NATIONAL HOUSING AGENCY

U.S. FEDERAL PUBLIC HOUSING AUTHORITY,

REGION II - JOHN A. KERVICK, DIRECTOR

RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION OF LOW-RENT HOUSING PROJECTS

Presented By

LHA MAINTENANCE SUPERINTENDENTS OF REGION II

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We are pleased to place before you, who are concerned with the planning and construction of low-rent housing projects, the recommendations of the maintenance superintendents of the local housing authorities operating within Region II on the design and construction aspects of future projects. These suggestions were based upon experience gained through the operation and maintenance of existing projects. The proposals contained herein were arrived at after lengthy and deliberate consideration by the Conference of Local Housing Authority Maintenance Superintendents held at New York City, June 3, 4, 5, 1946.

We sincerely hope that everyone who will be responsible for the design and construction of future low-rent housing communities--the local housing authorities, the architects, engineers, construction inspectors and all other interested parties will carefully review, consider and adopt, where applicable, these recommendations.

Many thanks to all of you who contributed to the compilation of this report.

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GENERAL RECOMMENDATIONS

1. Architects and engineers should be required, as a condition precedent to their employment, to spend at least two weeks at several comparable projects in operation, talking with managers and maintenance men.

2. There should be a standardization and simplification of parts and equipment, such as glass size for windows and doors, window and door sizes, seat and washer size for faucets, hardware, etc.

3. Maintenance personnel of operating projects, and the Regional Office Management Division, should be consulted during project planning and should approve plans and specifications prior to bidding.

4. All inspectors should be well qualified in their respective trades and overall inspection should be on a higher plane. Possibly a simplification and clarification of specifications would permit a more consistent interpretation of contract requirements which is necessary.

5. The contract for the services of an architect should require that he furnish the Authority with accurate, certified, as-build drawings on the completion of the project. The clause on as-built drawings should stipulate the number and type of drawings to be furnished as well as the information to be shown thereon.

1 - SITE SELECTION

A. PROJECTS BUILT NEAR DUMPS AND ON FILL

1 - Projects should not be immediately adjacent to trash areas. Many projects are located near active city dumps. Obviously under these conditions it is almost impossible to keep the project clean, as papers are constantly blowing over the project to say nothing of smoke and objectionable odors which are annoying to residents.

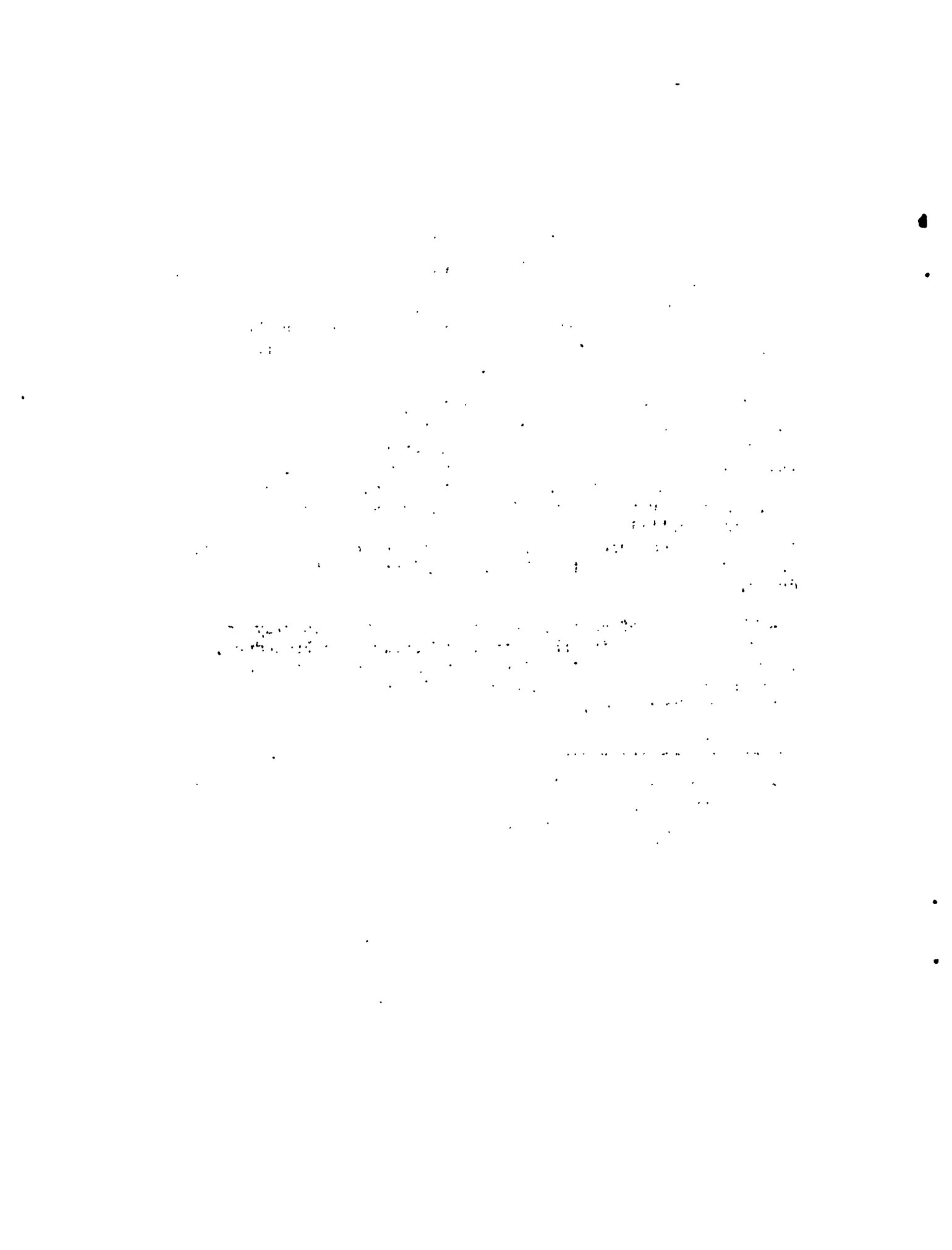
2 - The erection of projects on filled land or other poor subsoil creates a serious problem to the maintenance division. Generally provisions are made for the proper support of the buildings with piling, or by other approved methods. However, nothing is done about underground utilities, walks, roadways, etc. As a result these utilities, walks, and roadways are constantly settling, causing changes in grades and making drainage systems useless. Trees settle and considerable work is required to straighten them out, and prevent them from dying.

