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UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: DINING FACILITIES

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U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	Date	Location

This UFC supersedes MIL-HDBK-1036/4, Enlisted Dining Facilities dated August 1990.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD(AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Support Agency (AFCESA) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request (CCR). The form is also accessible from the Internet sites listed below.

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- Unified Facilities Criteria (UFC) Index http://65.204.17.188//report/doc_ufc.html.
- USACE TECHINFO Internet site http://www.hnd.usace.army.mil/techinfo/.
- NAVFAC Engineering Innovation and Criteria Office Internet site http://criteria.navfac.navy.mil.
- Construction Criteria Base (CCB) system maintained by the National Institute of Building Sciences at Internet site http://www.ccb.org.

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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CHAPTER 1

INTRODUCTION

1-1 **PURPOSE AND SCOPE**. This UFC (Unified Facilities Criteria) presents the design and construction criteria for all Department of Defense (DoD) enlisted dining facilities for both outside and inside the continental United States. Its purpose is to provide general and specific design guidance. Special attention is focused on planning and budgeting, energy conservation, state-of-the-art food service equipment and design for durability. Emphasis is placed on the design of functional and pleasant food service facilities that attract and retain service personnel.

1-2 **CANCELLATION**. This UFC cancels and supercedes MIL-HDBK-1036/4, *Enlisted Dining Facilities*, August 1990.

1-3 **DISTRIBUTION OF RESPONSIBILITIES** – By Service

1-3.1 **Navy.** Navy activities and A/E (Architectural & Engineering) designers using this UFC are advised there are three participants in the development of facility design that will review and approve all design submissions. First, the local Command identifies the need for a new, modernized or enlarged dining facility and initiates the project development process. Second, the Naval Facilities Engineering Command (NFEC) reviews designs of all Navy facilities and determines equipment requirements. Third, the Naval Supply Systems Command (NAVSUP) sets the standards for all Navy food service operations.

Direct questions regarding **Navy** projects to the Criteria Specialist for Dining Facilities, Naval Facilities Engineering Command, Engineering Innovation and Criteria Office, 1510 Gilbert Street, Norfolk, VA 23511-2669; telephone 757-322-4200.

1-3.2 **Army.** Army activities and A/E designers using this UFC are advised that there are three participants in the development of facility design. First, there is the local command that identifies the need for a new, modernized, or enlarged dining facility and initiates the project development process. Second, there is the Army Corps of Engineers, Center of Standardization for Army dining facilities, who is responsible for standards and review of designs of all Army facilities. Third, the Army Center of Excellence, Subsistence office sets the standard for all Army food service operations and determines the facilities and equipment required to perform the operations. The Army Center of Excellence, Subsistence is the agent of the Army Chief of Staff for Installation Management (ACSIM) Installation Management Agency (IMA).

Direct questions regarding **Army** projects to CEW-EV, HQUSACE, 441 G Street NW, Washington DC 20314; telephone 202-761-5903.

1-3.3 **Air Force.** Air Force activities and A/E designers using this UFC are advised there are three participants in the development of facility design. First, there is the local installation that identifies the need for a new, modernized, or enlarged dining facility and initiates the project development process. Second, the Major Command is responsible for management of design and construction of all Air Force facilities. Third, the Air Force Services Agency sets the standard for all Air Force food service operations and determines the facilities and equipment required to perform the operations.

Direct questions regarding **Air Force** projects to the Design Group/AFCEE/DCD, 8107 Aeromedical Drive (Bldg 728,) Brooks AFB, TX 78235-5312; telephone 210-536-4188.

1-3.4 **Marine Corps.** Headquarters Marine Corps, Logistics Food Service, Code (LFS-4) manages policies, sets standards, and directs all food service operations within the Marine Corps. The design project manager is responsible for approval of design and construction. Each new mess hall facility will have a technical representative assigned by the activity Food Service Office to coordinate needs and requirements between Code LFS-4, ROICC, and other activities' as needed.

Direct questions regarding **Marine Corps** projects to the Criteria Specialist for Dining Facilities, Naval Facilities Engineering Command, Engineering Innovation and Criteria Office, 1510 Gilbert Street, Norfolk, VA 23511-2669, phone 757-322-4433. Marine Corps requests will be forwarded by NAVFAC to Headquarters, U.S. Marine Corps, Facilities and Services Division (Code LF) for discussion.

1-4 DEFINITIONS

- Basic Allowance for Subsistence (BAS) - An individual is given an allowance for the purpose of purchasing meals.

- Dunnage/dunnage rack - These racks are generally 225 to 300 mm (9"-12") high shaped like storage shelving used for large unevenly shaped packaging. These are usually made with reinforced steel tops for heavier loads. Examples: 50 lb. bags of potatoes or other large bags of produce are stored on dunnage racks to keep them off the floor/refrigerator floor.

- Flight Kitchen - Area designated for the preparation and storage of packaged meals.

- Proofer - A proofing cabinet that provides warm, moist heat for the processing/growth of yeast in bakery products cycle. Baked yeast products go through several processes: mixing, yeast rising

(proofing), second rising after shaping and baking. These products are "proofed" in a cabinet for generally one hour for the yeast to activate and raise the products before baking.

- Rations in Kind (RIK) - A method of granting subsistence to service personnel in which the individual is given eating privileges without a cash transaction.

- Self-Serve Meal Service – Patrons serve themselves.

- Serving Lines – Distribution methods for patrons to receive their food may be traditional style meal service or self-service. Serving line configurations may vary as determined by the Services.

- Subsistence in Kind (SIK)- Furnished meals or rations provided at no charge to members not entitled to BAS from an appropriated fund dining facility or who are subsisted at no charge on behalf of the government.

- Take-Out/Home Meal Replacement – Concept of offering assorted pre-wrapped and pre-packaged items for immediate pick-up. Items may range from hamburgers and pizza to full meals.

- Traditional-style meal service – Patrons are served by staff at a serving line.

- Turnover Rate - The number of meals served per meal period divided by the seating capacity of the dining facilities, e.g., a facility with 500 seats which serves 1,500 meals per period has a turnover rate of three.

1-4.1 **Typical Serving Line Configurations:**

- Scatter System – Individual food stations in the serving area offering different types of food e.g. grill, sandwich, salad, dessert stations, see figure 6-41.

- Horse Shoe (Serving Line) – Horseshoe shaped serving line, see figure 6- 42.

- The Tee (Serving Line) – Tee shaped serving line, see figure 6-43.

- The Saw Tooth or Box (Serving Line) – Saw tooth shaped serving line, see figure 6-44.

CHAPTER 2

PLANNING FACTORS

2-1 **FOOD SERVICE PLANNING**. The specific design criteria presented later in this UFC were developed based upon food service policies and procedures.

2-1.1 **Number of Personnel to be served**.

- **Navy & Marine Corps.** Use P-80, *Planning Criteria for Navy and Marine Corps Shore Installations* category code 722, "Unaccompanied Personnel Housing-Mess Facilities."

- **Army.** Use TI-800-01, *Design Criteria*.

- **Air Force.** Use Air Force Handbook AFH 32-1084, *Facility Requirements*.

2-1.2 **Time for Meals**. The local command determines duration of meal periods. Army times for meals are noted in AR 30-22, *Army Food Service Program*.

2-1.3 **Seating Capacity**. Seating capacity is determined by the total number of patrons to be served divided by the turnover rate. Turnover rates can vary according to the size of facility and seating capacities. The standard turnover rate is 3 in a 90-minute meal period. For **Army** facilities, see TI-800-01, *Design Criteria* for seating requirements.

2-1.4 **Payment and Identification**. Design will be determined by the method used to identify patrons and collect payment.

2-1.5 **Menu Selection**. All menus are determined by the local command. However, the general policy is that all personnel are offered the choice of a fast food/short order menu as well as a full course menu.

2-1.6 **Procurement and Restocking Procedures**. Facility design for the Army and Navy must recognize operational requirements for storage of provisions and non-provisions based upon sustainment periods. Sustainment periods for the **Air Force** will be determined by USAF Services web site at http://www.afsv.af.mil/.

2-1.7 **Bussing**. The choice of contract/staff bussing or patron self-bussing is the option of the local command. All facilities are to be designed to accommodate both modes of bussing. Bussing carts should be screened from view of the dining area.

2-1.8 **Staffing**. Facilities are staffed by military mess management specialists, civil service and/or civilian contract mess staff as directed by local command.

2-1.9 **Trash & Garbage Removal and Recycling**. The local command chooses trash and garbage removal and recycling systems. Provisions for these services and facilities must be architecturally screened.

2-2 **SIZE OF FACILITIES**. Gross allowable area is defined by guidance provided for each service in the following documents;

- **Navy & Marine Corps.** Use P-80, *Planning Criteria for Navy and Marine Corps Shore Installations* category code 722, "Unaccompanied Personnel Housing-Mess Facilities";

- **Army.** Use TI-800-01, *Design Criteria*;

- **Air Force.** Use Air Force Handbook AFH 32-1084, *Facility Requirements*.

2-3 **SPACE PROGRAM**. Figure 6-1 identifies functional areas in dining facilities and provides a target space allotment for each functional area. These targets have been provided to serve as a budget to the designer and are not intended to be restrictive. The critical area that must be rigorously adhered to is the allowable gross area of the facility and storage requirements, i.e., provisions and non-provisions. Actual gross allowable area for each project will be defined in facility programming document DD-1391. **Air Force** will provide design guidelines for their facilities.

2-4 **PRELIMINARY COST ESTIMATING**. Cost estimating procedures must follow the guidance given at the NAVFAC Cost Engineering web site, www.uscost.net/costengineering/.

2-4.1 **Sustainability**. The Army uses Sustainable Project Rating Tool (SPiRiT). SPiRiT is a U.S. Army Corps of Engineers (USACE) developed rating tool that ensures Sustainable Design and Development is considered in Army installation planning decisions and infrastructure projects to the fullest extent possible, balanced with funding constraints and customer requirements. USACE has an agreement with the U.S. Green Building Council to use Leadership in Energy and Environmental Design (LEED) as part of SPiRiT. SPiRiT is very similar to LEED in terms of categories and scoring potential. SPiRiT includes three more categories that are more specific to the military community with a total of 100 achievable points. For the **Navy** use NAVFAC Policy Statements 98-01, 98-02 & 98-03. In February 2003, NAVFAC is expected to publish NAVFACINST 9830.1 detailing NAVFAC's use of LEED. This will supersede and cancel previous policy statements.

The Air Force uses the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program. Information and software is available from the USGBC web site.

Refer to paragraph 3-5 also.

2-4-2 **Force Protection**. The DoD objectives are to reduce personnel exposure to security threats and limit property. DoD policy and guidance for antiterrorism and the physical security of facilities is contained in UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*. These requirements are applicable for new construction, restoration, and modernization of existing facilities. For **Navy/Marine Corps** facilities refer to OPNAVINST 5530.14C, *Navy Physical Security* and MCO 5530.14, *Marine Corps Physical Security Program*. For **Air Force/Army** facilities refer to TM 5-853-1,2,3/AFMAN 32-1071, Security Engineering manuals.

2-5 **ADAPTATION OF EXISTING FACILITIES**. Although the design criteria included in this guide is primarily for use in the construction of new dining facilities, the general information and principles should also be used in the modernization of existing facilities.

CHAPTER 3

DESIGN OBJECTIVES

3-1 **INTRODUCTION**. This facility will be a focal point of the local community. It should be an open and inviting gathering place for service personnel.

3-2 **BUILDING SITE**. Special attention must be given to Anti-Terrorism Force Protection (ATFP) as stipulated in UFC 4-010-01, *DOD Minimum Anti-Terrorism Standards for Buildings*. The following factors should also be considered:

3-2.1 **Separation of Service Functions**. Service functions such as loading docks, maintenance yards, trash containers, on-grade mechanical equipment and staff parking must be separated from the rest of the site by architectural screening, landscaping, or grading.

3-2.2 **Patron Circulation**. Dining facilities have patrons arrive from many directions. Attempt to identify the various access points, both pedestrian and vehicular, and channel circulation to the entrance of the building. Encourage smooth circulation by landscaping and paving complimentary to the building. Entry circulation should begin as the patron enters the site and continues through the interior of the facility.

3-2.3 **Development of a Visual Image**. Since the dining experience represents a break in the patron's day, its environment should provide a visual "break" as well. Therefore, the designer is encouraged to provide a change of visual imagery from the purely functional environment, which characterizes a service person's workplace. Exterior design guidelines for the architect will be provided in the Base Exterior Architectural Plan (BEAP) for the **Navy & Marine Corps**. **Army** design guidelines will be in the Installation Design Guide (IDG). **Air Force** guidelines will be in the Architectural Compatibility Guide.

3-3 **PATRON SPACES**. The following issues are of special concern in the design of dining facilities:

3-3.1 **Separation of the Dining Area**. The seating area represents the conclusion of the process of arrival, queuing, identification, serving and payment. To the extent possible, separate dining patrons from the congestion and movement of arriving and departing patrons. To avoid congestion within the dining facility, patron circulation space at dish drop off area should be as large as possible.

3-3.2 **Development of Architectural Character**. Creation of interesting plan areas, spatial volumes, and other design elements under the architect's control should be considered as methods for the development of an interesting

environment. In appropriate climates, outdoor dining may be included in the design with consideration for sanitation.

3-3.3 **Use of Natural Light**. The use of natural light is encouraged as it contributes significantly to the energy efficiency of the building and communicates a feeling of well being and openness. While this is very important, consider selecting a site so the facility will maximize the use of natural light and minimizing heat gain through the glazing. Direct sunlight should not touch the glazing. Consider overhangs or landscaping to avoid the direct sunshine. Direct sunshine on dining patrons is very uncomfortable and distracts from a positive dining experience. Natural light can augment high efficiency artificial lighting with photosensitive controls that maintain lighting levels.

Skylights are prohibited in Navy and Marine Corps dining facilities designs.

3-4 **FOOD SERVICE SPACES**. Beyond the normal requirements for architectural space, food service spaces require special attention in the following areas:

3-4.1 **Functional Planning**. The relationship between the various storage, preparation, cooking, serving, and cleaning functions must be carefully studied to provide the maximum flow and efficiency. Keep travel distances short and minimize crossover of circulation paths. Keep sight lines as open as possible, and utilize mobile food service equipment for flexibility. Provide utility connections for mobile food service equipment. Plan for the option of using various serving styles.

3-4.2 **Design for Flexibility**. Designers should recognize that future renovations, additions and expansions of the facility are likely.

3-4.3 **Quality Work Environment**. Careful consideration should be given to all aspects of the work environment. This includes adequate natural and artificial lighting; proper ventilation and conditioned air supply; adequate employee facilities; inclusion of easily accessible safety devices; and preventing entry by vermin and insects.

3-4.4 **Design for Durability and Maintenance**. The materials proven to be the most durable are shown in Figure 6-2. To be successful, these materials must be detailed with an understanding of where extreme wear will be encountered. All joints and intersections of materials must be sealed, free of pocketed or porous materials, and be accessible for cleaning. Dishwashing and pot and pan wash areas experience extreme wear and have the most difficult ventilation requirements. Corridors and aisles must be designed for cart traffic.

3-4.5 **Energy Efficiency**. Consider all possible techniques for energy conservation, particularly in the selection of kitchen equipment. Some

techniques to be considered are the use of natural day lighting, heat reclamation equipment, adjustable air movement, etc. Design should adhere to American Society of Heating, Refrigeration and Air Condition Engineers (ASHRAE) Standard 90.1-2001, *Energy Standard for Buildings Except Low-Rise Residential Buildings* and Executive Order 13123 , *Greening the Government Through Efficient Energy Management* and UFC 3-400-01, *Design: Energy Conservation.*

3-5 **SUSTAINABLE DESIGN**. **Army** must comply with ETL 1110-3-491, *Sustainable Design for Military Facilities* for the use of renewable material and "Green Building" design.

The **Air Force** must use the *Air Force Sustainable Facilities Guide*, (http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/index.html.)

Refer to paragraph 2-4-1 also.

CHAPTER 4

GENERAL DESIGN CRITERIA

4-1 **GENERAL INFORMATION**. DoD Food Planning Board formulates specification development and procurement and supply. The Board is responsible for subsistence policy and improvement; quality assurance requirements and inspections; subsistence control and reporting systems; manpower, personnel resources, qualifications, training, and utilization; food preparation and serving systems, and energy utilization.

4-1.1 **Codes & Standards.** Use UFC 1-200-01 , *Design: General Building Requirements*. **Army** dining facilities must follow the *Department of the Army Standard Designs* that may be found at https://65.204.17.188/projnet/

4-1.2 **Design for Accessibility**. Dining facilities are federal facilities and are governed by the Uniform Federal Accessibility Standards (UFAS). Barrier-free design should be per the requirements of the UFAS as required by 42 U.S.C. 4151-4157, *Architectural Barriers Act of 1968* and consistent with 29 U.S.C. 794, *Rehabilitation Act of 1973*, but also meet the requirements of the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG). Use the criteria that provide the greatest barrier-free design requirements.

