Notice, on page 10 should be filled out and left at the dwelling unit. It is very important that all known infested dwelling units should be treated so as not to leave any unit from which the vermin can spread to adjacent homes.

II. Instructions to Treatment Crew. A daily work plan and precautions for the treatment crew to observe may be summarized as follows:

A. Address and send or deliver the Pre-Treatment Notice, Vermin Control Form No. VII, to as many tenants as you expect to call upon the second day after the notice is delivered. At the same time, list these addresses on Vermin Control Form No. VIII (Treatment Crew Daily Schedule and Work Report). Dwelling Units to be treated are taken off the Vermin Control Form III (Dwelling Unit Vermin Record Card) which is shown on page 11.

B. Visit all dwelling units notified for treatment on the date specified.

C. If any dwelling unit is not prepared for treatment, request the tenant to prepare it and proceed to the next unit. Advise the tenants how to prepare the unit and state that you will return later that day. Avoid assisting the tenant to prepare the room unless the occupant is aged, infirm or ill.

D. If unit is prepared, be sure that all plants, fish, pets and children are out of the room to be treated. Ventilate the room during treatment.

E. Upon completion of the treatment, deliver to tenant Vermin Control Form IX (Post-Treatment Hand-Out), a sample of which is shown on page 21, and instruct him to avoid re-arranging the room until the spray has dried (about 45 minutes). It has been found very helpful in reducing future work-loads if the tenant is handed an instruction sheet similar to the Vermin Control Form X (How To Get Rid of Roaches and Bedbugs) shown on pages 22 and 23 .

F. Courtesy is always required.

G. Fill out Vermin Control No. III (Dwelling Unit Vermin Record Card) and No. VIII (Treatment Crew Daily Schedule and Work Report).

H. When all the units, including the call-backs are treated, the treating employee or the foreman of the crew should fill out the Vermin Control Form No. XI, Summary Report for Treatment of Vermin-Infested Dwelling Units (see page 24), from the completed Vermin Control Forms No. VIII (Treatment Crew Daily Schedule and Work Report) and the time book for submission to the manager and others concerned.

III. Methods of Treatment. These are detailed in Section 2.43 for the specific equipment, material and vermin that are involved.

IV. Re-Treatment of Units. Fourteen days after treatment, the treated units should be re-inspected as outlined in Section 2.42, pages 7 and 10 . Some units will still be infested, since it is rare that an exterminator can obtain complete control in all units treated with one visit. From the re-inspection reports, all dwelling units still infested should be sent a copy of Vermin Control Form No. XII (Pre-Retreatment Notice), a sample of which is shown on page 25 , and the scheduling, treating and reporting proposed above should be followed as conditions require. Since the average amount of infestation requiring re-treatments is considerably reduced, an average of 16 units can be treated in an eight-hour day. Call-backs are handled as under the regular treatment.

In dwelling units where the first treatment for roaches did not substantially reduce the degree of infestation, it is recommended to use a combination of 5% DDT residual spray followed by an application of 10% DDT powder or PCH dust when the spray has dried.

A summary report of re-treatments should be completed for all re-treatments. Vermin Control Form No. XI can be used for this purpose by adding the prefix "Re" to Treatment in the title and filling in the appropriate data from Vermin Control Form Nos. III or VIII on the re-treatment.

V. Treatment of Vacant Units or Complaints. One problem that arises from the use of a central crew in a large housing authority with several projects is the treatment of vacant units on turnovers and the treatment of complaints. It is recommended that a piece of equipment for each type of treatment and a small supply of material be left with each project. A member of the project crew should be shown how to treat for bedbugs and roaches so that he can treat vacancies or complaints when the need occurs. It is wasteful and inefficient to have a member of the central crew leave one project to travel to another to treat one or two units.

VI. Charge to Tenants for Pest Control Treatment. Some local housing authorities feel that the tenants are responsible for the costs of treatment. While some difficulty is experienced in collecting these charges, it is frequently believed that tenants will cooperate with some personal efforts to eliminate vermin in their units if a charge is imposed. Where a charge for treatment is contemplated, it is recommended that all dwelling units be inspected and the infested units be treated, reinspected and, where required, re-treated before the charge system is initiated. After this has been done, the tenants should be notified of the charge system for any subsequent treatments. A sample notice is Vermin Control Form No. XIII (Charge for Pest Control Treatment) on page 26 , which may be adopted for this use. In computing this charge, the following formula will be approximately accurate for the cost.

Treatment Charge = 1½ (Hourly Wage Rate) + 1-1/3 (Cost per Quart of Insecticide)

MASTER CONTROL

It is desirable for the housing manager and executive directors of local authorities to be able to trace the progress of a control program, see the results of the work and know the unit costs. Accordingly, the attached Master Control sheet on page 27 has been developed and used in several programs, and appears to answer all questions of those interested in the total results. One sheet for each project may be set up in a binder for a local housing authority with several projects.

PRE-TREATMENT NOTICE

VERMIN CONTROL FORM NO. VII (Sample)

Project _____ Date _____

Dear Tenant:

The inspection of your apartment, made on _____, revealed the presence of _____. This may be due to no fault of your own.

Our employees will call at your apartment sometime during the day on _____ for the purpose of treating in accordance with approved methods. In order to save time, we request you to cooperate by preparing your unit for treatment as follows:

a. For bedbugs:

Remove all bed-linen, blankets, pillow-cases from all beds, cots and cribs in order that the mattresses, pillows, springs and frames may be sprayed.

b. For cockroaches:

Remove all food, dishes and utensils from cupboards, shelves, cabinets and other storage areas. It is necessary to apply the spray to the shelves, walls and baseboards of infested rooms.

We appreciate your cooperation and assure you that the material used will in no way cause damage to your belongings and is positively not injurious to human beings. Pets, birds, fish and house plants should be removed from rooms during spraying only.

The results of this treatment will vary from former experience in that live bugs may continue to be present on walls for several days but no biting should be experienced by the tenant after the treatment. The bugs should be completely gone in two weeks with most of them dead in 24 hours. The treatment is generally found to be effective for several months, so that bugs hatching after treatment or introduced into the apartment are killed by crawling over the sprayed surfaces.

The spray crews will start working at ____ .M., _____ and we will complete the job at as early an hour as possible. It should require only thirty minutes to treat your apartment if you have it prepared for spraying.

Yours very truly,

Housing Manager
Housing Authority of _____

(Annual Required Number - 4 x Number of infested Dwelling Unit.)

VERMIN CONTROL FORM NO. VIII (Sample)

Project

TREATMENT CREW DAILY SCHEDULE AND WORK REPORT

Date

Dwelling Unit	Treatment		Other (Specify type)	Material			Amount			Unit Prepared for Treatment	Remarks
	Bed-bugs	Roaches		Type: Spray	Dust	Other	Spray	Dust	Other		

(Annual Required No. - $\frac{4 \times \text{No. of Infested Units}}{8}$)

VERMIN CONTROL FORM NO. IX (Sample)

SAMPLE POST-TREATMENT HAND-OUT

THE HOUSING AUTHORITY OF _____

Dear Tenant:

We have just completed treating your dwelling for the extermination of household vermin. The material used does not always kill immediately but within 48 hours to a few days, you should be rid of the pests.

Poor housekeeping is not always the reason for the presence of vermin in the home. They can be brought in from the outside in many ways. Nevertheless, if they are permitted to increase without steps being taken to kill them off, carelessness or indifference to proper maintenance of the home is indicated.

Supplying this extermination service costs money and time. We are glad to help all we can to get rid of these pests, but it will require your help. We will make an inspection to find the results of this work at a later date.

We expect your full cooperation.

THE MANAGEMENT

(Required yearly number - 4 x No. of infested units.)

VERMIN CONTROL FORM NO. VIII (Sample)

Project

TREATMENT CREW DAILY SCHEDULE AND WORK REPORT

Date

Dwelling Unit	Treatment: Bed-bugs	Treatment: Roaches	Other (Specify type)	Material: Type: Spray	Material: Type: Dust	Material: Type: Other	Amount: Spray	Amount: Dust	Amount: Other	Unit Prepared for Treatment	Remarks

(Annual Required No. - $\frac{4 \times \text{No. of Infested Units}}{8}$)

VERMIN CONTROL FORM NO. IX (Sample)

SAMPLE POST-TREATMENT HAND-OUT

THE HOUSING AUTHORITY OF _____

Dear Tenant:

We have just completed treating your dwelling for the extermination of household vermin. The material used does not always kill immediately but within 48 hours to a few days, you should be rid of the pests.

Poor housekeeping is not always the reason for the presence of vermin in the home. They can be brought in from the outside in many ways. Nevertheless, if they are permitted to increase without steps being taken to kill them off, carelessness or indifference to proper maintenance of the home is indicated.

Supplying this extermination service costs money and time. We are glad to help all we can to get rid of these pests, but it will require your help. We will make an inspection to find the results of this work at a later date.

We expect your full cooperation.

THE MANAGEMENT

(Required yearly number - 4 x No. of infested units.)

VERMIN CONTROL FORM NO. X (Sample)

HOW TO GET RID OF ROACHES AND BEDBUGS

Roaches and bedbugs are not necessarily an indication of sloppy housekeeping. They may enter your apartment on laundry bundles, luggage or clothing. They travel from one apartment to another through cracks and along pipes.

The following suggestions should be helpful:

HOW TO GET RID OF ROACHES

1. Keep the home clean. Half the battle is the removal of bits of food, grease and accumulation of lint and dust.

2. Dispose of refuse and garbage frequently. Keep garbage can clean and the surrounding floor clean and dry.

3. When you find a roach, call at the Maintenance Office where you will be issued a small duster filled with powder which will kill roaches but is harmless to human beings or animals. Blow the powder into cracks or crevices where roaches hide - around water pipes, sinks, refrigerators, kitchen cabinets, stoves, shelves and completely around baseboards, including closets.

4. Leave the powder for several days or until all roaches have been killed.

5. Continue to inspect and treat rooms for roaches until all evidence of their presence is removed.

6. Inspect all packages that are brought in from outside.

7. Kill individual roaches immediately before they have a chance to multiply.

8. Liquid insecticides may be purchased for exterminating roaches, but some of these kill only those bugs with which the spray comes in contact. Care should be taken in purchasing these insecticides to obtain one that will kill roaches. Any inflammable insecticide should not be sprayed near open flame.

9. Take enough time to do a good job.

10. When the roaches are eliminated, pleeee return the duster for the use of your neighbors, since our supply is limited.

VERMIN CONTROL NO. X (Cont'd)

HOW TO GET RID OF BEDBUGS

1. A liquid insecticide containing DDT applied with a spray gun is preferable when treating bedbugs.

2. Be sure that the rooms and furnishings are kept scrupulously clean. Cleanliness is half the battle.

3. Spray all parts of beds, mattresses, chairs, couches, bureaus, closets, behind pictures and furniture, around carpets, baseboards, in cracks in walls and around door and window casings thoroughly.

4. Clean and spray all rooms that may be infested or may be the source of infestation.

5. Spray the places where bedbugs may be hiding whether you have seen them or not.

6. After thoroughly spraying a room, leave it for an hour or two before making beds and replacing the furniture.

7. From the time bedbugs are first discovered until all traces or evidence of them is removed, the apartment or infested rooms should be inspected and treated daily.

8. Furnishings should be examined at frequent intervals.

TO KEEP RID OF BEDBUGS--KEEP AFTER THEM

The above may be printed on back of Vermin Control Form No. IX, Post-Treatment Notice, and Vermin Control Form No. XIII, Charge for Pest-Control Treatment.

VERMIN CONTROL FORM NO. XI (Sample) HOUSING AUTHORITY OF _____ PROJECT _____

SUMMARY REPORT FOR
TREATMENT OF VERMIN-INFESTED DWELLING UNIT

For Reporting Summary of Re-Treatments, add "Re" to Treatment Above.

									Dates
									D. U. Treated
									No. of D. U. Call-Backs
									For Bedbugs Only
									For Cockroaches Only
									For Bedbugs and Cockroaches
									Dishes Removed
									Beds Stripped
									Hours of Work
									Rate Per Hour
									Total Labor Cost
									Amount of DDT Spray Used
									Cost Per Gallon
									Total Material Cost
									Total Cost of Material and Labor
									REMARKS Average Time Per Treatment Average Cost Per Treatment Other Notes of Interest

(Required Annual No. = 8 x No. of Projects)

VERMIN CONTROL FORM NO. XII (Sample)

PRE-RETREATMENT NOTICE

Project _____ Date _____

Dear Tenant:

Our re-inspection of your apartment 14 days after treatment indicated that the treatment was not completely effective.

This occurs in a few instances and it is part of our program to follow up all treatments and re-treat any apartments where the pests were not thoroughly eliminated. Accordingly, our employee will call at your apartment on _____ during the day to further treat your unit.

Your cooperation is again solicited to prepare your unit for this treatment in the same manner as before.

Yours very truly,

Housing Manager
Housing Authority of _____

(Required Annual No. = $\frac{4 \times \text{No. of infested units}}{4}$)

VERMIN CONTROL FORM NO. XIII (Sample)

CHARGE FOR PEST CONTROL TREATMENT

Project _____ Date _____

Dear Tenant:

As you know, the Management during the past few weeks has initiated an intensive program of pest eradication. Every apartment has been inspected and all infested units treated to improve your comfort. Hereafter, in order to keep operating costs at a minimum, and, since the elimination of bedbugs or roaches is in part the tenant's responsibility, the Management must charge the actual treatment costs for any further treatments to those tenants whose apartments have bedbugs or roaches. This cost will be _____ and will include the treatment, a reinspection 14 days later and one retreatment if the first one is not completely effective. Management will cooperate with you by bearing the cost of the periodical inspection of all apartments to locate the infested units. The amount of this charge will be revised periodically to correspond with the actual costs for labor and material to treat your apartment. You can help reduce the cost by cooperation in the following respects:

(1) Good housekeeping and frequent inspection by you.

(2) Preparation of your unit for treatment upon receipt of notice. If you do not have the unit ready for treatment when the spray crew arrives, the labor required to prepare and treat the unit is doubled, which doubles the cost of the work.

(3) Care of your unit according to the attached instructions.

Very truly yours,

Housing Manager
Housing Authority of _____

(Required Annual No., No. of D. U.)

MASTER REPORT SHEET (Sample)

VERMIN EXTERMINATION

THE HOUSING AUTHORITY OF _____

Project Name _____ Project No. _____ Total No. of D. U. _____

		SAMPLE I			
	REGULAR INSPECTION	NO. I	II	III	IV
1.	Date	2/11-13/46			
2.	No. D.U. Inspected	304			
3.	No. D.U. Bedbug Infested	81			
4.	% Bedbug Infestations	27%	Item 3x100 / Item 2 = 81x100 / 304 = 27%		
5.	No. D.U. Cockroach Infested	215			
6.	% Cockroach Infestations	71	Item 5x100 / Item 2 = 215x100 / 304 = 71%		
7.	Total Inspection Cost	$45.00			
8.	Inspection Cost per D.U.	15¢	Item 7 / Item 2		
9.	Inspection Time per D.U.	15 Min.			
	REGULAR TREATMENT				
10.	Date	2/14-16/46			
11.	No. of Treatments	296			
12.	Total Labor Cost	$183.30			
13.	Total Material Cost	$ 43.55			
14.	Unit Cost per Treatment	.76	Item 12 + Item 13 / Item 11		
15.	Time per Treatment	62 Min.			
	RE-INSPECTION OF TREATED UNITS				
16.	Date	3/2/46			
17.	D.U. Inspected	214	(This item should equal total of following units treated for bedbugs only, roaches only, and for both. Apparently all units treated were not re-inspected.)		
18.	No. D.U. Bedbug Infested	26			
19.	% Bedbug Infested	8%	Item 18x100 / Item 2		
20.	No. D.U. Cockroach Infested	106			
21.	% Cockroach Infested	35%	Item 20x100 / Item 2		
22.	Total Re-Inspection Cost	$27.00			
23.	Re-Inspection Cost per D.U.	13¢	Item 22 / Item 17		
24.	Re-Inspection Time per D.U.	13 Min.			
	RE-TREATMENT OF UNITS STILL INFESTED				
25.	Date	3/3-4/46			
26.	No. of Treatments	132			
27.	Total Labor Cost	$54.00			
28.	Total Material Cost	$16.75			
29.	Unit Cost per Treatment	54¢	Item 27 + Item 28 / Item 26		
30.	Time per Treatment	41 Min.			
	Total D.U. Cost for Inspection and Treatment and Re-Inspection and Re-Treatment	$1.21	Item 7 + 12 + 13 + 22 + 27 + 28 / Item 2		
	(Required No. = One for Each Project)				

6620

SPECIFIC INSTRUCTIONS

This section sets forth a description, the life habits and recommended control treatment for the most common household insect pests.

I. Cockroach - "Waterbug" or "Croton Bug". There are five species found most commonly in this country. All species have similar habits and therefore are treated alike.

A. Description. Roaches have flat, thin bodies which vary in size when full grown from one half inch long in the case of the Banded or Tropical Cockroach to 2 inches long in the case of the American Cockroach. With the exception of the Oriental Cockroach or "Black Beetle" which is black or deep brownish, the color is light brown to reddish brown.

B. Habits. Roaches are most active at night and hide during the day in cracks, crevices and other sheltered dark places such as may be found about the kitchen sink, drainboard, cabinets, radiators, bathrooms and under the trim of doors and windows. They move rapidly and can migrate readily from house to house, and room to room. They may be carried from grocery stores into the home with deliveries.

C. Food. They feed on all kinds of food but prefer starchy foods, sweets, beer and bananas.

D. Propagation. The eggs are laid in hard reddish-brown leathery capsules which are carried for several days attached to the body of the female before she drops them or glues them to objects in protected places. Each capsule contains up to 40 eggs. The young are hatched in five to six weeks and resemble the adult except for size. They are full-grown in 4 to 5 months.

E. Recommended Treatment.

1. Use a 5% DDT spray solution.

2. Apply spray with a nozzle adjusted to produce a heavy or wet spray.

3. It is important to spray all hiding places. All infested rooms should be thoroughly sprayed, applying the spray to shelves, cupboards, baseboards, window and door casings, transoms and moldings. A wide band, 12-18 inches wide, should be treated around wall extremities and casings.

4. In heavy infestations, it will be necessary to repeat the spraying if all insects are not killed in 14 days.

5. It is occasionally necessary to use 10% DDT dust along with the spray during the second treatment, driving the dust into hiding

places with a good hand duster. The dust or powder should not be applied until the spray solution has evaporated.

6. Supplementary treatments may be given by the tenants using PCH powder applied by a small hand duster at intervals of 1 to 2 weeks until all cockroaches are killed. This treatment should not be considered as a replacement of the treatment outlined above but only as an aid to the program and a means of reducing infestations at minimum cost.

7. Good experimental results are reported on a 2% "Chlordane" solution as a spray and on "PCH" powder and boric acid powder called "Sta-Rid" in several projects. It is possible that a program based on these materials will give equal or possibly better results than the 5% DDT. When a project-wide or authority-wide experiment can be initiated using these roachicides, a comparative study will be made to determine their effectiveness.

II. Bedbug or "Chinch"

A. Description. A flat oval insect, measuring approximately $\frac{1}{4}$ inch in length. The body is rusty-red or mahogany color. In starved condition the body is paper thin.

B. Habits. Bedbugs may be found wherever man lives. They are most active at night and can move from house to house and room to room but generally they are carried from one place to another on the person or furnishings. They may be found in bedsteads, mattresses, springs, upholstered furniture, behind torn or loose wallpaper, picture frames, under the baseboard, between or under floor boards, in the molding around doors and windows and in other locations which provide darkness and protection.

C. Food. They prefer the blood of man although they may attack almost any warm blooded animal. They suck their food through an elongated beak. They can live without food as long as one year.

D. Propagation. The small white oval eggs are laid in clusters about crevices or hiding places. They hatch in from seven to ten days at room temperature. The young are nearly colorless until they feed when they take the color and appearance of the adult. They require 5 to 8 weeks to become full-grown. There may be four or more generations produced per year.

E. Recommended Treatment.

1. Use 5% DDT solution.

2. Apply a light spray to all mattresses, pillows, bed-springs, bed frames and upholstered furniture, wall extremities, moldings,

window and door frames, fixtures and switch plates. It is unnecessary to spray the entire wall or ceiling because bedbugs are easily killed by crossing a 12 to 18 inch band around extremities of such areas.

III. Ants.

A. Description. Many species are considered as household pests especially in Southern States. They range in size from the very small red ant or Pharaoh's ant, which is so small that it is hard to see, to the large black ant or Carpenter Ant, which is about ½ inch long.

B. Habits. All ants form colonies or nests in which remain the queen ants, which lay the eggs, and the young ants, which have to be fed by the worker ants. The workers are the ants that are found attacking foods and crawling about the house. They collect food and carry it back to the nest, where they feed it to the queens and the young. The nests are usually out of doors, but sometimes nests are made in the house, especially in the woodwork. Ordinarily ants in wood are not to be feared, as termites are, for they usually make their nests in wood already softened or decayed and do not often attack thoroughly sound wood.

C. Food. All kinds of foods, chiefly sweets and meat.

D. Propagation. Mating occurs once each year when the males and queens, having wings, swarm from the old nest. Only one queen in many hundreds succeeds in establishing a new colony. She selects a nest and spends the rest of her life there laying eggs which are hatched and become workers in about 4 weeks to feed the queen and developing colony.

E. Recommended Treatment. Since the workers are usually the only members of the ant colony which leave the nest, the destruction of a few of them does not affect the queen or the development of the young unless enough of them are destroyed to seriously cut off their food supply. In the control of ant infestations, therefore, the secret of success is to locate and destroy the nests harboring the queens and the young, for when this is done the workers usually perish.

1. Treat the kitchen area and other infested rooms as recommended for roaches. Pay particular attention to doors and window sills and other places where the insects may enter the house from outside nests. Apply 10% DDT or FCH powder forcefully in all cracks or crevices that the ants use for entry.

2. Locate the nest by following back along the line or trail of worker ants as they come to and go from food. When the nest is located, apply carbon disulphide so that it reaches the queen and young within. Carbon disulphide is a liquid which evaporates

upon exposure to air, forming a gas that is heavier than air, so it will sink into the soil and cracks. If the nest is in the soil make holes about a foot apart over the infested hill areas with a pointed stick or bar to a depth of 3 or 4 inches and pour 2 to 3 tablespoonsfull of carbon disulphide in each hole. Then close the holes at the surface by pushing the soil together. When the nests are in the structure or under paving and can be reached through cracks, the carbon disulphide may be poured into the cracks. Structural and floor cracks or openings should be sealed with thin concrete or caulking material after the carbon disulphide has been applied. Caution. Carbon disulphide is explosive and inflammable in the presence of fire in any form, so keep matches, lighted cigars, cigarettes, etc., away while using or storing it.

IV. Flies, Mosquitoes and Other Similar Flying Insects with Soft Bodies.

A. Flies. There are many species of flies, the most common of which is the housefly.

1. Description. Flying insects of more or less tender body cover but with one pair of wings. The common Housefly is greyish brown in color and attains the length of from ¼ to 1/3 inch when full-grown. Many species such as the sandflies, are so small that they can enter the house through the mesh of ordinary screens, while others such as the Blow Flies or Blue Bottle Flies attain the length of 2/3 of an inch and still others such as the Horse Flies may attain the length of 1¼ inches. They all are thickly set with hair on the legs and body on which they may carry disease germs.

2. Habits. Flies travel about freely, frequently garbage storage facilities, manure heaps, and other places where filth may be found. They enter homes to feed on any kind of food that may be exposed. They may be found resting in the home on screens, ceilings, light cords and globes, porch posts, stairways and around garbage cans.

3. Food. They feed on all kinds of food but prefer animal excrement and fermented or decaying foods.

4. Propagation. They lay eggs from which larvae or maggots hatch. These maggots are wormlike and are white or colorless. They live in water, damp soil, rotting wood, decaying animal or vegetable matter and feed by sucking from these materials. The eggs are hatched, in the case of the Housefly in a few hours into maggots and after 8 days become adult flies. July and August is the height of the breeding season.

5. Recommended Treatment.

a. Use 5% DDT solution.

b. Spray all resting places such as lamp fixtures or cords, walls, ceilings, screens or windows, stairways and garbage stations.

c. Use aerosol spray in rooms filled with adult flies for a quick temporary control.

These insects are killed by contact with the dried DDT crystals for weeks after its application. Surfaces exposed to weather such as screens and garbage stations should require more frequent treatment than surfaces inside of the house. Strict application of preventive measures mentioned elsewhere will greatly reduce fly infestations.

B. Mosquitoes. These are similar to flies in many respects and are treated similarly.

1. Description. They are small soft textured insects resembling flies in that they have but one pair of wings. They have long slender bodies with narrow delicate wings.

2. Habits. All mosquitoes are troublesome in that they annoy man by their bite and many species are carriers of disease. Generally they are not long distance fliers. When abundant about a house, they are usually to be found breeding in the vicinity. They seldom travel a mile from their breeding place. The common house mosquitoes are night biters and hide away in closets and other dark places in the house and in basements, crawl spaces, street drains and storm sewers.

3. Food. They prefer the blood of man although they will feed on most warm blooded animals especially poultry. They suck the blood through a long beak which is inserted through the skin.

4. Propagation. Eggs are laid in or near water and hatch in about 2 days into wigglers which soon develop in the water into adults. Complete development from egg, to adult requires from 10 to 14 days. Many generations are developed, especially in the warm months of the year. While some mosquitoes breed in salt marshes, flood water, natural ponds and flowing streams, most domestic mosquitoes breed in man-made water containers such as rain barrels, tin cans, discarded automobile tires, bottles and other such vessels that will hold water. They often breed in unexpected places such as in water retained in eaves troughs, on flat roofs, in street catch basins, cutters, etc.

5. Recommended Treatment.

a. Removal or elimination by drainage or filling up all breeding places where mosquitoes propagate.

b. Treatment of any other breeding places with larvicide or oil. A light fuel oil applied every two weeks will control breeding.

c. Adult mosquitoes in dwellings or structures may be controlled by methods recommended for flies.

V. Moths, Carpet Beetles, Silverfish, and other similar insects.

A. Clothes Moths. These are found in nearly all dwellings. Their abundance is influenced by the temperature and humidity maintained in the house, the type of construction and furnishings and the thoroughness of the house cleanings. They are very destructive to clothing, carpets and upholstered furniture.

1. Description. The full-grown moth is yellowish or buff colored with a wing spread of half an inch. The larvae or worms are white with dark heads and are about half an inch long. They crawl readily when first hatched until they get to their food supply when they spin a shelter or web in which they conceal themselves.

2. Habits. The adult moth is not in itself destructive. These moths fly lazily in dark corners or just beyond the range of the brightest rays of light. They prefer darkness and may be found concealed in the folds of clothes, in cracks where lint and dirt have collected, under cushions of furniture, in chests, etc. The worms which really do the damage are found in the fabric or material on which they feed. They do not move much in this stage of development.

3. Foods. They feed on animal substances such as wool, hair, fur, feathers and all products made from these materials. Many people overlook the fact that woolen lint and hair accumulating in floor cracks, behind moldings and other such places are good breeding places.

4. Propagation. The full-grown moth which flies usually lives not more than 2 weeks. The female lays from 100 to 300 soft, white eggs about 1/32 of an inch long. The eggs are placed in the nap of clothing in upholstered furniture and in cracks. They hatch in from 4 to 8 days in room temperature. The newly hatched worms or larvae crawl until they find food and then spin a web in which they stay, feeding on the fabric most of the time. They pass through a pupal stage before maturing to adult moths. The complete development from egg to adult requires from 7 weeks to 3 years most of which time is spent in the destructive larval form.

5. Recommended Treatment.

a. Clean and air all clothes, woolens and furs to be stored.

b. Spray thoroughly with a light spray of 5% DDT solution all such articles to be stored.

c. Spray with heavy spray of 5% DDT solution, storage chests, trunks, closets, carpets, rugs, upholstered furniture and other areas where insects may rest or crawl before attacking fabric.

B. Carpet Beetles. Carpet beetles sometimes called "buffalo moths", cause great damage to clothes and household furnishings of wool, fur, feathers and hair.

1. Description. They are hard-shelled beetles about ¼ inch long. The color of the adult varies from pure black to a mottled pattern of white, yellow and black. The larvae or worms are generally whitish, overcast with black or brown.

2. Habits. The adult beetles fly readily, are attracted to daylight, and are often found crawling on window sills. They may fly from house to house in bright sunlight. They readily enter wall spaces where they may hide away out of reach of ordinary house cleaning. The larvae or worms, unlike the adult, do not like light and hide away in dark places, particularly in clothing long in storage, about the edges of carpets, in upholstered furniture, and beneath baseboards. The worms cause all the damage.

3. Food. Woolens, furs, feathers, hair and other animal substance.

4. Propagation. The adult seldom lives more than 2 weeks. The female lays not more than 100 eggs, which are placed in all sorts of locations such as floor cracks, about baseboards and in the nap of clothing, upholstered furniture and rugs. The eggs are soft and white in color. They hatch in 8 to 15 days. The young worms or larvae start feeding immediately and do not spin a web. They move about and feed during a long period of about a year. They increase in size by molting or shedding old skin. After each molt they eat very liberally but when ready to molt or when about to transform to pupae and adult stages they stop feeding and may crawl far from their food. They crawl behind baseboards and moldings and into wall and floor spaces where they gather in groups and are unmolested by housecleaning and spraying operations.

5. Recommended Treatment.

Same as for moths with the following additional measure:

Treat with 5% DDT solution, all cracks and crevices around infested rooms where the worms hide, as indicated above, and repeat treatments as needed when new hatchings may reappear.

C. Silverfish.

1. Description. Slender, wingless, scale-covered grayish colored insects. They are about 3/8 inch long with three long tail-like appendages at one end of the body and with two long slender feelers at the other end.

2. Habits. They are most active at night and hide during the day. They thrive in damp, warm spaces and move about rapidly from floor to floor and room to room, usually following pipe lines.

3. Food. They prefer vegetable foods having a high starch or sugar content and are very fond of moist wheat flour. They eat sizing in paper, bookbindings, wall paper, starchy insulating material, rayon fabric, starched clothes and lace curtains.

4. Propagation. They develop very slowly under usual house conditions and have a few young but are very hardy and able to live under unfavorable conditions for long periods. The female lays from 6 to 10 eggs which hatch in from 6 to 8 weeks. The newly hatched insects resemble the parent in form. They require from 1 to 2 years to reach maturity.

5. Recommended Treatment. Same as for carpet beetles with treatment directed at places infested with the insects as mentioned above.

VI. Fleas and Ticks.

A. Fleas. Fleas are annoying pests of man and domestic animals. Certain species that infest rats and other animals carry serious diseases such as bubonic plague, typhus and others.

1. Description. The adult is wingless, light or dark brown and about 1/10 of an inch long. The body appears compressed from the sides. The body cover is of over-lapping plates like armor and is hard and strong.

2. Habits. Fleas live in company with wild or domestic animals, especially cats, dogs, rats, poultry and man. They may be found on the bodies of animals or in their nests or beds. They can readily move about and transfer themselves from one animal to another or from animal to their beds by jumping. Basements and other similar places may become infested where pets are kept and, until the pests are exterminated they may annoy the entire household.

3. Food. They suck the blood of warm-blooded animals and feed only on this blood. They can live for as long as 18 months without food.

4. Propagation. Eggs are laid by the female while on the host and drop to the ground, where they hatch in a few days into legless maggots. In two weeks or more the maggots become full-grown in the dust, sand or litter on the ground and then spin cocoons, in which they change to adult fleas in the course of one or more weeks. They may breed in large numbers in basements or outbuildings where pets are kept. Even when pets are taken away, the flea maggots proceed to develop and the resulting adults may live for several weeks without food. This accounts for the presence of many fleas around in homes when occupants return after being away for some time.

5. Recommended Treatment.

   a. Use 5% DDT solution.

   b. Spray the floor especially under rugs and the surface of walls up to 36 inches from the floor, paying particular attention to basements or other spaces, where pets are kept.

   c. Do not spray DDT on pets or other domestic animals. Use PCH powder by liberally rubbing it into their fur or body coat. Their beds and surrounding area should also be thoroughly dusted.

B. Ticks.

1. Description. Flat oval insects about one quarter of an inch long. They are grayish to reddish brown in color and resemble bedbugs in general appearance.

2. Habits. They live on host animals, chiefly dogs, and may infest homes. In household infestations, the ticks will crawl under floor coverings and wall furnishings, such as pictures, tapestries, etc. Some species carry serious diseases such as Rocky Mountain spotted fever.

3. Food. They suck the blood of warm-blooded animals.

4. Propagation. Eggs are laid by the female after she has fed from the host animal. She drops from the host and deposits the eggs in cracks and crevices. Eggs hatch in 20-30 days. The young larvae await a host on which to feed and may live long periods if no food is available. The development from egg to adult is very slow and may take up to a year depending upon available food.

5. Recommended Treatment. Same as for fleas, with the addition of the following measure. Spray with 5% DDT solution behind all wall furnishings such as pictures, tapestries, etc.

SUGGESTED SUBSTITUTES FOR PYRETHRUM IN HOUSEHOLD PEST CONTROL

Due to the demand of the armed forces, and a restricted supply, the domestic sale of Pyrethrum in both powder and concentrate form has been severely restricted, and will not generally be available for household pest control. Suggested substitutes are as follows:

1. Sodium Fluoride Powder. Sodium fluoride powder has been previously recommended, particularly for roach extermination (p. 219.13 Local Authority Management Manual). It is commercially available at reasonable prices.

   POISONOUS: Should be kept away from food products and out of reach of children and pets at all times. Should be used in colored form, to prevent it being mistaken for baking powder or similar food products.

2. Thiocyanate Concentrate. Thiocyanate concentrate is particularly effective in bed bug control, but is also effective against other insect pests. It has been used successfully on projects by both tenants and project maintenance men. It is safe when properly used. Instructions for mixing and use must be followed carefully.

   a. Materials.

      1) Thiocyanate concentrate is sold under trade names, as follows:
         "Lethane" - Rohm-Haas Company, Philadelphia, Pennsylvania
         "Thanite" - Hercules Powder Company, Wilmington, Delaware

      2) "Water white" kerosene or "fine oil" is distributed by most oil companies locally. Some oil companies make a special oil for this specific purpose.

   b. Proportions.

      1) For use by tenants: 2 or 3 parts, but not more than 3 parts of concentrate to 97 or 98 parts of kerosene or oil.

2) FOR USE BY AN EXPERIENCED MAINTENANCE MAN: the concentrate can be increased to 5 parts per 100.

c. Method. This solution may be mixed in quantities to 25 or 30 gal. (Small drum).

IN SPRAYING WITH THE SOLUTION, AMPLE VENTILATION, SUFFICENT TO REMOVE EXCESS MIST, MUST BE PROVIDED.

THE WATERPROOFING OF LEAKY MASONRY WALLS

INTRODUCTION

A. General. This section presents information on methods of waterproofing leaky masonry walls which have been used on public housing projects and by others, and which appear at this time to have been reasonably successful.

The methods described are those selected by a conference held in Philadelphia in October 1944 and attended by FPHA architects and engineers, local housing authority representatives, members of the National Bureau of Standards staff and masonry contractors.

The conference was called because of the extent of the problem in public housing projects and the existence of a considerable amount of individual experimentation done, much of which was costly and ineffective. The conference selected certain methods which had proven satisfactory under the conditions encountered in a particular project and recommended other procedures which promised satisfaction. These methods are not offered as the final answer to all waterproofing problems in masonry construction, but as reasonably successful practices thus far observed and as being in the right direction. For example, one method which was reported to have proved to be generally unreliable was based on the use of colorless waterproofing materials for an over-all coating, particularly those of an organic nature.

Additional information on other corrective measures will be transmitted as studies indicate them to be satisfactory.

B. Condensation. One of the first considerations is to determine whether condensation is the real reason for what may seem to be roof or wall leaks. By making the following simple observations, this fact can be determined:

1. If on dry days dampness occurs on walls or ceilings, particularly following cooking or washing clothes in the kitchen and also if there has not been any recent rains, it is probably due to condensation from the air caused by cooling of wall or ceiling surface from the outside.

2. If the ceiling is an exposed roof slab, condensation may form in large areas or over the entire ceiling in a rather uniform manner. A leak will usually show in one spot.

3. If there is an air space between the ceiling and roof, condensation may form under the roof slab and drip down onto the attic floor, soak through the plaster and show in damp spots on the ceiling. When there is insulation above the ceiling, condensation would moisten the insulation in many spots or perhaps all over the area, but a leak would be confined to one or two spots.

Introduction (Cont'd)

4. If there are crawl spaces under buildings, condensation may be suspected in the dwellings, particularly if the crawl spaces are heated by steam pipes or other means.

   These conditions have been cured by stopping off all pipe chases and other openings at crawl space ceiling by insulation of bare steam pipes, and by increasing ventilation openings.

C. Suggested Steps in a Program of Correcting Leaks.

1. Determine location of leaks.
2. Select method to be used in correction.
3. Estimate the cost.
4. Submit complete report to the regional office for check on findings, selection of method and other assistance.
5. On receipt of regional approval, proceed with the work.
6. Follow up results carefully and give further attention as needed.
7. Keep a record of repair methods used, when they were done, and report results to regional office from time to time.

D. Procedure.

Part I enumerates the most common causes of leaks in masonry buildings, details of how to locate each type of leak and corrective methods that have been found to be successful.

Part II gives the six methods selected by the conference for correction of overall leakage.

Part III includes (1) a list of materials to be used in the various corrective measures as enumerated under Parts I and II, (2) an illustrated list of tools as mentioned in Parts I and II, (3) a "Glossary of Terms" and illustrations of repair methods, (4) illustrations of the occurrence of leaks in roofs and masonry walls. (Exhibits 1, 2 and 3)

PART I. VISIBLE WALL LEAKS - CAUSE AND CORRECTION.

Correction of dampness in masonry walls or top floor ceilings should never be attempted until after a careful physical inspection has been made of copings, parapet walls and flashings, roofs and roof flashings. Any suspicion of their failure should be noted. A small leak in any of these may appear as a side wall or ceiling leak as much as twenty feet away from its source. All parapet wall, roof or flashing leaks must be repaired before starting any exterior wall repairs.

Part I - Visible Wall Leaks-(Cont'd)

A low cost temporary method of stopping leaks for 3 to 5 years may result in permanent cure. This is due to the tendency of dirt and soot to close capillary paths and dissolved salts of cement and lime and magnesia to crystallize out of a solution and close them.

Leaks may often be traced by the use of an electrical moisture meter such as is used to determine if a plastered wall is dry enough to paint or to determine the moisture content of lumber.

It is imperative that experienced and competent personnel be used for making all roof and leaky wall repairs.

The following are the principal causes of visible leaks followed by suggested measures for correction:

a. Coping leaks
b. Parapet wall leaks
c. Roof and flashing leaks
d. Window and door opening leaks
e. Leaks through large cracks in exterior walls
f. Leaks through nail holes, caps and sags and visible hair cracks.

A. Coping Leaks.

1. Causes. These are due to cracks or other defects in joint material (mortar or mastic) of vertical and horizontal coping joints, due to shrinkage or disintegration of joint materials. They are also due to cracked or broken coping members. If bricks below coping on either side of parapet wall shows discoloration or efflorescence, it is probable that it is caused by a leak in coping joints directly above.

   Water from such leaks may pass down through the parapet wall and on down under the roofing material and show on the ceiling as an apparent roofing leak; or it may pass down to the roof slab and out, and appear as dampness on the outside of the wall. (See Exhibits 1 and 2 at the end of this Section).

2. Correction of Coping Leaks.

   a. Cut out all defective vertical and horizontal coping joints, (mortar or mastic) to a depth of 1" or until all disintegrated material has been removed. Use cape chisel (#2) or cut out tool (#1).

   b. Clean out the open joints thoroughly. Use wire brush (#5) and hose and nozzle.

   c. Moisten the joints with fog spray (#7) just in advance of repointing.

Part I, Par. A - Coping Leaks - Correction.-(Cont'd)

d. Repoint the joints to within 1/2" of the surface, using pointing mortar (#1) and pointers trowel (#10).

e. Cure by keeping repointed joints moist for 24 hours for high early strength cement (48 hours for standard cement) or until mortar is set. Use fog spray, frequently applied. Hot weather requires more frequent applications.

f. Seal the joint ahead of caulking by painting the 1/2" open repointed joint carefully with sealing compound (#6). Caution: Use care to keep sealing compound from brick and coping surfaces; it will mar the appearance.

g. Caulk joint full to the surface using gun grade caulking compound trowel smooth, and tool the joint to match original mortar joints. Use caulking compound (#5) and caulking gun (#9).

h. Replace cracked or broken coping members. First remove the broken member and clean the brick surface thoroughly; relay the new member in a full bed of fresh mortar (Pointing Mortar #1); rake out the joint to 1/2" of the surface. Cure as above. After mortar has set, seal and caulk the joint full and finish as above.

i. Suggestion. When permanent coping joints are desired, the use of the Minwax "Weathercap" is suggested. Manufactured by Minwax Company, Inc. 11 West 42nd Street, New York City. Cost of Type "A", Size No. 3 for a 3/8" joint is $.22 per lin. ft. These are installed by filling the coping joints to 1/8" above masonry with gun grade grey caulking compound. The lead "Weathercaps" are then cafefully set into the caulking compound and pressed down to a firm bed so that the bonding groves in the cap are solidly filled with caulking compound. Excess compound is then removed and the masonry left clean. (See Materials and Tools, Part III of this section).

B. Parapet Wall Leaks.

1. Causes. These are caused by large cracks, visible hair cracks, nail holes and gaps and sags in mortar joints. Water from such leaks may pass down and show as apparent roof leaks or may appear as dampness in exterior walls. Check both the interior and exterior surfaces of parapet walls for these causes of leaks.

2. Correction of Parapet Wall Leaks.

a. Large Cracks in Masonry Walls.

(1) Cut out all large cracks to a depth of 1" and to the width of the mortar joint, removing all loose or disintegrated mortar. Use cape chisel, or special cut out tool.

Part I, Par. B - Parapet Wall Leaks - Correction - (Cont'd)

(2) Clean crack thoroughly removing all particles of mortar, brick or dust. Use a stiff wire brush and strong stream of water or compressed air.

(3) Moisten the wall with fog spray in advance of tuck pointing to have wall damp but not watery.

(4) Grout the open joint with grout mixture (#2). Use small round paint brush (#16) so that grout reaches all interior surfaces of the open joint.

(5) Tuck point the crack full with tuck pointing mortar before the grout has set. Using a tuck pointer's trowel, force the mortar into the crack filling all voids; thoroughly and evenly compact the mortar to the surface. When mortar is thumb dry, tool the joint to match original joints.

(6) Cure. The tuck pointing must be carefully cured to insure an even set and a strong bond. Keep the walls evenly damp by using a fog spray as necessary for at least 24 hours for Early strength cement (48 hours for Standard Cement) or until pointing mortar is thoroughly set. Hot weather requires more frequent wetting.

(7) Seriously splintered or badly spalled brick should be replaced. Cut out, using cape and cold chisels.

(8) Bricks that are slightly nicked by cut out operations do not need replacing, but careful attention must be given to repointing where nicks occur. When bricks need replacing, the opening must be cleaned of all old mortar and thoroughly dampened. Using pointing mortar (#1) relay the new brick in full bed of fresh mortar. When thumb dry, tool the joint to match original mortar joints.

(9) Suggestion for cracks that have movement. Many cracks have movement after the repair is made. When it is suspected that movement continues, the following method is suggested.

(a) Cut out the crack to the depth of 1-1/2" and to the width of the mortar joint, removing all loose and disintegrated mortar.

(b) Clean crack thoroughly, removing all particles of mortar brick or dust. Using stiff wire brush clean thoroughly.

Part I, Par. B - Parapet Wall Leaks - Correction - (Cont'd)

(c) Caulk the crack to within 1/2" of the surface, using spun oakum and a plumbers straight caulking iron, or preferably a ships caulking iron with rounded working edges and rounded corners. Use wooden mallet.

(d) Seal the open joint, and the top surface of the oakum with sealing compound #6. Use small round paint brush #16 paint sealing compound into the crack so that it reaches all interior surfaces. Use care to keep sealing compound from all brick surfaces.

(e) Caulk the crack full to the surface using gun grade caulking compound (Note: use caulking compound that is same color as original mortar joints). When caulking compound has had time to oxodize, tool the joints to match original mortar joints. (See Part III, Materials and Tools).

b. Nail Holes, Visible Hair Cracks and Gaps and Sags in Mortar Joints.

(1) Cut out all nail holes, visible hair cracks, and gaps and sags in mortar joints and all defective vertical and horizontal mortar joints to a depth of 3/4" and to the width of the joint until all loose or disintegrated mortar is removed. Nail holes may generally be opened sufficiently with a punch.

(2) Clean out all open joints thoroughly using wire brush and a strong stream of water.

(3) Moisten the wall in advance of tuck pointers by using fog spray.

(4) Grout the open joint by painting with grout mixture, using smal round paint brush to reach all interior surfaces of the crack.

(5) Tuck point the open joints with pointing mortar; using tuck pointer's trowel, force the mortar into the joints filling all voids, thoroughly and evenly compacting to the surface. When thumb dry, tool the joint to match original joints.

(6) Cure. Using fog spray, dampen the wall evenly at frequent intervals as necessary for 24 hours for High Early Strength Cement (48 hours for standard cement) or until pointing mortar is thoroughly set.

c. Parging inside of the Parapet Wall. The inside of parapet walls is very vulnerable to leaks; if after above-mentioned repairs are made there is indication of general leakage through mortar joints, it is advisable to parge the inside of the parapet wall above the cap flashing, with 2 coats of parging as follows:

Part I, Par. B - Parapet Wall Leaks - Correction - (Cont'd)

(Before this is done, the outside face of the parapet walls and copings must first be thoroughly waterproofed.)

(1) Clean the wall and all mortar joints thoroughly removing all mortar particles, oil, grease, or any substance that will prevent bond of the parge coat.

(2) Moisten the wall ahead of the first parge coat using fog spray

(3) Parge first coat (Scratch Coat). Using pressure, apply parging 1/4" thick with mason's trowel or wood float, (#3) leaving a rough surface, or roughen with a stable broom (#14) or mason's scratcher.

(4) Cure first parge coat for 24 hours by spraying with fog spray, keeping surface always damp.

(5) Moisten first parge coat in advance of second parge coat.

(6) Parge second coat (Finish Coat). Using pressure apply 1/4" of parging with a mason's trowel and finish to a smooth even finish with cement finisher's steel trowel. (#12)

(7) Cure second parge coat. Spray evenly with fog spray for 24 hours for High Early strength cement (48 hours for standard cement) or until thoroughly set; keep surface damp while curing.

d. Tools and Materials (See Part III).

C. Roof and Flashing Leaks.

1. Causes.

a. Cap Flashings of Parapet and Pent-house Walls and Chimneys. Insufficient anchoring of flashings; lack of sufficient caulking; cracks in caulking due to shrinkage, and disintegration of caulking compound in caulking recesses, buckeled flashing sheets and failure of flashings sheet to lap adequately (at least 4"). (See Exhibit 1 at end of this section).

b. Base Flashings of Parapet Walls, Pent-house Walls and Chimneys. Punctures in flashings, disintegration of flashing material at the roof line and separation of flashing from roofing materials and wall. All base flashings should extend up the vertical wall at least 8" and have been firmly fastened to the wall by mopping; they should also extend at least 4" into the roofing material and have been thoroughly mopped. This applies to either felt or metal base flashings.

Part I, Par. C - Roof and Flashing Leaks - Causes - (Cont'd)

c. Roof Drain Flashings. Punctures in flashings and defective caulking in caulking recesses.

d. Gravel Stops. Punctures in flashings and wear, disintegration and rupture of materials, showing up as holes and cracks in the gravel stops.

e. Roof Surfaces. Wear, punctures and disintegration of materials; insufficient lap of roofing materials and lack of binder. The slag or gravel surfaces of flat roofs may be missing entirely; requiring remopping and resurfacing. (See Exhibit 1 at end of this section).

2. Correction of Roof and Flashing Leaks. Correction of all the above-listed roofing and flashing leaks should be made by experienced waterproofing or roofing workmen. It is important that the prescribed repair methods be carried out in the best and most workman-like manner.

When these repairs are completed they should be thoroughly tested for water tightness before proceeding with repairs or waterproofing of exterior walls. A hose test can be used as a preliminary method but the final test is that of a driving rain.

D. Window and Door Opening Leaks.

1. Causes. These are caused by gaps in caulking around window and door frames and lintels, due to shrinkage and disintegration of caulking compound and failure of caulking to bond to masonry and frames.

Cracked and disintegrated mortar at the window and door sills are due to movement and shrinkage of mortar. Such defects may be detected immediately after a driving rain and may show dampness on plaster, casements and window sills. (See Exhibit 2 at the end of this section).

2. Correction of Window and Door Opening Leaks.

a. Cut out all defective and disintegrated caulking compound to the depth of the caulking recess, using cape chisel, cut out tool, or ordinary cold chisel.

b. Cut out all defective lintel joints to a depth of 1" or until solid surfaces are reached.

c. Clean out the caulking recesses and lintel joints thoroughly. Brush out all particles of caulking compound, dust and mortar. Do not use water for cleaning these openings.

Part I, Par. D - Window and Door Opening Leaks - Correction - (Cont'd)

d. Seal: the caulking recesses and lintel openings by painting them with sealing compound and allow time to set. Caution: Keep sealing compound from exposed masonry and window frames.

e. Caulk the caulking recesses full of caulking compound, using caulking gun #9, trowel to a smooth even surface. Form a blunt U joint by facing with round joint facing tool (#11). Caution: Avoid a thin feather edge joint against masonry surface, which will shrink, dry out, break bond with masonry and cause leaks. (See Exhibit 3 at the end of this section).

f. Caulk the lintel opening full of caulking compound (gun grade); trowel to a blunt U joint. (See Exhibit 3 at end of this section).

g. Cut out defective mortar joints around window and door sills to the width of the joint and to the depth of at least 1" or deeper if necessary to remove all loose mortar.

h. Clean out the joints thoroughly using stiff wire brush and compressed air.

i. Grout the joint while moist, by painting with grouting mixture using a small round brush #8, to reach all internal surfaces.

j. Tuck point the crack full with tuck pointing mortar before the grout has set. Using a tuck pointer's trowel, force the mortar into the joint filling all voids and thoroughly and evenly compact the mortar until joint is filled. When thumb dry, tool the joint to a concave surface, using joint facing tool.

k. Cure the repointed joints by frequent moistening with fog spray #7 at intervals as necessary for about 24 hours with High Early strength cement (48 hours for standard cement) or until pointing mortar has thoroughly set.

l. Tools and Materials. (See Part III)

E. Leaks Through Large Cracks in Exterior Walls.

1. Causes.

a. Long Horizontal Cracked Joints. Check walls first by sighting along the walls for evidences that courses of brick have moved out at floor slab and roof slab lines. (See Exhibit 2 at the end of this section). If such evidence is found it will be noted, on close examination, that there are long horizontal cracked joints with broken and disintegrated mortar and sometimes loose and spalled brick. Leaks may show in a variety of ways on the inside of such walls.

Part I, Par. E - Leaks Through Large Cracks in Exterior Walls - Causes - (Cont'd)

b. Large Diagonal Cracks. These generally occur at corners of buildings, usually due to movement. They may also occur at door and window lintels due to deflection of lintels, movement or shrinkage of building members (See Exhibit 2). Leaks from such cracks will generally show as wall dampness at inside corners, or as wet plaster around doors and windows, and as moisture on door and window sills.

2. Corrections. For correction of large cracks in exterior masonry walls refer to Paragraph B-2-a of this part.

F. Leaks Through Nail Holes, Gaps and Sags, and Visible Hair Cracks.

1. Causes. Nail holes in vertical and horizontal joints, and gaps and sags in mortar joints are usually due to careless workmanship. Visible hair cracks are usually caused by shrinkage of mortar in the joints, resulting in breaking of the mortar bond. In connection with the above defects, leaks are most likely to be found where discoloration, efflorescence and disintegration of mortar are in evidence.

2. Corrections. For correction of nail holes, gaps and sags and visible hair cracks in mortar joints refer to (2) under 2-b, page 9.

PART II. WATERPROOFING METHODS

Even though visible defects may have been fixed, walls may leak because of a multitude of invisible leaks like minute hair-cracks. This condition may require an overall wall treatment of which there are several types and methods.

A. Method I - Tuck Pointing

1. General. This method does not destroy appearance of walls. The life expectancy of this method varies widely with the quality of workmanship and inspection service. Experience indicates that a well-executed job may be expected to last fifteen years, and may be permanent. However, since this method is costly it should not be used until less expensive methods have been fully considered and should not be adopted without Central Office concurrence after a careful estimate of cost or after receipt of bids.

When this method was used in public housing projects the work was usually let on a contract basis to an experienced tuck-pointing contractor with a trained, experienced crew. Costs ranged from $.35 per square foot upward. Some cases may be found where the project has personnel who are experienced tuck-pointers, in which case this method may be done on a "Force Account" basis. Only careful, painstaking workmen who know their trade thoroughly should be used. One careless workman can make a lot of good work ineffective.

Part II, Par. A - Method I - Tuck Pointing - (Cont'd)

2. Inspection Service. Complete and adequate inspection by competent inspectors is necessary to assure proper results.

3. Preliminary Procedure. Before an overall tuck pointing job is started, it is imperative that all visible sources of leaks in exterior masonry walls, parapet walls, roofs and roof flashings are first repaired. (See Part I).

4. Tuckpointing Procedure.

   a. Cut out all vertical and horizontal joints to the width of the joint and to a depth of 3/4" or until all loose or disintegrated mortar is removed. Caution: When deep voids are found they should be carefully cleaned, washed out, and grouted and compacted with trowel to within 3/4" of the surface. Cure (using fog spray) and allow 24 hours to set before pointing over.

   b. Clean out open joints with stream of water, removing all mortar particles and dust.

   c. Dampen Walls, if dry, using fog spray in advance of tuck-pointers. The wall should be damp but free from running water.

   d. Grout the joints while moist by painting with grouting mortar using a small round brush to reach all internal surfaces.

   e. Tuck point the joints. Using tuck pointer's trowel and pointing mortar, force mortar into joints, carefully filling all voids; compact mortar evenly and flush with the wall surface.

   f. Tool joints when thumb dry, using a joint facing tool to match original mortar joints.

   g. Cure by keeping repointed wall uniformly damp for 24 hours for High Early strength cement (48 hours for standard cement) or until mortar has set. Apply fog spray, using care to avoid washing out the joints. Curing of tuck pointed parapet walls may be done by keeping wet burlap bags laid over them after fog spraying.

   h. Clean all brick surfaces by removing pointing mortar, stains and streaks.

   i. Tools and Materials. (See Part III)

Part III,- (Cont'd)

B. Method II - Brush Grouting.

1. General. This method alters appearance of walls; bricks will be smeared with grout at the joints. The life expectancy of this method is short, varying from three to five years depending on quality of workmanship. The outstanding advantage is low cost ($.04 to $.15 per sq. ft. on force account basis).

2. Supervision and Personnel Qualifications. When this method is used, the crew should be supervised and carefully trained by an experienced waterproofer in the repair of all large parapet and wall cracks, mortar joint leaks and recaulking of windows and door openings and especially in the technique of the over-all brush grouting method.

3. Preliminary Procedure. Before an overall brush grouting job is started, it is imperative that all sources of roof and wall leaks be repaired. Repairs of all large cracks and defective mortar joints should be completed and the joints carefully tooled to match original joints as all joints will be grouted over in this operation. (See Part I).

4. Brush Grouting Procedure.

a. Clean all mortar joints with stiff wire brush removing all mortar fins and lumps. Use hose and spray nozzle with a strong stream of water to remove all dust and other loose material.

b. Dampen wall using a fog spray, just ahead of grouting operation. Wall should be damp but not watery.

c. Grout the joints. Using grouting brush #17, scrub grouting mortar into all vertical and horizontal joints exerting pressure on the brush. Stroking back and forth, make three strokes in each direction over the same area. Care should be taken to confine the grout to the joint and to keep the surfaces of the bricks as clean as possible.

d. Cure with fog spray, starting before scaffold is moved. Use care to avoid washing of the joints. Spray uniformly from top to bottom of wall area and as frequently as required to keep wall damp for about 24 hours for High Early strength cement (3 days for standard cement) or until grouting mortar is thoroughly set. Parapet walls may be cured by keeping wet burlap bags laid on them.

e. Tools and Materials. (See Part III).

C. Method III - Brush Grouting with Stencil Hawk. This method does not destroy appearance of walls. A "Stencil Hawk" is used in connection with scrub

Part II, Par. C - Method III - Brush Grouting With Stencil Hawk - (Cont'd)

grouting. The "Stencil Hawk" is shaped somewhat like the usual dust pan with a slotted rubber lip which acts as a mask to protect adjacent brick surfaces from smear. A pressure is developed which tends to force the grouting into the joints and makes a more positive bond with the original joints.

This process is in the development stage, but indications are that it has promise for good results. No information can be supplied at this time but will be released as soon as it becomes available. This method was used successfully on a project in the Indianapolis, Indiana Area.

D. Method IV - Insul-mastic.

1. General. This method changes the appearance of the walls but not to such an extent as to exclude it from use in public housing projects. It consists of an overall application of a mastic which is covered by mineral granules of selected colors to provide any desired color effect. It is done by contract only through the Insulmastic Corporation, Pittsburgh, Pennsylvania. It is considered a long-life treatment (possibly permanent). Cost: $.20 to $.30 per sq. ft.

   As required for all methods, permanent repairs of leaks on all roofs, walls, windows and door openings are made by the contractor with special Insul-Mastic process and all loose, splintered or spalled bricks are replaced before the overall waterproofing is applied.

2. General Description of Process. After all flashing, roof and large wall leaks are repaired, the entire surface is treated with "Gilsonite Insul-Mastic" sprayed on under pressure to a thickness approximately equal to 20 coats of paint, which furnishes the waterproof covering. Immediately following the application of the Gilsonite, a coating of colored mineral granules is blown on under pressure, imbeds the granuels in the asphalt coating and completely hides the asphalt base.

   By using granules closely matching the color of the original brick, the change of the appearance is not noticeable when viewed from a considerable distance (300 yards) where the absence of mortar joints is not noticeable.

   This method was used with reasonable success on housing projects in the Pittsburgh Area.

E. Method V - Organic Grouting.

1. General. This method alters appearance of walls due to the brick being smeared with grout at the joints.

Part II, Par. E - Method V - Organic Grouting - (Cont'd)

The life expectancy of this method is short, varying from three to five years depending on quality of workmanship. It is a low cost method ($.09 to $.20 per sq. ft. on force account basis).

When this method is used, it is practically impossible to make future repairs with any other method, except by cutting out the joints, due to the use of tung oil in the grout which makes it difficult to obtain a bond with other material.

Before an over-all Organic Grouting job is started, it is imperative that all visible leaks in roofs and walls be permanently repaired. All large cracks and other mortar joint openings should be repaired and the joints carefully tooled to match original joints, as all joints will be grouted over in this operation.

a. Clean the walls and all mortar joints thoroughly, removing all dust, mortar fins and lumps. Caution: Use stiff wire brush, #5, or high pressure air for cleaning. Do not use water for cleaning - dampness prevents the bond of organic grouting.

b. Grout all joints using grouting brush #18. Scrub organic grouting mortar #3 into all vertical and horizontal joints. Exerting pressure on the brush, stroke back and forth over the same area about 5 times. Do not use water curing process as dampness is detrimental to organic grouting.

c. Clean all superfluous mortar off the face brick surfaces before it has had time to set.

d. Application of Colorless Water Proofing Compound. The grouted walls were allowed to set and harden for four days. Then one coat of Cabot's colorless waterproofing compound was brushed on. This was allowed to dry for 24 hours and the second coat of Cabot's waterproofing was brushed on.

The Cabot's colorless waterproofing was used as an auxilary waterproofing method because the walls were built of soft porous brick and its purpose was to prevent moisture passing through the brick.

This method was used by Petney Village Housing Project, Atlantic City, N. J. The work was done by the maintenance crew, completed in August 1943 and at the end of two years it was reported successful.

e. Tools and Materials. (See Part III).

Part II - (Cont'd)

F. Method VI - Portland Cement Paint.

1. General. This method is an over-all treatment which changes the appearance of brick or concrete block walls, the color depending on the ingredients in the paint.

It has been used by public housing with reasonable success. Its service life depends on the kind of wall, care in preparation, bonding quality of paint, and care in curing after application. Under favorable circumstances its appearance life should be 5 to 8 years, but it usually stops wall leaks permanently, except on cracks or joints where movement has occurred.

Careful consideration must be given to characteristics of the wall to be waterproofed. Portland Cement Paint will not adhere properly to surfaces that are glassy smooth, soiled, or coated with foreign matter. It will not succeed on hard burned impervious brick, salt glazed or hard burned shale brick or glazed concrete surfaces. To obtain a strong bond it should be used only on porous surfaces such as porous common brick, cinder and concrete block, or monolithic concrete.

All such surfaces must be well cleaned and, if necessary, acid washed or sand blasted to open the pores and provide suction and "tooth" for the paint. Poor surface preparation results in poor adhesion which causes peeling or flaking of paint.

New cement stucco, brick or concrete masonry walls should not be painted within 24 days and monolithic concrete within 120 days after the construction curing period.

This method may be done by contract or by trained project personnel. Approximate cost $.11 per sq. ft.

Note: Like all other over-all methods, all roof and wall leaks must be permanently repaired before application of this method.

2. Inspection and Supervision. When the work is to be done by contract, complete and adequate inspection by competent inspectors is necessary to assure proper results.

Should the work be done by force account, the crew should be supervised and carefully trained by a competent waterproofer in the repair of wall cracks, roof and flashing leaks and especially in the techniques of preparation of the materials and in methods of application.

3. Preliminary Procedure. Before an overall cement paint job is started, it is imperative that all visible leaks in roofs and walls be repaired. (See Part I).

Part II, Par. F - Method VI - Portland Cement Paint - (Cont'd)

4. Cement Painting Procedure.

a. Clean walls thoroughly of all dirt, dust, oil and efflorescence. Dust and dirt must be scrubbed off with a brush and clean water. For oil and efflorescence, first scrub the affected areas with stiff bristle or wire brush; then wet the wall and apply a 20% solution of muratic acid; after 5 minutes scour off with a stiff brush; wash thoroughly with clean water to remove all acid. If oil is not removed with acid treatment use steel brush, abrasive stone, lye solution, or sand blast. Caution: Do not use soaps or any other organic cleaner.

b. Dampen wall before painting. Wet the wall uniformly with spray, approximately one hour before painting, repeating in three or four operations depending on how rapidly the surface absorbs water and allowing time between applications for moisture to soak into the wall. Do not paint when dripping wet nor when there is a visible film of water.

c. Mixing the paint powder. Mix a small batch at a time, enough to last about four hours. First reduce the dry material to a stiff paste with about half the estimated amount of water required, then gradually stir in the additional water until the desired consistency is obtained; stir several minutes until all particles are thoroughly wetted. Allow to stand to soak prehydrate for 30 minutes; stir well before using. The Class B paint (with aggregate) used on the first coat should be mixed to the consistency of ordinary cream and must be stirred frequently to keep the sand in suspension. The Class A paint, for the second coat should be mixed to the consistency of rich cream.

Class B paint (with aggregate) may be used for second coat if sand finish appearance is desired.

d. Application of paint and curing. The paint should be applied in two coats of the same color. Allow at least 24 hours between coats. On the average brick or concrete wall the Class B paint (with aggregate) should be applied as the first coat and vigorously scrubbed into the surface with a stiff bristle scrub-brush. Work the paint into all voids to provide a continuous paint film free from pin holes.

When paint has hardened sufficiently not to be damaged by spray, start curing with a fog spray and continue for two days between coats.

When the first coat has been properly cured and the wall has been dampened, start the application of the second coat. Use Class A paint (without aggregate) in the same manner as the first coat;

Part II, Par. F - Cement Painting Procedure - (Cont'd)

when it is hardened sufficiently to prevent damage, start the curing process using a fog spray two or three times a day for at least two days.

Class "B" paint (with aggregate) may be used for second coat if rough sand finish is desired.

Careful curing will improve the hardness and durability of the paint in every case and in some instances will mean the difference between a satisfactory and a poor paint job.

For further information on this subject refer to the Journal of the American Concrete Institute, 7400 Second Boulevard, Detroit, Michigan - Volume 13, No. 6, "The Nature of Portland Cement Paints and Proposed Recommended Practice for their Application."

PART III. MATERIALS AND TOOLS

A. Materials 1/

1. Pointing Mortar.

1 - Part High Early strength Portland Cement
1 - Part Hydrated Lime, Type "S"
5 - Parts Clean fine building sand, ASTM Standard (C144-44-100% passing #4 sieve and 0 to 15% passing #100 sieve)

Mix to plastic consistency. Note: Insist on the use of Type "S" Hydrated Lime. It is restricted to 8% unhydrated content and has 85% water retentivity. Most lime manufacturers make it. Each bag should be plainly marked with a large letter "S".

This same mixture may be used for masonry mortar when replacing splintered or spalled brick or coping stones.

2. Grouting Mortar.

1 - Part High Early strength Portland Cement
10% by volume hydrated lime, Type "S"
1-1/2 Parts clean fine graded sand 100% passing #10 sieve, not less than 80% through #20 sieve, not more than 5% passing #200 sieve.

Mix to cream consistency. Note: This mixture to be used for grouting mix (Method II Brush Grouting) and may also be used where grout is required to fill large voids.

3. Organic Grouting Mortar.

1 - Part Portland Cement
1 - Part Hydrated Lime Type "S"
1 - Part Clean fine silica sand passing #100 sieve.

Mix dry thoroughly, then add heat treated tung oil and mix to consistency of thick cream.

Note: This mixture to be used only for grouting mix for Method V, Organic Grouting.

1/ All mortar ingredients are proportioned by volume.

Part III, Par. A - Materials - (Cont'd)

4. Parging Mortar.

1 - Part High Early strength Portland Cement
10% by volume hydrated lime, Type "S"
3 - Parts clean graded plastering sand A.S.T.M. C-35-39

Mix to plastic consistency. Note: This mixture should be used for parging inside parapet walls.

5. Caulking Compound.

Federal Specification No. TT-C-598
Type I, Gun Grade. Note: Demand signed "Certificate of Compliance" from manufacturer for each lot of compound used. Caution: The use of inferior grades of caulking compound must be avoided. They must be fully equal to above specification.

6. Sealing Compounds. 1/

One sealing compound known as "Dum Dum Adhesive" manufactured by Arco Company, Cleveland, Ohio has proven satisfactory on one housing job. This material may be cut to paint consistency by V.M.P. Naptha (Varnish Makers and Painters Naptha).

7. Portland Cement Paint.

Federal Specification No. TT-P-21, Type II (80% Portland Cement)
Class "B" has Silica sand aggregate. Class "A" is without aggregate.

Class "B" is usually used for first coat on open texture walls. Class "B" may also be used for second coat if rough sand finish is desired. Class "A" is usually used for second coat where the rough sand finish is not desirable.

Job mixed Cement Paint may be prepared by mixing approximately equal parts by volume of water, white or grey waterproof Portland Cement and clean sharp sand or light weight aggregate none of which is retained on #20 sieve.

8. Wall Cleaning Solution.

20 - Parts Clean Water (by volume)
1 - Part (Commercial) Muriatic Acid

Caution: This solution must not be left on walls, but must be washed off with clean water within twenty minutes after application.

1/ Tests are in progress on several different "sealers"; results will be published later.

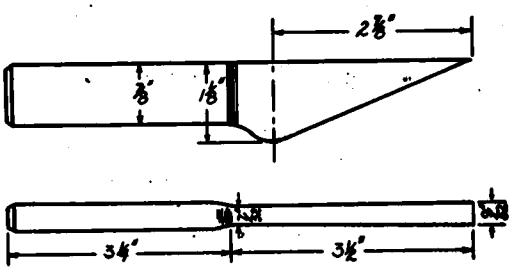
Part III - (Cont'd)

B. Tools

Note: Trade names of tools and suggested materials are used for purposes of describing kind and quality and shall not be construed as an approval for exclusive use of these products.

1. Cut Out Tools - Hand

#1 - Special Hand Forged Cut Out Tool: Made from 3/8" x 7/8" tool steel stock.

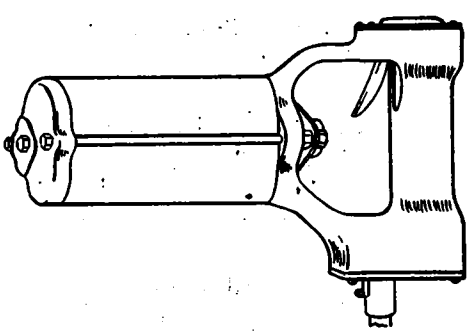


#2 - Cape Chisel: Use 1/4" and 5/16"; both sizes are needed.

2. Cut Out Tools - Power

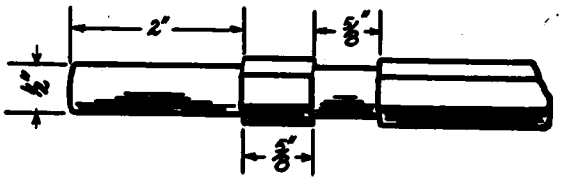
#3 - Syntron Electric Hammers: Size "MK" 5/8" capacity. Length overall 12", Weight 9 lbs. Manufactured by Syntron Company, Homer City, Pa.
Note: For large jobs saves much time and expense.

Suggestion: Suggest consideration of double bladed electrical circular saw; (Skelsaw or similar) about 6" Diameter for horizontal and 2-1/2" for Vertical joints, where the mortar does not readily yield to the Cyntron Hammer.



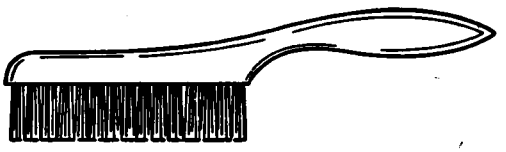
Part III, Par. B - Tools - (Cont'd)

#4 - Tool Shank for Syntron Electric Hammer: #1 shank for size "MK" Hammer. All above tools and 5 sizes of cold chisels can be made with #1 shank, or they can be purchased from Syntron Co. with #1 shank ready for use.

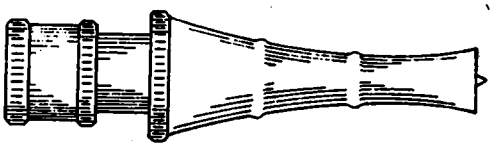


3. Clean Out Tools

#5 - Stiff Wire Brush With Shoe Brush Handle: Brush has two rows of stiff wire bristles; overall length, 10". (Width of mortar joint).



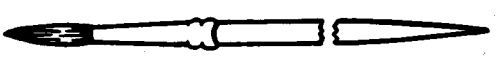
#6 - Gem Hose Nozzle: Adjustable stream nozzle for 3/4" garden hose. Adjusts from heavy stream when wide open to fine spray when nearly closed.



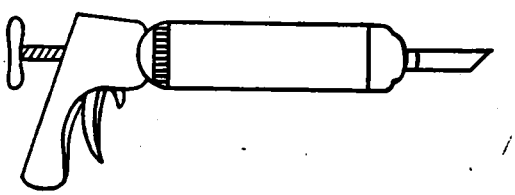
#7 - Fog Nozzle Spray Head: For 3/4" hose, manufactured by Fog Nozzle Company, 1520 East Slauson Ave., Los Angeles, California. When ordering specify the purpose of nozzle.

4. Caulking Tools

#8 - Brush for Sealing Compound: 1/4" round bristle brush for painting sealing compound into open joints.



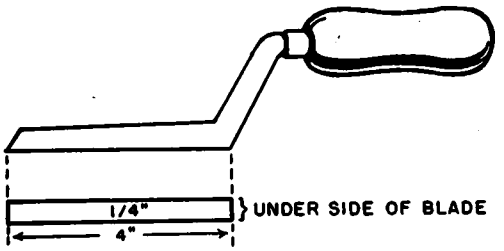
#9 - Caulking Gun: Spring trigger type caulking gun for use with or without mastic-cartridge.



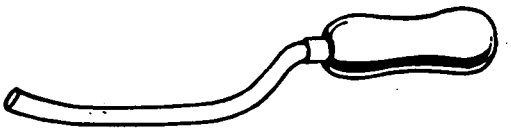
Part III, Par. B - Tools - (Cont'd)

5. Pointing and Parging Tools

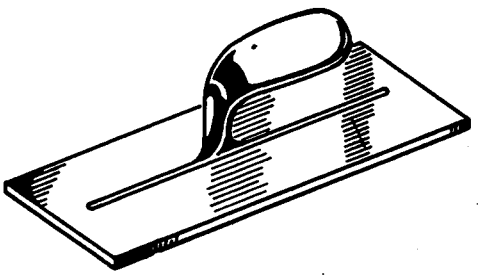
#10 - Tuck Pointers Trowel



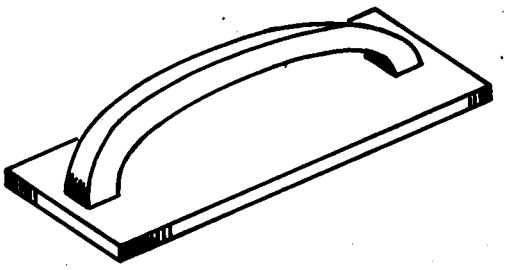
#11 - Joint Facing Tool: Made from round steel rod sizes 5/16" - 3/8" - 7/16" depending on width of joints.



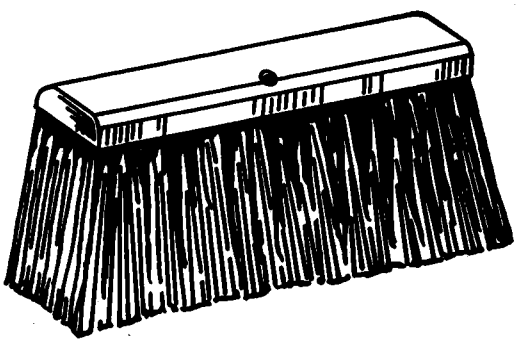
#12 - Plasterer's Trowel: Size of blade 4-5/8" x 10-1/2". Used for applying parge coats.



#13 - Wood Float: Size 4" x 12". Use for applying scratch coat of parging.