3 - The subject of "site selection" is treated expertly and covered completely in FPHA Manuals of Policy and Procedure. Therefore, we believe that the recommendations contained therein should be rigidly adhered to in the selection of future building sites.

B. STEEP GRADES AND TERRACES

1 - Many projects are built, in part, with extreme grades and the employment of steep banks and terraces. This has proved to be very costly and unsightly due to banks failing to hold, children creating dirt slides, uprooting shrubbery, destroying grass on banks, and erosion caused by heavy rains.

2 - Projects which require unusual site planning in regard to banks and terraces should be provided with ample funds so that stone retaining walls may be build to eliminate the objectionable features of high banks and terraces. Adequate drainage, ground cover, and planting should be provided. Refer to Bulletin #63, Part 9, issued by the Regional Office, on these subjects.



2 - SITE DEVELOPMENT

INCLUDING WALKS, ROADS, GRADING, PLANTING, ETC.

A. GRADING AND BACKFILLING

1 - More attention should be given the compacting of backfills to prevent the settlement of pavements and lawn areas, which is apparent in many projects.

2 - More care should be exercised in backfilling trenches for utility lines in order to prevent breakage which very often does not show up or cause trouble until after the contractor-guarantee has expired. As time has passed, more failures of underground distribution systems have appeared, necessitating expensive corrections.

3 - Backfilling around foundation and basement walls should be done at the proper time and in such a manner that it will not remove or damage any of the dampproofing.

4 - All rough or subgrading should be leveled off in conformity with (and 6 inches lower than) the finished grade.

5 - Finish grading should be free of low spots or level areas that collect and hold pools of water during the winter months which causes the grass to freeze and die.

6 - Steep slopes and small knolls should be omitted from landscape designs wherever possible, as they always present troublesome erosion and maintenance problems.

7 - Finish grading should be done with a bed of topsoil 6 inches thick sloping away from buildings to yard drains and catch basins, with sufficient grade to assure positive drainage during all seasons of the year.

8 - Existing trees should not be left on knolls above finished grades. Under such conditions trees inevitably die from drought and root damage.

9 - A study should be made of any unusual subsoil conditions to assure proper stabilization. Fills should be made in 8- to 12-inch layers as soon as the foundations have been completed and waterproofing on those foundations has been set, so as to give the earth sufficient chance to settle.

B. PAVED AREAS

1 - Sidewalks, steps, spray pools and platforms should be constructed of concrete. Streets should be constructed to conform to municipal specifications.

2 - Drying yards, junior play areas and sitting areas should be paved with asphalt. The curbing for asphalt pavements should be steel or concrete.

3 - Vehicular driveways should be at least 16 feet wide (wider, if possible). Principal streets should be at least 30 feet wide with sufficient parking bays to take care of the cars of residents and visitors.

4 - All project roads should have a permanent curb 6 inches above the road level. This would have a tendency to prevent vehicles from running over the side of the roads and would simplify the maintenance of grass. On all project streets where there is heavy traffic by school children there should be adjacent sidewalks, raised above the road, and extending to the curb.

5 - Bituminous, concrete and asphalt pavements with wood curbing have proved unsatisfactory because they develop potholes or sags which collect water and cause pedestrians to detour over the lawns. During the winter months frost raises the wood curbing, thereby necessitating the annual job of driving it down each spring, and the problem of restoring the torn or raveled edges always follows this operation.

6 - Concrete steps with pipe handrails are very satisfactory. However, cheeks or concrete strips about 18 inches wide should be placed on both sides of the steps level with the external junction of the risers and the treads. This addition will provide a runway for bicycles, roller skates, and children's foot traffic, thereby preventing paths and erosion. Short flights of steps should have ramps for baby carriage traffic.

7 - Walkways leading to stairhall entrances of apartment buildings should be wide enough to accommodate benches and baby carriage parking on both sides. Where there is a large number of families for a stairhall, a paved sitting area should be provided. Walks should be placed in the most direct line of travel from dwelling units to streets, laundries, and public spaces to eliminate short cuts across lawns and planted areas.