4-1.3 **Design for Safety.**

- For **Navy & Marine Corps** projects use P-80, *Planning Criteria for Navy and Marine Corps Shore Installations* category code 722, "Unaccompanied Personnel Housing-Mess Facilities";

- For **Army** projects use TI-800-01, Design Criteria;

- For **Air Force** projects use AFOSHSTD 91-300, *Food Services Operations* for safety design with special attention given to Anti-Terrorist Force Protection (ATFP). Note that Chapter 5 of this reference states that whenever Construction Criteria, Occupational Safety and Health Administration (OSHA) or ATFP standards conflict, "the standard providing the greatest degree of safety shall govern."

4-1.4 **Design for OCONUS Installations**. Specific guidance for construction in OCONUS locations will be the subject of special consideration. The designer must comply with Host Nation Agreements.

- **Army** - Construction of OCONUS dining facilities must follow Department of the Army (DA) Standard Designs by the Army Center of Excellence, Subsistence and Corps of Engineers and

conform to applicable codes and standards. The Standard Design may be found at https://65.204.17.188/projnet/.

- **Air Force** –New construction of OCONUS dining facilities must comply with Overseas Environmental Baseline Guidance Document (OEBGD) website, (http://www.afcee.brooks.af.mil/eq/ecamp/oegbd/index.asp.)

- **Navy** & **Marine Corps** - New construction of OCONUS dining facilities must follow the NAVSUP sample design drawings found on the NAVSUP Website, http://www.navsup.navy.mil/our_team/hq/org/05/food/index.jsp. All designs must conform to applicable codes and standards. OCONUS construction may comply with additional requirements based on location. The lead agency for Japan is the Army Corps of Engineers, who serve as project coordinators between the Government of Japan (GOJ) and the U.S. Government (USG.) Facilities located in Hawaii will comply with CONUS requirements.

4-2 **CIVIL ENGINEERING AND SITE PLANNING**. For general design guidance see UFC 2-600-01, *Installation Design*. Guidance for additional civil engineering, site work, and related topics is provided in the following documents:

- The **Navy & Marine Corps** use DM 5.01, *Surveying*; DM 5.4, *Civil Engineering – Pavements*; Mil-Hdbk-1005/3, *Drainage Systems*; UFC 3-230-02, *Water Supply Systems*; UFC 3-240-03, *Wastewater Treatment Systems*; UFC 3-250-03, *Standard Practice Manual for Flexible Pavements* and the appropriate Regional Civil Engineering design guidance.

- The **Air Force** uses AFPAM 32-1010, *Land Use Planning*.

4-3 **LANDSCAPE DESIGN**. General design guidance for landscape design is provided in the following documents:

- **Navy & Marine Corps** in NAVFAC Publications P-904, *Planting Design* & P-905, *Planting and Establishment of Trees, Shrubs, Ground Cover and Vines*.

- **Army** uses TM-5-803-13, *Landscape Design and Planting Criteria*.

- **Air Force** uses *USAF Landscape Design Guide*, found at the following Air Force web site: http://www.afcee.brooks.af.mil/dc/products/dcproducts.asp.

Plant materials must be selected on the basis of hardiness and degree of required maintenance. Avoid plants requiring frequent attention.

Consider landscaping as a possible solution to screening, defining circulation, providing summer shading and wind breaks.

4-4 **ARCHITECTURAL**. All plans illustrated in this document are notional except details; details are literal but should be substituted with best existing methods. General guidance for architectural design is provided in the following documents:

- **Navy & Marine Corps** use the appropriate Regional Architectural design guidance.
- **Army** uses the local installation design guide.
- **Air Force** uses AFMAN 32-1008, *Installation Design*.

Life safety related issues are governed by NFPA (National Fire Protection Association) 101, *Life Safety Code*.

4-4.1 **Building Envelope and Exterior Finishes**. Pay particular attention to the durability of materials used in high traffic areas such as: main entrances, loading docks, service entrances, and entrances to storage facilities.

4-4.2 **Interior Materials and Finishes**. Approved finishes for functional areas are located in figure 6-2. For deviation requests see paragraph 1-3. Materials must conform to flame spread characteristics defined in UFC 3-600-01, *Fire Protection for Facilities Engineering, Design and Construction*. Floors, which are slip resistant, drain well, and clean easily are of paramount importance. Floors must be able to endure cleaning by high-pressure spray equipment. All finishes will be coordinated with the Interior Designer.

4-4.3 **Wall and Corner Protection**. Provide protective wall and corner guards in all areas. Designers must give careful consideration to the placement of equipment with regard to potential damage caused by carts. See figure 6-35.

4-4.4 **Doors and Hardware**. Provide hardware and accessories that are durable and can be easily cleaned throughout the dining facility. Doors between kitchen/dishwashing areas and dining area must be sound resistive. See Figures 6-33 and 6-34 for minimum door requirements. Where feasible, design doors with wheeled traffic without raised thresholds.

4-4.5 **Acoustics**. Effective sound reduction techniques are needed to overcome the incompatibility between dining areas and noise producing areas, as well as overcoming the ambient noise produced within the various spaces. Procedures for attaining these levels are in the following paragraphs.

4-4.5.1 **Dining Areas**. Reduce noise in eating areas by considering the use of carpet in seating areas and by using one of the many types of available suspended acoustical ceilings. If additional acoustic treatment is necessary, use floating or wall-hung sound absorbing panels. Floors leading to the dining area should be treated as a kitchen.

4-4.5.2 **Dishwashing/Pot and Pan Wash**. Provide a separate washing room. Isolate dining area acoustically from washing area. Sound-absorbing materials in doors, door gaskets, walls and ceiling in washing room should be used to reduce sound transmission. Ceilings should be solid metal pans with moisture-resistant acoustic material because of the moisture problem caused by condensing vapors from the washing equipment. Open cell acoustical tile or other similar materials in any food area exposed to high moisture or requiring frequent cleaning is prohibited.

4-4.5.3 **Serving Line**. The finishes of the patron side of the serving line, except for the floor & paint finishes, must be treated as the dining area. The finishes (flooring & paint) of the patron side of the serving line area and immediate exiting area of the dishwashing rooms should be materials durable to wet and heavy traffic, as well as easily cleaned. All finishes of the serving side of the serving line must be treated as the kitchen.

4-4.5.4 **Kitchen**. Solid metal pan ceilings of sound absorbing material should be used to counteract noise produced by the hard, sound-reflective surfaces of the many durable finish materials found in kitchens and for ease of cleaning.

4-4.5.5 **Mechanical**. Methods of sound reduction and vibration isolation must be employed in the design of mechanical systems.

4-4.6 **Solar Design**. In appropriate climates, consider the use of solar energy design strategies. Active solar energy applications must be employed where life cycle costs are effective. Passive solar energy design is encouraged when it can be incorporated into the design without significant additional cost and without compromising the stated goals of this UFC. Passive solar design features should not impose additional operational or maintenance requirements. Refer to UFC 3-400-01, *Design: Energy Conservation*.

4-5 **STRUCTURAL ENGINEERING**. Use UFC 1-200-01, *Design: General Building Requirements*.

4-5.1 **Roof Loads**. Coordinate structural requirements with design of mechanical systems where required. Design screening for mechanical equipment per local wind loads and directional patterns. Anticipate roof-mounted accessories such as catwalks and ladders.

4-5.2 **Structural Column Locations**. Plan patron seating areas to be as free of columns as possible. When required, carefully coordinate columns with the functional layout of seating and equipment. Food preparation, food service and refrigerated storage areas must be clear of freestanding columns. Where required, columns must be located to form a section of a wall or partition.

4-5.2.1 **Seismic Requirements**. Seismic requirements are governed by UFC 1-200-01 , *Design: General Building Requirements*. Additional guidance is contained in the following documents:

- COMNAVFACENGCOM letter *Seismic Design Criteria for Navy/Marine Corp Owned and Leased Buildings*.

- *Seismic Hazards Mitigation Program for Facilities outside the Continental United States, its Territories and Possessions*.

- USACE Technical Instruction (TI) 809-04, *Seismic Design For Buildings* and USACE Technical Instruction (TI) 809-05, *Seismic Evaluation and Rehabilitation for Buildings*. (Navy adoption of these requirements is detailed in COMNAVFACENGCOM letter *Seismic Design Criteria for New Facilities* and COMNAVFACENGCOM letter *Seismic Design for New Facilities*.)

4-6 **HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) DESIGN.** HVAC requirements for dining facilities are not uniform due to the number of functions performed. Food preparation and service equipment place special demands on HVAC systems similar to industrial operations, but environmental comfort is much more important than in an industrial context. Design criteria presented here direct the design team towards creative, economical, serviceable and energy efficient designs. All **Navy** and **Air Force** HVAC designs must comply with MIL-HDBK 1190, *Facility Planning and Design Guide*.

- **Navy & Marine Corps.** Use P-80, *Planning Criteria for Navy and Marine Corps Shore Installations* category code 722, "Unaccompanied Personnel Housing-Mess Facilities."

- **Army.** Use TI-800-01, *Design Criteria*.

- **Air Force.** Use Air Force Handbook AFH 32-1084, *Facility Requirements*.

4-6.1 **Local Conditions**. Obtain climatic design conditions from UFC 3-400-02, *Design: Engineering Weather Data*. Obtain Navy design conditions and required calculations for heating and cooling from Interim Technical Guidance (ITG) FY98-1, *International Mechanical Code*. For information not specified in ITG FY98-1, use MILHDBK- 1003/3, *Heating, Ventilating, Air Conditioning and*

Dehumidifying Systems. Relevant criteria for Navy installations are contained in MIL-HDBK-1011/1, *Tropical Engineering* may also be applicable.

Determine the availability, capacity and characteristics of the various fuel and energy sources available for the facility. Accomplish identification of viable alternatives to serve the facility in close coordination with installation personnel based on their experiences and operating and maintenance capabilities. Both central generation of steam/hot water and/or chilled water and self-contained building systems may be viable alternatives. Base selection between the viable alternatives on a life cycle cost analysis. Identify characteristics of the available electrical service and coordinate with electrical equipment. Early identification of space requirements for HVAC equipment and systems will be necessary to determine compliance or variance from established space program criteria. All heat and moisture loads from process, computer and lighting systems must be coordinated with HVAC designers.

4-6.2 **System Concept.** Divergent operating and occupancy schedules necessitate individual air handling and control systems to provide comfort conditioning to kitchen, serving and dining areas. If a facility is configured with multiple dining areas, zone each area for individual controls. Where individual building boilers and/or chillers are used, sizing and number of units must consider building load (peak and part load), occupancy schedule and zone diversity, equipment reliability, maintainability, and energy efficiency. The use of multiple boilers/chillers is required for reliability due to the continuous operation nature of dining facilities. Total boiler/chiller capacity must not exceed 120% of the peak facility heating/cooling load. Equipment start/stop should be staged as the load increases/decreases and lead/lag operation should be alternated to reduce wear and tear on individual units. In **Air Force** facilities, design of boilers and unfired pressure vessels must meet the requirements of Air Force Instruction (AFI) 32-1068, *Heating Systems and Unfired Pressure Vessels*.

4-6.3 **Ventilation**. Ventilation requirements must comply with ASHRAE 62-2001, *Ventilation of Acceptable Indoor Air Quality*. The building must be maintained at a positive pressure relative to the outside to minimize air infiltration and migration of contaminants. Food preparation and food service areas should have a lower pressure relative to the dining and non-food related other building areas. Any variable air volume supply systems must be analyzed for coordination of ventilation balancing and building pressurization. Investigate air to air, and air to water, heat recovery potential from the exhaust system. Coordinate ventilation requirements of exhaust hoods, automatic dishwashing equipment and icemakers, with their impact on the HVAC systems. Consider the use of separate equipment to ventilate individual appliances or entire food preparation areas. The following spaces should be maintained at a negative pressure relative to adjacent spaces:

- Dishwashing/Pot and Pan washing areas

- Solid waste collection
- Locker rooms

If cold storage deliveries have direct vehicle access, coordinate zone pressurization and loading dock equipment that connects to the opening of the delivery vehicle.

4-6.3.1 **Exhaust Hoods**. Provide an exhaust hood over all heat producing equipment to minimize heat gain to the space and discharge fumes and odors. Give special consideration to dishwashing areas to control moisture and condensation. Design hoods per MIL-HDBK 1003/3 and the respective service document listed below. Provide area cooling at food preparation and scullery areas.

Specific design requirements for food preparation exhaust hoods and dishwashing equipment are presented in American Conference of Industrial Hygienists, Committee on Industrial Ventilation, *Industrial Ventilation: A Manual of Recommended Practice*. Requirements must comply with NFPA 96, *Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment*. Exhaust hoods should take into account the opening of equipment doors and extensions from the wall for exposed utilities. Stainless steel materials should be used for the entire duct systems of dishwashing equipment and other moisture producing equipment. Ductwork from automatic dishwashing equipment and other areas with high moisture air must be pitched and sealed to facilitate drainage of condensed water. See figure 6-40.

4-6.4 **HVAC Equipment**. The systems equipment selection process will be influenced by the following considerations in addition to normal requirements:

4-6.4.1 **Heat Recovery Equipment**. Economic analysis of heat recovery equipment, particularly from ventilation, cold storage and central HVAC refrigeration, must be per the following "Life Cycle" guidelines:

- **Navy & Marine Corps:** use NAVFAC P-442, *Economic Analysis Handbook*.
- **Army,** use TI-800-01, *Design Criteria*.
- **Air Force** use AFH 32-1089, *Economic Analysis Guidance Manual*.

4-6.4.2 **Special Considerations**. HVAC designs require corrosion resistant drip pans below all piping above food service and electrical equipment areas. Pipe insulation jackets must be moisture resistant.

4-6.4.3 **Fly Fans (air curtains)**. Fly fans must be installed on all facility doors and service windows that open to the outside as per health code. Preferred fly fan location is on the interior of doors. For **Navy** projects comply with Navy Bureau of Medicine and Surgery P-5010 (BUMED P-5010). For the **Army** use TB MED-530, *Food Sanitation*.

4-6.5 **Controls**. Design control systems for simplicity of operation, maintenance and energy efficiency. Specify direct digital control (DDC) system per UFGS 15910N, *Direct Digital Control Systems* or UFGS 15951A, *Direct Digital Control for HVAC*. Coordinate DDC specification to ensure proper interface to existing or planned base wide DDC/EMCS system.

4-7 **PLUMBING DESIGN**. General guidance for Navy plumbing design is provided in MIL-HDBK-1003/1, *Plumbing Systems*. Plumbing design, construction and installation must meet the *International Plumbing Code* (IPC) and local plumbing code as appropriate. Plumbing design must promote water conservation to comply with Executive Order (EO) 13123. Additional guidance provided in the following documents:

- **Navy & Marine Corps** projects use P-80, Planning Criteria for Navy and Marine Corps Shore Installations category code 722, "Unaccompanied Personnel Housing-Mess Facilities" and OPNAVINST 5090.1B, *Navy Environmental and Natural Resources Program Manual.*

- **Army** projects use TI-800-01, *Design Criteria*.

- **Air Force** projects use Air Force Handbook AFI 32-1066, *Plumbing Systems*.

Updated plumbing design guidance for all services will provided in UFC 3-420-01, Design: Plumbing to be published March 2003.

4-7.1 **Local Conditions**. Evaluate local conditions for their influence on design. Evaluate available fuels for the heating of potable water. Requirements for active solar system supplements to water heating will be dictated by solar feasibility analysis per UFC 3-400-01, *Design: Energy Conservation*. Provide early analysis of available water supply sources, metering requirements, pressures, temperatures, and chemical content for the budgeting of necessary equipment such as bulk water storage, booster pumping, chemical water treatment for health and operational standards. Preliminary space requirements presented to the planning team at the appropriate stage of project development will provide coordination of water and fire protection systems with the type of, and access for, mobile fire fighting apparatus.

4-7.2 **Utility Access**. Provide access to piping for maintenance and replacement to the maximum extent possible. When economically feasible, provide access to drain piping by means of pipe tunnels or crawl spaces.

4-7.3 **Waste Systems**. Guidance for planning the systems is provided in MIL-HDBK-1003/1. Army projects use TM 5-810-5, *Plumbing* and TI-800-01, *Design Criteria*. Give special consideration to:

- Grease traps and other interceptors must be located remote from the building as far as possible, out of traffic flow and easily accessible for cleaning.

- Local jurisdiction or waste management program will determine the type of waste from food grinders and waste pulping system. Army designers must refer to the Standard Design drawings and equipment list for the waste pulping system.

- Apply an air gap of two pipe diameters to all kitchen equipment drains not having other backflow protection. Backflow protection is required on all hose bibbs and faucets that are threaded to accept a hose, both internal and external to the building. Navy projects also use Cross-Connection Control and Backflow Prevention Program Implementation.

- Coordinate floor sinks of adequate size and non-splash receptor design with drained equipment requirements. Prime floor drains not used as indirect waste receptors or provide with deep seal traps.

- Avoid locating waste piping above kitchen and storage area.