#14 - Stable Broom: Has very stiff Rattan Bristles. May be used to roughen first coat of parging (scratch coat) or use regular plaster's scratcher.

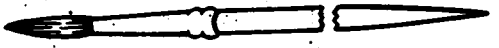


Part III, Par. B - Tools - (Cont'd)

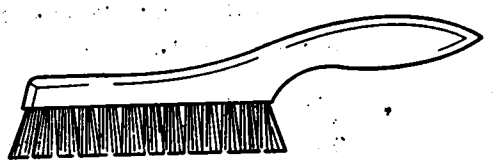
#15 - Tuck Pointers Cleaning and Moistening Brush: Has two rows of horse-hair bristles 2-1/2" long, 8" long overall.

6. Grouting Tools

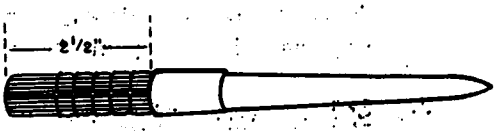
#16 - Grouting Brush: 1/4" round bristle brush. Used for painting grout mixture into open joints.



#17 - Grouting Brush: Made of stiff Chinese bristles, 2 rows, 1" long. Handle 1/2" wide, 8" long overall. Used for scrubbing in grout mixture. Method II, Brush Grouting.



#18 - Grouting Brush: 3/4" Round Sash brush horse-hair bristles 2-1/2" long, bridled down to 3/4" working end with copper wire. Used for applying organic grout mixture, Method V, Organic Grouting. Note: When brush wears down; remove a section of the bridle and so on until the brush is worn out.



Part III - (Cont'd)

C. Glossary of Terms and General Information.

1. Bond in construction of masonry buildings means the binding together of certain materials, such as the bond of mortar to brick.

2. Fog spray is water under pressure reduced to a fog by the use of a special fog nozzle. A fog spray should not exert much pressure on the wall, thus avoiding washing of mortar joints.

3. Feather edge. This is commonly used to describe the finish of a caulking compound joint where the compound is not trimmed off square but is drawn out into a tapered finish, like a knife edge, against the brick surface. This also occurs with mortar. See illustration in Exhibit 3, "Cross Section of Window and Door Frame."

4. Overall waterproofing refers to a method of waterproofing which covers the walls generally such as "Tuck Pointing", "Brush Grouting", etc. Does not include the repair of special sources of leaks such as large cracks, etc.

5. Sealer (Sealing Compound). A strongly adhesive material which hardens quickly and is impervious to water action. It is applied to an open joint which is to be caulked with caulking compound to retain the oils in the compound and add years of life to it. It is also applied to the exposed surface of compound to prevent exposed evaporation of oil.

6. Spalled brick refers to brick in a wall whose surface has disintegrated and dropped off, due to weather action. It is generally found to apply to very soft brick. Bricks that have moved out of the wall, are especially subject to this action.

7. Splintered brick refers to brick that has cracked, broken and splintered due to pressure and racking action of movement in the wall.

8. Tooth. The roughness of a surface which provides mechanical bond for paint, grout, mortar, etc. It requires the removal of all foreign substances that would prevent bond of the materials. Usually entails the use of wire brushes, acid washes and sometimes sand blasting.

9. Thumb dry. This is a term used in testing mortar, grouting or parging and is that condition which will result in a slight indentation of the surface when the end of the thumb nail is pressed against it.

WATERPROOFING SURVEY PROCEDURE

Large sums have been spent on the waterproofing of buildings on public housing projects. One of the reasons for the large expenditures is that in public housing the usual private practice of treating entire buildings has been followed, rather than attempting to identify and treat only those areas which are at fault.

The purpose of this section is to present a method of surveying the buildings of a project so that the faulty areas may be identified and causes of leaks determined. Corrective work may then be restricted to those areas, thus reducing the amount of work required with resultant savings in cost.

The four principal points to be examined are: (1) all walls, (2) flashings, (3) roofing and (4) caulking. Care must be exercised that damage to interior plaster caused by condensation is not mistaken for damage caused by leaks.

Method of Conducting a Waterproofing Survey

A. Material Required

1. Waterproofing Investigation Project Information Record Sheet (Page A).

2. "Plot plan" of project. Show direction of prevailing storms and winds (Page B).

3. Dwelling Unit Sketch Sheets, for indicating leakage on interior walls (Pages C and D).

4. Elevation Prints of each building to be surveyed. (For buildings with flat roofs, prints of roof plans should be obtained.) These may be ozalid prints of tracings, or if no tracings are available, matte finish photostats of the elevations. At the completion of the survey the work to be done will be indicated on these elevations.

B. Making the Survey

Step 1. Appoint the Survey Team, usually of two men experienced in construction. The team should be equipped with:

a. Clip boards.
b. Supply of dwelling unit sketch sheets (Item A-3).
c. 6" or 7" magnifying mirror, with a long handle.
d. Pair of 6-30 binoculars.
e. Drafting table and work space.

Step 2. Note on each elevation print (Item A-4); (a) the direction each wall faces, using only the four principal points of the compass; and (b) the number of each dwelling unit on one window of the respective unit.

Step 3. Inspect Dwelling unit interiors, recording findings on dwelling unit sketch sheets. (NOTE: The team should be provided with a pass key to prevent time wasted on call backs. In apartments entered with pass key, the team should always work together.)

Inspect the dwelling units in numerical order. For each unit first fill in the identifying information. Then make a careful examination of the interior side of all exterior walls. Make a careful analysis of damaged paint and plaster especially under the window sills in kitchens to determine, if possible, that what appears to be leakage is not the result of condensation. Where leakage is found, first write the name of the room such as "East Bedroom" then the affected walls such as "North Wall"; follow by drawing an outline of the entire wall including windows and doors and outline the pattern of the leak as it appears on the wall, using symbols as shown on Page E. Discuss with the tenant, if possible, the history of leaks in his unit, length of time he has lived there, and when the unit was last decorated. This will help to establish the seriousness of the leakage. Make notes on sketch sheet as required to supplement the sketches. If no leaks are found in the unit, enter N.L. Continue the same process for every dwelling unit in the building.

Step 4. When all units in a building have been surveyed, the information on all dwelling unit sketch sheets should be transferred to elevation prints. (See Waterproofing Survey Working Drawings, Page F). Start at one end of the building with the top unit and draw the leakage patterns on the exterior walls. This can easily be accomplished by looking at the back of the dwelling unit sketch sheet against the light so that the affected areas on the sketch can be transferred correctly to the exterior elevation. Continue on down to the lower floors until the building is completed. This will give a continuous pattern of the leaks. Where no leaks are found in a unit, indicate by N.L. (noleaks) on the respective unit window on the elevation drawings. The interior leakage patterns should be completed on all the elevations of each building. The plans are then ready for entering information obtained from examination of the exterior surface of the walls.

Step 5. Examine exteriors of parapet walls and outside coping joints using the magnifying mirror while standing on the roof. All accessible pent house walls must be carefully examined. Examine the rest of the exterior wall surfaces from the ground using the binoculars. All wall defects should be plotted directly on the elevation prints using exterior symbols as shown on Page E.

Step 6. For buildings with flat roofs, inspect roof and flashing, plotting defects on roof plan.

Step 7. Summarize the survey.

After all material for both walls and roofs is plotted, the drawings should be reviewed, noting extent of faulty areas and the defects found in each. The faulty wall areas will usually be found to have one or more of the following defects:

1. Areas with poor mortar joints, i.e., hair cracks, mortar sags, or nail holes in mortar.

2. Brick that have spalled because the brick are porous or absorptive, or because of leaking or disintegrated inner wall flashings.

3. Cracks caused by movement or settlement.

4. Window and door openings that require caulking.

Those areas will be the basis for making repairs.

LEGEND

INTERIOR SYMBOLS

- VERY WET AREA, RUNNING WATER
- WET AREA, CRUMBLING PLASTER
- DAMP AREA, MINOR MOISTURE
- CONDENSATION, DAMAGED PAINT OR PLASTER
- INTERIOR CRACKS, RUNNING WATER

EXTERIOR SYMBOLS

- EXTERIOR CRACKS, CAUSED BY MOVEMENT
- OPEN COPING BED JOINTS
- DEFECTING CAP FLASHING JOINTS
- WINDOW CAULKING OR POINTING
- X VERTICAL MOVEMENT CRACKS, PARAPETS
- *N.L.* NO LEAKS

WATERPROOFING INVESTIGATION
PROJECT INFORMATION RECORD

REGION _____

PROJECT NAME _____ NO. _____
LOCATION _____
HOUSING AUTHORITY _____
NO. BLDGS. _____ NO. D.U. _____ TYPE OF BLDG. _____
NO. STORIES 2 and 3 story CONSTRUCTION COMPLETED _____
GENERAL CONTRACTOR (ORIG. CONST.) NAME AND LOCATION _____

BUILDING DESCRIPTION

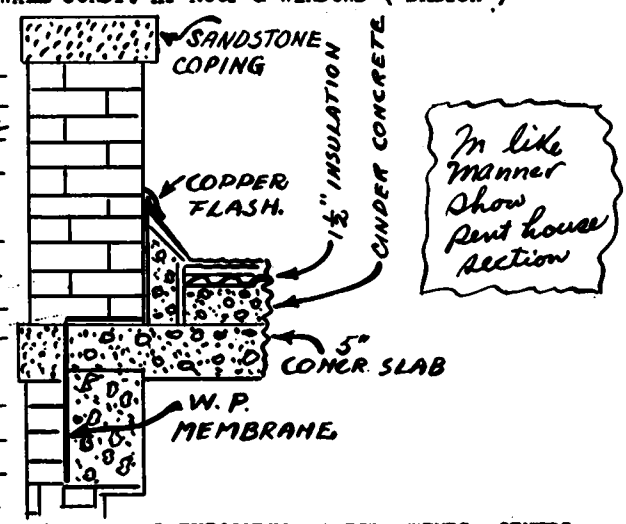
WALLS

FACE MAT. Common Brick
BRICK: KIND Sand Struck
DEGREE OF HARDNESS Generally Soft
DEGREE OF ABSORPTION 15 to 18%
MORTAR: KIND High Cement
MORTAR JOINT: KIND Concave
BACK UP. MAT. Cinder Block
SPANDREL W.P. Yes from slab to Lintel. very apparent
THICKNESS OF WALLS 12"
HOLLOW OR SOLID Solid
PARAPETS: Yes 30" high
WINDOW SILLS, MATERIAL 1" Slate
KIND Slate slip sills
WINDOWS & FRAMES: WOOD ____ METAL ✓
LOAD BEARING ✓ CONCR. FRAME ____
REMARKS Many sills are loose & slip out of place. Many other open joints

ROOFS

CONCRETE 5" Slab SPANDREL BM. No
WOOD _____
FLAT Yes PITCHED No
ROOFING MAT. 5 Ply tar - gravel
FLASHINGS Base, Fabric-Cap, Copper
PENTHOUSES Yes
REMARKS Continuation of roof slab

WALL CONST. AT ROOF & WINDOWS (SKETCH)



FLOORS

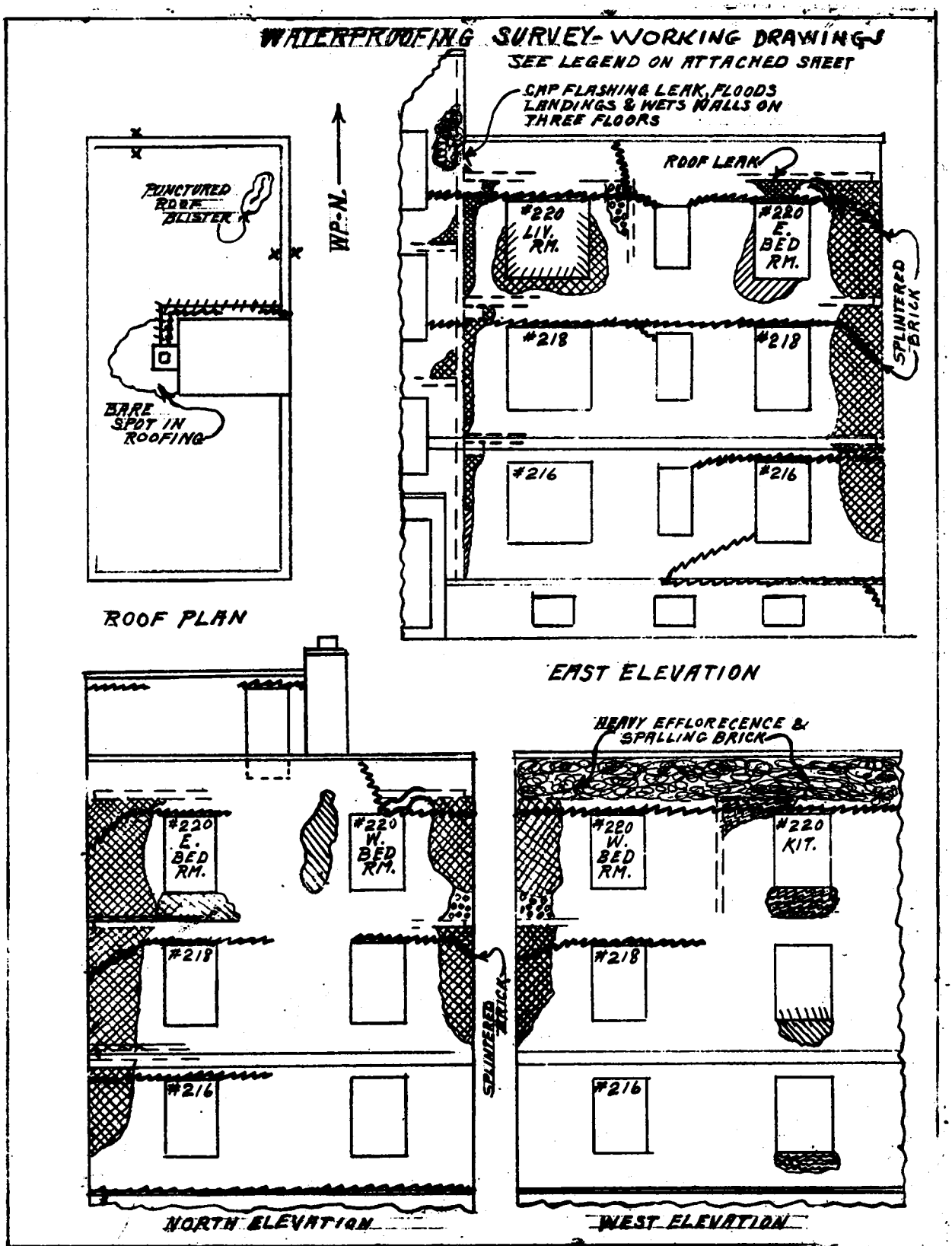
CONCRETE Yes SPANDREL BM. No
WOOD _____
REMARKS Some curling action of floor slabs

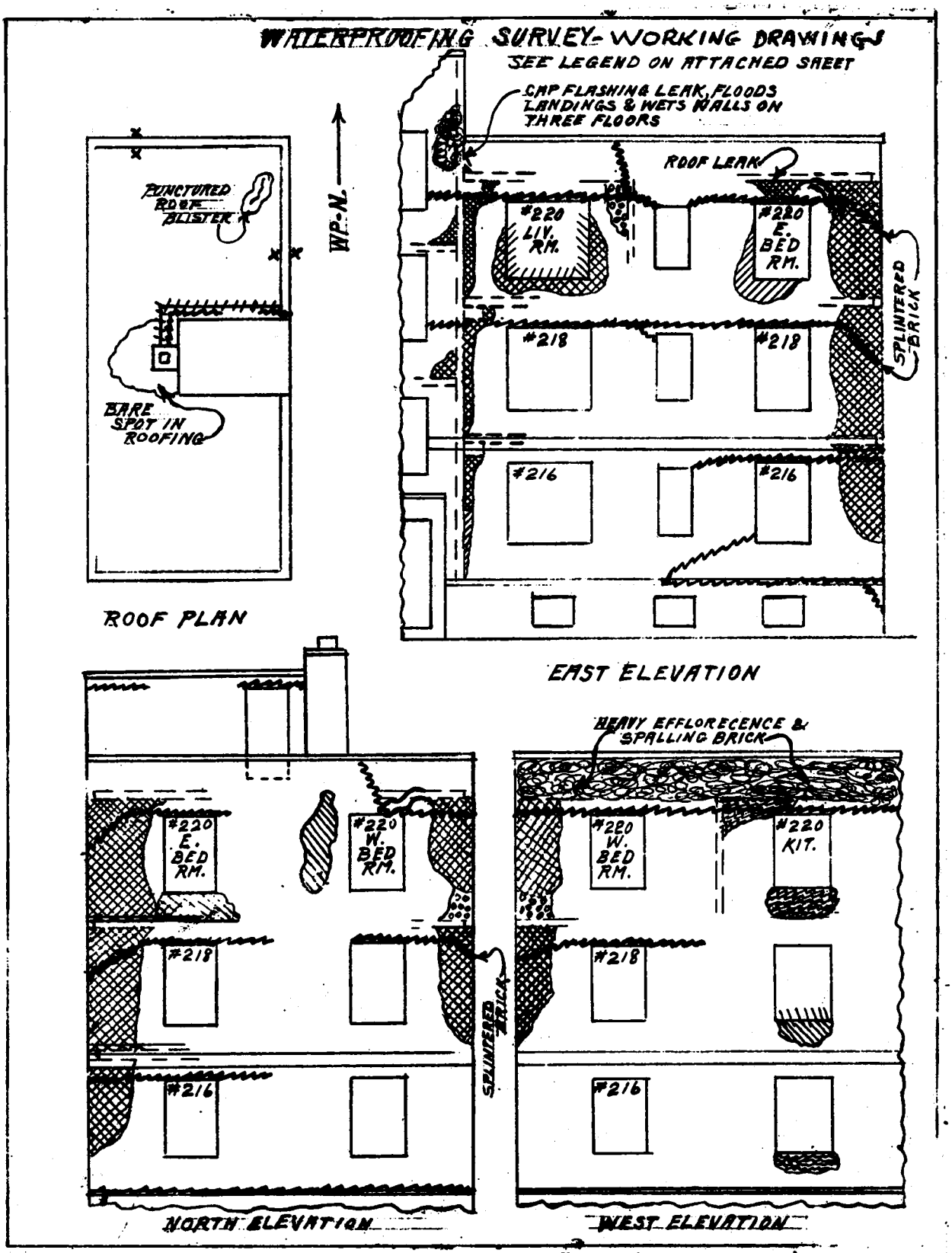
PLASTER

NONE _____ ONFURRING _____
ON W.P. Yes OTHERS _____
REMARKS _____

EXTREME WEATHER OR ATMOSPHERIC CONDITIONS, OR UNUSUAL EXPOSURES, WATER, WINDS, OTHERS, EXPLAIN. This project get full force of N-E storm winds direct from the bay.

REMARKS: Inspection shows long Hor. movement cracks at lintels on all floors, large areas of efflorescence, eroding joints and spalling brick. Many vertical movement cracks in parapet walls.


WATERPROOFING SURVEY - WORKING DRAWING
SEE LEGEND ON ATTACHED SHEET
CAP FLASHING & LEAK, FLOODS LANDINGS & WETS WALLS ON THREE FLOORS
ROOF LEAK
PUNCTURED ROOF BLISTER
BARE SPOT IN ROOFING
WP-N.
#220 LIV. RM.
#220 E. BED RM.
#218
#216
SPLINTERED BRICK
ROOF PLAN
EAST ELEVATION
HEAVY EFFLORECENCE & SPALLING BRICK
#220 W. BED RM.
#220 KIT.
NORTH ELEVATION
WEST ELEVATION


WATERPROOFING SURVEY - WORKING DRAWINGS
SEE LEGEND ON ATTACHED SHEET
CAP FLASHING LEAK, FLOODS LANDINGS & WETS WALLS ON THREE FLOORS
ROOF LEAK
#220 LIV. RM.
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#218
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#216
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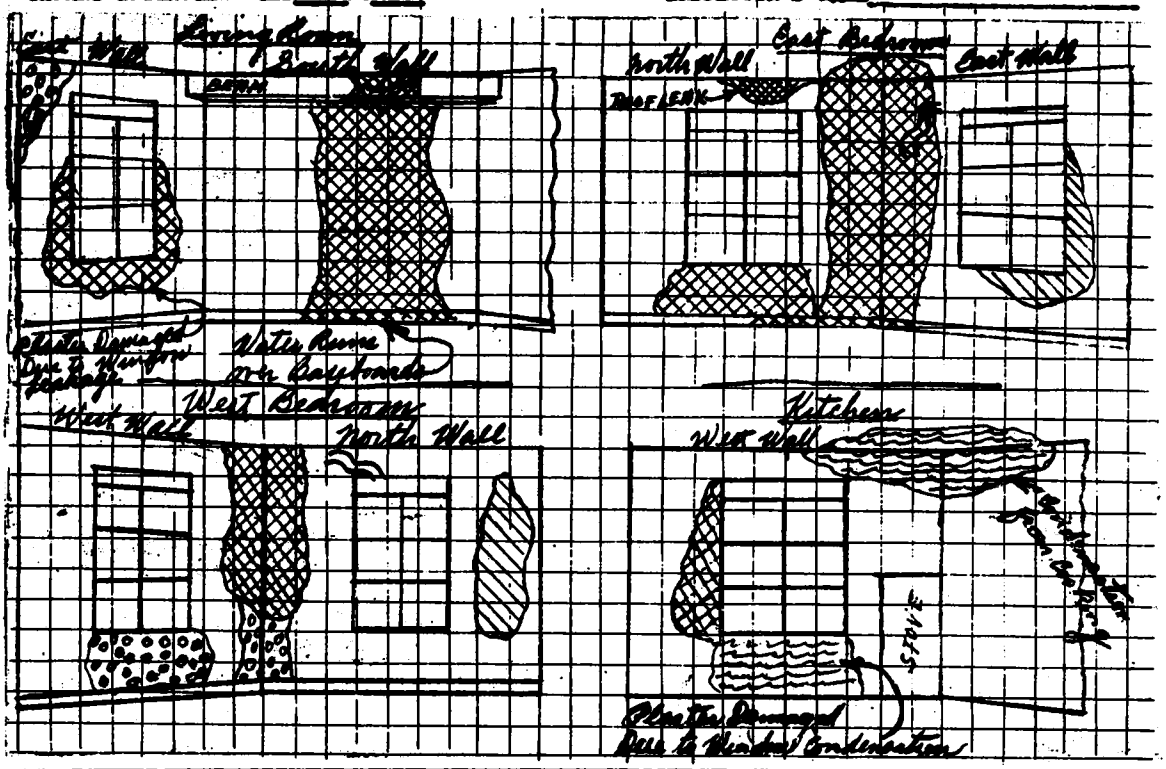
SPLINTERED BRICK
EAST ELEVATION
PUNCTURED ROOF BLISTER
BARE SPOT IN ROOFING
W.P.-N.
ROOF PLAN
HEAVY EFFLORECENCE & SPALLING BRICK
#220 E. BED RM.
#220 W. BED RM.
#220 W. BED RM.
#220 KIT.
#218
#218
#216
#216
SPLINTERED BRICK
NORTH ELEVATION
WEST ELEVATION

WATERPROOFING SURVEY—D.U. SKETCH SHEET

PROJ. NAME _____ LOCATION _____ NO. _____

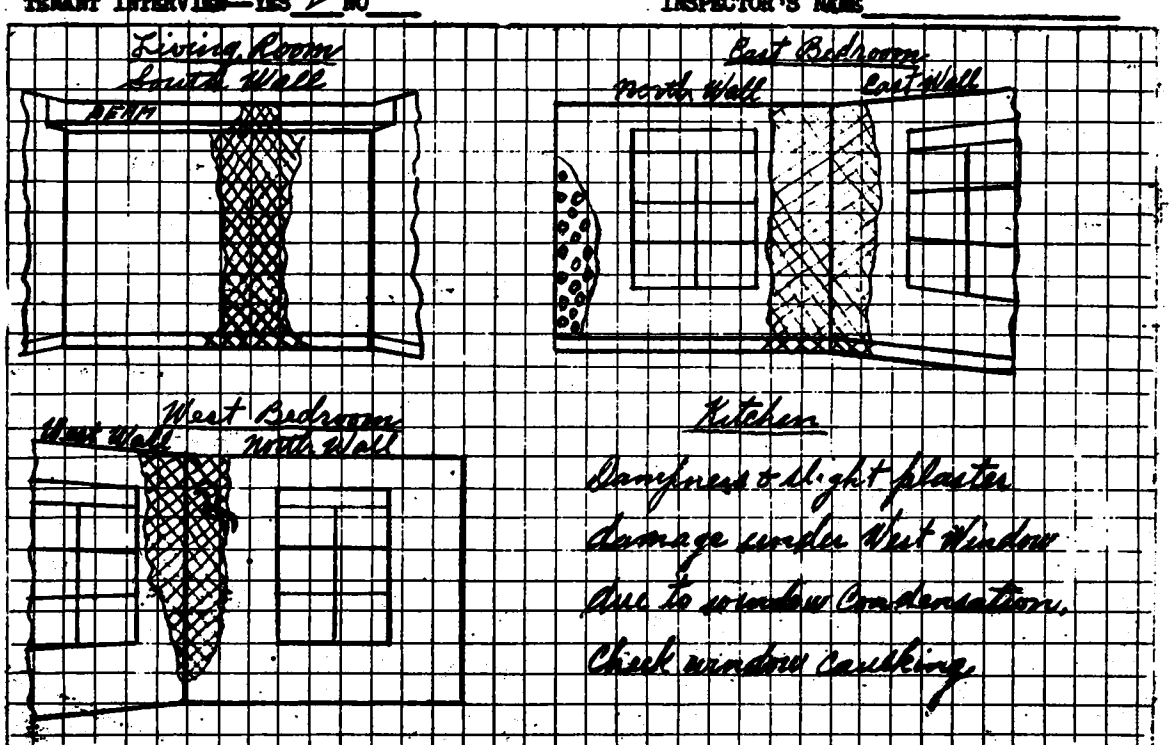
BLDG. NO. II D.U. NO. 220 FLOOR 3 TENANT NAME _____ DATE _____

TENANT INTERVIEW—YES ✓ NO ___ INSPECTOR'S NAME _____



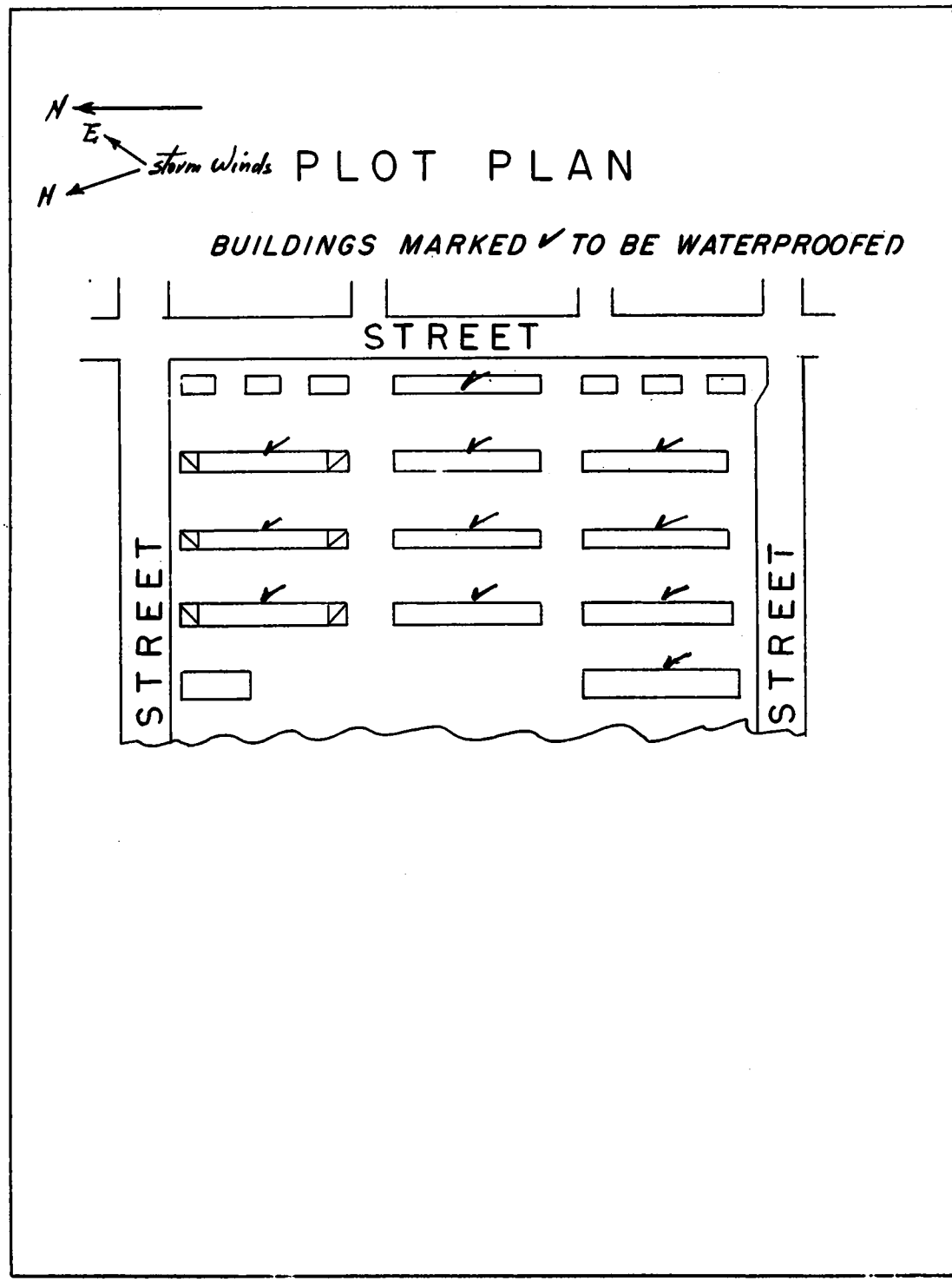
BLDG. NO. II D.U. NO. 218 FLOOR 2 TENANT NAME _____ DATE _____

TENANT INTERVIEW—YES ✓ NO ___ INSPECTOR'S NAME _____



Kitchen

Dampness & slight plaster damage under West Window due to window Condensation. Check window caulking.

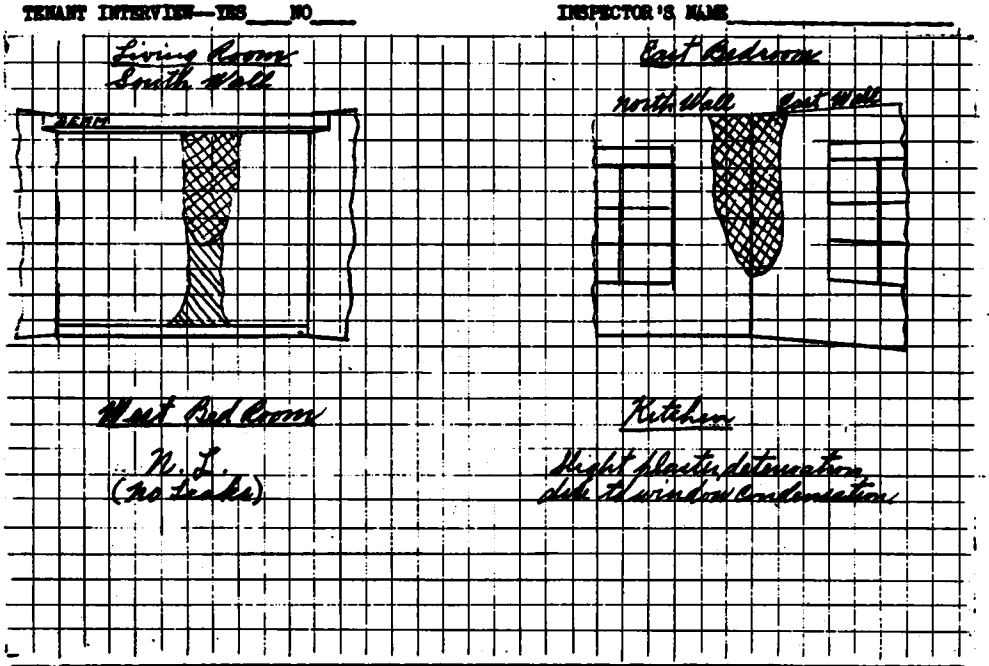

N
E
Storm Winds
N
PLOT PLAN
BUILDINGS MARKED ✓ TO BE WATERPROOFED
STREET
STREET
STREET

WATERPROOFING SURVEY—D.U. SKETCH SHEET

PROJ. NAME _____ LOCATION _____ NO. _____

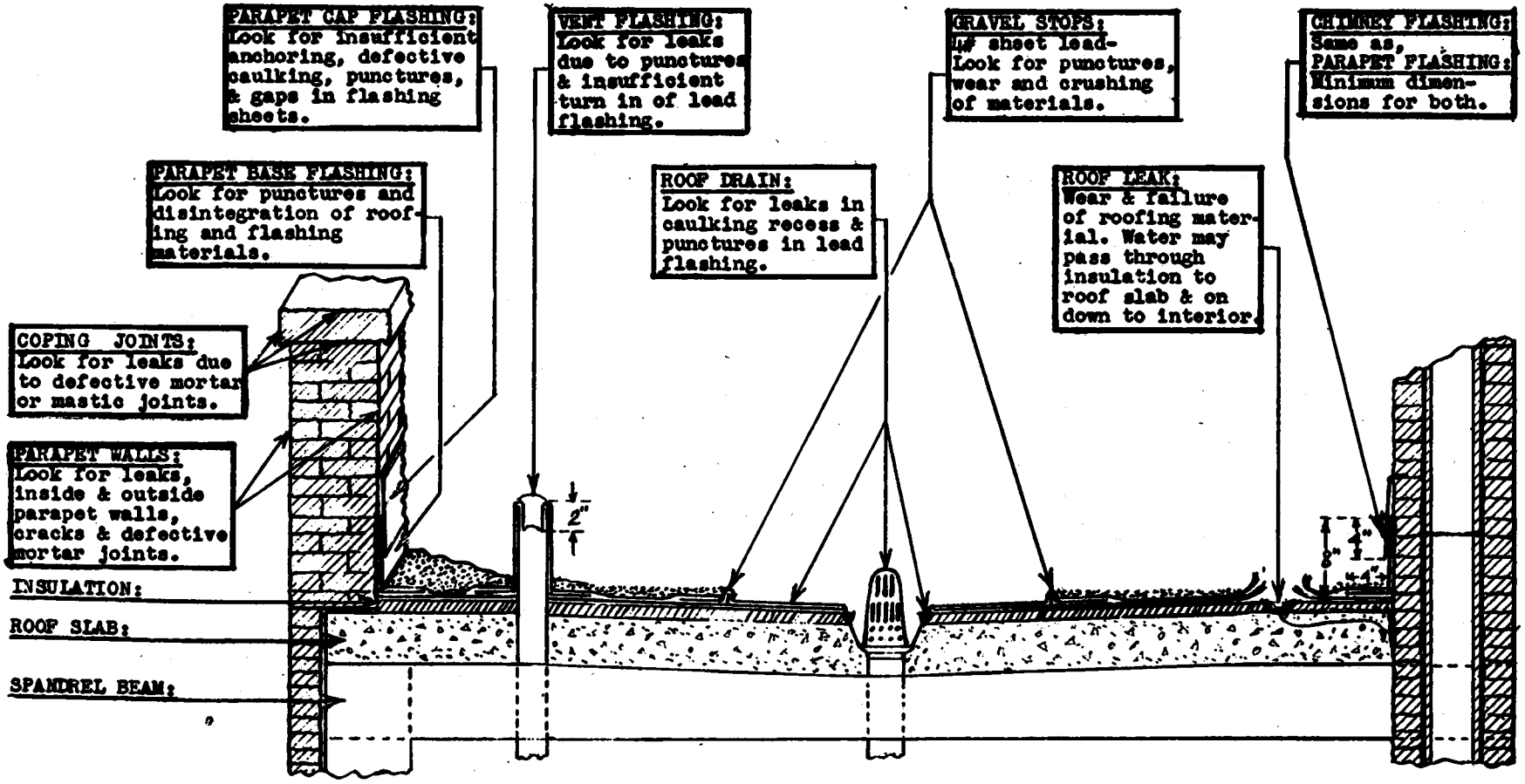
BLDG. NO. II D.U. NO. 216 FLOOR 1 TENANT NAME _____ DATE _____

TENANT INTERVIEW—YES ___ NO ___ INSPECTOR'S NAME _____

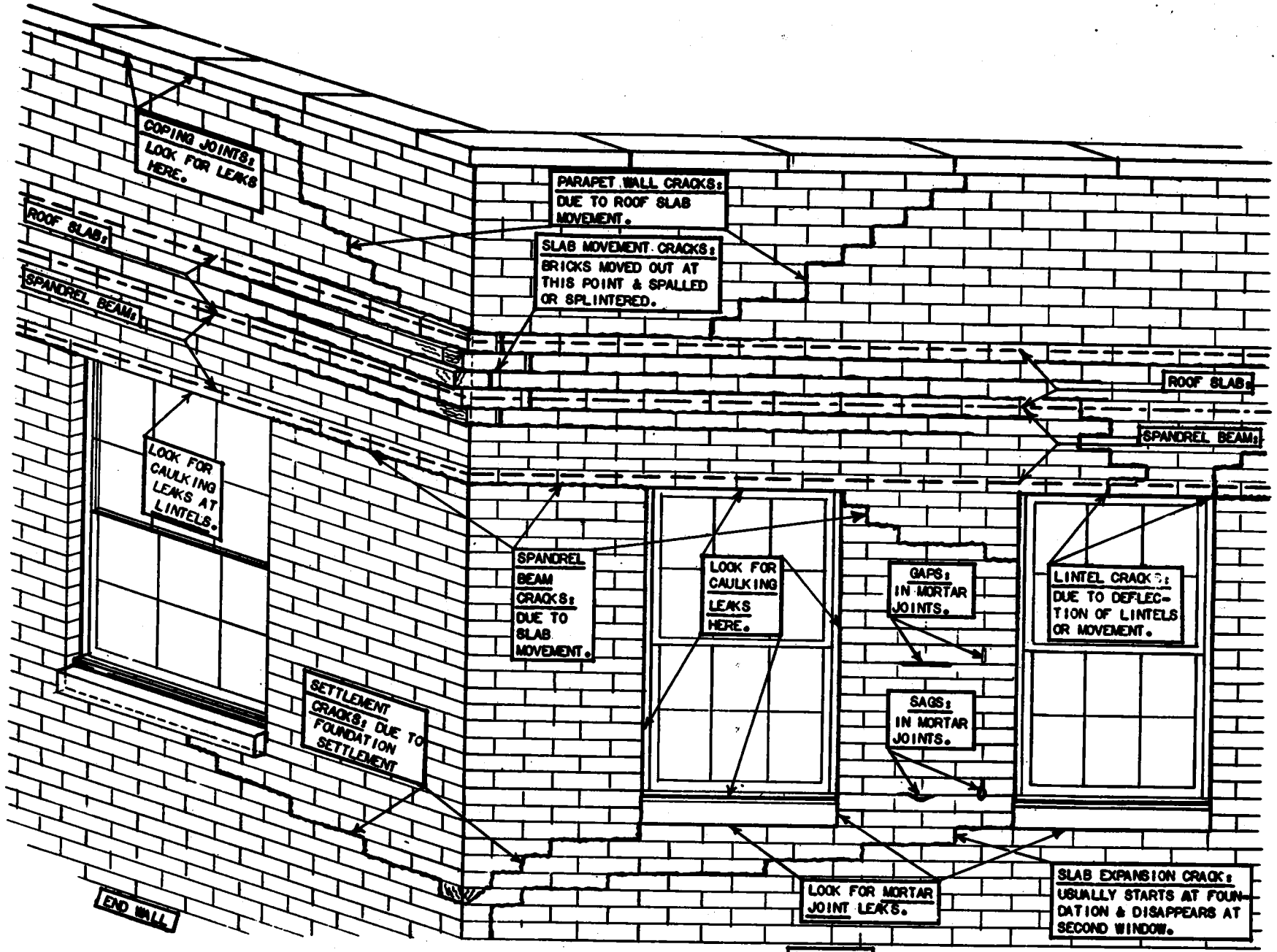


BLDG. NO. ___ D.U. NO. ___ FLOOR ___ TENANT NAME _____ DATE _____

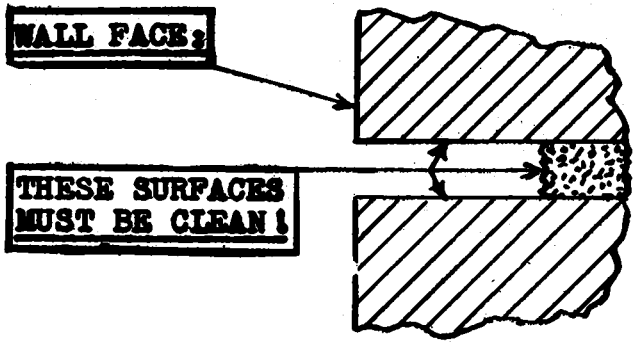
TENANT INTERVIEW—YES ___ NO ___ INSPECTOR'S NAME _____



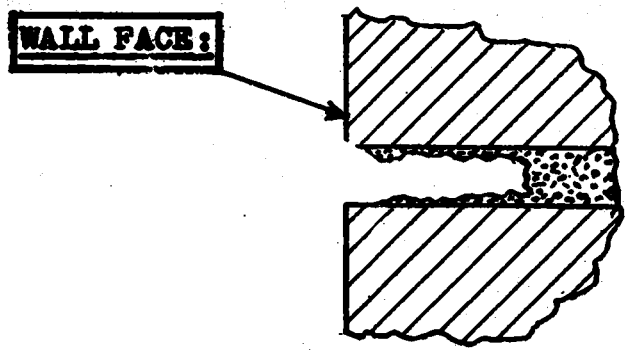
CROSS SECTION OF ROOF SLAB PARAPET AND CHIMNEY



ISOMETRIC DRAWING OF BUILDING: SHOWING SOME CAUSES OF LEAKS

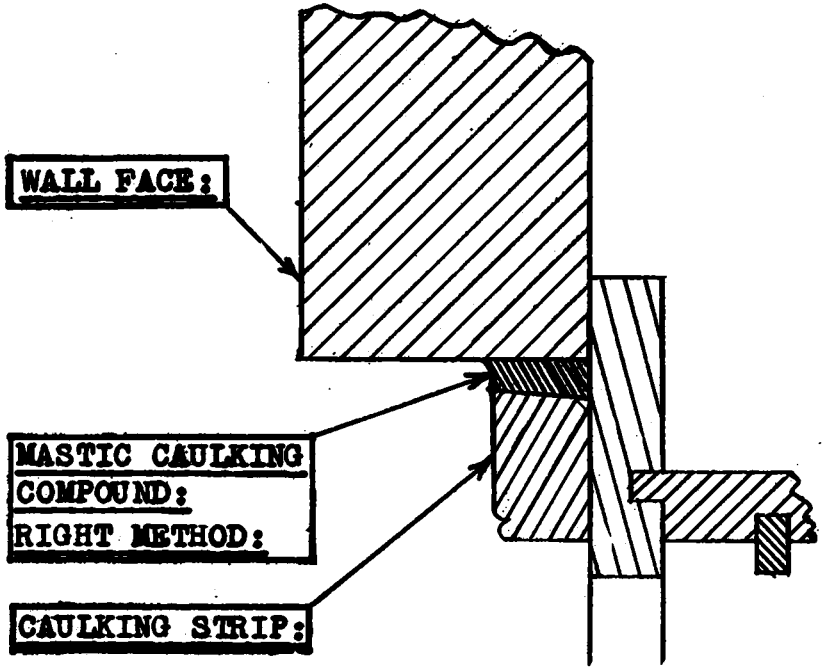


RIGHT

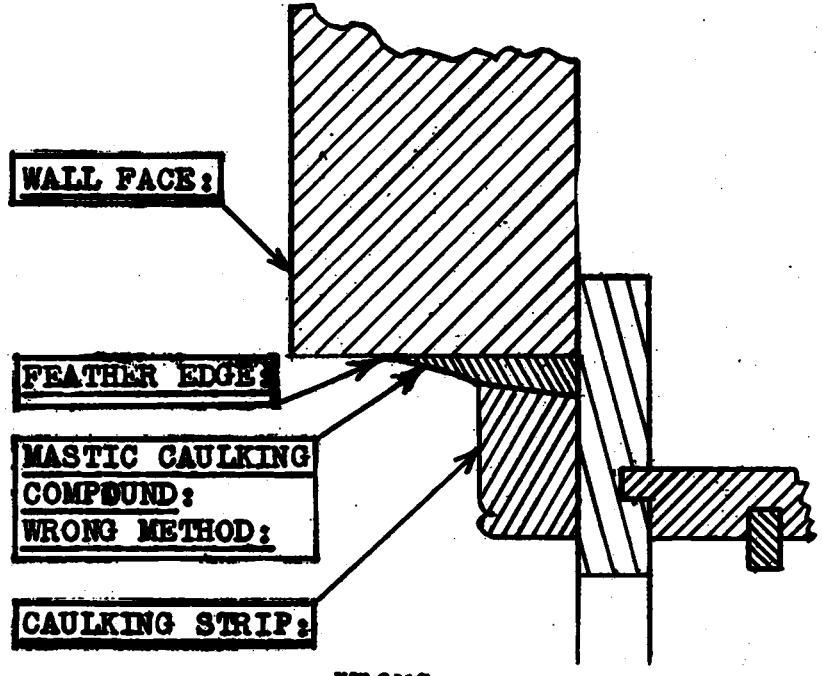


WRONG

CROSS SECTION OF MORTAR JOINT;
ILLUSTRATING THE RIGHT AND THE WRONG METHOD OF CUTTING OUT DEFECTIVE MORTAR JOINTS AND CRACKS.



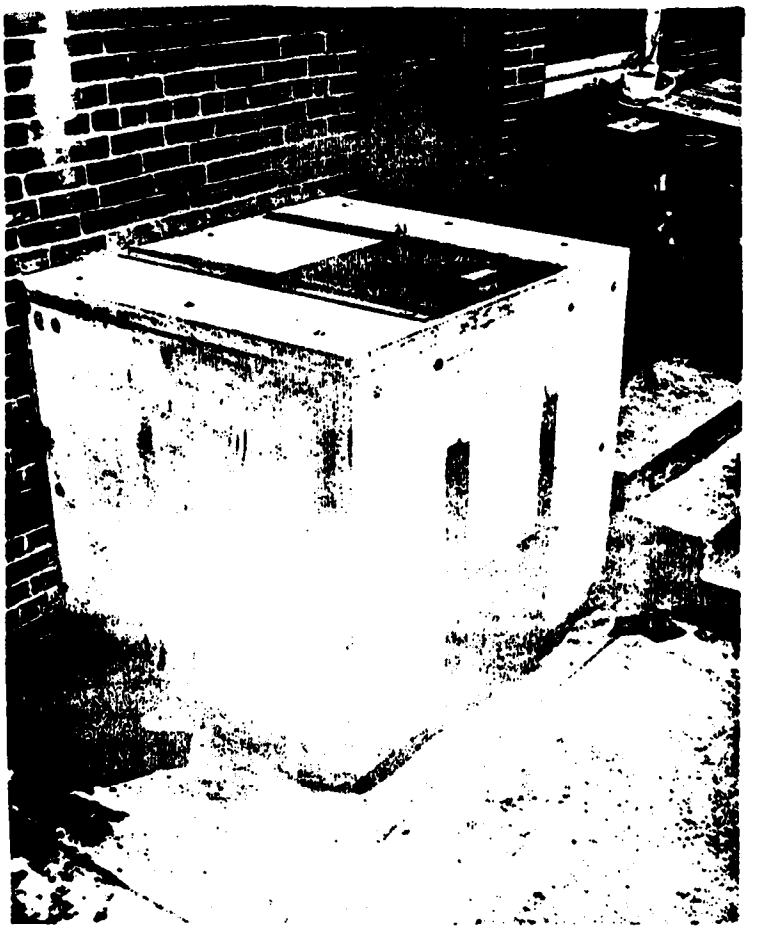
RIGHT:



WRONG:

CROSS SECTION OF WINDOW OR DOOR FRAME;
ILLUSTRATES TH IGHT CAULKING METHOD AND THE WRONG CAULKING METHOD.

PRECAST CONCRETE COAL BOX



Existing wood frame coal boxes are rapidly deteriorating on many projects and their replacement is imminent in many cases. Experience indicates that the replacement of coal boxes which are subjected to the elements, and constructed of wood, is uneconomical, because the life of wood construction, when subjected to constant dampness is relatively short.

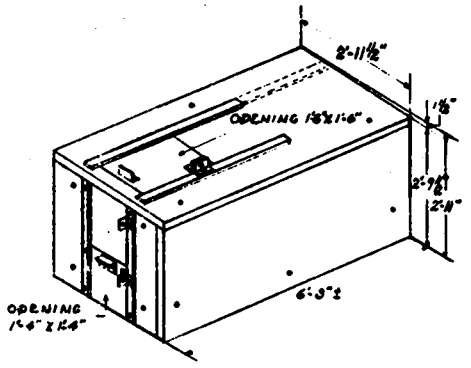
Considerable study of the problem of replacing coal boxes that had deteriorated beyond repair was made in collaboration with the National Capital Housing Authority, Bureau of Standards and others, in an effort to develop a coal box that could be economically constructed of masonry.

The coal box illustrated and described under Exhibit No. 1 of this Section has been developed as a result of these studies.

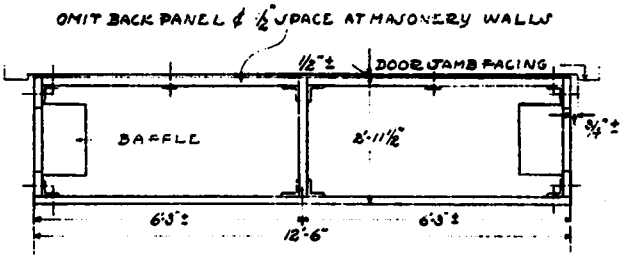
The box is built of precast concrete panels, with doors, door guides, angles, and other metal parts of aluminum. The box shown was developed for situations where concrete floor slabs are present. The average cost per dwelling unit for constructing 841 boxes of five sizes on five projects in Washington, D. C. during 1949 was $85.91.

In the event no floor slabs exist, it will be necessary to construct them. The floor slabs should be cast directly on the ground where possible, as construction above grade increases the cost disproportionately.

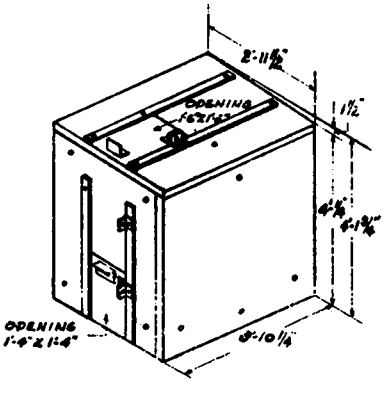
PLAN
for
PRECAST CONCRETE COAL BOXES
for
USE WHERE FLOOR SLABS EXIST



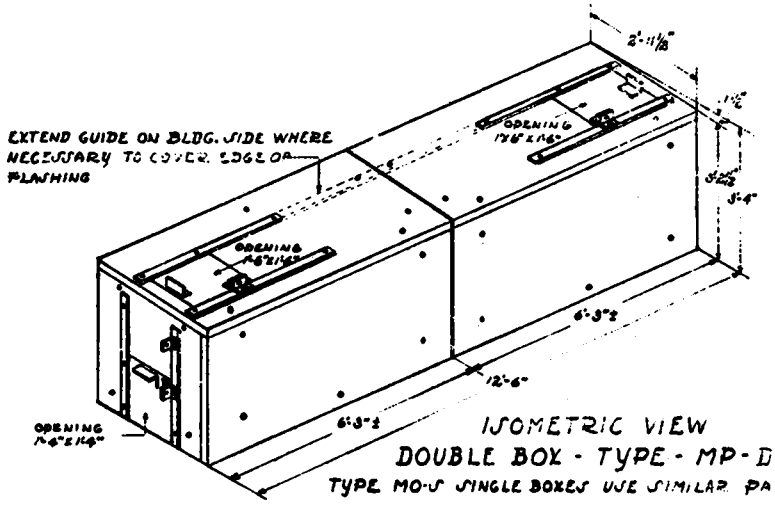
SINGLE BOX - TYPE N-CS



PLAN THRU BOX



SINGLE BOX - TYPE - NS



ISOMETRIC VIEW
DOUBLE BOX - TYPE - MP-D
TYPE MO-S SINGLE BOXES USE SIMILAR PANEL

- NOTE -

ABOVE DRAWINGS ARE SCHEMATIC. CONTRACTOR MUST VERIFY ALL DIMENSIONS, PREPARE AND SUBMIT SHOP DRAWING, AND OBTAIN APPROVAL OF SAME PRIOR TO FABRICATION OF ANY PARTS

- SPECIFICATIONS -

MINIMUM REINFORCING 6"x6" WELDED WIRE MESH OVER ENTIRE LENGTH AND WIDTH OF EACH PANEL UP TO WITHIN ½" OF EDGES, AND ⅜" ϕ DEFORMED STEEL REINFORCING PLACED ADJACENT TO EACH SIDE OF DOOR OPENINGS. RODS TO EXTEND FULL LENGTH OR WIDTH OF SLABS TO WITHIN ½" OF EDGES.
ALL BOLT HOLES ⅝" ACCURATELY FORMED IN CASTING.
PROVIDE A GROOVE ¼" AND ⅝" DEEP ON BOTTOM EDGE OF VERTICAL PANELS AND SET IN PLACE IN MORTAR.
CAULK ALL JOINTS WITH CAULKING COMPOUND AS ASSEMBLED.
ANGLE GLIDES 3"x3"x 0.188 GAUGE ALUMINUM 6S ALLOY 8½" LONG.
DOOR GLIDES 1⅜" WIDE X 0.188 GAUGE ALUMINUM 6S ALLOY OVER FULL LENGTH ALUMINUM SHIMS 1" WIDE x 7/16" THICK.
DOOR WIDTHS AND LENGTHS 1¼" GREATER THAN OPENINGS.
DOORS 0.188 GAUGE 6S ALUMINUM ALLOY.

EXHIBIT NO. 2

Specifications

Concrete - Precast:
Light weight, not over 100 lbs. per cubic foot.
Compression strength not less than 4000 lbs. at 28 days, tested in 2-inch cubes.
Waterproofing by addition of 2 pounds ammonium stearate to each bag of cement.

Concrete Footing:

1-2-5 mix, by volume, quick setting cement.

Mortar:

1-5 mix, by volume, cement mortar.

Reinforcing:
Platform 6" x 1/4" welded wire mesh
Posts - 3/4" smooth round bars
Stringers and Treads - 3/8" deformed rods.

Erection:

Dig 6 holes to receive the platform and stringer support posts. The holes should be approximately 8" in diameter and of sufficient depth to prevent the action of frost from disturbing the posts; pour concrete footings, 4" thick, in the bottom of the holes; install the posts at the proper position and level before the footing concrete has set (use template). Backfill the earth around the posts and allow the footing concrete to set for 24 hours before making further installations. Install stair stringers, placing the stringer tenons in the mortises of the front support posts of the platforms; install treads, and place the platform last.

Modifications

The platform may be constructed any desired height, the number of treads being varied to conform. The distance from top to top of treads should be maintained as near as possible to seven inches.

The size and shape of the platforms and steps also may be varied to meet local requirements. However, if the width (the dimension which extends parallel to the building) is increased in excess of 7 feet, two additional support posts should be installed at the center, front and rear. If the length of the stair treads is increased beyond 7 feet, a stair horse should be installed beneath the treads at the center.

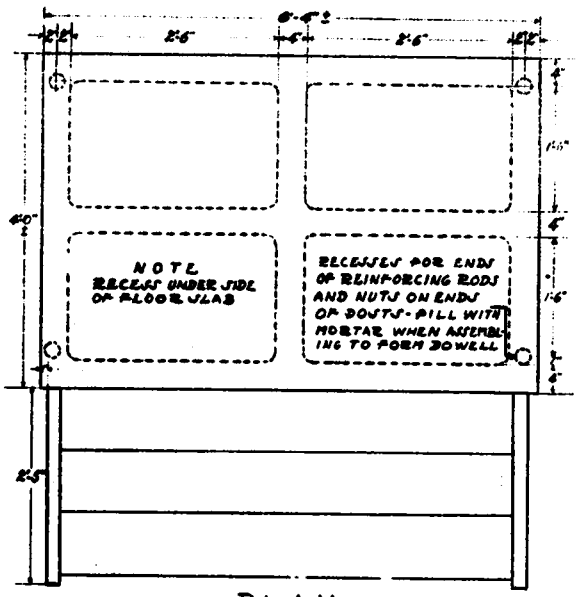
It is necessary only to place the footings at a depth sufficiently below grade to prevent heaving by frost. In areas where the soil is not affected by frost action, the support posts need not be extended below grade. Non-ferrous metal angle braces should be installed to prevent movement of the support posts.

Railings may be installed. Provision should be made for such installations prior to fabrication.

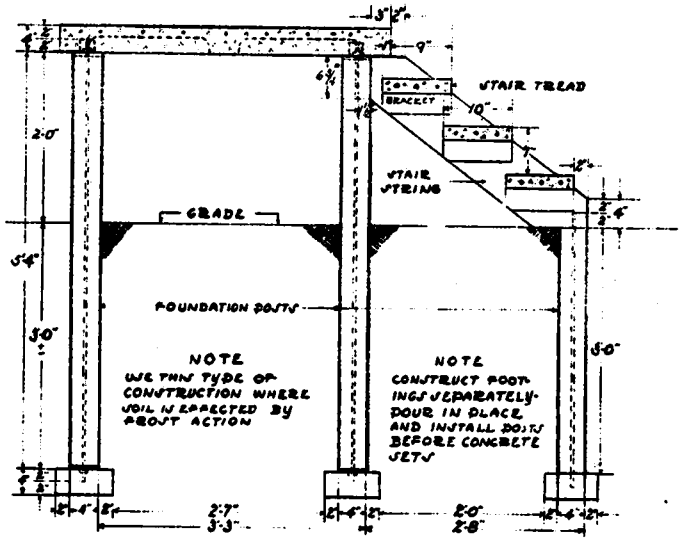
If the installation is to be made against a masonry wall, the rear of the platform may be supported by a metal angle bracket bolted to the wall, instead of on posts. The platform should be bolted to the angle where footings are installed at grade level.

Manufacture:

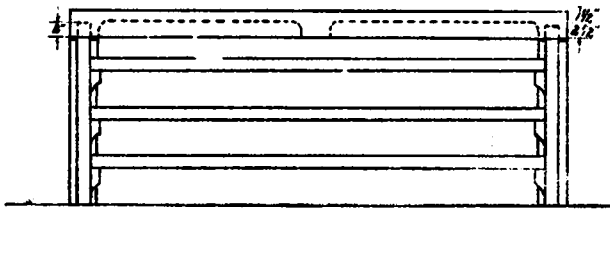
It is believed it will usually be more economical to have the precast concrete members made by a reputable concrete manufacturing concern rather than by project labor because of the equipment and skills required in this class of work. Project labor may, however, make the installation.



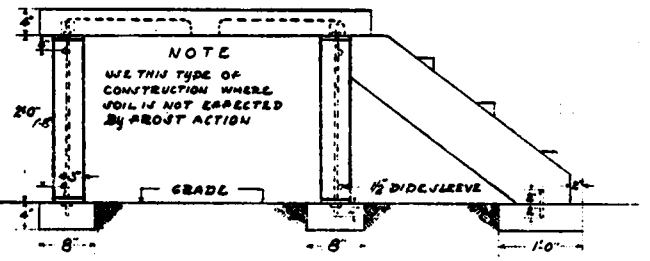
PLAN of PLATFORM & STEPS



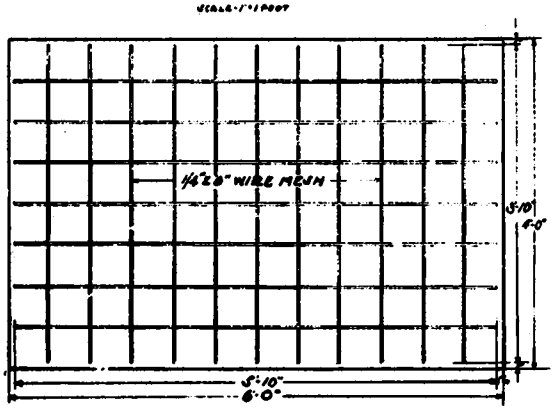
SECTION of PLATFORM & STEPS



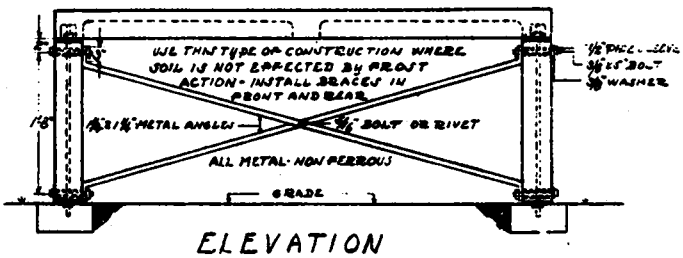
FRONT ELEVATION



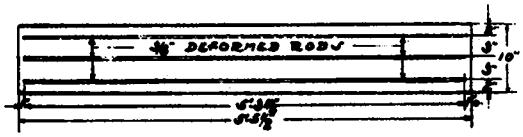
END ELEVATION



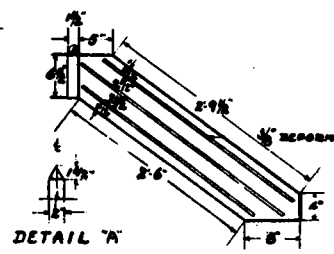
REINFORCING PLAN for PLATFORM



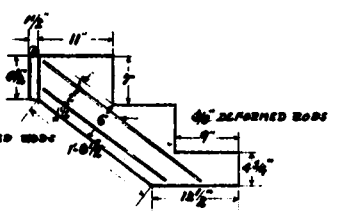
ELEVATION FRONT AND REAR



REINFORCING PLAN for STAIR TREADS



STAIR STRING

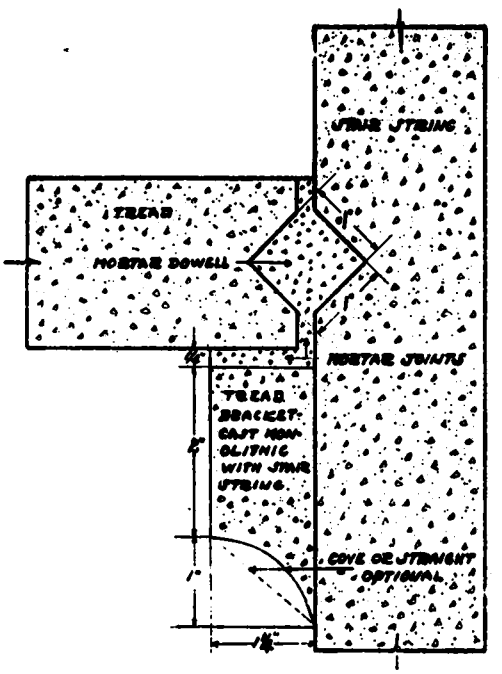


STAIR HORSE

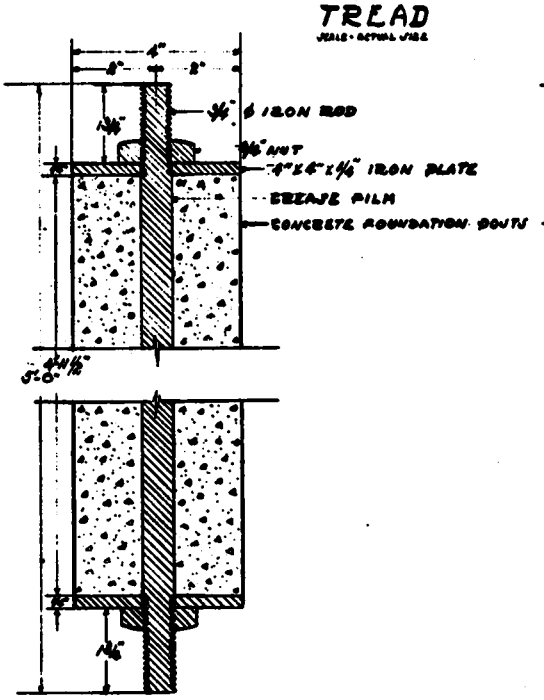
USE WHERE PORCH PLATFORM EXCEEDS 7 FEET IN LENGTH

PLAN for PRECAST CONCRETE PLATFORM and STEPS

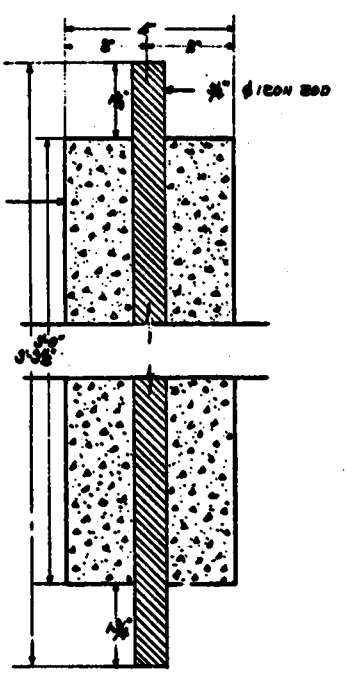
SHEET 1 of 2 EXHIBIT No. 1



SECTION
THROUGH STAIR STRING
and
TREAD



SECTION
FOUNDATION POST
for
PLATFORM



SECTION
FOUNDATION POST
for
STAIR STRING BASE

PLAN
for
PRECAST CONCRETE PLATFORM and STEPS

WINDOW SHADE MAINTENANCE ON WAR HOUSING PROJECTS

1. Standard. Window shades should be maintained so as to provide adequate service at a minimum expense, with a reasonable consideration for the appearance of the project.

2. General Policies.

   a. Management should select shades which will serve for the probable life of the project. In general, shades of a medium quality should be selected. However, when frequent replacement is required, paper or other low-priced shades should be used.

   b. Shades of a quality equal to or better than that specified in Federal Specification CCC-C-521-A may be washed or cleaned. Management on a project which is furnished with such shades should consider provision for their being washed or cleaned whenever their condition necessitates it.

   c. Shades of a quality which cannot be washed or cleaned, should be replaced after their maximum use has been obtained.

3. Tenant Cooperation. The maintenance that is required will depend upon the way the tenant uses the shade and the care he gives it. Tenants should be told how to handle shades and how to take care of them. (See Bulletin No. 20, Part IV.)

4. Replacement of Shades. Shades on the south side of a building will usually deteriorate more quickly than those on the north side. Therefore, when the shades in one room have been replaced, those shades that are still in a satisfactory condition should be used in other rooms in which only some of the shades require replacement.

5. Description of Window Shades.

   a. Quality of Shade Cloth. The grade of cotton fabric and its processing determine the quality of shade cloth. Inexpensive shades are made on loosely woven fabric (low thread count), which is filled with various types of starch or similar fillers. It is difficult to distinguish between types and grades of shade cloth when the shades are new. Federal Specification CCC-C-521-A prescribes the shade-cloth requirements for three types of window shades:

      Pyroxylin Impregnated
      Holland
      Cambric

(Cont'd)

Par. 5 (Cont'd)

These are three of the best types on the market, and in the best grades would serve on an average of from 4 to 5 years. A shorter life would be expected from the lower grades of these types, and from other cheaper types.

The type and quality of the shade cloth will determine whether a shade is:

(1) Washable. Readily washed by scrubbing with a brush. (See washing procedures as given under paragraph 6b)

(2) Semi-Washable. Cleanable by wiping with a cloth or sponge dampened with a mild-soap solution. Certain shade cloth of this kind is "washable" to a very limited extent, as it will not serve long after its first washing, or

(3) Dry-Cleanable. Cleanable with art gum or wall-paper cleaner - an expensive procedure.

b. Classification of Shade Cloth (manufacture).

(1) Pyroxylin Impregnated. Originally developed by DePont ("Tontine") but now also made by other manufacturers. Federal Specification Requirement: Thread count 136; thoroughly impregnated with pyroxylin, plasticizer, and pigment; no starch or dextrose permitted. The better qualities of this type can be washed several times without injury.

(2) Holland. Muslin base filled with a starch compound and then calendered between friction rolls. Federal Specification Requirement: Thread count 118; but threads are to be stronger than for "Pyroxylin"; coated with oil or with pyroxylin on both sides and made water repellant. This grade is "semi-washable" or "dry cleanable." Shades made of the lower grades of this type of cloth should be replaced.

(3) Cambric. Painted cotton fabric. Federal Specification Requirement: Thread count 144 for shade width less than 54"; painted type can stand some washing, but preferably should be sponged or dry cleaned. Shades made of the lower grades of this type should be replaced.

(4) Opaque. Similar to the "Cambric"; slightly lower thread count, and less oil and pigment.

(5) Machine Oils. Thread count approximately 105-110; coated with a mixture of clay and oils.

(Cont'd)

Par. 5 (Cont'd)

(6) Water Colors. Similar to the "Machine Oil" except for the use of inexpensive water colors instead of oils.

c. Paper Shades. Paper shades are made of a heavy fibre material which tears easily and deteriorates rapidly. They are useful when frequent replacement is required.

d. Window Shade Accessories. Federal Specification DDD-S-251 gives specifications for rollers, slats, cords, and accessories such as brackets and roller ferrules. The roller and its accessories are important parts of a window shade and should always be salvaged.

6. Maintenance of Shades.

a. Routine Maintenance. Project personnel should normally perform the following routine items of shade maintenance:

Adjust roller springs -
Proper adjustment of the spring tension will eliminate a large portion of the damage due to abuse. The tension should be just sufficient to lift the shade readily and fully.

Replace missing or damaged pulls -
A missing pull means a direct handling of the shade by the tenant, with a consequent abuse and soiling of the shades. Pulls should be kept on all shades.

Replace torn or damaged shades.

b. Washing and Cleaning. Determine first, by consulting a local shade shop or by making actual tests of several samples whether the shades are "washable" or "cleanable." If the tests show that the shades are washable, consideration should be given to provide means for having them washed.

Check carefully the cost of having the shades renovated or cleaned either by the project shop or by a private establishment. It may be found more economical to use the shades as long as possible and then replace them. Note that some types of shades after their first cleaning, need to be recleaned more frequently.

A shade-washing shop should be established only on the largest projects, or in a central maintenance shop serving a number of projects. Projects which are not in isolated areas can generally obtain adequate service at a reasonable cost from local shade shops. If service is not available locally, the possibility of shipping the shades to a nearby city should be considered.

(Cont'd)

Par. 6 (Cont'd)

In considering the advisability of establishing a shade shop, an estimate should be made of the cost of cleaning the shades on the project. The estimate should include the cost of installing the shop, the cost of labor and materials, and the probable work load. This estimate should then be compared with the cost of having the shades cleaned at local shade shops and with replacement costs. Contracts which are negotiated with local shade shops should include an arrangement for the exchange and renovation of shades.

7. Project Shop for Renovating Shades.

a. Personnel. An efficient supervising staff and space for the shop should be available without any additional expenditures.

Experienced labor is required for washing shades; otherwise the result will be unsatisfactory and the cost excessive. One experienced person can wash more than 100 shades a day. The average worker should be able to wash 400 or more shades a week.

b. Space Required. Not less than 400-500 sq. ft. of space will be required, including a separate drying room and shelf space for the storage of materials and shades. The drying rooms should provide for about 75-100 shades and for 3 lines (3/4" or 1" pipe) at a sufficient distance from the walls and far enough apart to provide space for hanging the shades, strung at a height of about 6'6" from the floor.

c. Water for Washing. Running water, hot and cold, should be available.

d. Equipment and Materials.

(1) For Washing Shades.

Washing Table - width, 6' or more, sufficient to carry the widest shade on the project.

Length, 6' to 10'.

Height - 36" to 40" at one end, 33" to 37" at the other end to give an inclined surface for drainage.

Top surface - covered either with seamless linoleum of "Battleship" or similar grade, or with galvanized iron, having smooth soldered seams and an edge extending 3 inches above the top surface on all four sides.

Hose and Nozzle - A simple and usually efficient arrangement for water can be provided by a 1" or 1¼" hose of 4-ply "cream type",

(Cont'd)

Par. 7 (Cont'd)

clamped to the water pipe and descending from the ceiling to the head of the table with a squeegee nozzle or faucet at the loose end, similar to those used on a gasoline-pump hose.

If two nozzles are preferred, a T-shaped water-pipe assembly should be fastened to the head of the table, extending about 18" above the top of the table, with about 30" of hose clamped to each of the two ends of the T. A squeegee nozzle should be attached to the loose end of each hose.

Scrubbing brushes - Two 8", brushes one rather stiff, the other soft.

Squeegee - One with renewable rubber blades, for expediting drying. An electric fan in the drying room will also reduce the drying time.

Pails - Two, 4 gallons each.

Scissors - One pair, 6 or 8" blade.

Washing Solution - One pound Oakite No. 5, or similar ditergent, to 4 gallons of hot water; approximately ½ pint of solution for each side of shade. Octagon, or a similar soap powder, dissolved in warm water may also be used. The proportions should be determined by experiment, as they will vary with the type of shade and soap powder.

(2) For Reversing Cloth.

Cutting Table - Not less than 6' wide.

Sewing Machine - With attachment for sewing shade cloth (Singer "78-3" or similar).

Hand Stapling Tacker - For attaching shade cloth to shade roller.

Hand Eyelet Remover.
Eyelet Machine (foot or power driven).
Cutting Knives - Two, 8 flat razor and paring.

Rulers - Two, 36" and 72".

Note: Check with catalogues of shade-machinery manufacturers, such as Aurora Shade Machinery Co., Aurora, Ill., or the Girard Mfg. Co. of Los Angeles, California.

(Cont'd)

Par. 7 (Cont'd)

e. Procedure for Washing Shades.

CAUTION: BE CAREFUL TO AVOID CREASING A WET SHADE, ESPECIALLY WHEN USING A SQUEEGEE.

(1) Clean the washing table and wet it.

(2) Place shade flat on table, with roller end near faucet (wet roller as little as possible).

(3) Wet shade thoroughly with clear water.

(4) Flush approximately ½ pint of soap solution on upper portion of shade and proceed rapidly with washing, using the stiff brush with the right hand and soft brush with the left. Brush shade off with long strokes starting at roller and working down to slat hem.