8 - A great majority of projects complain of inadequate project walks. A great many are too narrow, particularly on high density projects. Many others are poorly placed, requiring pedestrians to detour from the normal line of travel. In some projects, necessary walks are entirely missing. All of these shortcomings result in damage to lawns and shrubbery. Sidewalk intersections should be circular rather than square.

9 - Belgian blocks grouted with cement placed at each side of walks and raised slightly above walk surfaces are effective in protecting grass areas. Lawn level should be flush with top of block.

10 - All narrow areas between sidewalks and buildings should be paved except small areas adjacent to buildings, which should be left for vines or shrubs.

11 - Small grass areas between pavement and curb usually cannot be maintained. Extend either sidewalk or Belgian blocks to curb.

12 - Large central parking lots are not satisfactory. Provide small parking bays with curbs adjacent to streets and drives for apartment buildings. Individual parking platforms for residents of row houses to have utility for both parking and coal delivery.

13 - Projects should have one or more large playgrounds, according to the size of the project, to take care of the larger children for softball, basketball, football, etc. Such playgrounds should be free from playground equipment such as swings, Jungle Jims, etc. Such equipment should be placed in playgrounds which are intended for certain age groups who will utilize this equipment. Playgrounds in high density projects should be fenced with a design which will not lend itself to climbing.

14 - Small children must play within sight of their mothers. If their play yards are located in courts and are too small to be interesting to the older, more destructive children, everyone will be happier--including the Manager. Sandboxes should be eliminated but earth digging areas should be provided, which should be free from surface drainage and fenced on three sides.

15 - Sprinkler heads for children's play areas should be the plain perforated oval type designed to produce a spray in all directions. It should be mounted on a smooth pedestal seven feet high, and located at the center of a convex circular pavement. The pavement shall have a curb at its circumference forming a gutter equipped with a sump and baffle type trap to prevent dirt from entering and clogging drains. The water supply to the sprinkler head should be controlled by a stop and waste valve located in the basement from which the supply line emanates.

C. PLANTED AREAS

1 - Projects presenting a good appearance and not expensive to maintain have a total acreage or area covered by lawns and shrub beds in apartment-type projects which approximates the total site area occupied by the buildings.

2 - Lawn seed should be sown on a bed of topsoil at least 6 inches thick, and all new lawns should be fenced until a healthy permanent turf is established.

3 - Plant materials such as trees, shrubs and vines should be native of (or entirely acclimated to) the locality in which they are planted. The use of "cold storage" materials should not be permitted. They should be adequately protected by stakes, guys, or fences until they are permanently established, or until the hedge plants actually form a barrier.

4 - Most projects are either overplanted or unsatisfactory species have been used. Fewer, but better and larger, shrubs and trees are desired. Trees should be high branched, and not less than 3" caliper. Trees should be balled and burlapped. Free-standing beds of shrubs are invariably trampled, unless fenced until mature. Shrubs should be closely planted for mutual support and protection.

5 - The practice of planting specimen shrubs close to stair-hall entrance doors in apartment buildings should be discontinued as it is impossible to maintain healthy plants in most of these locations.

6 - Closer supervision and a more rigid inspection of "the original project planting" by inspectors familiar with this work will tend (1) to eliminate noncompliance with the specifications, (2) to assure the survival of plant material longer than the contractor-guarantee period, and (3) to produce the desired healthy growth thereafter.

7 - During the development of a project, designers, planners, and inspectors should carefully review and check all plot plans, planting designs, and mechanical block plans to make sure that large trees are not located on drawings or planted under overhead utility lines. Large shade trees planted in such locations will, after five years of growth, become entangled with the wires and present a difficult and hazardous maintenance problem.

D. DRAINAGE

1 - An almost universal weakness of design lies in surface drainage, particularly in regard to terrace banks. All too often, rain water is allowed to run from one level to another, washing out the intervening bank.

2 - Grating strainers and grilles on yard drains and catch basins should be fitted with locking bolts or screws to prevent children from removing and scattering them about the grounds to become lost or broken.

3 - The site should be studied so that where large areas are drained, sufficient catch basins are properly located in order that water will not gain momentum and wash out banks or terrace areas. Locate catch basins in paved areas, or provide them with concrete aprons.

E. EXTERIOR EQUIPMENT AND FACILITIES

1 - Whirligig clothes driers are too expensive to maintain and should not be used. Clothes posts should be of rust-proof metal of substantial design set in concrete. Metal hooks or brackets may be used for row houses.

2 - All projects should be provided with clothes posts and surfaced yards for drying the family wash outside during fair weather. The use of this equipment would automatically prevent the use of dryers during summer months, and the savings in fuel, power and repairs for interior drying equipment would soon pay for the installation.

3 - Incinerators with exterior hoppers have been satisfactory. It is definitely recommended that all multiple-dwelling-unit projects be equipped with incinerators. Floor-level, hopper-type incinerators for apartments and exterior hopper for abutting row houses have proved satisfactory and economical.

4 - Row houses serviced by project roads and dedicated streets should be so planned that city collection for garbage and trash can be picked up at each dwelling unit.

5 - Garbage and refuse compounds in many cases are not satisfactory because of size, construction, location, and enclosure height. More careful study should be given to this problem. Walls should be a minimum of 4'0" high. A drain should be provided, and shrubs planted for camouflage purposes. Location must be accessible to tenants and to collection service. Walks must be carefully planned.

6 - Garbage cans recessed in building walls are reported to be satisfactory and would be more so by the use of larger cans.