- Coordinate drain requirements for HVAC and cold storage refrigeration equipment.

Updated waste system design guidance for all services will provided in UFC 3-420-01, Design: Plumbing to be published March 2003.

4-7.4 **Water Supply Systems**. Give special consideration to the following domestic water requirements:

- Specialized food service equipment needs such as hard/soft water and pressure.

- Diversity factors for water heating based on food service equipment usage. Dining facilities may require two or more different hot water temperatures zones. Public and employee hand washing sinks

require either temperature limiting devices or different incoming hot water temperature than food equipment.

- Hot water storage and re-circulation. Note: where limited flow fixtures are required, piping and re-circulation system adjustments may be required to ensure hot water at fixture.

4-7.5 **Fire Protection Systems**. Fire protection design must comply with UFC 3-600-01, *Fire Protection for Facilities Engineering, Design and Construction.* Give special consideration to the following:

- Fire protection systems are not metered unless required by a local water authority. Water meters installed on fire protection systems must be listed/approved for use in fire protection systems.

- Pumping and storage of water to meet flow and pressure requirements.

- Interface fire protection equipment and base wide alarm system.

4-7.6 **Miscellaneous Piping Systems**. Fuel gas systems must comply with NFPA 54, National Fuel Gas Code for natural gas and NFPA 58, Liquefied Petroleum Gas Code for liquid petroleum (LP) gas. Criteria for these systems are presented for Navy projects in MIL-HDBK-1003/1.

4-8 **ELECTRICAL DESIGN**. Electrical design for dining facilities requires coordination of the power, lighting, communication systems, interior equipment space requirements and site planning. Give special consideration to coordination of food service equipment and spare electrical capacity. Electrical designs must comply with UFC 3-520-01, *Interior Electrical Systems* and all applicable related criteria provided in the following documents:

- **Navy & Marine Corps** use the MIL-HDBK-1004 series and NFPA-70, *National Electrical Code*.

- **Army** use TI-800-01, *Design Criteria*.

- **Air Force** use Air Force Manual AFM 32-1083, *Electrical Interior Facilities* and NFPA-70, *National Electrical Code (NEC)*. AFI 32-1063, *Electric Power Systems*, authorizes an emergency generator for one feeding facility per installation with MAJCOM having authority to approve additional eating facilities.

4-8.1 **Local Conditions**. Evaluate local conditions for their impact on facility design and backup power generation requirements.

4-8.2 **Lighting**. Criteria for lighting intensity levels is presented in MIL-HDBK-1004/4, *Electrical Utilization Systems*. Coordinate lighting design with architect, mechanical and interior designer. For lighting requirements;

- **Navy & Marine Corps** use MIL-HDBK-1190, *Facility Planning and Design Guide* and IESNA *Lighting Handbook*.
- **Army** uses TI-800-01, *Design Criteria*.
- **Air Force** uses Air Force Manual AFM 32-1083 *Electrical Interior Facilities* and NFPA-70, *National Electrical Code (NEC)*.

4-8.2.1 **Gasketed Light**. Provide gasketed fixtures for food preparation and dishwashing areas to prevent grease and moisture damage. Food serving areas should be illuminated with fixtures provided with lamp guards or sleeves to prevent contamination of food in the event a lamp is broken or shattered.

4-8.2.2 **Light Switching**. Ensure proper switching is provided to isolate various lighting zones within the facility. Consider using zoned lighting control panels connected to the DDC system to schedule lighting operation.

4-8.3 **Special Systems**. Pre-wire for the following:

- Local Area Network for computerized communications, such as food service and payment management system.
- Energy monitoring and control system when mandated or economically justifiable.
- Public address and intercom systems.
- Security systems, alarm systems & CCTV (Closed Circuit Television) systems.
- Cable television for dining areas.

4-8.4 **Lightning and Cathodic Protection**. Comply with applicable sections of MIL-HDBK-1004/6, *Lightning Protection* and MIL-HDBK-1004/10, *Electrical Engineering Cathodic Protection*.

4-9 **FOOD SERVICE EQUIPMENT**. All design work relating to kitchen equipment must be separately presented for review and must include all information required for fabrication and installation of all kitchen equipment. See reference below for equipment schedules:

- Navy & Marine Corps - http://www.navsup.navy.mil/our_team/hq/org/05/food/index.jsp

- Army - http://www.quartermaster.army.mil/aces/fed/articles/article_equip_schedules.html

- Air Force - https://www-r.afsv.af.mil/FD/Standards.htm

4-9.1 **Vibration**. Mount vibration-producing equipment on vibration isolators. Provide vibration resistant pipe mounting and joints for equipment requiring plumbing.

4-9.2 **Utilities**. Most food service equipment is available in electric, gas, and steam. Select equipment based on the type of utility available in the area. Some items of equipment may operate more efficiently or will produce a better product depending upon the utility supply. Confer with the appropriate operations representatives to make these types of equipment selection decisions (refer to UFGS-11400A, *Food Service Equipment* and UFGS-11400N*, Food Service Equipment*).

4-9.3 **Product Flow**. Food service equipment and layout must facilitate the flow of food through a production facility to be streamlined and uninterrupted. Food products are received and stored at the rear of the facility, then issued for production and follow a straight path through the kitchen. The completed products end up at the point of service, in the front of the facility. The various stations along this production path from rear to front usually include; receiving, storage, rough food preparation, cold food preparation, hot food preparation, hot and cold prepared food storage, serving, and dining areas.

4-9.4 **Coordination**. Pay careful attention to the coordination of food service equipment design and the design work of other disciplines as indicated below.

4-9.4.1 **Architectural Coordination**. Items requiring coordination with architectural design are:

- Requirements for floor drains, wall-recesses, stub walls, pads, piers, etc. needed for food service equipment.

- All bumpers, guards and protective devices.

- The use of special materials such as non-slip quarry tile, non-corrosive ceiling grid, skim coat plaster on CMU (Concrete Masonry Unit) walls, metal acoustic ceilings, plaster ceilings, and smooth face lay-in tile, etc.

- Structural elements built into architectural elements for the support of food service equipment.

- All roof, ceiling, floor and wall penetrations for ducts, control lines, refrigerant tubing, etc.

- Floor elevation and slope requirements to ensure proper drainage of water in wet areas.

- Doors from the loading dock into kitchen must be at least 2.4 meters (8 ft) tall in order to accommodate larger equipment.

4-9.4.2 **HVAC Coordination**. Items requiring coordination with the HVAC design are:

- Location and size of all ventilated equipment such as exhaust hoods, dishwashing equipment, etc. See Figure 6-40.

- Special requirements for ductwork connecting to equipment such as drip pans and pitched or vented duct work.

- Ventilation of remote refrigeration condensers.

- Balance of air supply systems so cooking and waste areas are under negative pressure ensuring that odors are not carried into public areas.

4-9.4.3 **Plumbing Coordination**. Items requiring coordination with the plumbing design are as follows:

- Food service designer determines the locations and specifications for all food service equipment (fixed and relocatable). Food service equipment layout and specifications must be coordinated with the facility mechanical designer for coordination of facility plumbing design.

- The locations of all water, waste, steam and steam condensate, refrigeration condensate, floor drains, and gas lines. These lines must be concealed but readily accessible for maintenance.

- Unavoidable exposed vents for island or freestanding equipment must be coordinated with the architect for enclosure.

- All special or custom made equipment must be installed by the plumbing contractor. Design and location of required grease traps will require coordination among the mechanical, plumbing, architectural and possibly, the structural designers.

- Empty conduit requirements for under-floor routing of beverage system.

- Plumbing to the automatic wash-down system for exhaust hoods.
- Special requirements for plumbing connections to utility distribution systems.
- Flexible connections must be stainless steel, 300 series finish.

4-9.4.4 **Electrical Coordination**. Items requiring coordination with the electrical design are:

- Location of all spot connections for equipment requiring electrical connection.
- The food service designer must inform the electrical engineer of all projected power requirements for food service equipment as early as possible. In addition to the power characteristics, the type of electrical connection required (plug-in, junction box) for each piece of equipment must be determined.
- Special requirements for equipment such as overload protection and control panels located at the equipment being protected.
- Integration of food service equipment with fire suppression system controls.
- Integrate electrical requirements for equipment utility distribution system.
- Location of conduit required for computer and electronic cash register stations.
- Electrical service requirements for all equipment must be as specified in UFGS-11400, *Food Service Equipment.*
- Floor mounted flush receptacles and conduit stub-ups are not permitted in the kitchen area or serving line. For safety reasons, ceiling cord reels will be provided in these areas.

4-10 **COMMUNICATIONS AND COMPUTER SYSTEMS**. General guidance for the design of telephone systems is provided in MIL-HDBK-1012/3, *Telecommunications Premises Distribution Planning, Design and Estimating*. Guidance pertinent to the design of dining facilities is as follows:

4-10.1 **Telephones**. Provide telephones in coordination with the local command.

4-10.2 **Public Address System**. Provide public address systems conforming to local command requirements and the following reference documents:

- **Navy & Marine Corps** projects use P-80, *Planning Criteria for Navy and Marine Corps Shore Installations* category code 722, "Unaccompanied Personnel Housing-Mess Facilities;"

- **Army** projects use TI-800-01, *Design Criteria*;

- **Air Force** projects use Air Force Manual AFM 32-1083 *Electrical Interior Facilities* and NFPA-70, *National Electrical Code (NEC)*.

4-10.3 **Electronic Cash Registers and Computers**. Coordinate location with the local command. Specific guidance for the installation of this equipment is contained in paragraph 5-6. In preparation for future computer systems, provide empty conduit from the array of register terminals to a location in the food service officer's office for linkage to a computer in use by the food service officer. Install telephone receptacles at all register locations.

4-10.4 **CCTV and Cable TV.** Wiring, conduit, routing devices and equipment must be provided by local command and installed as directed.

4-10.5 **Alarm Systems**. Each alarm system must be part of the appropriate Base Wide System such as:

- Fire Alarm System - Comply with applicable sections and related criteria within UFC 3-600-01, *Fire Protection for Facilities Engineering, Design and Construction* and all local codes. Coordinate the location of the fire alarm control/annunciation panel with the local installation.

- Security System - Including Intrusion Detection System (IDS), duress alarms and safe alarm systems.

- Food Refrigeration Alarm System.

4-11 **INTERIOR DESIGN AND FURNISHINGS**. When an interior design package is included in the A/E design contract, the designers must obtain their guidance from the appropriate interior design authority. All furnishings must be selected from manufacturers on the GSA schedule of manufacturers. Issues pertinent to the design of dining facilities are as follows:

4-11.1 **Interior Design Finishes**. Select finishes that are durable, easy to maintain, functional and aesthetic. See figure 6-2. Carefully seal junctions in materials to prevent moisture or vermin penetration.

4-11.2 **Furniture and Furnishings/Collateral Equipment**. Select items that are durable, easy to maintain, functional and coordinate with overall design. Use the Government's mandatory sources of supply when specifying furniture and furnishings.

4-11.3 **Graphics and Signage**. Provide signage per local command directives, with special attention to menu boards.

CHAPTER 5

SPECIFIC DESIGN CRITERIA

5-1 **INTRODUCTION**. The following material identifies the specific needs for each functional area as outlined in the space program. In addition to textual information, many of the spaces have graphic design guidance in the form of illustrations of facilities. These figures should not be considered absolute in their layout. These figures are schematic and are intended to inform the designer of principles and relationships necessary for proper functioning of the space. The designer is expected to interpret this guidance and configure the functional areas according to the needs of the project.

5-2 **ENTRY**. The entry may be an architectural focal point. All site circulation should clearly lead patrons to this point. Provide walk-off mat to prevent soil from being brought into the facility. Specific items that should be considered in the design of the entry are as follows:

5-2.1 **Canopies and Weather Protection**. Provide a canopy or enclosure for patrons who arrive in advance of the opening of the facility. In extreme weather areas, this function can be accomplished in the form of a vestibule. Canopies are to be included in the gross area of the project at fifty percent of their actual area and vestibules at their full area. If unusually large amounts of weather-protected space are required, an increase in the gross area may be justified.

5-2.2 **Menu Boards**. Presentation of the menu boards should be a focal point of the entry sequence. These may be located on the exterior or on the interior immediately inside the entrance. Provide separate menu boards for the full service and fast food menus. If a split circulation type queue is used, orient the menu boards to define the entrance to the appropriate serving line. If electronic menu boards are used, provide connections for power and data.

5-3 **HANDWASHING STATIONS.** Provide hand washing stations in the dishwashing, food preparation and serving areas.

5-4 **PUBLIC TOILETS**. Locate public toilets near the entry but do not interfere with circulation into or out of the building. Public toilets must not be accessed directly from the dining areas. Warm air hand driers are permitted as the sole method of hand drying only in toilets that are not used for food service personnel. Capacity requirements for the public toilets are in the following reference documents:

- **Navy & Marine Corps** projects use P-80, *Planning Criteria for Navy and Marine Corps Shore Installations* category code 722, "Unaccompanied Personnel Housing-Mess Facilities;"

- **Army** projects use TM 5-810-5 *Plumbing* and TB MED-530;

- **Air Force** projects use Air Force Handbook AFH 32-1084, *Facility Requirements*.

Facilities must conform to minimum requirements of Americans with Disabilities Act Accessibility Guidelines (ADAAG).

5-5 **QUEUE**. Design the entry to lead directly to the queue. Single queues should be not less than 1.2 meters (4 feet) wide and double queues should be not less than 2.1 meters (7 feet) wide. When the queue is adjacent to the dining area use a screen to separate entering patrons from the dining area.

5-6 **SIGN-IN/CASH COLLECTION STATION**. Allot space for a sign-in/cash collection station for meal payment and equipment with a sign-in/cash collection station for the purpose of identifying personnel and receiving payment for fixed price meals.

5-7 **CASHIER STATIONS**. Locate the cashier station to accommodate the method of identification and payment. The actual construction of the cashier station should allow for a courtesy panel on all sides and standard tray slides. Refer to Figure 6-11. Design should consider pricing, payment, queue layout, equipment and required utilities. Locate stations dependent on the payment method as follows:

- Itemized pricing/a la carte method: will be after the patron makes their selections.

- Full price method: will be determined by the local command, either before or after patron selections.

5-8 **DINING AREA**. The dining area is the principal function in the facility. Issues of particular importance are as follows:

5-8.1 **Space Division**. Facilities with larger dining areas should be capable of being subdivided by plan or partition to close-off portions during off-peak serving periods. This approach also helps to reduce the ambient noise generated by patrons and facilitates maintenance.

5-8.2 **Acoustic and Visual Separation**. A significant improvement to the quality of the dining experience is gained by separating the eating area from all other facility functions. This prevents the serving or dishwashing process noise from disturbing diners. Give careful consideration to acoustical treatment and visual screening between these spaces.

5-8.3 **Seating**. Seating should be composed of two-person and four-person tables and booths. Local commands may use partitions or dividers to create sub-groupings of tables. If this approach is taken, these sub-groupings should be on the perimeter of the space and the central portion of the space

should be composed of non-fixed furnishings to promote maximum flexibility. For specific design guidance on furnishings and spatial arrangement see figure 6-7.

5-8.4 **Bussing Provisions**. All facilities must accommodate both self-bussing and staff-bussing procedures. Therefore, all facilities are required to provide a soiled dish window from the main exit area to the dishwashing area. Provide an acoustically sealed and attractive appearing covers to close the window when not in use. The method of providing staff bussing may be in the form of remote tray carts located in the dining area or by bussing carts pushed throughout the facility by bussing personnel. Whatever the method of providing bussing, shield cart traffic in and out of the dishwashing area to prevent this activity from disturbing the patrons.

5-9 **SERVERY.** Serving food is handled by one or more methods including Full Menu Food Line, Speed/Fast Food Line/Combination Line, Soup & Salad Bar, and Beverage Stations. The type of service must be coordinated with the individual DoD service and local command.

5-9.1 **Full Menu Food Line**. The full menu food line must have the capability for serving various menu items including grilled foods, foods held and served from a hot food table, cold foods such as salads and desserts, sandwiches and so forth. For examples of layouts and equipment selections, refer to figures 6-5 through 6-8. This line must be immediately adjacent to the kitchen to permit rapid transfer of fresh products from the kitchen to the line. Include back-up refrigeration and food warming cabinets in the wall behind the serving line. These units are best utilized as roll-in/roll-through/pass-through units (between kitchen and serving line). Sneeze shields over serving counters are required. The serving line should be designed to allow for maximum customer turnover utilizing minimum amount of labor. Good equipment placement, space planning and a combination of work and service stations can accomplish this. Because the serving area is part of a customer area, it should be designed to be as attractive as possible, using wear resistant materials. Serving line counter-front must be separate from serving line equipment and will serve as an electrical chase for mobile serving equipment. See figure 6-36.

5-9.2 **Speed/Fast Food Line**. The emphasis is to provide rapid service and items such as hamburgers, french-fries, and sandwiches for immediate pick-up. Proper spacing of equipment, sizing and selection of equipment is very important. This station does not have to be immediately adjacent to the kitchen. Provide sufficient storage for one meal period when remotely located from the kitchen.