(5) Flush or rinse off with clear water.

(6) Lift shade from table, turn it over, and repeat (3), (4) and (5).

(7) Hang shade up to dry. To expedite drying, squeegee the shade before hanging it on the drying rack. Use of an electric fan in the drying room will greatly speed up drying.

f. Procedure for Reversing Shade Cloth.

(1) Before washing. Open slat hem by cutting the stitching. Remove the pull and eyelet, and roll the cloth up and remove from the roller.

The second time the shade is reversed, 3" to 4" of the cloth which originally enclosed the slat should be cut off.

Reroll cloth. Turn edge under and tack to the roller along a line drawn on the roller.

Proceed with washing.

(2) After drying. Make a slat hem. Insert a slat and install the eyelet and pull.

CAUSES AND CONTROL OF CONDENSATION

In many projects in the colder sections of the country, condensation in the structures is causing excessive maintenance costs. This is attributed to lack of ventilation of the units by tenants, the comparatively small size of rooms, and tenant practices which tend to produce condensation, such as laundering in the home.

1. Causes of Condensation

When water vapor is chilled it changes to water and the process is called condensation. (The water resulting is called condensate). Condensation takes place when moist air strikes a cold object such as a window pane, wall or ceiling. All have seen it take place on a glass of ice water.

All natural air contains some mositure in the form of vapor. As the temperature of air rises it can hold more moisture. The added amount of moisture which the air can hold by being warmed is not proportional to the rise in temperature since a pound of air at zero will support five grains of moisture, but at 70 degrees it will carry 110 grains, and at 80 degrees 155 grains.

It would be rare for air in a dwelling to become fully loaded (saturated) with vapor, but it may often carry half as much. Thus a pound of air at 60 degrees may contain 78 grains of water vapor which means it is 50% saturated. If this air were cooled to 60 degrees it would, at that point, be fully saturated, as at 60 degrees, the air could carry only 78 grains of moisture. If the air were cooled any more, it would have to deposit some of the moisture. That is what happens when moist air comes in contact with cold objects and the object begins to "sweat".

2. Condensation on Wall and Roof Materials.

Though a wall or ceiling may be cooler than the air, it may not be cool enough to condense the vapor. The vapor could, however, pass on through the paper or plaster of the inner wall or ceiling material and condense on the inside of the outer layers of wall or roof which in winter are much colder than the inner layers. If these outer cold materials are porous, such as unpainted wood, common brick and cinder block, the moisture may work through the wall and escape outdoors.

However, if moisture strikes a moisture-proof surface or layer like treated paper, paint, and glazed brick, water will be formed. Water collecting in unvented spaces is the chief cause of rotting and rusting of structural materials.

3. Sources of Moisture Vapor

Vapor is generated in many ways. In homes, the main sources of moisture are laundering, boiling of food, hot water in bath tubs, and the use of gas

(Cont'd)

burning appliances which are not vented. Often moisture enters wall and attic spaces from damp crawl spaces; this may be expected chiefly where heating pipes heat these spaces and thereby evaporate ground moisture.

4. Control of Condensation. From the above, it can be seen that it is practically impossible to stop the forming of water vapor. Therefore, the concentration of vapor in the air must be prevented so that it never contains more vapor than it can hold.

a. By Ventilation. On days when outside temperatures are low, the outside air contains only a few grains of moisture. If some of this air is allowed to enter a heated dwelling, the temperature of the entering air rises and mixes with the inside air which results in an atmosphere of low vapor content. The warm air that leaves the house carries with it a heavy load of vapor, thus reducing the vapor in the dwelling. This method of reducing the moisture in the house atmosphere by changing the air is known as the ventilation method. Obtaining the desired amount of ventilation can be done by one of the following methods.

(1) Ventilation by Tenants. An intensive campaign should be initiated to point out to tenants the advantages of ventilating their homes. Where tenant cooperation can be obtained it is the cheapest and most satisfactory means of combating condensation troubles. To eliminate condensation, the air in the dwelling must be completely changed several times a day by opening doors and windows for periods of from 5 to 10 minutes, and by airing out the unit as soon as a window shows signs of "fogging". On days when tenants do laundering within the units, more ventilation is necessary than on other days, and venting should be done while laundering is going on.

As an alternative to the above method, a tenant may desire to vent the unit continuously by opening windows slightly on opposite sides of the dwelling. The windows should be opened at the top, and remain open practically all of the time, and also the open windows should be on opposite sides of the unit to obtain cross ventilation.

(2) Installing Fixed Ventilation. If the effort to produce tenant ventilation is not successful, the management may have to install some type of fixed ventilation. The following methods of installing fixed ventilation have been tried and reported successful.

(a) Cutting slots through the meeting rails of wood sash.

(b) Preventing the upper sash from closing by nailing blocks on top of the sash or in the sash-run.

(c) Springing the steel sash ventilators so they will not close tightly.

(Cont'd)

(d) Installing window panes that are about ½-inch shorter than the opening so as to leave a slot at the top.

(e) Installing window panes of plexiglass with slots approximately 3/8 inches wide and 4 inches long.

Of course, any other method which will secure frequent air-changes will accomplish the desired result.

All openings should be screened, and metal or plastic shields may be installed to give protection from weather and drafts. Methods (d) and (e) do not produce drafts, as the opening is located at the top of the windows behind the shades. Evidence so far indicates that 20 to 60 square inches of opening are required per apartment, or 10 to 30 square inches on opposite sides of the dwelling. The area depends on the unit size, exposure, and living habits of the tenants. Any fixed ventilation should be installed so that it can be observed from the outside to detect stoppages.

The recommendation for the use of slotted openings is not put forth as a cure-all, as experience with them is limited, but it is urged that this remedy be tried. The venting of apartments will require some added heat. Care should be exercised, however, to prevent undue disregard for fuel economy. If an increase in heating costs results, it will probably be offset by the reduced maintenance expense on paint, plaster, sash, and doors. Where an inadequate amount of heat is supplied by management, tenants may try to heat with the cooking range, thereby increasing the moisture in the air.

b. Use of Vapor Barriers. If enough ventilation cannot be obtained to reduce the vapor in the air to a low point, other steps must be taken to prevent it from passing through the plaster walls and ceilings into the stud and attic spaces. Frequently a vapor barrier is erected within the outside walls during construction. This may be an aluminum foil backing on the plaster board or an asphalt treated paper placed across the studding under the plaster, etc. If no vapor barrier was built in, it will be necessary to add a paint type barrier on the inside surface of the wall or ceiling. This can be put on at any time (See Sec. 4.11).

SERVICING TIMBER CONSTRUCTION

1. General. Where trusses, columns, built-up sections, etc., have been assembled with underseasoned structural lumber, serious troubles or total failures can develop without proper maintenance. The amount of attention required by each assembly depends on the actual conditions of the particular structure. Members constructed with well-seasoned lumber of adequate species, grade and with proper design will require a minimum of servicing where the assemblies are well protected. Underseasoned lumber, as used in many war projects, necessitates continuous servicing.

2. Shrinkage. Shrinkage of underseasoned lumber varies with the species and amount of change in moisture content. Normally used species can be assumed to contract approximately 1/32 of an inch per lineal inch of cross-grain width. In extreme cases this can approach 3/64's of an inch per lineal inch of cross-grain width. It can readily be seen that close contact of surfaces can be assured only by servicing the structures until moisture equilibrium between the wood and its surroundings is reached.

3. Maintenance. Proper stress transmittal through a timber joint requires the faces of the members to be kept in close contact. All bolts and holding devices should be tightened to assure this contact but NOT to the point of splitting any member which might have twisted or slipped or to the extent that washers are forced in the timbers.

   Splits, checks and shakes resulting from the seasoning of lumber may or may not be serious. Their affect on the members or the joint depends on the direction of the stress and the extent and location of the defect.

4. Special Servicing. Where repairs or servicing other than normal tightening of bolts appear to be necessary, the services of the regional maintenance engineer or other experienced engineer should be employed to specify and supervise the work.

CONDENSATION AS IT AFFECTS DURABILITY OF EXTERIOR PAINT

On a number of projects of frame construction peeling of paint has occurred during the first year after repainting of exteriors. This not only results in poor appearance, but also in increased operating cost through the necessity of earlier repainting.

Frequently this is not the fault of materials or workmanship, but is due to condensation within the structure affecting the paint. The purpose of this section is to define the problem presented by condensation in this regard, and to suggest corrective measures.

1. How Condensation Affects Exterior Paint. Water vapor will pass through such porous materials as plaster, fiber board, water paint and wall paper. Condensation results when this water vapor is chilled. In cold weather, after passing through such materials, the vapor condenses as water on the inside surfaces of the cold exterior boards penetrating the frame members and reaching the exterior painted surface. This causes the paint to blister, peel or scale.

2. How to Recognize the Effects of Condensation. When the paint blisters or peels on a number of buildings or units in a project it can be said almost with certainty that condensation has caused the trouble. Of course, it is possible that a board here and there will peel because it was wet when painted, or if peeling starts near a joint in the siding, the chances are it is due to a leak. Some kinds of wood, such as fir, do not hold certain paints well and flaking may result from that. A good test is to remove or loosen a few siding boards where flaking has occurred and examine the back side for moisture. If caused by condensation, the building paper and sheathing will also be wet.

3. Corrective Measures. If condensation has caused the exterior paint to peel, it is useless to repaint until the condensation problem is solved and the siding dried out. This can be accomplised by the following methods:

   a. Ventilation - The easiest and most satisfactory method of control is by ventilation. For complete details, see Section 3.31.

   b. Sealing of Interior Wall and Ceiling Surfaces - Sealing interior surfaces is effective in preventing vapor from entering the wall. This requires a paint with a poor or low "permeability". Paint the interior walls with a good primer sealer and two coats of high gloss paint, or give the walls 2 coats of aluminum paint, after which oil or water paints may be used for the finish coat.

   Caution: Exteriors should be repainted only after the situation has been corrected by use of one or both of the above methods. On projects in colder climates, the siding and sheathing should be inspected to make sure that measures have been effective, before the painting is done.

REPAINTING OF FRAME STRUCTURES IN FUNGUS OR MILDEW SUSCEPTIBLE AREA

Justification for Treatment. Before any discoloration is put down as mildew or fungus, it should be definitely established that mildew or fungus is present. This can only be determined by a careful examination. If the discoloration is merely dust or dirt, the spots can be cleaned rather easily. Mildew or fungus, on the other hand, are hard to rub off, being generally well anchored in the paint coating. By using a strong pocket-type magnifying glass, it is usually possible to identify the individual spores of fungus, or the thread-like structure of mildew, if they are present.

Limitation on Use. The following procedure is suggested only where the fungus is known to exist on a large scale. The presence of fungus under the eaves in one building does not justify using the cleaning and pretreatment procedure outlined on the entire project. On buildings where fungus or mildew has been found to exist only in restricted areas the cleaning and sterilization procedure should be limited to those areas.

Use of Fungus Resistant Paint Without Pretreatment. Some paint manufacturers are recommending the use of a fungus resistant paint alone as sufficient for the prevention of fungus growth. This may be sufficient in some areas where fungus has not already started. However, experience has indicated that in badly infested areas prevention involves not only repainting with a fungus resistant paint, but also a thorough cleaning of the surfaces and elimination of the spores before the surface is repainted.

Preliminary Action Necessary Before Applying Procedure. Prior to applying this procedure, all wholly or partially rotted lumber or sections should be replaced. Construction should be corrected so that no frame member is left in contact with the ground. Insofar as feasible, branches of trees overhanging the buildings should be eliminated.

I. Method. The method consists of three steps - A. Cleaning, B. Sterilization and C. Painting.

A. Cleaning. Remove all surface dirt, mildew or fungus by one of the following methods:

Process 1 - Scrubbing

1. Material Required (for details, see Section II, Material)

a. Trisodium phosphate dissolved in water in the ratio of 1 pound per gallon or

b. Sodium carbonate dissolved in water in the ratio of 1 pound per gallon.

2. Procedure

a. Scrub thoroughly with one of the above solutions using a stiff bristle brush. Special attention should be given to areas difficult to clean, since it is in these areas that fungus will generally be found.

b. Rinse with water.

c. Allow to dry thoroughly before applying the next step.

Process 2 - Steam Cleaning

1. Equipment required (for details on source, see Section III, Equipment) - Steam Jenny

2. Procedure

a. Steam clean thoroughly using the same general method that is employed in cleaning gasoline engines or masonry walls. Cleaning should be started under the eaves and continued downward. If areas are encountered which do not yield to the steam cleaning method, such areas should be cleaned by scrubbing (Method 1, Scrubbing).

b. Allow to dry before proceeding with the next step.

B. Sterilization

Process 1 - Using "Dowicide A"

1. Materials Required (for details, see Section II, Materials) - "Dowicide A" - a 1 per cent solution of "Dowicide A" in water, or 1 1/3 oz. per gallon water present.

2. Procedure

a. Brush the "Dowicide A" solution over the entire area of the building. Caution - If applied by brush rubber gloves should be worn.

b. Allow to dry thoroughly before painting.

Process 2 - Using Bichloride of Mercury (Corrosive Sublimate)

1. Materials Required (for details, see Section II, Materials) - Bichloride of Mercury - ½ oz. per gallon of water. (Poison)

2. Procedure

a. Brush the affected area with the Bichloride of Mercury solution. Caution - Cover the hands with rubber gloves when applying the bichloride of mercury solution. Be very careful that none of the solution is taken internally.

b. Allow to dry thoroughly before painting.

Method 3 - Using "Chlorox"

a. Material Required - Commercial "Clorox" or equivalent.

b. Procedure. On small area where bleaching of the surface is not detrimental, washing with commercial "Chlorox" is recommended.

C. Painting. As a general rule mildew is less likely to form on hard paints than soft paint. Since zinc oxide is the constituent which imports hardness to the paint, a mixed pigment paint containing zinc oxide is less susceptible to mildew growth than 100% white lead paint. For this reason mixed pigment paints should be specified in a fungus susceptible area.

1. Material Required (for details, see Section II, Materials)

a. Mixed on the job.

(1) "Mildew X" added to outside house paint (Fed. Spec. TT-P-40, Type I or equivalent).

(2) "Dowicide 6" - Concentrate - added to outside house paint (Fed. Spec. TT-P-40, Type I or equivalent).

b. Ready Mixed. Fungus resistant paint.

2. Procedure. Apply one of the above paints in the usual manner.

II. Materials

A. Trisodium Phosphate (Phosphate Cleaner)

Powder form - available from any chemical or janitorial supply house. Easily dissolved in the ratio of 1 pound to a gallon of water.

B. Sodium Carbonate (Washing Soda)

Powder form - Available from any grocer store or janitorial supply house. Easily dissolved in the ratio of I pound to a gallon of water.

C. "Dowicide A" (Sodium salt of Orthophenylphenol). Substantially white ground flakes. Recommended concentration is 1.0 percent by weight in a water solution. Cost is approximately as follows:

Less than 100 pounds lots	$ .70 per pound
100 pounds to 1000 pounds lots	.42 per pound

Deliveries F.O.B. Midland, Michigan
Terms - Net thirty days
Package Fibre drums 100 pounds net, 109 pounds gross

If there is no local dealer handling "Dowicide", inquiry should be addressed to:

The Dow Chemical Company
Dowicide Division
Midland, Michigan

D. Bichloride of Mercury (Corrosive sublimate) Poison

Available in tablet form from the local pharmacist. This material is subject to the poison laws. Since this material is extremely poisonous, only reliable personnel should handle it. Be extremely careful that no material is taken internally. This material should be mixed only in the quantities required in the ratio of ½ oz. to a gallon of water.

E. "Chlorox" (Solution of Sodium hypochorite) - Liquid form usually available from any local grocery stores or janitorial supply house. Use full strength. Should not be used where discoloration (bleaching) is considered detrimental.

F. "Dowicide 6" Concentrate (Solution of "Dowicide 6" solid in diacetone alcohol). Generally it is necessary to add "Dowicide 6" concentrate on the job, since, at this time, it is only by special arrangements that paint manufacturers will grind the "Dowicide 6" solid in the paint at the factory. At the present time the Dow Chemical Company is not furnishing the prepared concentrate which makes it necessary that it be prepared by adding "Dowicide 6" in solid form (purchased as tan colored flakes) to diacetone alcohol in the ratio of 65% "Dowicide 6" to 35% Diacetone Alcohol by weight. This concentrate should be added to the oil paint in the proportion of 4¼ pounds to 95½ pounds of paint. For authorities not having a well organized painting crew, it is suggested this procedure be restricted to contract painting where the contractor will be responsible for mixing.

Costs - "Dowicide 6" -
(Tetrachlorophenol, Technical)

Less than 100 pound lots	$ .35 per pound
100 to 500 pound lots	.25 per pound

Deliveries F.O.B. Midland, Michigan
Packing - Wooden Boxes 275 pound net, 299 pound gross
Fiber drums 100 pounds net, 106 pounds gross

The diacetone alcohol can be procured from commercial chemical company or the local offices of the following:

Commercial Solvents Corporation
17 East Forty-Second Street
New York 17, New York

Carbide & Carbon Chemical Corporation
30 East Forty-Second Street
New York, 17, New York

G. "Mildew X" (Solution of Chlorophenols)

Product of the Glidden Company, Cleveland 2, Ohio - Director for mixing included on the can. Dealers located in most cities or towns.

Price	
$2.70	a quart
1.50	a pint
.84	½ pint
.54	4 ounces

H. Fungus Resistant Paint. There are on the market a number of fungus resistant paints on which the Central Office is just beginning to gather information. At the present time indications are that the following companies produce a satisfactory product.

The Kuhn Company
Houston, Texas

Master Mechanics
Cleveland, Ohio

The Sherwin Williams Company
Cleveland, Ohio

The Seidlity Paint & Varnish Company
Kansas City, Missouri

Cook Paint & Varnish Company
Kansas City, Missouri

Minnesota Linseed Oil Paint Company
Minneapolis, Minnesota

III. Equipment. Hypressure Jenny - Any satisfactory steam jenny. One which has been used is the following:

Hypressure Jenny
Made by Homestead Valve Manufacturing Company
Coroapolis, Pennsylvania
Price - Approximately $600.00

REPAINTING OF FRAME STRUCTURES IN FUNGUS OR MILDEW SUSCEPTIBLE AREA

Justification for Treatment. Before any discoloration is put down as mildew or fungus, it should be definitely established that mildew or fungus is, in fact, present. This can only be determined by a careful examination. If the discoloration is merely dust or dirt, the spots can be cleaned rather easily. Mildew or fungus, on the other hand, are hard to rub off, being generally well anchored in the paint coating. By using a strong pocket-type magnifying glass, it is usually possible to identify the individual spores of fungus, or the thread-like structure of mildew, if they are present.

Limitation on Use. The following procedure is suggested only where the fungus is known to exist on a large scale. The presence of fungus under the eaves in one building does not justify using the cleaning and pretreatment procedure outlined, on the entire project. On buildings where fungus or mildew has been found to exist only in restricted areas, the cleaning and sterilization procedure should be limited to those areas.

Use of Fungus Resistant Paint without Pretreatment. Some paint manufacturers are recommending the use of a fungus resistant paint alone as sufficient for the prevention of fungus growth. This may be sufficient in some areas where fungus has not already started. However, experience has indicated that in badly infested areas a thorough cleaning of the surfaces and elimination of the spores is necessary before the application of fungus resistant paint.

Preliminary Action Necessary Before Applying Procedure. Prior to applying this procedure, all wholly or partially rotted lumber or sections should be replaced. Construction should be corrected so that no frame member is left in contact with the ground. Insofar as feasible, branches of trees overhanging the buildings should be eliminated.

1. Method. The method consists of three steps - A. Cleaning, B. Sterilization and C. Painting.

   A. Cleaning. Remove all surface dirt, mildew or fungus by one of the following methods:

      Process 1 - Scrubbing

      1. Material Required (for details, see Section II, Material)

         a. Trisodium phosphate dissolved in water in the ratio of 1 pound per gallon; or

         b. Sodium carbonate dissolved in water in the ratio of 1 pound per gallon.

2. Procedure

a. Scrub thoroughly with one of the above solutions using a stiff bristle brush. Special attention should be given to areas difficult to clean, since it is in these areas that fungus will generally be found.

b. Rinse with water.

c. Allow to dry thoroughly before applying the next step.

Process 2 - Steam Cleaning

1. Equipment required (for details on source, see Section III, Equipment) - Steam Jenny

2. Procedure

a. Steam clean thoroughly using the same general method that is employed in cleaning gasoline engines or masonry walls. Cleaning should be started under the eaves and continued downward. If areas are encountered which do not yield to the steam cleaning method, such areas should be cleaned by scrubbing (Process 1, Scrubbing).

b. Allow to dry before proceeding with the next step.

B. Sterilization

Process 1 - Using Sodium Salt of Orthophenylphenol ("Dowicide A" (or equal)

1. Materials Required (for details, see Section II, Materials) - 1 per cent solution of Sodium Salt of Orthophenylphenol in water, or 1 1/3 oz. per gallon water present.

2. Procedure

a. Brush the Sodium Salt of Orthophenylphenol solution over the entire area of the building. Caution - If applied by brush rubber gloves should be worn.

b. Allow to dry thoroughly before painting.

Process 2 - Using Bichloride of Mercury (Corrosive Sublimate)

1. Materials Required (for details, see Section II, Materials) - Bichloride of Mercury - ½ oz. per gallon of water. (Poison)

2. Procedure

a. Brush the affected area with the Bichloride of Mercury solution. Caution - Cover the hands with rubber gloves when applying the bichloride of mercury solution. Be very careful that none of the solution is taken internally.

b. Allow to dry thoroughly before painting.

Method 3 - Using Commercial Solution of Sodium hypochlorite ("Chlorox" or equal)

a. Material Required - Commercial Solution of Sodium hypochlorite.

b. Procedure. On small area where bleaching of the surface is not detrimental, washing with commercial solution of Sodium hypochlorite is recommended.

C. Painting. As a general rule mildew is less likely to form on hard paints than soft paint. Since zinc oxide is the constituent which imports hardness to the paint, a mixed pigment paint containing zinc oxide is less susceptible to mildew growth than 100% white lead paint. For this reason mixed pigment paints should be specified in a fungus susceptible area.

1. Material Required (for details, see Section II, Materials)

a. Mixed on the job.

(1) Solution of Ready Mixed 2,3,4,6 Tetrachlorophenol ("Mildew X" or equal) added to outside house paint (Fed. Spec. TT-P-40, Type I or equivalent).

(2) Solution of 65% Tetrachlorophenol ("Dowicide 6" or equal) and 35% by weight Diacetone Alcohol - added to outside house paint (Fed. Spec. TT-P-40, Type I or equivalent).

b. Ready Mixed. Fungus resistant paint.

2. Procedure. Apply one of the above paints in the usual manner.

II. Materials

A. Trisodium Phosphate (Phosphate Cleaner)

Powder form - Fed. Spec. O-T-671a. Easily dissolved in the ratio of 1 pound to a gallon of water.

B. Sodium Carbonate (Washing Soda)

Powder form - Available from any grocer store or janitorial supply house. Easily dissolved in the ratio of 1 pound to a gallon of water.

C. Sodium Salt of Orthophenylphenol. Recommended concentration is 1.0 percent by weight in a water solution. The Specification for sodium salt of Orthophenylphenol is as follows:

Form - Substantially white, ground flakes with faint characteristic odor

Molecular Weight		264
pH of Saturated solution		11.4
Free Caustic not less than		3%
Orthophenylphenol content not	less than	64.5%
Color	Substantially	white

Solubility - 1 g. in 10 c.c. is not more than slightly cloudy and does not become turbid in diluting to 100 c.c.

Although there may be other suppliers of sodium salt of Orthophenylphenol, "Dowicide A" available from Dow Chemical Company, Dowicide Division, Midland, Michigan, is known to meet the minimum requirements.

D. Bichloride of Mercury (Corrosive Sublimate) Poison

Available in tablet form from the local pharmacist. This material is subject to the poison laws. Since this material is extremely poisonous, only reliable personnel should handle it. Be extremely careful that no material is taken internally. This material should be mixed only in the quantities required in the ratio of ½ oz. to a gallon of water.

E. Commercial Solution of Sodium hypochlorite - ("Chlorox" or equal) Use full strength. Should not be used where discoloration (bleaching) is considered detrimental.

F. Solution of 65% Tetrachlorophenol ("Dowicide 6" or equal) and 35% by weight diacetone alcohol. Generally it is necessary to add the solution (Concentrate) of tetrachlorophenol and diacetone alcohol on the job. The concentrate should be added to the oil paint in the proportion of 4½ pounds to 95½ pounds of paint. For authorities not having a well organized painting crew, it is restricted to contract painting where the contractor will be responsible for mixing.

The Specification for 2,3,4,6 Tetrachlorophenol is as follows:
Form - Tan Flakes with strong characteristic odor

Molecular weight	231.4
Freezing Point	50°C or above
Boiling Point	135-165°C at 8-10 mm
Flash Point	None
Fire Point	None

Although there may be other suppliers of Tetrachlorophenol, "Dowicide 6" from the Dow Chemical Company, Dowicide Division, Midland, Michigan, is known to meet the minimum requirements.

The diacetone alcohol can be procured from commercial chemical company or the local offices of the following:

Commercial Solvents Corporation
17 East Forty-Second Street
New York 17, New York

Carbide & Carbon Chemical Corporation
30 East Forty-Second Street
New York 17, New York

G. Solution of Ready Mixed 2,3,4,6 Tetrachlorophenol ("Mildew X" or equal) Although there may be other suppliers "Mildew X" available from the Glidden Company has met the minimum requirements.

H. Fungus Resistant Paint. There are on the market a number of fungus resistant paints on which the Central Office is just beginning to gather information. At the present time indications are that the following companies produce a satisfactory product.

The Kuhn Company
Houston, Texas

Master Mechanics
Cleveland, Ohio

The Sherwin Williams Company
Cleveland, Ohio

The Seidlity Paint & Varnish Company
Kansas City, Missouri

Cook Paint & Varnish Company
Kansas City, Missouri

Minnesota Linseed Oil Paint Company
Minneapolis, Minnesota

III. Equipment. Hypressure Jenny - Any satisfactory steam jenny. One which has been used is the following:

Hypressure Jenny
Made by Homestead Valve Manufacturing Company
Coroapolis, Pennsylvania
Price - Approximately $600.00

REPAINTING OF FRAME STRUCTURES IN FUNGUS OR MILDEW SUSCEPTIBLE AREA 1/

Justification for Treatment. Before any discoloration is put down as mildew or fungus, it should be definitely established that mildew or fungus is, in fact, present. This can only be determined by a careful examination. If the discoloration is merely dust or dirt, the spots can be cleaned rather easily. Mildew or fungus, on the other hand, is hard to rub off, being generally well anchored in the paint coating. By using a strong pocket-type magnifying glass, it is usually possible to identify the individual spores of fungus, or the thread-like structure of mildew, if they are present.

Limitation on Use. On areas where mildew or fungus is known to exist, the following procedure is recommended. Confine the work to the areas affected, as the presence of mildew or fungus in a restricted part or on certain buildings does not justify treatment and repainting of the entire project.

Use of Fungus Resistant Paint without Pretreatment. Some paint manufacturers are recommending the use of a fungus resistant paint alone as sufficient for the prevention of fungus growth. This may be sufficient in some areas where fungus has not already started. However, experience has indicated that in badly infested areas a thorough cleaning of the surfaces and elimination of the spores is necessary before the application of fungus resistant paint.

Preliminary Action Necessary Before Applying Procedure. Prior to applying this procedure, all wholly or partially rotted lumber or sections should be replaced. Construction should be corrected so that no frame member is left in contact with the ground. Insofar as feasible, branches of trees overhanging the buildings should be eliminated.

1. Method. The method consists of three steps - A. Cleaning, B. Sterilization and C Painting

   A. Cleaning. Remove all surface dirt, mildew or fungus by one of the following methods:

      Process 1 - Scrubbing

      1 Material Required (for details, see Section II, Material)

         a. Trisodium phosphate dissolved in water in the ratio of 1 pound per gallon; or

         b. Sodium carbonate dissolved in water in the ratio of 1 pound per gallon.

1/ This supersedes Section 4.12, Sheets 1, 2, 3 and 4, dated 9-24-47. Revision of "Limitation on Use", Page 1; revision of C-1 (a-1 and 2, and b) "Material Required", and C-2, "Procedure", Page 3.

2. Procedure

a. Scrub thoroughly with one of the above solutions using a stiff bristle brush. Special attention should be given to areas difficult to clean, since it is in these areas that fungus will generally be found

b. Rinse with water.

c. Allow to dry thoroughly before applying the next step.

Process 2 - Steam Cleaning

1. Equipment required (for details on source, see Section III, Equipment) - Steam Jenny

2. Procedure

a. Steam clean thoroughly using the same general method that is employed in cleaning gasoline engines or masonry walls. Cleaning should be started under the eaves and continued downward. If areas are encountered which do not yield to the steam cleaning method, such areas should be cleaned by scrubbing (Process 1, Scrubbing).

b. Allow to dry before proceeding with the next step.

B. Sterilization

Process 1 - Using Sodium Salt of Orthophenylphenol ("Dowicide A" or equal)

1. Materials Required (for details, see Section II, Materials) - 1 per cent solution of Sodium Salt of Orthophenylphenol in water, or 1 1/3 oz. per gallon water present.

2. Procedure

a. Brush the Sodium Salt of Orthophenylphenol solution over the entire area of the building Caution - If applied by brush rubber gloves should be worn.

b. Allow to dry thoroughly before painting.

Process 2 - Using Bichloride of Mercury (Corrosive Sublimate)

1. Materials Required (for details, see Section II, Materials) - Bichloride of Mercury - $\frac{1}{2}$ oz. per gallon of water . (Poison)

2. Procedure

a. Brush the affected area with the Bichloride of Mercury solution. Caution - Cover the hands with rubber gloves when applying the bichloride of mercury solution. Be very careful that none of the solution is taken internally.

b. Allow to dry thoroughly before painting.

Method 3 - Using Commercial Solution of Sodium hypochlorite ("Chlorox" or equal)

a. Material Required - Commercial Solution of Sodium hypochlorite.

b. Procedure. On small area where bleaching of the surface is not detrimental, washing with commercial solution of Sodium hypcchlorite is recommended.

C. Painting. As a general rule mildew is less likely to form on hard paints than soft paint. Since zinc oxide is the constituent which imports hardness to the paint, a mixed pigment paint containing zinc oxide is less susceptible to mildew growth than 100% white lead paint. For this reason mixed pigment paints should be specified in a fungus susceptible area.

1. Material Required (for details, see Section II, Materials)

a. Mixed on the job.

(1) Solution of Ready Mixed 2, 3, 4, 6 Tetrachlorophenol ("Mildew X" or equal) added to outside house paint primary coat and to finish coat. Add 1/2 pound per gallon each to the primary and finish coats.

(2) Solution of 65% Tetrachlorophenol ("Dowicide 6" or equal) and 35% by weight Diacetone Alcohol - added to primary coat and to finish coat. Add this concentrate to finish paint in a concentration of $4\frac{1}{2}\%$ by weight per gallon of paint.

b. Ready Mixed. Fungus Resistant paint.

2. Procedure. After the surface is prepared for repainting apply the above paint in the usual manner. All places where paint has been removed in the cleaning process, whether in spots or over the entire area, should first receive a primer coating. After these surfaces have thoroughly dried, the finish coat should then be applied to complete the work.

II. Materials.

A. Trisodium Phosphate (Phosphate Cleaner)

Powder form - Fed. Spec. O-T-671a. Easily dissolved in the ratio of 1 pound to a gallon of water.

B. Sodium Carbonate (Washing Soda)

Powder form - Available from any grocer store or janitorial supply house. Easily dissolved in the ratio of 1 pound to a gallon of water.

C. Sodium Salt of Orthophenylphenol. Recommended concentration is 1.0 percent by weight in a water solution. The Specification for sodium salt of Orthophenylphenol is as follows:

Form - Substantially white, ground flakes with faint characteristic odor

Molecular Weight	264
pH of Saturated solution	11.4
Free Caustic not less than	3%
Orthophenylphenol content not less than	64.5%
Color	Substantially white

Solubility - 1 g. in 10 c.c. is not more than slightly cloudy and does not become turbid in diluting to 100 c.c.

Although there may be other suppliers of sodium salt of Orthophenylphenol, "Dowicide A" available from Dow Chemical Company, Dowicide Division, Midland, Michigan, is known to meet the minimum requirements.

D. Bichloride of Mercury (Corrosive Sublimate) Poison

Available in tablet form from the local pharmacist. This material is subject to the poison laws. Since this material is extremely poisonous, only reliable personnel should handle it. Be extremely careful that no material is taken internally. This material should be mixed only in the quantities required in the ratio of $\frac{1}{2}$ oz. to a gallon of water.

E. Commercial Solution of Sodium hypochlorite - ("Chlorox" or equal) Use full strength. Should not be used where discoloration (bleaching) is considered detrimental.

F. Solution of 65% Tetrachlorophenol ("Dowicide 6" or equal) and 35% by weight diacetone alcohol. Generally it is necessary to add the solution (Concentrate) of tetrachlorophenol and diacetone alcohol on the job. The concentrate should be added to the oil paint in the proportion of $4\frac{1}{2}$ pounds to $95\frac{1}{2}$ pounds of paint. For authorities not having a well organized painting crew, it is restricted to contract painting where the contractor will be responsible for mixing.

The Specification for 2,3,4,6 Tetrachlorophenol is as follows:
Form - Tan Flakes with strong characteristic odor

Molecular weight	231.4
Freezing Point	50°C or above
Boiling Point	135-165°C at 8-10 mm
Flash Point	None
Fire Point	None

Although there may be other suppliers of Tetrachlorophenol, "Dowicide 6" from the Dow Chemical Company, Dowicide Division, Midland, Michigan, is known to meet the minimum requirements.

GLAZING

The setting of glass is a specialized trade known as glazing and persons trained in this work are classified as professional glaziers. In many instances glazing is closely connected with the painting job, therefore the painter is frequently called upon to make such installations and in other cases it may be undertaken by either the maintenance staff or the tenants.

Purpose. The purpose of this section is to present directions for glazing broken window panes on housing projects.

Preparation of Surface. After the old glass has been removed from the window, the surface of the glazing rabbet in the sash should be cleaned of dirt, old putty, and loose paint. It must be free of dampness or ice. Foreign substance can be removed by wiping the rabbet clean with a cloth saturated with turpentine or mineral spirits. It is important that suitable priming be applied to the rabbet of wood or metal sash before installing the glass. Priming of wood sash rabbets is necessary in order that the dry wood will not draw out the oil from the putty before it has had time to set and in the case of steel sash this operation is essential to protect the sash against corrosion. Suitable priming materials for wood and metal are white lead linseed oil paint and rust-inhibitive paint, such as red lead or zinc chromate, respectively. These coatings should be allowed to dry hard before putty or glazing compound is applied.

Preparation of Glass. Glass should be cut sufficiently scant so that it will fit into the opening in the window frame without crowding or forcing, since glass which fits the opening too tightly is sometimes cracked by expansion. It is prudent to furnish the supplier with the exact size of the pane required as cutting of glass is an operation best accomplished by experienced persons. If this cannot be done, good results in cutting glass may be obtained, if care is exercised by those less experienced, by the use of a glazier's cutting wheel. The glass is placed on an even surface and using a straight edge, the cutter is run along the outline of the pane. If good pressure is applied to the cutter, a deep scratch will be made in the glass. The section beyond the cut is then broken off by tapping the underside of the glass along the cut. Where rough edges are left on the glass they may be removed by crushing the small projections with a pair of pliers or nippers. A carborundum stone is preferred for removing sharp corners although a file dipped in turpentine may also be used for this purpose.

Installation of Glass. Spread a thin layer of putty all around the bottom of the rabbet. This is known as back puttying. Place the glass in the opening and gently force and press it into place. Excess putty will be squeezed out on the inside and should be cut off even with the edge of the muntin or rails. Glass is held in place in wood sash by means of glazier's points or small triangular pieces of metal which are forced into the wood with a screw driver on the exterior side of the glass. A glass setting tool is desirable for inserting glazier's points where a large number of

installations are required. Putty should then be applied and beveled with a putty knife around the perimeter of the rabbet and glass, and the excess neatly removed. The putty should not extend on the outside face of the glass further than the wood extends on the inside as this gives a poor appearance and indicates careless workmanship.

Steel sash are glazed in the same manner as wood sash except that special spring clips are used to hold the glass in place and an elastic glazing compound is used instead of linseed oil putty.

In some cases, especially on interior doors, glass is held in place with a wood stop instead of putty and the stops are held in place with countersunk brads or screws. If such doors are found on the exterior, both faces should be back puttied.

Putty and Elastic Glazing Compound. Putty and elastic glazing compound should be painted within two months of application. However, paint should not be applied until the putty or compound is hard and thoroughly set, as the formation of an airtight film retards drying and may later cause the paint and putty to crack. Paint should be applied carefully over the putty and should extend far enough beyond the edge of the putty or glazing compound onto the glass to form a seal between the putty and glass.

Federal Specification TT-P-791a covers the requirements for high-grade linseed oil putty for general use on wood sash glazing and is furnished in Types I and II. Various proprietary putties presenting claims as to. hard drying, quick setting, etc., are also available. Type I is a whiting putty and does not contain white lead. This type of putty is not recommended where a hard drying material is desirable and some users consider it less durable than Type II putty. Type II putty is a white-lead-whiting putty and is used particularly where a hard material is required, as for filling of holes and cracks.

Federal Specification TT-P-781a, Type I and Type II, covers Elastic Glazing Compound as intended for general use for the glazing of metal sash. Materials of that nature prepared under numerous proprietary names are also available. Type I covers elastic glazing compounds that may be used principally for glazing either interior or exterior metal sash and properly primed wood sash. It should dry to a hard surface but at the same time remain slightly plastic underneath for a reasonable time. It is desirable that the plastic undersurface condition be attained where the elastic compound is required to sustain glazing under considerable vibration or where maximum durability is desired. This material should be used where low annual maintenance cost is of prime importance. Type II covers an elastic compound of lower quality than Type I and would probably be suitable for use in temporary construction.

Putty should be kept in tightly covered cans otherwise it will dry out. Putty left in a container may be protected from exposure to air by a film of linseed oil poured over the surface or if being used from day to day an inch of water floated over the surface thereof will prevent drying.

PREPARATION OF INTERIOR SURFACES FOR REPAINTING

Table of Contents

A. Purpose of Bulletin. This bulletin is designed to provide instructions for preparation of surfaces when repainting the interior of structures, and to emphasize the importance of that phase of the paint job in achieving a satisfactory and durable finish.

B. Surface Conditions. In preparing the surface for repainting, cleaning thereof may be the only treatment required. If failure of the paint film has started, partial or complete removal of the old coating may be necessary and in addition, certain structural repairs may be required. Another matter warranting consideration is the number of coats of paint which have been previously applied to a surface, as repeated painting builds up film thickness and eventually leads to early paint failure. In any case, it is necessary to properly prepare a surface to receive the new finish, for even top quality paint will give poor service if applied over an improperly conditioned surface.

1. Paint Failure. When observation and inspection of the old finish indicates that it has not deteriorated, only the minimum of surface preparation will be required. But if an unsound condition is apparent, every effort must be made, before repainting, to determine if possible the reason for such failure and correct it before repainting.

   The appearance of blisters, cracking, flaking or peeling of paints on plaster, wood, or metal surfaces is indicative that the coating is in unsound condition. This condition may be localized and confined to small areas or it may be generally evident in large patches. Regardless of the scope of failure, repainting should not be undertaken until the surface is satisfactorily prepared.

2. Conditions Contributing to Failure. In most instances failures can be attributed to one or a combination of the following elements -- structural defects, poor surface preparation, or poor application. Faulty structural conditions which admit water or dampness behind painted plaster or woodwork are harmful to paint coatings. These items are: Improperly controlled drainage of rain water from buildings, condensation within walls, plumbing leaks, and wall surface defects. Therefore correction of structural defects prior to repainting is an essential phase of good surface preparation. Poor surface preparation should be guarded against by prescribing the proper treatment thereof and then determining that such directions are executed. Typical examples of poor surface preparation are indicated by a spotty surface or a peeling finish which are the results of painting over porous surfaces and dirty or greasy surfaces respectively.

   Poor application of paint to the surface is manifested by sagging, lapping, and brush marks in the finish, all of which indicate improper brush technique. Likewise, alligatoring or cracking of the paint film shows that the finish was applied too soon over the primer or that the undercoat was too soft.

C. Cleaning Operations.

1. Plaster, Wood, and Metal Interior Surfaces.

a. General. Cleaning of the surface before repainting is equally as important as any other phase of surface preparation, and the following directions should be adhered to as the first step in producing a satisfactory repaint job.

(1) Cleaning Dusty and Soiled Surfaces. Although a painted surface may be otherwise in good condition, all foreign matter such as dust, soiled areas, grease, and surface gloss must be removed before repainting. Dust may be removed by brushing the surface and soiled areas cleaned by wiping with a cloth dampened with turpentine or mineral spirits. Painted metal surfaces, if not rusted, should be slightly roughened with a wire brush and then wiped clean. Washing the surface with laundry soap and water is also considered a satisfactory means of cleaning dust and soiled areas.

(2) Removing Grease. Kitchen walls and ceilings and other surfaces to which grease has adhered should be thoroughly cleaned before repainting. To remove grease from painted surfaces, wipe the surface with a cloth dampened with mineral spirits or apply a preparation made by adding to a bucket of warm water a small amount of washing powder, soap, and sufficient flour to make a slightly sticky mixture. Spread this mixture with a large brush and allow it to remain on the surface for 2 or 3 minutes, then wash it off with a cloth or sponge and clean water. Commercial preparations for removing grease are also available.

(3) Removing Gloss. Removal of gloss from semi-gloss and gloss painted surfaces is essential before repainting in order to establish better adhesion between the old and new finishes. To remove gloss, rub the surface with a fine sand paper, taking care to apply it lightly as too much pressure will damage the existing enamel film. After sanding, remove dust from the surface by wiping with a cloth dampened with mineral spirits or turpentine. Gloss may also be removed by washing the surface with water in which is dissolved some trisodium phosphate (about 2 oz. per gal.) See section E, par. 2.

(4) Removing Rust. In most cases rust contains moisture and moisture behind a paint film causes its early failure. Therefore, where paint is applied over rust it cannot be expected to give good service. Consequently all rust should be removed from metal before repainting and the use of a power-driven

wire brush is best for this purpose, although a wire brush manually operated may be adequate. Apply the brush to the affected surface to remove as much loose paint and rust as possible, then rub with flint paper to extract all final traces. Complete the cleaning process by wiping the surface with a cloth dampened with mineral spirits or turpentine to remove dust or grease. Do not remove more of the existing finish which remains secure than is necessary, for an old finish which adheres well to the metal surface provides an excellent foundation for the new paint and requires only a light sanding or wire brushing to improve adhesion before repainting. However, the importance of removing rust spots down to the bare metal is stressed if corrosion is to be halted and a durable finish obtained.

D. Removing Old Paint Finishes.

1. Plaster, Wood, and Metal Interior Surfaces.

a. Localized Failure.

(1) Removing Oil Paints, Resin Emulsion Paint, Casein Paint, and Calcimine. Before applying the new finish, all paint film which has failed in small patches should be removed, for regardless of the quality of the paint to be used, it is certain of premature failure if placed over an insecure surface. Wire brushing or scraping, or a combination of the two, on the affected surface, followed by a light sanding with garnet paper is considered the most practical means of removing loose paint. Edges of remaining paint around the perimeter of bare surfaces should then be feathered by sanding to avoid evidence of a depression when repainted. After loose paint has been removed, clean the entire surface in accordance with directions in section C, as applicable.

b. General Paint Failure.

(1) Removing Oil Paint, Semi-Gloss, and Gloss Paint, and Resin-Emulsion Paint. When the existing paint is peeling or flaking over a large area of the surface, general paint failure is indicated and the old finish should be removed. Paint and varnish remover, an automatic sanding machine, or a power-driven wire brush may be used for this purpose. After paint has been removed, it is important that the surface be cleaned with cloths dampened with mineral spirits to remove dust, small paint particles, or paraffin remaining from the paint and varnish remover. See section E, paragraphs 1 to 6, as applicable.

(2) Removing Casein Paint. When casein paint has failed generally over most of the surface, its removal is necessary. Even though casein paint is in good condition, it should be removed when there are two coats or more of it on the surface if an oil paint is to be applied. Complete removal of casein paint is accomplished by scrubbing the surface with a stiff brush using a strong solution of trisodium phosphate and hot water (see section E, par. 2.) After paint has been removed, rinse the surface with clean water and allow it to dry before repainting.

(3) Removing Calcimine. Calcimine coatings must be removed before applying another type of paint to the surface. To remove calcimine, follow directions mentioned in section C, par. 1-a(2) for Removing Grease.

E. Materials for Removing Paint.

1. Paint and Varnish Remover. In applying paint and varnish remover, a varnish brush is best suited. Apply the remover slowly but liberally with a one-way stroke only. Brushing over several times evaporates the volatile solvents and impairs the action of the remover. Allow the remover to remain on the surface for about 15 minutes or until the coating wrinkles, then scrape off the softened paint. Use of a wire brush is helpful in removing the remaining paint spots. Wash off the paint and varnish remover with mineral spirits before applying new paint. Paint and varnish remover may be used for removing paint from plaster, wood, and metal surfaces. On vertical surfaces best results may be attained by using a spray gun for applying the remover.

2. Trisodium Phosphate. Three pounds of this chemical dissolved in a gallon of water forms an effective solution for softening paint. This solution should be liberally applied to the surface and allowed to soak into the paint for about 15 minutes. The paint will then be softened and may be scraped off with a scraper. A milder solution prepared by mixing 2 ounces of trisodium phosphate in a gallon of water may be used to clean painted surfaces. After washing the surface with this solution it should be rinsed with clean water and allowed to dry thoroughly before repainting. Scrape off paint in the direction of the grain.

3. Scraping. A scraper or a sharpened putty knife is recommended for scraping away paint and rust. When using a putty knife or scraper, hold the tool at an angle of about 30° to the surface as it may gouge the surface at a greater angle and will not be effective at a lesser one. As stated above, scraping on wood should always be done in the direction of the grain.

4. Brushing. A stiff bristled wire or fibre brush should be used when dust, dirt, loose paint film or rust can be removed by brushing. When using the brush, hold it parallel to the surface and brush with medium pressure.

5. Hand Sanding. Old painted surfaces which are to be repainted are frequently sanded either to remove gloss on the old finish or to remove paint which has failed in some degree. Finer grades of sandpaper are used where the old coat is in fair condition and the coarser grades used where the old coating is in bad condition and must be completely removed.

6. Automatic Sanding. Automatic sanding is used for removing old paint coatings which are in an advanced stage of failure on wood and metal surfaces. This method of paint removal is best adapted to exterior surfaces but may be used on the interior. There are no special precautions to be observed except that when automatic sanders are used care must be taken to avoid grinding away structural material. If done properly, sanding or grinding has the advantage of roughening the base so that better adhesion is obtained when the paint is applied.

F. Repairing Surfaces.

1. Repairing Plaster. After the plaster surface has been cleaned, all cracks or holes therein should be repaired. Very fine hair cracks need not be cut out but may be given a touch-up coat of heavy priming paint which should hide them to subsequent coats. In repairing cracks and holes in plaster, care should be taken to see that such breaks are cut slanting in toward the lath or in the shape of an inverted "V" so that edges converge toward the surface and dovetail the new material into the old. When repairing small cracks and holes, patching plaster or spackling compound should be used. Soak the edges of the crack or hole with water to bound the patching material with the existing plaster and fill the opening to within 1/4 inch of the surface. Allow the plaster to set partially, then add sufficient plaster to fill the opening and level off at the surface. After the plaster has set and presents a firm finish, smooth off rough or uneven spots with fine sandpaper. The average painter should be competent to make small plaster repairs as mentioned above in connection with the painting but replastering of large areas should be attempted only by workmen skilled in that trade. To patch small areas use hydrated lime and gaging plaster. If grease has deeply penetrated a plaster surface, it cannot be removed by cleaning and if painted over will result in unsatisfactory appearance of the finish. Therefore, when plaster is in such condition, the area affected should be cut out and repatched. If an oil paint is to be applied following plaster repairs, the surface should be allowed at least 72 hours for thorough drying after which the repaired plaster is spot primed. Follow spot priming with full priming before finishing the entire surface. Allow at least 24 hours for drying between application of coats.

2. Miscellaneous Repairs. Wood which is decayed or split and metal which has been weakened by corrosion cannot be suitably repaired for repainting and should be removed and replaced. Loose boards should be securely fastened. Holes left by countersunk nails and empty nail

holes should be reputtied and any existing gaps as around door or window casing should be filled with calking compound.

G. Priming.

1. Plaster, Wood, and Metal Interior Surfaces.

a. Priming Surfaces in Good Condition. After surfaces in good condition have been prepared as directed in the aforementioned instructions, consideration should be given application of the priming coat. The need for a priming coat will be discussed in the following paragraphs and depends upon the condition and type of the existing surface, and the type of finish to be applied. Recent developments in the paint industry have made it possible to obtain a one-coat type of oil paint possessing a quality which primes, seals and finishes in one application. This paint may be applied over old paint in good condition and its use constitutes a factor in reducing labor and material costs, but it is not recommended where the existing paint is in poor condition.

(1) Priming Flat Oil Painted Surfaces. When repainting over a flat oil painted finish, clean the surface in accordance with applicable directions, then apply one coat of priming paint and allow 24 hours to dry before putting on the finish paint. Elimination of the priming coat is done at the risk that the finish coat may "flash" and present an uneven spotty appearance. Most flat paints are porous and if this condition is not counteracted by use of a primer to seal the old paint, flashing or spotting may result.

(2) Priming Semi-Gloss and Gloss Surfaces. When repainting semi-gloss and gloss finishes, prepare the surfaces in accordance with applicable directions stated in section C. Semi-gloss and gloss surfaces should always be lightly sanded before repainting but care must be taken so as not to damage the enamel film. When durability and appearance are the main factors, an enamel undercoat should be applied to the surfaces, particularly wood and metal, following the sanding operation. The purpose of the enamel undercoat is to supply a foundation for the finish, to improve adhesion between the old and new coats, and to insure the maximum smoothness of the surface. An enamel undercoat should also be applied when repainting flat oil, resin-emulsion, or casein painted surfaces with semi-gloss and gloss paints. If economy of operation is the prime consideration, application of the enamel undercoat may be omitted but in its absence the durability and appearance gained in the above operation cannot be expected. Application of one coat of the enamel undercoat is sufficient in preparing the surface for a semi-gloss or gloss finish. Allow at least 24 hours to dry before applying the finish.

(3) Priming Resin-Emulsion and Casein Painted Surfaces. Where resin-emulsion and casein painted surfaces are in good condition and cleaned, application of a primer coat is not required when repainting with similar paints. If two or more coats of casein paint exist on a surface, it should be removed and the surface reprimed before repainting with an oil paint. A coat of enamel undercoat should be applied to surfaces having one coat of resin-emulsion or casein paint when refinishing with semi-gloss or gloss paints. After applying the enamel undercoat or priming paint, allow at least 24 hours for the surface to dry before applying finish.

b. Surfaces Having Localized Paint Failures.

(1) Priming Interior Plaster and Wood Surfaces. Prepare surfaces in accordance with applicable directions stated in sections C and D before spot priming. Spot priming of repaired plaster (sec. F, par. 1) should be delayed 72 hours to allow plaster to dry out and become firm. Fill woodwork defects, such as holes and cracks, with plastic wood or putty before spot priming. Allow spot priming to dry 24 hours before applying full priming, enamel undercoat, or finish paint, as applicable under section G, par. 1-a.

(2) Priming Interior Metal Surfaces. Prepare metal surfaces which show localized failure as directed in sections C and D. The importance of removing loose paint and rust spots down to the bare metal is stressed if corrosion is to be halted and a durable finish obtained. After removing loose paint and rust, wire brush the entire surface and spot prime the exposed metal with a rust inhibitive undercoat, such as red lead or zinc chromate, as soon as possible after the metal has been cleaned. Allow 24 hours for the spot priming to dry, then apply finish coat to the entire surface.

c. Priming Interior Surfaces Showing Complete Paint Failure. Prepare interior plaster, wood, and metal surfaces showing complete paint failure in accordance with directions stated in section D, par. 1-b. When ready to repaint, treat the area as a new surface and apply a full priming coat. Allow it 24 hours to dry before putting on the finish.

Distribution: All Projects

PAINT BRUSHES:

Securing satisfactory paint brushes for project painting programs is becoming a serious problem. This release outlines the present situation as to natural bristle brushes and describes newer types of brushes using synthetic bristle.

1. Bristle Brushes

Natural bristle is a critical material and its use in paint brushes has been limited by War Production Board Order M-51, dated September 28, 1943. It is therefore of great importance to conserve the bristle brushes on hand by proper use and care. Old brushes should be reclaimed whenever possible.

2. Bristle-Horsehair Brushes - Victory Model.

Brushes of present manufacture cannot under the above Order contain more than 55% bristle. The remainder is made up of horsehair or other substitute. These brushes are not as efficient and satisfactory as a full bristle brush; the paint does not hold as well and there is a marked tendency to curl and mat, causing "fingering" of the brush.
NOTE: Bristle can be distinguished from horsehair by rubbing between the fingers; the bristle will slip or slide, while the horsehair will rotate.

3. Synthetic Bristle Brushes.

a. Producers of Synthetic Brushes. Several reputable manufacturers are producing synthetic bristle paint brushes, development of which was started before the present emergency. These brushes if properly used and cared for are almost as efficient and satisfactory as the natural bristle brush. Producers of synthetic bristle brushes from whom information has been received are as follows:

(1) The Rubberset Company: Makers of brushes using Tapered Nylon Synthetic bristles as made by the E. I. DuPont Company. At present their entire production is taken

by the Government, principally the Navy Department. It is not known when the brush will be released for civilian use. Reports indicate the brush to be a satisfactory substitute for the bristle brush.

(2) Pittsburgh Plate Glass Company: Makers of "Neoceta" brushes. These brushes, although limited to some extent, are available in the types and sizes generally required. Prices are comparable with the bristle-horsehair Victory brush. In overall efficiency they exceed the Victory brush, but are not quite on a par with the full bristle brush.

(3) Devoe and Raynolds Company: Makers of "Deratex" brushes, (Plastic Coated Cellulose Cord.) At present only small varnish and enamel brushes are available. This Company reports that they hope to be able to supply limited quantities of mechanics' paint brushes for the spring season. Brushes are reported as being satisfactory. Prices are comparable to the Victory type brush.

b. Care and Use of Synthetic Bristle Brushes. Synthetic brushes should be used as any good quality natural bristle brush. It should be cleaned however, only in turpentine or mineral spirits. Paint and varnish remover or any brush cleaner containing acetone, lacquer or lacquer thinner must not be used.

Read and carefully observe the manufacturer's directions for use and care.

PAINT BRUSHES AND THEIR CARE

Purpose - The purpose of this section is to describe the make up and care of paint brushes.

Description of Brushes - The illustrations attached show the various types of brushes most commonly used by painters.

The brush is composed of three parts: (1) Handle, (2) Bristles, (3) Ferrule. The latter is commonly a metal band holding the bristles in place. The "heel" referred to herein is that portion of the bristles adjoining the ferrule.

Types of bristles - Bristles may be of such material as horse hair, nylon, or natural boar bristles. Good bristles are flexible and have a smooth appearance. Most brushes are marked by the manufacturer with the type of bristle used.

A good brush has the bristles well bound together and tightly bedded in a suitable phenolic resin, or rubber. The best brushes are those in which the bristles are tapered and have the ends split. The advantages of such a brush are:

(1) The split tips tend to make the brush drag. The paint is evenly distributed and brush marks are less noticeable.

(2) The split tips together with the tapering make it possible for the brush to hold paint in the interior of the brush when lifted from the paint container.

Proper Care - The life of brushes will be extended if proper care is given them. The finely-ground pigments and quick-drying materials contained in present day paint tend to harden on the bristles very quickly and even when brushes are left for only an hour or so without cleaning some of the exposed bristles are being cemented together by the dried paint. Partial drying of paint in brushes makes the job of cleaning them difficult. If a brush is to be used within 48 hours in the same type of paint it may be suspended with the bristles immersed in thinner.

Cleaning the brush - The three important points to be kept in mind are:

(1) Use the correct thinner for the paint product used. (For water paints use water, for lacquers use lacquer thinner, for oil paint use oil or mineral spirits, for shellac use alcohol, etc.)

(2) Clean the bristles - Knead, and work or "finger" the bristles deep into the heel so that all paint is removed.

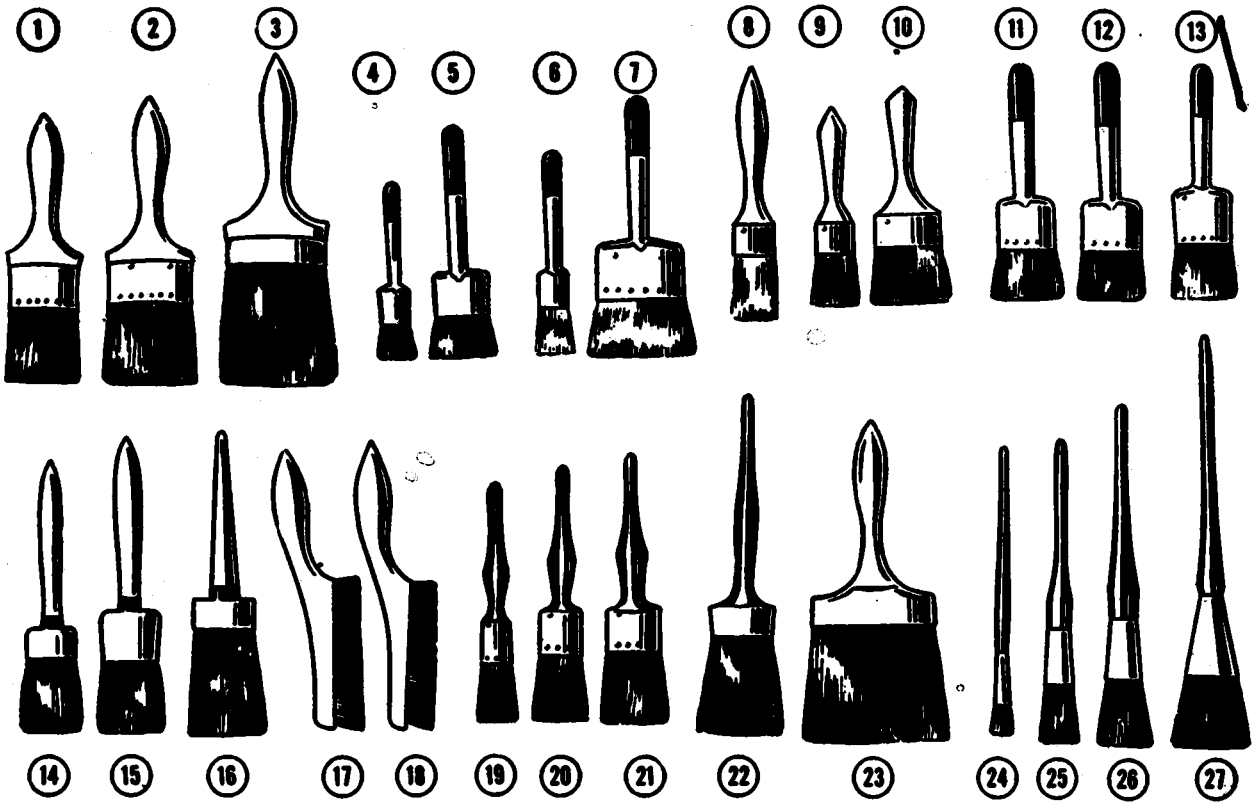
(3) Clean the brush thoroughly - Even a few bristles left uncleaned will bind to others and cause brush marks in future jobs.

(n.b.) When cleaning the brush never draw the bristles over the sharp edges of a can where the lid has been cut off as this will cut the bristles.

Wrap instead of suspend a brush - Suspending a brush in thinner for longer than 48 hours even though it may have been thoroughly cleaned is not a satisfactory method of protecting it and keeping it in working condition. Experience shows that brushes suspended in thinner invariably flare and wear too rapidly on the ends of the bristles. A brush that has started to flare allows paint to get up into the heel which in turn causes it to flare even more. As a result paint spreads harder, work requires more time and uneven depth brush marks give a bad paint job. After cleaning the brush the best practice is to wrap the bristles in oil soaked wrapping paper. This keeps the bristles flexible and also keeps the chisel shape of the brush. When used, the brush will wear on the sides thus retaining the length of the bristles and the chisel shape both of which are necessary for securing a uniform, smooth flow of paint. The advantage of a chisel-shaped brush is that under uniform pressure the supply of paint within the brush feeds itself into the outer bristles and the paint flows easily and uniformly along the outside surface.

Breaking in a new paint brush - Bristles are quite porous. Animal hair when viewed under the microscope, is shown to be formed with layers of scales, and hollow in the center. When hair is oily as in nature, it has life and toughness. As nearly as possible the same condition should be reproduced in the bristles when they are a part of a paint brush. The bristles in a new brush have usually dried out so that when the brush is dipped directly into paint the pigment particles get under the minute scales of the bristles causing them to stiffen making it practically impossible to remove the pigment by any cleaning process. A new brush should therefore be soaked in raw linseed oil to properly condition the bristles. The paint pigment or gums cannot then get cemented within the bristle itself and each bristle will remain flexible. A brush properly broken in with raw oil will, therefore, always work better, last longer and spread paint more satisfactorily. The oil also protects the bristles from the volatile thinner used in cleaning. Strong alkali brush cleaners, however, may remove all the oil from the brush and it then should be broken in again by repeating the oil soaking operation.

Reclaiming Brushes - To clean a brush that has hardened soak it in a solution made of a commercial brush cleaner or paint remover. Leave it until the paint or varnish on the bristles begins to soften. Then work the bristles and rinse frequently until they become pliable. If the bristles are badly bent soak the brush in machine oil, lay it on a heated piece of metal until the oil in the bristles sizzles. While the brush is still hot reshape and bind the bristles with metal strips or wire. After the brush has cooled, wash it in mineral spirits and rinse with benzol or acetone. Keep the brush wrapped in paper and before again using, soak in raw linseed oil. If a brush cannot be cleaned thoroughly it can frequently be cleaned sufficiently for use for rough work.



1, 2, and 3. Standard 2-, 3-, and 4-inch black china-bristle wall brushes for paint.

4 and 5. Standard 1- and 2½-inch ^tch brushes for shellac, lacquers, and varnishes. Bristles are skunk and black china, single-thick.

6 and 7. Standard 1- and 4-inch pure badger brushes for varnish-flowing; triple-thick; full chisel.

8. Standard 1½-inch white Russian bristles for varnish-flowing and enameling; double-thick; full chisel.

9 and 10. Standard 1- and 3-inch camel's-hair bristles, used only for color coats on undercoatings for a varnish schedule on automobile.

11. Standard 3-inch bear bristles for shellac, lacquer, varnish, and enamel; double-thick; full chisel.

12 and 13. Standard 2-inch Siberian ox-hair bristles for shellac, lacquer, varnish, and enamel; single- and double-thick respectively; full chisel.

14, 15, and 16. Standard 2/0, 6/0, and 8/0 black china oval, painter's general-purpose paint and varnish brushes; brush (15) has tin bridle.

17 and 18. Standard ½- and 1-inch molding, scrubbing, or rubbing brushes for pumice and oil rubbing or for cleaning work.

19, 20, and 21. Standard 1-, 2-, and 3-inch black china-bristle, full-chisel, varnish-flowing household general-purpose brush.

22. Standard 2½-inch round painter's duster.

23. Standard 4-inch flat painter's brush.

24, 25, 26, and 27. Standard ½-, ¾-, 1-, and 1½-inch oval sash tools for painting window sash; black china bristles.

(1) From War Department Technical Manual TM 5-618
Painting Repairs & Utilities

PAINT BRUSHES AND THEIR CARE 1/

Purpose - The purpose of this section is to describe the selection and care of paint brushes.

Description of Brushes - The illustrations attached show the various types of brushes most commonly used by painters. The brush is composed of three parts: (1) Handle, (2) Bristles, (3) Ferrule. The last is commonly a metal band holding the bristles in place. The "heel" referred to herein is that portion of the bristles adjoining the ferrule.

Types of Bristles - Bristles may be of such material as horse hair, nylon, or natural boar bristles. Good bristles are flexible and have a smooth appearance. Most brushes are marked by the manufacturer with the type of bristle used. The horse hair and vegetable fibre bristles sometimes found in cheap brushes are poor substitutes for the natural bristles found in more expensive brushes.

A good brush has the bristles well bound together and tightly bedded in a suitab phenolic resin, or rubber. The best brushes are those in which the bristles are tapered and have the ends split. The advantages of such a brush are:

(1) The split tips tend to make the brush drag. The paint is evenly distributed and brush marks are less noticeable.

(2) The split tips together with the tapering make it possible for the brush to hold paint in the interior of the brush when lifted from the paint container.

Selection of Brushes - Upon starting a paint job certain factors determine the selection of the proper brush, these are:

(1) The type of coating to be applied.

(2) The type of surface on which the coating is to be applied.

(3) The area of the surface to be coated.

(a) Flat brushes having long, soft bristles are recommended for applying paint. The width of such brushes will be determined by the area and type of surface to be painted.

(Cont'd)

1/ This supersedes Section 4.32 dated 9-24-47. Paragraph on "Selection of Brushes" has been added; revisions in "Breaking in New Brushes" and "Cleaning Brushes"; "Care and Storage of Brushes" supersedes the paragraph on "Wrap Instead of Suspend Brushes".

(b) A thick brush shaped to a chisel point should be used for applying enamel. Brushes with soft and fine skunk hair bristles are best for this type of work.

(c) A brush with relatively stiff bristles, preferably rubber set, should be used in staining operations in order to work the stain into the wood. In staining close grained wood a softer brush is recommended.

(d) A wide rubber set brush with soft and fine skunk hair full chisel shaped bristles, single thickness, is recommended for the application of shellac, varnish or lacquer.

(e) Oval brushes or sash tools 1/2", 3/4", 1" and 1-1/2" in diameter should be used for painting window sash.

Breaking in a New Brush - Before using a new brush, it should be well shaken to remove loose hair and dust, and then carefully combed straight. A steel comb is recommended. If desired, the brush may also be washed with turpentine or mineral spirits. Following this step, the brush should then be soaked in linseed oil for about 12 hours before being put into the paint. Before painting press surplus oil out of the brush and when ready to use dip brush into paint about one-half the length of the bristles.

Conditioning a new brush in this manner prevents the paint pigment or gums from becoming cemented within the bristle itself and each bristle remains flexible. A brush properly broken in with linseed oil will, therefore, always work better, last longer and spread paint more satisfactorily. The oil also protects the bristles from the volatile thinner used in cleaning. Strong alkali brush cleaners, however, may remove all the oil from the brush in which case it should then be broken in again by repeating the oil soaking operation.

Cleaning the Brush - The best time to clean paint brushes is immediately after use thus insuring their softness and pliability for future painting. As much paint as possible should first be wiped off the brush; then it should be washed in turpentine or special paint brush cleaner, until all paint is removed. It may be necessary to follow this operation by a final washing with yellow laundry soap and water. Therefore, two important points to keep in mind are:

(1) Use the correct thinner to remove the paint from the brush. Solvents of the paint material just used are the best possible cleaners such as water to remove water paints; lacquer thinner to remove lacquer; oil, mineral spirits or turpentine for removing oil paint and alcohol for dissolving shellac.

(2) Clean the Bristles - Knead and work or "finger" the bristles deep into the heel so that all paint is removed. Pour a small amount of solvent into a shallow container and work it thoroughly into the brush. When the solvent is loaded with paint from the brush it should be discarded. Repeat the cleaning operation in fresh solvent as many times as necessary until all traces of pigment and paint disappear from the brush and bristles are soft and pliable. Clean the brush thoroughly, for even a few bristles left uncleaned will bind to others and cause brush marks in future jobs. When cleaning the brush never draw the bristles over the sharp edges of the can where the lid has been cut off as this will cut the bristles.

(Cont'd)

Care and Storage of Brushes - The life of brushes will be extended if proper care is given them. The finely-ground pigments and quick-drying materials contained in present day paint tend to harden on the bristles very quickly and even when brushes are left for only an hour or so without cleaning some of the exposed bristles are being cemented together by the dried paint. Partial drying of paint in brushes makes the job of cleaning them difficult. If a brush is to be used within 48 hours in the same type of paint it may be suspended with the bristles immersed in thinner.

Daily Care. Upon completion of the day's work all paint brushes in daily use should be stored overnight in a brush keeper. Suspend the brushes 2 or 3 inches above the bottom of the keeper and the bristles completely submerged in the appropriate liquid for maintaining them in a soft and pliable condition. Never allow the bristles to rest on the bottom of the brush keeper as this action will cause the bristles to bend and deform.

(1) Brushes used in oil paint, enamel and resin-oil emulsion paints should be immersed in a mixture of raw linseed oil to which a small amount of turpentine has been added.

(2) Brushes used in oil paint, enamels and varnishes should not be kept in water as the bristles become soft and flabby.

(3) Brushes used in lacquer should not be immersed in linseed oil until thoroughly cleaned with lacquer thinner.

(4) Brushes used in shellac, varnish or shellac varnish replacement should be kept in a keeper containing denatured alcohol.

(5) Brushes used with water paints and whitewash need only be washed with soap and water or placed in a keeper containing water.

Do not allow brushes in the keeper to touch each other. A brush which has been kept overnight in linseed oil should be cleaned by pressing out all oil and immersing it in a small amount of solvent before starting the day's work. Suspending a brush in thinner for more than 48 hours even though it has been thoroughly cleaned is not a satisfactory method of protecting it or keeping it in working condition and should not be permitted. Brushes suspended in thinner too long will tend to flare and wear too rapidly on the ends of the bristles. Such flaring allows paint to get up into the heel of the brush which in turn causes it to flare more. As a result paint spreads harder, work requires more time and uneven depth brush marks give a bad paint job.

Indefinite Storage - When brushes are not to be used for an indefinite period they should be prepared for storage as follows:

(1) Clean thoroughly in accordance with the method prescribed herein.

(Cont'd)

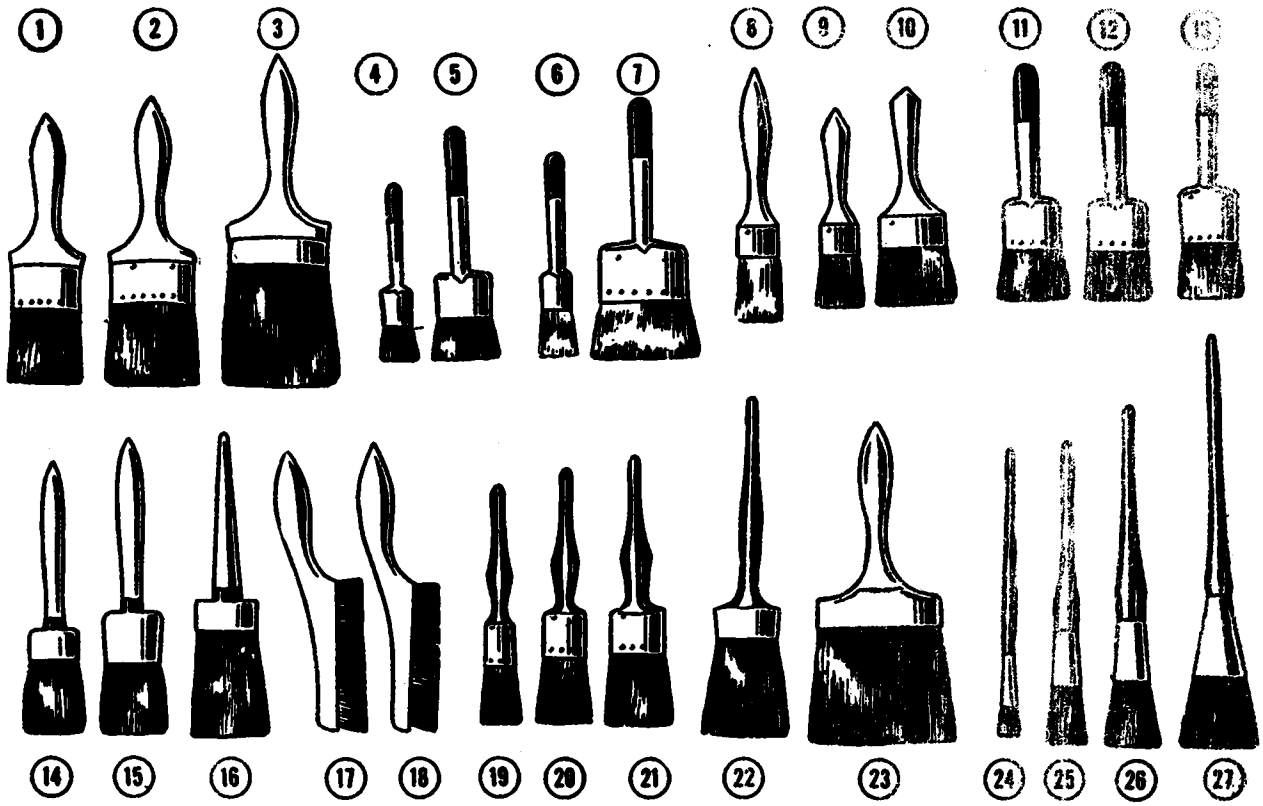
(2) Allow the brush to remain immersed in raw linseed oil in the brush keeper for a short time.

(3) Remove the brush from the keeper, press out most but not all of the linseed oil.

(4) Wrap the bristles in oiled paper or brown paper, making sure that paper extends well up around the ferrule, then fasten paper. Store brushes flat and do not allow any object to rest on the bristles. The brush may be stored for a reasonable length of time if treated in this manner; however, it is advisable after a 6-month period, to remove the paper and retreat the brushes as directed above. It is also recommended that a few moth balls be placed among the stored brushes.

The treatment prescribed in this article, if followed, will keep the bristles flexible and maintain the chisel shape of the brush. When used, the brush will wear on the sides thus retaining the length of the bristles and the chisel shape, both of which are necessary for securing a uniform, smooth flow of paint. The advantage of a chisel-shaped brush is that under uniform pressure the supply of paint within the brush feeds itself into the outer bristles and the paint flows easily and uniformly along the outside surface.

