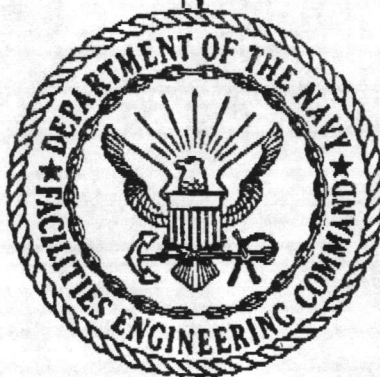


NAVFAC DM-28.4
SEPTEMBER 1984



OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

of pages 4

To	Mr Nichols	From	J. ERDMAN
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NSN 7540 01 317 7368 6000-10 GENERAL SERVICES ADMINISTRATION

GENERAL MAINTENANCE FACILITIES

DESIGN MANUAL 28.4

APPROVED FOR PUBLIC RELEASE

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
200 STOVALL STREET
ALEXANDRIA, VIRGINIA 22332

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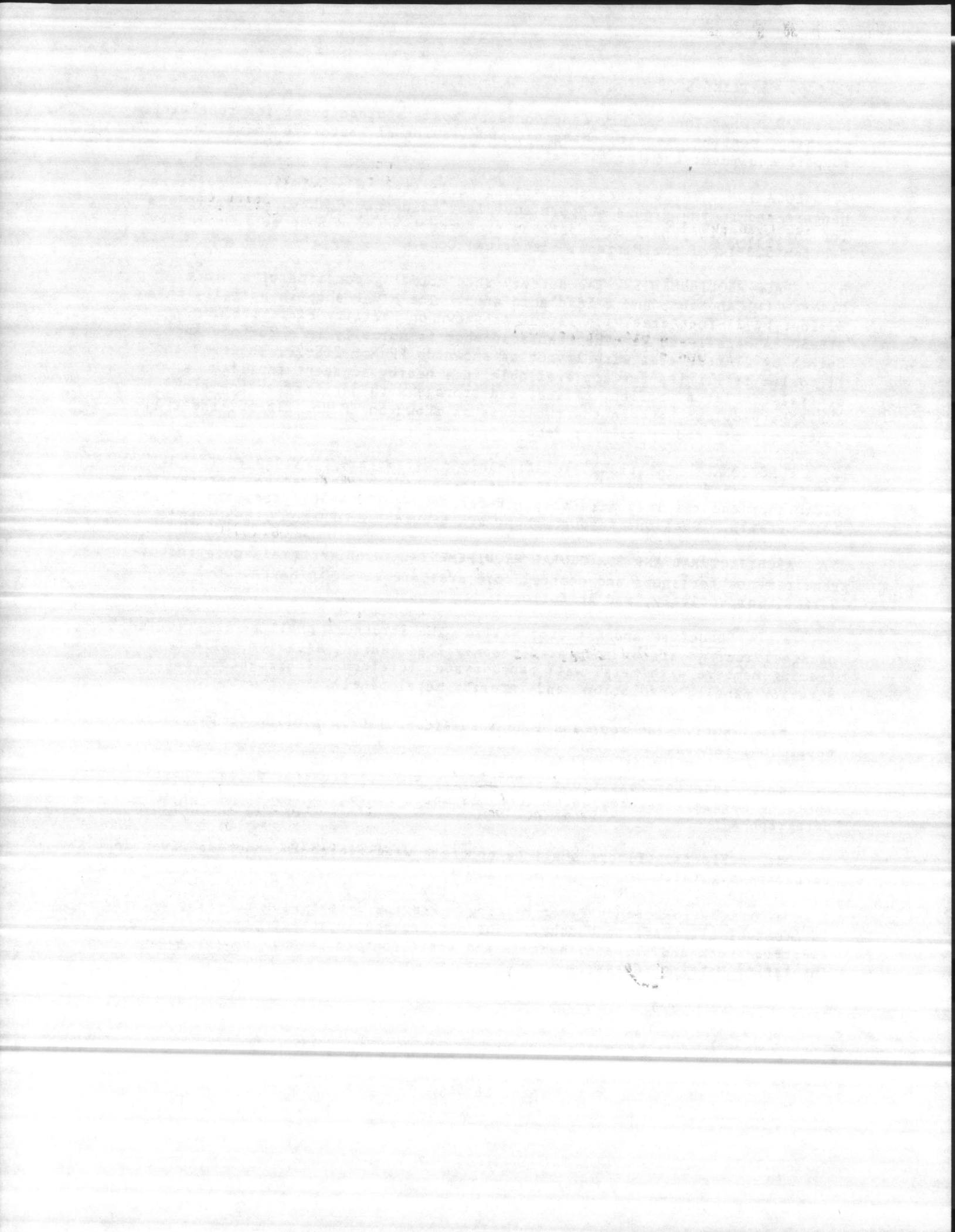
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Part 6. BATTERY SHOP