5-9.3 **Combination Line**. The combination line is essentially a full menu line with the addition of a fry and grill station. It has all the capabilities of a fast food line and full menu line. It is used in smaller facilities where space does not permit separate serving lines for each type of menu. In all cases, the combination line should be immediately adjacent to the kitchen for ease of

service and freshness of product. Pass through refrigeration and warming cabinets are recommended.

5-9.4 **Soup & Salad Bar**. The soup & salad bar will serve soup, salad and an appropriate selection of accoutrements that will be provided in a separate line located adjacent to the serving line. The serving equipment will include cold food storage below and refrigerated display with sneeze guard.

5-9.5 **Beverage Stations**. All dining facilities will have beverage stations, usually located at the end of the serving line. Beverage stations consist of various hot, cold and ice dispensing machines. Dessert cold pans, ice cream, milkshakes, frozen yogurt machines and condiments are included in many beverage stations. Beverage station locations must accommodate patron refills without returning to the serving line or passing the cashier. Refer to figures 6-09 and 6-10.

5-10 **FOOD SERVICE AREAS.** Food Service includes receiving, storage, preparation, and cleaning areas.

5-10.1 **Dishwashing Area**. Dishwashing areas will vary greatly in layout and equipment type according to the size of the facility. Refer to figures 6-13 through 6-18. Soundproofing is a major concern when designing a dishwashing area, especially if the space is adjacent to a dining or serving area. Finishes are also a major concern; refer to Chapter 4. Design all dishwashing areas so soiled tableware is held in separate locations from clean tableware. Dishwashing areas must be easily accessible to the serving areas for replacement of clean tableware. The dishwashing area should be located as close to the dining area exit as possible to permit self-bussing by the patron. A tray conveyor bussing system or a cart bussing system may be incorporated into the design.

5-10.2 **Walk-in Refrigeration/Freezer.** This is used to store dairy products, daily food supplies, meats, vegetables, and frozen foods. The floor under the box is depressed and insulated so its finished height is level with the surrounding kitchen floor. See figure 6-37 for guidance concerning cold storage slab insulation. Most walk-in refrigerator manufacturers provide the necessary walls, ceilings, condensing and cooling units and lighting for their products. Each box must have a separate temperature indicator. Locate the condensing units separately for easy service. The designer should allow for proper ventilation and protection from the elements in these areas. Vinyl slatted curtains must hang inside the doors of walk-in refrigerators and freezers to retain refrigerated air and reduce insect infestations per Navy Bureau of Medicine and Surgery P-5010 (BUMED P-5010). For the **Army** & **Air Force** use TB MED 530

5-10.3 **Dry Stores (Semi-perishable)**. All food products that do not require refrigeration are held in this area. Walls and floors should be easy to clean and floors sealed. Refer to figures 6-29 and 6-30.

5-10.4 **Carbonated Beverage Storage**. This area is for storing carbonated beverages, CO_2 tanks, and the beverage pumping system. Due to the unexpected leaking or damaged packaging, it is recommended that finishes be durable and cleanable with a hot water hose hook-up and a floor drain in the room. Air conditioning or ventilation to control the heat produced from equipment used and maintaining syrup temperatures as necessary. Distance of the beverage pumping system from the beverage serving equipment must be as recommended by the equipment manufacturer. The space must be accessible from the delivery area. Provide conduits to the beverage stations so beverage supplier may run supply lines. The storage room requires water and power for equipment operation.

5-10.5 **Non-food Storage**. Non-food storage areas are for holding paper and cleaning supplies. Cleaning supplies must be stored in areas specifically designed for that purpose. Cleaning products cannot be mixed with food products. Proper ventilation in the cleaning products storage area is important due to the various chemicals used in cleaning. Refer to figures 6-29 and 6-30.

5-10.6 **HAZ-MAT Storage**. All hazardous materials must be identified, segregated and given special labeling, storage conditions and access in some cases. Guidelines can be found in NFPA 101, *Life Safety Code,* UFC 1-200-01, *Design: General Building Requirements* and UFC 3-600-01 *Fire Protection for Facilities Engineering, Design and Construction*.

5-10.7 **Kitchen**. The type and size of kitchen equipment will vary greatly according to the type and size of facility. Refer to figures 6-20 through 6-23. Locate the kitchen as close as possible to the serving areas to allow easy transfer of products to the serving lines. Provide individual or continuous floor grates with drains to facilitate cleaning and catch discharge from cooking equipment such as steam kettles and tilting frying pans. Refer to figure 6-24. Steam generating cooking equipment emits water droplets that can interfere with other cooking operations, especially frying operations. Provide sufficient separation between steam generating cooking equipment and other open type cooking equipment.

5-10.8 **Vegetable Preparation Area**. In smaller facilities, the vegetable preparation area may be no more than a two-compartment sink, slicer, and worktable that shares space with the kitchen. In larger facilities, this area may be a separate, refrigerated room with its own dedicated walk-in refrigerator, sinks, slicers, choppers, mixers, worktables and other equipment. Refer to figures 6-25 and 6-26. In all cases, the preparation area should be near the kitchen and have easy access to storage and trash removal.

- **Army** facilities, no matter the size, 3 (three) sinks are used. A 1 (one) compartment and a 2 (two) compartment, separated by a soiled ware counter.

5-10.9 **Bakery**. Bakery facilities will vary greatly according to size the size of the facility. The smaller bakeshops will share space and equipment with the kitchen and cold food areas and will only prepare items such as rolls and cakes, and bake frozen products. Larger bakeshops will be located in specific areas and will have the capability of producing cakes, pies, doughnuts, rolls, and pastries. Bread will be bought locally. Refer to figures 6-27 and 6-28.

5-10.10 **Flight Kitchen**. Not all locations will require a flight kitchen. A flight kitchen is a staging area where food products are assembled and packaged for delivery to aircraft. Specialized equipment may be required for food transport, packaging and holding as determined by local operation representatives. Flight kitchens should have easy access to the kitchen areas and should also be adjacent to the loading dock area.

5-10.11 **Carry-out/Take-out**. The carry out area will serve a selection of items ready for immediate pick-up. This station does not have to be immediately adjacent to the kitchen. Provide sufficient storage for one meal period when remotely located from the kitchen. This area may have a separate entrance/exit and will also have its own point-of-sale station.

5-10.12 **Field Feeding Equipment Storage Area (Army Facilities)**. This area is designated for storage of insulated food and beverage containers used in support of field feeding missions. Design storage area with heavy-gauge wire dunnage racks and shelves in order to store the insulated containers. The room should have double doors with kick plates to protect them from the platform truck traffic. Equip the storage area with an ice machine and hot water faucet in order to chill and heat, respectively, the insulated food containers. A coffee urn will also be placed in the room for the sole purpose of supporting the field-feeding mission. Provide a wall mounted booster heater to deliver water at a temperature of 82 degrees Celsius (180 degrees Fahrenheit) at the pre-chill/pre-heat basin. This area should be in close proximity to a sink provided for dumping the hot water and or ice.

5-10.13 **Utensil/Pot and Pan Wash.** This area provides for the washing and sanitizing of utensils, pots and pans. Allot space for easy wash down of all surfaces, appropriate ventilation, and storage of clean utensils/pots and pans. Soiled items must not come in contact with the clean, so separation of areas is required. Provide a canopy-type exhaust hood over the three-compartment sink and pot wash machine. Utensil and pot washing areas may be incorporated into dishwashing areas or may be separate entities. Provide a booster heater for the final rinse sink. Refer to figures 6-17 and 6-18.

5-10.14 **Can Wash Areas**. These areas are designated for washing trash containers. This can be a curbed area off the loading dock containing hot water under pressure and a drain connecting to a sanitary sewer or an enclosed area within the building. Refer to figure 6-32.

5-10.15 **Loading Docks**. Provide loading docks for all facilities to accommodate deliveries made by trucks. Standard dimensions and layout for loading docks are shown on figure 6-31. Loading platform heights must be confirmed for each project to assure the platform is set at the height closest to the majority of trucks servicing the facility. Dock levelers may be provided to accommodate varying truck platform heights. Facilities having multiple berths may use a dock leveler at one berth to service odd sized delivery vehicles. Loading dock area requirements must be as indicated in figure 6-31. In most cases, the loading dock will be open-air. In locations with extreme weather conditions, the loading dock may need to be enclosed. In this case, each loading berth would be equipped with a rolling door and a weather seal. The number of loading berths for each facility size must be as specified in Table 5-1. For larger facilities, refer to local command. All loading docks must have a ramp connecting the dock with the vehicular area to facilitate the use of handcarts.

Table 5-1 Loading Berths Per Facility Size

PERSONS	LOADING BERTH REQUIREMENTS
40 TO 250	1
651 TO 1000	2
1000 TO 2200	3

5-11 **ADMINISTRATION AREAS.** Administration areas include offices for government and contract staff, toilets and locker rooms.

5-11.1 **Offices**. All food service offices must be adjacent to, or readily accessible to, each other. The food service support office (or the food service officer's office in smaller facilities) must be adjacent to and have a view of the kitchen. If possible it should also overlook the service entrance to the kitchen area. The civilian contractor's office should be adjacent to or readily accessible to the serving area and have a view of the service and dining area. The number of workstations and the location for safes, computer stations, and public address equipment must be as indicated in parentheses.

- **Navy/Marines**:

STAFF	OFFICE REQUIREMENTS
40 to 80	Food Service Officer (2 stations) (Safe) (PA) Civilian Contractor (1 station)
81 to 150	Food Service Officer (3 stations) (Safe) (Computer) (PA) Civilian Contractor (1 station)
151 to 250	Food Service Officer (3 stations) (Safe) (Computer) (PA) Civilian Contractor (1 station)
251 to 400	Food Service Officer (Safe) (1 station) Food Service Support Office (1 isolated station, 2 support stations)(Computer) (PA) Civilian Contractor (2 stations)
401 to 650	Food Service Officer (1 station) (Safe) Food Service Support Office (1 isolated station, 3 support stations)(Computer) (PA) Civilian Contractor (2 stations)
651 to 1000	Food Service Officer (1 station) (Safe) Food Service Support Office (1 isolated station, 3 support stations)(Computer) (PA) Civilian Contractor (2 stations)
1001 to 1500	Food Service Officer (1 station) (Safe) Food Service Support Office (1 isolated station, 3 support stations) (Computer) (PA) Civilian Contractor (2 stations)
1501 to 2200	Food Service Officer (1 station) (Safe) Food Service Support Office (1 isolated station, 4 support stations) (Computer) (PA) Civilian Contractor (2 stations)

- **Air Force**: The number of offices will be determined by local installation.

- **Army**: Two offices are required per facility

5-11.2 **Staff Toilets**. Both government and contract personnel must use toilet facilities provided for staff use. Fixture counts must be as indicated in the International Plumbing Code (IPC). Employees' toilet facilities for food establishments must be provided with proximity valves. Designer must consult with the local command to determine staffing figures and shift population. Facilities must conform to minimum requirements of Americans with Disabilities

Act Accessibility Guidelines (ADAAG). For the **Army**, only individual paper towel dispensers are acceptable in food service staff toilets.

5-11.3 **Staff Lockers**. Provide separate facilities for male and female personnel. Locate locker facilities adjacent to the toilets. Equip locker rooms with two showers, lockers, benches, and coat hooks to facilitate the changing of clothes. Locker quantities must be as indicated in Table 5-2. All lockers must be half height except for facilities for 1001 patrons and over, where three-tier lockers must be used. It should be noted the number of lockers scheduled for each space exceeds the projected number of workers for each category. This is to accommodate the likely shifting balance of male to female workers. If equipment costs prohibit this number of lockers, provide space for the number of lockers in Table 5-2. In this case, a portion of the lockers should be freestanding so that they can be shifted from space to space as the staffing balance changes. All lockers must have sloped tops.

Table 5-2 Locker Quantities for Staff Lockers

	MILITARY		CONTRACT	
No. Staff	**MALE**	**FEMALE**	**MALE**	**FEMALE**
40 to 80	(Combined Facilities, 10 male, 6 female)			
81 to 150	(Combined Facilities, 16 male, 10 female)			
151 to 250	18	6	6	12
251 to 400	24	8	12	24
401 to 650	30	10	30	48
651 to 1000	48	12	44	70
1001 to 1500	64	16	64	96
1501 to 2200	96	24	88	132

5-11.4 **Janitor's Closet**. Provide janitor's closets for the storage of janitorial supplies. Equip each janitor's closet with a mop receptor or mop sink, bucket fill, mop rack, and shelf units. Facilities serving fewer than 251 must have one janitor's closet, adjacent to the public toilets; larger facilities must also have a janitor's closet adjacent to the kitchen. For **Army** facilities provide one janitor's closet in the kitchen area. Area requirements are as indicated in the space program.

CHAPTER 6

FIGURES

6-1 **FIGURES**. This chapter contains all the figures referenced in the preceding chapters.

Figure 6-1a - Space Program - Navy

		Public Areas				Serving Area					
Facility Size	Minimum Seats & Turnover Rate	Dining Area & Circulation	Public Toilets	Queue	Sign-In Station	Regular Food Line	Fast Food Line	Combination Line	Beverage Line	Cashier Station	Dishwashing
1-80	62	87	17	12	4	23			19	3	17
		935	180	130	40	250			200	30	180
	1.3	1285 sf		120 sm			660 sf		62 sm		
81-150	108	150	19	23	4	30			23	3	23
		1630	200	250	40	320			250	30	250
	1.4	2120 sf		196 sm			850 sf		79 sm		
151-250	116	174	20	30	4			39	33	5	30
		1875	220	325	40			420	350	50	320
	2.2	2460 sf		228 sm			1140 sf		107 sm		
251-400	172	279	23	46	6			58	46	5	35
		3000	250	500	60			620	500	50	380
	2.3	3810 sf		354 sm			1550 sf		144 sm		
251-500											
		0 sf		0 sm			0 sf		0 sm		
401-650	288	437	28	70	8	56	56		60	9	42
		4700	300	750	80	600	600		650	100	450
	2.3	5830 sf		543 sm			2400 sf		223 sm		
501-800											
		0 sf		0 sm			0 sf		0 sm		
651-1000	345	587	30	93	9	60	60		65	14	56
		6320	320	1000	100	650	650		700	150	600
	2.9	7740 sf		719 sm			2750 sf		255 sm		
801-1300											
		0 sf		0 sm			0 sf		0 sm		
1001-1500	460	753	32	102	11	98	60		75	19	68
		7565	340	1100	120	1050	650		810	200	730
	3.3	9125 sf		898 sm			3440 sf		320 sm		
1501-2200	575	1022	34	153	11	121	60		98	23	96
		11000	370	1650	120	1300	650		1056	250	1032
	3.8	13140 sf		1220 sm			4288 sf		398 sm		

Note 1: For each heading in this chart the top number is the recommended area in square meters, the middle number is the same area in square feet. The lower number is the area of the functional sub-group in square feet and meters

Note 2: "Other" includes all mechanical areas, all areas required for weather protection, such as vestibules and covered walkways, and any justifiable functions

Note 3: The total area for any given project will vary with the number of special functional requirements added to the basic programs

Figure 6-1 b Space Program - Navy

		Preparation Areas					Storage Areas							
Facility Size	Minimum Seats & Turnover Rate	Kitchen	Vegetable Preparation	Meat Preparation	Bakery	Utensil Wash	Cooks Chill (Minimum)	Dairy Chill (Minimum)	Vegetable Chill (Minimum)	Meat Chill (Minimum)	Freezer (Minimum)	Dry Storage (Minimum)	Non-Food Storage	Carb. Beverage Storage
1-80	62	60										6	5	3
		650										65	50	35
	1.3	650 sf			60 sm				150 sf			14 sm		
81-150	108	74							6	6	7	11	5	3
		800							60	60	70	120	50	35
	1.4	800 sf			74 sm				395 sf			38 sm		
151-250	116	56	20			16	3	3	7	3	11	19	7	3
		600	220			175	30	30	70	30	115	205	70	35
	2.2	995 sf			92 sm				585 sf			56 sm		
251-400	172	79	24			20	5	5	10	5	17	30	8	5
		845	255			220	50	50	110	50	180	325	85	50
	2.3	1320 sf			123 sm				900 sf			85 sm		
251-500														
		0 sf			0 sm				0 sf			0 sm		
401-650	288	93	28			31	6	6	16	6	27	49	9	5
		1000	300			330	60	60	175	65	290	530	100	50
	2.3	1630 sf			152 sm				1330 sf			124 sm		
501-800														
		0 sf			0 sm				0 sf			0 sm		
651-1000	345	102	33	22	64	37	8	8	24	11	42	75	12	5
		1100	350	240	690	400	80	80	260	120	450	810	125	50
	2.9	2780 sf			258 sm				1975 sf			185 sm		
801-1300														
		0 sf			0 sm				0 sf			0 sm		
1001-1500	460	119	33	28	77	46	10	10	36	14	62	113	16	7
		1285	360	300	825	500	110	110	390	150	670	1220	175	75
	3.3	3270 sf			303 sm				2900 sf			268 sm		
1501-2200	575	149	56	46	96	56	15	15	54	22	93	167	23	9
		1600	600	500	1035	600	160	160	580	240	1000	1800	245	100
	3.8	4335 sf			403 sm				4285 sf			398 sm		

Note 1: For each heading in this chart the top number is the recommended area in square meters, the middle number is the same area in square feet. The lower number is the area of the functional sub-group in square feet and meters.