Reclaiming Brushes - To clean a brush that has hardened soak it in a solution made of a commercial brush cleaner or paint remover. Leave it until the paint or varnish on the bristles begins to soften. Then work the bristles and rinse frequently until they become pliable. If the bristles are badly bent soak the brush in machine oil, lay it on a heated piece of metal until the oil in the bristles sizzles. While the brush is still hot reshape and bind the bristles with metal strips or wire. After the brush has cooled, wash it in mineral spirits and rinse with benzol or acetone. Keep the brush wrapped in paper and before again using, soak in raw linseed oil. If a brush cannot be cleaned thoroughly it can frequently be cleaned sufficiently for use for rough work. Such brushes may be used for jobs of minor importance or if worn down. can be utilized in priming rough masonry.



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(1) From War Department Technical Manual TM 5-618
Painting Repairs & Utilities

Distribution: All Projects

PREVENTIONS AND CORRECTIONS OF FREEZEUPS

"An ounce of prevention is worth a pound of cure." The prevention of frozen plumbing will save labor, critical metal, fuel and water.

1. How to Prevent Plumbing Freezeups and Procedure. Pipes so placed that there will be danger of freezing should be insulated. Underground pipes should be buried below the freezing level or covered with additional protective material. Outdoor hose faucets and pipes connecting same should be shut off at the stop valve provided. Water must be drained out of the pipe by opening the hose faucet in advance of freezing weather. In cases where no other precautions can be taken, arrange to maintain heat so plumbing freeze-ups cannot occur.

   When a house is to be left unheated at a time when outdoor temperatures are low, all water must be drained off to prevent damage by freezing. The procedure is as follows:

   The main supply valve is closed. All faucets are opened. This will empty each supply branch to the level of the lower most fixture.

   War Housing units are provided with plugged tee connections for drain outlets for emptying the parts of the piping below the lowest fixture. Should the plugged tee connection be lacking, the supply pipe should be disconnected at the lowest points. Horizontal pipes of any length should be checked for assurance that they drain naturally. When at any point there is an up slant; when a pipe is formed into a loop to pass under a beam in a partition wall, or when from any other reason a pipe will not drain, air pressure should be applied to empty it, or the piping at such points should be disconnected.

   The pressure tank of a pumping system should be emptied and the pump drained.

   All toilet flush tanks should be emptied. As much water as possible should be removed from toilet bowls by sponging. With toilet bowls of the syphon jet variety,

which are common, a syringe or other means should be used to remove water from the lower passage, the pipe being passed through the syphon hole in the bottom of the bowl.

Traps (note exposed traps in crawl spaces under was housing units) of all plumbing fixtures and floor drains should be filled with a liquid that will not freeze; further it should not evaporate for if it does, sewer gas will be admitted. Kerosene or other oil can be used, or a non-freezing compound as used in automobiles.

Two quarts or so should be poured into each toilet bowl to till the trap. Other plumbing fixtures will require from one to two pints each.

If the dwelling unit has a basement an additional quart or more should be poured into any of the fixtures to fill the house trap in the cellar.

Domestic hot water tanks must be drained. A drain cock for this purpose should be provided at a low point of the tank.

Steam or hot water boilers must also be drained. To prevent water being held in pipes or radiators by air pressure, the air valve should be removed from a top floor radiator, or other opening made to admit air.

2. Methods of Thawing Frozen Water Pipes. Thawing a frozen water pipe will not cause the pipe to split. Splitting or cracking of a pipe occurs as the water freezes but does not become apparent until the ice melts and water runs out of the opening.

In thawing a frozen pipe all faucets connected to the pipe should be opened, and heat applied to the pipe at end near the fixtures. Water from melting ice can thus run out of the faucet. If the heat is applied at the supply end this melting ice water cannot escape.

Some form of electric heat is safer to use to thaw pipes than a blow torch because of the danger of igniting the woodwork. Care should be taken to prevent contact between the electric device and the pipe. A heating pad can be wrapped around the pipe, a bowl heater, or a cooking appliance placed beneath the pipe. Clothes wet with boiling

water can be used, with precaution against damage to decorations from water drip. Steam if available can also be applied.

Where pipe is exposed or can be made accessible, surround frozen portion with unslaked lime and hold in place by wrapping with cloth. Then, slake lime by pouring water on slowly; the heat generated is usually sufficient to thaw out the frozen pipe.

Where a pipe, located behind a partition or in an inaccessible place, becomes frozen it may be possibly thawed out by applying a torch to the nearest point below. As the water is heated within the pipe, it will circulate and clear the obstruction. Care should be exercised so that combustible materials surrounding pipe do not come in contact with the flame.

3. Location and Repair of Leaks. Leaks that remain undetected within walls or under buildings, may cause serious damage to footings, walks, or other sections of the building or structure.

The cost of loss of water should be considered in tracing and eliminating leaks.

Under ordinary conditions and pressure the loss of water through leaks is as follows:

1/32	of	an	inch	opening	will	lose	400	gallons	per day.
1/16	"	"	"	"	"	" 1,000	"	"	"
1/8	"	"	"	"	"	" 4,000	"	"	"
3/16	"	"	"	"	"	" 8,000	"	"	"
1/4	"	"	"	"	"	"12,000	"	"	"

Larger openings will be in proportion.

If a leak is detected after a plumbing freeze-up the water supply should be turned off before beginning any repair on water pipes or faucets. The main valve in the supply pipe is usually located in the kitchen just within the wall at the floor, or in the crawl space below the floor, or five feet outside the building wall line underground in main water supply line to the building.

After the shut off valve is closed, all faucets in its pipe should be opened. If only a lower faucet is opened, water may be retained in the pipe above by atmospheric pressure. Complete draining of the system will avoid additional freeze-ups or loss of water and critical material.

Repairs should be made in a manner to avoid the reoccurrence of trouble in the plumbing system and to avoid repeated shutdowns.

Distribution: to all projects

VENTING AND SERVICING OF HEATING EQUIPMENT

1. Section 6646:1, effective 3-15-44, of the Housing Manager's Manual and Section 4646:1, effective 3-21-44, of the Manual of Policy and Procedure assigns responsibility to the local management for safety measures on their projects. One serious source of accident is carbon monoxide poisoning resulting from improper operation of gas fired domestic water heaters. As a rule, this occurs because heaters have not been vented.

2. FPHA Standards require the venting of all gas fired domestic water heating equipment. However, where projects have been constructed by other agencies, who have not followed this standard, or where the standard has not been adhered to for other reasons, the local management shall immediately provide for such venting.

CORROSION CONTROL IN DOMESTIC WATER SYSTEMS

The purpose of this section is to provide information on the treatment of corrosion in domestic water systems.

Corrosion, (rust) is most prevalent in iron or steel surfaces. Copper, red brass, or bronze are considered noncorrosive. Yellow brass is affected in hot water systems.

Cold Water Piping is not frequently subject to serious corrosion. However, certain waters even when cold do attack iron, steel, and galvanized pipe, and special water treatment is required. If inspections indicate such a problem it should be referred to the regional maintenance adviser for recommendation.

Domestic Hot Water Tanks and Piping are very commonly subject to corrosion and this section is primarily directed toward that problem. Many devices, systems and chemicals are for sale for corrosion control and for several years most of these have been investigated, some to the point of definite decision as to their merits. Quite a number appear to be worthless or too expensive. However, some definite recommendations can be made. More information will be available as the result of continuing study of the problem.

Effect of Dissimilar Metals on Corrosion is often misunderstood. It is a common and erroneous impression that corrosion of a metal is always hastened by being in contact with a less active metal. As the contact of dissimilar metals may or may not hasten corrosion, it is recommended that where such conditions exist a careful examination be made at such points in the system before deciding upon the cause of the trouble or correction for it.

1. Evidence of Corrosion.

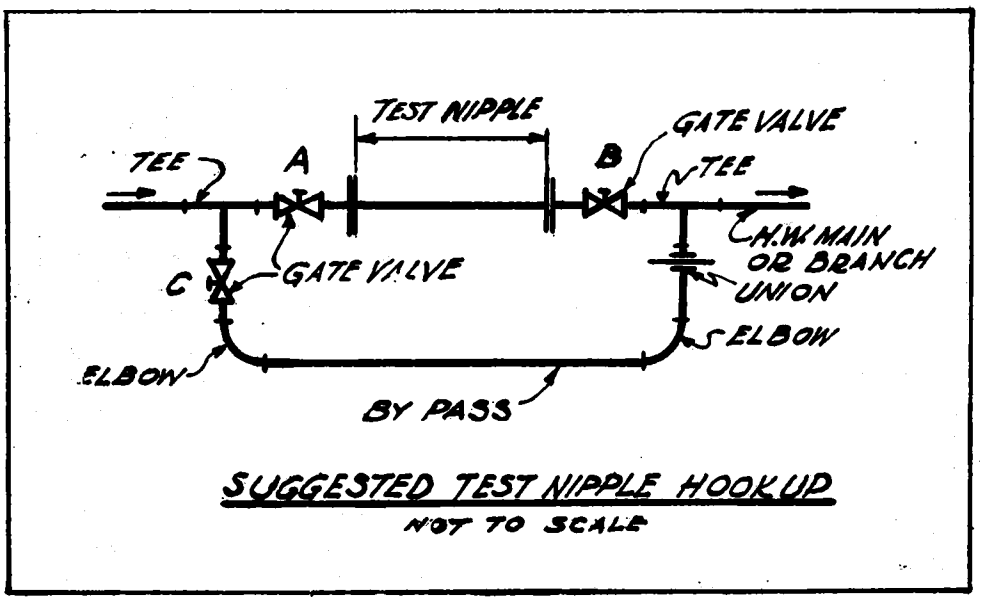
Where hot water pipes and tanks are made of steel or wrought iron, either black or galvanized, corrosion should be expected. One evidence is rust stains on sinks or bath tubs under the faucets. Another is the reduction in force of flow from the water faucets; this indicates that pipes are getting clogged and corrosion has reached the point of being serious.

The most positive way to determine whether a corrosion problem exists or may develop is to inspect the system after a year of operation and at least once a year thereafter.

a. Large tanks should be drained, opened and inspected. The piping system should be opened for examination at several locations such as: (a) main supply near the generator, where piping receives the hottest water, (b) main supply at a straight run of pipe some distance from the generator where the flow is continuous and rapid, (c) risers where the flow is intermittent because of opening and closing of faucets, (d) nipples from vertical risers to fixture trim which often become clogged with corrosive materials. At points such as (a) and (b) where lines are opened for examination, pieces of pipe should be removed and replaced with new pipe

Par. 1 (Cont'd)

nipples. These new nipples should be tagged with inspection dates and installed with flanges or unions and valved so that they may be easily removed for future periodical inspection without interrupting service. See sketch below:-



SUGGESTED TEST NIPPLE HOOKUP
NOT TO SCALE

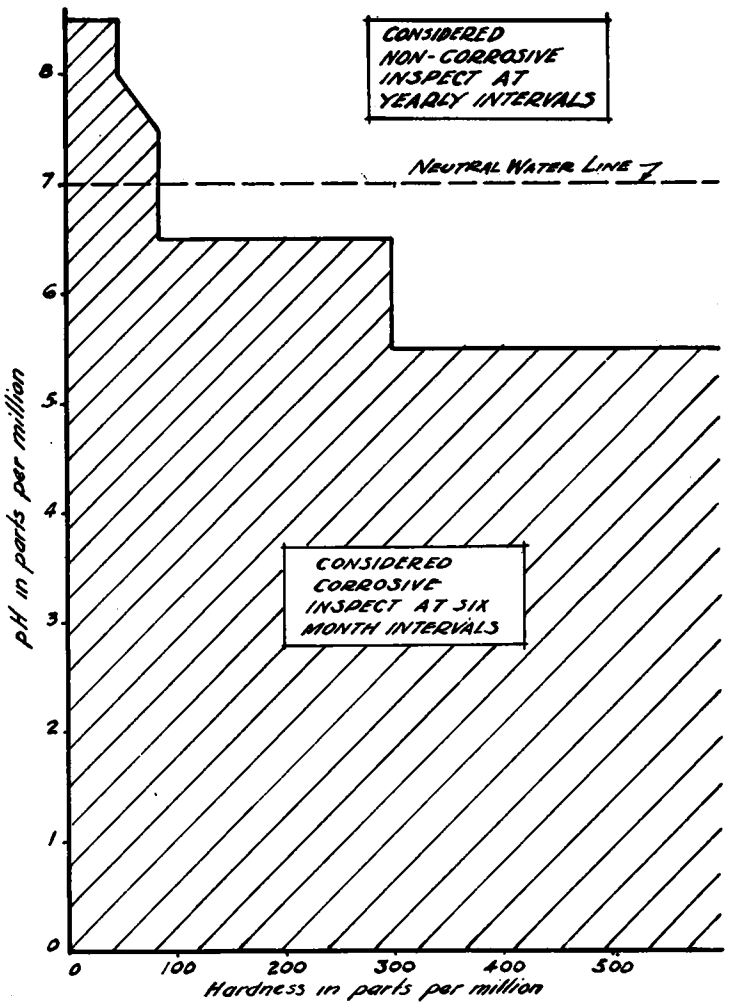
b. Individual tenant hot water tanks may be very troublesome and when they rust through the trouble may occur throughout the project at one time. If examination of the hot water pipe directly above one of these tanks shows signs of corrosion it would be advisable to remove one of the existing tanks, replace it with a new one, and open the used one for inspection. This will give an idea of how bad the problem is, and how long it may be before leaks due to rust may occur. If such an inspection is made once a year the project would eventually obtain a good history of corrosion, and its progress year by year, which would provide a basis for programming water treatment and tank replacements.

c. A thin white or light brown mineral coating inside of pipes or tanks is a good protection against corrosion and is highly desirable, but when it builds up to about 1/8" thickness in the piping, steps should be taken to stop further build up. If these mineral deposits are reddish in color they indicate corrosion some place in the system in addition to the deposition of the mineral salts.

Par. 1 (Cont'd)

Illustration shows an extreme case of mineral accumulation which occurred within a 3 year period, destroying the usefulness of the pipe. The metal is in perfect condition due to the protection of the accumulation. Sample of pipe by courtesy of Region VI.

d. Experience has shown that water analyses cannot always be relied upon as a sole guide for use in diagnosing corrosion troubles or prescribing for them. However, within certain limits they may serve as a warning that corrosion may be anticipated. The following graph based on pH and hardness of waters, is presented only as a guide in anticipating corrosion. Oxygen which is one of the controlling factors in the rate of corrosion, has for purposes of simplification, been purposely omitted from this chart. Where waters are known to fall within the danger limits shown, frequent inspections of the piping should be made.



2. Corrosion Protection by Coating Surfaces. Where large generator and storage tanks or small individual steel tanks are used with steel or iron piping, the solution to the corrosion problem involves water treatment. Tanks usually need not, in this event, be coated.

   a. Large Hot Water Tanks. Where the tank is of steel and piping is of non-corrosive metal, the problem is confined to the tank and the simplest solution is to coat the inside of the tank.

Par. 2 (Cont'd)

(1) Cement Coating. Tanks that are accessible through man holes may be coated with cement to a thickness of from 1/4 " to 3/4".

This requires taking the tank out of service about 24 hours, cleaning the inside surface thoroughly by wire brushing or sand blasting and washing. Among special cements which are available and with which FPHA has had several years satisfactory experience are the following:

Lumnite - Universal Atlas Cement Company
135 East 42nd Street
New York, New York

Zemanoc - Cemline Corporation
Pittsburgh, Pennsylvania

The cements are applied by project labor using manufacturers application methods.

Cement coating may also be contracted to companies which specialize in this work. The following companies have been most active in making FPHA installations:

The Ford Tank Maintenance Company
717 East 135th Street
New York, New York

The Porcelain Tank Lining Company
3317 West 30th Avenue
Denver, Colorado

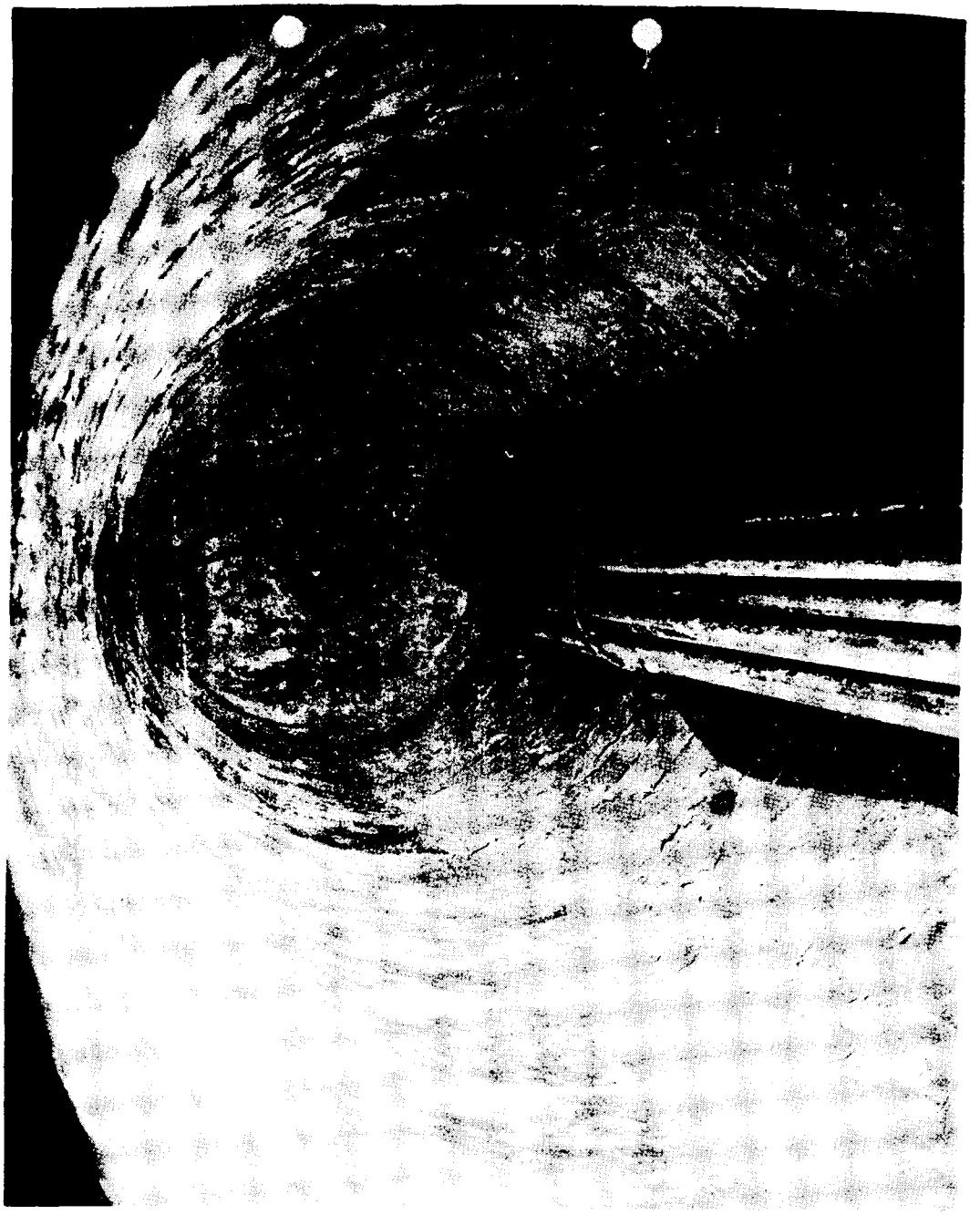
CAUTION: It is important that tanks be refilled and placed under pressure as promptly as possible after coating is applied, before the cement dries thoroughly, to provide adequate curing, which tends to prevent cracking of the lining.

(2) Whitewashing. This is applied to thoroughly cleaned tanks and acts as a temporary protection. This treatment provides a coating which wears off and must be patched frequently, as often as every six months. It is therefore not in general use..

(3) Painting. Many paints have been tried, most of which have failed. They blister, crack, peal and require frequent retouching. One break through to the metal may eventually cause a leak unless corrected. The Dampney Corporation of America has developed several paints known as Apexior No. 1, Apexior No. 2, etc., most of them are for steam boiler protection. An Apexior No. 4 has recently been developed for hot water tanks which seems to have possibilities for success. It is being tested and evidence thus far obtained indicates that it may be safely used particularly where the rate of corrosion is not very high. It has the advantages of low cost and easy application.

Par. 2 (Cont'd)

Caution: Where project personnel apply coatings or paints, extreme care must be exercised to guard personnel against asphyxiation or electrocution. Fans should be used to insure ventilation of tank interiors where applying paints. Electric extension cords and lights should be carefully inspected for defective insulation before placing them in tanks.



A project installation of a cement coating made in a 48" x 120" tank. This installation was made at project Kentucky 1-1 in 1943. Upon inspection at time of cleaning during 1945 this lining appeared to be in perfect condition.

Par. 2 (Cont'd)

(4) Costs. The following cost data on tank coatings should be used only as guides in estimating, material prices being subject to change and labor hours depending upon installation characteristics:

Ford Linings: Contracts vary from $1.25 to $1.70 per square foot. The higher figures applying to localities farthest from N. Y.

Lummite Cement: (2 coats, project labor)
Material approximately 12¢ per square foot.
Labor approximately 5 square feet per hour.

Zemanoc Cement: (2 coats, project labor)
Material approximately 17¢ per square foot.
Labor approximately 5 square feet per hour.

Dampney No. 4: (2 coats, project labor)
Material approximately 4¢ per square foot.
Labor approximately 10 square feet per hour.

3. Corrosion Protection by Water Treatment. The cost of installation, of chemicals and of labor for servicing makes this method of protection adaptable only where no other methods will suffice. Two general methods of water treatment are being promoted by manufacturers:

Electrolytic method
Chemical method.

a. Electrolytic Method. There are three distinct types of electrolytic methods used to stop corrosion, which are distinguished by the methods used to produce the electric current. They are as follows:

(1) Method No. 1. Recommended by its promoters for use in heating boilers and hot water generators. This method consists of inserting into the tank a device consisting of zinc and copper elements. Electrolytic action between the zinc and copper is supposed to "neutralize" the water to render it non-corrosive. Several of these devices have been and are still being tested by FPHA, universities, laboratories, and others. No reliable evidence has yet been obtained that these devices provide protection against corrosion. Until positive proof has been established that this method is satisfactory it is not only a waste of money to install such devices, but it is dangerous to place reliance in them.

(2) Method No. 2. Recommended for use with elevated tanks or standpipes. This method consists of immersing inactive anodes (graphite or stainless steel) in the water and making the tank a cathode by impressing a low direct current voltage. Anodes must be arranged to insure uniform current density over the surface to be protected. The tank

Par. 3 (Cont'd)

must be protected at the water line by paint, treating the tank to a safe distance below the water line. This method has been used successfully for large outdoor storage tanks but is not applicable to piping systems or hot water generator tanks.

(3) Method No. 3. Recommended by its promoters for use in individual tenant hot water tanks. This method consists of immersing an active anode (magnesium) in the top of the tank at one of the regular tappings. This anode is reputed to act as a sacrificial element in the electrolytic action which is set up, and thus protect the surface of the tank. Insufficient performance data as to results obtained, and the present high cost make the application of these undesirable at this time.

b. Chemical Method. This consists of adding chemicals to the water to destroy its corrosive properties or to create a film or deposit on the metal surfaces to protect them against corrosive action.

(1) Feeders. Feeders are used to add the chemicals to the water, and one is usually required at each hot water generator. They may be simple pot-type devices installed on a pipe line or tank, mechanically driven plunger pump types which lend themselves to positive feeding in proportional amounts, or tank types with various arrangements for admitting the chemicals to the water supply. The success of the treatment may depend on the principle and reliability of the feeder. The cost of installing the feeding system is frequently a deciding factor in selecting the method of treatment, and the cost of servicing the feeders must also be considered. Although the corrosion problem may be confined to the domestic hot water system, it may be more economical to treat the entire water supply at one or two feeding stations than to install and service numerous feeders at scattered hot water generating stations.

(2) Economic Analysis and Survey. As stated above, the installation cost of feeders and the cost of servicing the system are two important cost items. But the cost of chemicals may be an even more important factor particularly, becuase the quantity of chemical needed may easily be miscalculated. Therefore, it is essential that a careful survey be made involving water analyses, recommendations by the regional maintenance adviser, tests to determine quantities of chemicals needed and the effectiveness of the treatment, and the amount of water used.

A proper survey may reveal that the major problem is confined to a relatively few points such as: the hot water tank, the pipe nipples directly above the tank where the hottest water exists, and certain horizontal pipe runs particularly where they terminate at faucets. In some cases it may be best to plan intermittent water treatment, i.e. alternate with a month of treatment followed by a month of no treatment. Treatment for a month may build up a protective coating which may take another month to disappear.

Par. 3 (Cont'd)

(3) Chemicals Used.

(a) Sodium Silicate. This material forms the basic constituent of a number of remedies sold under various trade names. It is applied in liquid form and produces a protective film on the metal surfaces. However, it should not be used with water containing magnesium, due to the possibility of forming scale, which is particularly objectionable on heating coils of domestic hot water systems as well as in hot water lines.

(b) Sodium Hexametaphosphate. This material also is a basic constituent of many remedies. Under certain condition it holds in solution, calcium and other minerals which would ordinarily separate out of the water and form scale. Among the treatments using sodium hexametaphosphate are "Calgon" and "Micromet". "Calgon" is introduced into the system in solution and is practical from the standpoints of both cost and method of application. "Micromet" is granular in form and is placed in a suitable container in the supply line or generator where it is dissolved and carried through the system. The cost of "Micromet" is high, which greatly limits its application.

(c) Sodium Carbonate (Soda Ash). Soda ash is recommended for the treatment of steam boiler feed waters but is not recommended for use in domestic hot water systems. It is contained in some remedies sold under trade names. It acts to precipitate minerals, which is opposite from the action of sodium hexametaphosphate. With waters high in calcium content it may cause the lines to clog.

c. Approval of Treatment. The following must be observed by federally operated projects and are recommended to local authorities:

(1) Vendors shall be required to submit chemical analyses of their products.

(2) Approval of the treatments shall be secured from local health authorities and water departments.

(3) Complete details of the corrosion problem and the treatments considered shall be submitted to the regional office for the approval of the maintenance adviser and sanitary engineer consultant. (See Manual of Policy and Procedure, Sections 3644:8, 4644:8 and 6644:12; "Selection of Corrosion Treatment for use in Water Distribution Systems.")

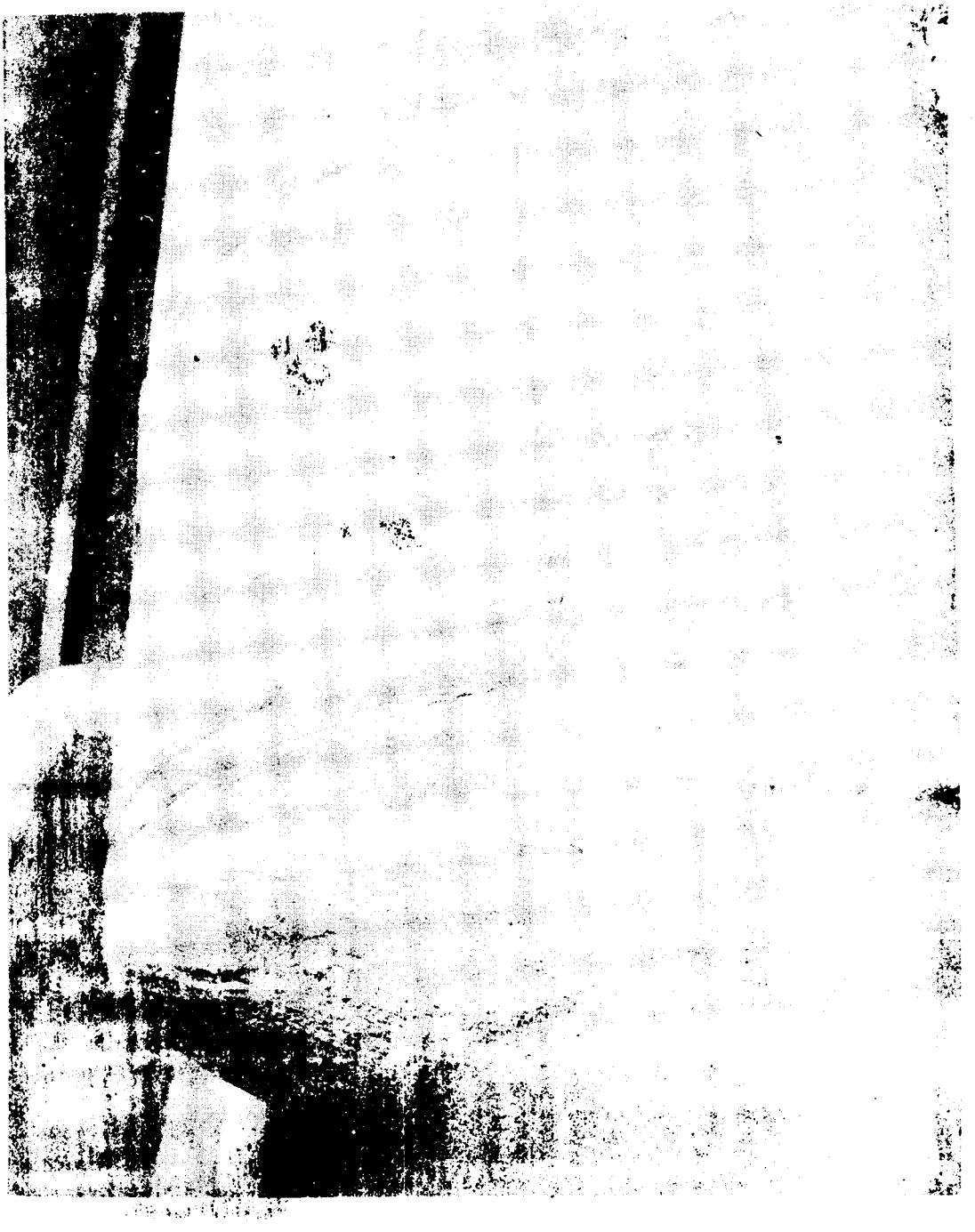
4. Suggestions on Operation and Maintenance:

a. Hot water generator temperatures should not exceed 140°F.
b. Drain and wash all tanks at least once a year. Red sludge or scale accumulations in the bottom of tanks accelerates corrosion.

c. Inspect test nipples installed in building pipe lines.
d. Large tanks that have failed because of corrosion can in some instances, if equipped with man holes, be salvaged by welding the leaks and lining the inner surfaces with cement. The following photographs, loaned through the courtesy of the Ford Tank Maintenance Company, illustrate an extreme case of corrosion and the method used to save a tank which would ordinarily be considered worthless.

This is a view of the corrosion on the inside of the tank. Sludge was from two to three inches deep in the tank and when it was scraped off, many holes were found in the top of the tank.

This view shows a few of the many holes in the metal of the tank top.



This view shows the tank after a new plate was welded in the top.

This view is looking directly through the tank after the cement lining had been installed. The bottom shows considerable water which was seeping in through a leaky valve before the photograph was taken.

Miscellaneous Current Information on Corrosion Control

This Bulletin is issued for the purpose of placing the most current corrosion control information available in the hands of operating personnel. Only by a constant circulation of such factual information and authoritative test data can this corrosion control problem be adequately and economically solved.

Use of Magnesium Electrodes for Protection of Water Heaters

For the past two years the Cleveland Heater Company, manufacturers of domestic water heaters, have been sponsoring tests of magnesium anodes for corrosion inhibition in domestic water heaters. These tests have been conducted at the Case Institute, Cleveland, Ohio. The results obtained and the data collected by the Company from these experiments are considered to be sufficiently reliable for them to advocate the use of the magnesium anodes for the protection of galvanized steel heaters under certain specified conditions of exposure. Detailed data resulting from the tests will be available soon. Following is a summary of data available now: (All tanks were galvanized steel excepting No. 10)

Tank No.	Type of Water	Exposure Time	Electrode Installed?	Operating Temp.	Appearance of Inside Surfaces
2	Tap	1½ yrs.	Yes	150° F.	Clean
3	Zeolite	½ yr.	Yes	200° F.	Clean
4	"	½ yr.	No	200° F.	Completely covered with rust
5	Distilled	2½ mos.	Yes	200° F.	Clean
6	Tap	2½ mos.	No	140° F.	Rust Spots and Tubercles
7	Zeolite	½ yr.	Yes	150° F.	Clean
8	"	½ yr.	No	150° F.	Rust Spots and Tubercles
9	Tap	1 yr.	Yes	150° F.	Clean
10	Tap	1-3/4 yrs. *	Yes	150° F.	Small amount of rust
11	Tap	1-3/4 yrs. **	Yes	200° F.	Small Black Tubercles

* Black steel tank

** Operated for 6 months at 150° F.

Note: Heaters manufactured by the Cleveland Heater Company are not conventional center - flue type; therefore, they are most adaptable to the magnesium - anode treatment.

The Central Office is negotiating with the Cleveland Heater Company at the present time in an attempt to have the experimental use of magnesium anodes broadened to include tests of their effectiveness in large storage type hot water generators.

Notes on Anti-Corrosion Treatment

Experience of the Cleveland Housing Authority: Operating personnel of the Cleveland Housing Authority have been very active in testing materials and water-treatment methods at the Lakeview Terrace Project in their endeavor to control corrosion.

Among the devices tested is one consisting of two different metals so arranged, that when submerged in water, it produces a flow of electric current between the dissimilar metals. It is claimed that this electrolytic action renders the water non-corrosive. There are several manufacturers of such devices, each having its own special design. Results obtained at Cleveland were inconclusive, as has been the case at other test installations. Case Institute has conducted rather exhaustive tests of such devices and has declared them ineffective. These bi-metallic elements should not be confused with the magnesium-anode, referred to above, which entails the use of only one metallic substance - the magnesium rod.

They have also tried a number of chemical water-conditioning mixtures in their attempts to control corrosion. Most of these conditioning compounds depend upon their content of sodium silicate (water-glass) or sodium metaphosphates for their effect. Among the mixtures tried were:

Westo, Western Chemical Co. (Basic Sodium Silicate)

Rustang, Feedwaters, Inc. (Basic Sodium Silicate)

Liquid Corrodocide, Metropolitan Refining Co. (Basic Sodium Silicate)

Sci-Eff-Ec Laboratories (Sodium Aluminate Solution)

Sodium Sulpho and Tetra Phospho Glucosate, D. W. Haering & Co. Inc. (Sodium Metaphosphate)

Micromet and Calgon, Calgon, Inc. (Sodium Hexametaphosphate)

While there was some evidence of success with some of these treatments, it is generally considered by the Local Authority that the cost of treatment was not justified by the results obtained. One of the main factors increasing the cost at Lakeview Terrace is the large number of treating stations needed, necessitating rather excessive servicing labor.

Most of these chemical treatments were tested for periods of 60 or 90 days, which is considered to be too short a time upon which to base definite conclusions.

Experience at Clinton Hills Project, Equitable Life Insurance Company, Brooklyn, N. Y.

This privately-owned housing development has been the laboratory for a long-term study of sodium silicate water conditioning. The project is equipped with galvanized steel piping in both hot and cold water systems. Since its initial occupancy, approximately 4 years ago, this development has been treating its water supply with sodium silicate. The treatment is being supervised by Water Service Laboratories, Inc., New York, under joint sponsorship of the development owners and the Committee on Steel Pipe Research, American Iron and Steel Institute. Results obtained to date are apparently satisfactory to the test sponsors. Initial concentration is believed to have been 15 ppm., while present concentration is approximately 8 ppm. No data on costs are available, as yet. The success of this treatment is apparently attributable to the care taken in obtaining the correct amount of silicate feed, proportionate to the flow of water.

Data on Tank Linings:

Detroit Housing Commission reports that cement linings on approximately 60 hot water generators and condensate tanks, are holding-up well after 2½ years of service at Parkside. On another Detroit Project, porcelain-enamel lined domestic water heaters are failing after approximately 5-years service. A sample piece of one of the failed tanks was examined by the Enamel Coatings Section of the National Bureau of Standards, where it was determined that the lining was of an inferior type, not suitable for hot water heater service. These inferior enamel linings were produced during the war years, and should not be used to judge the effectiveness of procelain linings being produced today.

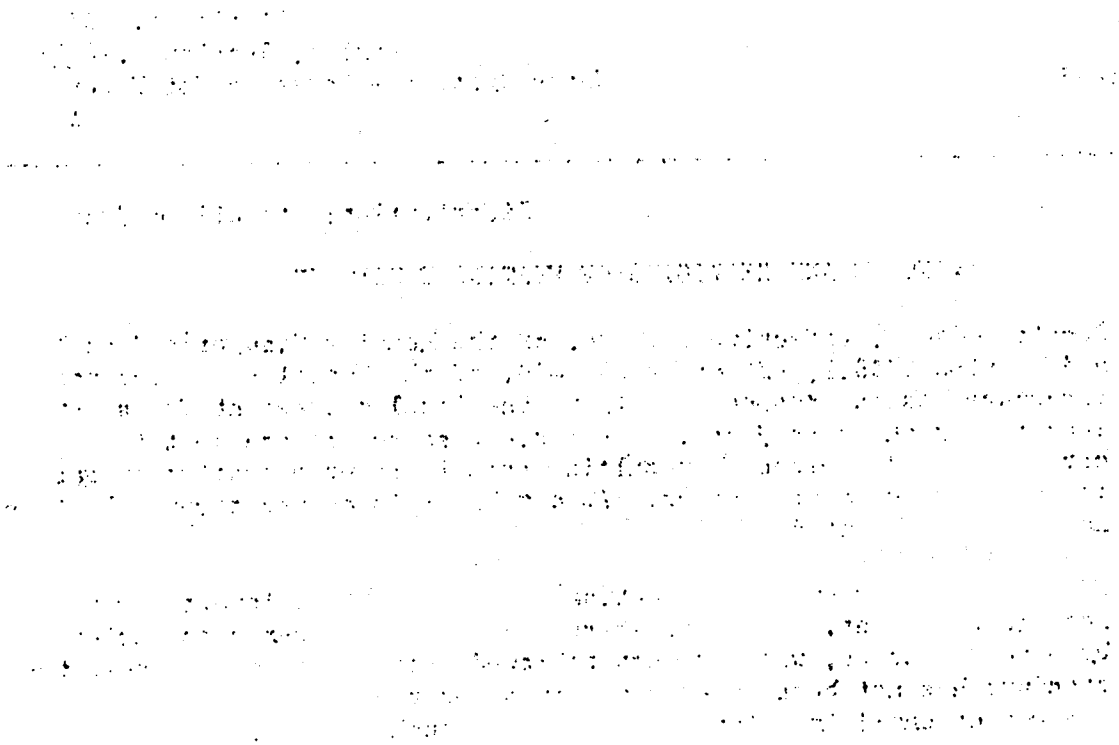
Distribution: to all projects

VENTING AND SERVICING OF HEATING EQUIPMENT

1. Section 6646:1, effective 3-15-44, of the Housing Manager's Manual and Section 4646:1, effective 3-21-44, of the Manual of Policy and Procedure assigns responsibility to the local management for safety measures on their projects. One serious source of accident is carbon monoxide poisoning resulting from improper operation of gas fired domestic water heaters. As a rule, this occurs because heaters have not been vented.

2. FPHA Standards require the venting of all gas fired domestic water heating equipment. However, where projects have been constructed by other agencies, who have not followed this standard, or where the standard has not been adhered to for other reasons, the local management shall immediately provide for such venting.

1/ This section supersedes Section 5.12 of Part 5, Bulletin 63, dated 3-15-44. It has been recoded to this section.



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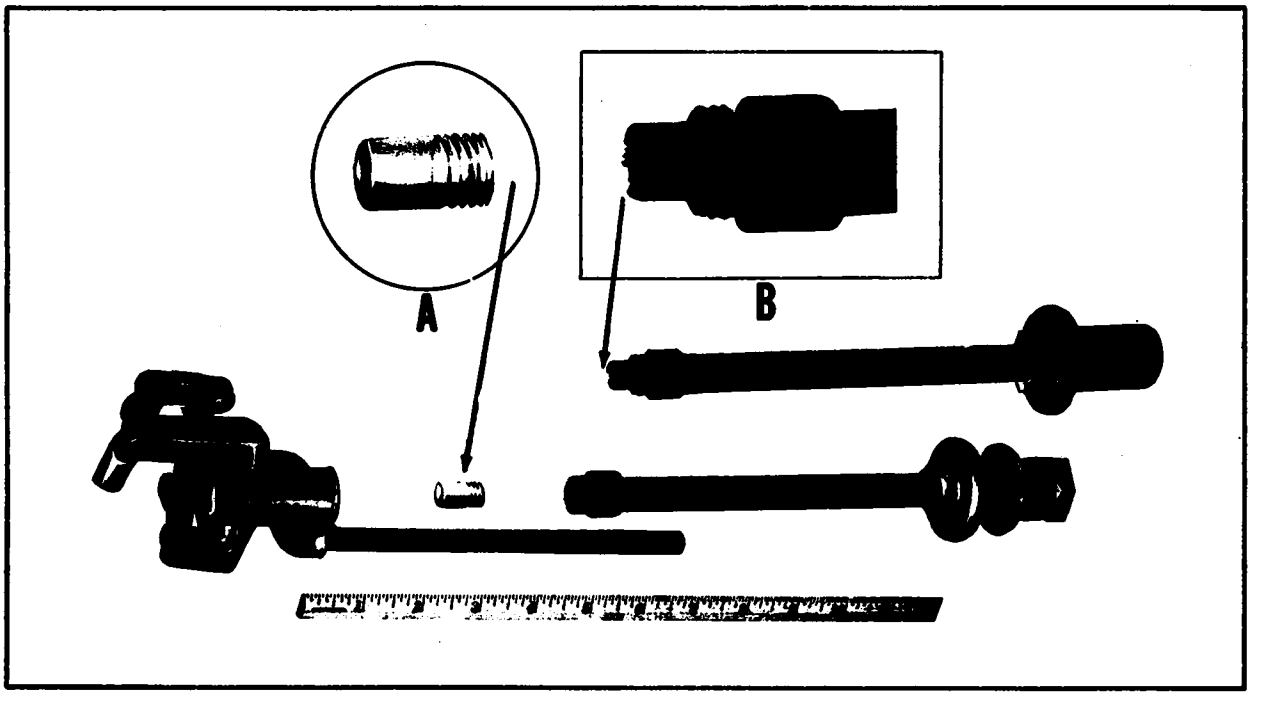
This section presents a suggested repair method for ball cocks in localities where high corrosive water exists. In such localities one of the frequent plumbing repairs is caused by the water attacking the metal ball cock and corroding the disc to such an extent that full shut off of the cock is prevented. In a number of instances this will occur in less than one year. The method of repair presented here has eliminated the necessity for further replacement of the part for a period of seven years, with no sign of deterioration, and with the cock still sealing tightly.

The repair is based on the use of a short piece of plastic tubing for the leak instead of replacement with another metal disc.



A - Plastic Disc

B - Conventional Disc

Method of making repairs:

1. Remove ball cock from water closet tank
2. Remove the disc stem from the ball cock
3. Drill out disc with a Q drill
4. Tap drilled hole 3/8" # 24
5. Cut tubing in 1/2" lengths

6. Cut 3/8" # 24 thread 1/4" long on one end of tubing and level off and smooth up the other end

7. Screw tubing in tapping with thumb and finger. No cement is necessary.

8. Check for tight seating. File with fine file and adjust as necessary.

9. After completed, replace ball cock in toilet tank.

This tubing product is a clear plastic, 1/4" inside diameter 3/8" outside diameter costing approximately 17¢ per foot. About 24 discs can be cut from 12" of tubing. The saving possible by using the method will vary according to the water encountered in the locality. When the water is highly corrosive, necessitating repair with the conventional disc every year, the use of the plastic disc will show a saving in labor alone of about $25.00 per D.U. over a period of seven years, based on an estimated two hours to remove the ball cock, make the repair and replace the cock, at $1.80 per hour. This saving will be reduced somewhat in localities where the water is less corrosive and repairs less frequent.

Limitations - Temporary Dwelling Units

Recent information indicates an increase in the use of electrical devices in war housing projects. This is probably due to increased production of such devices and their availability in local markets.

War housing wiring systems, because of the scarcity of critical materials, were designed and installed with a minimum of materials, of capacities limited to provide only essential comforts, and for this reason the present tendency to overload these systems has produced a hazardous situation. This release contains action to be taken by local management to correct this situation.

1. Basis of Problem. Portable type space heaters and hot plates, which place an excessive load on the circuits, are usually the cause of the trouble, although in some instances the simultaneous use of a number of devices which individually consume less current may be the cause. The wiring as installed permits the use of necessary household devices such as an electric iron, radio or toaster when normal house lighting is in use, but in no instance shall the total load of such devices exceed 1,000 watts.

2. Need for Prevention of Overloading of Circuits. Increasing the capacities of these systems is considered economically unsound because of the temporary character of the housing and, in addition, materials required for such changes are badly needed for new construction. Local management shall therefore make every effort to prevent overloading of electrical circuits and to secure the cooperation of tenants in utilizing these systems in a safe and economical manner. Tenants shall be informed of the situation by means of circulars, or handbills, through tenant associations and by personal instructions by management and maintenance personnel. The use of any device or the simultaneous use of a number of devices which will overload circuits shall be prohibited.

   Among benefits which will be realized are the following:

   a. Greater safety to tenant families by eliminating hazardous practices and preventing destruction of homes which cannot be replaced;

   b. Provision of better service to tenants by reducing the number of power interruptions;

   c. Reduction of maintenance costs by a decrease in the number of service requests and in the number of necessary replacements of damaged wiring and equipment due to overloads;

   d. Reduction of project utility costs.

(Cont'd)

3. Approximate Capacities of Household Devices. The following data relative to approximate capacities of various devices may be helpful in tenant instruction:

Appliance	Capacity Watts (Approximate)
Clock	2
Coffee Maker	Up to 1,000
Curling Iron	20
Fans	
Large	110
Small	90
Hand Iron	1000
Heating Blanket	215
Heating Pad	60
Mixer	100
Portable Heaters	1000 and up
Radio	100
Roaster	1650
Sewing Machine	75
Shaver	10
Sun Lamp	400
Toaster	Up to 1150
Vacuum Cleaner	400
Waffle Baker	1000

(Cont'd)

Par. 3 (Cont'd)

It is presumed that all housing has adequate space heating equipment. Therefore, the use of electric space heaters shall be positively forbidden.

The use of any device or the simultaneous use of a number of devices which will overload circuits shall be prohibited.

4. No Overfusing Permitted. The local management shall strictly adhere to requirements of Part VII "Electrical" Bulletin No. 2, "Standards for Temporary War Housing", relative to the fusing of:-

(a) tenant branch circuits

(b) building feeders and services

(c) project branch circuits, feeders and services

In addition to the above, where transformers, or banks of transformers operating as a unit, are protected on the primary side by a fuse cut out or automatic overcurrent device, the latter shall not be fused or set at more than 200% of the full load current rating of the transformer or bank of transformers.

Tenants shall be informed that the tampering with branch circuit fuses, for the purpose of increasing their capacities, creates a fire hazard and endangers their own lives as well as those of other members of the community, and will not be tolerated.

Distribution: All Projects With Steam Heating Plants

BOILER FEED WATER TREATMENT FOR STEAM HEATING PLANTS 1/

Following are methods for treating feed water in fire box boilers, in order to control scaling, corrosion, and pitting.

1. Occurrence of Scaling, Corrosion, and Pitting. Scaling is not generally a problem in low pressure boilers, due to the small quantities of makeup water; it is more prevalent in high pressure boilers. Where it does occur, it will be very slow in building up. When a scale reaches a thickness of 1/32-inch, it should be removed. Corrosion and pitting, however, are more general in both high and low pressure boilers and should be controlled promptly and properly by the application of chemical treatment to the feed water.

2. Method of Controlling Scaling. Scale reduction can be accomplished by the introduction of phosphates in the feed water. Each case should be treated individually.

3. Methods of Controlling Corrosion and Pitting. Control of corrosion is obtained by maintaining proper alkalinity in the boiler water. To preclude corrosion, a pH of 8.5 or higher should be maintained. 2/ If tests indicate a pH of a higher value where no treatment is used, no steps need be taken to reduce it; however, if chemicals are being used, the quantities should be reduced. Soda ash (sodium carbonate) is the most satisfactory material for use in increasing alkalinity, as it is effective, safe, and readily obtainable. Caustic soda (sodium hydroxide) is cheap and effective, but it is hazardous, and its use is recommended only by the most competent boiler operators and with proper equipment for handling the chemical. Discussed below are two methods for testing boiler water alkalinity:

   a. Test Kit for pH Determination and Control. The use of the test kit described below is recommended strongly as a simple means of acidity control of boiler feed water. The Federal Bureau of Mines will furnish small test kits for testing boiler water alkalinity to Federally-owned projects. The kit consists of:

      Item 1 - 1 6-ounce Bottle of Indicator
      " 2 - 2 1/2-ounce Test Bottles
      " 3 - 3 - 1 Dropper Bottle
      " 4 - Instructions for Use

1/ This insert supersedes the Circular, "Boiler Feed Water Treatment for Low Pressure Steel Fire Box Boilers," dated 8-26-43.

2/ The pH value is a scale used for stating the acidity or alkalinity of matter; at 7 on the scale the condition is neutral; below 7 it is acid and above 7 it is alkaline.

Par. 3 (Cont'd)

Local authorities for whom the Bureau of Mines cannot furnish the kits, can purchase the necessary bottles locally. Item 1, however, which is standardized for use with this particular kit, can be purchased from the Bureau through the regional office. Instructions for using the test kit may be obtained from the regional office.

b. Check Tests. Federally-operated projects may send a sample of water to the Federal Bureau of Mines for test. Upon request, the Bureau will furnish a 2-ounce sample bottle in a shipping container. In order to minimize the demand on the Bureau for water analysis, it is suggested first, that an initial sample be sent to the Bureau to check the test made by using the kit; second, that another check sample be sent in 30 days; and third, that check samples be sent thereafter, at 60-day intervals during the heating season.

c. Requesting Equipment and Information. All requests for equipment or information should be addressed to the Federal Bureau of Mines, Washington 25, D. C., Attention of Mr. J. F. Barkley

HAZARDS AND SAFEGUARDS

Reports show that a number of accidents have occurred with coal burning, hand and/or stoker fired forced hot-water heating systems. Generally these accidents result in the destruction or burning of the boiler, although in several instances, due to explosions, they resulted in serious destruction of other property.

1. Causes of Accidents. An analysis of the accidents which have occurred indicates that they are limited to coal burning installations and are usually due to a combination of circumstances. Installations converted from gas or oil to coal are particularly susceptible. Coal burning installations are affected because of the overrun in boiler heating which occurs when the room thermostat or the aquastat controlling the circulating pumps becomes satisfied and cuts out these pumps. When this occurs with a hand-fired boiler or a thermostatically controlled stoker installation, the boiler firebox may contain a large bed of fuel which continues to build temperature and pressure after the pumps have stopped. When such a condition occurs the following may happen:

   a. The pressure relief valve may fail to operate, causing an explosion.

   b. The pressure relief valve operates, discharging overheated water, but the valve is not of sufficient capacity to relieve the pressure as fast as it is being generated, causing an explosion.

   c. The pressure relief valve operates, discharging overheated water, but the pressure being generated in the boiler exceeds the available water supply pressure. This makes impossible the automatic replacement of the overheated water, resulting in a damaged boiler.

   d. The pressure relief valve operates and discharges water at a sufficient rate to overcome the pressure which is being generated. The valve, however, is so located in the system that it drains the boiler. Consequently, the boiler is burned or broken.

2. Safeguards. The following steps shall be always taken to protect projects which have coal-burning, forced hot-water heating systems:

   a. Inspect and make corrections as necessary, so that all pressure relief valves and valve installations will be as follows:

      (1) A.S.M.E. Standard, set and designed for operation on low pressure heating boilers (Maximum 30# water pressure)

      (2) In good operating condition.

      (3) Of sufficient capacity for the system. (Refer to boiler manufacturers recommendations and valve manufacturers guaranteed capacity rating.)

Par. 2 (Cont'd)

(4) Not less than 3/4" pipe size, nor greater than 2" pipe size.

(5) Located on top of the boiler or on the distribution supply piping, in the immediate vicinity of the boiler, at a height not less than the height of the boiler.

(6) Installed, when located on the piping system, so that no device or valve is located between the pressure relief valve and the boiler.

(7) Installed, when located on the piping systems, on a pipe of equal or greater capacity than the capacity of the relief valve.

b. All systems shall be equipped with a reverse acting aquastat having a temperature differential of 10° to 20° F.

Caution: Care must be exercised in wiring these controls to see that the reverse acting aquastat is wired in on the line side of pump cut-off switches.

The cycle of operations using the aquastat will be as follows: Normal operation of the system controls would cut out the circulating pump at the desired building temperature. In case of an overrun in boiler temperature, the reverse acting aquastat would restart the circulating pump and carry off the excess heat developed.

c. All relief valves and other automatic devices shall be inspected monthly during the time boilers are in operation.

Distribution: All Projects

CHAPTER 7.51 - FUELS, STORAGE

PREVENTION OF SPONTANEOUS COMBUSTION IN STOCK PILING COAL.

A. General

Coal which is stored over long periods, except possibly high-grade anthracite, has a tendency to heat spontaneously, and this heat may become appreciable in 90 days or more. Managers of all projects which stockpile coal must therefore take percautions to minimize the possibility of spontaneous combustion.

The suggestions below relate generally to storage of relatively small piles of tenant coal and project coal, at railroad sidings or on the project - indoors or out. The storage of large stock piles require that additional precautions be taken. An expert of the coal industry (inquire of the coal dealer) may be called upon for advice, or the Fuel Economy Section, Bureau of Mines, Department of the Interior, Washington, D. C., will advise projects on specific storage problems. The Bureau of Mines "Information Circular 7235" (a free copy may be obtained from their Fuel Economy Section) contains extremely useful information regarding storage of large quantities of coal.

B. Precautions To Be Taken When Stock Piling Coal 1/

1. All Kinds of Coal

a. Keep surface water from running under coal piles. Store coal on ground which has natural drainage away from the coal pile, if possible. On sloping sites, earth can be banked up on the up-hill side so that surface water will drain to the sides of and away from the coal piles.

b. Keep coal away from sources of heat. Do not store over steam or hot water mains, even though buried.

c. Keep foreign matter out of and away from coal piles. Clear ground of leaves, grass, weeds, paper, rags, pieces of wood, etc., before depositing coal, and keep all such combustibles out of the coal pile.

Keep coal away from open fences. If necessary to pile against a fence, use planks to create a solid wall.

2. Anthracite Coal

Little trouble is anticipated in storing even large deep piles of anthracite coal. (See item 1 above).

1/ Coal can be classified as listed below. If in doubt, inquire of the dealer or a coal expert.

3. Bituminous Coal or Bituminous-Anthracite (size 3 & 4) Mixtures

a. Sized bituminous coal can be stored relatively safely indoors or out, provided precautions listed under item 1 above are taken.

b. Run-of-mine bituminous coal or bituminous-anthracite mixtures can normally be stored safely indoors in bins with air-tight walls and floor, if general recommendations under Item 1 are followed.

If indoor coal bin walls and floor are not air-tight, or if stored outdoors, the following precautions must be taken in addition to those listed under item 1:

(1) Avoid air movement through the pile as completely as possible. Do not store over sewers, covered pipe trenches, or any openings in, through or adjacent to coal piles, nor over wood planking or anything else which might increase air flow through the pile. Avoid standing timbers, pipes, etc. since small air passages around these act as flues.

(2) Keep coal piles as low as possible. The lower the pile, the less the likelihood of heating. No run-of-mine bituminous coal pile should be higher than 6'-0"; high-volatile coal, being particularly susceptible to heating, should be stored in even lower piles, even though it is mixed with anthracite.

(3) Limit the size of the coal pile. Fires in long, narrow piles can be handled more readily than in square or round piles. Piles should be limited to 50 tons each.

4. Subbituminous and Lignite Coals

Store indoors only where air and moisture can be absolutely excluded from the coal pile. Storage bins must have air-tight walls and floor, and air must be excluded from the top (A covering of several layers of paper, weighted down, may be used). Store not more than 10 tons in one such bin. See also Item 1 above.

C. Handling Spontaneous Combustion

Dangerous heating may be detected by steaming of the coal pile, or the odor of burning coal. When this occurs, dig into the pile, remove and spread out the hot coal (outdoors) so that it may cool off, or use the hot coal immediately. Very hot coal may then be drenched with water. Pouring water over a burning pile is generally ineffective, since a hard crust which will shed water forms over the heated coal.

Chapter 7.60. A Course of Training for FPHA Employees in the Operation and Maintenance of Heating Equipment

SECTION I. INFORMATION SHEETS

A. HEAT AND HOW PRODUCED

The job of a fireman on the project is to produce heat. The quantity of heat we produce is measured in degrees of temperature shown on the thermometer.

The common fuels used to heat homes are wood, coal, oil, and gas. Burning (called combustion) starts when enough heat, along with oxygen from the air, is added to a substance such as coal. No burning can take place without oxygen and since the air is slightly more than one-fifth oxygen, a large amount of air is necessary in order to make the fuel burn. We know that when we blow on a fire it burns faster. This is because we are giving the fire much more oxygen. We also know if we place a lighted piece of paper or candle in a jar and then put on the lid the fire will go out in a few minutes because it uses up all the oxygen from the air in the jar. Therefore a fire cannot burn long if it does not get plenty of air.

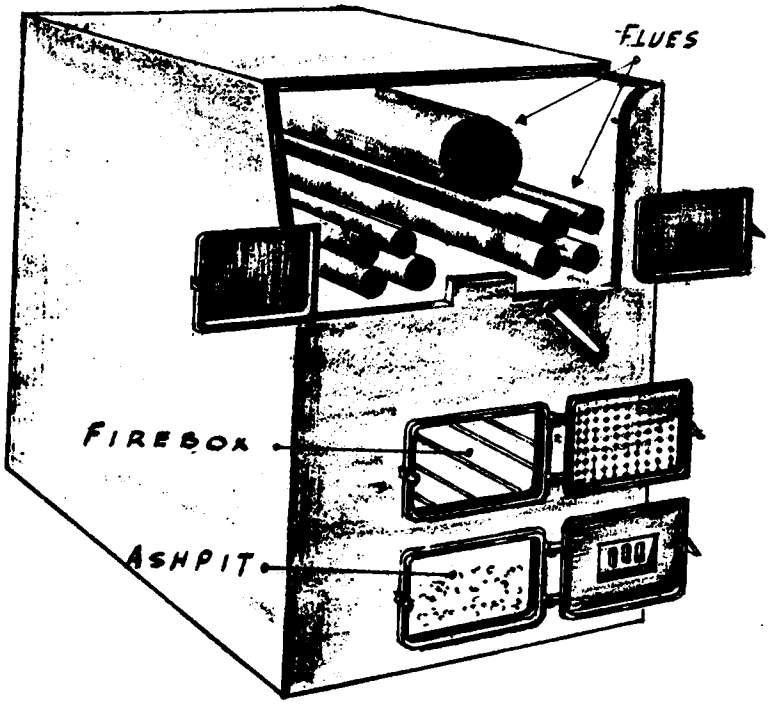
Coal is found in many forms, but most commonly takes the form of Anthracite (hard coal) or Bituminous (soft coal). It is burned on grates in a firebox; it leaves ashes, and produces smoke. Black smoke indicates that the fire is not receiving enough air to completely burn the coal.

Anthracite is easily recognized because it is hard, shiny and makes little dust when handled. It is not easy to start burning but after being started it burns easily with a short flame and makes very little smoke. It usually requires little or no attention except when more fuel is needed.

Bituminous coal is soft and dusty making it dirty to handle. It is easy to start burning and burns with a long flame. It forms soot, smoke and more ashes than hard coal when burned slowly. In burning it forms a crust over the fire bed which must be broken up often.

Stoves, furnaces and boilers are the equipment used to burn fuel and provide heat. They differ in size and shape according to the kind and amount of fuel to be burned and the amount of heat desired. They are always made up of the following parts: a firepot or firebox in which the fuel burns, an ash-pit where the waste or ash is collected, and the flues through which the heated gas and smoke pass on their way to the chimney.

1/ This page supersedes the corresponding page of Bulletin No. 63, Chapter 7.60, dated 9-1-44.



Firebox

The firebox may be round or square depending upon the size of the heater. It is located under the flues and over the ashpit. The bottom of the firebox on which the fuel burns is made up of open cast iron grille work, called grates, which permit ashes from the fire to drop through into the ashpit and allow air from the ashpit to pass upward through the bed of fuel to keep the fire burning. The grates are movable and so arranged that they may be shaken to loosen the ashes and cause them to drop into the ashpit.

The firebox is of such size that with the fire kept at the right depth on the grate, there is still sufficient space above the firebed for an adequate supply of air to mix with the gases given off by the burning fuel and completely burn them. The air used for burning these gases is admitted over the firebed through a hand controlled slide in the firedoor.

Ashpit

The ashpit which is located under the firebox and grates acts as a collection box for ashes from the burned fuel and as a passageway for the air which goes through the grates to keep the fire burning. The air passing through the ashpit to the fire is admitted through an adjustable opening commonly known as the "draft damper," which may be a part of the ashpit door.

Flues

The flues, which are directly above the firebox, are openings through which the hot gases and smoke pass on the way to the chimney. The walls of the flues become heated and transfer this heat to either air or water which surrounds them. Dirty flues may completely stop this heat transfer.

Heating systems in common use are of three general types: forced warm air, forced hot water, and steam.

Chapter 7.60. A Course of Training for FPHA Employees in the Operation and Maintenance of Heating Equipment

SECTION I. INFORMATION SHEETS

A. HEAT AND HOW PRODUCED

Heat is something which is usually recognized by our sense of feel. If we touch a piece of ice we say it is cold, but if we place this piece of ice in a pan over a fire it slowly melts and becomes water. Finally, by taking heat from the fire, the water becomes hot and we say it contains a great deal of heat. The quantity of heat anything contains is measured in degrees of temperature which are shown on an instrument known as the thermometer.

Heat, as we are interested in it, is produced or comes from burning substances which we usually call fuel, such as wood, coal, oil, and gas. Burning (also known as combustion) starts when enough heat, along with oxygen from the air, is added to a substance such as coal. No burning can take place without oxygen and since the air we breathe is slightly more than one-fifth oxygen, a large amount of air is necessary in order to make the fuel burn. We know that when we blow on a fire it burns faster. This is because we are giving the fire much more oxygen. We also know if we place a lighted piece of paper or candle in a jar and then put on the lid the fire will go out in a few minutes because it uses up all the oxygen from the air in the jar. Therefore a fire cannot burn long if it does not get plenty of oxygen, which means plenty of air.

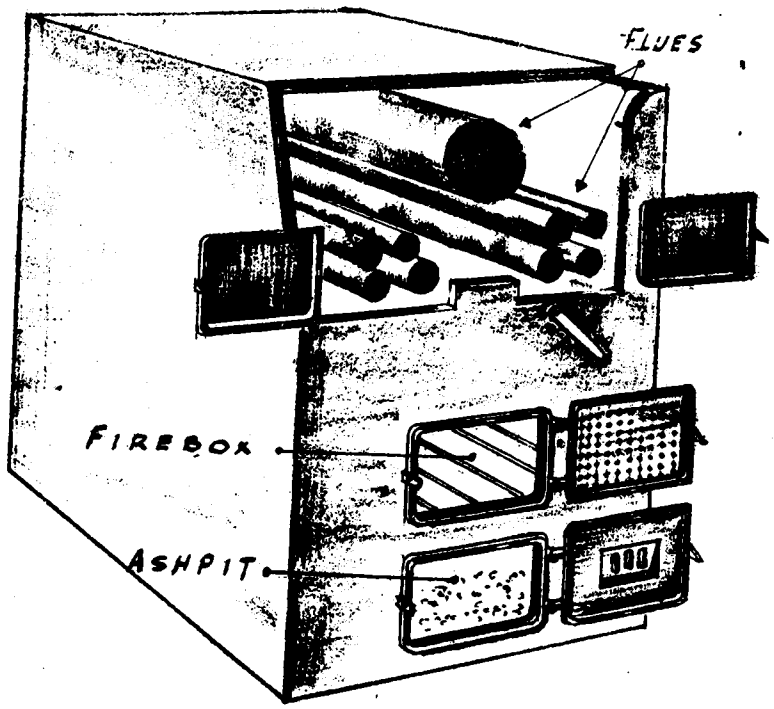
The types of fuels most commonly used to make heat are coal, oil, and gas.

Coal is mined from the ground and is found in many forms, but is most commonly referred to as Anthracite (hard coal) or Bituminous (soft coal). It is always burned on grates in a firebox, leaves waste known as ashes, and produces gases which are usually black and are referred to as smoke. Black smoke indicates that the fire is not receiving enough air to completely burn the coal.

Anthracite coal (called "hard coal") may be recognized because it is hard, shiny and makes little dust when handled. It is not easy to start burning but after being started it burns easily with a short flame and makes very little smoke. It usually requires little or no attention except when more fuel is needed.

Bituminous coal (called "soft coal") is soft, dusty and dirty to handle. It is easy to start burning and burns with a long flame. It forms soot and smoke when burned slowly. In burning it forms a crust over the fire bed which needs to be broken up often.

The equipment commonly used to burn fuel and provide heat is known by the following names: stoves, furnaces, and boilers. This equipment will differ in size and shape according to the kind and amount of fuel to be burned and the amount of heat desired, but is made up of the following parts: a firepot or firebox in which the fuel burns, an ashpit where the waste or ash is collected, and the flues through which the heated gas and smoke pass on their way to the chimney.



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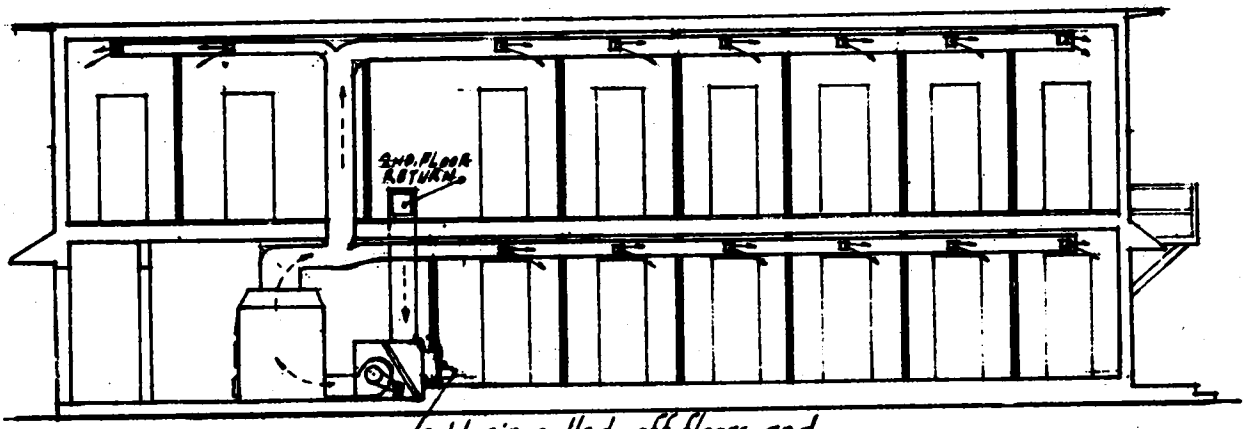
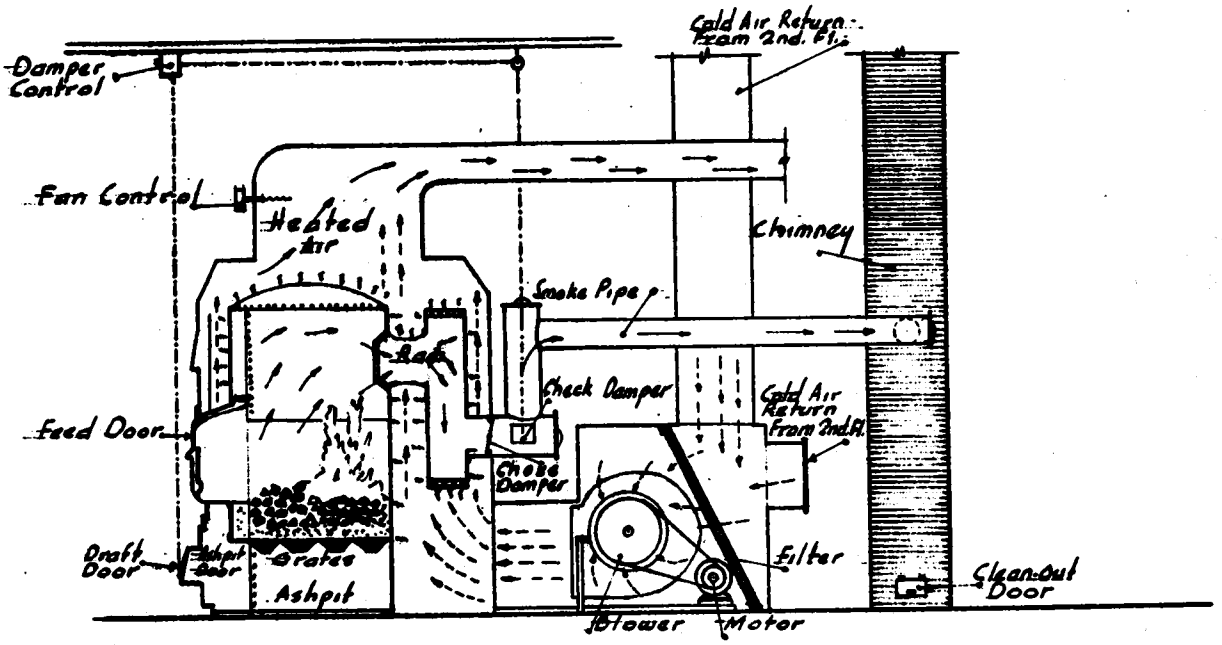
Heating systems in common use are of three general types: forced warm air, forced hot water, and steam.

B. TYPES OF HEATING SYSTEMS

1. FORCED WARM AIR SYSTEM

Arrows indicate warm air being discharged from ducts blanketing room with heat





TYPICAL EQUIPMENT HOOK-UP

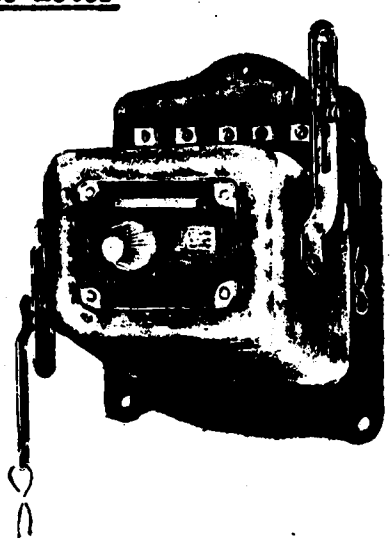
In this system, air is blown by a fan into the base of the furnace, and travels up around the outside of the hot firebox and flues where it becomes heated; from there, it passes out the top of the furnace into a system of ducts used for distributing it to the rooms to be heated. In some systems this air is returned to the fan through a similar set of ducts. In systems where the air is not returned from the rooms a fresh supply of air is furnished to the fan by a duct from outside the building.

a. CONTROLS

Room Thermostat

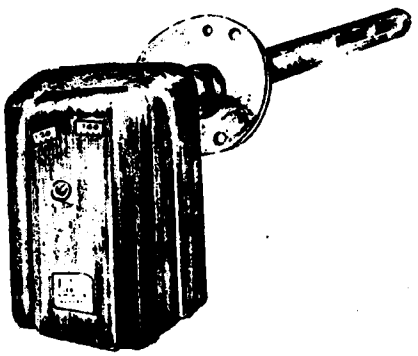
The room thermostat is an instrument which is used for controlling temperature and is operated by changes of temperature in the room in which it is located. It may be set at any desired temperature and changes from that temperature, either up or down, make an electrical connection which causes the damper motor to operate.

Damper Motor



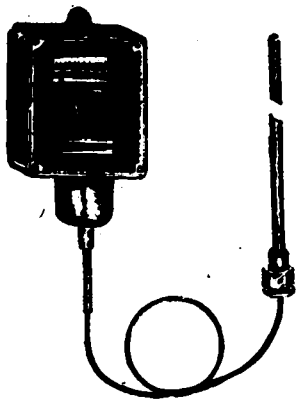
The damper motor is a small electrical motor with two arms located on opposite sides of the motor shaft. These arms are connected by chains to the draft and check dampers. When the room thermostat calls for more heat the damper motor will open the draft damper in the ashpit and close the check damper in the smokepipe, or will reverse this action when the room thermostat calls for less heat.

Fan Control



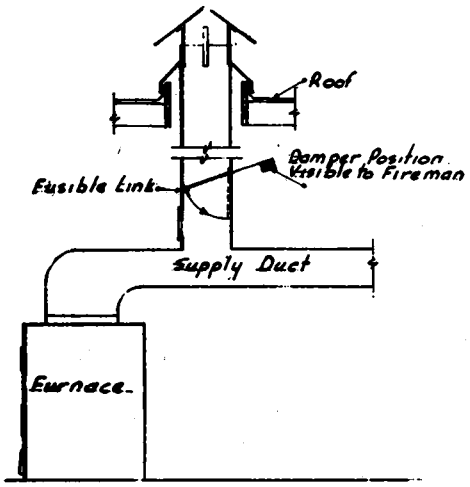
The fan control is an instrument which regulates the operation of the fan or blower. It is located near the top of the furnace with one end extending into the air heating chamber of the furnace. This instrument keeps the fan from starting until the air in the furnace has reached a certain desired temperature, and will stop the fan, if it is operating when the air drops below the desired temperature; this is to prevent blowing cold air into the rooms to be heated. In some cases this instrument may serve two purposes; the one described above, and another for which it is connected to the damper motor and causes it to close the drafts, when the air in the furnace becomes too hot.