7 - Chain link fences not less than 4' for playgrounds, drying yards and certain project boundaries have been satisfactory.

3 - STRUCTURES

A. FOUNDATIONS AND BASEMENT WALLS

1 - Tile drains should be laid around and outside the footing course in all full or part basement walls unless it is evident that such drains are definitely not required. (See par. 7 - Drainage System.)

2 - Basement or foundation walls should be waterproofed below the finished grade line. The type of waterproofing should be consistent with existing conditions, and backfill should not be permitted until waterproofing has thoroughly set.

3 - In crawl spaces, or buildings with less than full height basements, 1 square foot of ventilation should be provided for each 25 lineal feet of wall. Ventilators should be so placed as to assure cross-ventilation and the ventilators must be screened. The minimum clearance for crawl spaces should be 4 feet between the earth floor and the lowest beam, and the maximum should be 10 feet. Earth floors should be smooth and graded to a low point. Any building containing more than four dwelling units should have a crawl space entrance at each end of the building.

4 - Access to crawl spaces should always be either from boiler rooms, equipment rooms or from outside entrances, and should never necessitate the entrance of crawl spaces through units. All exterior crawl space entrances should be provided with locks of cylinder types. No crawl space entrances should be through manholes or vertical areaways.

5 - All pipe chases and pipe sleeves terminating in crawl spaces should be sealed to prevent the passage of moisture and vermin from the crawl space to other parts of the building.

B. FLOORS: WOOD AND CONCRETE

1 - Adequate expansion joints must be included in all concrete floor and roof slabs to prevent excessive cracking of the floor and exterior walls.

2 - Mastic tile, 3/16" thick, on concrete floors, has proved to be very satisfactory and economical. Greaseproof tile in kitchens has proved satisfactory and economical. Bathroom walls may be either Keene cement or tile. Linoleum, with waterproof cement, on kitchens and bathroom floors, is satisfactory.

3 - Openings in concrete floors around pipes should be sealed with the proper grade and quality of caulking compound to prevent noises, water, dust and vermin from passing from one dwelling unit to another. Steel pipe sleeves should extend to approximately 1/4" above the finished floor.

4 - All finished wood floors should be at least 3/4 of an inch thick, laid over heavy paper and subfloor, and be securely nailed. Grade should be not less than No. 1 common hard wood.

C. EXTERIOR MASONRY WALLS

1 - Design and construction of exterior walls must be improved. Wall leaks are so extensive in many existing projects that the cost of corrective measures will seriously affect the financial structure of many housing projects. It is not the purpose here to enumerate the steps that must be taken but to emphasize the importance of corrective measures for future design.

2 - Adequate roof vents must be provided to prevent condensation.

3 - The use of horizontal wood trellises (for purely decorative purposes) doweled or embedded into the face brick should be discontinued, as they present potential wall leaks and unnecessary maintenance problems.

D. ROOFS

1 - The construction of built-up roofing on flat decks should include the best methods of flashing and interior roof drains and conductors and roof pitched toward drains. Formation of roof along the edge should be such as to prevent water from flowing over the gravel stops. The junction between gravel stops and built-up roofing should be so constructed as to prevent water from entering at this point.

2 - Flat roofs with hanging gutters on each side have proved to be unsatisfactory.

3 - For sloping roofs, the pitch of roof and weight and type of shingles should be designed and specified to suit local conditions. Paper should be used under the shingles.

4 - All sloping roofs should be equipped with rain gutter and conductors to prevent dampness on the interiors of the buildings, and soil erosion. Connect all leaders to the storm water drains.

5 - Orangeburg pipe or fibre pipe that has been used in lieu of metal conductors on some projects is not satisfactory because it is easily damaged by freezing weather and by children.

E. INTERIOR TRIM, HARDWARE FIXTURES

1 - Threshold at all entrance doors should be 3/4 of an inch above the finished floor to assure that the door will swing clear of a rug with under-mat.

2 - All dwelling units should be equipped with a combination bracket to hold shade, curtain and over-drape rods.

3 - The push button stop works in the face plate of the lock in apartment entrance doors should be eliminated or rendered inoperative to prevent accidental lock-outs. Where building codes or safety rules permit, the door check or closer should also be removed.

4 - All kitchen cupboards should be fitted with solid wood doors or wood with glass panels. Plywood or presswood doors should not be used on cupboards directly over or near sinks and laundry trays. Moisture coincident with the use of these fixtures penetrates the doors and soon separates the layers of wood.

5 - Apartment entrance doors should be equipped with interviewers with apartment numbers. Hardware in general should be of a higher quality. Maintenance of existing hardware is out of proportion to its cost.

6 - Wood sash should be equipped with sash weight and cord or chain. Window stops should be fitted with adjustable window stop screws (not nailed).

F. DESIGN, ALTERATION AND ADDITION

1 - When the economic analysis indicates that tenant heating equipment be installed, then it is recommended that full basements be included.

2 - Steel sash should be redesigned before being used in housing projects to reduce condensation, rust, scaling of sash, and early replacement. Consideration should be given to other metals rather than steel, such as aluminum, stainless steel, etc. It is believed that the use of aluminum sash should be seriously considered since it will reduce continued maintenance cost, and will eventually prove more economical. Steel sash set in wood frames prevents back rusting, reduces condensation.