Note 2: "Other" includes all mechanical areas, all areas required for weather protection, such as vestibules and covered walkways, and any justifiable functions.

Note 3: The total area for any given project will vary with the number of special functional requirements added to the basic programs.

Figure 6-1c Space Program - Navy

		Support Areas						Other		
Facility Size	Minimum Seats & Turnover Rate	Offices	Staff Toilets	Staff Lockers	Janitor's Closet	Can Wash	Loading Dock (compute @ 50%)	Gross Allowable Area	Flight Kitchen	Other
1-80	62	21	24		2	4	19	325	9	
		230	260		25	40	200	3500	100	A/R
	1.3	755 sf				70 sm				
81-150	108	29	24		2	4	19	465	9	
		310	260		25	40	200	5000	100	A/R
	1.4	835 sf				78 sm				
151-250	116	37	24	11	2	4	19	595	9	
		400	260	120	25	40	200	6400	100	A/R
	2.2	1045 sf				97 sm				
251-400	172	54	24	15	5	4	21	827	9	
		580	260	160	50	40	230	8900	100	A/R
	2.3	1320 sf				123 sm				
251-500										
		0 sf				0 sm				
401-650	288	65	33	24	5	4	28	1199	12	
		700	360	260	50	40	300	12900	125	A/R
	2.3	1710 sf				159 sm				
501-800										
		0 sf				0 sm			0	sm
651-1000	345	65	40	35	7	6	28	1599	12	
		700	430	380	75	60	300	17200	125	A/R
	2.9	1945 sf				181 sm				
801-1300										
		0 sf				0 sm				
1001-1500	460	65	42	35	7	6	37	1933	14	
		700	450	380	75	60	400	20800	150	A/R
	3.3	2065 sf				192 sm				
1501-2200	575	84	46	46	9	6	37	2742	14	
		900	500	480	100	60	400	29500	150	A/R
	3.8	2440 sf				228 sm				

Note 1: For each heading in this chart the top number is the recommended area in square meters, the middle number is the same area in square feet. The lower number is the area of the functional sub-group in square feet and meters.

Figure 6-1d Space Program-Army

		Public Areas				Serving Area					
Facility Size	Minimum Seats & Turnover Rate	Dining Area & Circulation	Public Toilets	Vestibule-Queue	Carry-out	Kitchen	PME and Com	ADMIN (office,toilets, lockers)	Field Feeding	Dishwashing	
151-250	120	148	37	27	21	278	67	65	13	50	
		1590	400	295	225	2992	724	705	144	540	
		2510 sf		233 sm			5105 sf		473 sm		
251-501		299	41	68	24	310	158	67	20	50	
		3224	451	731	258	3337	1700	721	215	540	
		4664 sf		432 sm			6513 sf		605 sm		
501-801	374	512	93	60	33	310	93	67	28	58	
		5511	1000	753	360	3337	1010	721	305	624	
		7624 sf		698 sm			5997 sf		556 sm		
801-1300	454	632	94	65	38	310	98	75	28	58	
		6802	1018	799	409	3337	1054	408	305	624	
		9028 sf		829 sm			5728 sf		569 sm		

Note 1: For each heading in this chart the top number is the recommended area in square meters, the middle number is the same area in square feet. The lower number is the area of the functional sub-group in square feet and meters.

Note 2: "Other" includes all mechanical areas, all areas required for weather protection, such as vestibules and covered walkways, and any justifiable functions.

Note 3: The total area for any given project will vary with the number of special functional requirements added to the basic programs.

Figure 6-2 Architectural Finishes

SPACE	FLOOR	BASE	WALL	PROTECT	CEILING
Entry/Vestibule	QT or VCT	QT or VCT	Note 1	-	Note 3
Queue	QT or VCT	QT or VCT	Note 1	-	Note 3
Public Toilets	CT	CT	CT	-	MR ACT
Check-In	QT or VCT	QT or VCT	Note 1	-	Note 3
Dining Area	Carpet or VCT	Vinyl	Note 1	Note 2	Note 3
Serving/Patron Side	QT	QT	CT or GSU	Wall, Corners	MR ACT
Serving/Serve Side	QT	QT	CT or GSU	Wall, Corners	MR ACT
Dishwashing	QT	QT	GSU	Wall, Corners	Metal Pan
Food Prep. Area	QT	QT	GSU	Wall, Corners	Metal Pan
Utensil Wash	QT	QT	GSU	Wall, Corners	Metal Pan
Storage/Freeze	QT	-	MIP	-	MIP
Storage/Chilled	QT	-	MIP	-	MIP
Storage/Dry	VCT	QT or Vinyl	GWC on CMU	Corners	ACT
Storage/Non-food	Concrete	Vinyl	GWC on CMU	Corners	Exposed or ACT
Storage/Carb. Bev	QT	QT or Vinyl	GWC on CMU	-	ACT
Offices	VCT	Vinyl	Paint CMU	-	ACT
Staff Toilets	CT	CT	GWC on CMU	-	MR ACT
Staff Lockers	VCT	Vinyl	GWC on CMU	-	MR ACT
Janitor Closet	VCT	Vinyl	GWC on CMU	Corners	Exposed
Can Wash	Acid Resist	QT	GWC on CMU	Wall, Corners	MR ACT
Loading Dock	Concrete	-	Exterior	-	Exterior
			-	-	-
Mechanical	Concrete	-	Paint CMU	-	Exposed

Note 1. Walls in public areas may be a variety of durable materials such as brick, split block, exposed concrete, plaster, vinyl wall covering on approved substrate, or other materials as approved.

Note 2. Wall guard protection should be provided at locations where cart traffic is expected. See plates XX, XX, and XX for details.

Note 3. Ceilings in public areas may be a variety of suspended acoustic ceilings materials.

Note 4. Quarry tile on an insulated slab.

ABBREVIATIONS

ACT - Acoustic Ceiling Tile
CMU - Concrete Masonry Unit
CT - Ceramic Tile
GSU - Glazed Structural Unit
GWC - Glazed Wall Coating
MIP - Metal Insulated Panel
QT - Quarry Tile
VCT - Vinyl Composition Tile
MR - Moisture Resistant

Figure 6-3 Overall Dining Facility Flow Schematic

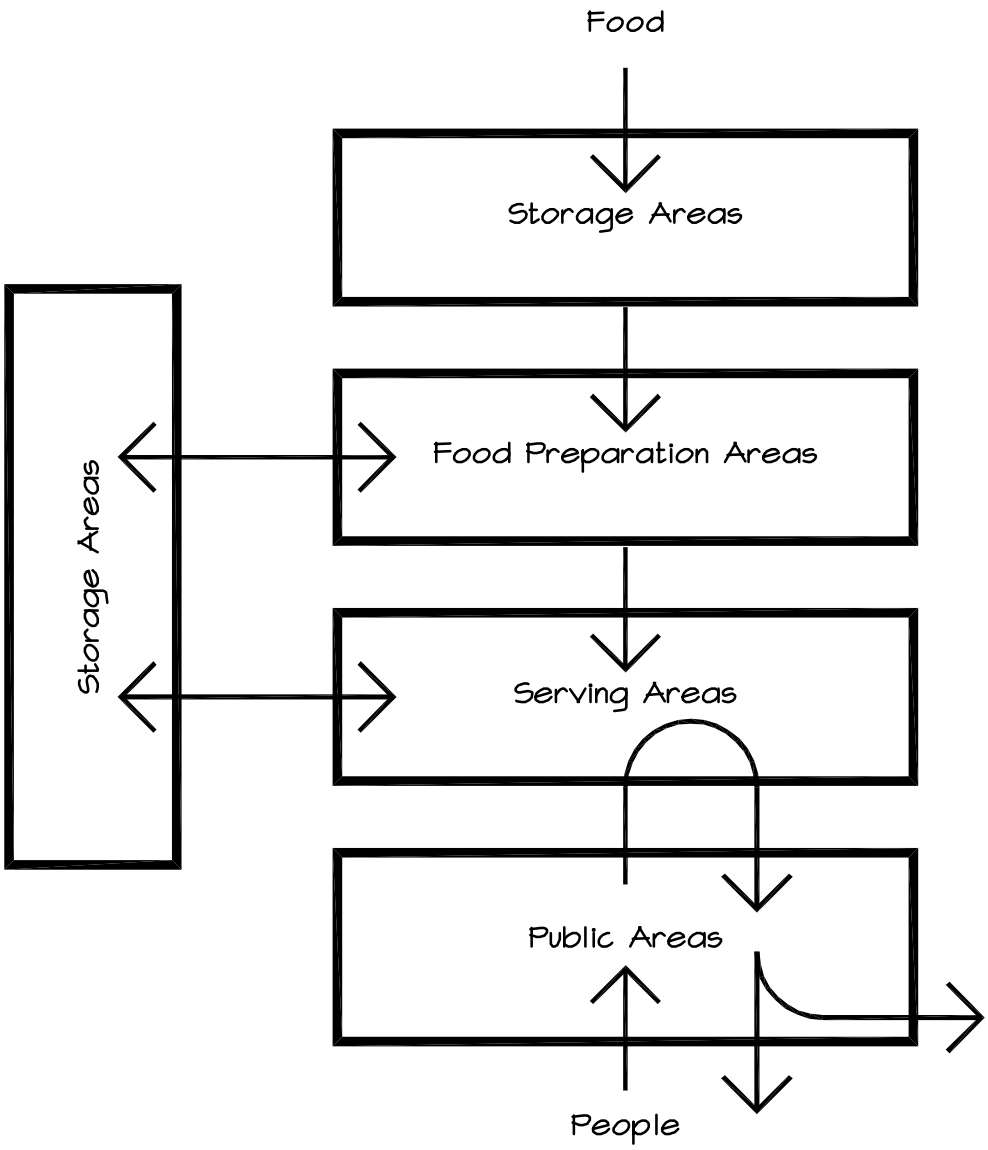
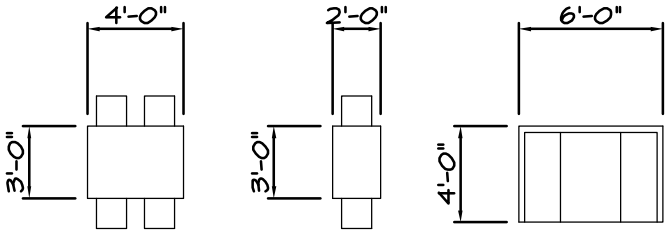
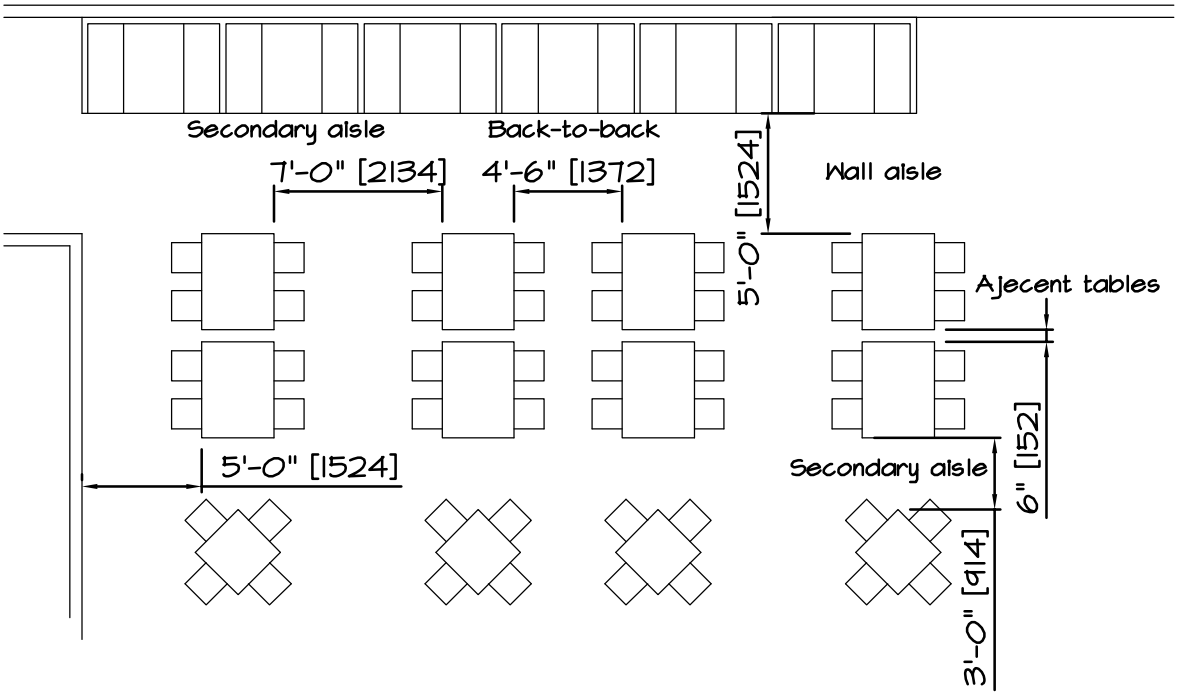


Figure 6-4 Table Sizes and Clearances





1. A variety of table sizes and configurations should be used to avoid a monotonous arrangement , however, the use of round or square tables is not as space efficient as rectangular tables. Consideration should be given to avoid or minimize seating arrangements which cause one patron to disturb another for access or egress.

2. Aisle widths shown are minium and must be verified with NFPA 101 and Life Safety Code requirements. Sizes may need to be increased for very long aisles.

3. If partitions at tables are desired, partition height should be not greater than 4'-6" (1350mm) to maintain openness of space.