Bulb Thermostat



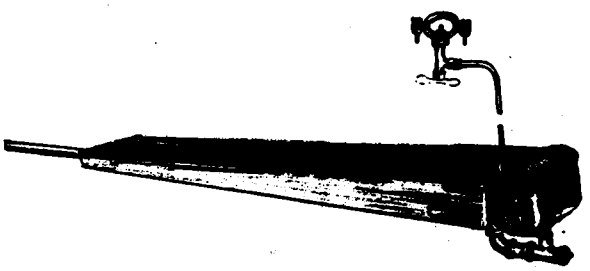
This thermostat acts on the same principle as the room thermostat but is used only for a system in which the air used for heating is returned from the rooms to the fan. When used it is located in the return duct system and acts to shut off the fan when the air returning from the rooms becomes too hot. This thermostat should be used only where a relief duct is a part of the system.

Relief Duct



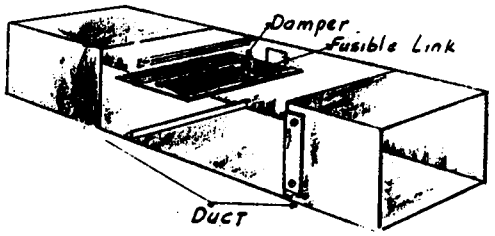
The relief duct is a duct running from the top of the furnace to the outside of the building. This duct contains a fire damper which is normally held in a closed position by a fusible link. If the furnace should overheat due to failure of the controls, the fusible link which holds the fire damper closed will melt, causing the damper to open and the hot air to escape to the outside.

Humidifier



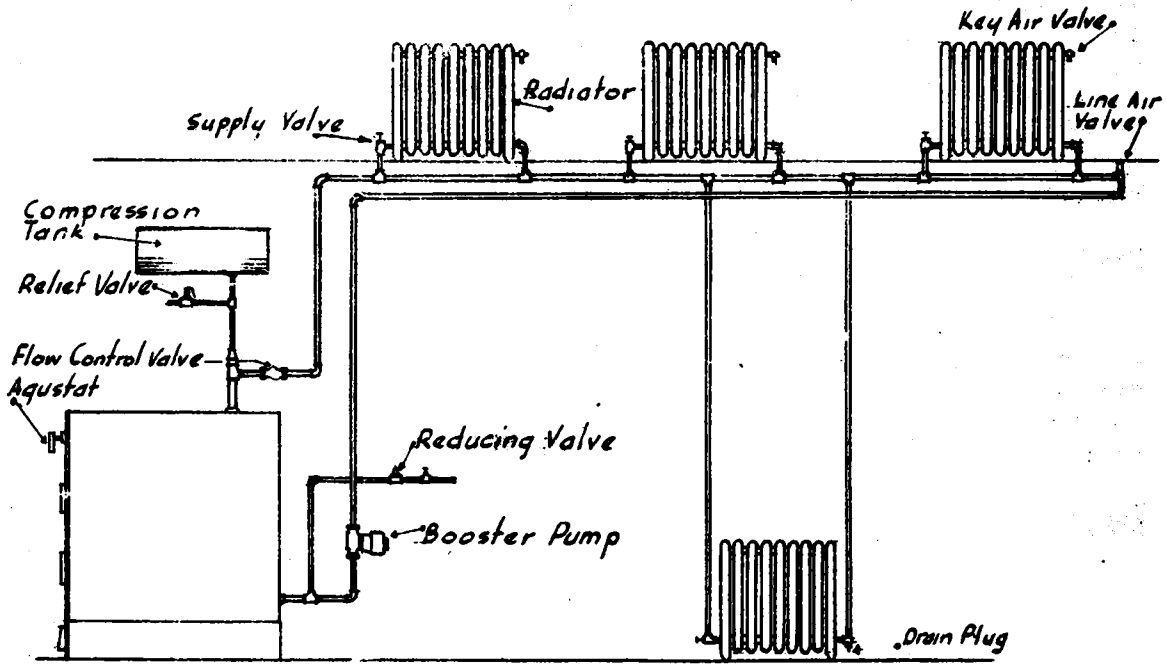
The humidifier is a device for adding humidity (moisture) to the warm air before it is delivered to the rooms. It usually consists of an open pan located inside the hot air space of the furnace. Water is supplied to this pan from a pan located outside the furnace; the two pans are connected together so that the water will stand at the same level in both pans. The outside pan is usually filled by hand but sometimes through a small pipe line connected to the city water supply; in that case the outside pan contains a float which operates a valve in the water supply pipe and the filling becomes automatic.

Fire Damper



The fire damper is a damper located within the duct system, usually at points where the ducts pass through fire partition walls. The damper is held in an open position, by a fusible link, for the passage of heated air during normal operation. If for any reason, such as failure of the controls to operate, the air in the system becomes dangerously hot, the fusible link melts and allows the damper to fall shut thus closing off and protecting the part of the building served by that particular duct.

2. FORCED HOT WATER SYSTEM



In this system, water is pumped into the boiler and travels up around the outside of the hot firebox and flues where it becomes heated. From there it passes out the top of the boiler into a system of pipes used for distributing it to radiators located in the rooms we wish to heat. In this type of system the boiler, piping, and radiators are always full of water.

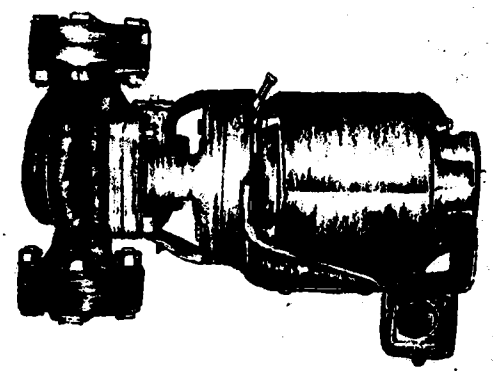
A. CONTROLS

Room Thermostat

(see top of next column)

The room thermostat is an instrument which is used for controlling temperature and is operated by changes of temperature in the room in which it is located. It may be set at any desired temperature and changes from that temperature either up or down make an electrical connection which causes the Booster pump to operate.

Booster Pump



The booster pump is a small electrical pump usually installed in the return piping of the system. When the room thermostat calls for heat

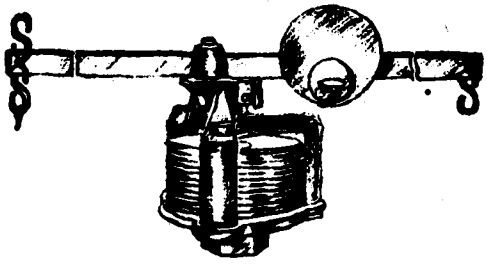
(see next page)

the Booster pump starts pumping cool water from the return piping into the boiler, thus forcing the heater water from the boiler through the piping system to the radiators in the rooms to be heated. This pump operation continues until the rooms have sufficient heat and the thermostat shuts it off.

Draft Damper Controls

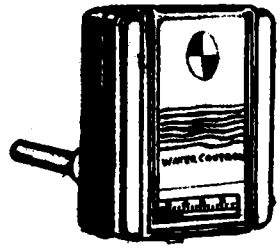
The draft dampers on the forced hot water system may be operated in several ways; the most common methods in use are by means of the damper control or the aquastat.

Damper Control



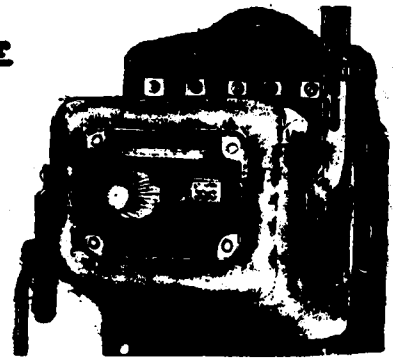
The damper control is an instrument used to control the temperature of the water in the system. It is located on the top of the boiler and is so set that the bottom extends down into, and is surrounded by the heated water in the boiler. Any change in temperature of the water raises or lowers a metal bar which is connected by chains to the draft damper and check damper. A movable weight on one end of this bar enables us to increase or decrease the movement of the bar, and thus control the action of the dampers and the temperature of the water.

Aquastat



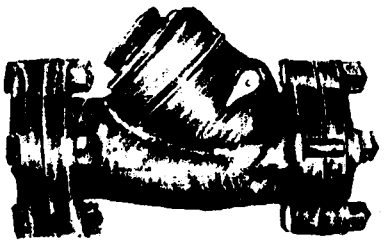
The aquastat is an instrument used to control the temperature of the water in the system. It is usually located near the top of the boiler with one end extending into the water heating section of the boiler. It may be set to keep the water at any desired temperature and any change from that temperature makes an electrical connection which causes the damper motor to operate.

Damper Motor



The damper motor is a small electrical motor with two arms located on opposite sides of the motor shaft. These arms are connected by chains to the draft and check dampers. When the aquastat calls for more heat the damper motor will open the draft damper in the ashpit and close the check damper in the smoke pipe, or will reverse this action when the aquastat calls for less heat.

Flow Control Valve

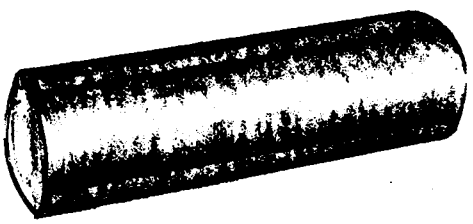


The flow control valve is a flapper or check type of valve usually located in the main supply pipe from the boiler. The purpose of this valve is to prevent the water from the boiler moving through the piping system when the thermostat has not called for heat and the pump is not running. The force created by the pump operation opens this valve and permits the passage of the heated water through the system.

Relief Valve

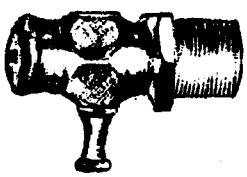
The relief valve is usually installed on the boiler or the piping near the boiler and can be set to open when the pressure in the system becomes too high. The water discharged from this valve goes to the drain. This valve protects the boiler, radiators and piping from breakage.

Compression Tank



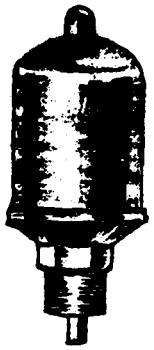
The compression tank is a closed metal tank connected to the main supply pipe near the boiler. This tank is full of air which acts as a cushion to take up the normal expansion of water when it is heated, and to create a pressure in the system which will prevent the water from boiling at fairly high temperatures. It also serves as a cushion against sudden pressures caused by the pump starting.

Key Air Valve



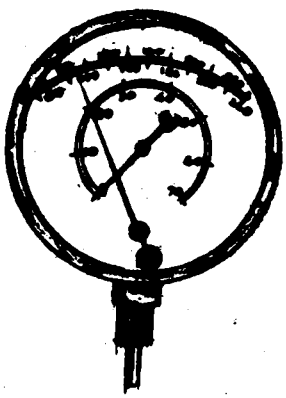
These small air valves are located on all radiators so that any air which accumulates in the top of the radiators may be removed. Any air in the radiators takes up part of the hot water space and cuts down the amount of heat given off by the radiators.

Line Air Valve



The line air valve is placed at high points in the supply lines to remove air which will slowly move through the water to these high points. This air must be removed as any great amount of air in the lines will cause the water to stop moving; such a condition is known as an air lock. This valve operates automatically.

Altitude Gauge and Thermometer

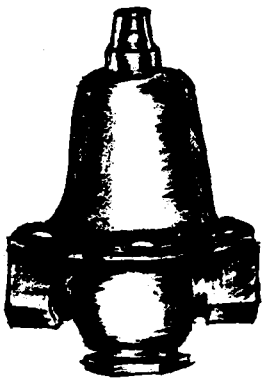


This instrument is located on the top of the boiler where it can easily be seen by the operator. The instrument is composed of two parts: the thermometer which shows the temperature of the water system, the altitude gauge which shows the pressure.

A low thermometer reading may indicate the fire in the boiler needs attention.

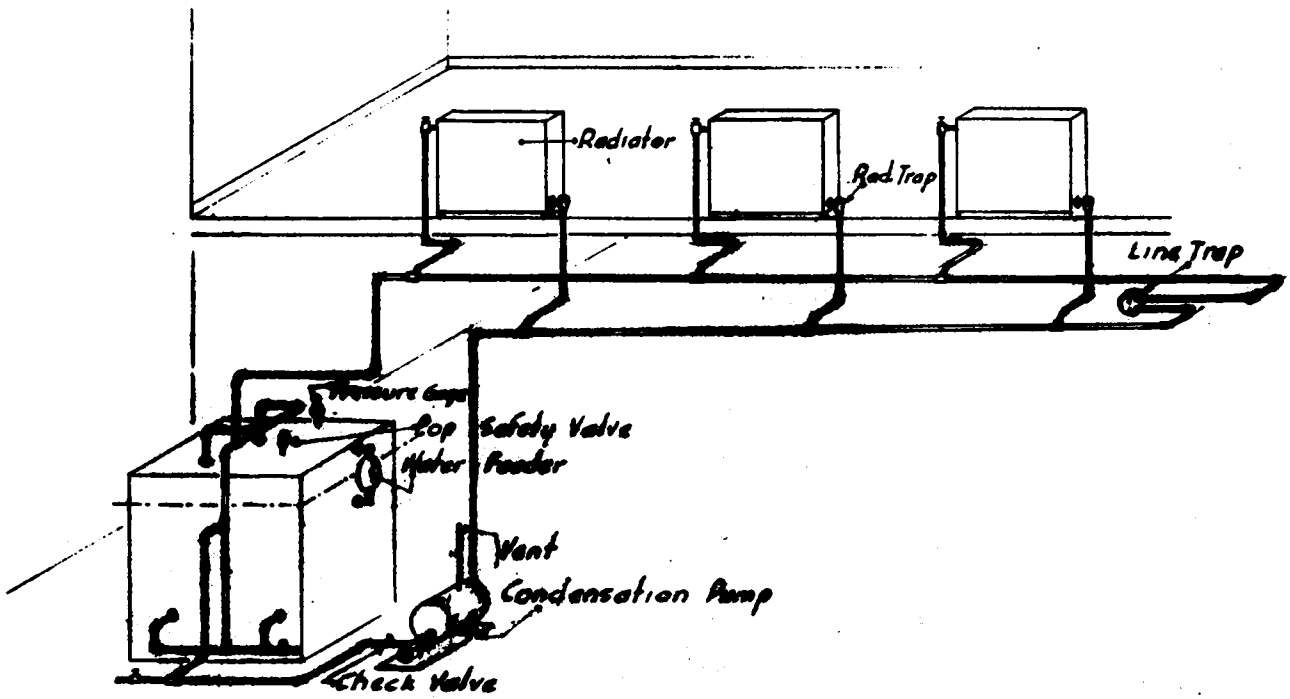
A high altitude gauge reading may indicate a dangerous pressure in the system, in which case the fire should be checked, and the pressure relief valve examined to see if it is operating.

Reducing Valve



The reducing valve is an automatic valve located in the water line supplying the system. It may be set for any pressure desired in the system and automatically maintains this pressure by adding or discharging water. It restores water to the system which may be lost due to the operation of the pressure relief valve.

3. STEAM SYSTEM



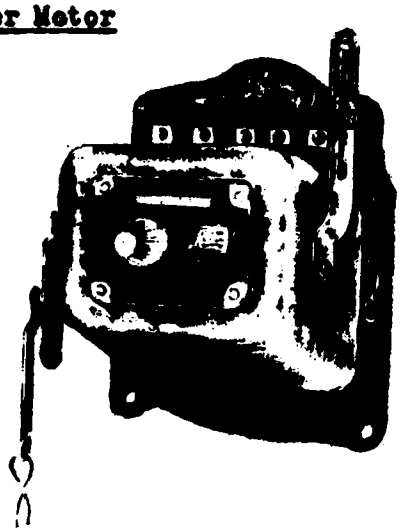
In this system, the parts of the boiler surrounding the hot firebox and flues only, are filled with water. This water is heated until it forms steam which passes out of the top of the boiler into a system of pipes used for distributing it to radiators located in the rooms to be heated. This steam after giving up its heat to the radiators changes back to water and is returned through a similar system of pipes to the boiler. In some cases where a great amount of steam is made, a pressure may exist in the boiler. This pressure keeps the water which returns from the radiators from reentering the boiler; in this case a condensation pump is used to force this water back into the boiler.

a. CONTROLS

Room Thermostat

The room thermostat is an instrument which is used for controlling temperature and is operated by changes of temperature in the room in which it is located. It may be set at any desired temperature and changes from that temperature, either up or down, make an electrical connection which causes the damper motor to operate.

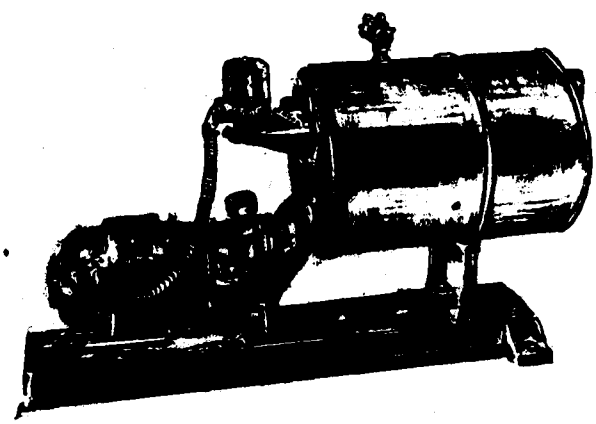
Damper Motor



The damper motor is a small electrical motor with two arms located

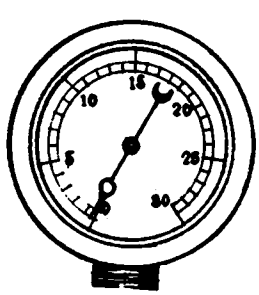
on opposite sides of the motor shaft. These arms are connected by chains to the draft and check dampers. When the room thermostat calls for more heat the damper motor will open the draft damper in the ashpit and close the check damper in the smokepipe, or will reverse this action when the room thermostat calls for less heat.

Condensation Pump



The condensation pump is an electric pump used to return water from the piping system to the boiler, in those systems where the boiler pressure prevents its return by gravity. The pump assembly is composed of a receiver tank, pump and motor. The receiver tank contains a float which raises as the tank fills making an electric connection which starts the pump and forces the water into the boiler. The pump is always located at a low point in the system, sometimes being set in a pit in the heater room floor so that the water can run by gravity to the receiver tank.

Steam Gauge



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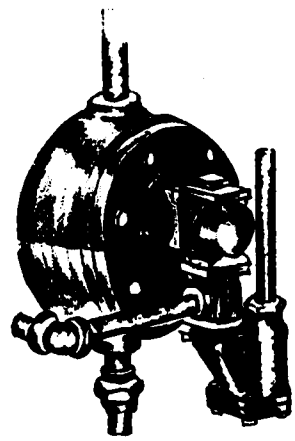
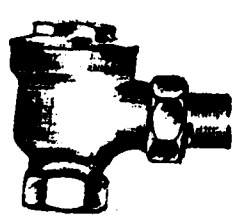
The steam gauge is a device which shows the steam pressure in the boiler and indicates whether or not the fire requires attention.

Boiler Water Feeder



The boiler water feeder is a device used to keep the water in the boiler at a constant level and to prevent the boiler from going dry. The feeder is located on the side of the boiler and is connected to it at the water line. The feeder contains a float which operates a valve connected to the water feed line. When the water level in the boiler drops, the float in the feeder drops, opening the feed water valve and allowing a fresh supply of water to enter the boiler until the proper level is reached.

Thermostatic Trap



(see next page)

The thermostatic trap is a device used on the ends of radiators and steam lines. It connects the outlet of the radiator to the return piping and is so made that it will pass air and water but will close when steam comes in contact with it.

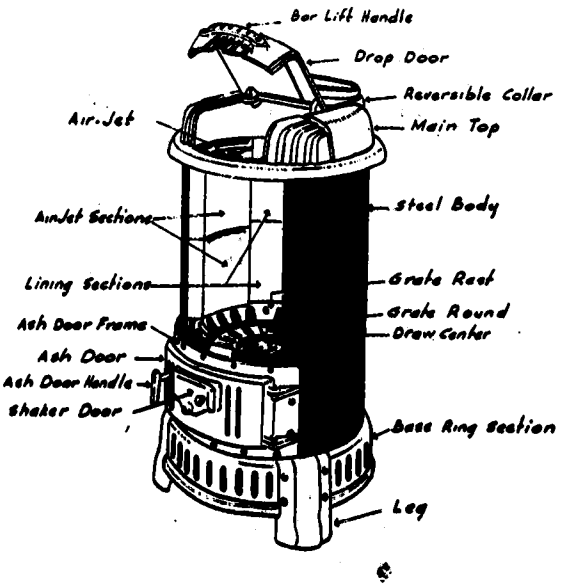
Gauge Glass

The gauge glass (water column) is a glass tube set at the side of the boiler and connected to it at two points; one point several inches below the operating level of the water in the boiler, and one point several inches above the operating water level of the boiler. The level of the water in the glass indicates the level of the water in the boiler. When the level of the water in the glass drops below the normal operating level, water should be added.

Safety Valve

The safety valve is a device located on the boiler which opens when the steam pressure in the boiler becomes too high and allows the excess steam to escape into the air. This valve may be set for any desired pressure.

4. SPACE HEATER



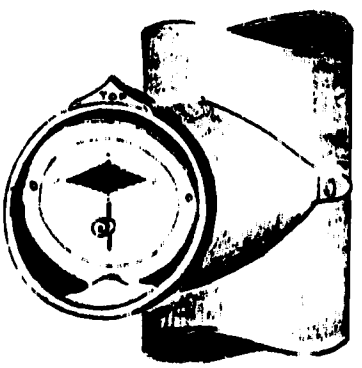
The space heater or room stove is one of the oldest types of heaters in use today. This heater is constructed similarly to other types of heaters, consisting of a firebox, grates and ashpit.

In operation they compare favorably, as regards efficiency, with most types of heating equipment, making use of from 70 to 80 percent of the heat in the fuel.

In heating a room the hot surfaces of the heater give off heat by radiation to objects in the room, and in addition, give up heat to the air which comes in contact with them.

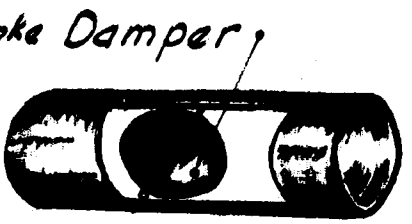
a. CONTROLS

Draft Regulator:

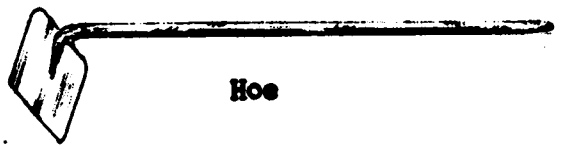


This device, sometimes known as a barometric damper, is usually located in the smokepipe between the choke damper and the chimney. It may be set to maintain a draft of any intensity by adjusting a movable weight on the face of the damper.

Choke Damper



This damper is located in the smokepipe between the heater and the draft regulator. It is manually operated and is used to vary the rate of burning which takes place in the heater.

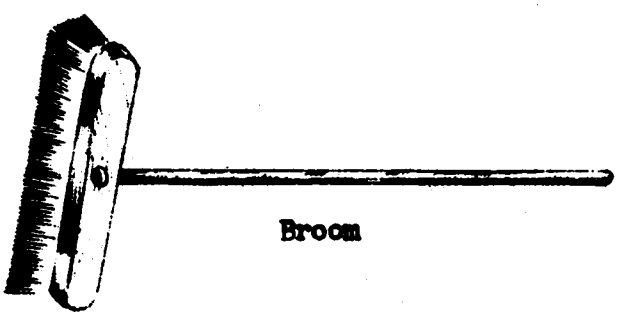


Hoe

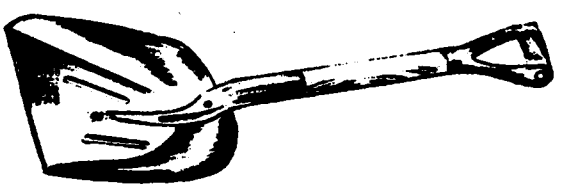
Straight Poker

Hook Poker

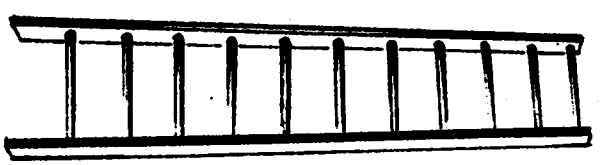
Screw Driver



Broom



Shovel



Ladder

Ash Can

Flue Brush

SECTION II. OPERATION SHEETS

A. HOW TO INSPECT CHIMNEY

Tools and Equipment: Mirror
Trowel
Heavy Paper

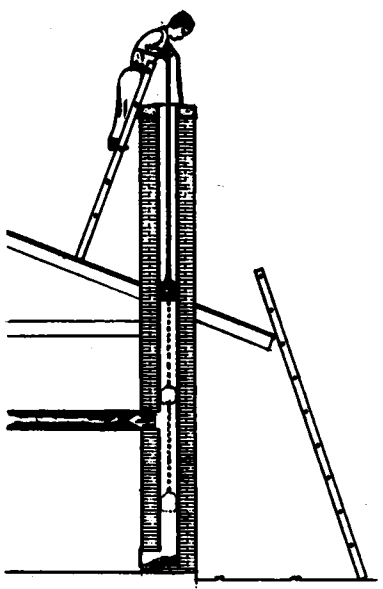
Procedure:

1. Lay heavy paper or cardboard on heater room floor beneath clean-out door.
2. Open cleanout door
3. Scrape soot from base of chimney on to paper or cardboard using hoe or trowel.
4. Remove soot to ash can.
5. Hold mirror in base of chimney leaning it toward back of chimney.

   NOTE: If inside of chimney shows soot on walls and is getting smaller, chimney should be cleaned.
6. Close cleanout door.
7. Return tools to storage.
8. Report condition to proper authorities.

B. HOW TO CLEAN CHIMNEY

Tools and Equipment: Chimney swab, Chimney cover, Ladder, Broom, Heavy paper, Hoe or trowel, Ash can



Procedure:

1. Cleanout door should be closed.
2. Place ladder in position against building.

   CAUTION: Set ladder firmly.

   Carry chimney swab and cover to roof.
4. Lower chimney swab into chimney.
5. Clean by raising and lowering swab in chimney until liner appears clean.
6. Remove swab from chimney and lower to ground.
7. Place cover over chimney.

   NOTE: Chimney is covered to prevent scattering soot over neighborhood.
8. Lay heavy paper or cardboard on heater room floor beneath cleanout door.
9. Open cleanout door.
10. Scrape soot from base of chimney on to paper or cardboard using hoe or trowel.
11. Remove soot to ash can.

    NOTE: Soot should be disposed of with ashes.
12. Brush soot from door frame and clean floor.
13. Close cleanout door.
14. Remove cover from top of chimney.
15. Remove ladder. Clean equipment and return to proper storage.

C. HOW TO CLEAN SMOKEPIPE

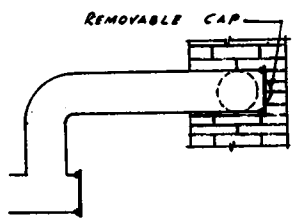
Tools and Equipment: Furnace Brush, Furnace Hoe, Bucket or ash can, Screw driver, Wrench

Procedure:

1. Open choke draft damper when located in smokepipe.

   NOTE: This permits passage of brush and allows gases to escape up chimney.

2. Take out screws or bolts holding cap in place.



   Exception - as illustrated in sketches on this page.

3. Remove cleanout cap.

4. Clean sides of smokepipe by brushing with furnace brush.

5. Scrape soot into bucket using furnace hoe.

6. Replace cleanout cap pushing firmly into place.

   NOTE: A loose cleanout cap will affect draft. If loose, report to proper authority.

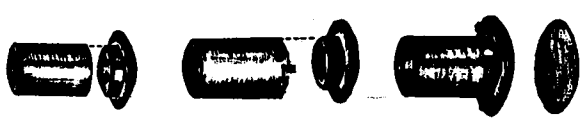
   NOTE: Where exception occurs as illustrated in sketches on this page, replace screws or bolts.

7. Reset choke damper.

8. Remove soot to ash can.

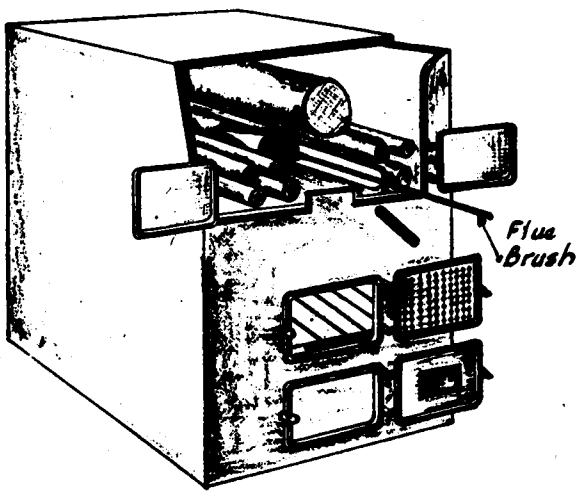
9. Clean up any split soot.

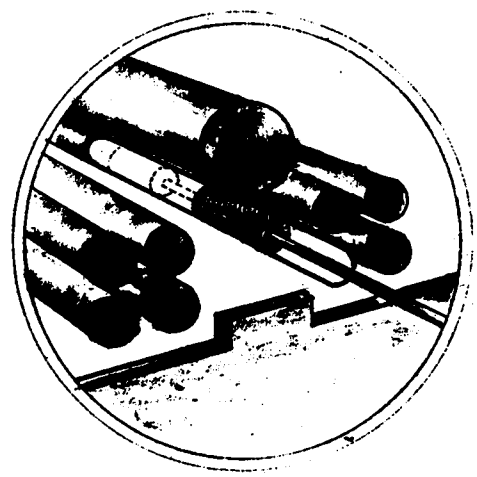
10. Return tools to proper storage.



D. HOW TO CLEAN FLUES

Tools and Equipment: flue brush, trowel or small shovel, bucket or ash can





Procedure:

NOTE: Fire should be low or banked at time of cleaning.

NOTE: Flues should be cleaned twice a week - type of fuel will determine frequency.

1. Open choke damper.

NOTE: This will draw gas and loose soot away from flue doors.

2. Open flue doors.

3. Clean flues by pushing flue brush back and forth through tubes or over interior surfaces.

NOTE: Turning flue brush as it is moved over surface of flues will save brush and do better job.

4. Remove soot from front of heater with trowel or small shovel.

5. Close flue doors.

6. Reset choke damper.

7. Clean up any soot spilled.

8. Return tools to proper storage.

E. HOW TO CLEAN FIRE BOX

Tools and Equipment: flue brush, ash can, hook poker, broom

Procedure:

NOTE: Fire should be low or banked at time of cleaning.

1. Open choke damper.

NOTE: This will draw gas and loose soot away from fire door.

2. Open fire door.

CAUTION: Do not stand in front of fire door. Stand on side on which door is hinged. Gas in fire box may explode out open door.

3. Brush interior walls and crown by pushing flue brush back and forth and up and down.

4. Check liners to see that they fit up properly to furnace walls.

NOTE: Steel furnaces usually have liners. Cast iron furnaces usually do not have liners.

5. Make note of broken or burned liners.

6. Remove ashes or clinkers from top of liners.

7. Work ashes free from sides of liners.

8. Close fire door.

9. Reset choke damper.

10. Clean floor in front of heater.

11. Return tools to proper storage.

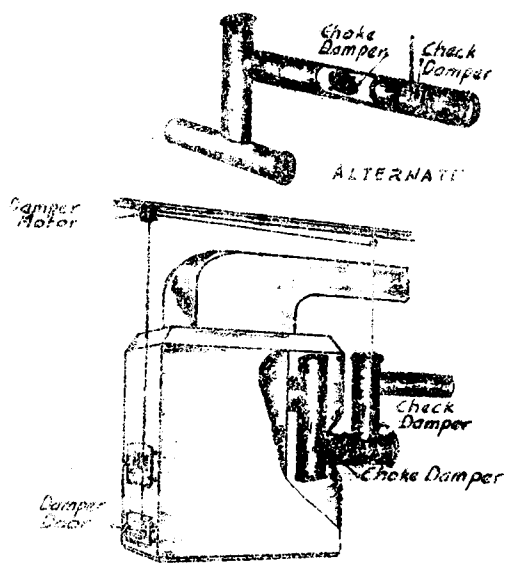
12. Report defective liners to proper authorities.

1. [illegible]

Tools and Equipment: Shovel, Furnace hoe, ash can, brook

Procedure:

1. Open choke damper.
2. Close check damper.

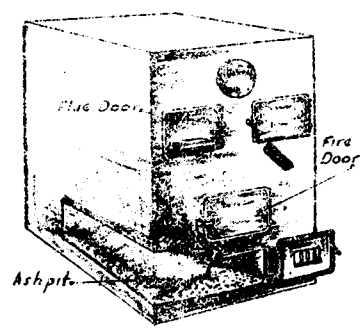


NOTE: Unhook chain if in open position.

NOTE: Opening choke damper and closing check damper will help keep gas and dust in ash pit.

3. Unhook draft damper chain to prevent damage to damper motor.

4. Open ash pit door.



CAUTION: Do not remove ashes immediately after shaking grates. Hot ashes give off gas and will burn cans.

CAUTION: Do not wet down ashes in ash pit. Steam will rust grates and splashed water will break them.

5. Shovel ashes from pit to ash can.

NOTE: Ashes from rear of pit may be pulled forward with furnace hoe.

6. Close ash pit door.
7. Hook draft damper chain.
8. Reset choke and check dampers.
9. Clean floor in front of furnace.
10. Return tools to proper storage.
11. Remove ashes to storage.

G. HOW TO REPLACE FIREBOX LINER

Tools and Equipment: Hoe
Liner
Gloves
Trowel

Procedure:

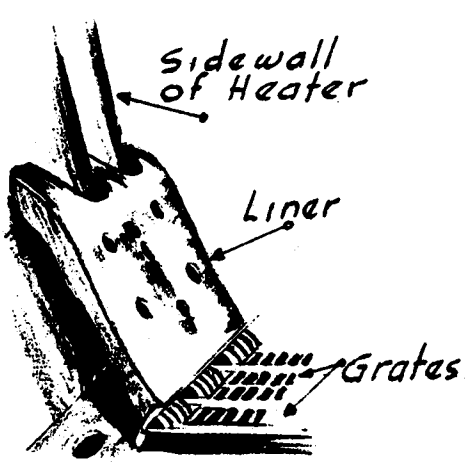
CAUTION: If liner cannot be reached from the outside of fire door, heater should be allowed to cool.

1. Open choke damper.
2. Close draft damper.

   NOTE: This will cause air to carry ash dust to chimney.
3. Open fire door.
4. Shake grates to remove part of ashes.
5. Push loose ashes away from liner with hoe.
6. Reach in fire door, life liner and pull toward center of fire box.
7. Life liner from fire box.

   CAUTION: Gloves should be used to protect hands.
8. Clean accumulated ashes from behind liner using trowel or small tool.

   NOTE: Ashes behind the liners will cause liners to burn.
9. Set new liner in place.
10. Pull ashes back to place with hoe.
11. Dispose of damaged liner.
12. Return tools to proper storage.



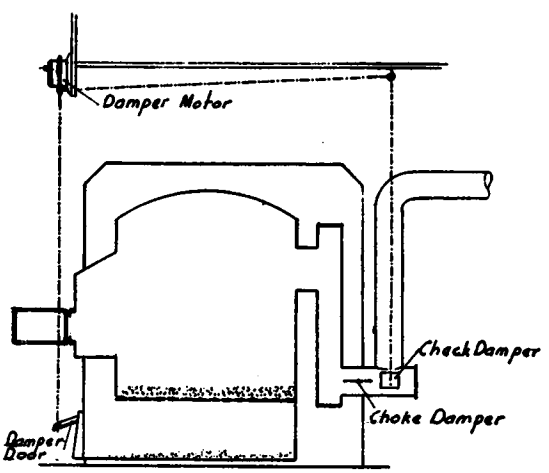
H. HOW TO START FIRE

Tools and Equipment: Paper, Dry Kindling Wood, Shovel, Coal, Matches

Procedure:

CAUTION: Check electric circuits to see that controls will operate furnace blower, booster pump or condensation pump. Check water in steam and hot water boilers.

1. Open choke damper.
2. Close check damper.
3. Open draft damper.
4. Open fire door.

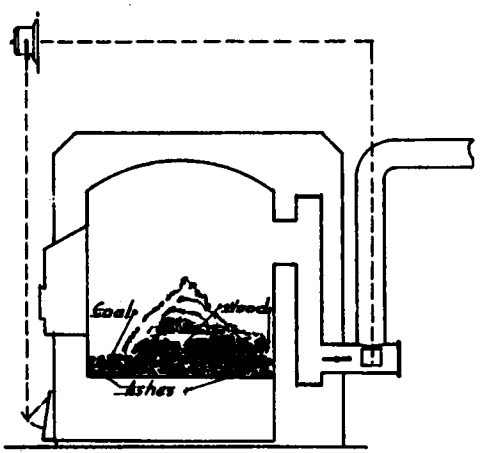


NOTE: Method No. 1 usually used with Bituminous coal.

5. Shovel 2" layer of ashes on clean grate.
6. Shovel 4" layer of coal on ashes.
7. Place paper on coal.

NOTE: Paper should be crushed and balled for free burning.

8. Place kindling wood on paper.



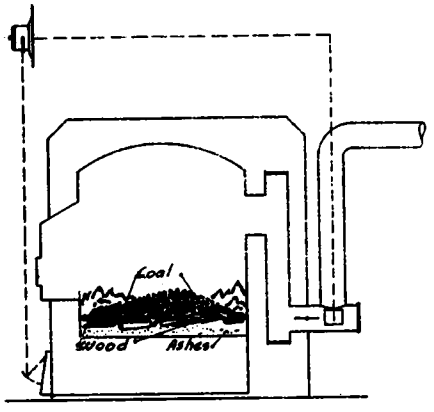
NOTE: Method No. 2 usually used with Anthracite coal.

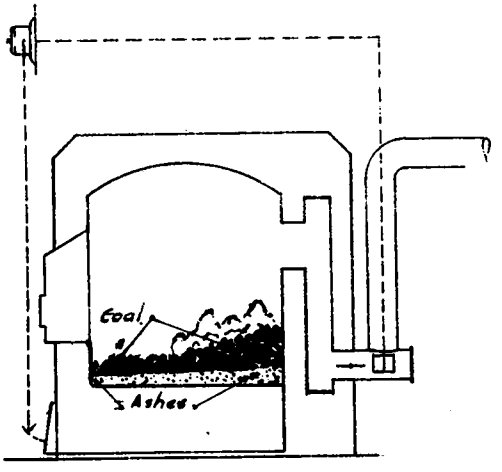
5(a) Shovel 2" layer of ashes on clean grate.

6(a) Place paper on ashes.

7(a) Place kindling wood on paper.

8(a) Shovel 2" layer of coal on wood.





9. Light paper and kindling.

10. Close fire door.

11. Open slide in fire door.

NOTE: Check to see that humidifier contains water.

12. When the fire is burning well add more coal.

13. Open fire door.

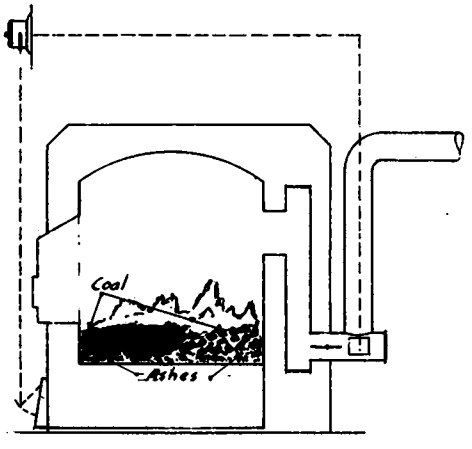
CAUTION: Do not stand in front of fire door. Stand on side on which door is hinged. Gas in firebox may explode out open door.

14. Push hot coals to back of grate with furnace hoe.

15. Break up ash on front of grate.

16. Shovel fresh coal into front of heater.

CAUTION: Always leave a few red coals exposed to burn off gases.



17. Close fire door and open slide on door.

NOTE: Repeat operations 13 through 17 until firebed is level with firedoor opening.

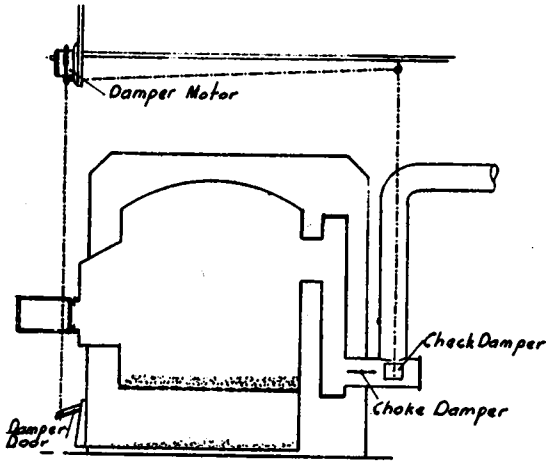
NOTE: Check blower operation at this time. Under normal conditions blower should be in operation.

I. HOW TO MAINTAIN FIRE

Tools and Equipment: shovel, furnace hoe, coal, ash can, straight & hook pokers, shaker lever

Procedure:

1. Open choke damper.
2. Open ash pit door.
3. Open fire door.



CAUTION: Do not stand in front of fire door. Stand on side on which door is hinged.

4. Break up burned out ashes at edge of fire with hook poker.

NOTE: In mild weather these ashes may be allowed to accumulate in order to reduce size of fire bed.

5. Shake grates gently with short strokes until first red coals appear in ash pit.

NOTE: In mild weather shake only as necessary to maintain fire.

6. Break up fire bed with straight poker.
7. Remove any clinkers with hook poker.

NOTE: All clinkers and ashes should be allowed to cool before placing in containers.

8. Level fire bed with hoe or poker.
9. Add fresh coal.

CAUTION: Always leave a few red coals exposed to burn off gases.

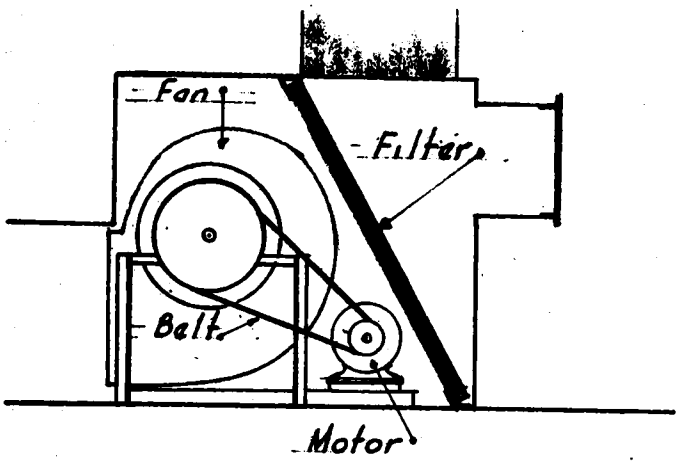
10. Close fire door.
11. Adjust slide in fire door to full opening for a few minutes.

NOTE: This will burn off gases from fresh coal.

12. Close ash pit door.
13. Reset choke damper.
14. Clean floor in front of furnace.
15. Return tools to proper storage.

J. HOW TO ADJUST FAN BELT

Tools and Equipment: Wrench



Procedure:

1. Pull switch so that fan motor cannot start.
2. Turn handles on access panel of fan housing.
3. Pull top of panel away from fan housing and lift out.
4. Loosen bolts on motor base with wrench.
5. Slide motor on base guide with hands until belt tightens.

NOTE: Fan belt should be kept fairly tight - should not sag.

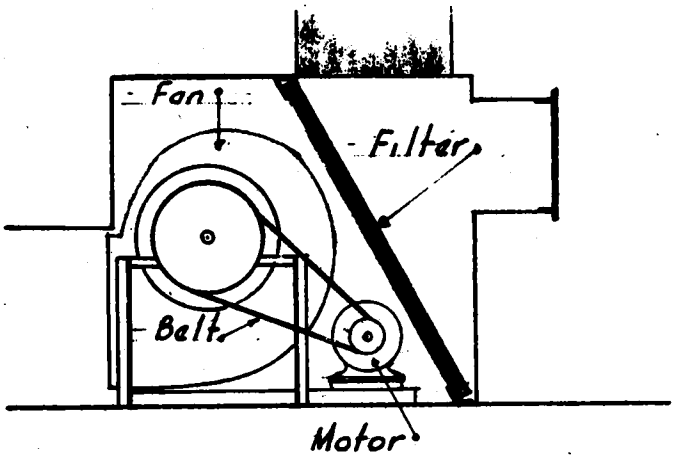
6. Tighten bolts on motor base.

CAUTION: Check fan and motor pulleys for alignment. If not properly aligned motor will overheat.

7. Close or reset access panel and lock firmly in place.
8. Close switch which operates blower.
9. Return wrench to proper storage.
10. Report motors out of alignment to proper authorities.

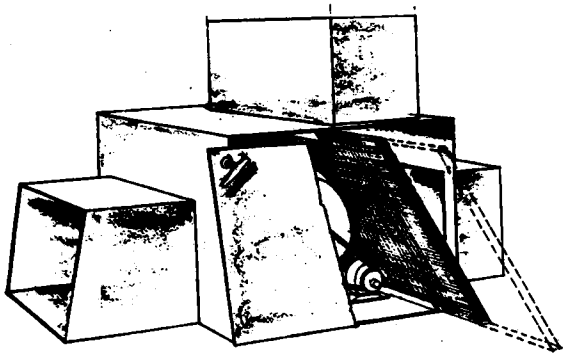
K. HOW TO CLEAN FILTER

Tools and Equipment: Vacuum Cleaner
Broom
Shovel



Procedure:

1. Pull switch so that blower cannot operate.
2. Turn handles on access panel of fan housing.
3. Pull top of panel away from housing and lift out.
4. Lift filters from racks.



5. Tap filters on floor to shake out dust. Apply vacuum cleaner where available.

   NOTE: Filters are usually of throw away type and should be replaced when dirt cannot be properly removed.

   CAUTION: Always replace filters. Operation of system without filters creates fire and health hazards.

6. Place bottom of filter on rack and push into position.
7. Close or reset access panel and lock firmly into place.
8. Close switch which operates blower.
9. Clean floor and return equipment to proper storage.
10. Make request for replacement filters if necessary.

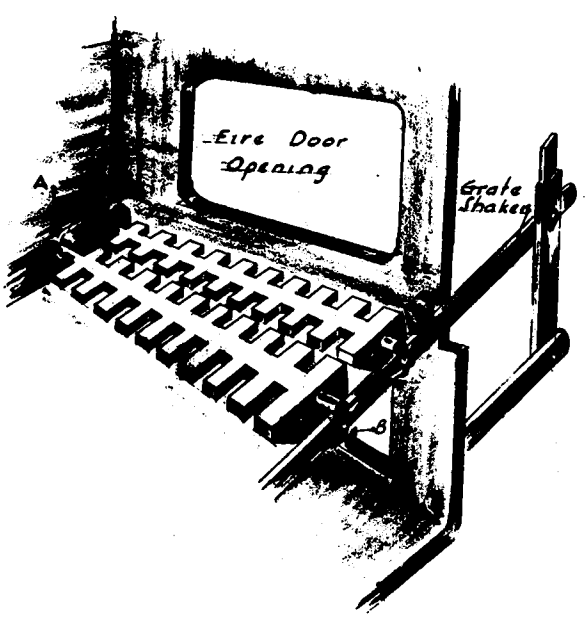
L. HOW TO REPLACE A GRATE BAR

Tools and Equipment: Pliers, Grate Bar, Extension Cord and Light

Procedure:

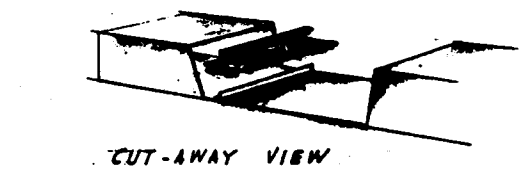
1. Open choke damper.
2. Open fire door and ashpit door.

   NOTE: Fire should be out.
3. Shake ashes through grate and leave in open position.
4. Clean ashpit. See page 22 of this chapter.
5. Connect extension light and place in firebox.
6. Lay new grate bar in ashpit.
7. Lie flat on back and slide head and shoulders into ashpit.
8. Straighten end of cotter pin holding grate bar and remove pin with pliers.
9. Lift end "A" of grate bar from cradle and pull away from shaker bar. (See figure below).
10. Place end "B" of new grate bar through hole in shaker bar and slide into position. (See figure below).
11. Put cotter pin through the hole in grate bar arm and bend pin to hold grate in place.
12. Remove old grate bar from ashpit.
13. Disconnect extension light.
14. Close ashpit door.
15. Return tools to proper storage.

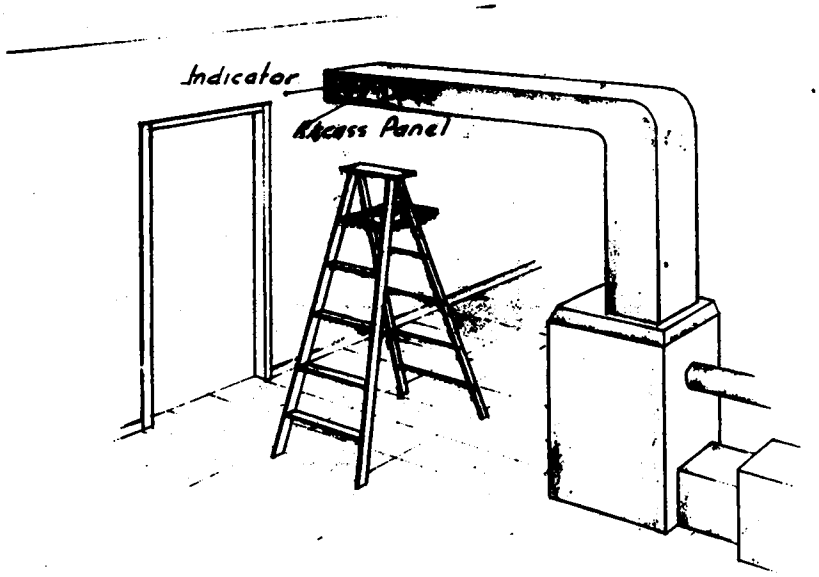


M. HOW TO REPLACE FUSIBLE LINK IN FIRE DAMPER

Tools and Equipment: Ladder
Screw Driver
Fusible Link



CUT-AWAY VIEW



Procedure:

1. Place ladder firmly in position.
2. Remove screws from access panel with screw driver and remove panel.
3. Remove old fusible link by unhooking ends of link.

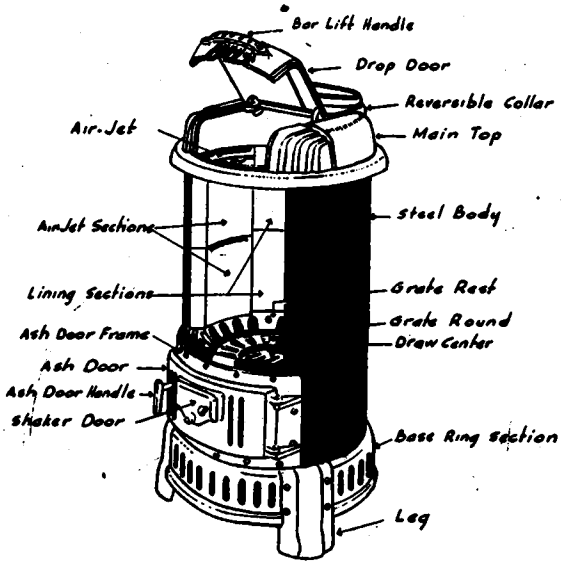
   NOTE: Lift fire damper and allow to fall to see if free acting. If door does not fall freely report to proper authority.
4. Place new fusible link in position.

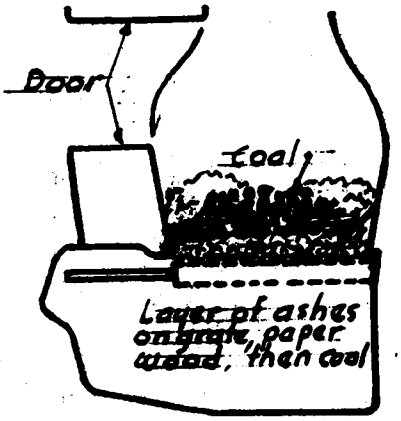
   NOTE: Check to see that indicater shows true position of damper.
5. Replace access panel and screws.

   NOTE: Access panel should close opening to make air tight fit.
6. Remove ladder and return to proper storage.

N. HOW TO OPERATE CIRCULATING COAL SPACE HEATERS

Tools and Equipment: Paper, Dry Kindling Wood, Matches, Small Shovel, Coal





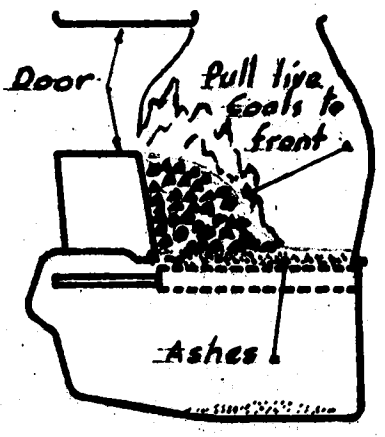
How to Build a Fire

Procedure:

1. Remove ashes and clinkers leaving 1" covering of ashes on grate.
2. Open choke damper in smokepipe.
3. Close check draft or barometric draft.
4. Open draft damper.
5. Open coal feed door.
6. Place paper on ashes.

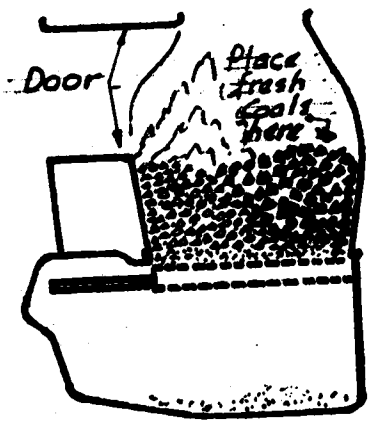
   NOTE: Paper should be crushed and balled for free burning.

7. Place kindling wood on paper and set paper on fire.
8. Close coal feed door until fire is well started.
9. Open coal feed door and add small amount of coal.
10. Close coal feed door and allow coal to get well started.
11. When fire is burning well, open coal feed door.
12. Pull live coals to front of heater.



13. Add fresh coal to back of heater and close coal feed door.

CAUTION: Always leave a few red coals exposed to burn off gases.



14. Open draft slide in feed door.

NOTE: This will allow gases to burn off above firebed.

15. Repeat operations 12, 13 and 14 until firebed reaches desired level.

How to Maintain Fire

Procedure:

1. Open choke damper.
2. Open draft damper.
3. Open coal feed door and break up burned out ashes at edge of fire.

NOTE: In mild weather these ashes may be allowed to accumulate in order to reduce size of fire-bed.

4. Shake grates gently with short strokes until the first red coals appear in the ashpit.

NOTE: In mild weather shake only as necessary to maintain fire.

5. Break up firebed with poker.
6. Remove clinkers with poker or shovel.
7. Level firebed with poker.
8. Add fresh coal and close door.

CAUTION: Always have a few red coals exposed to burn off gases.

9. Open draft slide in feed door for a few minutes.

NOTE: This will allow gases to burn off above firebed.

10. Reset choke damper.
11. Clean floor in front of heater.

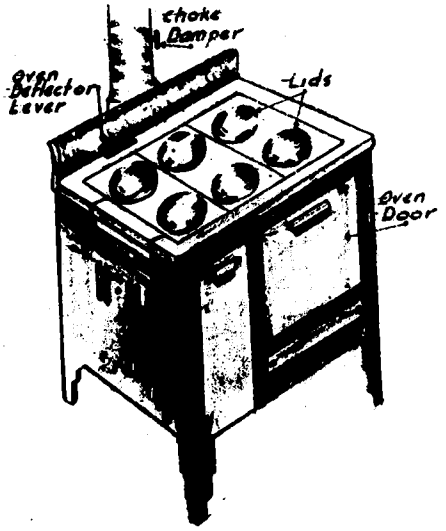
How to Remove Ashes

Procedure:

1. Open choke damper in smokepipe.
2. Close check damper.
   NOTE: This will cause air to draw dust up chimney.
3. Shake grates gently.
4. Open ashpit door and pull ashpan from heater, place on floor.
   NOTE: Ashes should be removed daily. A full ashpit may cause grates to burn or warp.
5. Open coal feed door and remove clinkers with small shovel and place in ashpan.
   NOTE: Do not force clinkers through the grate.
6. Close coal feed door.
7. Remove ashes and clinkers to ash container.
8. Replace ashpan in heater.
9. Close ashpit door.
10. Clean floor.

O. HOW TO OPERATE COAL COOKING RANGE

Tools and Equipment: Paper, Kindling Wood, Matches, Small Shovel, Coal



1. How to Build Fire

Procedure:

1. Open choke damper in smokepipe.
2. Close oven deflector by moving lever on top of stove.
   NOTE: The above operations will allow air to carry dust out chimney.
3. Shake grates to remove ashes.
4. Remove stove lids and top over firebox.
5. Open ashpit door and remove ashpan.
6. Remove clinkers from firebox with small shovel and place in ashpan.
   NOTE: Do not force clinkers through grates.
7. Place paper and kindling on grate and replace crosspiece.
   NOTE: Paper should be crushed and balled for free burning.
8. Set the paper on fire and replace stove lids until fire is well started.
9. Lift stove lids and add small amount of coal.
10. Close stove lids and allow coal to get well started.
11. Add more coal until firebed is built up.
    CAUTION: Water back or coils should be only partially covered by hot coals.

2. How to Maintain Fire

Procedure:

1. Open choke damper.
2. Open stove lids and break up firebed.
3. Add coal and replace stove lids.
4. Set damper controls.

NOTE: For quick burning and heat, damper in smokepipe and ashpit should be open. For low fire or banking, damper in ashpit should be closed and choke damper in smokepipe partially closed.
CAUTION: Ashes should be removed daily. A full ashpan may burn out the grates.

SECTION III. SUPPLEMENTARY OPERATIONS

A. FORCED WARM AIR SYSTEM

Firemen should be familiar with the location and use of all fire fighting equipment in the buildings in which he works.

1. Before starting fire:

   a. Check electric circuits and switches to see that controls and blower will operate.

   b. Check fire dampers in supply ducts.

   c. Check fire dampers in relief duct.

2. After starting fire:

   a. Check operation of blower.

      NOTE: These systems are designed for almost continuous blower operation.

   b. If blower fails to operate:

      (1) Open fire door.

      (2) Open choke damper.

      (3) Close draft dampers.

      (4) Check for power failure.

      (5) Check electrical connection.

      (6) Report condition to proper authorities.

   c. Check operation of damper motor.

   d. If system fails to supply sufficient heat:

      (1) Check condition of fire.

      (2) Check position of draft dampers.

      (3) Check position of fire dampers.

      (4) Check ventilation of heater room.

      (5) Check adjustment of fan belt.

      (6) Check condition of filters.

      (7) Check valve dampers on supply louvres.

      (8) Check condition of smoke-pipe and chimney.

   e. If the building is on fire:

      (1) Warn all occupants.

      (2) Report to fire department.

      (3) Shut off blower.

      (4) Open choke damper.

      (5) Open fire door.

      (6) Close draft dampers.

      (7) Close outside doors.

   f. If the building overheats - no building fire:

      (1) Keep blower running.

      (2) Open choke damper.

      (3) Close draft door.

      (4) Open fire door.

      (5) Open access panels at fire dampers.

      (6) Open heater room door.

Firemen should be familiar with the location and use all of all fire fighting equipment in the buildings in which he works.

B. FORCED HOT WATER SYSTEM

1. Before starting fire:

   a. Check the water in the system.

   b. Check and relieve air from all radiators.

   c. Check electric circuits and switch positions to see that controls and booster pump will operate.

2. After starting fire:

   a. Check altitude gauge and thermometer frequently.

   b. Check operation of booster pump.

   c. Check pressure relief valve.

   d. Check operation of damper control.

   e. Check air cushion in compression tank.

3. If system fails to supply sufficient heat:

   a. Check condition of fire.

   b. Check temperature and pressure of water in system.

   c. Check position of draft dampers.

   d. Check operation of controls, thermostats, etc.

   e. Check operation of booster pump.

   f. Check line supply valves.

   g. Check air elimination valves on lines, if any.

   h. Check water in radiators, relieve any accumulated air.

   i. Check radiator supply valves.

   j. Check draft conditions, chimney, etc.

   k. Check ventilation of heater room.

Firemen should be familiar with the location and use of all fire fighting equipment in the buildings in which he works.

C. STEAM SYSTEM

1. Before starting fire:
   a. Check water in gauge glass of boiler.
   b. Check electric circuits and switch positions to see that controls and condensation pump will operate.
2. After starting fire:
   a. Check water in boiler gauge glass frequently.
   b. Check pressure gauge frequently.
   c. Check pop safety valve.
   d. Check damper motor operation.
3. If boiler gauge glass shows no water:
   a. Do not turn water into the boiler.
   b. Check pet cocks on water column if any.
   c. Open fire door.
   d. Open check damper.
   e. Close draft damper.
   f. Open heater room door.
4. If water does not return to gauge glass within short period:
   a. Remove part of fire by shaking grates.
      NOTE: Do not fill ashpit.
   b. Cover remaining firebed with ashes.
   c. Allow boiler to cool.
   d. Check boiler water feeder operation (if any).
   e. Check condensation pump.
   f. Report to proper authorities.
5. If pressure gauge shows excessive pressure:
   a. Check water gauge glass.
   b. Check fire in boiler.
   c. Check operation of pop safety valve. Tie open if necessary.
   d. Check draft control.
6. If system fails to supply sufficient heat:
   a. Check boiler gauge glass.
   b. Check condition of fire.
   c. Check pressure.
   d. Check operations of controls (Thermostat, etc.)
   e. Check draft dampers.
   f. Check vent on condensation pump.
   g. Check supply line valves.
   h. Check return line traps.
   i. Check radiator supply valves.
   j. Check radiator traps.
   k. Check ventilation of heater room.
   l. Check draft conditions (chimney, etc.)

IV. OUTLINE OF MAINTENANCE OF HEATING EQUIPMENT

The items as noted below for the several types of equipment should be performed at the end of each heating season in order to increase operating efficiency for the coming heating season and to prolong the life of the equipment.

A. All Heating Systems

Chimney:

1. Inspect.
2. Clean if necessary.
3. Check cleanout door for leaks.
4. Record condition.

Smokepipe (Breeching):

1. Clean.
2. Store cleanout cap and allow smokepipe to remain open.
3. Check points of pipe and chimney connection for leaks.
4. Repair leaks.
5. Record condition.

Heater (Boiler or Furnace):

1. Clean flues.
2. Remove all ashes from firebox and ashpit.
3. Clean ashes from behind liners, if any.
4. Check grates.
5. Check doors for leaks.

   NOTE: Slight warping may occur due to dampness. Face of door joints may be ground down to make a tight joint.
6. Paint all exposed iron or steel surfaces.
7. Leave all doors open for air circulation.

   NOTE: If there is danger of warping remove doors and place in dry storage. Due to the humidity in some areas of the country, which may cause excessive condensation on the interior of undrained boilers the above may not apply.
8. Record condition.

Tools:

1. Check condition of shovels, hoe, flue brush, pokers, brooms, ash cans and storage bins.
2. Record condition.

B. Forced Warm Air Systems

Furnace:

1. Follow out directions as outlined under section "All Heating Systems."
2. Check casing for leaks.
3. Repair leaks.
4. Check and clean humidifier.
5. Record condition.

Fan (Blower and Filters):

1. Remove and clean filters.
2. Clean fan blades.
3. Clean and oil motor.
4. Check motor and fan for alignment and adjust.
5. Adjust fan belt.
6. Check housing for leaks and repair.
7. Record condition.

Controls

1. Check all wiring connections.
2. Check operation of all controls.
3. Oil damper motor.
4. Check operation of damper motor connecting chains.
5. Control requiring repair or adjustment should be returned to the manufacturers or their closest service representative, unless mechanics skilled in this work are available on the project.
6. Record condition.

Fire dampers:

1. Remove fusible links and check ease of operation.
2. Oil bearings.

C. Steam System

Boiler:

1. Follow directions outlined under section "All Heating Systems."
2. Blow down or clean boilers with reliable chemical compound if considered necessary.

   NOTE: A fluctuating water line or grease and rust in the gauge glass indicate a dirty boiler condition which will affect efficiency of operation.
3. Remove and clean water gauge glass.
4. Do not drain system and allow boiler to stand dry.

   NOTE: A dry system may result in damage to the boiler caused by unauthorized firing during the off season.
5. The bolts on tie rods of cast iron sectional boilers, which have been in service one season or more should be loosened one quarter to one half turn.

   NOTE: This loosening will relieve any strain on the sections set up by rust accumulation between them.
6. Record condition.

Valves:

1. Remove and clean air elimination valves on lines and radiators. Washing in gasoline or kerosene will cut grease.
2. Check pop safety valve.
3. Check radiator supply valves, pack where necessary.
4. Remove thermostats from traps and clean, check valve seats. If necessary regrind.

Condensation pump:

1. Check wiring connections.
2. Check float control.
3. Oil motor.
4. Inspect check valve.
5. Record condition.

Controls:

1. Check damper control and operation of connecting chains.
2. Check all wiring connections.
3. Check operation of damper motor connecting chains.
4. Oil damper motor.
5. Check boiler water feeder.
6. Controls requiring repair or adjustment should be returned to the manufacturers or their closest representative, unless mechanics skilled in this work are available on the project.
7. Record condition.

D. Forced Hot Water System

Boiler:

1. Follow directions outlined under section "All Heating Systems."
2. Drain compression tank to renew air cushion.
3. Do not drain system and allow boiler to stand dry.

NOTE: A dry system may result in damage to the boiler caused by unauthorized firing during the off season.

4. The bolts on tie rods of cast iron sectional boilers, which have been in service one season or more should be loosened one quarter to one half turn.

NOTE: This loosening will relieve any strain on the sections set up by rust accumulation between them.

5. Record condition.

Valves:

1. Remove and clean air elimination valves on lines.

NOTE: Washing in gasoline or kerosene will cut grease.

2. Check pressure relief valve.
3. Check automatic feed valve.
4. Check radiator supply valves, pack where necessary.
5. Check key air valves on radiators.
6. Record condition.

Booster pump:

1. Check wiring connections.
2. Oil motor.
3. Record condition.

Controls:

1. Check all wiring connections.
2. Check operation of damper motor connecting chains.

3. Oil Damper motor.

4. Check Aquastat.

5. Record condition.

Upon completion of servicing for the off season check records of condition and immediately order all repair parts necessary to put the plant in condition for the coming season.

E. Oil and Gas Burners

Every oil or gas burner installation should be thoroughly inspected and serviced at the end of each heating season, so that minor repairs may be made and the equipment placed in good operating condition.

The proper servicing of oil and gas burners will require mechanics experienced in handling this type of equipment.

If adequately skilled mechanics are not available on the project force, assistance in servicing these burners may generally be had through oil dealers and local utility companies. If not available this service should be secured from the manufacturers or reliable service companies.

Oil Burners:

In servicing oil burners special emphasis should be placed on the following:

1. Check all electrical connections.

2. Oil motor bearings.

3. Clean blower fan and air inlet.

4. Clean oil strainer.

5. Adjust burner combustion rate.

6. Check burner nozzle as to proper orifice, cleanliness and pressure of oil.

7. Check extension of points into flame for carbonization.

8. Test and clean safety controls. (Stack switch, etc.).

Items 1, 2, 3, 4 and 5 listed above can in most cases be handled by project personnel.

Gas Burners:

In servicing gas burners special emphasis should be placed on the following:

1. Check all electrical connections.

2. Check and clean air shutters.

3. Adjust burner combustion rate.

4. Check pressure regulating valve.

5. Check safety pilot control.

6. Check automatic gas valve.

7. Record condition.

Items 1, 2 and 3 listed above can in most cases be handled by the project personnel.

SECTION V. BOOKS AND PAMPHLETS

1. Anthracite Industries. Instruction Leaflets. Anthracite Industries, 101 Park Avenue, New York 17, N. Y., free.

   A series of leaflets and folders giving hints on the operation of your furnace. The titles are as follows:

   Hand Firing for Winter Weather.
   Care and Operation of Anthracite Stokers.
   Summer Care of your Heating Plant.
   Operation of Cook Stoves.
   Ash Removal by Gravity.
   Operation of Space Heaters.
   Hand Firing - Fall and Spring.
   Operation of Tank Heaters for Service Hot Water.
   How to Conserve Anthracite and Improve Your Heating.
   Bulletin L-38 - Baffles for Stoker Fired Boilers.
   Bulletin L-37 - Domestic Anthracite Stokers - Selection, Installation, Service.

2. Appalachian Coals, Inc. "Know How" to solve Heating Problems. 1943. Appalachian Coals, Inc., Fuel Engineering Division, Transportation Building, Cincinnati, Ohio, free.

   A booklet which has been written to help solve consumer problems and gives the answers to a number of common questions asked by consumers.

3. Bituminous Coal Consumers' Counsel. Save Coal. A Chart (8 x 13). Distributed by Appalachian Coals, Inc., Transportation Building, Cincinnati, Ohio, free.

   An illustrated chart which gives a daily firing schedule, shows standard firing methods, influence of air on fire and general information about bituminous coal.

4. MaGirl Foundry and Furnace Works. Instructions for Operating National Super-Air-Heaters. 300 Series. 400 Series. 500 Series. A Chart. 12" x 14". P. H. MaGirl Foundry & Furnace Works, 413 East Oakland Ave., Bloomington, Ill., free.

   A chart prepared by the manufacturers which gives instructions on the operation of the National Super-Air-Heaters.

5. Office of Price Administration. How to Make Economical Use of Anthracite Coal. A Chart. 12½ x 19. Anthracite Industries, Inc., free.

   An illustrated chart which gives hints on selection of proper size fuel, starting the fire, program for the morning, attention of furnace, program for banking fire at night, suggestions for economy, conveniences and comfort and the domestic hot water heater.

6. Richmond, K. C. Furnace Heating Guide. 19 pp. Illus. Published by Coal-Heat Magazine, 20 W. Jackson Blvd., Chicago, Ill., Distributed by Rutter Coal Co., 1246 Melrose St., Chicago, Ill., free.

   Contains information of interest on the operation and maintenance of the heating system.

7. Rutter Coal Company. How to Fire Pocahontas Coal. A Chart. 5½ x 10. Rutter Coal Co., 1246 Melrose St., Chicago, Ill., free.

   A chart which tells how to fire with pocahontas coal by the conical method. Also shows a cross section of furnace in color, showing the location of various parts of the furnace and general shape of the fire.

The attached training outline is to be distributed only to projects with Duo-Therm Oil-Fired Water Heaters, Models 16, 40-2, 40-3, or 90-2. If needed, additional copies may be obtained from the Central Office.

Housing Managers and local authorities holding Bulletin No. 63 shall file this outline in Part 7 of that bulletin. Holders of Bulletin No. 58 shall file it in Part III, Section 4.

JOB BREAKDOWN

STEPS	KEY POINTS
1. INTRODUCTORY TALK	Note: These are notes for the instructor to use in beginning his talk. - There is no need to fear the heater--just respect it. The heater is properly designed and equipped to give satisfactory and safe operation. - The heater in a way is like a washing or sewing machine; when the instructions are followed correctly, it gives good service without any danger. - Heater accidents are usually casued by carelessness. - Only adults (never children) should light or regulate the heater. - Operate heater only when flue pipe is rigidly connected to heater and chimney, and in good repair. If loose, disconnected, or rusted out, do not use - notify management immediately. - Do not store combustible material on or near the heater. - If there is any doubt, notify the management immediately.
2. PURCHASING AND STORING FUEL	- Purchase only No. 1 fuel oil (kerosene). - Oil flows from outside drum to thermostat control and then into burner. - Keep drum cap tight - avoid water getting in oil. - Drum should always remain level. Never tilt to drain as it will loosen the fittings, causing serious leaks and will drain dirt and water in bottom of drum into oil line. - Check drum at least once a week for leaks. Notify management if any are found.

STEPS	KEY POINTS
3. HEATER PARTS	- Fuel line valve. - Safety reset lever. - Burner. - Thermostat control. - Lighter door. - Lighter opening. - Outer door. - Cleaner rod.
4. LIGHTING HEATER	- Do not light hot burner. - Be sure that fuel line valve is open all the way (counter-clockwise (_↑). - Latch safety reset lever by pressing down firmly for a few seconds. - Wait 2 or 3 minutes for oil to flow into the burner. - Raise lighter door and leave open. - Insert a small roll of paper about 4" long into lighter door so that just enough sticks out to light. - Light end of paper. Never light paper <u>before</u> placing in lighter opening. - Allow oil to burn at least a minute. - Close lighter door <u>gently</u>. - Close outer door.
5. TURNING HEATER OFF	- Close fuel line valve (clockwise ↑_)). - Release safety reset lever by pressing sideways and upwards <u>away</u> from heater. - Fire should go out in a few minutes.

STEPS	KEY POINTS
6. CLOSING REMARKS	- For proper and economical operation, leave heater lighted all the time when used regularly. - If heater will not be used for 2 days or more, then turn off. - Thermostat has three settings, "warm," "medium," and "hot." The "warm" setting (140°F.) will give water hot enough for daily use with greatest economy. - If thermostat is set to "warm" and water is extremely hot, notify management immediately. - Once a week push in the cleaner rod and rotate several times. When finished leave pulled out.

5-7-45

TRAINING OUTLINE - DUO-THERM OIL FIRED WATER HEATER, MODELS 16, 40-2, 40-3, or 90-2

INTRODUCTION

This training outline is primarily for the use of the instructor in teaching employees and tenants in the operation of the Duo-Therm Water Heaters, Models 16, 40-2, 40-3, and 90-2. It is not a self-training outline for use by a person without previous knowledge of the operation. The operation may appear to be simple, but yet forgetting just one small detail may jeopardize the safety of the dwelling occupants. For this reason, it is important that only an experienced person do the teaching. It is management's responsibility to see that at least one person on each project staff is capable of properly instructing others.

In addition to the breakdown of how to operate the heater with safety, the outline also includes a few teaching suggestions. It is divided into 6 steps and the instructor beginning with the first step should proceed to the next only when he is satisfied that the trainee knows the steps that have been given so far.