1. **FUNCTION.** The battery shop contains space and equipment for receiving, cleaning, testing, repair, charging, and issuing of batteries for ground support equipment and for aircraft.
2. **LOCATION.** The battery shop should be located in proximity to maintenance hangars and to the ground support equipment maintenance shop. Charger Room for charger units shall be separated from the Lead Acid Shop as required by Section 503-14 of the National Electrical Code.
3. **SPACE REQUIREMENTS.** The battery shop normally consists of a Nickel Cadmium (NICAD) shop and a lead acid shop. The NICAD shop is normally in a 22-foot by 21-foot area with layout as shown on Facility Plate (FP) No. 218-50, sheets 1 and 2. The lead acid shop is normally in a 28-foot and 8-inch by 21-foot area with layout as shown on FP No. 218-50, sheets 1 and 2. If toilet facilities are not available in a nearby adjacent facility, a central core area (toilet, office, and storage with janitor service sink) shall be provided between the two shops as shown on FP No. 218-50, sheet 2. Toilet may be used by male or female personnel.
4. **FUNCTIONAL.** Functional relationship diagrams are provided as FP No. 218-50, sheet 3. It is essential that there be no direct access between the NICAD shop and the lead acid shop. Refer to page 28.4-38, paragraph 9.b, for more details. Sections through shops are provided on FP No. 218-50, sheet 4.
5. **ARCHITECTURAL AND STRUCTURAL REQUIREMENTS.** Architectural and structural requirements for shops and central core area are given in NAVFAC DM-1 and DM-2 Series, respectively, and as follows:
 - a. **Structure and Exterior Walls.** The structure shall be constructed of steel roof joists on insulated masonry load bearing exterior walls or metal framing members with metal wall panel system (preformed (corrugated) metal exterior panels, insulation, and interior metal panel).
 - b. **Roof.** The roof shall be insulated built-up roofing or insulated metal roof panels.
 - c. **Interior Partitions and Interior Side of Exterior Walls.** Partitions shall be concrete masonry units (CMU) or metal finish panels as indicated in paragraph a.
 - d. **Floors.** Floors shall be concrete with finish in shops as given in paragraph 5.g.(3).
 - e. **Charging Bench Floor Matting.** Provide 3-foot wide non-slip matting in front of all charging benches. The matting shall protect personnel from electric shock and slipping hazards and shall conform to ASTM D 178, Rubber Insulating Matting, Class 2.



f. Ceilings.

(1) Shops. Ceilings shall be water-resistant gypsum board on metal joists. Ceilings shall slope at a minimum of 1/2 inch per foot from the front to the back of the building, see sections A-A and B-B, FP No. 218-50, sheet 4. Openings in ceiling shall be limited to those required for air supply and exhaust. Air shall be exhausted from the high point of the ceiling at the back of the shops to prevent hydrogen gas accumulation within the shops.