4. Booth seating should not exceed 30% of total seating.

Figure 6-5 Notional Plan of Serving Line for Small Dining Facility

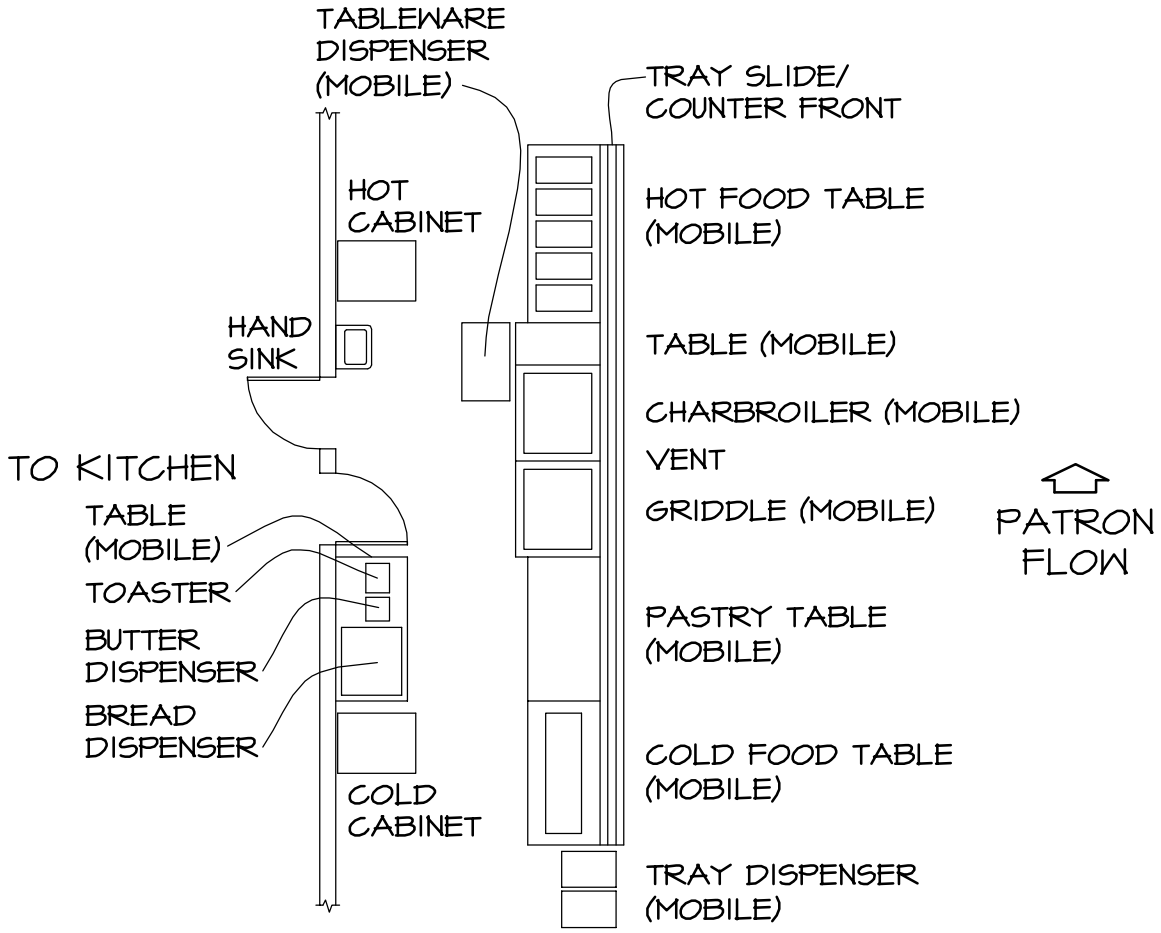


Figure 6-6 Notional Plan of Serving Line for Medium Dining Facility

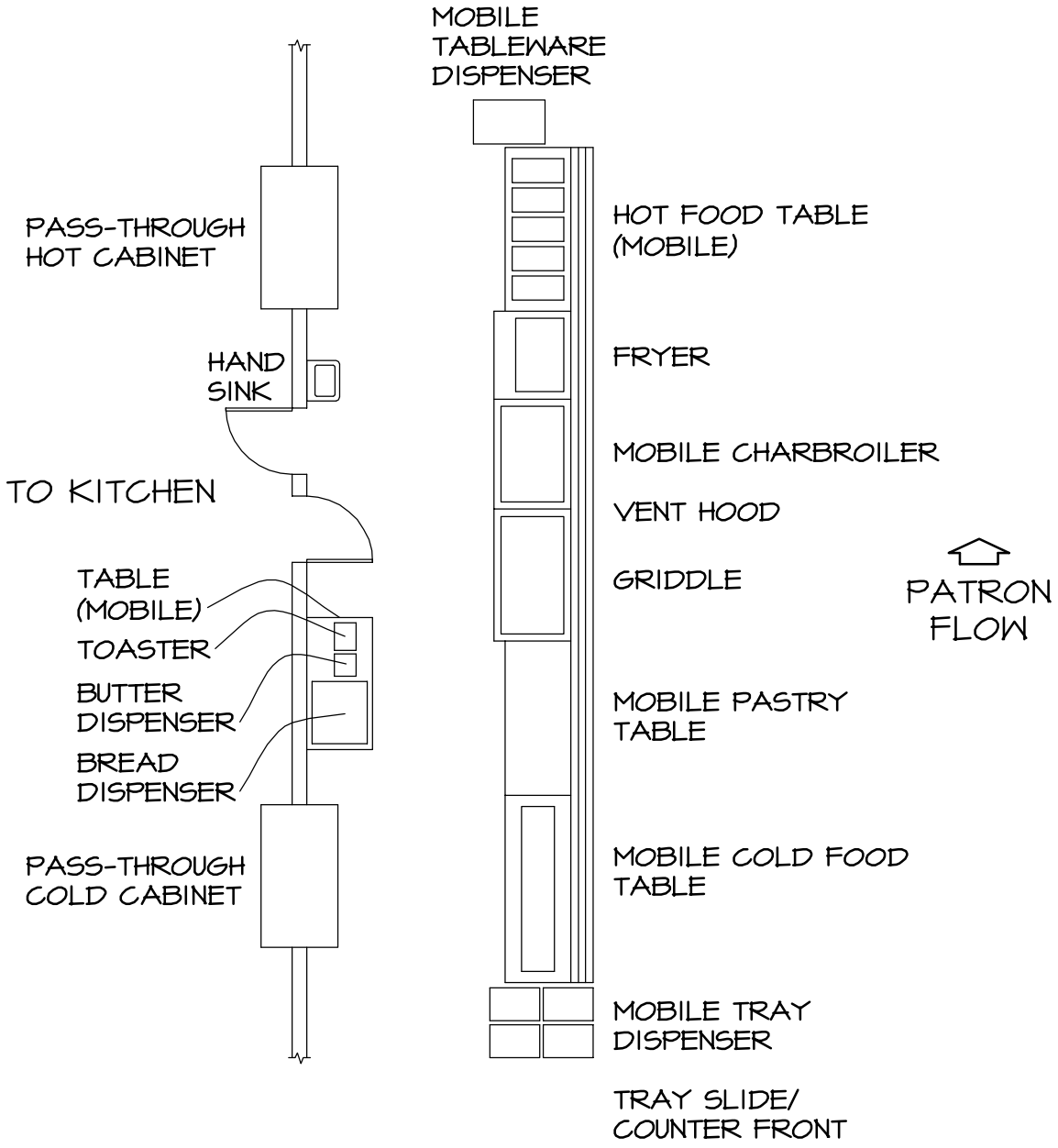


Figure 6-7 Notional Plan of Double Serving Line for Large Dining Facility

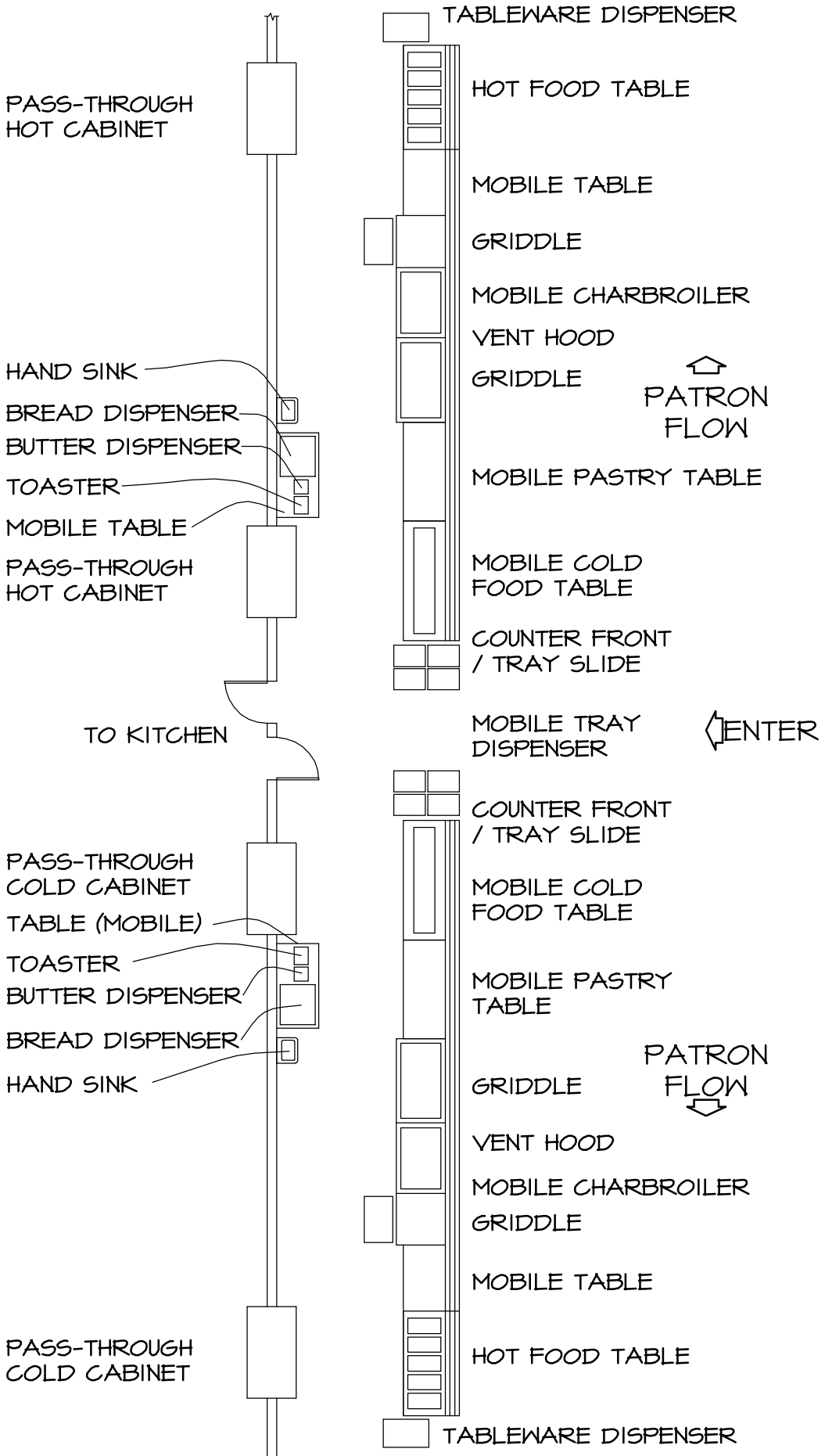


Figure 6-8 Notional Plan of Fast Food Serving Line

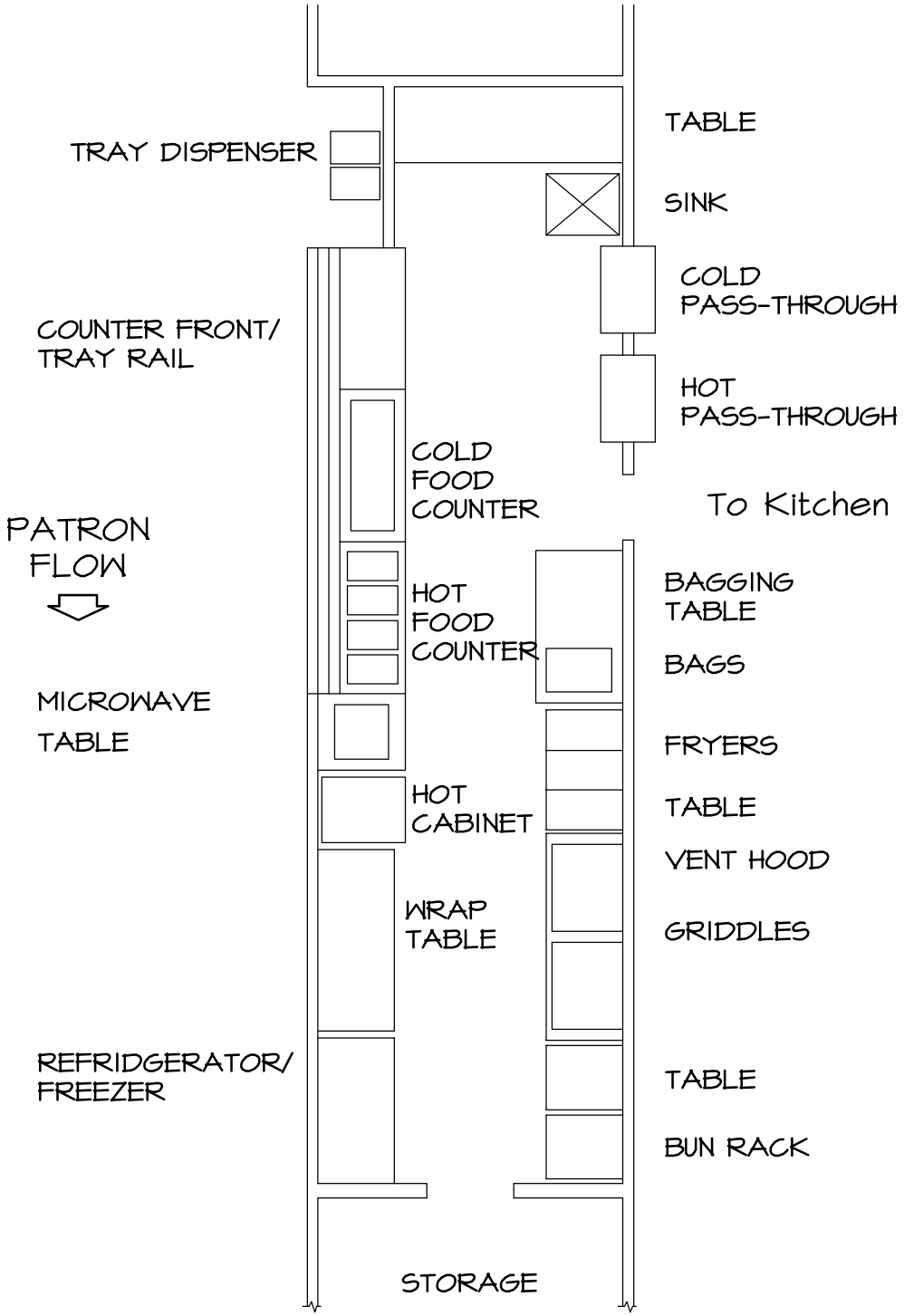


Figure 6-9 Notional Plan of Single Beverage Serving Line

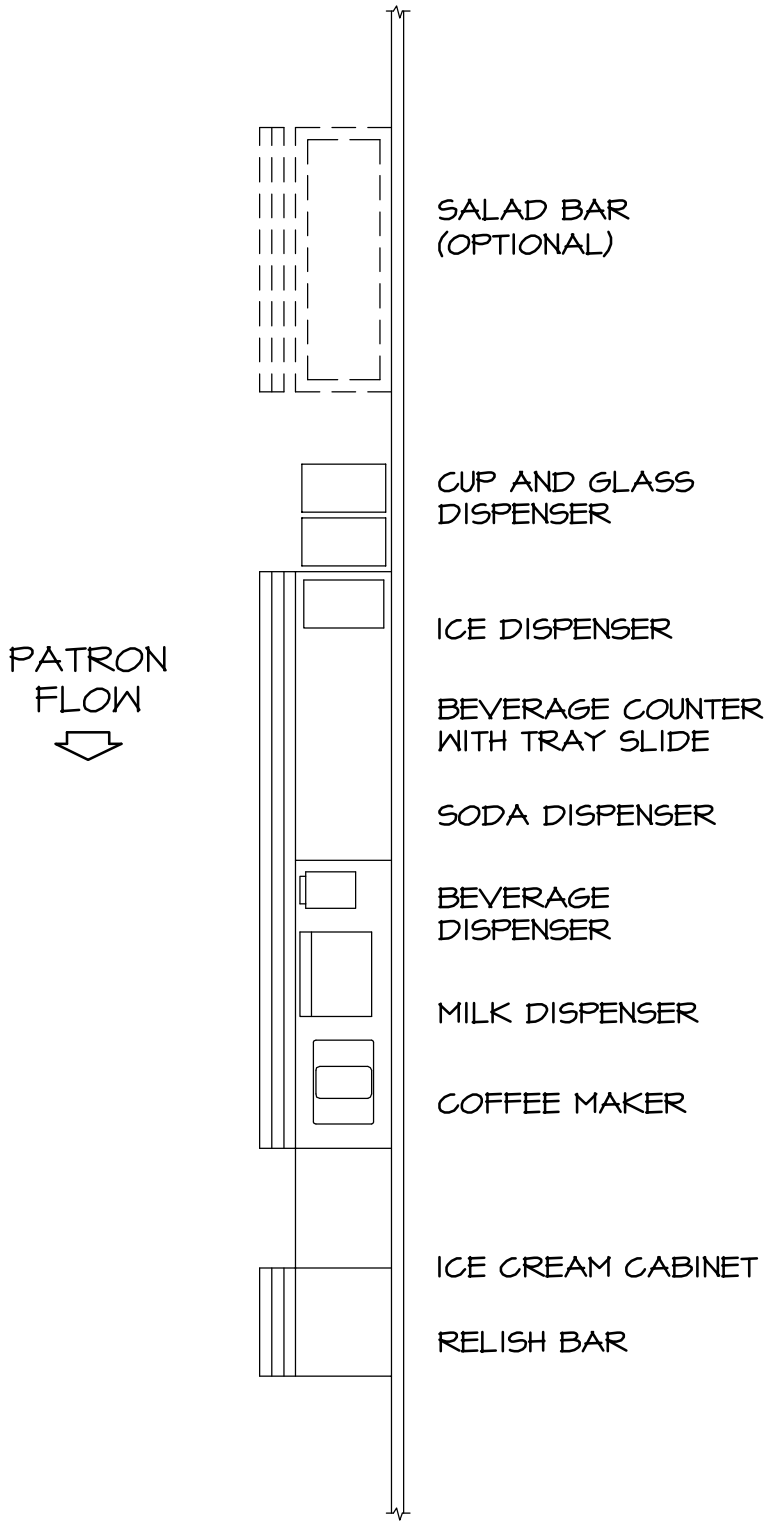
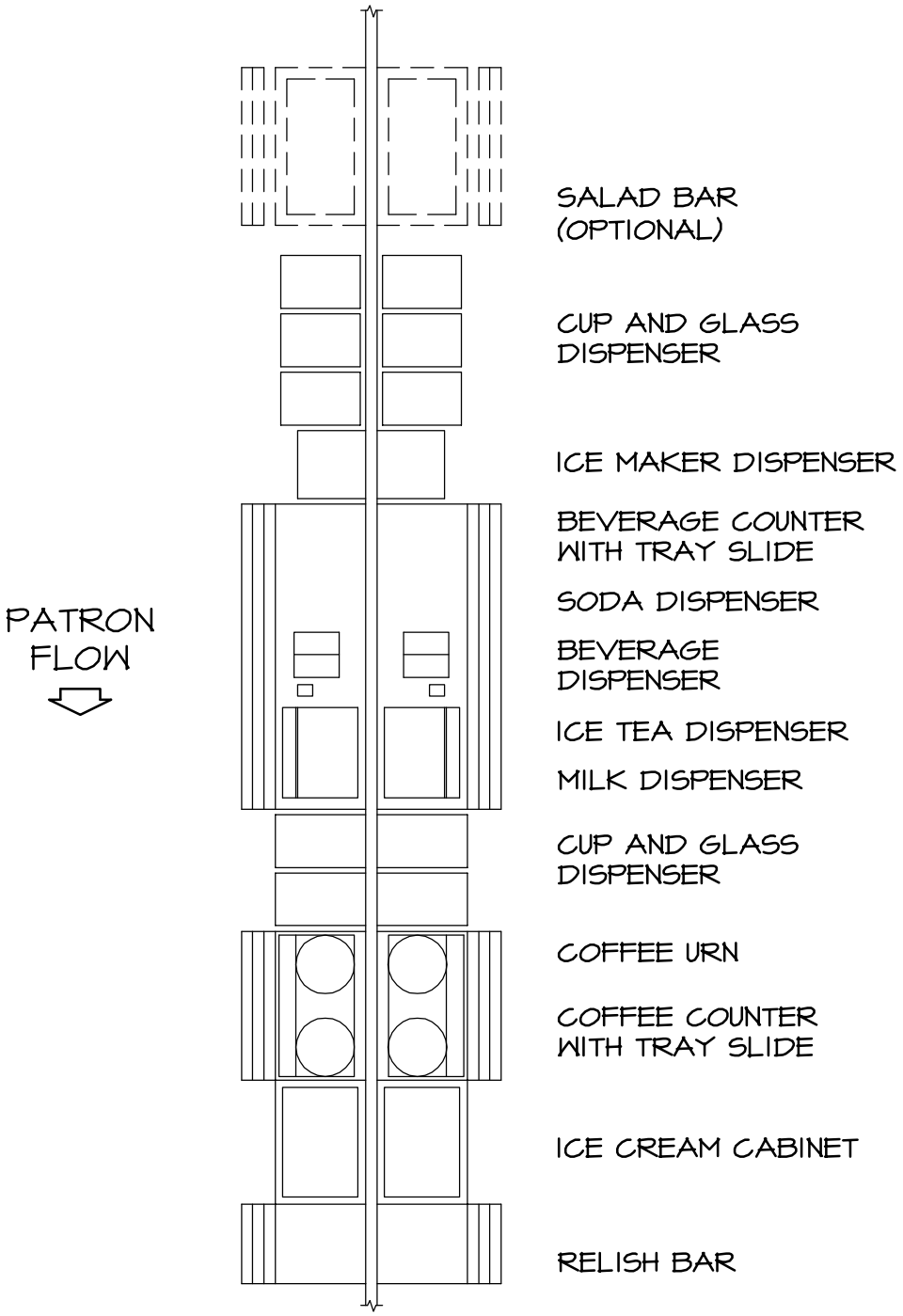