3 - Floors over public spaces, pump rooms, laundries, boiler rooms, in basements and party walls between dwelling units should be insulated to prevent the transmission of heat and noises.

4 - Exterior entrance doors to stairhalls in apartment type buildings should be recessed. Exterior doors should be made of solid stock. Include hoods over exterior entrance row-house doors.

5 - In future row-house projects, consideration should be given to the use of a combination storm and screen door, since where it has been used, it has proved to be quite satisfactory in eliminating drafts and in reducing heating costs. Also, for Management, it means less expense, as screen doors do not have to be removed and installed every year. Combination doors should be at least 1-3/8" thick, and the space between combination door and exterior door should be at least 4" in order to provide for milk bottles. Panel size should be reduced. It is important that hardware of sufficient strength be used to prevent doors from being damaged by the wind. Such doors should be hung on three hinges with removable pins. Wind damage has been great, and a chain with spring at each end has proved to be an inexpensive and effective door check. There should also be a separate substantial spring closing device and a latching device.

6 - All basement windows should be protected with heavy metal guards. Where possible, sash should be hinged at the top or sides. Gratings over basement window areaways should be hinged and equipped with catches or locking devices. The catches or locks should be attached to the under side of the gratings and they should be operable only from the basement. This method of operation would prevent children from opening the gratings from the outside and would preclude the possibility of serious accidents.

7 - The walls of stairhalls should be finished with glazed tile or glazed brick instead of plaster. This type of surface may be easily cleaned, requires no painting, cannot be defaced by children, or damaged by moving furniture through the stairways.

8 - Access doors leading from stairhalls to the roof should be equipped with hinges and locks, conforming to all building codes, to prevent the wind from blowing them off, or children from opening them.

9 - The plaster finish on housing projects should be hard and troweled as smooth as possible. It is impossible to wash sand finish plaster with any degree of success or satisfaction, and the expense of maintaining this type of wall finish is exceedingly high.

10 - The interior surfaces of concrete columns and beams in the exterior walls should be furred to reduce condensation.

11 - The paper thickness of metal weather stripping at the bottom of doors is practically worthless as it rapidly becomes crumbled and of no effect. Weather stripping, to be effective, should be

of a substantial material even though the original cost is substantially more. Drafty windows and doors cause a heat loss and result in additional heat cost.

12 - Storage space within units is not considered adequate. In those projects where screen doors and window screens must be stored for the winter, units should provide space for storage of screens, which would prove most economical to maintenance costs. However, in most projects such storage facilities are not available. Scuttle holes added to attic space should be of sufficient size to permit the passage of screens and storm sash.

4 - CENTRAL AND GROUP HEATING

A. CENTRAL HEATING

1 - In housing communities with large, closely group apartment buildings, the central heating plant appears to be the most economical and practical system in use today.

2 - Distribution main should be equipped with adequate sectionalizing valve for shutting off small sections of the system in order to simplify and expedite repairs.

3 - Smoke breeching and stacks should be sized or designed by sound engineering practices to suit boiler capacities and operating conditions. The architectural aspect of the buildings should not control either the location of building or the height of stacks.

4 - Extreme care should be exercised in the specifications and designs for heating systems and distribution systems. We recognize the necessity for keeping cost down but the lowest priced article is usually very expensive in the long run.

5 - Circulating pumps on hot water heating systems should be installed in such a manner that the heat exchanges or boilers will be on the suction side of the pumps. This arrangement will reduce excessive pressure on these vessels.

6 - Pumps should be insulated from the building structure. In addition, all supply and return lines to the pumps should be provided with flexible couplings to reduce noise and vibration. Phase protection should be provided on all polly phase motors.

7 - Central heating systems should be well equipped with proven heating control systems, metering and recording instruments. Shut-off valves should be provided for all radiators. It should be possible to operate all heating control valves from the boiler plant and a three valve by-pass should be provided for each heating control valve.

8 - Vaults for expansion joints and expansion loops on distribution mains should have a manhole at each end to provide adequate ventilation and safe working conditions. Vaults and conduits should be provided with positive drainage. Tunnels for steam and hot water distribution should be used under city or project streets. Serious consideration should be given to the use of tunnels for all distribution mains, especially where the sidewalk could be used for the top of tunnel.

9 - Steam jet ash conveyor should be a vacuum type.

10 - Manhole frames for coal holes should be raised at least 3" above the drive and should not be designed in locations where foot traffic prevails.

11 - Fuel storage should be designed for a minimum of 10 days' supply during peak heating load.

12 - Forced warm air convector radiation should be discontinued. Maintenance costs are too high.

13 - The practice of fitting boilerhouse equipment into inadequate basement spaces has made the operation and maintenance of boiler plants very difficult and expensive in some cases.

14 - Boiler rooms should be of ample size, well ventilated, as free from columns as possible and should contain showers, toilets and locker facilities.

15 - Continuous flow, differential heating control systems are definitely preferred.

B. GROUP HEATING

1 - Small group heating systems are not in general economical and should not be considered unless justified by actual operating experience of the type proposed or in operation in the same locality. If used they should be tied together for economical summer operation. Group plants in Philadelphia and Buffalo are expensive to operate and maintain.

2 - Most items included with central plants are applicable to group plants also.

5 - TENANT-OPERATED HEATING

1 - Individual tenant-operated heating units in many localities appear to have lower operating costs than would be possible with any other equipment.