Beginning with Step 3 and extending through Step 5, the instructor should observe the following:

1. Demonstrate each step and explain carefully. Wherever possible, give the "why".

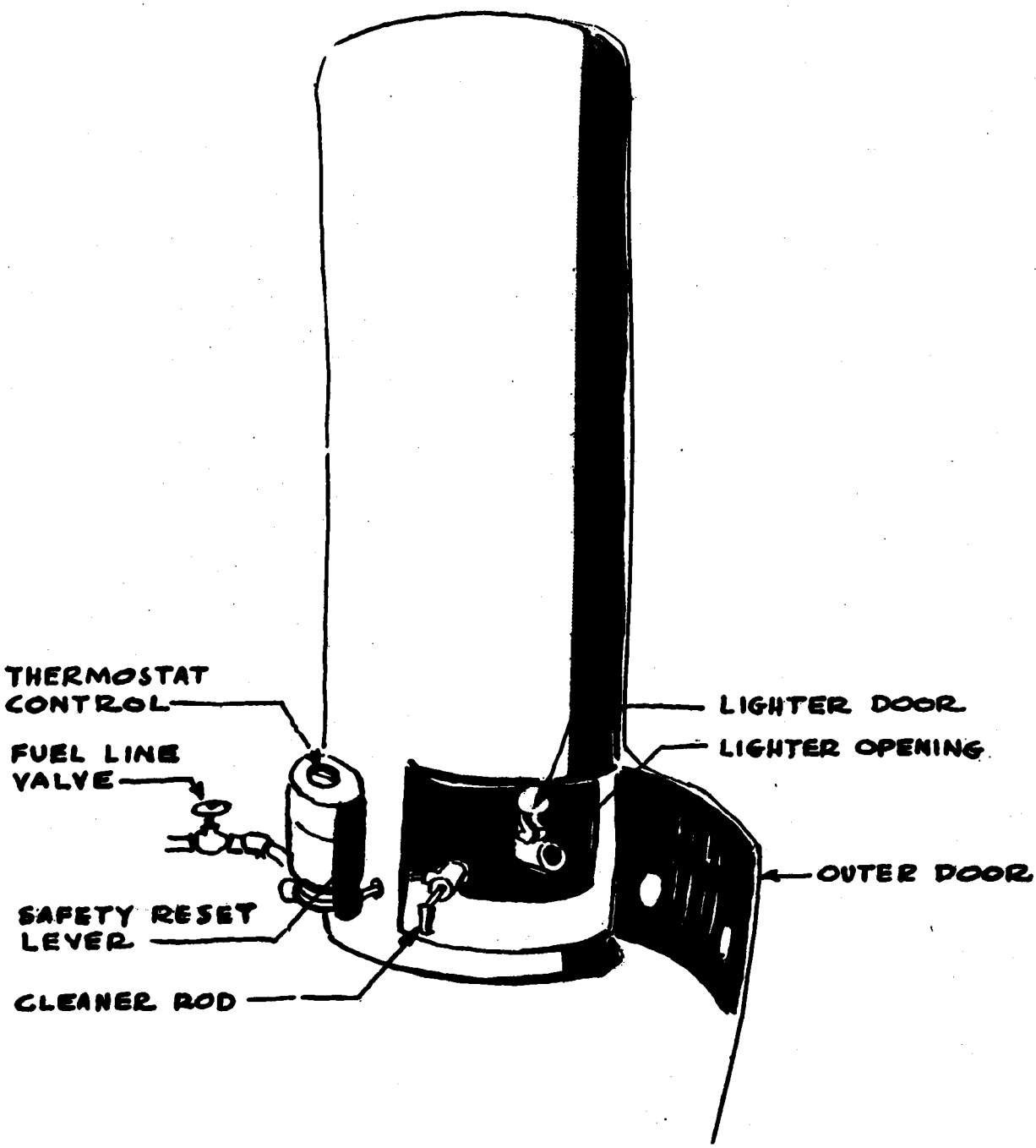
2. Have the trainee repeat the operation, telling what he is doing. Ask "why" questions. Avoid questions that can be answered with a "yes" or "no".

3. When the instructor is satisfied that the trainee has mastered the total heater operation, have him repeat it several times. Ask questions.

Certain employees also have the responsibility of instructing tenants in the operation of this heater. Therefore, after they have mastered the operation, they should be taught "how to instruct". This can be accomplished by having the employee use this outline in teaching the operation to the instructor as if the latter were a tenant. This should be repeated until the instructor (now being trained by the employee) is satisfied that the employee is qualified to teach tenants. Following this, the instructor should follow through by observing the employee in his teaching of tenants. This should continue until the employee knows how to do the job properly.

The job breakdown portion of this outline may be reproduced (with any necessary changes) by local management for distribution to tenants. Under these conditions, it is recommended that Steps 1 and 6 be developed to become a signed statement by the executive director or housing manager and that an illustration be substituted for Step. 3.

DUO-THERM WATER HEATER
(MODEL 40-3)



VACUUM CLEANERS - NEW INDUSTRIAL

Regional requests indicate a growing need for this type of equipment and recent negotiations with the War Production Board have resulted in a limited number of these machines being made available to this Authority.

The following are standards for securing the approval of priority applications

Use. The use of vacuum cleaners are limited to cleaning heating plants, radiators and other parts of the heating system; and for cleaning dwelling units on turnover.

Allotment.

One machine for each project of 300 DU or over.

One additional machine for each increment of 300 DU over the initial 300 DU.

This allotment may be modified upon adequate justification.

Justification. War Production Board approval will be based primarily on estimated fuel and labor savings in critical areas; therefore, the following items of justification must accompany application form WPB 1319 in order to expedite approval;

1. Name and location of project.
2. Number and type of dwelling units.
3. Type of heating plant and number of units.
4. Use to which machine is to be put (be specific).
5. Possible fuel savings.
6. Labor conditions which may affect the need of the equipment and estimated labor savings.
7. Other justification for requesting the approval of the equipment.

All applications shall be placed through Priorities Division of the Central Office.

FPHA-837
10-5-45

BUDGET BUREAU NO. 60-R159.1
APPROVAL EXPIRES: 6-30-47

NATIONAL HOUSING AGENCY
FEDERAL PUBLIC HOUSING AUTHORITY

OPERATION AND MAINTENANCE QUARTERLY REPORT

(See Bulletin No. 6q, Section 1.41 for instructions)

PROJECT NO.	LOCATION (CITY AND STATE)
Ohio 15-2	Smithtown, Ohio
NO. OF DWELLING UNITS: 900	OCCUPANCY (%): 96.5
QUARTER ENDING: March 31, 1945	DATE: April 6, 1945

I. PROJECT HEATING:

1. FUEL: [X] COAL [ ] OIL [ ] GAS DESCRIBE: Bituminous - Screenings
2. B.T.U. OF FUEL: 1150 3. COST: 3.72 PER [X] TON [ ] GAL. [ ] 1000 CU.FT. [ ] TONS [ ] GAL. [ ] CUBIC FT.
4. FUEL CONSUMED: 900 BUDGETED: 8.30
5. HOT WATER AVERAGE/D.U./DAY: 64 GALLONS
6. FUEL CONSUMED: JULY X AUGUST X [ ] TONS [ ] GAL. [ ] CUBIC FT.
7. HOT WATER AVERAGE/D.U./DAY: JULY X AUGUST X [ ] TONS [ ] GAL. [ ] CUBIC FT.

II. TOTAL PROJECT UTILITY CONSUMPTION:

UTILITY	QUANTITY BILLED	QUANTITY BUDGETED	UNIT
STEAM			
WATER	5910 M	6150 M	GALLONS
GAS	753 M	775 M	CUBIC FT.
ELECTRIC	90400	90000	K.W. HRS.
ELEC. DEMAND	999		K.W.

III. IMPORTANT MECHANICAL AND ELECTRICAL ITEMS WORKED ON:

PLUMBING - Replaced pump shaft on sewage ejector - Bldg. - G-7
RANGES - Replaced 21 gas temperature controls. This control manufactured by X Company has been unsatisfactory.
REFRIGERATORS - Cleaned condensors and contact points on 36 units, replaced one door handle - door gaskets are failing after 6 years.
HEATING SYSTEM - Replaced 3 steam reducing valve diaphrams.
Summer maintenance schedule being prepared.
See attached sheet.

IV. PAINTING:

A. EXTERIOR — 1. NO. DWELLING UNITS PAINTED: 82 — 2. APPROXIMATE COST: PROJECT LABOR $ 3120 CONTRACT $ - TOTAL $ 3120

B. INTERIOR

	NO. OF ROOMS: Trim	NO. OF ROOMS: Walls 1/	APPROXIMATE COST PER ROOM: Walls 1/	APPROXIMATE COST PER ROOM: Trim	APPROXIMATE COST PER ROOM: Walls 1/ and Trim	TOTAL MAN HOURS
a. Tenant		84	4.50			21
b. Management	328	244	15.20	4.50	19.45	2772
c. Contract	-	-	-	-	-	-

5 ROOMS PAINTED: 1 COAT 100 $ OIL 100 $ OTHER - $ - KIND -
2 COATS $ OIL $ OTHER - $ - KIND -

C. COMMENTS:

Paint in use is good quality and should stand up for the 3 year cycle.
Approximately 1 hour of management supervision is devoted to each tenant doing painting.
Oil paint only is used on this project. Other proved unsatisfactory. Interior sides of windows is included in the painting of trim.

1/ Include ceilings.

V. STRUCTURES: (IMPORTANT STRUCTURAL ITEMS WORKED ON)

Settlement and Expansion Wall Cracks
Caulking Doors and Windows
Repairs to 150 screen doors
Replacing 200 exterior doors.

VI. GROUNDS:

A. PAVED AREAS (STREETS, ETC.) 1. HAVE REPAIRS BEEN MADE? [X] YES [ ] NO; ARE ADDITIONAL REPAIRS NECESSARY? [X] YES [ ] NO

2. DESCRIBE CHARACTER AND EXTENT OF REPAIRS AND COSTS INVOLVED:

Repaired with cutback asphalt patching mixture, 200 sq. yds. of bituminous paving in parking areas and service drives in Blocks A & B at $.60 per sq. yd. Raised 15 slabs of concrete walks at buildings #1, 3 and 5 with mudjack at $1.00 per slab.

B. LAWNS:

1. % OF TOTAL LAWN AREA: RESEEDED 25 FERTILIZED 50 REBUILT 10

2. % OF TENANTS PARTICIPATING IN LAWN MAINTENANCE 40 (Row House Units Only)

C. TREES AND SHRUBS: % OF TOTAL NUMBER

FERTILIZED 30 PRUNED 30 CULTIVATED 40

D. COMMENTS:

This completes the scheduled three-year cycle of reseeding and fertilizing lawn areas (total of 800,000 sq. ft. @ $3.00). Replaced 20 trees at $15.00. Adjusted 200 shrubs at doorways at $.50. Replaced 150 shrubs about play areas at $1.50. Borers in Oaks reported last summer now under control.

VII. LABOR DISTRIBUTION - MAN HOURS:

JANITORIAL 4210	EXTERMINATING 4220	HEATING LABOR 4350	SUPERVISION AND OVERHEAD 4401	GROUNDS 4410	STRUCTURES 4420	PAINTING AND DECORATING 4430	PLUMBING AND GAS 4440
4212	500	5148	520	2000	1000	2793	550

ELECTRICAL SYSTEM 4450	HEATING & VENTILATING SYSTEM 4460	RANGES 4481	REFRIGERATORS 4482	OTHER EQUIPMENT 4490
350	2600	75	200	100

VIII. OUTSTANDING REPAIR AND REPLACEMENT ITEMS ANTICIPATED TO BE DONE AND WHEN:

All bituminous paving to receive a seal coat of asphalt and limestone in April or May estimated at 2000 sq. yds. @ $.54.

IX. ITEMS OF MAINTENANCE (OTHER THAN LAWNS AND YARDS) TENANTS HAVE PARTICIPATED IN:

Removal and storage of window screens.

X. ITEMS OF RMBR WHICH YOU WISH TO DISCUSS WITH THE REGIONAL MAINTENANCE STAFF:

Boiler settings showing cracks - Condensation in crawl spaces. - Tenant Maintenance in grounds areas of apartment units.

MAINTENANCE SUPERINTENDENT John Smith DATE 4-7-45

MAINTENANCE OF ROADS AND OTHER SURFACED AREAS OF TEMPORARY HOUSING PROJECTS

1. Standard. Maintenance shall be strictly limited to the amount necessary to provide safe, convenient and uninterrupted service throughout the period of probable occupancy of the project.

2. Types of Surfaces. The types of surfaces generally used on temporary projects are gravel, waterbound macadam, stabilized soil and soil-cement, all with or without bituminous wearing surface and, to a lesser extent, cement concrete.

Most of these surfaces are of a light and inexpensive type, presumed to have but a short life. In order to assure satisfactory service for the useful life of the project, constant and well planned maintenance is very essential.

Methods, practices, materials and equipment for maintenance of the above types of surfaces are suggested here. Although local conditions and practices will vary in some degree from those given, the general routine will be found to be similar in all parts of the country.

a. Gravel Roads. Gravel roads are constructed of native materials of either natural bank run gravel or of graded gravel with added binder of soil or clay.

(1) Objectives of Maintenance. Maintenance consists of accomplishing the following:

(a) A firm, consolidated surface with a minimum of loose material.

(b) A crown adequate to insure rapid run-off of surface water (at least 1/2" per foot or 5" for a 20' roadway).

(c) Adequate drainage, by ditches or gutters, to insure disposal of run-off.

(2) Spring Conditioning. It is very important to take advantage of the early spring period to bring the road up to ideal shape and smoothness, as this early maintenance will be directly reflected as an improved surface and in less maintenance during the months which follow. As soon as the frost has left the ground, or in warmer areas, winter rains are largely over, the road should be worked to a good condition. If the spring maintenance is done thoroughly, no further heavy maintenance should be necessary until the shaping in the fall.

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Par. 2 (Cont'd)

Large pot-holes should be repaired by first squaring the sides to the greatest depth of the hole; filling with well proportioned gravel and binder, moistening; and then temping in well with a heavy tamper. Calcium chloride mixed with gravel will aid in obtaining a well bound, tight job.

After pot-holes are filled, the road should be bladed or dragged. This operation has two purposes, first, to give proper shape to the road cross section, and second, to remix the road surface materials. As above noted, the crown of the road is of great importance. Blading or dragging should reform the crown, fill hollows, ruts, etc., and give the road a firm, well drained surface. Blading should be done during or immediately following a rain. Blading should work the surface material from the side of the road toward the center and then reversing the operation, feather the material to the edge of the road.

If the road surface is in very poor condition, and funds and equipment are available, the road may be scarified, new material added and mixed in place with the scarified material. A check should be made of the approximate ratio of aggregate to binder, about one part of binder to nine of aggregate being usually proper.

(3) Summer and Fall Maintenance. Maintenance during this period is limited to light blading of the surface. As in spring conditioning, the blading should be done during or after a rain. Care should be taken to maintain only a length of road that can be compacted before the road surface becomes too dry to bond under traffic.

In many cases these surfaces can be improved by the application of a binding medium such as calcium chloride, road oil or cut back asphalt. The binding material should be applied after the surface has been bladed and shaped by working it into the surface material. The amount of application will vary depending upon the character of the surface material and should be determined after consultation with local highway maintenance people. In the case of calcium chloride, it will usually be found satisfactory to apply it at the rate of one pound per square yard for the initial treatment and approximately 1/2 to 3/4 pound per square yard for subsequent treatments as may be found necessary. In the case of road oils and asphalt binding materials, local conditions and

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character of the materials vary so much that no set rule can be stated which will satisfy all requirements. It is suggested that local practice be followed in the application of these materials.

b. Waterbound Macadam Roads. Waterbound macadam road consists of layers of graded sizes of crushed limestone, dolomite or trap rock placed on a carefully prepared subgrade and bound together, by rolling, with screenings and water.

(1) Spring Conditioning. As in the case of gravel roads, waterbound macadam roads should be reconditioned each spring after weather conditions become favorable. Pot-holes should be cleaned out by removing all loose stone and dirt. The loose stone removed should then be replaced, tamping and adding more stone, if necessary, until the holes are filled. Screenings should then be placed on the stone and watered in, repeating until the voids are filled, tamping well after each operation. If a pot-hole is more than 4" in depth, the stone should be placed in two layers, screening in each layer independently and tamping well.

This type of road is not generally scraped or bladed as in so doing, the road surface may be destroyed. Should the road be in bad condition, it may be necessary to reconstruct the surface by scarifying, adding new material, and rolling.

In the normal use of the road, traffic and water will tend to carry the screenings to the side of the road, exposing the aggregate. As a part of routine maintenance, the screenings should be broomed back over the road, new screenings being added as required to fill voids and bind the aggregate.

After the road surface has been reestablished, calcium chloride, or other binding media, may be applied as outlined under gravel roads.

c. Bituminous Surfaces. Bituminous surfaces consist of bituminous surface treatment, bituminous macadam, road mixes, and bituminous concrete with either tar or asphalt used as binders. Such surfacing may be placed on gravel, macadam or soil cement bases.

Bituminous surfaces on temporary war housing projects consist usually of surface treatment, having a thickness of not more than 3/4 inch, on a base as noted above.

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It is very important that light bituminous surfacing be kept as water-tight as possible and that repairs are made before there is serious deterioration. Before winter sets in, particularly, the road should be carefully inspected, and patched and sealed as required. Open patches should be sealed by applying a coat of tar, and then coating with sand. In the spring after heavy rains have ceased, the road should again be inspected, and winter damage fully repaired. Satisfactory maintenance of both types of road surfaces can result from careful patching and sealing of surface breaks, when needed.

(1) Patching. Cold Patch mixes, tars and emulsified asphalts are widely used and acceptable materials for patching, and for repairing thin surface breaks.

In repairing thin surface breaks, the surface should be thoroughly cleaned, coated with bituminous material and covered with small chips, pea gravel or coarse sand.

To repair holes in the road, cut the wearing surface back to a firm vertical edge, and sweep hole clean. Paint edges and 2 inches of adjacent pavements with bituminous material. Fill the hole to slightly above grade with a prepared mix. Tamp or roll the mix until thoroughly compacted.

Deep holes in bituminous surfaces should be cleaned out and filled with two layers of patching material, using 3/4" aggregate to within an inch of the road surface, with a top layer of 3/8" aggregate. The top layer should be placed so as to slightly more than fill the hole. (For best results, seal all open patches in the fall with a coating of bituminous material and cover with sand in order to seal the voids for winter protection.)

The mix for patching holes and other heavy repairing, may be prepared as follows:

For normal patching, use 3/4" - No. 8 uniformly crushed stone, slag or gravel; for thin patches use 3/8" - No. 8 size materials. Use approximately .5 to .6 gallons of bituminous materials per cubic foot of aggregate for normal patching. If a denser mix is required, add 10 to 15% by volume, of coarse sand after the binder and aggregate have been mixed. It may be necessary to slightly increase the amount of binder. Mixing may be by hand on a clean metal or wood platform. Mixing should be continued until all aggregate is thoroughly coated

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and distributed throughout the mix. If a concrete mixer is used, the dried aggregate should be put in the mixer first, the binder being added slowly, and mixing continued until a uniform mix is obtained. The mix should be prepared at least two weeks before it is used, and in warm weather, if possible.

The use of rapid curing cut back asphalt is suggested where the material is available, because of the ease in handling. The mix should be prepared in a concrete mixer or cement mixing box, using 94.5 - 96.0% mineral aggregate to 4.0 - 5.5% cut back asphalt. The mix should be prepared at least two weeks before it is used. The aggregate should be thoroughly dry and at a temperature of not less than 50 degrees F.

(2) Surface Treatment. A seal coat applied to the road surface when needed (before large voids or disintegration begins) should be sufficient to keep the surface in good condition. The procedure of applying a seal coat is as follows: Clean the road surface by brooming and patch as previously described, if necessary. Apply bituminous material at the rate of approximately 1/3 gallon per square yard and cover immediately with limestone, trap rock or slag chips (size 3/8" - No. 8) or torpedo sand at the rate of 20 to 25 lbs. per square yard. Broom, drag and roll.

If the road surface is in poor condition, it is advisable to obtain technical assistance on the methods and materials to be used from one familiar with local conditions, such as the local city or county highway engineer.

(3) Bituminous Surfacing on Soil-Cement Roads. When the bituminous surface, under normal usage, wears down to the soil-cement, it should be replaced with a similar seal coat. In case the seal coat ruts or peels, it should be removed, the soil-cement base carefully cleaned down to hardened material, and the seal coat replaced as described above.

d. Soil Cement Roads. In patching failures in soil cement roads, the broken material should be removed, the space cleaned out to a depth of 6 or 8 inches and filled with a soil-cement mixture of the same cement content, moisture content and density as used in the construction of the road. Usually a mixture of from 10 to 15 per cent of cement, by volume, is adequate. In many cases it will be practical and convenient to use a small concrete mixer if the repairs are extensive. Soil from the shoulder, which will generally be found satisfactory, should be thoroughly mixed with the cement, the material then compacted from the

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bottom up to the required grade. Smaller quantities can be mixed on a wooden platform or steel plate.

c. Concrete Roads. Concrete pavements, if constructed properly, should require a minimum of maintenance for many years. Cracks, however, will occur if the subgrade is defective or if joints are not properly spaced, and may cause the pavement to settle or heave.

(1) Correction of Settlement. Serious cracking and settlement of sections of the pavement can often be corrected by the use of a mud jack, forcing in proper amount and kind of soil and cement until the slab of concrete has been brought back to its proper level.

(2) Cracks. Cracks should be filled as soon as they appear. Each crack should be carefully cleaned and dry. An iron hook is handy to dig out the dirt. This should be followed by a thorough sweeping. Bituminous material should then be poured into the crack and covered with sand, pea gravel or limestone chips.

3. Road Drainage. Inadequate drainage is often the reason for roads and road surfaces deteriorating. When this is the case, it is futile to attempt to correct the road surface condition without correcting the cause. Inadequate drainage may be caused by the following factors:

a. Inability of water to drain from the subgrade.

(1) Profile of the road too low in relation to the surrounding ground causing drainage toward the subgrade. This should be corrected by raising the profile of the road or by providing drainage away from the subgrade of the road through or around the surrounding ground.

(2) Inadequate dimension and grade of gutters. This should be corrected by adequately extending and properly grading the gutters.

(3) Excessive growth of vegetation and collection of debris in gutters. This should be corrected by cleaning gutters of these obstructions.

b. Inadequate cross drainage from the higher to the lower side of the road. This should be corrected by providing adequate cross drainage at proper locations.

c. Pervious road surface and impervious shoulders. This should be corrected by properly compacting, binding and sealing the road surface

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and by draining through the shoulders at intervals where necessary.

d. Development of springs in the road subgrade. This should be corrected by adequately draining the areas effected by springs to free the subgrade of the road of all excess water.

4. Walks

a. Concrete. The maintenance of concrete walks will generally be limited to removing hazards, such as heaved, sunken or broken slabs.

Excessive amounts of sunken slabs can be brought to their proper level by the use of a mud jack. Where minor repairs are necessary on walks less than 5 feet in width, the slabs can be raised with a bar and the space filled by tamping earth from the edges.

b. Gravel. Maintenance of gravel walks will be limited to filling in depressions that occur and adding new material when necessary. In the spring, walks may need raking and rolling to bring them to the desired cross section. The use of calcium chloride is beneficial in holding the surface and preventing dust. The amount used in initial application should not be over 1 pound per square yard.

5. Maintenance Methods, Materials and Equipment. The size of project, types of road and local factors will largely determine methods used in road maintenance. With the type of road generally used in the construction of temporary housing projects, the regular road patrol method is recommended. The patrol should be of such frequency that damage can largely be found and repaired in an incipient stage, before major repair is required. On gravel or waterbound roads of moderate to heavy use, a patrol of once a week is advisable, as well as immediately following heavy rains and storms. Follow up should be made at once of reports of damage in addition to that normally made by the patrol.

On smaller projects, the patrol may consist of one man, with wheel barrow or cart, carrying tools and limited amount of repair materials. Small stock piles should be protected so as to prevent their use as sand piles by children. They should be located as far as possible in accessible places and adequately covered with burlap, tar paper, boards, or other satisfactory material or stored in closed bins or boxes. The patrol on the very large projects may be a two or three men crew, with a light truck, carrying tools and materials. A crew of this size could take care of more extensive damage, as well as that in an incipient stage.

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The smaller tools necessary, such as shovel, tamper, rakes, etc., are not too difficult to obtain. The larger pieces of equipment, however, such as graders, rollers, drags, etc., which will be needed from time to time are difficult to obtain. In most instances it may be possible and probably more economical to borrow or rent such equipment from city, street or county, highway departments, at times with trained crews.

Some of the smaller pieces can be made in the project shop:

a. Road drag or scraper. Built of timbers, to be dragged by truck or tractor and to carry additional weight as needed.

b. Calcium chloride spreader. A farm lime spreader may be used. A simple box spreader, however, can easily be made to fit on the rear of a truck. One type is a box approximately a foot square, 8 feet long, without top; constructed with a hinged bottom so that the opening may be adjusted for various rates of distribution. Hooks for hanging the spreader to the tail gate hinge rod or elsewhere, should be provided.

6. Traffic Regulation. Fast moving traffic is a contributing factor to road deterioration especially on waterbound macadam and gravel roads. Cars turning corners rapidly on this type of road, in particular, cause ravelling and the throwing of aggregate to one side of the road, creating pot-holes or completely destroying the road surface.

The project should be posted with adequate signs indicating the proper use of the traffic arteries and the maximum allowable speeds. Strict enforcement of the established regulations should be enforced.

7. Consultation. The foregoing is only a brief outline of some of the problems and of methods used in road maintenance. The many varying conditions, materials and methods used in the several parts of the country, and the necessity of a thorough knowledge of the existing conditions make it advisable to obtain technical assistance from one familiar with local conditions and materials. It is suggested that a local engineer or the city or county highway department be consulted in devising an overall program of maintenance, and especially before attempting any extensive repair or reconditioning work.

INSPECTION OF PROJECTS TO ELIMINATE COMMON FIRE & ACCIDENT HAZARDS 1/

This section contains requirements for inspections needed to reduce fire and accident losses on war-housing projects. Project inspections supplement inspections made by the regional staff, who may be called upon for advice and assistance in developing the project inspection program. Inspection work should be done by regular project employees. Local fire and police departments should be requested to assist in making such inspections.

1. Importance of Inspections. Virtually all fires and accidents are avoidable. Those on public housing projects may generally be attributed to:

   a. Carelessness, primarily due to lack of knowledge of hazards.

   b. Failure to teach children the dangers of fire, automobiles, etc., and inadequate supervision of children.

   c. Project equipment which was improperly installed, or has become defective, or has not been properly maintained.

   d. Tenant-owned equipment which originally was, or has become, unsafe to use.

   The above causes of fire and accident may be largely eliminated by careful inspection of properties and by safety education. Safety education is most effective if it is related to actual home conditions. Dwelling inspection provides this opportunity, and the person making the inspection should point out any unsafe practices which he finds, or which he suspects may exist, in the dwelling inspected.

2. Use of Check List. The "Check List of Common Fire and Accident Hazards" (Form FPHA-146) is to be used for making inspections of all dwelling and nondwelling buildings and units, and outdoor spaces. (See Exhibit 1 at end of this Section). All check list items may not apply to each project 2/ or to each unit or building inspected 2/; on the other hand, additional hazards not included on the check list may be discovered. Corrective action required by such additional hazards should be inserted at the end of each section of the list, or on its reverse side. The check list includes items which require corrective action by both tenants and management, since these responsibilities vary on different type projects. In addition, it lists items in which tenants should receive instruction (items 81 & 82) and additional items (91-96) for discussion with tenants. Tenant instruction cannot be overemphasized, and the inspector should lay special stress on these items.

1/ See Manual Sections 4646:1 and 6646:1 for responsibilities of local management for inspecting projects, training employees and instructing tenants.

2/ Note that certain subitems under items 1, 2 and 3 (for example) apply only to particular types of heating and cooking equipment.

3. Reports of Inspections. Exhibit 2 at the end of this section contains a suggested form to be used by the inspector in reporting hazards found and corrective action required. It can be reproduced by the project by typing or other process. A copy of each inspection report shall be submitted to the regional management division.

4. Training Inspectors. 1/ Persons making the inspections should become familiar with common hazards. This may be accomplished by discussing with them the attached check list and other fire prevention and safety material included in other sections and chapters of this bulletin, safety-grams, etc. Additional information about hazards should be obtained from the National Fire Protection Association, the National Safety Council and other organizations with which fire and police chiefs are acquainted. Employees and others assisting in inspections should be acquainted with all types of heating, cooking and electrical equipment used in the project. They should know how the equipment operates and how it should be maintained, how to detect improper operation, and all the possible hazards related to the equipment. If manufacturers' operating and maintenance instructions are not already available, they should be requested of the manufacturer.

   Inspection work and training should be under the direction of the best qualified project employee. The project fire or police chiefs, or maintenance superintendent will normally be selected as supervisor. The local fire and police chiefs should be called upon to provide assistance in training inspectors as well as in doing the actual inspections.

5. Frequency of Inspections. A complete inspection of all dwelling and non-dwelling buildings and spaces shall be made initially and annually thereafter. This inspection should be combined with the annual maintenance inspection.

   In addition to the annual inspection, the following inspection schedule should be followed:

   a. All types of dwelling units - at the time when a new tenant moves in. 2/
   b. Stop-gap housing - monthly inspections.
   c. Dormitory and multiple family dwellings - bi-monthly inspections.
   d. Family dwelling units (excluding multiple family dwellings) - prior to the beginning of each heating season and six months later.

   Reinspections need include only items which are known hazards, such as the functioning of equipment, a check on hazards previously noted and instruction needed by the tenant with respect to the use of equipment, a review of possible housekeeping hazards, etc. (See Check List Items 81, 82 and 91-96)

1/ See also the following releases in this bulletin:
   a. Section 10.90 "Training Project Employees in Fire Prevention and Fire Fighting."
   b. "Training Outlines" relating to the operation of gasoline and oil-burning stoves and heaters.
   c. Section 7.61 "A Course of Training for FPHA Employees in the Operation and Maintenance of Heating Equipment.

2/ Prospective tenants should be instructed in how to use their heating and cooking equipment before they move into the project.

FPHA-1936
7-1-45

NATIONAL HOUSING AGENCY
FEDERAL PUBLIC HOUSING AUTHORITY

CHECK LIST OF COMMON FIRE AND ACCIDENT HAZARDS

(See reverse side for instructions)

HEATING AND COOKING EQUIPMENT

1-SPACE HEATER OR FURNACE: a-Clean. b-Check operations. c-Adjust flame. d-Level (oil or kerosene).
e-Repair or replace: (1) automatic controls, (2) thermostat, (3) fuel supply line, (4) fuel tank, (5) fuel overflow, (6) water line, (7) water gauge, (8) water overflow, (9) relief valve, (10) fire-box, (11) grates, (12) door, (13) chains.
f-Move away from combustible walls or protect 1/: (1) walls, (2) ceilings, (3) floor.
g-Remove combustible materials stored too close.

2-WATER HEATER: a-Clean. b-Check operations. c-Adjust flame.
d-Repair or replace: (1) automatic controls, (2) relief valve.
e-Move away from combustible walls or protect 1/: (1) walls, (2) ceilings, (3) floor.
f-Remove combustibles too close.

3-COOK STOVE: a-Clean. b-Check operations. c-Repair. d-Level (oil or kerosene). e-Remove combustibles.
f-Move away from combustible walls or protect 1/: (1) walls, (2) floor, (3) cabinets.

4-SMOKE PIPE: a-Clean. b-Make tight. c-Replace. d-Support rigidily. e-Repair or replace dampers or controls.
f-Install smoke pipe for: (1) space heater, (2) water heater.
g-Provide air space or insulate 1/ from combustible material.

5-CHIMNEY OR FLUE: a-Clean. b-Make tight. c-Repair clean-out. d-Provide air space or insulate 1/ from combustible material.

6-DUCTS: a-Adjust or repair dampers. b-Replace or provide fusible links. c-Replace combustible construction. d-Insulate from combustible construction. e-Remove combustibles stored too close.

7-RELIEF DUCT: a-Adjust or repair dampers. b-Replace or provide fusible link. c-Remove combustibles stored too close.

8-ASHES: a-Remove. b-Remove combustibles too close. c-Provide metal cans.

9-[illegible]: a-Keep away from heaters, smoke pipes, chimneys and combustibles.

OTHER:

FLAMMABLE LIQUIDS (Note: Storage and use permitted only if required as fuel)

11-GASOLINE, NAPHTHA, BENZINE, ETC: a-Remove from premises. b-Store outside away from structures. c-Provide safety can. d-Reduce to two gallons or less.

12-KEROSENE OR FUEL OIL: a-Store outside (away from structures). b-Provide metal can with cover. c-Repair leaking oil drums or fittings.

OTHER:

ELECTRICAL - INSIDE

21-ELECTRIC INSTALLATION, FIXTURES, EQUIPMENT: a-Repair: (1) wiring, (2) fuse box, (3) switch box, (4) outlets, (5) fixtures, (6) loose fixtures.
b-Equipment (1) unsafe, (2) repair.
c-Replace improper fuse. d-Keep fuse box and cabinets closed. e-Remove paper lamp shades.

22-EXTENSION CORDS: a-Shorten. b-Repair. c-Replace. d-Remove from floor or under rug. e-Remove cord draped over nails, pipes or metals.

23-FIRE ALARM SYSTEM: a-Test system (chart indicates system has not been checked for a week). b-Obtain spare batteries.

24-[illegible]

EXITS

31-DOORS: a-Repair: (1) door, (2) screen door, (3) hardware, (4) glass.
b-Remove obstructions.
c-Refit or loosen: (1) door, (2) screen.

32-WINDOWS: a-Repair: (1) window, (2) screen, (3) hardware, (4) glass.
b-Refit or loosen: (1) window, (2) screen.

33-PASSAGEWAYS, STAIRS: a-Clean aisles and passageways.
b-Remove storage from: (1) stairs, (2) fire escapes.
c-Unlock exit door. d-Provide exit signs. e-Repair railings. f-Provide railings.

34-FIRE DOORS: a-Repair. b-Repair hardware. c-Provide or replace fusible link. d-Avoid blocking opening (remove hooks, etc.).

OTHER:

STORAGE AND TRASH

41-STORAGE ROOMS OR CLOSETS: a-Clean up. b-Eliminate congestion. c-Remove unnecessary combustible material.

42-STORAGE IN BUILDING: a-Remove: (1) paper, magazines, (2) old clothes, rags, (3) old furniture, (4) garbage, trash, etc.
b-Provide closed cans for oily rags or wash out rags. c-Air-out paint or oil stained overalls, etc.

43-TRASH: a-Provide closed metal can. b-Remove.

OTHER:

MISCELLANEOUS - BUILDINGS

51-FLOORS, CEILINGS: a-Repair: (1) floor boards, (2) ceiling.

52-FOUNDATION, BASEMENT: a-Repair foundation wall or skirting. b-Correct settling. c-Keep access locked. d-Remove combustible storage.

53-ATTIC, ROOF: a-Repair, coat or paint roof. b-Remove bird nests. c-Remove combustible storage. d-Keep access to attic locked.

54-KITCHENS: a-Clean up. b-Clean up grease. c-Repair water leaks. d-Remove obstructions in passageways.

55-TOILETS: a-Clean up. b-Repair leaks. c-Clean passageways.

56-LAUNDRIES: a-Clean up. b-Repair water leaks.

OTHER:

OUTSIDE AREAS

61-GARBAGE AND TRASH: a-Remove rubbish, ashes, broken glass, etc. b-Provide adequate number of metal cans.

62-STREETS; WALKS, GRASS: a-Repair streets. b-Repair curbs. c-Repair walk. d-Cut grass and weeds and remove cuttings.

63-STREET LIGHTS: a-Provide additional light.
b-Repair or replace: (1) standard, (2) glass, (3) bulb.

64-TRAFFIC LIGHT OR SIGN: a-Provide. b-Repair or replace.

65-ELECTRIC OR TELEPHONE: a-Wires sagging or broken. b-Pole needs repair. c-Report to utility company.

66-MISCELLANEOUS: a-Trees: (1) remove tree or low, broken or dead branches, (2) stop decay.
b-Remove, raise or relocate clothes line. c-Check for gas leaks. d-Repair or replace broken or missing manhole covers.

OTHER:

1/ *Protect with 3/16" asbestos board. Support wall insulation on 1" incombustible furring, with space for air to enter at bottom and leave at top. Provide ventilated thimble where smoke pipe passes through a partition or ceiling.*

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FIRE FIGHTING EQUIPMENT

71-FIRE HYDRANTS, ETC.: a-Repair. b-Replace. c-Thaw (frozen)., d-Loosen cap.

72-FIRE EXTINGUISHERS: a-Repair. b-Recharge. c-Clean corrosion. d-Mount on wall. e-Tag.

73-FIRE AND GARDEN HOSE: a-Repair or replace. b-Clean. c-Provide hose reel or rack. d-Repair or replace fittings and/or nozzle.

OTHER:

INSTRUCTION OF TENANTS IN USE OF EQUIPMENT, ETC.

81-INSTRUCTIONS: a-Needed.
b-Given-in operation of: (1) heating equipment, (2) cooking equipment, (3) electrical appliances, (4) fire extinguishers; or in (5) calling fire department, (6) emergency escape.

OTHER:

AVOIDANCE OF HAZARDS (For discussion with tenants)

91. Matches, smoking - Smoking in bed, safe handling of matches and cigarettes, safe ash trays.

92. Gasoline, etc. Fuel - Safe handling, danger of explosion. Pour into stove tank outdoors only. (See item 11)

93. Kerosene & fuel oil - Safe handling. Never fill tank while heater is [illegible]. Wipe up if spilled. (See item 12)

94. Falling hazards - Objects on floor. Loose rugs. Wet or greasy floors. Makeshift ladders, etc.

95. Safety of children - Don't leave them alone at home! Keep matches, poisons, short and small objects, etc., out of reach. Don't let them handle gasoline, kerosene, etc. Keep pot handles, etc. turned away from the edge of stove. Don't leave heavy objects where they can be pulled down. Show them where to play safely.

96. Miscellaneous - Turn off stoves, electric irons, etc. when not using and check before leaving home. Avoid overheating. Report equipment not working properly. (See also items 8, 21, 22, 42 and 61)

INSTRUCTIONS FOR USE OF CHECK LIST

This check list outlines corrective action required to eliminate common hazards. All dwelling and non-dwelling buildings and spaces (indoors and outdoors), roads, walks, etc. require inspections. All sub-items may not apply to each item inspected, e.g., certain sub-items under item 1 apply only to particular types of heating equipment.

Items 91 through 95 are for discussion with tenants. Discuss items which may apply to the family living in the dwelling inspected. Request cooperation in eliminating such hazards.

REPORT OF INSPECTION OF COMMON FIRE AND ACCIDENT HAZARDS

PROJECT NUMBER

LOCATION

UNITS INSPECTED (1)	ITEMS TO BE CORRECTED BY TENANT	O.K. OR DATE	ITEMS TO BE CORRECTED BY PROJECT	O.K. OR DATE	REMARKS

INSPECTED BY:	DATE	CORRECTIONS CHECKED BY:	DATE	HOUSING MANAGER:	DATE

(Instructions on Reverse)

INSTRUCTIONS FOR PREPARING REPORT FORMS

Column 1. List dwelling units by number or address and identify non-dwelling units and building and outdoor spaces. List all units or buildings whether inspected or not. Outdoor spaces should be included as part of the unit or building.

Columns 2 & 4. List item numbers (from check list) which require correction by tenant (column 2) or by management (column 4).

Columns 3 & 5. Enter "OK" if no corrections are required. Fill in dates when required corrections have been completed.

Column 6. Enter corrective action for hazards if such action is not covered by check list. Enter reason for non-inspection of a unit or building. Continue "remarks" across entire width of sheet, if desired.

Continue this form on separate sheets if required.

A. INSPECTIONS BY PROJECT PERSONNEL, TO ELIMINATE COMMON FIRE & ACCIDENT HAZARDS. 1/

This section contains requirements and suggested procedures for inspections to be made by regular project employees and by local fire and police departments, on the initiative and under the direction of project management.2/ These inspections should supplement those made by the regional office staff. The regional fire prevention and safety engineer may be called upon for advice and assistance in developing project inspection programs.

1. Importance of Inspections. Virtually all fires and accidents are avoidable. Those on public housing projects may generally be attributed to:

   a. Carelessness, primarily due to lack of knowledge of hazards;

   b. Failure to teach children the dangers of fire, automobiles, etc., and inadequate supervision of children;

   c. Project equipment which was improperly installed, or has become defective, or has not been properly maintained;

   d. Unsafe tenant-owned equipment.

   e. Poor housekeeping.

   These causes of fire and accident may be largely eliminated by careful inspection of properties and by safety education. Safety education is most effective if it is related to actual home conditions. Dwelling inspection provides this opportunity, and the person making the inspection should point out any unsafe practices which he finds or which he suspects may exist in the dwelling inspected.

2. Frequency of Inspections. A complete inspection of each dwelling and non-dwelling building and outdoor area shall be made annually. This inspection should be combined with the annual maintenance inspection.

   In addition, interim inspections should be made as often as they are warranted by hazards known to exist and to the extent

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1/ This supersedes the corresponding Section 10.01, Pages 1-4 and the Exhibits thereto, the first two pages of which were dated 7-10-45 and the last two of which were dated 10-5-46. The check lists have been revised and the requirements for reporting inspections have been changed.

2/ See Manual Sections 4646:1 and 6646:1 for responsibilities of local management in inspecting projects, training employees, and instructing tenants. Low-rent projects should also be inspected at least annually. Suggestions included in this section should prove of value to management of low-rent projects.

Par. 2 (Cont'd)

permitted by available personnel. These interim inspections may be limited to such items as known hazards, hazards previously noted, necessary instructions to tenants with respect to use of equipment, and a review of possible housekeeping hazards (see Check List items 81 and 91-96 on Form FPHA-1436, Exhibit 1).

The following schedule of inspections is based on the relative hazards of the different types of structures, and is offered as a guide to project management in setting up such a schedule on the project:

a. All types of dwelling units - at the time when a new tenant moves in; 1/

b. Stop-gap housing - monthly inspections;

c. Dormitory and multiple family dwellings - bi-monthly inspections;

d. Family dwelling units (excluding multiple family dwellings) - prior to the beginning of each heating season and six months later.

3. Use of Check List. Form FPHA-1436, "Check List of Common Fire and Accident Hazards" (Exhibit 1 at the end of this Section) is to be used in making inspections of all structures and outdoor spaces, or it may be used as a guide in preparing individual check lists for different types of structures or areas. The list is so designed that the inspector can indicate corrective action which should be taken either by the project or by the tenant, depending upon the nature of the hazard and of the action required. Tenants should be requested to take corrective action as quickly as possible. The inspector might assist them in the immediate elimination of certain hazards, such as trash, combustibles near stoves, electric extension cords, etc.

Included in the list are items on which instruction should be given to the tenants or which should be discussed with them (see items 81 and 91-96). The importance of tenant instruction cannot be over-emphasized, and the inspector should lay special stress on these items.

All of the items on the list may not apply to every project, or to every structure or area on a project 2/. On the other hand,

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1/ Prospective tenants should be instructed in how to use the heating and cooking equipment, etc. in their own dwellings, before they move into the project.

2/ Note that certain sub-items under items 1, 2, and 3, for example, apply only to particular types of heating and cooking equipment.

Par. 3 (Cont'd)

hazards not included on the list may exist on some projects; in this case, corrective action for these unlisted hazards may be noted on the check list, at the end of the appropriate section.

4. Report of Inspections. Exhibit 2 at the end of this Section offers a suggested inspection report form which should be reproduced by the project, either by typing or by some other process.

   Projects should require copies of the inspection reports to be submitted to the person in charge of the inspections and to the maintenance superintendent.

   Provision should be made for a follow-up to see that necessary corrective action has been taken.

   The regional office need only be notified in the event that the corrective action requires their assistance.

   A copy of each inspection report shall be maintained on the project for inspection by regional representatives.

5. Training of Inspectors. 1/ Inspections and the training of inspectors should be under the direction of the project employee qualified for the work by training and experience. The project fire or police chief, or the maintenance superintendent, should usually be selected as supervisor. The local fire and police chiefs should be requested to provide assistance in the training of inspectors and, if possible, in making the actual inspections.

   Inspectors should become familiar with common hazards through a study of the Check List and of fire prevention and safety material included in other relevant sections and chapters of this bulletin, in safety-grams, etc. Additional information should be obtained from the regional fire prevention and safety engineers, from the National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts, the National Safety Council, 20 N. Wacker Drive, Chicago 6, Illinois, and other organizations known to fire and police chiefs.

1/ See also the following releases in this bulletin:
   a. Section 10.90, "Training Project Employees in Fire Prevention and Fire Fighting";
   b. Parts 7 and 11, "Training Outlines", relating to the operation of gasoline and oil-burning stoves and heaters; and
   c. Section 7.61, "A Course of Training for FPHA Employees in the Operation and Maintenance of Heating Equipment".

Par. 5 (cont'd)

Inspectors should also familiarize themselves with the types of heating, cooking, and electrical equipment used on the project, how the equipment operates and how it should be maintained, how to detect improper operation of the equipment, and all possible hazards related to it. Manufacturers' operating and maintenance instructions, if not already available, should be requested from the manufacturer.

Before undertaking a training program, those in charge should inspect a sufficient number of the various types of structures and spaces to acquaint themselves with actual conditions on the project and to determine the best method of making inspections and the most effective way to use the Check List.

The most practical way to train inspectors is, first, to have trainees accompany the supervisor on regular inspections, for purposes of observation. This should be followed by several inspections made by each trainee in company with and under the direction of the supervisor. When the trainees have begun to make independent inspections, they should be encouraged to meet with the supervisor and with each other at the end of the day, to exchange experiences and to have questions answered; this practice should continue until trainees are sufficiently experienced to dispense with it.

B. INSPECTIONS BY PROJECT PERSONNEL TO ELIMINATE HAZARDS IN SPACE AND DOMESTIC-WATER HEATING INSTALLATIONS 1/

The foregoing pages of this section relate to inspections to eliminate various common fire and accident hazards on war housing projects. This portion deals with the detailed spot checking of space and domestic-water heating installations on such projects.1/

This detailed spot check should be made by project personnel who are thoroughly acquainted with the details of installation, operation and maintenance of project heating systems. Manufacturers' operating and maintenance instructions should be available on the project. The regional office will assist in training inspectors when called upon.

Fire and accidents in connection with heating installations may be caused by:

a. Improper installation;

b. Improper maintenance;

c. Failure of automatic devices to operate properly;

d. Closeness of combustible material;

e. Poor housekeeping

Regular and timely inspection of heating installations should make it possible to discover hazards and eliminate them before damage is done.

1. Frequency and Scope of Inspections. A complete inspection of all project-operated installations and of at least 3% (but not less than five installations) of each type of tenant-operated equipment picked at random, shall be made prior to the beginning of each heating season 2/. If any hazardous conditions are discovered in tenant-operated equipment as a result of the spot check, all other similar installations must also be checked.

   Additional complete inspections should be made if warranted by the nature of the installation, and by existing conditions.

   In addition to inspections of the entire heating installation, all equipment controls, relief valves, fusible link dampers, and other automatic devices in project-operated installations shall be inspected at frequent intervals, but not less than once per month.

1/ Information contained in this section should also be of value to local housing authorities operating low-rent projects.

2/ All types of installations shall be inspected as soon as possible after receipt of this section, unless a thorough inspection has recently been made.

Par. 1 (Cont'd)

Normally, items which do not change, such as distance from combustible construction, need be checked only during the first inspection.

2. Use of Check List. Form FPHA-1451, "Check List to Determine Hazards in Space and Domestic-Water Heating Equipment" (Exhibit 3 of this Section), shall be used when inspecting space and domestic water heating installations, or it may be used as a guide in preparing check lists which are limited to the types of installations existing on the project, or in particular buildings. This check list consists of statements concerning the safe installation of space and domestic-water heating systems, and proper operation and maintenance of such systems in accordance with FPHA standards and accepted safe practices. If the statement on the check list is not true to the condition which exists, the condition may be hazardous.

   All conditions which are hazardous, such as corroded or improperly operated pilot lights or other safety devices, absence of relief valve, etc., must be corrected without delay. The assistance of the regional office should be requested immediately if there is any doubt as to which conditions are hazardous.

3. Reporting Inspections. Exhibit 4 to this section contains a suggested form for use in reporting all inspections made and all items which are not in accordance with the check list. It also provides space for indicating whether or not corrective action should be taken, and the date on which corrective action is completed.

   It is not necessary to submit copies of these inspection reports to the regional office; however, a file of these reports shall be maintained on the project for review by regional representatives.

FPHA-1436
10-15-46

NATIONAL HOUSING AGENCY
FEDERAL PUBLIC HOUSING AUTHORITY

CHECK LIST OF COMMON FIRE AND ACCIDENT HAZARDS

INSTRUCTIONS *(See also Bulletin 63, Section 10.01, Part A and Exhibit 2)*

This check list outlines corrective action which the inspector may find to be necessary to eliminate common hazards. All dwelling and non-dwelling buildings and spaces (indoors and outdoors), roads, walks, etc. require inspections. All sub-items in this check list may not apply to each item inspected, e.g., certain sub-items under item 1 apply only to particular types of heating equipment.

Items 91 through 96 are for discussion with tenants. Discuss items which may apply to the family living in the dwelling inspected. Request cooperation in eliminating such hazards.

HEATING AND COOKING EQUIPMENT, ETC.

(NOTE: See also Check List Form FPHA-M61)

1-SPACE HEATER OR FURNACE: a-Clean. b-Check Operations. c-Adjust flame. d-Level (oil or kerosene). e-Repair or replace (1) automatic controls, (2) thermostat, (3) fuel supply piping, (4) fuel tank, (5) fuel overflow, (6) water pipe, (7) water gauge, (8) water overflow, (9) relief valve, (10) fire-box, (11) grates, (12) door, (13) chains. f-Move away from combustible walls or protect 1/ (1) walls, (2) ceiling, (3) floor. g-Remove combustible materials stored too close.

2-WATER HEATER: a-Clean. b-Check operations. c-Adjust flame. d-Repair or replace (1) automatic controls, (2) relief valve. e-Move away from combustible walls or protect 1/ (1) walls, (2) ceilings, (3) floor. f-Remove combustibles too close.

3-COOK STOVE: a-Clean. b-Check operations. c-Repair. d-Level (oil or kerosene). e-Remove combustibles. f-Remove curtains close by. g-Move away from combustible walls or protect 1/ (1) walls, (2) floor, (3) cabinets or shelves.

4-SMOKE PIPE: a-Clean. b-Make tight. c-Replace corroded or broken pipe. d-Support rigidly. e-Repair or replace dampers or controls. f-Install smoke pipe for (1) space heater, (2) water heater. g-Provide air space or insulate 1/ from combustible material.

5-CHIMNEY OR FLUE: a-Clean. b-Make tight. c-Repair clean-out. d-Provide air space or insulate 1/ from combustible material.

6-DUCTS: a-Adjust or repair dampers. b-Replace or provide fusible links. c-Replace combustible construction. d-Insulate from combustible construction. e-Remove combustibles stored too close.

7-RELIEF DUCT: a-Adjust or repair dampers. b-Replace or provide fusible link. c-Remove combustibles stored too close.

8-ASHES: a-Remove. b-Remove combustibles too close. c-Provide metal cans.

9-OTHER:

FUEL AND INFLAMMABLE LIQUIDS

11-GASOLINE, NAPHTHA, BENZINE, ETC. (NOTE: Storage and use permitted only if required as fuel.) a-Remove from premises. b-Store outside away from structures. c-Provide safety can. d-Reduce to two gallons or less.

12-KEROSENE OR FUEL OIL: a-Store outside (away from structures). b-Provide metal can with cover. c-Repair leaking oil drums or fittings.

13-LIQUEFIED PETROLEUM: a-Check fuel tanks, controls and supply piping. b-Remove combustibles near fuel tanks. c-Add odor.

FUEL AND INFLAMMABLE LIQUIDS (Continued)

14-NATURAL GAS: a-Add odor.

15-COAL: a-Keep away from heaters, smoke pipes, chimneys and combustibles.

19-OTHER:

ELECTRICAL - INSIDE

21-ELECTRIC INSTALLATION, FIXTURES, EQUIPMENT: a-Repair (1) wiring, (2) fuse box, (3) switch box, (4) outlets, (5) fixtures, (6) loose fixtures. b-Equipment (1) unsafe, (2) repair. c-Replace improper fuse. d-Keep fuse box and cabinets closed. e-Remove paper or makeshift lamp shades.

22-EXTENSION CORDS: a-Shorten. b-Repair. c-Replace. d-Remove from floor or under rug. e-Remove cord draped over nails, pipes or metals.

23-FIRE ALARM SYSTEM: a-Test system (chart indicates system has not been checked at least once a week). b-Obtain spare batteries.

29-OTHER:

EXITS

31-DOORS: a-Repair (1) door, (2) screen door, (3) hardware, (4) glass. b-Remove obstructions. c-Refit or loosen (1) door, (2) screen. d-Rehang (to open out) public space (1) exit doors, (2) screen doors.

32-WINDOWS: a-Repair (1) windows, (2) screen, (3) hardware, (4) glass. b-Refit or loosen (1) window, (2) screen, (3) storm sash. c-Rehang storm sash to open easily from inside.

33-PASSAGEWAYS, STAIRS: a-Clear aisles and passageways. b-Remove storage from (1) stairs, (2) fire escapes. c-Unlock exit door. d-Provide exit signs. e-Repair railings. f-Provide railings.

34-FIRE DOORS: a-Repair. b-Repair hardware. c-Provide or replace fusible link. d-Avoid blocking opening (remove hooks, etc.).

39-OTHER:

(Over)

1/ Protect with 3/16" asbestos board. Support wall insulation on 1" incombustible furring, with space for air to enter at bottom and leave at top. Provide ventilated thimble where smoke pipe passes through a partition or ceiling.

STORAGE AND TRASH

41-STORAGE ROOMS OR CLOSETS: a-Clean up. b-Eliminate congestion. c-Remove unnecessary combustible material.

42-STORAGE IN BUILDING: a-Remove (1) paper, magazines, (2) old clothes, rags, (3) old furniture, (4) garbage, trash, etc.
b-Provide closed cans for oily rags, or wash out rags.
c-Air-out paint or oil stained overalls, etc.

43-TRASH: a-Provide closed metal can. b-Remove.

49-OTHER:

MISCELLANEOUS - BUILDINGS

51-FLOORS, CEILINGS: a-Repair (1) floor, (2) ceiling.

52-FOUNDATION, BASEMENT: a-Repair foundation wall or skirting. b-Correct settling. c-Keep access locked. d-Remove combustible storage. e-Correct damp condition. f-Provide more ventilation. g-Correct rotting or termite infestation in wood (1) floors, (2) posts, (3) foundations. h-Correct corrosion in gas lines (1) in ground, (2) above ground. i-Provide rigid supports for (1) gas lines, (2) plumbing lines.

53-ATTIC, ROOF: a-Repair, coat or paint roof. b-Remove bird nests. c-Remove combustible storage. d-Keep access to attic locked. e-Replace corroded smoke pipe or roof jack.

54-KITCHENS: a-Improve housekeeping. b-Clean up grease. c-Repair water leaks.

55-TOILETS: a-Improve housekeeping. b-Repair leaks.

56-LAUNDRIES: a-Improve housekeeping. b-Repair water leaks.

57-PUBLIC SPACES, SCHOOLS, ETC.: a-Repair furniture. b-Remove inflammable decorations.

58-MISCELLANEOUS: a-Correct defective, rotting or termite infested wood in columns, etc. b-Roof trusses: (1) correct sagging or defective material, (2) tighten bolts. c-Telephones: (1) repair (out of order), (2) post emergency phone numbers.

59-OTHER:

OUTSIDE AREAS

61-GARBAGE AND TRASH: a-Remove rubbish, ashes, broken glass, etc. b-Provide adequate number of metal cans.

62-STREETS, WALKS, GRASS: b-Repair street. b-Repair curb. c-Repair walk. d-Cut grass and weeds and remove excessive cuttings, leaves, and trash.

63-STREET LIGHTS: a-Provide additional light. b-Repair or replace (1) standard, (2) glass, (3) bulb.

64-TRAFFIC LIGHT OR SIGN: a-Provide. b-Repair or replace.

65-ELECTRIC OR TELEPHONE LINES: a-Wires sagging or broken. b-Pole needs repair. c-Report to utility company

66-PLAY AREAS: a-Repair, remove or replace defective or hazardous equipment. b-Provide railings or guards. c-Repair surfacing. d-Provide supervision.

OUTSIDE AREAS (Continued)

67-MISCELLANEOUS: a-Trees: (1) remove tree or low, broken or dead branches, (2) stop decay.
b-Remove, raise or relocate clothes line.
c-Check for gas leaks.
d-Repair or replace broken or missing manhole covers.
e-Repair fence.

69-OTHER:

FIRE FIGHTING EQUIPMENT

71-FIRE HYDRANTS; ETC.: a-Repair. b-Replace. c-Thaw (frozen). d-Loosen cap.

72-FIRE EXTINGUISHERS: a-Repair. b-Recharge. c-Clean corrosion. d-Mount on wall. e-Tag.

73-FIRE AND GARDEN HOSE: a-Repair or replace. b-Clean. c-Provide hose reel or rack. d-Repair or replace fittings and/or nozzle.

79-OTHER:

INSTRUCTION OF TENANTS IN USE OF EQUIPMENT, ETC.

81-INSTRUCTIONS: a-Needed, or b-Given: in operation of (1) heating equipment, (2) cooking equipment, (3) electrical appliances, (4) fire extinguishers, or in (5) calling fire department, (6) emergency escape, (7) good housekeeping.

89-OTHER:

AVOIDANCE OF HAZARDS (For discussion with tenants)

91-MATCHES, SMOKING - Smoking in bed, safe handling of matches and cigarettes, safe ash trays.

92-GASOLINE, ETC. FUEL - Safe handling, danger of explosion Pour into stove tank outdoors only. (See item 11)

93-KEROSENE & FUEL OIL - Safe handling. Never fill tank while heater is hot. Wipe up if spilled. (See item 12)

94-FALLING HAZARDS - Objects on floor. Loose rugs. Wet or greasy floors. Makeshift ladders, etc.

95-SAFETY OF CHILDREN - Don't leave them alone at home! Keep matches, poisons, objects which may be swallowed, etc., out of reach. Don't let them handle gasoline kerosene, etc. Keep pot handles, etc. turned away from the edge of stove. Don't leave heavy objects where they can be pulled down. Show them where to play safely.

96-MISCELLANEOUS - Turn off stoves, electric irons, etc. when not using and check before leaving home. Avoid overheating. Report equipment not working properly (See also items 8, 21, 22, 42, and 61)

99-OTHER:

REPORT OF INSPECTION OF COMMON FIRE AND ACCIDENT HAZARDS

PROJECT NUMBER _____

LOCATION _____

(See Instructions on Reverse Side of This Sheet)

ADDRESS OF UNITS INSPECTED	ITEMS TO BE CORRECTED BY TENANT	O.K. OR DATE	ITEMS TO BE CORRECTED BY PROJECT	O.K. OR DATE	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)

(Continue On Additional Sheets, As Necessary)

INSPECTED BY:	DATE:	CORRECTIONS CHECKED BY:	DATE:	HOUSING MANAGER:	DATE:

INSTRUCTIONS FOR PREPARING REPORT FORMS

(See Also Section 10.01, Part A)

This form is merely a sample of the report form which should be used in inspecting projects, using the "Check List of Common Fire and Accident Hazards," Form FPHA-1436.

Prepare a sufficient number of copies of this form to cover all units inspected. Maintain a copy of each of these reports on the project, for inspection by FPHA representatives upon their visits to the project.

Include the following information:

Column 1. List dwelling units by number or address and identify non-dwelling units and building and outdoor spaces. List all units or buildings whether inspected or not. Outdoor spaces should be included as part of the unit or building.

Columns 2 & 4. List item numbers (from check list) which require correction by tenant (column 2) or by management (column 4).

Columns 3 & 5. Enter "OK" if no corrections are required. Fill in dates when required corrections have been completed.

Column 6. Give a more definite description of the hazard, if necessary. Enter corrective action for hazards if such action is not covered by the check list. Enter reason for non-inspection of a unit or building. Continue "remarks" across entire width of sheet, if desired.

REPORT ON INSPECTION OF SPACE AND DOMESTIC WATER HEATING INSTALLATIONS
(See Instructions on Reverse)

NATURE OF INSPECTION:

_____ _____
Project No.

_____ _____
Location

INSTALLATION INSPECTED (Address and Building Type)	ITEMS NOT IN ACCORDANCE WITH CHECK LIST (Form FPHA 1451)				
	Items Nos.	Explanation of Items	Correction Required		Date Corrected
			Yes	No	
(1)	(2)	(3)	(4)	(5)	(6)

(Continue on additional sheets)

INSPECTED BY:	DATE:	CORRECTIONS CHECKED BY:	DATE:	HOUSING MANAGER:	DATE:

INSTRUCTIONS FOR PREPARING REPORT ON INSPECTION OF SPACE AND DOMESTIC WATER HEATING INSTALLATIONS

1. Number and Distribution of Copies:

To be established by local management. One copy of each report must be maintained on the project for review by regional representatives.

2. Preparation of Report:

Columns 1, 2, and 3 are to be filled in by the inspector. Column 4 is to be filled in by the maintenance superintendent or other person qualified to determine whether or not corrective action should be taken. Column 5 is to be filled in by the person who checks on the completion of corrective work.

a. Heading Items.

(1) Nature of Inspection: Indicate here the types of installations inspected (e.g., all space and domestic water heating installations, all heater controls, etc.)

b. Columns.

(1) Column 1: List all installations, giving address and building type.

(2) Column 2: List item numbers (according to Check List, Form FPHA 1451) of items not installed or maintained in accordance with the Check List, or which are not in operating condition.

(3) Column 3: Explain the way in which existing conditions differ from the Check List, so that it can be readily determined whether or not a hazard exists.

(4) Columns 4 & 5: Place a check mark (x) in the appropriate column.

(5) Column 6: Fill in date on which condition was corrected.

FIRE FIGHTING FACILITIES AND EQUIPMENT - GENERAL

1. Project Facilities and Equipment.

Project management should consult with local fire department officials and the regional fire and safety engineer regarding appropriate types, sizes, and locations of fire extinguishers, hose and other fire fighting equipment, the size and organization of project fire fighting groups, etc.

The entire protection program is subject to approval of the regional director as indicated in Manual Section 4646:1 or Housing Manager's Manual, Section 6646:1.

2. Instructions in Handling Fire Fighting Equipment.

Every project employee, fire fighter, etc. should know the location of and how to operate, all fire fighting equipment which he may be called upon to use. (See Manual Section 3646:7 or Housing Manager's Manual, Section 6646:4, "FPHA Fire Fighting Organizations.")

Each tenant should be shown how to operate his own extinguishers (if any) upon occupancy of the project, and during annual examination of his extinguisher.

Demonstration in the proper use of fire extinguishers (for tenants and project personnel) should be given when project extinguishers are refilled, (at least annually). Persons designated as fire fighters should practice the discharging. Instruction should also be given on the use of carbon tetrachloride, carbon dioxide and dry powder compound extinguishers, if used on the project.

CORRECTION NOTICE

Paragraph 6d should be corrected to read as follows:

"d. Carbon tetrachloride extinguishers will operate at temperatures as low as -40° F."

MAINTENANCE AND OPERATION OF FIRE EXTINGUISHERS

1. Effectiveness of Fire Extinguishers. Fire extinguishers are classified (by the National Fire Protection Association) according to the types of fires which they are designed to combat.

   a. Extinguishers for Class "A" Fires For use on fires in ordinary combustible materials where the quenching and cooling effect of quantities of water are most effective. Such extinguishers include:
      (1) Water buckets, pails, etc.
      (2) Pump tanks
      (3) Soda Acid
      (4) Foam

   b. Extinguishers for Class "B" Fires. For use on fires in flammable liquids, greases, etc. where a blanketing effect is essential. Such extinguishers include:
      (1) Foam
      (2) Carbon dioxide
      (3) Carbon tetrachloride
      (4) Dry powder compound (approved shaker type)
      (5) Sand

   c. Extinguishers for Class "C" Fires. For use on fires in electrical equipment where use of a "non-conducting" extinguishing agent is of first importance. Such extinguishers include:
      (1) Carbon dioxide - 4 pounds and larger sizes
      (2) Carbon tetrachloride
      (3) Dry powder compound (approved shaker type)

   Although most class "A" extinguishers are not recommended for fires in flammable liquids, greases, etc., they are of value on fires due to such liquids or greases where the quenching and cooling effect of the water can be utilized. They are also effective on fires due to faulty electrical equipment if the electric current is turned off before applying water or water solutions. (Caution: There is danger of electrocution if extinguishers not approved for class "C" fires are played on electric current. Furthermore, soda-acid extinguisher streams should never be used on electric motors, generators, etc. except in case of extreme emergency, since sodium sulphate produced in the chemical reaction is highly corrosive and will damage the equipment.)

   If any water or water solution is applied to electrical equipment, an insulation testing device should be used to determine that all water in contact with such equipment has been thoroughly dried out before current is again turned on.

   Carbon dioxide, carbon tetrachloride, and dry powder extinguishers are not effective on deep seated fires of ordinary combustible materials, but they may be of value for surface fires in small quantities of such material, where the smothering effect of the gas generated may be utilized.

2. Arrangement of Fire Extinguishers - General. All extinguishers should be conspicuously located where they are readily accessible, and so distributed as to be immediately available in case of fire. Unless otherwise indicated, all extinguishers should be hung on hangers or set on brackets or shelves so that their upper rims will not be higher than 5 feet, nor less than 2 feet from the floor.

3. Operation of Fire Extinguishers - General. Except when otherwise indicated, all fire extinguishers should be operated as close to a fire as possible. Streams should be directed at the base of the flames. Follow the flames with the stream. Work all around the fire, if possible.

The average maximum effective distances at which various types of extinguishers may be used follow:

Water buckets, pails, etc.	-	Depends on operator
Pump Tanks	)	
Soda acid	)	Up to 40 ft.
Foam	)	
Carbon dioxide	-	Up to 8 ft.
Carbon tetrachloride	-	Up to 30 ft.
Dry compound	)	
Sand	)	Depends on operator

4. Maintenance of Fire Extinguishers - General. All fire fighting equipment and accessories should be examined at least once each month, to make sure that they are in good operative condition and in their proper places. Make sure that extinguishers are full of the proper material and undamaged, and that hose nozzles are not clogged.

Once a year (unless otherwise indicated) all extinguishers must be discharged, thoroughly cleaned, examined to detect any excessive deterioration requiring replacement of parts or of the entire unit, and recharged in accordance with directions on the extinguisher. Extinguishers must also be thoroughly cleaned, examined and recharged immediately after use.

All extinguishers should be labelled indicating date of periodic and annual inspections, and other suitable record of maintenance should be kept in the management or maintenance office. Such office record should include type, serial number, location, date of recharging, etc.

5. Specific Maintenance and Operation Notes.

a. Water Barrels, Buckets, etc.

(1) Water barrels should be painted red on the outside, heavily pitched on the inside and marked "FIRE" in black letters at least 2½" high. The barrel should have a cover. Provide three standard fire pails in or near the barrel.

Buckets or pails should be painted red and marked "FIRE". They should be hung on hangers or set on brackets (see foregoing item 2).

Keep barrels, buckets etc. filled with clean water. Replace foul water.

b. Pump-Tank Extinguishers

(1) Operation: (See instruction on the extinguisher). There are two general types as follows:

(a) Pump integral with the tank body. This type must be set down near the fire, the foot placed on the foot rest and the pump handle operated.

(b) Back-pack type, generally with pump on the hose, is operated while carrying the extinguisher on the back. It is especially useful for fighting grass fires.

(2) Maintenance: (See also foregoing item 4). In recharging, wash thoroughly and drain water through the hose. Operate pump several times. Fill (up to filling mark) with clean water.

During periodic (monthly) inspections, operate the pump handle several times, pumping the water back into the tank. Add clean water as required. Replace foul water. Put thin oil on the piston rod packing occasionally. Keep pump tanks tightly covered to avoid excessive evaporoeration and to keep trash out.

c. Soda Acid Extinguishers. Materials used for charging are bicarbonate of soda dissolved in water for the extinguisher shell, and sulphuric acid for the bottle with loose (lead) stopple.

(1) Operation. Hold the hose between the thumb and index finger of the right hand, which also holds the top ring while carrying the extinguisher to a fire. At the fire grasp the bottom handle with the left hand and invert the extinguisher. The right hand should let go of the top ring (but retain its hold on the hose) when the extinguisher is about three quarters inverted.

Once brought into action, empty the entire extinguisher; otherwise the high pressure generated may cause the extinguisher to explode.

(2) Maintenance. (See also foregoing item 4). In recharging wash thoroughly with water and drain water through the hose. Replace parts not in good condition. In view of high pressures generated, never straighten out or repair the body of the extinguisher; send it to the manufacturer.

Mix the sodium bicarbonate solution thoroughly outside the extinguisher. Avoid spilling acid on hands, clothing, fire hose, etc.

Acid bottles and stopples, when replaced, must be exact duplicates of the ones originally provided.

d. Foam Extinguishers. Materials used for charging are bicarbonate of soda and a foam stabilizing agent dissolved in water for the main body, and aluminum sulphate dissolved in water for the inner cylinder.

(1) Operation. Same as soda-acid extinguisher (see item c(1) above), except that the foam stream is usually most effective when directed from a distance (up to 30 or 40 feet from a fire). It may also be used close to a fire.

At fires in containers of flammable liquids, best results are obtained when the discharge is directed against the inside of the container just above the burning surface, to permit the natural spread of the foam over the liquid. If this cannot be done, the operator should stand far enough away so that the foam may fall lightly on the burning surface. The stream is not effective if turned directly into the burning liquid.

Once brought into action, the entire contents of the extinguisher must be emptied, because of high pressures generated.

(2) Maintenance. Similar to soda-acid extinguisher (see item c(2) above).

For recharge use the chemicals indicated on the extinguisher. Dissolve them thoroughly in lukewarm water outside the extinguisher, in exact accordance with directions on the extinguisher or charging unit.

e. Carbon Dioxide Extinguishers.

(1) Operation. See instructions on the extinguisher. Continue the discharge on the burned surface even after the flames are out, to prevent possible reflash. Coat hot surfaces and glowing material with the "snow".

On flammable liquid fires the discharge should sweep the flame off the burning surface. Begin at the near edge of the fire and gradually progress forward, moving the discharge cone very slowly from side to side.

(2) Maintenance. Keep filled at all times. Examine for injuries or deterioration. Weigh annually on an accurate scale. Send any extinguisher showing a loss in weight of 10% or more of the rated capacity stamped on it to the manufacturer or his agent, or to a producer of carbon dioxide, for recharging.

f. Carbon Tetrachloride Extinguishers. The extinguishing agent used is a specially treated non-conducting liquid having a carbon tetrachloride base. Use only this special liquid (and not commercial carbon tetrachloride) in these extinguishers.

(1) Operation. See instructions on the extinguisher. On the way to the fire, unlock the pump handle by turning. If the extinguisher is of the air pump type, hold finger over nozzle and pump up pressure.

On fires in containers of flammable liquids, best results are obtained when the discharge is played against the inside of the container, just above the burning liquid, to break up the stream near the burning surface. The stream is not effective if turned directly into the burning liquid.

Avoid inhaling the gas generated by carbon tetrachloride in contact with fire.

Carbon Tetrachloride vapor has an anaesthetic effect and, played on a fire it may form toxic gases including Hydrochloric Acid and Phosgene. Good air circulation is therefore advisable while fighting fires in small rooms. Air out spaces thoroughly after a fire.

(2) Maintenance. Keep filled at all times. At annual inspections, test by discharging a small portion of the contents with the stream directed alternately upward and downward. Direct as much as possible of this discharge into a can and reuse. Replace extinguishers not in good condition.

g. Dry Powder Compound (Approved Shaker Type) Extinguishers. These comprise a specially prepared dry powdered sodium bicarbonate.

(1) Operation. Powder is shaken thru the diaphragm top of the container.

(2) Maintenance. The powder contains water repellant properties so that it does not cake, nor deteriorate. Replace extinguishers used at a fire even though only partially used. (In emergencies, when replacements are not available, partly used exinguishers may be refilled with material from other extinguishers).

h. Sand must be kept dry.

6. Protection Against Freezing.

a. Water Barrels, Buckets, Pails, and Pump Tanks must be protected against freezing, upon the approach of cold weather. The antifreeze solution may be:

(1) 75% calcium chloride (free from magnesium chloride) added to water, as follows:

For Lowest Temperatures (Degrees F.)	Ca Cl per Gallon Water
10	2 lbs. 4 oz.
0	3 " 0 "
-10	3 " 11 "
-20	4 " 3 "
-30	4 " 9 "
-40	5 " 0 "

Make sure that containers for calcium chloride solutions are coated with asphaltum paint. All anti-freeze solution must be drained out of pump tank hoses and nozzles.

(2) Common salt solutions may be used in wooden water barrels, pails etc. but only if calcium chloride is unobtainable. Add 2-3/4 pounds of salt per gallon of water to protect water from freezing at temperatures down to 0° F. Do not use in pump tanks - salt will corrode the tank.

Keep a quantity of calcium chloride (free from magnesium chloride) on hand in an airtight receptacle during freezing weather. After freezing weather is over, discard anti-freeze solutions, clean containers thoroughly, and refill with water.

b. Soda acid and foam extinguishers. Anti-freeze solutions cannot be added to such extinguishers. They must not be kept in locations where they would be exposed to continuous temperatures lower than 40° F.

c. Carbon Dioxide Extinguishers are not subject to freezing.

d. Carbon tetrachloride extinguishers will operate at temperatures as low as 40° F.

OPERATION AND MAINTENANCE OF FIRE HYDRANTS

This section relates particularly to the maintenance of fire hydrants. Other types of water outlets used in lieu of fire hydrants should be similarly maintained.

1. General. The maintenance of fire hydrants may be the function of the fire, water or public works departments of the local community, or of the project maintenance staff. Where projects maintain their own hydrants, a nearby community department in charge of hydrant maintenance may be called upon to repair leaky hydrants or to perform other maintenance services. In any event, it is the responsibility of the project management to make certain that hydrants are adequately maintained and always ready for use.

   All hydrants should be located not more than 7' from the access pavement. (If placed further away, the local fire department should be consulted regarding the necessity for relocation.)