(2) Central Core Area. Ceilings shall be gypsum board on metal joists or noncombustible suspended acoustical units.

g. Shops Interior Paint Finish. The NICAD shop and the lead acid shop shall be painted with an acid-alkali resistant epoxy-urethane coating system as follows and shall conform to NFGS(TS)-09815, High-Build Glaze Coatings:

(1) The lower 4 feet of the walls shall be light blue for the NICAD shop and light pink for the lead acid shop.

(2) The upper walls and ceiling shall be white.

(3) The concrete floor shall be gray with a sand finish.

h. Central Core Interior Paint Finish. Inside face of exterior walls and partitions shall be painted white and conform to NFGS(TS)-09910, Painting of Buildings (field painting).

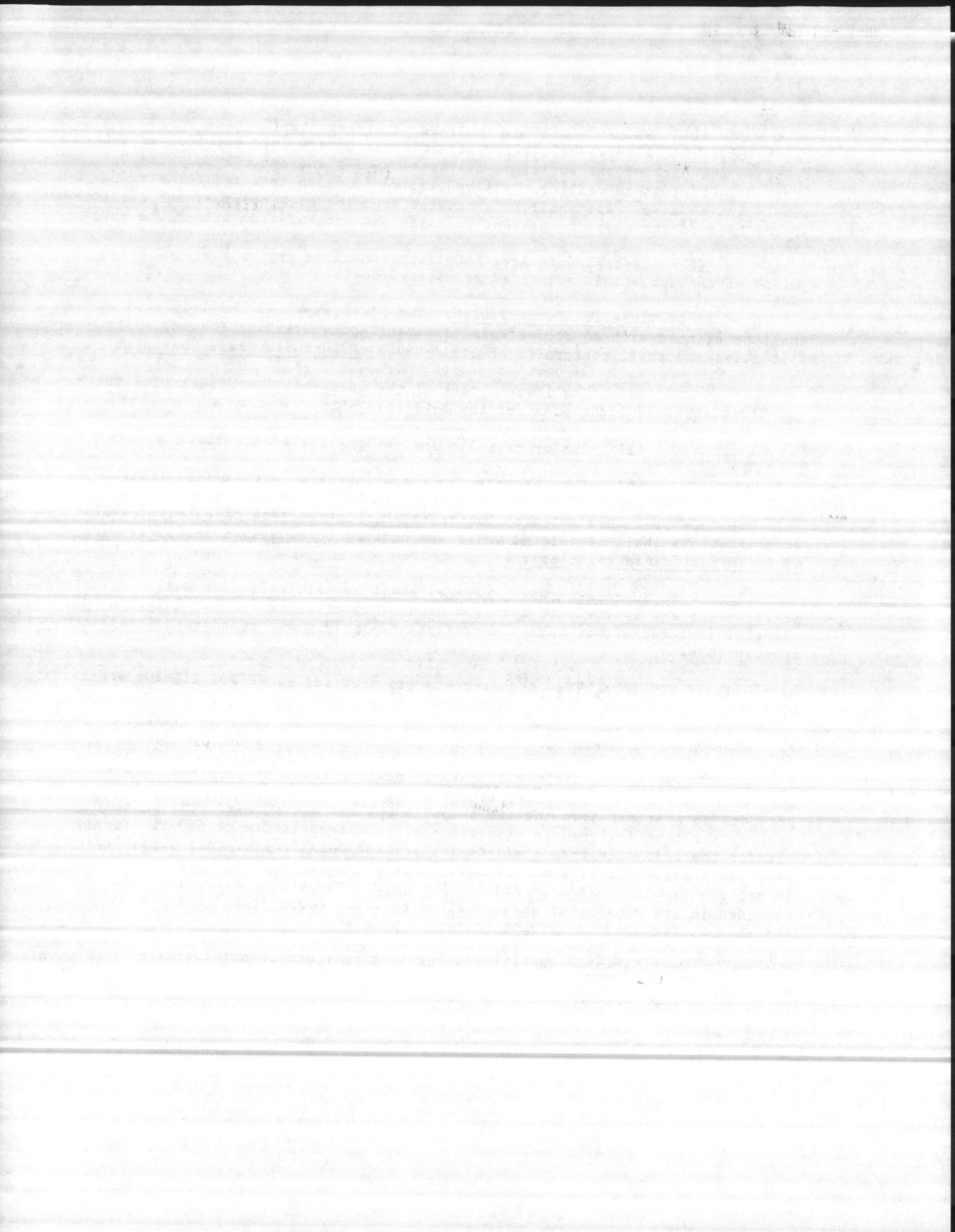
i. Work Surfaces. Work surfaces shall be acid-resistant and alkali-resistant in the lead acid and NICAD shops, respectively. Suitable material includes either corrosion-resistant steel, glass reinforced laminate or soapstone.