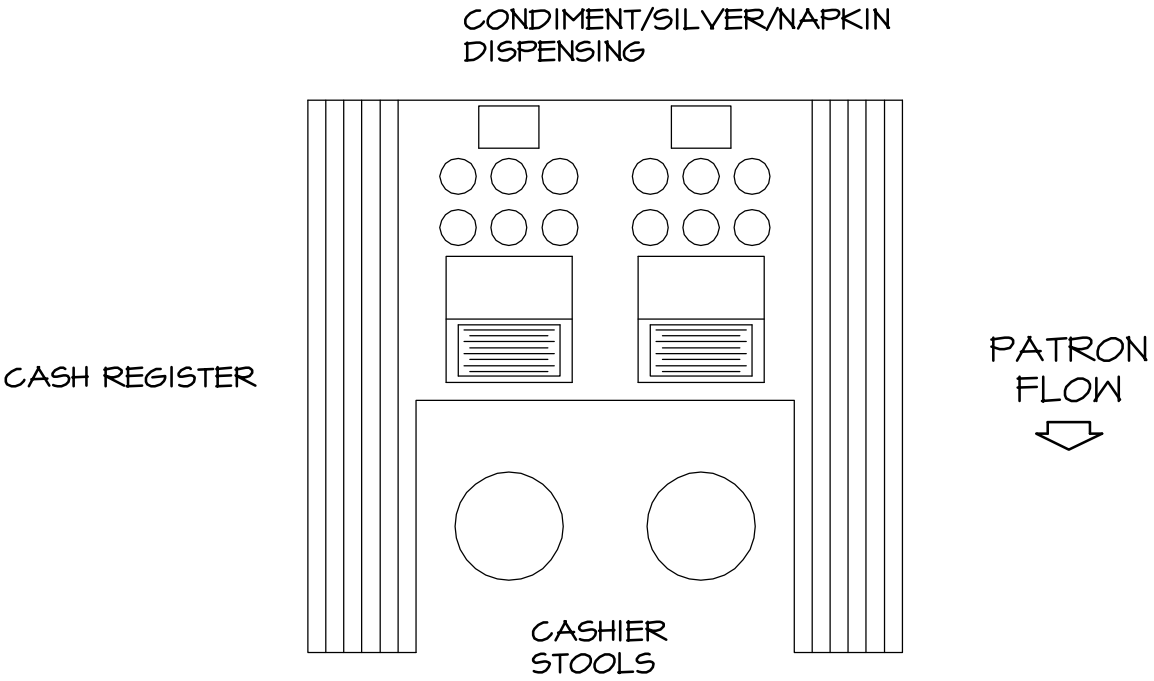


Figure 6-10 Notional Plan of Double Beverage Serving Line



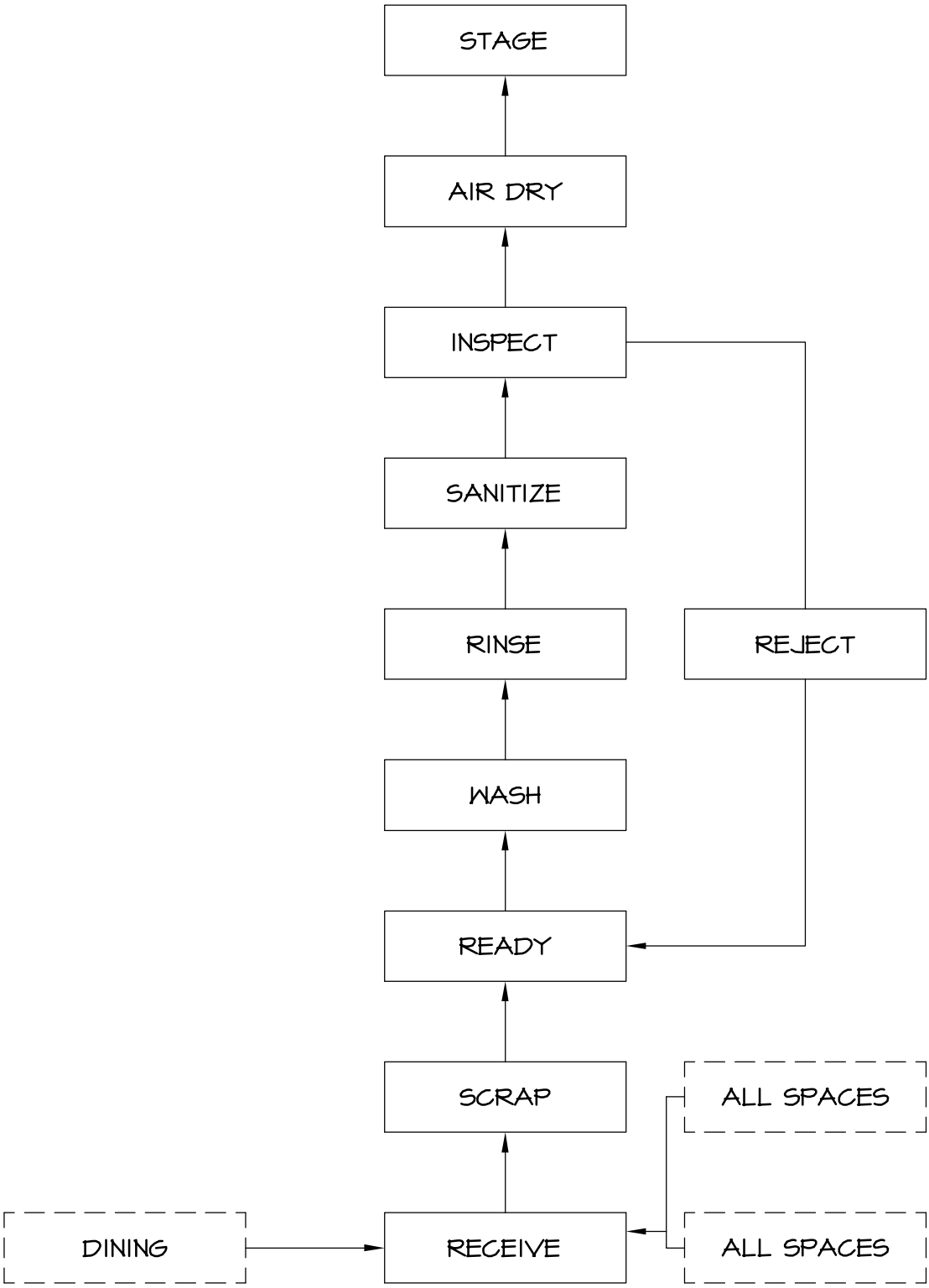
NOTE: EACH LINE CONTAINS IDENTICAL EQUIPMENT

Figure 6-11 Notional Plan of Cashier Station



NOTE: CASHIER STANDS ARE PRODUCED IN SEVERAL CONFIGURATIONS AS STANDARD ITEMS BY SEVERAL FOOD SERVICE EQUIPMENT MANUFACTURES.

Figure 6-12 Support Area Dishwashing and Utensil Washing Flow Diagram



RECEIVE	Accumulate, sort, rack, soak
SCRAP	Drain, scrape, dispose
READY	Pre-rinse, scrub, rack, load
WASH	Rinse, sanitize, inspect, air dry
STAGE	Temporary stowage prior to service