   All hydrant steamer connections should face the street. (The steamer connection is the large outlet to which suction hose is connected.) Local fire departments should be consulted regarding the necessity of turning hydrants which face in the wrong direction.

   Check with the regional fire and safety engineer regarding the necessity of moving hydrants which are located within 25' of buildings.

   A record of inspection and maintenance of all fire hydrants should be kept in the project office.

   Maintenance data and cross-section views of hydrants used on the project may be obtained from hydrant manufacturers.

2. Accessibility. Access to fire hydrants should not be blocked. Parking should be restricted to the side of the street opposite hydrants wherever possible. In any event, no vehicle should be parked within 10' of any hydrant (check with local ordinances). It is generally desirable to indicate the parking restrictions by some form of curb or pavement marking or by use of warning signs.

   Heavy snow must be cleared away from around hydrants as soon as possible.

   Where hydrants are controlled by auxiliary gate valves, the valves must be kept clear and readily accessible at all times.

3. Maintenance

   a. Inspection and tests. Hydrants should be inspected at least once every three months. They should also be inspected immediately after

use at fires (within 2 or 3 hours during freezing weather) and before freezing weather sets in. During extremely cold weather it may be desirable to test only for water in hydrant barrels at least once a week.

Fire departments serving the project should be requested to replace hydrant caps loosely after use at fires so that air may enter, thus permitting the hydrant to drain.

At inspections, hydrants should normally be tested as follows:

(1) Remove hydrant caps and flush the hydrant. (Never permit the use of any type wrench other than a hydrant wrench. Note whether caps are properly chained to the hydrant, whether they are hard to remove, or if the wrench nut is excessively worn.) Do not flush hydrants during freezing weather; let the water rise up only to the level of the outlet, but do not let it spill out.

(2) Shut off the water and note whether or not the water level drops in the hydrant barrel.

(3) Replace and tighten up the hydrant caps.

(4) Turn on the water and note whether any water leaks out around the hydrant head or outlets.

(5) Turn off the water.

(6) During the winter, wait about 5 minutes then loosen up the hydrant caps so that air may enter, thereby permitting the hydrant to drain.

(7) During the winter, (also after use at fires) return to hydrants in 2 or 3 hours and test for water in hydrant barrels, (see item "b" below) then tighten caps.

In flushing hydrants, begin at the one closest to the source of water supply and flush each hydrant in its turn, so that sediment throughout the distribution system may be washed out during this process.

Once a year, or more frequently if there is an indication of inadequate water flow, or as required by the regional fire and safety engineer, a flow and pressure test should be made (generally by the local fire, water or public works department or the regional fire and safety engineer).

The manager should request a copy of such report made by a local agency, for transmittal to the regional fire and safety engineer. (Copies of reports indicating inadequate water pressure should also be transmitted to the regional sanitary engineer consultant.)

b. Water in Hydrant Barrels. Fire hydrants have a drain or drip valve near the base of the barrel, which is open when the main valve is closed, thus permitting water to drain out of the barrel after the hydrant is used. Water remaining in hydrant barrels should be removed or treated upon the approach of cold weather.

The presence of water may be detected by:

(1) Lowering a weight on a stout string in the hydrant. (This method should normally be used.)

(2) Sounding by striking the hand over an open outlet. (Water in the barrel shortens the "organ tube" and raises the note.)

Hydrant drip valves may become clogged by gravel or other obstruction from the outside. It may be possible to remove such an obstruction by opening the hydrant valve just enough to let in water without closing the hydrant drain (while hydrant caps are on tight). If this method does not remove the obstruction, it may be necessary to use a hydrant force pump, which delivers water under pressure through a special cap into the barrel of the hydrant.

If drainage out of the barrel is insufficient to prevent freezing during the winter, additional stone fill or a dry well into which water could drain should be provided. The natural earth under and around hydrants should be disturbed as little as possible. This may be accomplished by locating the stone fill (at least 6 cu. ft. stone) or dry well to the side of and below the level of the water main feeding the hydrant, and several feet from the hydrant. The hydrant drain could be connected to this stone fill or dry well by use of additional stone fill and/or a pipe.

Dry wells may be built of 2 ft. diameter clay tile capped with a precast concrete slab with stone fill around and below it. (The tile may be laid horizontally, with creosote impregnated wood planks covering both ends.) Make sure that water will be able to seep rapidly into the dry well.

Where the ground water level is high, it may be necessary to plug the hydrant drain (generally from the outside and pump the water out of the hydrant barrel when necessary during freezing weather.

c. Leaks in Hydrants - Leaks May Occur:

(1) In main valve when hydrant is closed.
(2) In drip valve when main valve is open.
(3) In mains near the hydrant.
(4) At head and through the packing box, or at the outlet caps, when the hydrant is in use.

When necessary to shut off the water supply during repair operations, project occupants affected should be notified in advance whenever possible. At such times, the fuel supply to manually controlled hot water heaters must be shut off.

Where main hydrant valves operate by opening downward against pressure in the water main, it is necessary to remove the valve seat (by use of a special wrench) before the valve can be removed. It is normally desirable to have on hand at least one extra main valve for each type hydrant, so that such repair may be made as quickly as possible.

d. Frozen Hydrants. Frozen hydrants must be thawed out as quickly as possible. Freezing may be detected in the same manner as is the presence of water, or by trying to turn the hydrant stem with a hydrant wrench. Blows on the hydrant wrench should be avoided, since that may break the valve stem.

Frozen hydrants may be thawed:

(1) By use of a steam hose pushed down into the hydrant, or by use of an electric thawing device. These are preferred methods. A thawing device is standard equipment of many fire, water and public works departments.

(2) By placing quicklime with hot water in the hydrant barrel. This requires thorough flushing of the hydrant afterwards, to avoid the possibility of contaminating the water supply.

Salt or salt solutions must not be used because of their corrosive effect and limited usefulness. The use of calcium carbide, or gasoline, alcohol or other flammable liquid or any substance hazardous to health is not recommended.

Special note - particular attention of fire fighters: If the hydrant stem alone is frozen at the top, it can frequently be loosened by lightly tapping the top (wrench) nut with a hydrant wrench.

e. Lubricating. Threads of hydrant outlets and caps and on main valve stem (at the upper end) should be lubricated at least once a year - preferably before freezing weather sets in.

The hydrant outlet and cap threads should be lubricated with graphite grease mixed with cylinder oil.

The method of lubricating hydrant stem threads varies with different hydrants. Generally there is a small hole protected by a set screw in the top (wrench) nut through which oil may be applied; otherwise it may be necessary to remove the hydrant head to gain access to the oil inlet. In addition, graphite grease should be applied directly to the stem threads (after hydrant head and probably the top plate below it are removed.)

Where stem threads operate by lowering into the water barrel, a stiff graphite grease or other water resistant grease must be applied to such threads.

It may also be necessary to put stiff graphite grease in the packing box.

Stiff graphite grease around the top nut will generally prevent water penetration and avoid freezing of the hydrant stems.

f. Painting Hydrants. Hydrants should be kept well painted at all times. Use quick drying (1 or 2 hours) enamel or synthetic enamel paint.

Unless local considerations warrant the use of some other color, hydrants requiring painting should be painted chrome yellow, to assure good visibility day and night. Wherever any considerable variation in water flow is found to exist, or where for any reason such distinction is considered desirable, hydrant tops should be painted in varying colors to signify such differences. In such cases, red should be used to signify a water flow of less than 500 gallons per minute, orange for 500 to 1000 gallons per minute, and green for 1000 or more gallons per minute. (Capacities of hydrants should be rated by flow measurements and tests of individual hydrants at a period of ordinary demand. Ratings should be based on 20 lbs per square inch residual pressure when initial pressures are more than 40 lbs. per square inch; when initial pressures are less, residual pressures should be at least half of the initial pressures.)

1. General. Good hose will last a long time if given proper care. With careless handling, hose could become unfit for use before it has even had actual fire service. In addition to wear and tear, all hose is subject to injury by acids, burns, mildew, mold, etc. Rubber lined hose may also be injured by gasoline, grease, oil, exposure to heat, drying out, etc.

   Be sure that hose received on projects has not been damaged. (Note that damage by acid may be difficult to detect.)

   Hose must be kept rolled or properly folded. Hose not in active use should be rolled and stored horizontally.

   Make sure that hose threads will fit all hydrants to which they may be attached, or that proper adaptors are available.

   Tie a hydrant wrench around the end of the hose which will be brought to the hydrant, so that it will be available immediately. The wrench can be tied with a rope by forming a loop through the wrench eye, then looping the rope around the hose.

2. Precautions at Fires. Greatest wear and tear comes at fires. This may be reduced considerably by proper handling. At fires, lay hose lines adjacent to curbs; do not let the lines cross the street except directly in front of a fire. Hose should not be dragged unnecessarily over pavements; traffic must be prohibited from running over hose; hose must be protected from injury due to unavoidable traffic by use of hose bridges (under no circumstances should equipment be allowed to pass over flattened hose); hose couplings should not be dropped or dragged as this may result in mashed threads, etc.

   Hose attached to pumpers may suffer severe damage from vibration, which affects suction hose particularly, even when vibration is hardly perceptible. Suction hose should be protected from chafing on rough pavements and particularly at curbs, by wrapping the hose in a piece of burlap, or rope, or by use of chafing blocks.

   Shut off hose streams rather slowly as water hammer resulting from sudden water shut-off may burst the hose.

3. Maintenance of Hose.

   a. General.

      (1) All dirt should be removed (by brushing or washing with plain water and scrubbing).

      (2) Gasoline, grease and oil, including oil in paint, will penetrate through the casing and affect rubber hose lining, or the cement holding the jacket and lining together.

      Make sure that gasoline is not allowed to spill on such hose.

Par. 3 (Cont'd)

Do not use oil paint to put identification lines or marks on rubber lined hose. If necessary, stencil the hose with indelible ink and use only enough ink on the brush to color the jacket, or use a rubber stamp to print identifications on couplings.

Hose subjected to action of gasoline, grease or oil should be washed with soap and a mild alkali as soon as possible, and thoroughly rinsed.

(3) Acid attacks hose casings. Some acids brown the hose immediately; others are slower acting and cause fibers to take a powder form.

Acid damage may be caused by acid spilled while servicing extinguishers, or it may result from hose coming in contact with the initial charge of an improperly used fire extinguisher. Furthermore, sulphuric acid may be generated from sulphur in hose not properly dried.

Hose exposed to acid or acid fumes should be thoroughly washed as soon as possible.

(4) Heat damage may be due to exposure to sources of heat, to high temperatures in storage, or to burns received at a fire. It may be detected by discoloration, or the rubber lining may deteriorate rapidly by accelerated vulcanization.

(5) Mildew, mold and other forms of rotting result from improper drying. Hose must be thoroughly dried out before it is rolled or folded, and it must be kept dry. Hose must not be allowed to droop down between supports while drying. If hose drying rack or tower is not available, hose can be dried on sloping ground and afterwards brushed clean.

(6) Couplings should be so adjusted that they can be easily screwed on by hand. After hose is used, they should be examined and any injured or defective couplings should be repaired or replaced. Couplings should never be oiled or greased since this may result in injury to hose. If dirty, they should be spun in a pail of soapy water. Never use a wire brush on threads.

Rubber coupling washers should be renewed as required. See that they do not project into the waterway, particularly at the nozzle.

b. After Use at Fires. Inspect all hose carefully for scorched jackets, oil or grease spots, cuts, chafed or worn parts, acid indications or frozen strands. See also foregoing item "a".

Par. 3 (Cont'd)

c. Monthly Inspections. All hose and accessories should be given a thorough examination at least monthly. Make sure that the proper lengths of hose and all accessories such as hose spanners, playpipes, hydrant wrenches, couplings, etc. are in place and ready for use at all times.

Change the location of all folds in rubber lined hose.

Make sure that hose is not mildewed or moldy, or has not been damaged (see foregoing item "a").

See that hose connected to standpipes or hydrants is not wet (due to water leakage).

d. Every Two Months. Flush out all rubber lined hose and dry it thoroughly

e. Annual Testing. Hose should be tested annually, and whenever indication of excessive damage may require, at a pressure equal to 50 pounds more than the greatest water pressure which may be encountered at a fire. Most fire departments are equipped to make such pressure tests.

f. Frozen Hose. Hose frozen at fires must be handled as little as possible Chop it clear by using an axe to free the ice below it. Bend the hose as little as possible, allow it to thaw out indoors, then clean and inspect it as indicated under item "a" above.

g. Damaged or Weakened Hose. Portions of hose which have been scorched (particularly if discoloration has penetrated the jacket) or which have been materially weakened by chafing, chemical action, etc. should be cut out. Hose which is found to be unfit for use especially after a pressure test, should be discarded. (Note that such discarded hose can be used for chafing blocks, in the construction of hose bridges, etc.)

EMERGENCY CALLS - FIRE, POLICE, ETC.

1. Need for Corrective Action. Fire loss reports (Forms FPHA-1274) indicated that the following conditions, which have resulted in increased losses, exist on some housing projects:

   a. No telephone or other means for calling the fire department.

   b. Telephone out of order.

   c. Distant fire department called instead of one close to the project.

   d. Failure to call the fire department when a building fire alarm operated.

2. Responsibility in Providing for Fire-fighting services. Local housing authorities and housing managers are responsible for providing for prompt and adequate fire fighting protection on war housing projects.1/ These responsibilities include:

   a. Providing and maintaining adequate means for reporting fires.

   b. Instructing tenants and project employees in how to report fires.

   c. Making necessary arrangements for public and project fire fighting protection.

3. Provision and Maintenance of Telephone or Other Emergency Call Facilities. When there are no other adequate means for calling fire and police departments, telephone service, available at all hours of the day and night, must be provided. The regional fire and safety engineer should be consulted regarding the adequacy and location of such telephones. He will assist in obtaining priorities for such installations.

   a. Use of Project Office Phones. Telephones in the management and maintenance offices, etc., must be made available for emergency use, if other facilities are inadequate or temporarily out of order.

   b. Phones Which Are Out of Order. When a public telephone or other means for making emergency calls is out of order, a notice must be placed at such equipment stating this fact and giving the location of the nearest serviceable telephone, etc. The telephone company (or fire or police department) should be requested to repair such emergency call facilities as quickly as possible.

1/ See Manual Sections 4646:1 and 6646:1 for general responsibilities in fire prevention and safety. See also Manual Section 4646:4 and 6646:4 for project fire-fighting organizations and Bulletin 63 Sections 10.90 and 10.91 for fire-fighting training.

4. Instruction to Tenants. All project residents should be instructed as to the location of the telephone and/or fire-alarm and police call box closest to their dwellings, and how to report fires. Such instruction should be given when the tenant first arrives, and should be repeated when dwellings are inspected.

a. Placards at Public Phones. Emergency phone numbers should be posted conspicuously at all public phones. It is generally desirable to include the following on such cards.

"THIS TELEPHONE IS HERE TO HELP YOU"

"YOU OR ONE OF YOUR NEIGHBORS MAY NEED IT VERY BADLY SOME DAY - IN CASE OF FIRE, ACCIDENT OR PERSONAL EMERGENCY. Please do not misuse it - you may put it out of order.

"Please tell the management if this telephone is out of order, or if you find someone tampering with it.

"EMERGENCY TELEPHONE NUMBERS:

FIRE _____

POLICE _____

AMBULANCE _____ "

The cooperation of the local telephone company should be obtained in posting and maintaining such cards in phone booths.1/

b. Placards in Buildings Having Building Fire Alarms. In dormitories, community buildings, etc., having building fire alarms, placards should be posted in public spaces, in corridors (near the main entrances) and/or at break-glass stations. These placards should explain the following (use only the items which apply; check and modify them as required):

"THIS BUILDING HAS AN AUTOMATIC FIRE ALARM SYSTEM WHICH WARNS YOU IF A FIRE BREAKS OUT. IT DOES NOT CALL ANY FIRE DEPARTMENT.

1/ Cards 7"x10½" containing a notice similar to the above have been reproduced by the Chesapeake and Potomac Telephone Co. These cards were framed and posted by that company at public phones in Metropolitan D. C. housing projects.

"IN CASE OF FIRE:

(1) If the alarm bells do not ring, warn the other occupants by breaking the glass in the alarm box located at_____ _____. This will ring the alarm bells.

(2) Go to the nearest fire alarm telephone located at_____ _____, break the glass, open the door, lift the receiver and tell the operator where the fire is located, giving the exact street and number.

(Alternate #1): Go to the nearest fire alarm box located at_____, break the glass (pull the lever down) and wait till the fire engines arrive.

(Alternate #2): Go to the nearest telephone located at_____. (This is a coin telephone).

Call (or dial) the operator (or_____) and report the fire, giving the exact address (Street and Number)"

c. Listing Emergency Phone Numbers in Telephone Directories. Examine the telephone directory and make sure that it lists emergency phone numbers on the cover or information page. Where such listings do not exist:

(1) Make sure that tenants and others who have private telephones know which fire department should be called in case of emergency, and ask them to list this number together with other emergency numbers on the cover or page 1 of their telephone directory.

(2) Ask the telephone company to do such conspicuous listing on the cover or first information page in future issues of the directory.

d. Stickers in Dwellings. The Vancouver (Washington) Housing Authority has provided stickers to be posted inside dwelling entrance doors, which tell how and where to report fires and make other emergency calls. These stickers were placed in envelopes which called attention to the desirability of going to the nearest fire alarm box (or telephone) and knowing exactly what to do, even in the dark. The envelopes were distributed to all tenants. Consideration should be given to the printing and distribution of such stickers to all tenants.

SAFETY BULLETIN

TESTING AND MAINTENANCE OF BUILDING FIRE-ALARM SYSTEMS

On projects with Building Fire-Alarms, local management shall see that such alarm systems are in operative condition at all times, as stated in Manual Sections 4646:1 and 6646:1.

1. Testing and Maintaining Fire-Alarm Installations

   a. All installations must be tested at least once a week (preferably at the same hour of the day to avoid alarming tenants). They must also be tested immediately after any fire. Systems which become inoperative for any reason must be repaired within 24 hours.

   b. One or more project employees should normally be delegated to test and maintain all building alarm installations. At least two such project employees should be trained (preferably by the fire-alarm manufacturer or his representative) in methods of testing, how to locate the points at which the system may become inoperative, and how to repair such inoperative systems. They shall be furnished with essential testing equipment, or shall have access to such equipment. They should be responsible for keeping on hand a supply of replacement wire, detectors, etc., sufficient to repair alarm installations which become inoperative.

   c. Printed instructions relating to the testing, maintenance, and repair of systems should be available at the project. These instructions should be obtained from the fire-alarm contractor, who shall also be required to leave a set of plans and specifications, showing the actual installation, with the housing manager. Copies of the manufacturer's service manual should also be obtained.

   d. In certain instances, it may be advantageous to request assistance of the local fire or public works departments in performing all or a certain part of this testing, maintenance and repair work. All proposed contracts for such services must be submitted to the regional office for approval.

2. Assistance of the Regional Fire and Safety Engineer. The fire and safety engineer will assist project management in training, or in providing for the training of personnel delegated to test and maintain the project alarm installations. He or someone acceptable to him, is required to check on the operation and maintenance of such systems periodically. He will also advise and assist management when called upon for such services.

1/ Section 10.21, pages 1-2, dated 1-5-44, "Maintenance and Testing of Type I Automating Fire Alarm Systems," should be renumbered to Pages 3 and 4 and filed after this release.

Testing and Maintenance of Interior Fire Detecting Systems

This section describes two types of interior fire detecting systems used by the PHA and explains the necessity for weekly testing of these systems and for their maintenance in good working order. Paragraph 6 calls for the use of Form PHA-1789 (Exhibit 1), "Log of Weekly Tests of Fire Detecting Systems", a supply of which will be provided for each leased or directly managed project equipped with these systems. Copies of this form should be provided for maintenance engineers and on-site fire departments where such departments are employed.

1. Introduction. There are two types of interior fire-detecting systems, one where continuous thermoplastic wire is installed (Protectowire type), the other where thermostats are employed. On those projects where "Protectowire" interior fire-detecting systems are installed, the maintenance instructions prepared by the Protectowire Company should be given to the person whose responsibility it is to maintain the system.

   The thermostats require no special instructions for replacement as each thermostat is applied directly to the ceiling and the connections made to the existing wire.

2. Control Panel. Each system, regardless of type, is equipped with a control panel in which is installed a test button; and for those installed for Protectowire Systems, the dry cell batteries are installed within, together with a silencing switch. This switch is for silencing the alarm to save the batteries after the alarm has served its purpose, or in the event of a false alarm. If the silencing switch is closed when the system is in working order, an alarm will be sounded.

   In the case of systems where thermostats are used, some are energized by storage batteries equipped with a trickle charger, and others are energized off the house service and employ a low voltage transformer.

3. Thermoplastic Wire and Thermostats. Where Protectowire installations are in place, the thermoplastic wire extends from the control panel throughout the area covered and returns to the control panel, forming a complete loop. In the event the system is set off, it is not necessary to replace the entire loop. It is necessary only to remove the affected section of cable and replace it with new thermoplastic wire, according to the maintenance instructions prepared by the Protectowire Company. (See Page 7 of this section).

   For the spot-type detector or thermostat systems, the wiring in connection therewith is used only to conduct the current from the batteries or source of current supply through thermostats to the bell, and does not set off the alarm as does the thermoplastic wiring.

(Cont'd)

4. Alarm Bells or Howlers. Each system is equipped with either alarm bells or howlers installed within the structures. On projects which are under inactive management or in terminated status, one alarm bell with connections to each of the interior systems should be installed in a dry location on the exterior of the building. It is not necessary that an additional alarm bell be procured, but merely that the central bell of the interior system be removed from the interior and reinstalled on the exterior of the building. This is recommended because the systems are designed for evacuating the structures and naturally when unoccupied there would be no one within the structures to hear the alarm signal. Therefore, by mounting the alarm bells on the exterior, the alarm would attract the attention of the custodian within the immediate vicinity of the project site.

5. Manual Fire Alarm (Break-Glass) Stations. For each of the above types of systems, there may have been installed one or more exterior mounted manual fire alarm (break-glass) stations which are solely for the purpose of permitting the system to be set off by any passer-by detecting a fire in the building. In many instances, these exterior manual stations have been a source of trouble due to tampering or to condensation forming in the box or conduit leading thereto and thereby causing a false alarm. If this condition is prevalent, it is recommended that these boxes be removed and eliminated from the system as the interior thermoplastic wire or thermostats will automatically detect the fire.

The reason for these manual break-glass stations has evidently been misunderstood, in many instances project occupants, after being warned by the automatic system to evacuate the building, have used these manual boxes under the impression that they are turning in a direct alarm to the fire department, although they may have been previously informed that these boxes do not call the fire department.

Therefore, every manual break-glass station shall carry a sign reading as follows:

THIS ALARM DOES NOT
CALL
FIRE DEPARTMENT

These signs should be of either metal or wood and should have over-all dimensions of approximately twelve inches in width and six inches in height. The inscription should be in red letters not less than one inch in height on a white background.

(Cont'd)

6. Tests.

a. Timing. Weekly tests must be made of all interior fire detecting systems. They also must be repaired and tested immediately after any fire.

It is recommended that weekly tests be conducted at the same hour each week (which should be Wednesday at noon to comply with universal practice) in order that the occupants will not be alarmed and also will become accustomed to the sound and its meaning. A notice should be prominently posted advising the occupants that tests are to be conducted at this time each week; that they should disregard the bell at that time unless it continues to ring without interruption; that at any other time they are to evacuate the building immediately, go to the nearest fire alarm box or fire telephone, or, in the event neither of these is available, go to the nearest public telephone and report the fire.

Storage batteries should be checked every three months to determine the need for additional water, so that the water level will be maintained above the top of the plates at all times.

b. Responsibility. On those projects where on-site departments are employed, it should be made the responsibility of the fire chief to supervise the tests; otherwise it should be the responsibility of the maintenance staff to conduct the tests. When maintenance employees are delegated to make the tests and maintain the systems, at least two such project employees should be trained in methods of testing, how to locate the points at which the systems may become inoperative, and how to repair such inoperative systems. They should be furnished with essential testing equipment, or should have access to such equipment. They should be responsible for keeping on hand a supply of replacement wire, detectors, etc., sufficient to repair alarm installations which become inoperative.

c. Instructions. Printed instructions relating to the testing, maintenance, and repair of systems should be available at the project. These instructions should be obtained from the fire-alarm contractor, who shall also be required to leave a set of plans and specifications, showing the actual installations, with the housing manager. Copies of the manufacturer's service manual should also be obtained.

(Cont'd)

Par. 6 (Cont'd)

d. Making the Tests. All tests shall be made at the testing button located in the control panel. The bells should be allowed to ring for at least 5 seconds at each test. If the system is found inoperative it must be corrected immediately.

The sound of the fire alarm bells at each weekly test will determine the condition of the batteries. If the bell sound is weak, the batteries should be replaced immediately and the test repeated.

WARNING

In some instances a relay switch has been provided to cut the hot-air heating blower motor upon operation of the fire detecting system. Where relays have been installed, special care must be exercised to reset the relay switch following the test of the detecting system.

e. Record of Tests. On each leased and directly managed project, a record of the weekly tests shall be maintained on Form PHA-1789, "Log of Weekly Tests of Fire Detecting Systems."1/ This record shall show the date and hour each test was made, the results of the tests, the dates of reports to management on failures and corrections, and, in the event the system was found to be in an inoperative condition, shall show in the space provided on the reverse of the form, the cause of and the action taken to correct this condition. Exhibit 1 illustrates how this form shall be prepared.

The form shall be prepared for each building or building wing (in the case of dormitories or apartments) equipped with an interior fire detecting system. Each building shall be identified in the heading by type and numerical, alphabetical or directional designation.

A copy of the report shall be submitted to the regional management division, attention of the regional fire prevention and safety engineer, immediately following each quarter. This report shall cover all weekly inspections made during the quarter.

(Cont'd)

1/ Local authorities with aided projects equipped with fire detective systems are urged to maintain records of tests on a form similar to that shown in Exhibit 1.

7. Assistance of Regional Office. The regional fire prevention and safety engineer will assist local management in training, or in providing for the training of personnel delegated to test and maintain the project alarm installations. With respect to Federally owned projects, he is required to check on the operation and maintenance of such systems at the same time general project inspections are made. He also will advise and assist local management when called upon for such services.

MAINTENANCE AND TESTING OF TYPE I AUTOMATIC FIRE ALARM SYSTEMS

Standard specifications for Type I fire alarm systems require that 100 feet of heat-resistive cable per building be delivered to the project manager as a part of the contract.

The Protectowire Company, Hanover, Massachusetts, has placed upon the market a kit (price $12) consisting of the following:

50 ft. heat-sensitive cable "regular" rating (155 degrees)
50 ft. heat-sensitive cable "intermediate" rating (185 degrees)
4 Connecting blocks
100 Insulated staples
1 Sheet instructions

If desired, a kit such as described above may be purchased in addition to specification requirements of 100 feet of cable for repairs.

The repair kit is intended for use when after a fire or a condition of excessive heat it is necessary to replace a section of the Protectowire fire detecting circuit. This can be done as follows:

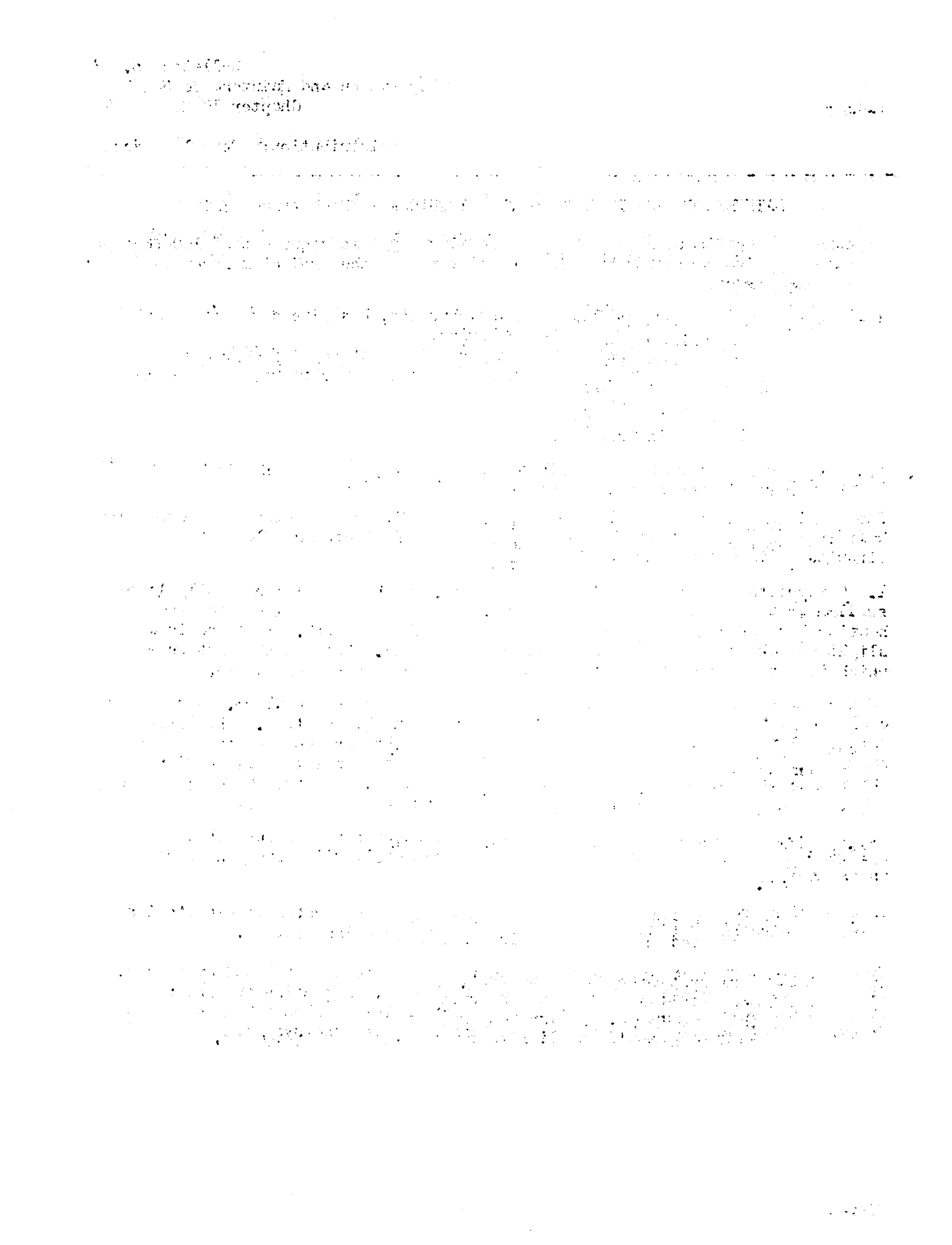
1. Cut out the affected section of the cable. Such a section generally looks swollen or as though the twist were gone. Another way to tell how far the heating has affected the cable is to bend it back and forth. If there is a slight squeak or crackling sound, the cable is good. Cut out the part from which this sound cannot be obtained and a few inches more for safety.

If necessary, a meter can be used to locate the source of an alarm. Each of the cable conductors has a resistance of a tenth of an ohm per foot. The "round trip" resistance is, therefore, two-tenths of an ohm per foot and the affected section will be found a distance in feet from the test point equal to five times the number of ohms resistance measured. For example, 10 ohms, 50 feet; 40 ohms, 200 feet; 13 ohms, 65 feet. (Five times the ohms gives the feet.)

2. Splice in a new piece of cable using the connector blocks furnished or splicing sleeves. Leave staples so cable will readily slide back and forth under them.

In case of operation caused by a fire or failure of the system, the batteries should be disconnected and the repairs should be made immediately.

Type I fire alarm systems should be tested at least once a week and every day, if possible, preferably at the same hour of the day. A testing button is supplied for this purpose. Designated project employees should be responsible for the testing and should familiarize themselves with the system.



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BUDGET BUREAU NO. 63-R 066.2
(APPROVAL EXPIRES: 7-31-48)

HOUSING AND HOME FINANCE AGENCY
PUBLIC HOUSING ADMINISTRATION

LOG OF WEEKLY TESTS OF FIRE DETECTING SYSTEMS

PROJECT NO. WAS[illegible]00 | PROJECT LOCATION: Hilldale

PERIOD COVERED: [illegible] - 3/31/46 | BUILDING: Community Building No. 2

OFFICIAL IN CHARGE (NAME AND TITLE): Donald Williams, [illegible], Fire Department

INSPECTION DATE	INSPECTION TIME	INSPECTOR	0*	1*	FAILURE REPORTED DATE	FAILURE REPORTED TIME	CORRECTION REPORTED DATE	CORRECTION REPORTED TIME	RETESTED DATE	RETESTED TIME	INSPECTOR ON RETESTING
	12:05 PM	John Doe	x								
	12:10 PM	Willie Blake	x								
	12:01 PM	Charles Jones	x								
1/23	12:15 PM	John Doe		x	1/23	12:30 PM	1/23	2:30 PM	1/23	3:00 PM	Richard Burns
1/30	12:01 PM	Willie Blake	x								
2/6	12:05 PM	Charles Jones	x								
2/[illegible]	12:01 PM	John Doe	x								
2/[illegible]	11:45 AM	Raymond Smith	x								
2/[illegible]	12:01 PM	John Doe	x								
3/6	12:10 PM	Willie Blake	x								
3/[illegible]	12:15 PM	Charles Jones		x	3/13	12:30 PM	3/13	1:30 PM	3/13	2:00 PM	John Doe
3/20	12:20 PM	Raymond Smith	x								
3/27	12:01 PM	William Blake	x								

SYMBOLS: 0 = OPERATIVE; 1 = INOPERATIVE

SYSTEMS FOUND INOPERATIVE SHOULD BE CORRECTED IMMEDIATELY, STATING CAUSE AND REMEDIAL ACTION ON REVERSE

NO.	CAUSE	REMEDIAL ACTION	REPAIRED BY
4	Malicious Tampering with Thermoplastic Wiring	Replaced 10 ft. Thermoplastic Wire in Recreation Room	Project Electrician
11	Dead Battery	Replaced Battery	Project Maintenance

PROTECTION OF VACANT PROPERTIES

Recently two small children were found suffocated in the ice-box of a vacant dwelling. A number of fires have also been reported from time to time, caused by unauthorized persons getting into vacant structures. Such dwellings or buildings may or may not have been securely locked.

In view of these occurrences, merely locking vacant structures cannot be considered adequate protection against fire and accident. It is therefore recommended that the following precautions be taken by all project management:

1. Securely lock all doors and windows of all vacant dwelling units, and other buildings. Post U. S. Government "No trespass" signs.

2. Request all tenants to be sure that their homes are securely locked during their absence. (Provide adequate locking means for all dwellings not already so equipped.)

   Request all tenants to inform the project management when they are expecting to leave their dwellings for an extended period of time.

3. Delegate one or more of the project employees to survey all vacant properties daily. Call the police to arrest trespassers, when discovered.

PREVENTION OF FIRE HAZARD IN CONNECTION WITH THE WASTE PAPER AND RAG SALVAGE CAMPAIGN

The careless storage of waste paper and rags is a constant fire hazard. If large quantities are stored in connection with the current salvage program this hazard is amplified. It is therefore recommended that storage problems be avoided wherever possible. This might be accomplished by arranging for regular collection days, at which time paper could be immediately hauled away from the project. Such arrangements could normally be made with the local salvage committee. A boy scout troop or other local volunteer group could do the house to house collection and tying up of papers. They could deposit paper and rags on porches or at curbs on project streets, with truck pickup following, or some other method recommended by the local salvage committee might be employed.

The Bureau of Foreign and Domestic Commerce and the War Production Board, in "Nations Supply of Salvable Waste Paper," estimate a national average of over 28 pounds of waste paper per non-farm family per month. If half this amount were actually salvaged by a regular collecting group, collections every two weeks from 500 dwellings (for example) would provide a small truck load of paper (about 3500 pounds), and such collection would at the same time eliminate all extra fire hazard.

In the event that the above arrangements cannot be made, and project storage is required, the following precautions should be observed:

1. Waste paper and rags should be stored in a separate, detached building wherever possible.

2. They must not be stored in any building used for sleeping purposes or for public assembly, nor in heater rooms or spaces used for storage of flammable material such as paint, fuel oil, etc.

3. They must not be stored adjacent to heat sources such as heating equipment, chimneys, flues, ducts, etc., or near electrical equipment, control panels or wires. They must not block access to meters, electric controls, etc.

4. Paper should be securely tied in neat bundles and stacked in an orderly manner. Rags may be rolled and tied in tight bundles, or kept in closed metal cans. Oily, greasy or paint stained rags must be thoroughly washed out or disposed of by burning (under supervision) some safe place outdoors. Never store such rags, since there is danger of spontaneous combustion.

5. Storage must be supervised by a project employee and the storage space must be kept locked at all times. (Wire enclosures are not considered adequate. Prohibit smoking in such spaces.

6. Dispose of all salvage waste paper and rags every week if possible. Such material should not be stored longer than 2 weeks.

SUBJECT: TRAINING PROJECT EMPLOYEES IN FIRE PREVENTION AND FIRE FIGHTING 1/

Most fires on FPHA projects can be attributed to carelessness. Since material destroyed by fire is difficult to replace, and manpower is completely lost. It is urgent that project employees be instructed in precautionary measures to be taken to prevent fires, what to do in case of fire, etc. All project employees should also receive training in fire fighting adequate for an emergency which they might be expected to meet.

1. Use of Training Outline. The attached training outline is meant to serve as a tool for acquainting employees with their responsibilities in fire prevention and fire fighting. The outline has been prepared with a realization that responsibilities of project employees will vary with their other duties, and that responsibilities on one project may differ considerably from those on another project. For this reason, the outline should be reviewed carefully and, if necessary, modified to meet the needs of the particular project or group of employees. The regional fire and safety engineer and the management training adviser are available for assistance in developing the project training program.

   The left-hand column of the training outline, "What the Employee Does," lists that which might be expected of the staff member. The right-hand column, "What the Employee Must Know," outlines the information with which the employee should be acquainted.

2. Training Assistance. Any training program should utilize the best qualified trainers available in developing the program. The services of the housing manager, maintenance superintendent, local fire department officials and the State Board for Vocational Education 2/ might be utilized in training project employees.

3. Nature of Training. The outline may be used in training employees individually or in groups. In no instance should the training of a single employee be postponed for lack of a group, since that particular employee may be the one who tomorrow might need to report a fire, to lead some one to safety, or to report a fire hazard.

   Since one learns best by experience, all phases of this training should be as realistic as possible. It does some good for an employee to see another use a fire extinguisher; it is far better for him to use the extinguisher himself, and have his mistakes corrected.

1/ See Manual Sections 3646:1, 4646:1 or 6646:1 for responsibilities of the regional offices, local authorities and housing managers.

2/ See Section 1.90 of this Bulletin for the listing of state directors for vocational education.

If an employee is expected to instruct tenants directly, he should be permitted to observe actual demonstrations by some qualified person of the proper approach to tenants. Following this, his own handling of similar situations should be observed and the good and bad features discussed with him. This should continue until the employee can demonstrate that he is qualified to handle the situation on his own.

OUTLINE FOR TRAINING PROJECT EMPLOYEES IN FIRE PREVENTION AND FIRE FIGHTING

WHAT THE EMPLOYEE DOES:	WHAT THE EMPLOYEE MUST KNOW:
1. Enforces policy	-What the policies are
a. Project (as in Manual Chapter 4646 or 6646)	-To whom and how violations should be reported
b. Local community	
2. Practices fire prevention in daily work	-What practices to follow (i.e., no smoking in paint room, place oily rags in proper container, extinguish cigarette butts, safe way to handle flammable liquids, etc).
3. Reports conditions in non-dwelling spaces that may cause fires or prevent proper fighting of fires	-Where the nondwelling spaces are -What the safe practices are -What conditions and practices are not safe -What safety devices are used on heating, cooking, electrical equipment, etc; how they operate; when they are in proper condition to operate; when they are not in proper condition to operate. -To whom and how unsafe conditions should be reported.
4. Reports fire hazards in dwelling units	-What the safe practices are -What conditions and practices are not safe -What safety devices are used on heating, cooking, electrical equipment, etc., how they operate; when they are in proper condition to operate; when they are not in proper condition to operate. -When to deal directly with occupants -When not to deal directly with occupants -How to deal effectively with occupants -To whom and how unsafe conditions should be reported.

WHAT THE EMPLOYEE DOES:	WHAT THE EMPLOYEE MUST KNOW:
5. Reports conditions which may interfere with exit in case of fire	-What the safe practices are (i.e. exits not blocked, doors and windows open readily from inside; exit lights and markers in proper condition; fire-doors held open only by proper fusible link devices, etc.) -To whom and how to report unsafe practices.
6. Reports fire alarm system not in proper operating condition. (See Chapter 10.2)	-The purpose of building fire alarm systems. -How and when they are tested -How to tell when they operate properly. -To whom and how to report systems which are not operating properly.
7. Reports fires	-When to call assistance -Where and how to call assistance -What information to give
8. Directs people to safety. (See Section 10.92	-What to do in case of emergency. (Saving lives comes before saving property; how to prevent panic, etc.) -The location of exits and how they operate.
9. Uses fire protection facilities. These include: a. Fire extinguishers. (See Section 10.11) b. Hydrants. (See Section 10.12) c. Hose. (See Section 10.13)	-Where to find -When to use -How to use effectively -What to do after use.
10. Treats injured	-When to treat -When not to treat -When and how to call medical assistance -First aid

TRAINING FOR FIRE-FIGHTING ORGANIZATIONS 1/

Project fire-fighting organizations shall receive adequate training in fire prevention, in the operation and proper care of all project fire-fighting equipment, and in methods of extinguishing fires, safety precautions, and rescue at fires. 2/

1. PROVISION FOR INSTRUCTION. Tentative lists of projects on which fire fighting training will be required were prepared by the regional offices. These were submitted to the Vocational Division of the United States Office of Education. On the basis of these lists, approval has been obtained for instruction in certain states to be carried on through State Boards for Vocational Education, insofar as their time, personnel and facilities will permit. Such services will be rendered without cost to FPHA or local authorities.

Regional Directors should contact the appropriate State Directors for Vocational Education 3/ and arrange for these training services. Housing managers and local authorities having projects which are not already on the tentative lists and on which training services are desired, should request the regional office fire and safety engineer to consider including such projects in the training program.

If regions find it desirable to include projects in states other than those already included 3/ in this training program, a list of such projects should be submitted to the Central Office Fire Prevention and Safety Section for necessary action in obtaining additional approvals. The project list should include the total number of persons (employee and tenant fire-fighters) to be trained on each project.

1/ See Manual Section 3646:7 or Housing Manager's Manual, Section 6646:4 for establishment and compensation of fire fighting organizations.

2/ Members of project fire-fighting organizations should also receive instruction in rendering first aid. Apply to the local Red Cross or Office of Civilian Defense for Information and instruction.

3/ Requests for instruction have already been submitted for projects located in Alabama, Arizona, Arkansas, California, Florida, Georgia, Indiana, Kansas, Kentucky, Maryland, Michigan, Mississippi, Nevada, New Jersey, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Utah, Virginia, Washington, W. Virginia, Wisconsin.

Where facilities for training are unobtainable from any State Board for Vocational Education, training services may be carried on under the direction of the chief fire fighter, if he is qualified to give such instruction, or under a special instructor who may be secured from the local fire department.

2. TRAINING PROGRAM. The training program will vary depending upon the type of fire-fighting equipment provided on each project. Projects having mobile equipment may require additional time, beyond that outlined below, to provide training in the proper handling of such equipment; those having only limited equipment may require shorter periods of training. Chief fire fighters and officers should have additional training (see also Bulletin No. 44 "A Guide for Watchman Training").

The following training program, subject to approval of the regional fire and safety engineer, should cover requirements of the average project organization:

a. General Instruction - 2 Hours.

(1). Causes of fires and the project fire prevention program.

(2). Fire fighting facilities and equipment available to the project, including off-site facilities.

(3). Classification of fires and fire extinguishers. (See Section 10.11).

(4). Care of fire-fighting equipment - general. (See Chapter 10.1).

(5). Location of fire hydrants and other water supply for fire fighting.

(6). Project fire-alarm systems.

(7). Responding to an alarm.

b. Hose and Ladder - 2 Sessions, 2 hours each.

(1). Hose and nozzles - explanation of use, care, and testing.

(2). Ladders - use, care, testing.

(3). Hose and hydrant houses (if any) - equipment and maintenance.

(4). Rope practice - knots, hitches, hoisting tools, coils.

(5). Ladder practice - carrying, raising, placing, climbing, and lowering.

(6). Hydrants - operation and maintenance.

(7). Hose practice - loading; hydrant-to-fire and fire-to-hydrant layouts carrying, dragging, and dogging hose.

(8). Using hose and ladder tools.

(9). Combined hose and ladder evolutions.

(10). Safety precautions.

c. Fire Extinguishers and Tools - 2 Hours.

(1). Extinguishers - location, use of each type and size, types of fires combatted.

(2). Small tools - names, use, care, locations.

(3). Extinguisher practice.

(4). Tools practice - forcible entry, getting at a fire.

d. Fire Fighting Tactics - 2 Hours.

(1). Responding to an alarm.

(2). Entering buildings, ventilation, locating fires.

(3). Possible spread of fire; comfining fires.

(4). Procedure for fighting various types of fires; fires in basements, attics, partitions; chimney and roof fires, etc.

(5). Hazards and precautions - smoke, carbon tetrachloride fumes, water on electrical fires, etc.

(6). Rescue work - handling burns and suffocation, carries.

e. Periodic Training - Two 1½-hour practices monthly.

Review hose and ladder work and all other fire-fighting practices, rescue work, etc.

SAFETY BULLETIN

Advice regarding the necessity for fire exit instructions and drills and assistance in organizing all exit drills may be received from the regional fire and safety engineer. In addition, assistance may be obtained from local fire departments.

1. Purpose of Instruction and Drills. 1/ The objectives of fire exit instruction and drills are:

   a. Order and control during evacuation.

   b. Acquaintanceship with all means of exit in the event of fire and other emergency occurring in various locations.

   c. Speed in evacuation. (While desirable, this is not a major objective. It should be secondary to the foregoing two items.)

   Proper instruction and drills will prevent panic, which has been responsible for a great part of the loss of life in the major fire disasters of our country.

2. Instruction in Emergency Exit. Every project employee and all group activity leaders should be made thoroughly familiar with all means of emergency exit existing in buildings in which they carry on their work. They should also be instructed in and charged with the responsibility of assuming control over other persons in an emergency, and leading such persons to safety. Such persons should see to it that swinging doors in the line of egress are held open, to facilitate evacuation. Leaders of tenant activity groups, including adult education classes, Boy Scouts, Girl Scouts, etc., should give informal instruction in emergency exit to their classes.

   Information regarding emergency exit should be posted conspicuously in public spaces.

3. Fire Exit Drills. Periodic fire exit drills shall be held in all child care centers. They may be held in other locations where such drills are considered desirable by the project management.

   Drills should be carefully planned to simulate actual fire and emergency conditions. In each instance, the assumption should be made that fire or smoke is blocking one or more specific exits, all occupants being led out by some other routes. Occupants should be made acquainted with outside stairs and other emergency means of exit not habitually used.

1/ Section 10.33 of this Bulletin, which will be issued shortly, will contain instructions regarding the maintenance of exit passageways, etc.

Initial drills should be held at predetermined times and all occupants should be made acquainted with the proposed time, presumed locations of the fire, exits to be used, etc. Such drills should occur frequently, until occupants are thoroughly familiarized with all means of egress.

The series of initial drills should be followed within a short time by several drills held in unexpected ways and at unexpected times, and such drills should be held at least once per month thereafter.

Persons in charge of evacuation should lead occupants to some designated space where they would not be subjected to danger from fire, nor interfere with fire fighting activities. They should not move in the direction of a fire hydrant.

People are known to have perished as a result of re-entering a burning building in an effort to save personal belongings. In order to avoid the possibility of children re-entering such buildings and to permit a count of those present, as well as to prevent interference with fire fighting activities, fire exit drill control should continue even after the street or other place of safety is reached.

4. Fire Fighting Precautions. Fire fighting should always be secondary to life safety. Where there is a project fire fighting group, it should be instructed to defer any activity which might interfere with prompt and orderly exit until after buildings are vacated. Special emphasis should be laid on avoiding obstruction to lines of exit by laying fire hose across stairways, or blocking open fire doors with hose lines until all occupants in that portion of the building are out of danger.

Tampering with Electrical Fuses by Tenants in War Housing Projects.

Some of the recent war housing fire loss reports reaching the Central Office indicate that the fires were due to electrical short circuits or other breakdowns in the interior electrical distribution system. In most cases it was found that the lighting circuit fuses had been tampered with by the tenants, either by increasing the capacity of the fuses or by bridging burned out fuses with coins or other metallic materials. This hazardous practice should be prohibited.

Most of the fuse tampering may be due to the increased use of electrical devices in war housing projects, as discussed in Section 6.11 "Electrical System-Interior Distribution." As that section points out, these wiring systems were originally designed and installed with a minimum of materials. Overloading of such systems will blow more fuses and may lead to early deterioration of the wiring. In such cases, the tenants are apt to replace the burned out fuse with one of greater capacity or to bridge it, which immediately creates a hazardous situation.

To cope with this problem tenants should be thoroughly educated in the use of proper fuses in their lighting circuits and the hazards involved in the use of makeshift arrangements. This should be programmed on a continuous year around basis and can be done through personal contact with tenants, suitable posters, circulars, and project newspapers and other tenant publications.

A simple record should be kept of the progress made; particular note should be made of continuous offenders. If it becomes evident that the educational program has failed with some tenants, individual pressure should be brought to bear. Such pressure should be in the form of personal contacts to warn the tenants that such practices will not be tolerated and, if continued, may lead to the removal of their privilege of having access to the fuse panel box, or even to the institution of whatever legal action (including eviction) may be available under local laws and ordinances. If this approach fails, before taking available legal action, one of the following actions may be taken:

1. Installing approved tamper-proof 15-ampere fuses;

2. Providing for each panel box a kit containing a supply of approved 15-ampere fuses, as required by the National Electric Code for residence lighting circuits. This kit could be placed on the wall near the fuse panel box;

3. Arranging to seal the fuse panel boxes; or

4. Putting the fuse panel boxes under lock and key.

Items 3 and 4 above should not be used except as a last resort, because of the initial installation cost and the maintenance service cost.

The Central Office will prepare, as often as possible, proper posters, Safety-Grams, and other materials for the purpose of stimulating interest in the educational program. However, the success of the program will depend largely on action taken by the regional offices and the local management.

The attached training outline is to be distributed only to projects with Preway Gasoline Stoves, Model 441P. If needed, additional copies may be obtained from the Central Office.

Housing managers and local authorities holding Bulletin No. 63 shall file this outline in Part 11 of that bulletin. Holders of Bulletin No. 58 shall file it in Part III, Section 4.

TRAINING OUTLINE - PREWAY GASOLINE STOVE, MODEL 441 P

INTRODUCTION

This training outline is primarily for the use of the instructor in teaching employees and tenants in the operation of the Preway Gasoline Stove, Model 441 P. It is not a self-training outline for use by a person without previous knowledge of the operation. The operation may appear to be simple, but yet forgetting just one small detail may jeopardize the safety of the dwelling occupants. For this reason, it is important that only an experienced person do the teaching. It is Management's responsibility to see that at least one person on each project staff is capable of properly instructing others.

In addition to the breakdown of how to operate the stove with safety, the outline also includes a few teaching suggestions. It is divided into 10 steps and the instructor beginning with the first step should proceed to the next only when he is satisfied that the trainee knows the steps that have been given so far.

Beginning with Step 3, the instructor should observe the following:

1. Demonstrate each step and explain carefully. Wherever possible, give the "why".

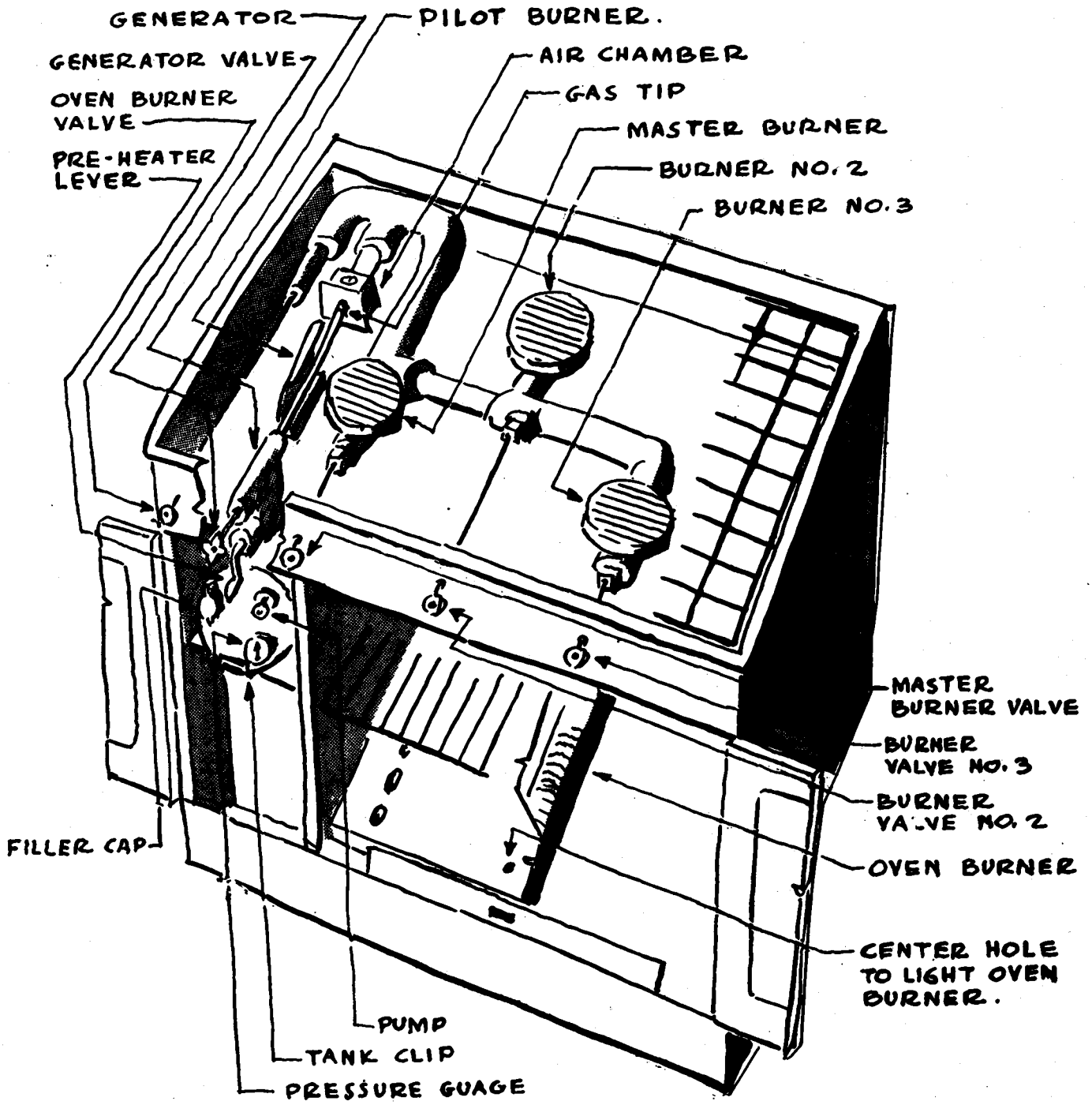
2. Have the trainee repeat the operation, telling what he is doing. Ask "why" questions. Avoid questions that can be answered with a "yes" or "no".

3. When the instructor is satisfied that the trainee has mastered the total stove operation, have him repeat it several times. Ask questions.

Certain employees also have the responsibility of instructing tenants in the operation of this stove. Therefore, after they have mastered the operation, they should be taught "how to instruct". This can be accomplished by having the employee use this outline in teaching the operation to the instructor as if the latter were a tenant. This should be repeated until the instructor (now being trained by the employee) is satisfied that the employee is qualified to teach tenants. Following this, the instructor should follow through by observing the employee in his teaching of tenants. This should continue until the employee knows how to do the job properly.

The job breakdown portion of this outline may be reproduced (with any necessary changes) by local management for distribution to tenants. Under these conditions, it is recommended that Step 1 be developed to become a signed statement by the executive director or housing manager and that an illustration be substituted for Step 3.

PREWAY GASOLINE STOVE
(MODEL 441-P)



JOB BREAKDOWN

STEPS	KEY POINTS
1. INTRODUCTORY TALK	Note: These are notes for the instructor to use in beginning his talk. - There is no need to fear the stove--just respect it. The stove is properly designed and equipped to give safe and satisfactory operation. - The stove in a way is like a washing or sewing machine; when the instructions are followed correctly, it gives good service without any danger. - Stove accidents are usually caused by carelessness. - Only adults (never children) should light or regulate the stove. - If there is ever any doubt, notify the management immediately.
2. PURCHASING AND STORING GAS	- Purchase only water white gasoline - without lead. - Store in approved safety can. If these are not available, use metal can with spout. Both can and spout must have screw covers. Keep can cover tight but loosen spout cover about one-fourth turn to prevent can from breaking in hot weather. - Tenants should never have more than 1 or 2 gallons of gasoline on hand - Store outside--never inside.
3. STOVE PARTS	- Master Burner - Master Burner Valve - Burners 2 and 3 - Burner Valves 2 and 3 - Air Chamber - Generator - Gas Tip - Pre-heater Lever - Generator Valve - Pilot Burner - Tank - Tank Clip - Filler Cap - Pressure Gauge(if there is one) - Pump - Oven Burner Valve - Oven Burner - Center hole to light oven burner

STEPS	KEY POINTS
4. REMOVING TANK FROM STOVE	- Do not smoke when removing tank. - Be sure there is no flame in the stove. - Be sure generator is shut off securely (clockwise ↑). - Be sure pre-heater lever is off (clockwise ↑). - Release tank clip by pressing down with thumbs. - Slide tank out, using one hand to pull on generator valve. Put other hand under bottom of tank to keep it from falling.
5. FILLING TANK	- Do not smoke. - Fill only outside on ground. - Use only water white gas without lead. - Remove filler cap slowly to release air pressure. Put filler cap on top of tank--never on the ground. - Use spout of safety can or funnel to pour gas in tank. - Be sure spout or funnel rests solidly in gas tank. - Pour slowly. - Fill tank until 2/3 full--no more. - Replace filler cap. Tighten firmly by hand--never use a wrench. - Wipe the tank dry. - Pump up pressure in tank to 30 lbs. When no pressure guage is provided, the number of pump strokes required may range from 30-60. The exact number can be determined only by experience. - Check top of tank for leaks by tilting at eye level. - If tank leaks, do not use. Notify management office immediately. - Return storage can to proper outside place. Leave rags used to wipe tank outdoor until entirely dry.

STEPS	KEY POINTS
6. REPLACING TANK IN STOVE	- One hand on generator valve. - Other hand under bottom of tank. - Slide in gently. - Be sure gas tip fits snugly in air chamber. - Lock tank in place with tank clip.
7. LIGHTING MASTER BURNER	- Be sure all burners are closed tightly (clockwise ↻). - Turn master burner valve fully open (counter clockwise (↺ . Valve is fully opened with 3 to 4 complete turns.) - Turn pre-heat lever on (1/4 turn counter clockwise (↺). - Light match and hold over master burner slightly to right of center. - Turn generator on quickly 1 to 2 complete turns. (counter clockwise (↺). If color of flame is yellow, close generator partially until flame is blue. - Master burner will light at once. - Observe pilot burner which should light itself automatically from the master burner; if not lit, apply lighted match to it. If it still doesn't light, turn off generator valve (clockwise ↻) and preheat lever (clockwise ↻). Do not use stove. Notify management immediately. - In about one minute—when the flame starts to "float" or flutter on the burner, slowly turn off preheater lever by turning clockwise ↻). Note: a. If only one burner is needed, it should always be the master burner. Use generator to control flame with the burner valve wide open. Be sure pilot burner remains lighted. b. The pressure in the tank should always be maintained at 25-30 pounds. There will be a 5 to 10 lb. air loss when first lighting master burner.

STEPS	KEY POINTS
8. LIGHTING BURNERS 2 and 3	- Be sure master burner is lit before turning on any other burner. - First light match. - Open generator further (counter clockwise (↺). - Turn on burner valve two to three turns (counter clockwise (↺). - Apply match to the burner. It will light at once. Note: If the master burner plus one or both of the other burners is on, use generator and burner valves to control the flames.
9. LIGHTING OVEN	- Master burner must be on at least five minutes. - Open generator further (counter clockwise (↺). - Light match and place flame down into the small center hole in front part of oven bottom. - Turn oven burner valve two to three turns (counter clockwise (↺). - Oven burner will light in a few moments. Note: If oven alone is to be used, turn oven burner valve wide open. Reduce flow of gas by turning generator, and close off burner valve not used. Control flame by turning generator. The pilot burner must remain lighted.
10. TURNING STOVE OFF	- Master burner must be lit. - Partially close generator (clockwise ↻). - Shut off all burner valves--except master one. - Turn pre-heater lever on again (counter clockwise (↺). - Turn generator off (clockwise ↻) firmly--don't force. - Turn master burner off (clockwise ↻) when flame starts flickering. - Turn pre-heater lever off (clockwise ↻).

DWELLING FURNITURE REPAIR

I. OBJECTIVE.

The purpose of this section is to recommend methods of furniture repair and the replacement of parts of FPHA-owned dwelling furniture. Since basic furniture standards include a minimum amount of furniture only, and also since new furniture is difficult to obtain because of shortages of materials, it is necessary to keep all furniture in use by immediate repair. For those projects sufficiently large to employ skilled furniture repair men this information may not be useful, but in the majority of projects a few men must be responsible for all maintenance, and specialization in furniture repair is not possible.

Based on project experiences, certain furniture and certain furniture members require more repair than others; therefore, only those repair jobs caused by the most frequent breakage are discussed.

In order to facilitate repair work, detail drawings showing the construction of basic furniture are included.

II. THE REPAIR OF WOOD FURNITURE.

1. Definition of Terms. Most of the terms used in this chapter are familiar to everyone; however, the following few definitions and information on uses of construction may be helpful:

Seat Rail. The members directly below the chair seat and joining the legs and posts of the chair. These are usually double dowelled to the posts or legs. (See drawing I on page 4.)

Arm Stump. The member attached to the chair seat rail which supports the front of the chair arm. (See drawing I on page 4.)

Back Post. A continuous member forming both the post and back leg of the chair. (See drawings I and II on pages 4 and 5.)

Chair Stretchers. Members joining the legs and posts of the chair to provide additional support. Center stretchers join two opposite stretchers. These are usually chucked to posts and legs and other stretchers. (See drawings I and II on pages 4 and 5.)

Table Apron. The four members directly below the table top joined to table legs and top. (See drawing III on page 8.)

Center Drawer Guide. A small member, usually 2" wide, nailed to the center back chest frame and screwed to the center front frame, on which the drawer slides.

Dowel. A wood pin used to fasten two joining members. Hardwood, spirally grooved dowels are preferred. Double dowelling is used to strengthen joints. (See Drawing I, front leg and chair apron joint on page 4; also, drawing II, table apron and leg joint on page 5.)

Mortise and Tenon. A tenon is a projection, usually rectangular, on the end of a member, made by cutting away the surrounding wood, which fits into a rectangular hole which is the mortise. (See drawings I and II, chair post and back slat joint; also, drawing VI, figure 5 on page 13.)

Chuck or Chock. A projection, usually square, on the end of a member which fits into a hole of the joining member. This is used only in this furniture for chair stretchers. Dowelling is used more frequently, but since a dowel in a chair stretcher permits the stretcher to turn, the chuck is more desirable. (See drawings I and II on pages 4 and 5.)

Dovetailing. Interlocking joints used for the joining of drawer sides and ends. (See drawing IV, figure 6 on page 10.)

2. Causes of Glue Failure and the Gluing of Loose Joints. Loose joints in all furniture caused by glue failure creates one of the most frequent repair needs.

a. Glue Failure. The most common causes are:

(1) Improper gluing such as failure to apply glue to both dowels and dowel holes, chucks and chuck holes or all of the surfaces of other joints.

(2) Hot, dry climates or exposure to moisture.

(3) Inferior glues.

(4) Where old joints are re-glued, failure to sand paper off all old glue.

b. Glues. There are several satisfactory glues suitable for furniture gluing. The most desirable are the water-proof glues, but these are not obtainable, at present. Animal hide glue, casein glue or vegetable glues may be used for repair work, but the best grades only should be purchased. Glues are usually provided in powder form and the directions supplied with each should be carefully followed in mixing, and in cooking, if the latter is required.

Liquid glues are more costly and some are unsatisfactory.

c. The Preparation of Joints for Gluing and the Gluing of Joints
All loose joints should be repaired, immediately. Delay usually causes further damage to the furniture. Since the most common cause of glue failure is improper gluing, special attention should be given to gluing processes. In repairing:

(1) Scrape off all old glue with chisel or scraper, then sand paper remaining glue from both dowels and dowel holes, chucks and chuck holes and mortise and tenon joints.

(2) If possible, do not increase the size of the holes in removing the old glue.

If the hole should be increased, do not add additional glue to fill the hole. If the joint is of dowel construction, a larger dowel may be used. If the joint is mortise and tenon or chuck construction, holes may be plugged, tenons and chucks sawed off, new holes bored for dowels and dowels inserted.

(3) Apply new glue with a small brush to all areas of the joints. In dowel and chuck joints, glue should be applied to the holes as well as dowels and chucks. This is important.

(4) Apply clamp to joint and allow to remain clamped over night.

3. Occasional and Dinette Chairs (See drawings I and II on pages 4 and 5.) Chairs require more repair than other basic furniture due to misuse and frequently due to the inability to obtain woods with as tough fibre as is desirable.

a. Broken Back Posts. Many of the back posts, particularly those of occasional chairs, are steam bent. Some are band sawed. If there is occasion to replace a number of steam bent back posts, or possibly those band sawed, it may be desirable to obtain them from the manufacturer of the chairs. If band sawed new posts are to be made:

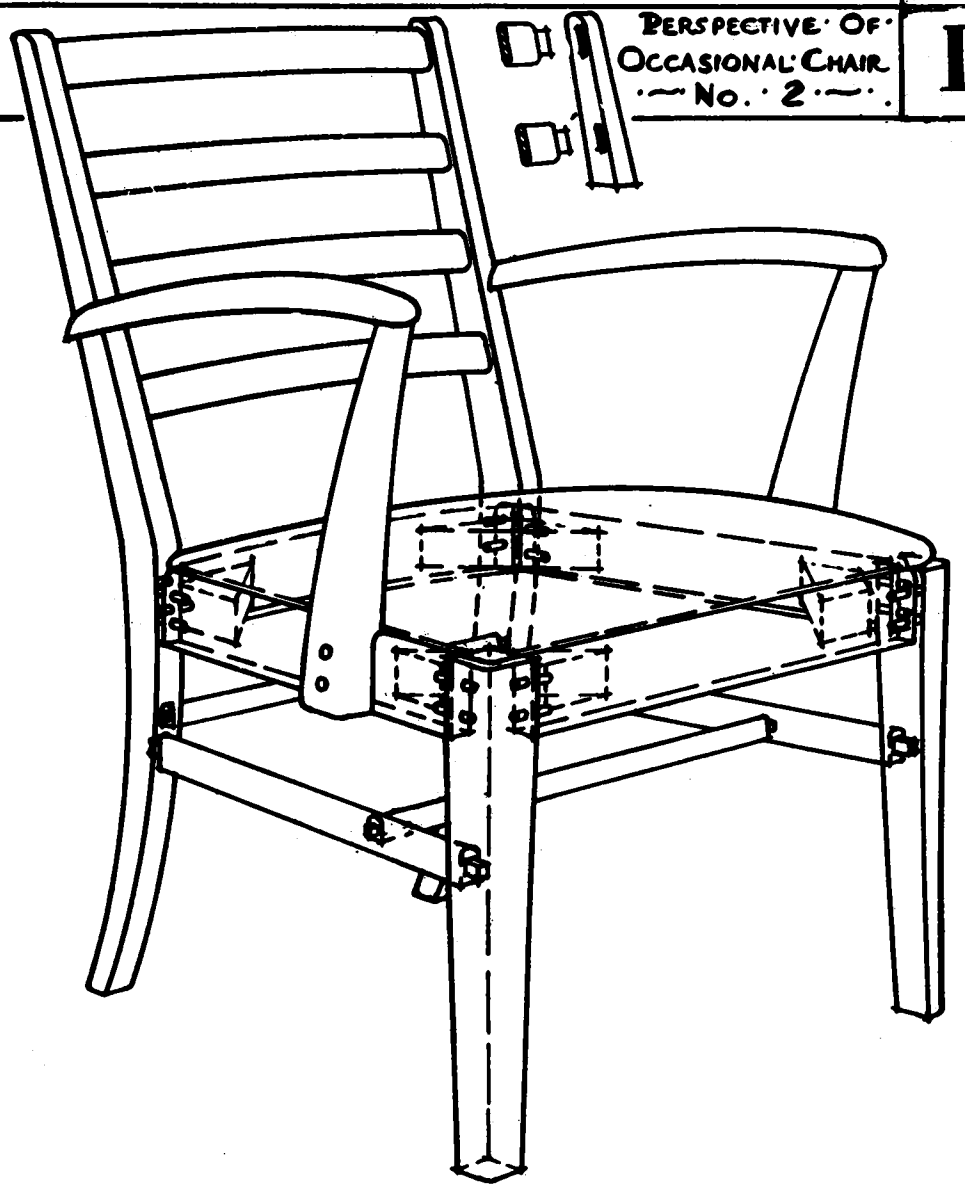
(1) Screws must be removed from corner block, side rail and back rail.

(2) Wood plug must be removed from the back of the post and the bolt from the arm.

(3) The post should be driver from seat rail, back slats and stretchers by the hammer and block method.

PERSPECTIVE OF OCCASIONAL CHAIR —~ NO. 2 ~—.

I



1-BACK SLATS ARE MORTISED AND TENONED OR DOUBLE DOWELED INTO BACK POSTS.

2-ARMS ARE FITTED TO BACK POSTS AND BOLTED.

3-ARM STUMPS ARE MORTISED AND TENONED OR CHUCKED INTO ARMS; GLUED AND WOOD PEGGED.

4-ARM STUMPS ARE BOLTED AND SCREWED TO SEAT RAILS.

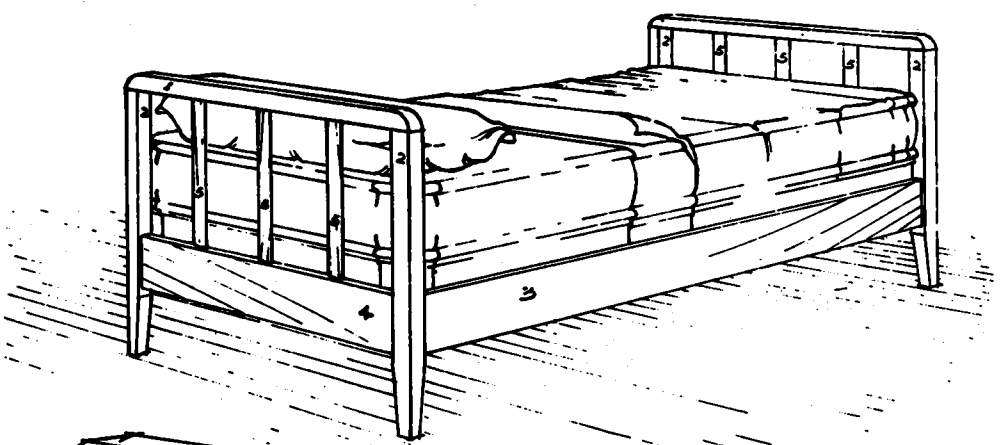
5-SEAT RAILS ARE DOUBLE DOWELED OR MORTISED AND TENONED TO BACK POSTS AND FRONT LEGS.

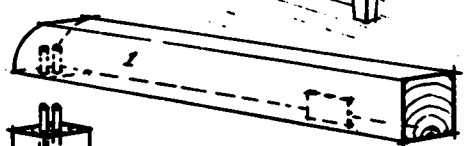
6-SEAT RAILS ARE REINFORCED AT EACH INSIDE CORNER BY FITTED CORNER BLOCKS; GLUED AND SCREWED TO RAILS.

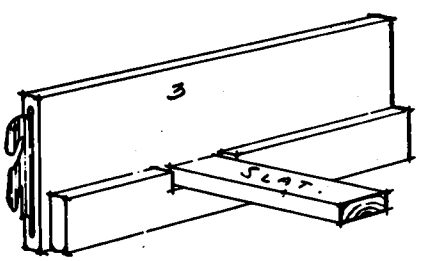
S.H.

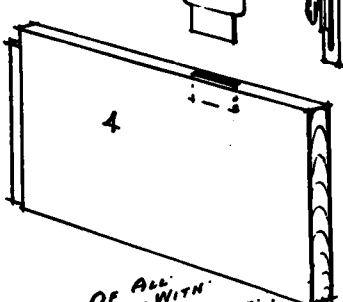
N.S.

PERSPECTIVE AND DETAILS OF ~A TYPICAL 3'-3" WIDE BED~ VI









BOTTOMS OF ALL POSTS FINISHED WITH A 3-PRONGED CASEHARDENED METAL DOME.

1--TOP RAILS WITH ROUNDED CORNERS CARRIES OVER POSTS.

2--POSTS ARE DOUBLE DOWELED AND GLUED TO TOP RAILS.

3--SIDE RAIL WITH BED HOOKS, SLAT BEARER AND SLATS. BEARER SECURED TO RAIL WITH GLUE AND SCREWS. ONE SCREW REQUIRED UNDER EACH SLAT.

4--HEAD AND FOOT RAILS WITH ENDS DOUBLE DOWELED AND GLUED, OR MORTISED AND TENONED AND GLUED INTO POSTS.

5--BALUSTERS WITH ENDS DOUBLE DOWELED AND GLUED, OR MORTISED AND TENONED AND GLUED INTO BOTH TOP AND BOTTOM RAILS FIT HEAD AND FOOT OF BED. ADD ONE ADDITIONAL BALUSTER AT BOTH HEAD AND FOOT OF ALL 4'-6" WIDE BEDS.

B.H.
N.B.