2 - Gravity hot water systems in row houses and flats with full basements are preferred. All radiators should have shut-off valves and the system a positive drain to sewer.

3 - Adequate coal storage for a year's supply within the basement is recommended.

4 - Heating units in utility rooms are too crowded for economical maintenance and the storage of tenant's equipment in such rooms is difficult to control and presents a potential fire hazard.

5 - All equipment using project-supplied fuel should have a limiting or fixed maximum type of thermostat.

6 - Forced warm air heating systems seem to be fairly satisfactory from a heating standpoint. However, the following conditions are observed: power requirements are fairly high; tenants use blowers in summer; motor repairs and replacements are high in some projects; without filters redecorating costs are increased; if filters are used they should be of a type and so located that tenants can remove them and clean them; some additional duct work, especially returns, are necessary for a more uniform distribution of heat; motor and fan bearings requiring lubrication once a year will reduce maintenance costs.

7 - Chimneys must be designed on sound engineering practice and not for architectural appearance. Where coal-fired space heater is used in conjunction with gas-fired hot water heaters an adequate flue must be provided.

6 - PLUMBING AND SANITATION

A. GAS SYSTEMS

1 - For permanence and long-term economy, underground distribution main for gas should be of wrought iron pipe.

2 - Master meters and area meters should be located in basement meter rooms instead of in outside vaults. Pressure regulators should be provided and located in meter rooms.

3 - At the point where gas lines enter the buildings there should be a shut-off valve and a meter loop for check-metering purposes. Provide adequate sleeve when passing through exterior walls and locate access door near valves in crawl spaces.

4 - It is recommended that 100 per cent check-metering be provided.

B. WATER LINES AND EQUIPMENT

1 - All underground distribution mains for cold water should be pressure cast iron with leaded joints. Provide sectionalizing valves.

2 - Underground distribution lines for domestic hot water should be copper pipe with screwed fittings or copper tubing and streamline fittings, as water conditions indicate. Corrosive water and poor joints have caused excessive maintenance, where streamline fittings have been used. Expansion loops are preferred.

3 - Provide shut-off valves for each building, each riser, each fixture, and each hose bed connection. Where valves have been provided for risers only, maintenance costs in apartment buildings have been very excessive. Shut-off valves for row houses should be located within the dwelling unit and not in crawl space.

4 - All fixture faucets should have copper to I.P.S. adaptors. Compression adaptors with rubber or composition tapered sleeves are unsatisfactory.

5 - All hose bibbs should, wherever possible, be located on the exterior walls in most convenient points for accessibility to grounds. Hose bibbs should be of key type. Practice of installing lawn hydrants in planted areas should be eliminated.

6 - When single tanks are provided for project-operated hot water service, provide a by-pass connection between hot and

cold water directly above the hot water tank to permit the draining of the hot water tank without taking the pressure off the piping system. This will eliminate considerable work and cut down on the number of floods caused by tenants leaving faucets open when the water service is returned to the system.

7 - In all cases, hot water tanks should be constructed of nonrusting material, or provided with a suitable rust preventative lining, such as stone, cement, or elastic porcelain.

8 - Do not install restricted flow water closets. (Red Hook Houses, New York City)

9 - All hot and cold water pipes should be covered in all spaces, whether they are concealed or not.

10 - All plumbing fixture trimmings should be so designed that they permit the use of one size washers for the entire project, and equipped with replaceable seats.

C. DRAINAGE SYSTEMS

1 - Where soil stacks and waste lines pass through or are embedded in concrete floor slabs, sufficient clearance should be provided for expansion and contraction to eliminate breakage of the fittings.

2 - Where dwelling-unit construction is such that plumbing fixtures are set back to back on party walls, the waste line should be so arranged that discharge from one fixture does not flow into the fixtures of the adjoining apartment. In order to eliminate frequent stoppages in horizontal waste lines serving bath lines and kitchen equipment, all such horizontal waste lines should be properly pitched and equipped with accessible cleanout plugs. They should be of adequate size and installed with drainage fittings.

3 - The base of all soil stacks and all changes in direction of soil and waste lines should be fitted with accessible pipe size cleanouts but not larger than 4 inches. Provide full size, accessible cleanout at end of horizontal sink and bath waste. Maximum spacing for cleanouts should not be over 50 feet.

4 - All floor drains and catch basins should be countersunk at the low point of the floor to assure positive drainage. Grilles on floor drains should be equipped with locking devices.

5 - All downspouts should be connected directly to storm sewers in order to prevent damp basements and crawl spaces, as well as to prevent erosion.

6 - When codes permit, eliminate house traps. If used, provide double cleanouts. Locate fresh air inlets preferably in building walls. If located in lawn areas, provide with mushroom or perforated countersunk screwed cleanout plugs. Any cover must be substantial and locked in place.

7 - Provide positive drainage, not french or blind drains, for all basements, crawl spaces, basement entrances, areas, etc. Specify only drains with large drainage areas. Leaves and paper often cause stoppage with consequent flooding of basements.

8 - All bathtub waste lines should be equipped with drum traps. P traps or half S traps are very unsatisfactory for this type of service.

7 - ELECTRICAL SYSTEMS

1 - Experience at some projects to date indicates that a carefully planned and well installed underground distribution system, while more expensive in first cost, is less expensive to maintain. In many locations it is costly to provide for inspection and emergency service for overhead systems.