6. UTILITY REQUIREMENTS. Requirements are provided as FP No. 218-50, sheets 6, 7 and 8.

7. MECHANICAL REQUIREMENTS.

a. Heating and Air Conditioning. Heating shall be provided in accordance with NAVFAC DM-3.3. A separate heating system for each shop shall be provided so that air from the two shops is not allowed to mix. The heating systems shall be designed to maintain a minimum temperature of 68° F. Supply air for the lead acid shop shall be 100 percent outside air. Air conditioning shall be provided for the office area, when a central core area is provided, in accordance with NAVFAC DM-3.3 and DOD 4270.1-M. Air conditioning shall be provided in the NICAD shop when required to limit temperature to 85 °F and the shop is required to service batteries used aboard aircraft.

b. Ventilation. Ventilation shall be provided in accordance with NAVFAC DM-3.3 and as follows:



(1) Air exhausted from the shops shall be removed at the highest point of the ceiling which will be at the back of the building.

(2) The exhaust fan for the NICAD shop shall be sized to provide a minimum of one air change per hour. The exhaust fan should be sized larger when outdoor air can be used to limit shop temperature to 85 °F.

(3) The exhaust fan for the lead acid shop shall be sized to provide a minimum of 3 air changes per hour. The exhaust fan should be sized larger when required for mechanical ventilation cooling. The fan shall have a nonsparking wheel and the motor shall be located out of the airstream. The ventilation system for the shop shall be designed to provide a negative static pressure by exhausting 10 percent more air than is supplied. Supply air for the shop shall be 100 percent outside air.

(4) Exhaust fan for the toilet in the central core area shall be 2 cfm per square foot of toilet floor area.

(5) The exhaust vents in the battery shops shall be at the back of the building. Also, the exhaust and the air supply vents shall be the only recessed items in the ceiling of the shops.

c. Plumbing. Plumbing shall be provided in accordance with NAVFAC DM-3.1 and as follows:

(1) Acid-resistant and alkali-resistant floor drains shall be provided in the lead acid and NICAD shops, respectively.

(2) Emergency shower and eyewash facilities shall be provided with acid-resistant and alkali-resistant floor drains in the lead acid and NICAD shops, respectively. These facilities shall be provided within 25 feet (1620 mm) of the battery handling areas.

(3) Provide fiberglass holding tank (underground or above-ground) for waste electrolyte. Underground tank shall be located in a concrete containment pit with removeable waterproof cover. Above-ground tank shall be located on concrete slab with concrete berm around perimeter which provides containment equal to tank volume plus 10 percent. Tank shall be located to provide gravity drainage from dump sinks. Provide float type level indicator, pump out connection and vent on holding tank. Sections through tanks are provided as FP No. 218-50, sheet 5.

(4) Acid-resistant and alkali-resistant dump sinks shall be provided in the lead acid and NICAD shops, respectively. The sinks shall empty into a holding tank before disposal. Caution shall be exercised when separately pouring acid or alkaline waste. Acid and alkaline waste shall never be poured together into the sinks.

(5) Base cabinet sinks shall be the shallow photolab type and shall be acid-resistant and alkali-resistant in the lead acid and NICAD shops, respectively.

(6) Facilities, such as hose bidd, garden hose and rack, shall be provided for flushing and neutralizing spilled electrolytes for each shop.