(4) All old glue should be thoroughly removed from the mortise and tenon joints of the back slats, from the arm where it joins the post, from the seat rail dowels, and from the stretcher chucks. (See drawings I and II on pages 4 and 5.) In many chairs, dowel construction is used for back slats instead of mortise and tenon; if these dowels or the dowels in the seat rail are broken, holes should be bored out for new dowels. New holes should not be bored too large.

(5) Old post should be used as pattern in order to precisely mark off dowel and chuck holes and mortise and tenon joints.

(6) If stretcher chucks are broken, the stretcher and new post may be bored for new dowels. Dowels used should be of hard wood, grooved spirally and cut long enough to make a strong joint.

(7) For gluing, (see Causes of Glue Failure and the Gluing of Loose Joints, page 2)

(8) After applying glue, press together, replace arm bolt, insert wood plug or fill with wood putty, clamp, and allow to remain over night.

(9) For finishing (see Wood Furniture Finishing, page 12)

b. Broken Chair Arms. Arms usually break at the juncture of the post and arm, usually due to too short a grain in the wood at this section, too large a bolt or chair misuse. Most chair arms are either steam bent or band sawed. A comparatively satisfactory job can be done by band sawing new arms.

To remove arm, wood plug should be pried out of the back of the post over the arm bolt, arm bolt removed and arm lifted from stump by block and hammer method. In cutting the new arm, avoid too short a grain at back post section.

Holes should be bored through new arm to receive arm post bolt and arm notched to receive post. Care should be exercised in notching the arm, since too deep a notch will weaken the member. Glue should be removed from all old glue joints and new glue applied on the joint between the stump and arm, and also the notch and area where this joins the back post. Joints should remain clamped over night.

c. Split Posts and Arms. The splitting of members is quite common, but the repair is simple. The member should be spread open sufficiently to apply glue on both sides of the break. A hand screw should be applied as quickly as possible to prevent the glue from setting before clamping. It is sometimes advisable to drill small holes in members and insert small screws to prevent further splitting.

d. Broken and Loose Stretchers. Stretchers may split, break or loosen. If the stretcher splits, the same operations are used as for split posts and arms. The replacement of stretchers is not difficult. These are usually chucked into back posts and legs and into other stretchers, since chucking prevents them from turning. It is usually more desirable to bore out chucks and replace by dowels. The gluing process is as stated above.

Loose stretchers should be glued immediately to prevent further chair breakage.

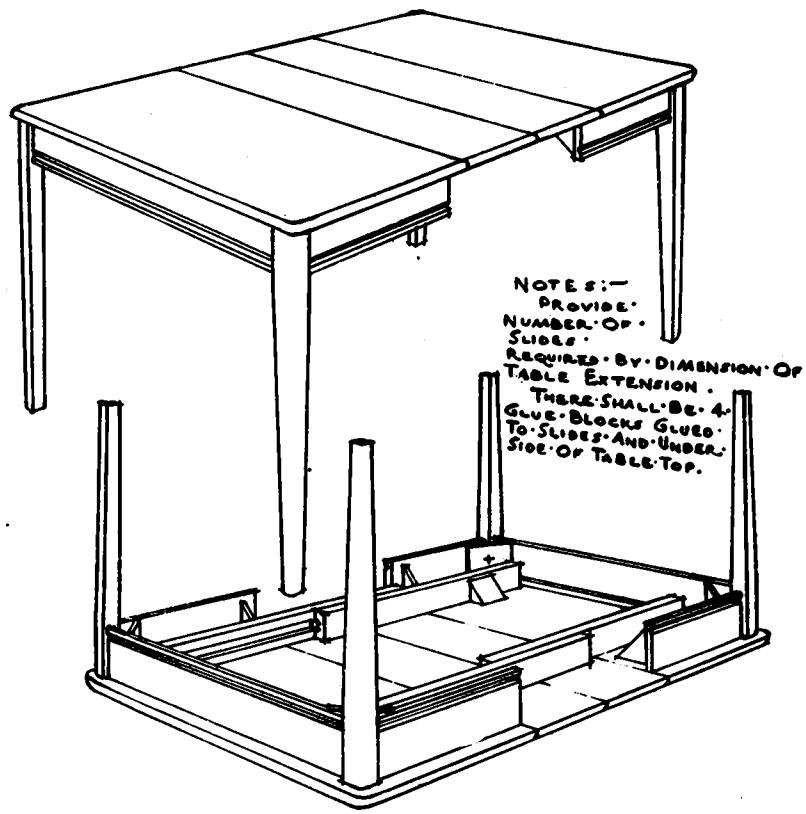
4. Dinette Tables. (See drawing III on page 8.)

a. Loose Legs. If lag bolt cannot be tightened, remove lag bolt and bore a 3/8" hole through leg, insert bolt through leg and corner block, use metal washer and nut and tighten. Bolt should be counter sunk and hole plugged.

b. Loose Apron. If apron loosens from top, it is not desirable to use longer screws than the original in order to tighten the apron. New screw holes should be bored in strip holding apron to top, screws inserted and screwed into apron and top.

PERSPECTIVES OF A TYPICAL DRAW-TOP EXTENSION DINETTE TABLE

III



1—TOP IS SECURED TO APRONS WITH SCREWS COUNTER-SUNK IN HARDWOOD STRIPS SCREWED TO APRONS AND SCREWED THROUGH OVERBORED HOLES IN STRIPS TO TOP. OVERBORED HOLES PERMITS EXPANSION AND CONTRACTION OF WOOD.

2—TOP AND APRON ARE SECURED ON EACH SIDE OF OPENING WITH TRIANGULAR BLOCKS GLUED AND SCREWED TO APRON AND SCREWED THROUGH OVERBORED HOLES TO TOP.

3—SLIDES ARE SECURED TO UNDERSIDE OF TOP WITH SCREWS THROUGH OVERBORED HOLES AND LARGE GLUE BLOCKS. TWO SLIDES ARE REQUIRED FOR 45" TABLES, 3 FOR 54".

4—LEG IS HELD IN PLACE WITH LAG BOLT THROUGH CENTER OF CORNER BRACE, NOTCHED INTO APRONS. BRACE IS SECURED TO APRONS WITH FOUR COUNTER-SUNK SCREWS AND GLUED.

B.H.
N.B.

c. Warped Tops. If top warps so that dowels will not enter the dowel holes in the joining member, trim dowels. Do not enlarge dowel holes.

5. Chests. For information on loose joints, split legs, etc., see previous pages.

Two types of chests are provided: (1) Post and panel construction with 6" legs; and (2) solid end construction with kick-plate. (See drawings IV and V on pages 10 and 11, for construction detail.)

The most common repair needs other than those described above, such as loose joints, split members, etc. are broken drawer guides, loosened dovetailing of drawers and sticking drawers.

a. Broken and Loose Drawer Guides. Broken drawer guides cannot be repaired. A new guide identical to the old one should be made and nailed to back frame, but screwed to front frame. It is important that dimensions of new guide be identical to those of the old one.

Some chests were manufactured with drawer guides nailed to front frame rather than screwed. These frequently loosen and should be tightened by replacing the nail by a screw.

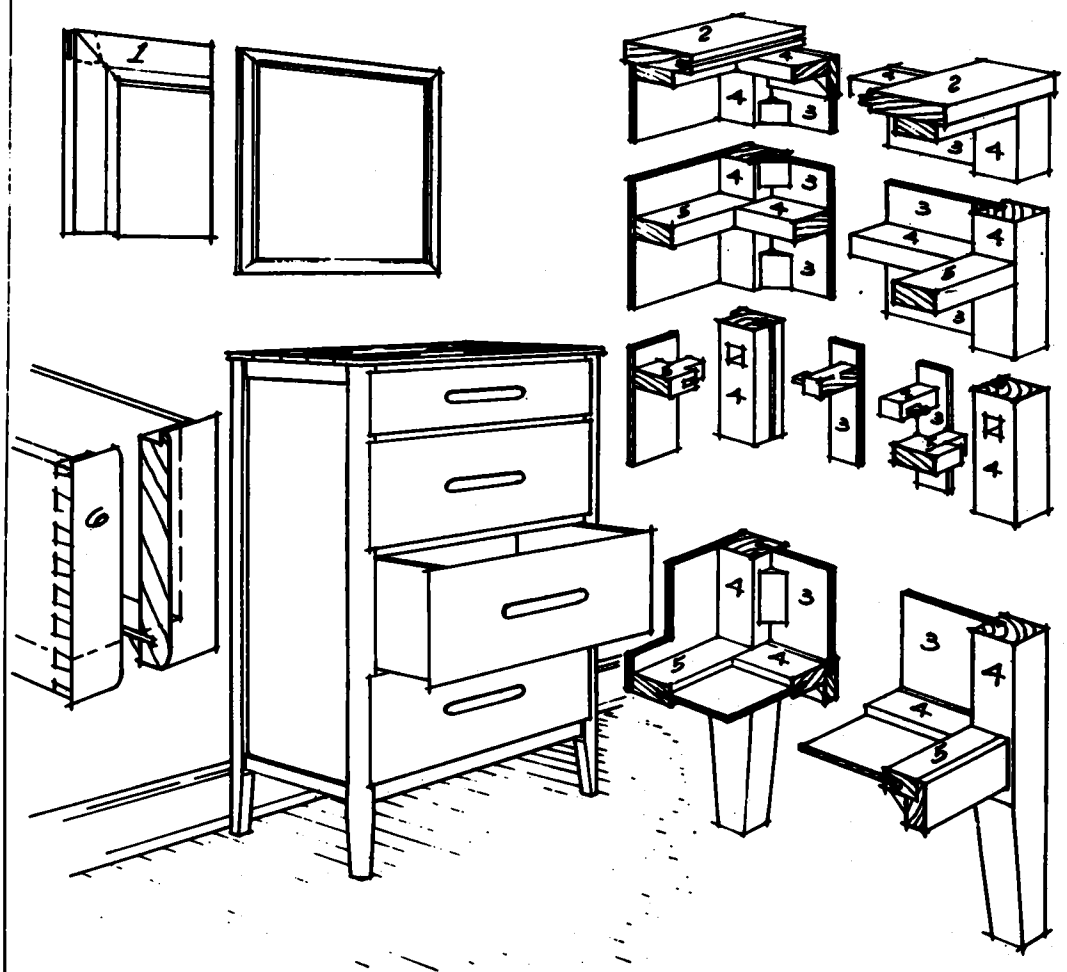
b. Loosened Dovetailing. If dovetailing pulls apart due to glue failure or warping, the most satisfactory repair method is re-gluing. Old glue should be scraped off and dovetailing re-glued. If drawer sides are warped, bradding may be necessary. Dovetailing may be temporarily repaired by omitting the gluing and bradding only.

c. Loosened Glue Blocks. Chest framing and chest drawers are glue blocked for additional strength. All loosened glue blocks should be replaced, since these strengthen drawer bottoms and chest framing. Glue two sides of the block and also the areas upon which it is to be placed.

PERSPECTIVES OF A TYPICAL DRESSER AND MIRROR

IV

THIS DRESSER IS 32" WIDE · 17" DEEP · 43" HIGH .



1-MITERED JOINTS OF MIRROR FRAME ARE SPLINED .

2-TOP IS SCREWED TO FRAME THROUGH SLOTTED HOLES TO PERMIT CONTRACTION AND EXPANSION OF WOOD .

3-END PANELS ARE FRAMED, TOP AND BOTTOM, FITTED INTO RAILS AND POSTS, GLUED AND GLUE-BLOCKED .

4-CASE IS FULL FRAMED AND BRACED THROUGHOUT .

5-FRAMING IS MORTISED AND TENONED INTO FRONT AND BACK POSTS, GLUED AND GLUE-BLOCKED .

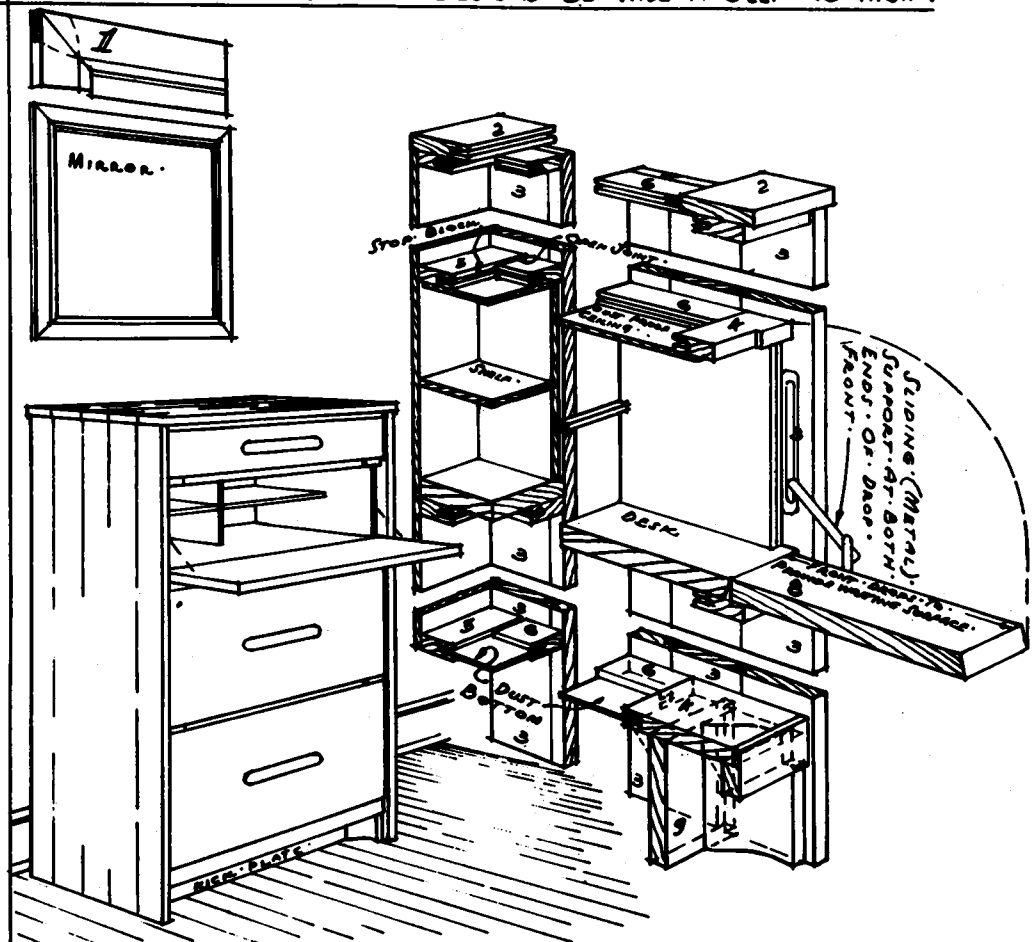
6-DRAWER ENDS ARE DOVETAILED INTO FRONT AND BACK AND GLUED .

O.N.
N.O.

PERSPECTIVE OF ALTERNATE CHIFFO-DESK — WITH DROP FRONT FOR WRITING SURFACE.

V

THIS CHIFFO-DESK IS 32" WIDE 17" DEEP 43" HIGH.



1—MITERED JOINTS OF MIRROR FRAME ARE SPLINED.

2—TOP IS SCREWED TO FRAME THROUGH SLOTTED HOLES TO PERMIT CONTRACTION AND EXPANSION OF WOOD.

3—ENDS OF CASE EXTEND TO FLOOR.

4—ENDS OF FRONT FRAMING RAILS ARE MORTISED AND TENONED INTO CASE.

5—ENDS OF BACK FRAMING RAILS ARE RABBATTED INTO CASE.

6—ENDS OF END FRAMING RAILS ARE TONGUED INTO FRONT FRAMING RAILS AND GLUED. ENDS OF END FRAMING RAILS ARE TONGUED INTO BACK FRAMING RAILS. 8" INCH WIDE OPEN JOINTS ARE MADE AT TONGUES AND SHOULDERS AT THESE ENDS OF END RAILS TO PERMIT CONTRACTION AND EXPANSION OF WOOD.

7—CORNERS OF ALL DRAWERS ARE DOVETAILED AND GLUED.

8—DESK PORTION OF CHEST IS INDICATED WITH A HINGED FRONT THAT DROPS TO PROVIDE WRITING SURFACE.

9—KICK PLATE IS LET INTO ENDS OF DESK AND GLUED. FRONT FRAMING RAIL IS NAILED AND GLUE BLOCKED TO KICK PLATE. KICK PLATE IS NAILED AND GLUED TO MOLDED RECESS BLOCKS.

B H.
H B.

d. Sticking Drawers. These usually may be remedied by the use of parawax on pressure points - bottom runner or sides. If this is not satisfactory, planning where pressure exists will be necessary.

6. Beds. (See drawing VI on page 13 for construction detail.) There has been little bed breakage. With the exception of loosened joints, the only other frequent repair need that has been reported is the loosening of slat bearers which are easily repaired by re-gluing.

Bottom and Top Rail Joints. Bottom rail joints often become loosened at the mortise and tenon joint due to frequency of bed moving. This should be immediately re-glued in accordance with gluing methods described above.

If top rail joint loosens, dowels should be re-glued or replaced if necessary. Broken dowels should always be replaced by new ones.

7. Matching Woods. In supplying new members for furniture, the same wood species as in the original piece should be used, if possible. Where original woods cannot be obtained, the following woods may be substituted. These will produce fairly satisfactory matching:

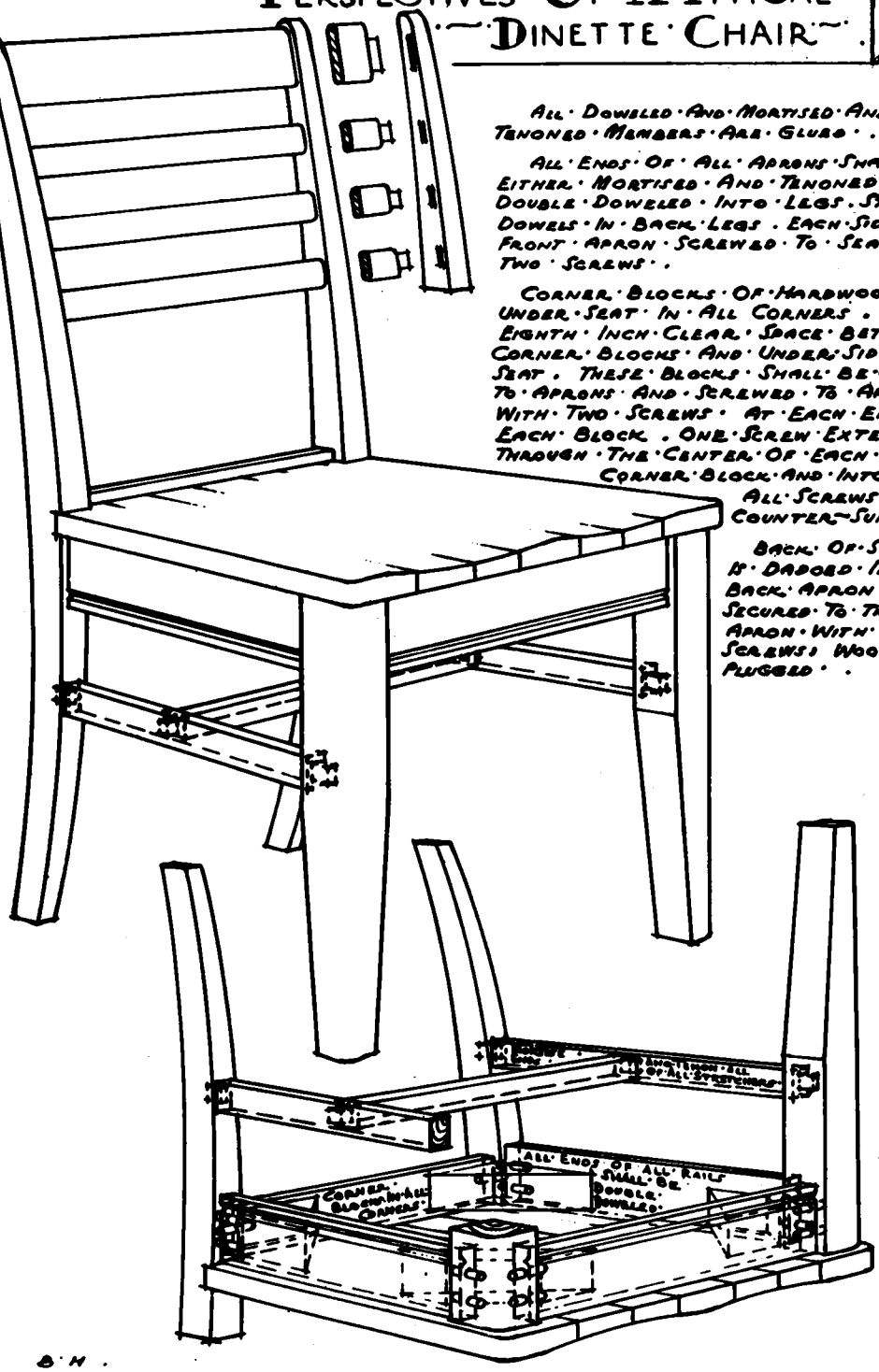
Original Wood	Substitute
Oak	Elm, ash, hackberry
Birch	Beech, maple, red alder, gum
Maple	Birch, beech, red alder, gum
Gum	Maple, birch, beech, red alder

8. Wood Furniture Finishing. Where there is considerable refinishing to be done, a spray booth is recommended. This should be kept at an even temperature of about 75° F and equipped with a fan to eliminate fumes. Spraying greatly reduces the time required for finishing.

The original furniture is finished with lacquer, not varnish. Lacquer finishes simplify refinishing, since a small portion of an area may be refinished, eliminating the necessity of refinishing an entire area.

The following finish specification was used for the manufacture of FPHA furniture.

PERSPECTIVES OF A TYPICAL ~ DINETTE CHAIR ~ II



ALL DOWELED AND MORTISED AND TENONED MEMBERS ARE GLUED.

ALL ENDS OF ALL APRONS SHALL BE EITHER MORTISED AND TENONED OR DOUBLE DOWELED INTO LEGS. STAGGER DOWELS IN BACK LEGS. EACH SIDE AND FRONT APRON SCREWED TO SEAT WITH TWO SCREWS.

CORNER BLOCKS OF HARDWOOD, UNDER SEAT IN ALL CORNERS. ONE EIGHTH INCH CLEAR SPACE BETWEEN CORNER BLOCKS AND UNDER SIDE OF SEAT. THESE BLOCKS SHALL BE GLUED TO APRONS AND SCREWED TO APRONS WITH TWO SCREWS. AT EACH END OF EACH BLOCK. ONE SCREW EXTENDS THROUGH THE CENTER OF EACH CORNER BLOCK AND INTO SEAT. ALL SCREWS ARE COUNTER-SUNK.

BACK OF SEAT IS DADOED INTO BACK APRON AND SECURED TO THIS APRON WITH TWO SCREWS; WOOD PLUGGED.

B.N.
H.B.

"All woodwork must be thoroughly sand papered to a true surface.

"Finish shall consist of water stain for close-grain woods and non-grain raising stain for open-grain woods (such as oak), wash coat sealer, filler, sanding sealer of not less than 16 per cent solids and two coats of clear lacquer of not less than 21 per cent solids. The first coat of lacquer to be sanded and the last coat rubbed with steel wool and wax or grit free pumice and oil, to a smooth finish. The finish shall be a transparent finish and not cloud the grain of the wood."

Close grain woods rarely require a filler.

a. Refinishing Entire Pieces. If a complete finishing job is required, the processes for refinishing are as follows:

(1) Old finish should be removed with a commercial lacquer remover or sand paper or both. The wood should be cleaned and sand papered to a smooth finish.

(2) Stain should then be applied and wiped and allowed to dry to an even color - probably 3 or 4 hours.

(3) If filler is required, apply and allow to stand until a film appears, wipe off, and allow to dry over night.

(4) Sealer should be applied and allowed to dry for one hour and sand papered.

(5) Clear rubbing lacquer should be applied and allowed to dry. (If lacquer is unobtainable, a varnish will be necessary, but this is not as satisfactory and requires a longer drying time.)

(6) The lacquer finish may be rubbed with pumice and oil or with wax.

Where spraying facilities are available, this finishing process requires little time, except for drying.

b. Refinishing Small Areas. Small areas may be finished satisfactorily by touching up with stain, allowing to dry, applying lacquer and rubbing with oil and pumice or wax.

III. TOOLS.

In addition to the usual tools required for general repair such as: bench with vise, framing square, planes, auger sets, screw-drivers, hammers, hand saws, and nail sets, the following tools and equipment are recommended if considerable furniture repair is expected:

Band saw; 36", 10" and 6" iron clamps; 3" by 5" hand scraper; mortise gauge; counter-sink bit; auger set - 1/4", 3/8" and 5/8"; hand screw; tenon saw, dovetail saw, half-round and 3-cornered files, glue pot, preferably electric; 2 inch stain and lacquer brushes, and pencil brush; 1/2" round glue brushes; assorted sand paper and hardwood dowels (these may be purchased in sticks and cut the desired length), and finishing materials.

IV. FURNITURE CARE.

Wood furniture not in use should be kept dry and away from direct sunlight. Care in storing furniture and particularly in stacking will prevent future refinishing. If wood furniture is to be stored for long periods, it should be kept in a space with a temperature of not less than 45°F. In hot, dry climates areas should be ventilated. (For details, see Ch. 14.10, pages 8 and 9)

1. Cleaning Wood Furniture. A mild soap and a very small amount of water should be used to clean lacquer finished furniture, the furniture wiped dry and waxed. Commercial cleaners should not be used.

   Leatherette chair seats may be cleaned with saddle soap.

2. Care of Mattresses and Pillows. Surplus quantities of both mattresses and pillows are sent with each furniture order. These are frequently stacked in piles on cement floors or placed on edge. If storage is for a period of weeks, mattresses should be placed in stacks of not more than 5 and stored where the bottom mattress receives some ventilation. They should be preferably stacked on slat platforms raised 4 or 5 inches from the floor.

   Unused pillows should also have ventilation and should not be stored in stacks of more than 10.

   Occasional sunning of both mattresses and pillows is desirable.

Distribution: All Projects with Community and Child Service Buildings - Nos. 116 to 121, inclusive.

ELECTRIC REFRIGERATORS

The following instructions are only for the operation of those electric refrigerators specifically described below:

1. Description. Self-contained, in excess of 16 cubic feet capacity, as furnished through mass purchase for Community and Child Service Buildings - Nos. 116 to121 inclusive.

   NOTE: These refrigerators were purchased without service, hence any service required must be furnished by the project, locally.

2. Starting and Operating. Read carefully and follow the instructions attached to the refrigerator.

   If after having followed the instructions the refrigerator does not start, or is not working properly, the project personnel is not sufficiently familiar with refrigerator operation to determine the cause, a local refrigeration engineer should be called to investigate and make the necessary adjustments or repairs.

   When first starting machine, be sure that valves are open.

3. Defective Parts - Replacement Guarantee. Manufacturers of refrigeration type compressors (condensing units) guarantee their products for a period of 12 months to be free from defective parts or workmanship.

   When, after careful check by a competent refrigerator engineer, it has been determined that the trouble is due to a defective part or parts, the part or parts will be replaced without charge. The request for the parts should be made through the supplier or the vendor.

ELECTRIC REFRIGERATORS - CHILD CARE CENTERS.

The following instructions apply only to those electric refrigerators specifically described below:

1. Description. Self-contained in excess of 16 cubic feet capacity, as furnished through mass purchase for Community and Child Service Buildings - Nos. 116 to 121 inclusive.

   NOTE: These refrigerators were purchased without service, hence any service required must be furnished by the project, locally.

2. Starting and Operating. Read carefully and follow the manufacturer's instructions relative to setting and connecting the refrigerator. These instructions will be found attached to the refrigerator.

   NOTE: Do not start the unit until it has been inspected by the manufacturer's local service representative or a recognized refrigeration engineer.

   In no case shall unit be started until valves are open.

3. Repairs and Maintenance. Diagnosis of troubles and all repairs requiring adjustment or replacement of parts or the recharging of system shall be done by manufacturer's local service representative, a recognized refrigeration engineer or maintenance personnel skilled in refrigeration work.

   In no case shall repairs be intrusted to personnel not thoroughly familiar with this type of equipment.

   Caution: Many gases used in refrigeration work are considered dangerous in the hands of inexperienced persons.

4. Defective Parts - Replacement Guarantee. Manufacturers of refrigeration type compressors (condensing units) guarantee their products for a period of 12 months to be free from defective parts or workmanship.

   When, after careful check by a competent refrigeration engineer, it has been determined that the trouble is due to a defective part or parts, the part or parts will be replaced without charge. The request for replacement parts should be made through the supplier or the vendor.

1/ This page supersedes the corresponding page of Bulletin No. 63, Chapter 11.21, dated 7-1-44.

Distribution: All Projects

GARBAGE CANS: Method of Treatment to Extend Life of Galvanized Iron Cans

"If possible the treatment should take place before the can has been used. However, if it has been used, it should be first boiled out with a strong soda solution and thoroughly cleaned with boiling water and allowed to dry. For a 20-gallon can, use approximately 2 pounds of asphalt. Place the asphalt in the can and bring the asphalt to a temperature high enough to cause it to be very fluid. While the asphalt is still in a fluid condition, revolve the can and at the same time keep the can tipped to an angle that would empty it of its contents. It must be remembered that the work of revolving the can to secure uniform coverage must be done rapidly as the asphalt cools quickly and then will cease to run. Use heavy gloves as the can becomes quite hot. I have used this method of preservation for many years, and if the can is treated in this manner once a year, it will easily last ten years. The exterior bottoms of the cans can be protected in the same manner by pouring the asphalt on the upset can from a container holding hot asphalt."

Submitted by:
Mr. M. P. Lauer
Executive Director
Akron Metropolitan Housing Authority
Akron, Ohio
(through the Region V Office)

Asphalt: Bird, Carey, or other standard roofing asphalt for hot application. Melting point 160° - 280°F. Should not be overheated (less than 400°F.).

Distribution: All Projects

AUTOMOTIVE EQUIPMENT

Although the automotive equipment on a project may not be extensive, it is important that it be given every care, and that the best advice and information be obtained for its repair and maintenance.

1. Motor Vehicles.

   a. Literature Available. Recognizing the need for information and recommendations regarding the care and repair of motor vehicles, the Office of Defense Transportation has published a series of helpful, well illustrated pamphlets on various phases of the subject. These have been prepared for the Office of Defense Transportation by the Society of Automotive Engineers. Any or all of the series may be obtained from the Office of Defense Transportation, 1147 New Post Office Building, Washington, D. C. or from any of the 143 district offices of the Office of Defense Transportation, Division of Motor Transport; or from the Regional Offices of the ODT, Office of Information.

      (1) Of particular interest at this time are the following:

      Cooling System-Cleaning, Flushing
      Rust Prevention, Antifreeze.
      Preventative Maintenance and Inspection
      Procedure.

      (2) Others in the series are

      Pistons to Fit Reconditioned Cylinders
      Reconditioning Brake Drums-Limits and
      Tolerances
      Reconditioning of Cast in Block Engines.
      Fitting of Sleeves, etc.
      Cold Welding
      Hard Surfacing Applications and Techniques
      Report on Engine Bearings: Replacement Techniques for Installation of Fittings

Distribution: All Projects

CONSERVATION OF MOTOR OIL 1/

In compliance with the directions contained in Bureau of the Budget Circular No. 399, which provides for uniform oil changing practices by all Federal agencies, the crankcase of all motor vehicles assigned to field offices of the Federal Public Housing Authority shall be regularly checked and serviced to insure efficient use and conservation of motor oil. The following standards shall govern the use and changing of crankcase oil under normal operating conditions. For use under extreme conditions, such as very low or very high temperatures, under heavy loads over extended periods or in excessively dusty regions, the provisions hereunder shall be so modified as to protect the life and operating efficiency of the motor.

1. Classification of Motor Vehicles. For these purposes motor vehicles shall be classified either as light or heavy equipment. Light equipment shall include passenger cars, station wagons, panel delivery trucks, pick-up trucks of 1½ tons or less capacity and motorcycles. Heavy equipment shall include all equipment in excess of 1½ tons capacity.

2. Motor Vehicles Equipped with Oil Filter. The oil in motor vehicles equipped with oil filters shall be changed according to the following schedule:

	Light	Heavy
During Breaking-in Period	At 1000 Miles " 2000 " " 5000 " "10000 "	At 1000 Miles " 2000 " " 3000 " " 4000 " " 5000 "
After Breaking-in Period	Semi-Annually (Spring-Fall)	Every 6000 Miles or Semi-Annually
Spring Change	SAE 20 ordinarily SAE 30 for sustained heavy load or high temperature	SAE 20 to 50 (See note below)
Fall Change	SAE 20 ordinarily SAE 10 extreme cold or prolonged cold	SAE 10 to 30 (See note below)

(Cont'd)

1/ This release was transferred to Bulletin No. 63 from Section 6128:1, effective 5-15-43, of the Housing Manager's Manual.

Par. 2 (Cont'd)

Note: It is difficult to specify the exact viscosity that should be used, especially for heavy equipment, but in general the larger the engine the higher the outside temperature, and the older the engine the heavier the oil should be.

3. Motor Vehicles not Equipped with Oil Filters. The oil in motor vehicles not equipped with oil filters shall be changed according to the following schedule:

	Light	Heavy
During Breaking-in Period	At 500 Miles " 1000 " " 2000 " " 3000 "	At 500 Miles " 1000 " " 2000 "
After Breaking-in Period	Every 3000 Miles	Every 2500 Miles

4. Oil Filters.

a. Although oil filters should be installed on every motor vehicle, emergency conditions may necessitate operating without a filter for a short period. Generally speaking, the large, heavy duty, replaceable cartridge element type of oil filter is the best and all motor vehicles should be equipped with such a filter. On vehicles having a non-replaceable element type filter, a replaceable element type should be substituted for the non-replaceable element type if and when the latter becomes clogged. Cotton waste replaceable cartridge elements are very economical, and satisfactory for most purposes. Such elements can be used in most types of replaceable element filters.

b. The filter element should be changed at least every time the crankcase oil is changed, or when the oil becomes black. The skill necessary to determine whether the oil has darkened sufficiently to require the changing of the filter element can be acquired only by repeated observation of used oil as compared with new oil of the same grade and quality. The filter element should be inspected every 1000 miles. The blotter test, in which after every 500 miles of driving a drop of hot oil from the dipstick is placed on a white blotter of sufficient size for at least a year's record, may be used in determining the necessity for changing the filter element and for judging its condition.

5. Essential Practices. Employees who are designated as responsible for the efficient use and conservation of motor oil should observe the following important directions:

   a. When each change of oil is made, drain the crankcase while the engine is still hot and flush the crankcase with a flushing oil;

   b. Do not fill the crankcase higher than $\frac{1}{4}$" below the "full" mark on the dipstick;

   c. Check oil condition every 500 miles, when motor is cold or has been turned off at least 5 minutes;

   d. Clean the air filter periodically, as specified by the manufacturer. Unless this is done, dirt and grit will enter the motor and may cause serious damage;

   e. Whenever high oil consumption and rapid clogging of the filter element are observed, the motor should be checked and, if necessary, overhauled to correct the trouble;

   f. Extreme variations in motor temperature increase both engine wear and oil dilution. Seasonal checks of the condition of the cooling system and thermostats should be made. In cold weather radiator covers should be used where necessary to maintain the proper operating temperature;

   g. Since the proper adjustment of the motor is a very important factor in the life of oil, there should be a practical application of the preventive maintenance program outlined in the booklet, "America's Trucks - Keep 'Em Rolling," published by the Office of Defense Transportation.

6. Additional Considerations. Too much oil is not only wasteful but also can be harmful to the engine. A high rate of oil consumption may result from the use of an oil that is too light, but do not try to "eliminate" oil consumption by using a very heavy oil, because increased gasoline consumption and wear on the battery will more than offset the saving in oil. The manufacturer's specifications may be followed insofar as oil viscosity is concerned, but it is generally agreed by most fleet operators and laboratory technicians that an oil one grade lighter than specified usually gives better all-round operating efficiency and economy.

Distribution: All Projects

CONSERVATION OF MOTOR OIL

All PHA directly operated projects, operating Government-owned motor vehicles, shall conform to the practices recommended by the Technical Committee on Lubricants and Liquid Fuels, Federal Specifications Board, as set forth in its "Information Bulletin", dated November 18, 1948, which is reproduced below.

Local housing authorities operating leased or aided projects are urged to conform to the provisions of the bulletin.

INFORMATION BULLETIN

THE CONSERVATION OF AUTOMOTIVE ENGINE OILS

The need for the conservation of petroleum products requires consideration of the most economical use of these materials. Motor oils comprise an important volume, in gallons and dollars, of all lubricating oils and it is timely to re-evaluate the recommendations concerning their use.

A variety of practices appear to exist among Government agencies with respect to the intervals between the draining of used motor oil from vehicle engines. The reasons for some of these practices are obscure, or are based on information which is no longer applicable and in many cases oil is wasted by changing too frequently.

Current recommendations of motor vehicle manufacturers specify 2,000 to 5,000 miles as safe intervals between oil changes. Many motor vehicle fleets with well supervised maintenance operate on appreciably longer intervals ranging from 5,000 miles to semi-annual or "seasonal" oil changes which result in the accumulation of up to 20,000 miles of oil service.

The following recommendation is made in the interest of the conservation of engine lubricating oil:

CHANGE OIL IN ALL GOVERNMENT PASSENGER CARS, TRUCKS, AND BUSES IN THE SPRING AND IN THE FALL OR AT 4,000 MILE INTERVALS, WHICHEVER COMES FIRST.

(Cont'd)

Where experience indicates that longer intervals between oil changes are satisfactory, no change in existing practice is recommended.

Where the operating conditions include "stop and go" service, especially in cold weather, or when sand and dust are regularly encountered, a shorter interval between oil changes is desirable.

For heavy construction equipment, diesel powered automotive, mobile, and portable units and other high speed diesel engines, it is recommended that the manufacturers' instructions be followed or a procedure that has been developed for that particular equipment be used.

General Information:

To assure the attainment of satisfactory performance under the foregoing procedure, it is recommended that engines be maintained in good mechanical condition by a schedule of preventive and corrective maintenance. This should include proper adjustment and repair of the ignition, fuel, and cooling systems and proper servicing of the oil filter and air cleaners.

An efficient oil filter will aid in keeping the engine oil free from abrasives. The heavy duty replaceable cartridge type filter may be purchased under Bureau of Federal Supply contracts. This type should be used in replacing all "sealed can" types.

It is important to maintain a sufficiently high temperature, (approximately 160° F.), in the cooling system in Winter to insure good engine performance and a minimum rate of oil deterioration.

November 18, 1948

Technical Committee for
Lubricants and Liquid Fuels
Federal Specifications Board

Distribution: All Projects

STORAGE AND MAINTENANCE OF VEHICLES

All FPHA vehicles used in project operations shall be stored, whenever possible, at the project site or at government-owned or operated garages and serviced through government stations. Contracts for the storage and maintenance of FPHA vehicles shall be made by FPHA project officials only if Federally owned facilities are not available. In no case shall such vehicles be stored at the residences of project employees.

Distribution: All Portable Shelter Unit (PSU-2) Projects Including Local Housing Authority Managed

SUBJECT: Tenant Planting for Projects Comprised of Portable Shelter Units (PSU-2).

Planting is restricted, in the initial development of these projects, to that required for erosion control. Attractiveness has been of secondary consideration.

Planting for attractiveness will therefore have to be done by the tenant.

Housing Managers are requested to encourage tenants to plant flowers and to assist wherever possible in an effort to create and maintain attractive surroundings. Most people enjoy flowers and have the natural urge to plant them about their homes. With little encouragement this urge can be developed into keen interest in not only the planting of flowers but in the general overall neat appearance of the home.

Annual flowering plants are highly recommended to be planted generously in beds about the base of the house walls or about the borders of the yards. Annuals are inexpensive and are easily grown from seed. They require the minimum effort to maintain and are tolerant to subnormal growing conditions and therefore require little gardening experience to produce satisfactory results. The following varieties are suggested.

A. Annual flowering plants adapted for close planting in beds.

Ageratum	Cosmos	Portulaca
Aster	Larkspur	Sweetalyssum
Bachelor Button	Marigold	Balsam
Callendula	Nasturtium	Snapdragon
Calliopsis	Petunia	California Poppy
Candytuft	Phlox	Zinnia

B. Annual vines adapted for training on the walls of the house, old established trees, fences or on temporary supports such as trellises.

Morningglory	Japanese Hop	Scarletrunner
Moonflower	Balloon Vine	Climbing Nasturtium
Gourd	Cypressvine	Cardinal Climber

Perennial Flowers, Vines and Shrubs may be used where more permanent plants are desired, in locations similar to those suggested for annual plants. They are not generally grown from seed but can be transplanted from local fields and woods or they may be made available where surplus stock may exist through local garden clubs, city park departments, county agricultural

(Cont'd)

agents, state forestry departments and other similar agencies or they may be purchased directly by the tenants from local dealers. Some of these local agencies may be equipped to assist in the organization of the planting program and to advise on layout and planting technique either through direct contact or through publications available on the subject. The following are suggested lists of these plants.

A. Perennial flowering plants adapted for close planting in beds:

Hollyhocks	Iris	Plantainlily
Phlox	Aster-Michaelmas Daisy	Yarrow
Chrysanthemum	Tickseed	Bleeding Heart
Sunflower	Daylily	Veronica
Daisy	Sweet William	Gallardia
Stonecrop	Moss Phlox	Marguerite

B. Perennial vines adapted for training on walls, fences, old established trees, trellises, etc.:

Halls Honeysuckle	Climbing Rose	English Ivy
Trumpetcreeper	Wisteria	Matrimonyvine
Clematis	Fleeceflower	Grape

C. Shrubs adapted for planting at foundation of house and at borders of yards.

Lilac	Spiraea	Coralberry
Privet	Forsythia	Flowering Quince
Snowball	Weigela	Mockorange
Hydrangia	Elderberry	Deutzia

Victory gardens should be encouraged (See Bulletins numbers 7 & 8). Although space in tenant yards may be limited, the smaller vegetables might be grown there. In the protective belt around each group of units, ample space might be assigned to all tenants desiring gardens where the general run of vegetables for family use may be grown or land outside the project may be made available for this purpose.

INSTRUCTIONAL MATERIAL ON HOUSEHOLD CONSERVATION PRACTICES.

Items with which the maintenance personnel should be conversant and which they should in their daily contacts pass on to the tenant as the opportunity presents itself are described below.

A. UTILIZATION OF HEAT

1. Access doors to crawl spaces under buildings should be kept closed.

2. Bedroom windows should be opened only slightly at night. Natural leakage ordinarily provides sufficient ventilation.

3. Doors should be kept closed between rooms with open windows and other heated portions of the house.

4. Radiators or warm air supply registers should be turned off in bedrooms at night and in rooms which are being aired or cleaned during the day.

5. Overheated rooms should be cooled by adjustment of the heat supply - not by opening windows.

6. Draperies or covers over radiators or warm air supply and return registers should be removed, as they affect the circulation of air upon which heating depends.

7. Windows which are infrequently opened should be kept locked; this fits sash tighter and reduces infiltration of cold air.

8. Drawing of draperies or shades over windows at night reduces heat loss.

9. House temperatures should be reduced to a minimum consistent with comfort. 65° to 70° is considered a healthful temperature. Estimates of reliable authorities show savings in fuel of from 15% to 34% when house temperatures are reduced from 75° to 70°.

10. Fires should be reduced to a minimum during mild weather.

B. COOKING

1. Burners of electric, gas or oil stoves and drafts of coal stoves should not be turned on until needed.

2. Drafts of coal stoves and burners of other stoves should be turned off immediately after using the stove.

3. Top burners or ovens of electric, gas and oil stoves should not be used for heating the rooms.

4. Draft adjustments of coal ranges should be studied in order to determine proper positions for different heat requirements.

5. Electric, gas and oil equipment burners should be cleaned regularly.

6. Poor air adjustment of gas burners or unusual flame should be reported immediately to the management office.

7. Boiling of water or foods should be done with a minimum amount of heat or flame, boiling generally takes place at a fixed temperature for certain substances, increasing or decreasing the rate of boiling will not affect this temperature and has no effect on the speed of cooking.

8. Burning gas forms water vapor which is carried by the air to the cold wall surfaces and forms condensation or dampness which is very harmful. When using any open gas flame proper ventialtion should be provided in order to prevent this condensation. Ventialtion may be provided by opening a window slightly, preferrably by lowering the top sash.

9. Equipment not in proper operating condition should be reported immediately to the management office.

C. ELECTRICITY

1. See section "Cooking".

2. See section "Refrigeration".

3. Economy should be practiced in the use of hot water.

   a. Stoppers should be used in lavatories and sinks instead of allowing water to run.

   b. Leaky faucets should be reported immediately. Several hundred gallons of water a day may be wasted due to one leaky faucet.

4. Hot water heaters should be turned off before departing for any great length of time.

5. All lights not in use or not needed should be turned off.

6. Light shades and bulbs should be cleaned regularly. This will result in much more light per bulb.

7. Irons, radios, fans and other appliances should be turned off immediately after use.

8. Washing machines should be operated according to manufactuere's instructions. Machines allowed to operate longer than necessary wear out clothes and waste fuel.

D. GAS

1. See section "Utilization of Heat".

2. See section "Cooking".

3. See section "Refrigeration".

4. Economy should be practiced in the use of hot water.

   a. Stoppers should be used in lavatories and sinks instead of allowing water to run.

   b. Leaky faucets should be reported immediately. Several hundred gallons of water a day may be wasted due to one leaky faucet.

5. Absences from home for any length of time should be reported to the management so heater may be turned off.

6. Hot water heaters not properly operating should be reported immediately.

E. REFRIGERATORS

1. Doors should be kept closed.

2. Foods should be allowed to cool before placing in refrigerator.

3. Refrigerator should be defrosted regularly.

4. A minimum distance of 4" should be maintained on all sides of refrigerator.

5. The motor or equipment compartment should not be used for storage purposes. Air circulation is necessary around equipment for proper operation.

6. Refrigerators should be turned off before departing for any great length of time.

7. Refrigerators not operating properly should be reported immediately.

DISTRIBUTION: Field Offices, Housing Managers, Local Housing Authorities

SUBJECT: Exterior Television Antennas

This release sets forth policy governing the installation of exterior television antennas on dwelling units on locally and Federally owned housing projects.

1. Prior Approval of Management. Tenants shall be required to obtain approval from local management before installing exterior television antennas.

2. Limitations on Approval. Approval shall not be granted (1) if the locality and type of structure permit satisfactory reception with indoor antennas or (2) if installation of an exterior antenna will damage the structure or is otherwise impracticable. There is less possibility of damage if an antenna is attached to an exterior wall (supported by two offset brackets, to clear roof projection and gutters) instead of being installed on a roof surface. The tenant shall be required to have the antenna installed by qualified radio service personnel in a manner satisfactory to local management.

3. Responsibility for Costs. All expenditures incident to the installation and removal of exterior antennas shall be borne by the tenant.

Distribution: Housing Managers and Local Authorities with Projects in Custodial Management

SUBJECT: INSTRUCTIONS FOR PREPARATION FOR CUSTODIAL MAINTENANCE AND PROTECTION

The following items of work are generally required for placing a project or portion of a project in a standby status. However, not all of these items may be required for each project.

Service Contracts. All work hereinafter noted should be programmed in conformity with contract requirements covering termination or reduction in service.

1. Tools and Equipment.

   a. Prepare tools and equipment, not needed for the custodial work but required during standby or terminated status, for storage by cleaning and otherwise treating to prevent corrosion. Store in a dry and preferably fire and theft-proof storeroom.

   b. Garbage and trash cans - clean thoroughly and store.

2. Grounds - General. Clean up generally, remove and dispose of debris.

   a. Ground cover and plantings - no work required.

   b. Roads and walks - block off in a manner permitting use of roads for fire protection and by custodial force. Properly mark and protect barricades.

   c. Yard appurtenances - movable, such as benches, etc. - remove and store.
      - Others - grease working parts.

   d. Signs - place "No Trespass U. S. Government Property" signs in conspicuous locations, and necessary directional signs for fire and police control.

3. Mechanical

   a. Water Mains. If fire hydrants are on general service mains, keep the mains in service. For a project in standby status exceeding 3 months, or in terminated status, or before the advent of freezing weather, if no fire hydrants are on the mains serving dwelling units:

      (1) Close valves in service main(s).

      (2) Open house cocks or disconnect unions.

Par. 3 (Cont'd)

(3) Remove and store meters if considered advisable from a safety standpoint, or if the entire system is in disuse and the meters are project-owned. If the utility company owns meters, notify it to take proper protective measures.

b. Building Water Lines, Drains, etc. If stop cocks are provided on building service lines, close and drain; if no means of cut off are provided, the season of the year and the length of the "standby" period will determine the course to pursue. In extremes, it may be advisable to expose the service line, cut, and cap. If water has been cut off:

(1) Open faucets

(2) Flush toilets

(3) Drain domestic hot water tanks after extinguishing fires.

(4) Remove drain plugs or disconnect unions at all low points in piping; prevent drained water from damaging interiors.

(5) Fill any traps in danger of freezing with anti-freeze solution.

c. Project-Owned Water Supply Plant. Secure from the regional office, instructions for placing the plant in custodial care.

d. Sewerage Systems. Same as "c" above.

e. Gas Mains - City Supply.

(1) Close valves in main gas service.

(2) Close valves in distribution pipes.

(3) Turn off all main burners and pilot lights.

(4) Notify utility company to disconnect service.

NOTE: Should any service, such as occupancy of a unit by custodial employees or heat for storage rooms be required, the above should be modified accordingly.

f. Liquefied Petroleum Gas Systems.

NOTE: Liquefied petroleum gas is highly inflammable.

The handling of a liquefied petroleum system and equipment should be by experienced, skilled and careful mechanics only. Unless the project force can supply such personnel, it is advisable to employ specialists in the handling of these systems and equipment in closing them down, as described below. Every precaution must be taken to avoid explosion and fire.

Par. 3 (Cont'd)

(1) For projects in partial standby or terminated status:

(a) Cut off gas at building.

(b) Burn out gas in building line at stove burner.

(c) Shut tight all gas cocks on utilization equipment.

(d) Notify supplier of change in the amount of use and service; check the contract for any required action.

(2) For projects in complete standby status:

(a) Notify supplier of changed circumstances; check contract requirements.

(b) Remove all liquid from tanks.

(c) De-gas tanks and lines

(d) Burn remnant gas through nozzle to be installed on storage tank.

(e) Close all valves on storage tank and balance of system.

(f) Seal all openings to prevent moisture from entering storage tank.

(g) Inventory all equipment, such as tanks, regulators, meters, etc., but do not remove.

(h) Protect as necessary against theft and vandalism

NOTE: Items (b) to (f) can probably best be done by contract with the supplier, who is equipped for such work

(3) For projects in complete terminated status:

(a) Items (a) to (h) as above for complete standby status

(b) Remove, plug and seal, inventory and store all regulators, valves, meters, and similar equipment, as directed by the regional representative.

(c) Seal storage tanks

NOTE: Where possible, liquid gas removed as noted, for use on other projects.

Par. 3 (Cont'd)

g. Oil Lines

(1) Close valves at main oil lines

(2) Close valves in distribution lines

(3) Close all burner valves and pilot valves

(4) Empty tanks

(5) Notify oil supplier to discontinue service

h. Heating - Steam and Hot Water Systems

(1) Extinguish all fires

(2) Disconnect electric switches on control wiring

(3) Close all feed water valves

(4) Do not drain boilers and systems except during freezing weather.

(5) Clean fire box and ash pit; check and report on condition of grate bars, boiler breechings, etc.

(6) Remove all fuel, soot and dirt from system and flues

(7) Protect all motors, controls, instruments, etc., from damage or loss by removal and storage of equipment, unless heating plants are thoroughly protected from forcible entry.

i. Forced Warm Air Systems

(1) Extinguish all fires

(2) Disconnect electric switches on control wiring, blower motors, etc.

(3) Shut off water to humidifier, and drain

(4) Clean all fire boxes and ash pits

(5) Remove all fuel, soot and dirt from entire system including flues

(6) Protect all motors, controls, instruments, etc., from damage or loss, as under "h" above.

Par. 3 (Cont'd)

j. Circulators, Stoves and Ranges

(1) Extinguish all fires

(2) Close all burner valves and pilot valves

(3) Remove all fuel from system

(4) Clean all fire boxes, ash pits, smoke pipes, etc.

(5) Protect all controls, instruments, attachments from damage or loss

(6) Disconnect electric switches to control systems

4. Electrical

a. Service Mains

(1) Notify utility company or other source of supply of change in service requirements.

(2) If electricity is required for other services; i.e., pumping system, street lighting, etc., provision should be made to maintain uninterrupted service.

(3) Check fire alarm systems. Do not disconnect electric service to the portion(s) of this system which is to remain in service. Install separate hookup to project fire alarm system where necessary.

(4) Disconnect all main switches if possible, under (2) and (3).

(5) Remove main fuses, list, stock and store.

b. Building Service

(1) Disconnect main service entrance switch.

(2) Remove all fuses and store.

(3) Remove all light bulbs and store.

(4) Protect all electric fixtures, switches, panels and accessories against damage or loss. Where a building is to be used for storage or other purposes, continue the use of the fire protection system, when considered advisable.

Par. 4 (Cont'd)

(5) Check building fire protection system to insure that disconnecting electric service does not affect the project fire protection system which is to be kept in operation.

5. Refrigerators

a. Ice Boxes

(1) Clean and dry interior

(2) Clean, scald and dry drains

(3) Place drip pan inside

(4) Leave doors open

b. Mechanical Refrigerators

(1) Defrost

(2) Clean and dry interior

(3) Leave doors open

(4) Shut off at box switch

(5) Disconnect power

(6) If for a long period, or if suggested by considerations of safety, remove motors and refrigerating units, prepare for storage and store.

6. Buildings

a. Inspect each building for immediately necessary repairs and make them.

b. Broom-clean the entire building, removing all debris

c. Check to make sure all equipment is in satisfactory condition, utilities shut off if required, etc.

d. Lock securely all windows, doors and other openings

e. If no reason exists for lowering shades, they may be left rolled all the way up, to preserve them. If, however, it is desirable to lower them partially, they should be adjusted at a uniform

Par. 6 (Cont'd)

height throughout the project. In buildings or rooms used for storage, where direct sunlight may cause damage, shades should be pulled all the way down.

f. If the project is to be in custodial management for an extended period and other conditions such as location of the project, extent of watchman service to be provided etc., indicate advisability, board up windows. This work must be approved in advance by Regional office.

7. Miscellaneous

a. Check sewage pumping stations and sump pumps for requirements. Make such provision for use as will be necessary. If not required, provide for closing service, and for protecting or storing of equipment, as may be advisable.

8. Other Project Facilities Equipment. (This includes equipment in cafeterias, community buildings, infirmaries, clinic trailers, maternity convalescence trailers, and playgrounds.)

a. Dishwashing machines, bain maries, steam tables, urns, sinks, food trucks, etc.: Drain and dry.

b. Mechanical equipment: Clean, oil, or grease; if exposed, cover adequately.

c. Ranges, ovens, steam tables and other such equipment of unenameled or unpainted metal; Protect by oiling or greasing. Treat both interiors and exteriors.

d. Small metal items: Clean, oil if necessary, wrap, box and store.

e. Metal pots and pans, silverware and other utensils: Dry, oil, and box properly in suitable containers.

f. China, glass and stone ware: Clean thoroughly, dry and box properly in suitable containers.

g. Wood furniture: Stack and store in closets and/or in center of rooms, and protect against direct sunlight, dampness, etc. Folding chairs, card tables, ping pong tables, and other collapsible furniture shall be folded before stacking. Miscellaneous small items, such as table tennis paddles, balls, nets, billiard queues, shall be adequately boxed before storing.

Par. 8 (Cont'd)

h. Motion picture equipment: Relieve tension on all exterior belt springs before placing in container. Carefully wrap loose items, box properly with machine in upright position, label plainly and store in cool dry place away from steam pipes, damp floors, etc. Store film in accessible cool dry place, and list subjects on outside of containers.

i. Library books: Box and cover, and store in dry place.

j. Stage equipment: Dismantle, fold, and wrap curtains, stack rigid equipment, cover and store in dry place.

k. Clinic equipment: Small metal items shall be treated as in d. above. Pharmaceuticals likely to deteriorate shall be disposed of in accordance with the recommendations of the United States Public Health Service District Office.

l. Playground equipment: Disassemble and disengage all removable equipment on playground and child service play yards, including swings, teeter-totter boards, slides, basketball goals, nets, etc. Store in community buildings or child service centers. Stack all wood equipment away from windows and cover to protect from direct sunlight and dampness. Place bolts and other hardware in bags and attach to large items removed. Box and label all small items such as toys, books, first aid equipment, etc., before storing.

9. Dwelling Furniture Care.

a. Periods of Out-of-Use.

(1) When a project is in a stand-by status for a period of two months or less, dwelling furniture should be maintained at the project. It may remain in individual rooms, unless the temperature of these rooms is below 45° F. or other storage area is more economically heated than the individual rooms.

(2) When the dwelling furniture is to remain in a standby status for more than two months, the procedures established on transfers in the memorandum to all assistant regional directors for management, dated March 17, 1944, entitled Utilization of Movable Equipment from Deprogrammed or Vacant Projects, should be followed. A copy of the request for shipping authorization should be sent to the Management Standards Division, Central Office.

b. Protection Requirements. If re-shipping is impossible, the protection requirements as specified below should be followed.

Par. 9 (Cont'd)

c. Inventories. All furniture and furnishings should be inventoried.

d. Storage Space. All furniture should be stored in locked space, completely protected from the weather and should be kept free from moisture and dampness.

(1) Wood furniture and bed springs should be stored in space with a temperature of not less than 45° F. and away from direct sunshine. In hot climates, such as in Arizona, and Nevada, storage space should be ventilated.

(2) Mattresses, pillows, blankets and bed linen should be stored in well ventilated space free from rats and mice and preferably with some sunshine. Space need not be heated. Blankets, linen and mattress pads may be stored on linen room shelves or in cartons in linen room if space is adequate.

e. Care Before Storing.

(1) Wood Furniture and Springs. If furniture is to be stored for two months or less, cleaning and waxing may be postponed until it is to be made ready for use. When storing for longer periods, it is preferable to wash all furniture with a mild soap, dry, and wax, applying at least one, but preferably two coats of wax before storing. Do not neglect waxing. Springs should be brushed and wood areas washed with soap and water. In cases of bugs, adequate extermination methods should be used before storing. Leatherette seats of chairs should be rubbed with saddle soap.

(2) Mattresses and Pillows. When stored for short periods only, these should be brushed or vacuum cleaned, and, unless absolutely dry, should be aired before storing. When stored for long periods, both mattresses and pillows should be cleaned and disinfected. Stack mattresses not more than five high on slat platforms permitting ventilation. Platforms should be raised at lease 4" from the floor and sufficiently large to permit the entire mattress to lay flat. Mattresses also may be rolled and tied in the center with a 12" width material and placed on sides. Do not stack more than three rolled mattresses deep. Pillows should be stored in piles of not more than 10 and on the same type of platform as mattresses; or stored in ventilated bins. Cover bottoms and tops of both mattresses and pillow piles for protection from dust. Never stack mattresses and pillows directly on cement floors.

Par. 9 (Cont'd)

(3) Used blankets should be washed or dry-cleaned, and carefully wrapped in heavy paper to protect from moths. Unused blankets should be aired, and wrapped in the same manner as used blankets.

(4) Sheets, Pillow Cases, Mattress Pads and Towels. Store in piles on linen shelves and cover with sheets, or stack in cartons.

f. Care After Storage. Except for protection from fire and theft, the only service required is the ventilation of mattresses and pillows. A sufficient amount may be obtained by opening once each month, the doors and windows of the space(s) where these are stored.

Subject: MAINTENANCE AND CARE OF PROJECTS PLACED IN CUSTODIAL MANAGEMENT 1/

1. Standard. The project shall be so maintained that the realty and equipment will be in as good condition, except for normal depreciation, at the close of the custodial period as when the project was placed in custody. 2/

2. Survey of Projects in Custodial Management.

   a. The custodial manager, with a regional maintenance engineer or other qualified person appointed by the assistant director for management, should survey the buildings and grounds and estimate the work required to condition the project for custody. Reports of surveys should include an estimate of the work required on the buildings; equipment and materials needing replacement; and all other items of cost such as roads, drainage, utility systems, etc. This report should be sent to the assistant director for management, within 30 days following the notification from the regional office that the project has been placed in custodial management, or when required by the assistant regional director for management.

   b. The custodial manager should send the assistant director for management such amendments to the report as are required from time to time by changes in the condition of the projects.

3. Inspections.

   a. Each building, the grounds and all the facilities and utilities should be periodically inspected by the manager for the adequacy of protective measures, and to determine the repairs and additional protective measures necessary to maintain the standard stated in Paragraph 1 above.

   b. Such inspections should be made at least every 30 days and at such other time as may be required by unusual weather or other conditions. (See Chapter 14:30 Item 2a for "Project Patrolling")

      (1) Watchmen and other employees should report to the custodian any damage, risk of damage, and other items requiring attention.

1/ See Bulletin No. 63, Section 14:10 for instructions for preparation for custodial maintenance and protection.

2/ For information on measures for the protection and safety of project property, see Chapter 14:30, "Protection and Fire Prevention-Custodial Management".

Par. 3 (Cont'd)

(2) A regional maintenance engineer will inspect each project at reasonably frequent intervals, as determined by the assistant regional director for project management.

4. Maintenance and Protective Work. The following outline and suggested limits of work for projects in custody are furnished as a basis for programming and budgeting.

a. Grounds.

(1) Grass (or other ground cover). Keep the grass mowed and cleaned sufficiently to prevent health or fire hazard, especially in the area immediately around the buildings (within 10'). Remove and dispose of all cuttings and other debris constituting a health or fire hazard. Debris should be burned only under supervision and at a safe distance from the buildings. These precautions are particularly important during the autumn.

(2) Planting - Trees and Shrubs. Do only work necessary for the protection of life or property.

(3) Erosion Control - Drainage. Keep surfaces properly drained and maintain erosion controls.

(4) Roads and Walks. Keep road drainage functioning by cleaning catch basin, ditches, etc., and by shaping the road surface.

Keep the road surface in condition for use by fire and safety equipment and by custodial personnel.

Remove snow to the extent necessary for the movement of equipment and personnel.

(5) Yard Appurtenances. Maintain the appurtenances sufficiently to preserve them.

b. Mechanical-Electrical Equipment and Systems.

(1) Building water supply

(a) Check all the lines and fittings and repair those that need it.

(b) On the approach of freezing weather, provided there is no indication of change in project status; cut off the water and drain the house system, including the hot-water lines,

Par. 4 (Cont'd)

traps, tanks, range waterbacks, etc. If no building cut-offs have been provided and if the fire hydrants are on the same mains as the house systems, notify the assistant director for management of these conditions and request instructions.

(c) Fire hydrants are to be maintained in service. For further details see Part 5, Chapter 5:1.

(2) Heating Equipment and Systems.

(a) Supply fuel for heating of buildings which are being kept in partial or complete operation.

(b) Provide for firing and controlling the heating plants of buildings kept in operation.

(c) Provide for cleaning the furnaces or boilers and for removing the ashes.

(d) Drain unused hot-water and steam systems on the approach of freezing weather.

(3) Electrical Equipment and Systems.

(a) Maintain the street-lighting system.

(b) Maintain the project fire-alarm systems. (See Chapter 14:30, Items 1e and 2b.)

(c) Check and record utility meter readings monthly.

(4) Sewage-Treatment Plants and Sewerage Systems.

(a) Obtain from the regional sanitary engineer consultant instructions for the care of treatment-plant and other sewage-disposal facilities.

c. Buildings.

(1) Make repairs and take necessary measures, such as periodic cleaning, etc., to protect the property from damage due to weather and other causes.

(2) Inspect buildings as follows:

(a) Roof: Inspect for leaks after rain.

(b) Walls: Inspect for leakage after rains.

(c) Doors, Floors and Windows: Inspect for safety, damage, and protection.

(3) On inspection visits, check condition of all equipment; take the necessary protective measures.

Distribution: All Projects

SUBJECT: PROTECTION AND FIRE PREVENTION FOR PROJECTS IN CUSTODIAL MANAGEMENT 1/

The complete protection and fire prevention program should be determined by local management subject to advice from and approval by the regional office, as soon as possible after the notice of "standby" or termination has been received.

1. Preparation for Custodial Management. The following are among the items which must be taken care of:

   a. Secure necessary watchman's clocks.

   b. Check adequacy of means for summoning fire fighting apparatus.

   c. Be sure that all fire hydrants and water supply connections used for fire protection remain connected and have adequate water flow. 2/

   d. Make sure that all fire fighting equipment is in good working order. 2/ Relocate indoor equipment, if necessary, so that it is readily accessible from the building entrance. Provide signs at such building entrances to indicate the type of fire fighting equipment to be found inside.

   e. Test all building fire alarm systems to be maintained and continue such tests periodically in the same frequency and manner as required for occupied projects.

   f. Remove all dead grass, weeds, etc., to a safe distance from all buildings. In the autumn, before grass, weeds, and other growth have died off, cut down all such growth to a distance not less than 10 feet from all buildings. Rake up and remove all cuttings.

   g. Remove all trash, rubbish, etc., from the project. Do not burn trash and rubbish near buildings. Supervise all burning of waste material.

1/ See Manual of Policy and Procedure, Sections 3646:3 and 4646:3, or Housing Manager's Manual, Section 6646:5 for the responsibilities of the regional offices, local housing authorities, and project managers. See also Bulletin No. 63, "Operation and Maintenance Handbook," Chapter 10.10 for maintenance of fire fighting equipment.

2/ See Bulletin No. 63, Chapter 10.10.

h. Turn off all utilities from buildings, except those actually needed for custodial management.

i. Securely lock up all buildings as they are vacated, but do not barricade doors. Windows will not usually require boarding up where watchmen are on duty.

j. Blockade all roads entering the project sufficiently to exclude casual traffic, but provide for ready removal of barricades so that emergency vehicles can enter project without delay.

k. Post "No Trespass U. S. Government Property" signs in conspicuous locations, and necessary directional signs for fire and police control.

2. Protection of Projects in Custodial Management.

a. Each project must be patrolled, and each building examined for unlawful entry or attempt, once each day or more often if deemed necessary. (Preferably, avoid any fixed routine.) Buildings such as warehouses, pump houses, community buildings, commercial buildings, etc., should be patrolled more frequently.

Watchclocks and stations should be kept in good working order and recordings checked periodically.

Watchmen should preferably live on the project, and the presence of at least one watchman at all times should be mandatory unless the project is so small that cost would be prohibitive, and is unwarranted.

b. Maintain accessible and continuous facilities for summoning fire and police assistance.

c. Maintain project fire department or apparatus, if any, sufficient to afford proper protection.

d. Maintain streets in passable condition for fire and police emergency vehicles.

e. Maintain normal street lighting.

f. Maintain all other applicable items listed under Item 1 above, in good condition.

Subject: PROTECTION AND FIRE PREVENTION FOR PROJECTS IN CUSTODIAL MANAGEMENT 2/

The local management of Federally owned projects is responsible for determining the protection and fire prevention program for the custody project, subject to advice from, and approval of, the regional office (fire prevention and safety engineer). It is also responsible for the effective operation of the protection program during the custodial period.

1. Formulation of Protection Program. An outline of the proposed protection program shall be prepared as soon as possible after the notice has been received that the project is placed in custody. 3/ The protection program must give due consideration to the location of the project, to local services which will be rendered, and to other items discussed in this section. Consideration must be given to the cost of protection as related to the value of the property to be protected.

2. Preparation for Custodial Management. The following items supplement the requirements in Manual Sections 4646:3 and 6646:5:

   a. Secure necessary watchman's clocks.

   b. Check adequacy of means for summoning fire fighting apparatus and police.

   c. Be sure that all fire hydrants and water supply connections used for fire protection remain connected and have adequate water flow. 4/

1/ This section supersedes Section 14.30 of Bulletin No. 63, dated 7-25-44. Information included in the section has been clarified and additional information has been added.

2/ See Manual Sections 3646:8, 4646:3, or 6646:5 for the responsibilities of the regional offices, local housing authorities, and project managers.

3/ Two copies of the program shall be submitted to the regional office.

4/ See Bulletin No. 63, Section 10.12.

d. Make sure that all fire fighting equipment is in good working order. 1/ Relocate indoor equipment, if necessary, so that it is readily accessible from the building entrance. Provide signs at such building entrances to indicate the type of fire fighting equipment to be found inside.

e. Test all building fire alarm systems which are to be maintained, and continue such tests periodically in the same frequency and manner as required for occupied projects.

f. Remove all dead grass, weeds, etc., to a safe distance from all buildings. In the autumn cut down all grass, weeds, and other growth before they have died off, to a safe distance from all buildings. Rake up and remove all cuttings.

g. Remove all trash, rubbish, etc., from the project. Supervise burning of all waste material. (Do not burn trash and rubbish near buildings.)

h. Turn off all utilities from buildings, except those actually needed for custodial management. (See Section 14.10, Paragraphs 3 and 4.)

i. Inspect and securely lock up all buildings as they are vacated, but do not barricade doors. Windows will not normally require boarding up where watchmen or other project employees are on duty.

j. Blockade roads entering the project (see Section 14.10, Paragraph 2b).

k. Post "No Trespass U. S. Government Property" signs, etc. (See Section 14.10, Paragraph 2.d.)

l. See Section 14.10 for additional maintenance and protection items.

3. Protection of Projects in Custodial Management. Local management must notify police, fire and utility companies when projects are being placed in custodial management. At this time, arrangements for project protection must be completed. The extent of local cooperation rendered in policing the project and in providing fire fighting services will determine the requirements for additional protection to be furnished on each project.

The following, together with Paragraphs 4 and 5, are recommended as a guide in developing project protection programs. They may be modified on specific projects as the exercise of good judgment may dictate:

a. Patrol each project street and drive, one or more times each day. Examine each building for unlawful entry or attempt as often as deemed necessary but not less than once per week. Buildings such as warehouses, pump houses, community buildings, commercial buildings, etc., should be examined more frequently.

1/ See Bulletin No. 63, Chapter 10.1.

Normally, building examination will be limited to trying all doors and observing all windows to make sure they are locked and have not been tampered with. Where there is any suspicion of unauthorized entry or attempt, buildings should be entered and inspected. The frequency of examination and the extent of inspection are subject to approval of the regional office.

b. Maintain accessible and continuous facilities for summoning fire and police protection.

c. Maintain project fire and police department or apparatus, if any, sufficient to afford proper protection.

d. Locate watch clock stations where necessary to assure proper protection, and maintain such stations in good working order. Check recordings periodically.

e. Maintain in good condition, all other applicable items listed in Paragraph 2 above.

f. See Section 41.20 for additional maintenance requirements.

4. Provision of Police Protection. Services recommended under Item 3a may be performed under any one or a combination of the following plans. Any plan will normally include Item e below:

a. Protection by a neighboring military post or base or other Government establishment. An interdepartmental arrangement may be made for such protection.

b. Protection by the local police department or the sheriff's office, for projects within the jurisdiction of such public protection agency. When projects are located outside such local boundaries, a contract might be negotiated with the adjacent public protection agency. Police or sheriff scout cars should cruise through all project streets and drives.

Additional services above those normally provided, such as inspecting all buildings, might be rendered by such local agencies under special contract.

c. Protection, as part of their regularly assigned duties, by one or more regular employees of an active housing project or local authority, whose offices are located within reasonable distance of the vacated project. In other instances, such services might be rendered by one or more of these employees on their way to and/or from their place of regular employment.

d. Protection by contract with one or more persons who live adjacent to the projects or with a private company which furnishes such services.

c. Protection by persons employed (or with whom contracts are negotiated) to perform watchman services who will live on the project (see Item 5 below). They may have additional employment on the project or elsewhere. (See Section 6112:6 for the policy with respect to dual employment with the Federal Government.)

5. Project Protection by Resident-Employees. In order to assure adequate protection at minimum net cost, it may be desirable to provide dwelling space on the project for all persons, and their families, required to protect and maintain the custodial project. The mere physical presence of one or more persons on the project at all times should in itself provide a large measure of protection. Such persons should be responsible for calling the police or fire departments, for first-aid fire-fighting, etc., if and when the need arises. If one or more persons, charged with such watchman responsibility, own dogs, project protection would be considerably improved.

a. Number and Location of Project Residents. The number of project residents (and their families) will vary with the location and size of the project. The number should be strictly limited to essential protection requirements.

Normally, there should be at least two residents (families) on a custodial project. It is recommended that two residents be located at each point at which protection is required such as, at each entrance to the project, at reasonable intervals along highways which may run through or skirt the project, and at other such locations. Residence other than at project entrances and along highways should receive approval of the regional office.

If there is a project fire department, a certain number of employees who are required to assist in fighting fires should be provided with residence in or adjacent to the fire station.

Each two neighboring residents (families) should be required to arrange between themselves the periods of time during which one or the other of them may be absent from the project.

b. Use of Full Time Watchmen. In some instances it will be necessary to have full-time employees operating on one or more eight-hour shifts, to perform watchman services alone; in other instances, watchman, maintenance and other services could be combined. In general full-time watchmen should be hired only when such arrangement constitutes the most economical method of securing regular patrol of the premises or when a cheaper method of regular patrol cannot be arranged for.

c. Telephone Service. Watchmen and persons rendering such services while living on a project should be assisted in obtaining private telephone service, if they desire such services and/or if such service is required to supplement other facilities for calling fire and police departments.

6. Employment and Compensation of Contract-Employees on Directly Operated Projects. 1/ In order to simplify the keeping of accounts and records on custodial projects, resident-employees should be employed on a contract basis, and they should be required to render services at least equal to the rental value of their dwelling. See Chapter 6112 of the Housing Managers' Manual for factors which sould be considered in determining payments to be made to contract employees, and other employment and compensation information.

7. Notification of Loss. Lost, stolen or damaged property on directly-operated projects must be reported to the regional office in accordance with Section 6136:1 of the Housing Manager's Manual.

Loss due to fire, accident or catastrophe, including injury or death resulting from accidents, must be reported in accordance with Manual Sections 4646:2 or 6646:3. See also Manual Section 6115:2 for procedure to be followed in making claims for compensation in the event of injury or death to employees on directly operated projects.

1/ Similar arrangements are recommended for the consideration of local housing authorities.