2 - Incoming high tension lines should be conveniently located with respect to the boiler house or maintenance shop. If overhead distribution system is necessary, recommend use of 2-wire feed rather than single conductor with a ground.

3 - Mark-time and key-operated switches in public spaces are not satisfactory.

4 - All yard lights should be equipped with reflectors and guards to prevent lights from shining into buildings and to prevent breakage. All yard lighting should be controlled by a separate circuit, and not combined with apartment hallway or stairway lights.

5 - Many projects are beginning to experience very high maintenance costs, due to water in conduit. This may be from improper swabbing during construction or from condensation. More care should be exercised during construction, and ends of conduit should be waterproofed with suitable sealing compound.

6 - Provide adequate lighting in crawl spaces with a switch at entrance.

7 - Ironing boards and hot plates are never used in many projects. After a careful investigation of the locality, much of this equipment can be omitted on new projects.

8 - All lighting fixtures should be controlled by Toggle switches in lieu of pull chains. This includes all apartments, public services, etc.

9 - Recommend one master time clock located in either the boiler room or management office for the control of street and stair-hall lighting.

10 - Some study should be given to the type of bedroom and bathroom fixtures now being used. Maintenance men are experiencing considerable trouble in securing replacement parts as this appears to be a special fixture. It is suggested that a combination of the receptacle switch and socket be discontinued and a separate duplex base receptacle be installed in the wall proper.

11 - All main distribution panels should be placed in accessible locations, either in full basements or on exterior walls and not in crawl spaces.

12 - All basement ceiling lights should be so placed that the light is not obstructed by piping.

13 - The method of employing breakers in lieu of fuses has proved to be the better type of installation, and it is suggested that on future jobs all circuits be protected with the conventional type of circuit breaker.

14 - Where circuit breakers are not used, fuse panels on controlling domestic circuits should be located within the dwelling units or stairhalls in order that a tenant may replace blown fuses in the lines serving his apartment.

15 - Duplex base receptacles should be of the standard heavy duty type.

16 - It is recommended that 100 per cent check metering be provided.

17 - The location of building disconnects, unless they can be locked, should be located in inaccessible places or non-public places.

18 - All switches in public places and laundry controls shall be located not less than five feet from the floor.

8 - INTERIOR PAINTING

1 - Casein and resin emulsion paints, except for temporary coverage, are entirely unsatisfactory. Except for trim there should be no painting of plastered walls or ceilings until the plaster is thoroughly cured.

2 - Sufficient funds should be provided in the development budget for a three-coat lead and oil paint job.

3 - When plaster is deemed sufficiently cured (before or after occupancy), the original oil paint job should be done with enamel in kitchen and bath, semi-gloss in all other rooms.

4 - Stain and wax is an acceptable finish for wood trim in all rooms except kitchen and bath. Enamel finish is preferred for metal trim and the trim and cabinets in kitchen and bath should be enamel in any instance.

9 - CENTRALIZED MAINTENANCE FACILITIES

A. CENTRAL STOREROOM

1 - A central storeroom is imperative for the efficient and economical operation of any housing authority maintaining a number of communities under the central maintenance system. As its name implies, it should be located where it is readily accessible to all projects.

2 - In the planning of a central storeroom care should be taken to provide sufficient space for future storage needs. It is a universal fallacy, apparently, which dictates the construction of a storeroom seemingly of ample floor space at the time of initial operation of an authority, but which utterly fails ir its purpose after a few years of management. Such overcrowded storage conditions make difficult an orderly arrangement of supplies and materials so that they can be readily located and inventoried, and ultimately bring into usage supplemental storage spaces often located apart and distant from the central storeroom. While experience provides no accurate statistics, we believe it would be feasible to provide 1-1/2 square feet of floor space per dwelling unit for a central storeroom serving five thousand or more dwelling units. For a smaller number of units, increase the amount of space per dwelling unit.

3 - Shelving, bins and lockers are essential accessories in equipping a storeroom. Their number and arrangement is naturally dependent upon the size and shape of the storeroom proper. In all instances they should be placed so that the greatest use is made of natural light. Where this is impossible, artificial light should be provided for every foot of shelving, bin and locker space.

4 - Lumber, pipe sand, gravel and other bulky items of a like nature should be stored in a space separate from but adjacent to the storeroom.

5 - Highly inflammable or combustible items such as oils, turpentine, kerosene, naptha and paints should be stored in a separate building approved by the Board of Fire Underwriters.

6 - The storeroom should be provided with loading platforms of ample size, protected by a roof.

7 - Entrance to the storeroom proper should be permitted only to those responsible for the supplies and materials stored therein. It should be kept under lock and key when not in use.

8 - Up-to-date records should be maintained of each item stocked in the central storeroom so that, at any chosen time, it will be possible to ascertain the quantity and value of all supplies on hand. File cabinets must be provided for this purpose.

B. SHOPS

1 - Maintenance shops should be located on the ground floor adjacent to the central storeroom so that supplies necessary for their operation may be easily and readily requisitioned and obtained. Supply 2 or 3 phase, 220-volt wiring as available.

2 - The failure to provide sufficient space is perhaps more evident in the average maintenance shop than in the storeroom. In designing a central shop, provision should be made to provide a separate room or space for each craft. This would eliminate confusion and place the responsibility of keeping tools and equipment in good condition directly upon the workmen using them. Although records fail to throw much light upon the matter, we believe that a central maintenance shop serving five thousand or more dwelling units should have 2 square feet of floor space per dwelling unit. This is in addition to individual project maintenance facilities.

3 - A separate shop approximately 8 feet by 10 feet should be provided for the locksmith for 5000 dwelling units or more.

4 - All shops should be well lighted and ventilated and supplied with equipment. Equipment and machinery should be provided with all modern safety devices to protect the workmen from industrial hazards. Suitable lockers should be available for each mechanic for clothes and personal belongings, as well as adequate sanitary facilities. Lockers should also be incorporated in work benches for the safekeeping of tools and material. Each shop should be protected by lock and key when not in use.

5 - Loading platform should be provided for or easily accessible for the use of each shop. Access to loading platforms should be by ramp.

C. TRANSPORTATION

1 - In order to transport maintenance personnel as well as supplies, material and equipment, it is necessary and economical to make use of motor vehicles in the operation of a central maintenance system. Their number if dependent upon the number of communities served, the size of the projects served, and the area served.

2 - Before a truck is purchased, careful consideration should be given regarding the purpose for which it will be used. Obviously, a ground maintenance crew will find a dump truck much more serviceable for its purposes than a truck with an express body.

3 - The central garage housing the motor vehicles should be located near the maintenance storeroom and shops. In addition to having sufficient stalls for all motor vehicles, space should be provided as needed for other motor-powered vehicles such as pumps, lawn mowers, and sprayers. If the number of vehicles warrants it, a separate stall used for lubrication and repairing would be recommended. The garage should be equipped with an air compressor.

5 - A gasoline storage tank of at least 1000-gallon capacity served by a motor-operated pump should be maintained by an authority having a fleet of three or more motor vehicles. Motor fuel is thus easily available and the economy of purchasing fuel in bulk quantities will soon repay such an expenditure.

D. DECENTRALIZED MAINTENANCE

Some authorities, both large and small, employ overall maintenance direction from the central office with individual project maintenance facilities, labor and supplies.

In most cases such projects were designed for decentralized maintenance and consequently, while facilities may not be entirely adequate or economical of operation, an attempt has been made to make the maintenance department of such projects self-sufficient as far as operational facilities go.

There are some definite advantages to centralized maintenance and there are likewise definite advantages to decentralized maintenance. This is a large and controversial subject and only an analysis of cost factors based on a number of years of experience under each system with comparable results obtained can determine the most efficient, practical and best method to use.

Needless to say, with decentralized maintenance, adequate facilities for all work done on the project by project maintenance labor must be provided.

At a later date additional information pertaining to maintenance facilities for individual projects will be forwarded for insertion.

10 - DWELLING EQUIPMENT

A. RANGES AND APPLIANCES

1 - All gas ranges, water heaters, etc., should have the A.G.A. approval before installation and should be equipped with pilot lights.

2 - Type and location of ranges should be such as to permit burner adjustments and must not be near windows.

Pilot lights on electric ovens are a source of great expense and should be eliminated in future installations.

3 - Flexible tubing where permitted should always be used for connecting gas ranges to the supply lines. This type of connection will permit slight shifting of the stove without causing a gas leak. Provide shut-off cock and accessible union for each gas appliance.

4 - Provide receptacle and plug for electric ranges.

5 - Eliminate all hot plates in laundries and ironing boards in most locations.

B. REFRIGERATORS AND CABINETS

1 - Refrigerators should be equipped with devices which will not permit the refrigerator to operate when the door is open.

2 - Table-top refrigerators should not be used due to high maintenance costs.

3 - The cost of replacement units for present equipment varies from $45 to $85. In selecting equipment in future projects it is obvious that replacement costs must be fully evaluated.

C. HOT WATER HEATERS FOR INDIVIDUAL DWELLING UNITS

1 - Safety pilots should be provided for all hot water heaters, regardless of location. These pilots should be the complete shut-off type; that is, all gas would be shut off in case the pilot light goes out. Bimetal types should be avoided.

2 - Orifices should be required in the A and B valves to permit operation with these valves wide open at all time. It is impossible to get the proper flame on either the main burner or the pilot light unless orifices, designed for the gas pressure available, are used.

3 - Blue-flame pilots (inspirated) are preferable. Yellow-flame pilots cause soot to form which quickly builds up to such an extent that heat transfer is reduced to a minimum.

4 - Tank drain valves should always be provided, particularly on under-fired storage type to drain off sediment and thus prevent the accumulation of scale which would eventually cause the crown sheet to burn or blister.

5 - Relief valves should be of the temperature and pressure type and should be piped to some point that would not flood the apartment, basement or crawl space.

6 - Fusible plug type of temperature relief should not be permitted. It is unreliable and increases maintenance costs.

7 - Thermostats should be either of the adjustable type with 140 degrees F. maximum setting or of the fixed type set for 135 to 140 degrees F.

8 - Minimum storage capacity should be 20 gallons for 0 to 1 bedroom units and 30 gallons for all other units. The use of all 30-gallon storage tanks would simplify and reduce maintenance costs.

9 - Side-arm heaters should not be used. They are expensive to operate and maintain.

10 - Many storage tanks are failing after 1 to 2 years of operation. In future design all tanks should be constructed of nonferrous materials or heavy gauge steel porcelain lined.