Figure 6-13 Dishwashing Notional Plan for Small Dining Facility

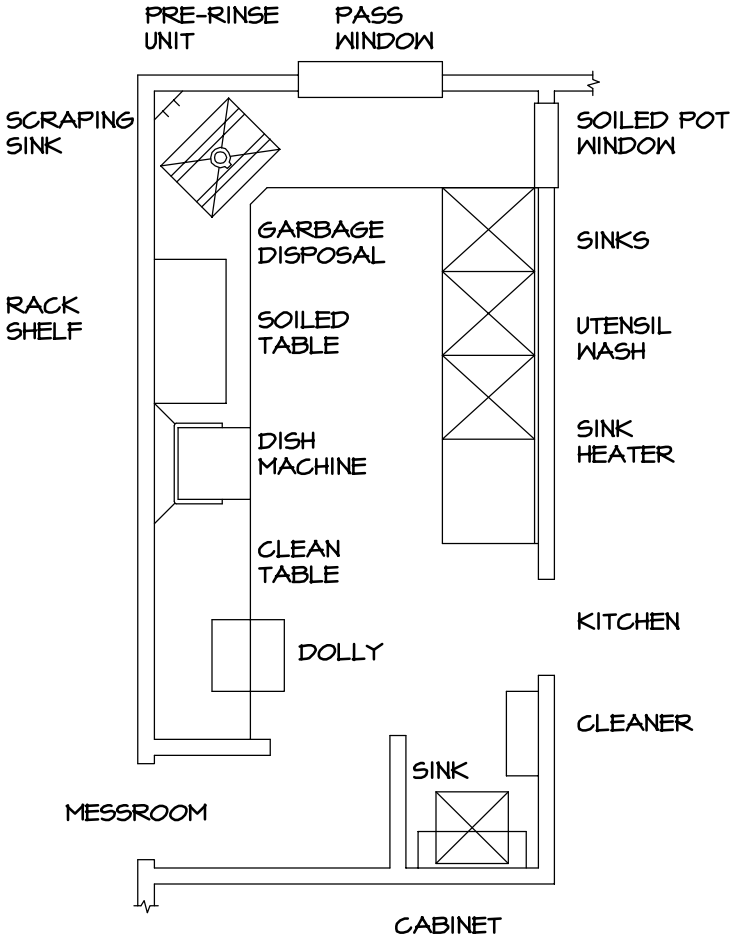


Figure 6-14 Dishwashing Notional Plan for Medium Dining Facility

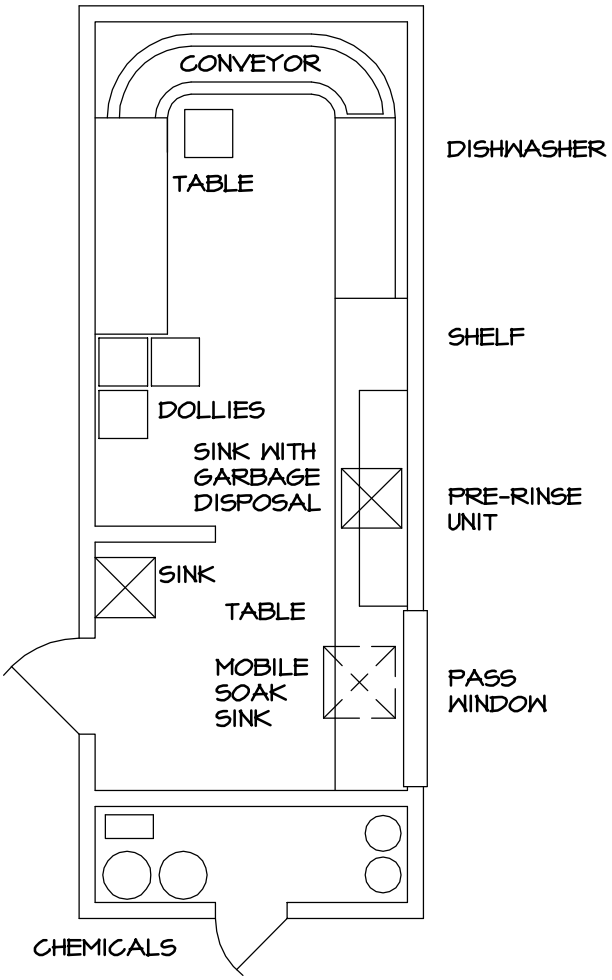


Figure 6-15 Dishwashing - Circular Type

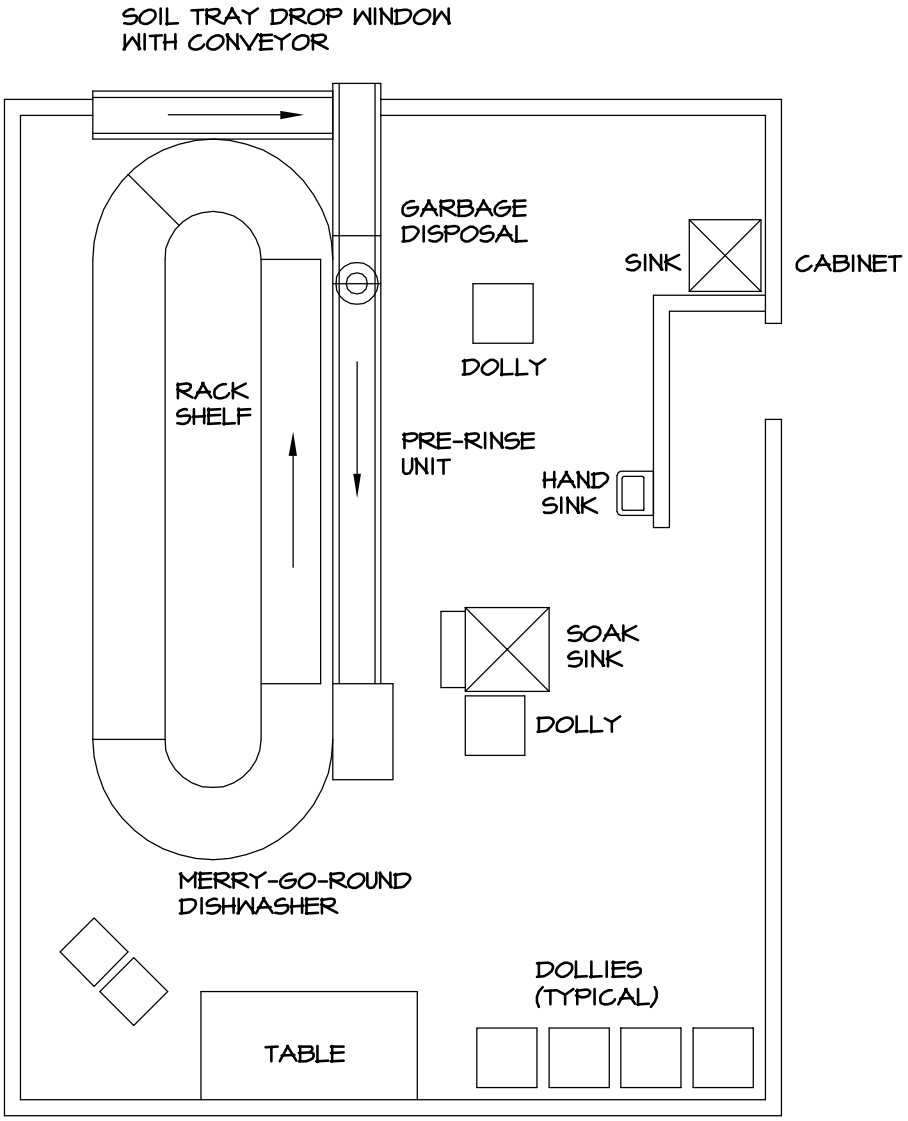


Figure 6-16 Dishwashing Notional Plan - Flight Type

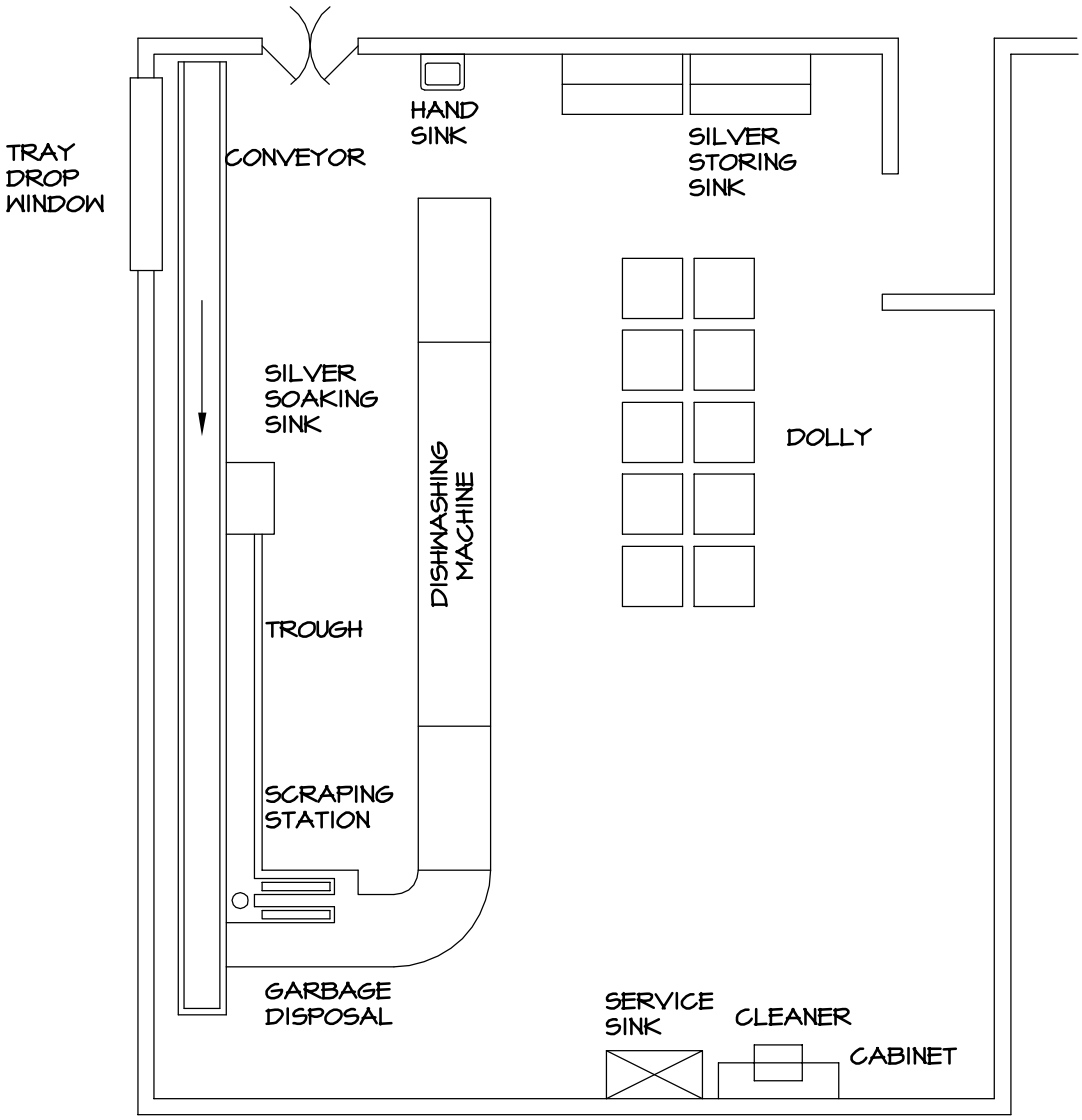


Figure 6-17 Notional Plan
Utensil Washing

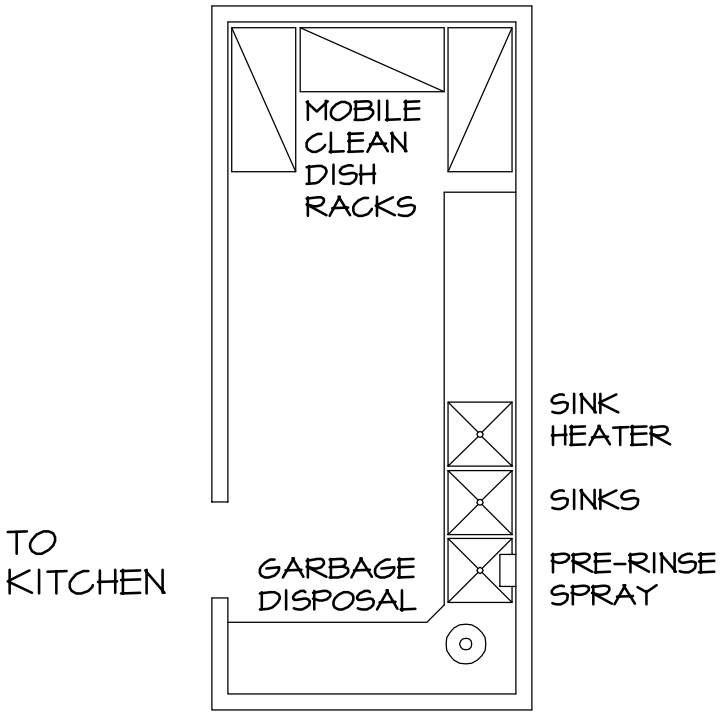


Figure 6-18 Notional Plan of Mechanical Utensil Washing

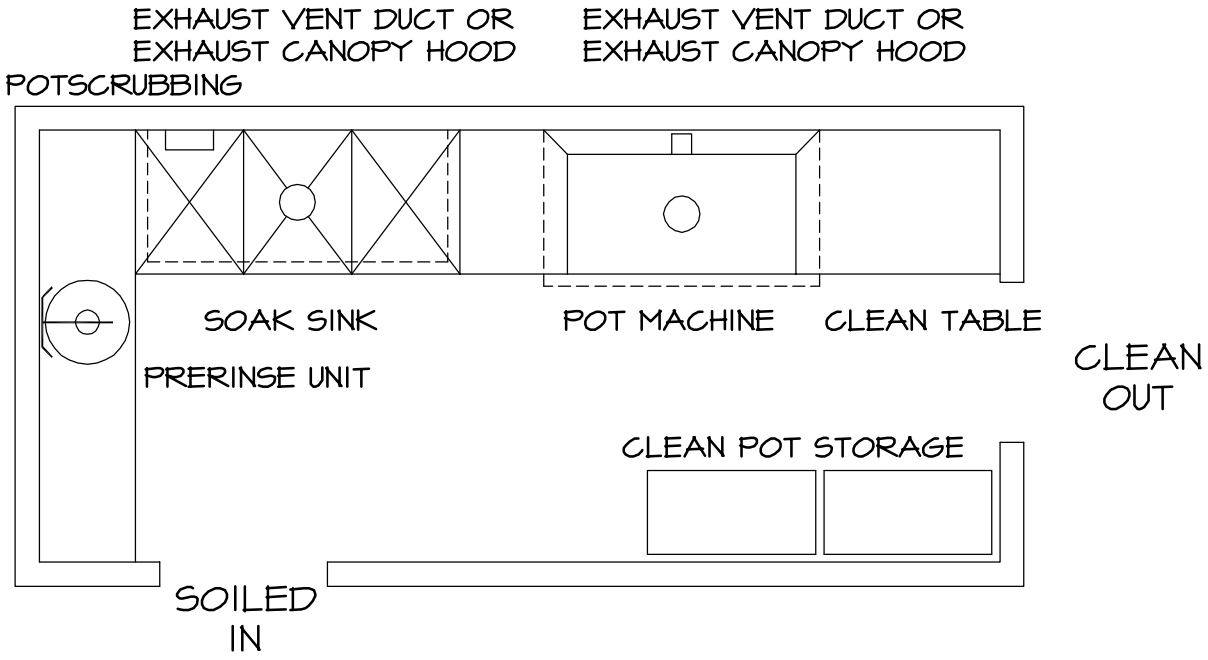
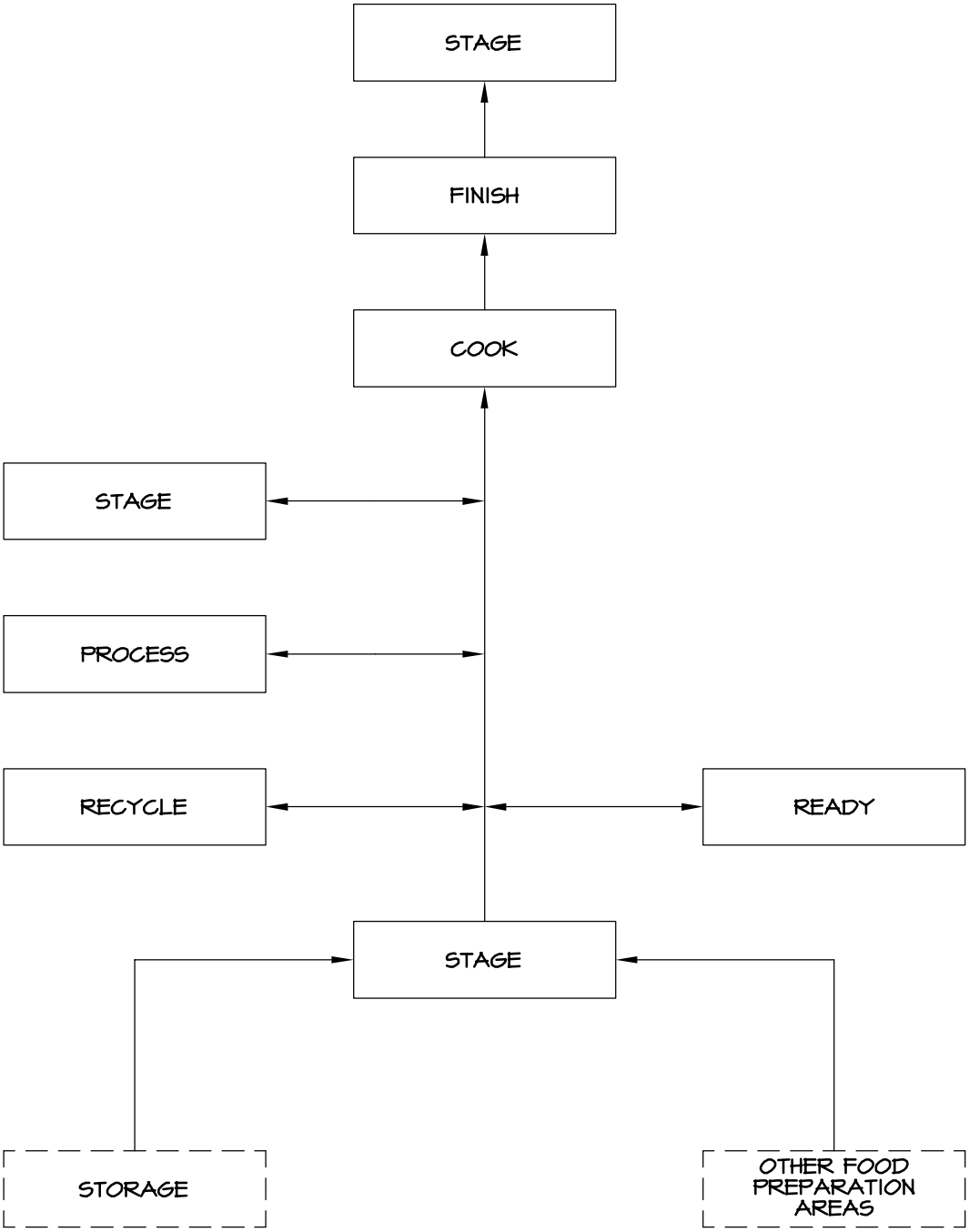


Figure 6-19 Food Preparation Areas Flow Concept Diagram



STAGE	Temporary holding prior to readying, processing or further preparation or service (ambient, hot, cold)
READY	Unpack, drain, wash
RECYCLE	Separate, store for pickup
PROCESS	Measure, mix, assemble, form, cut, shape, fill, pan, load
COOK	Bake, roast, fry, steam, simmer, boil, braise, saute, grill
FINISH	Season, garnish, slice, portion, pan

Figure 6-20 Notional Plan of Kitchen for Small Dining Facility (Pot Cookery)

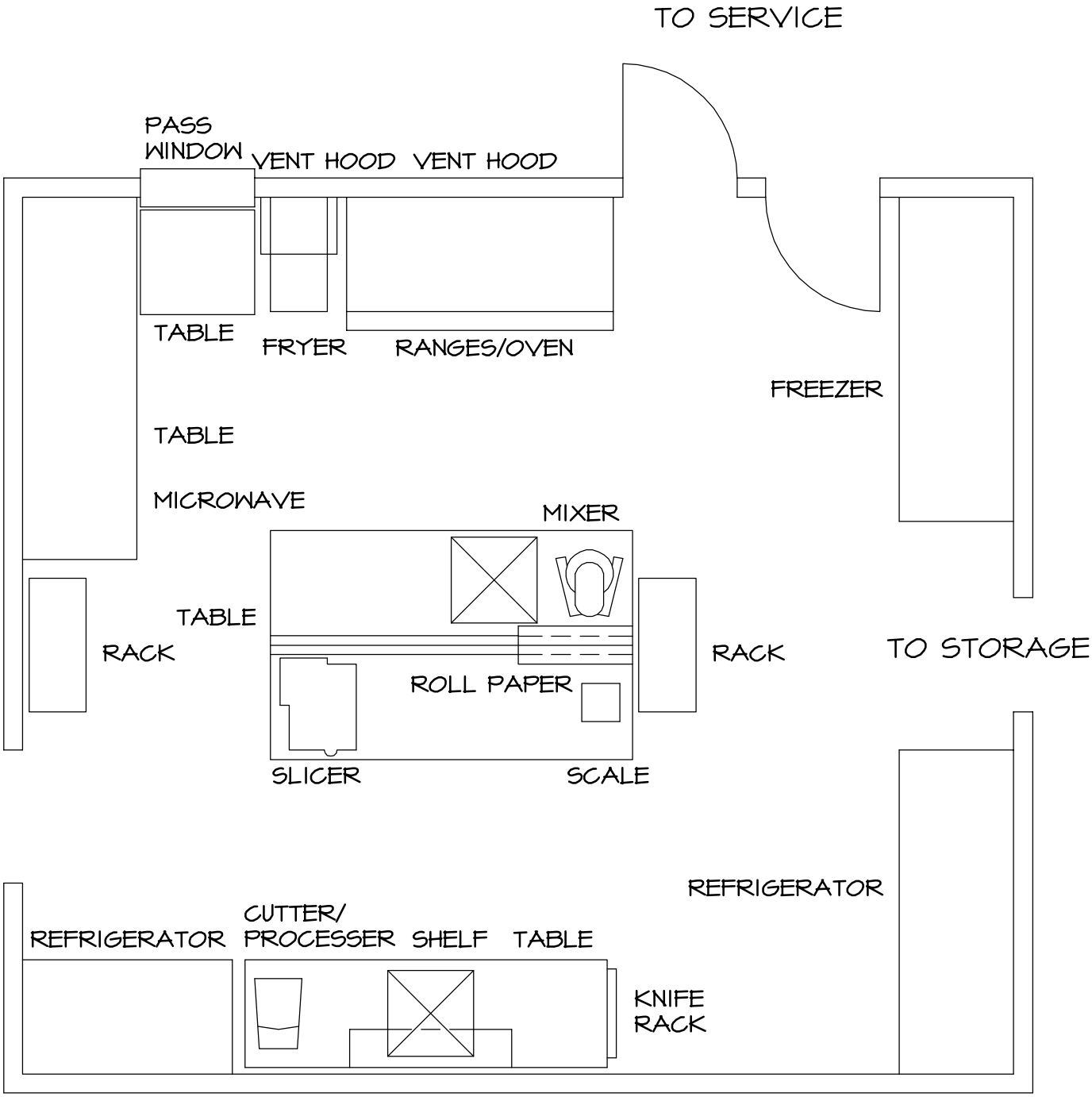


Figure 6-21 Notional Plan of Kitchen for Small Dining Facility (Ovens and Kettles)

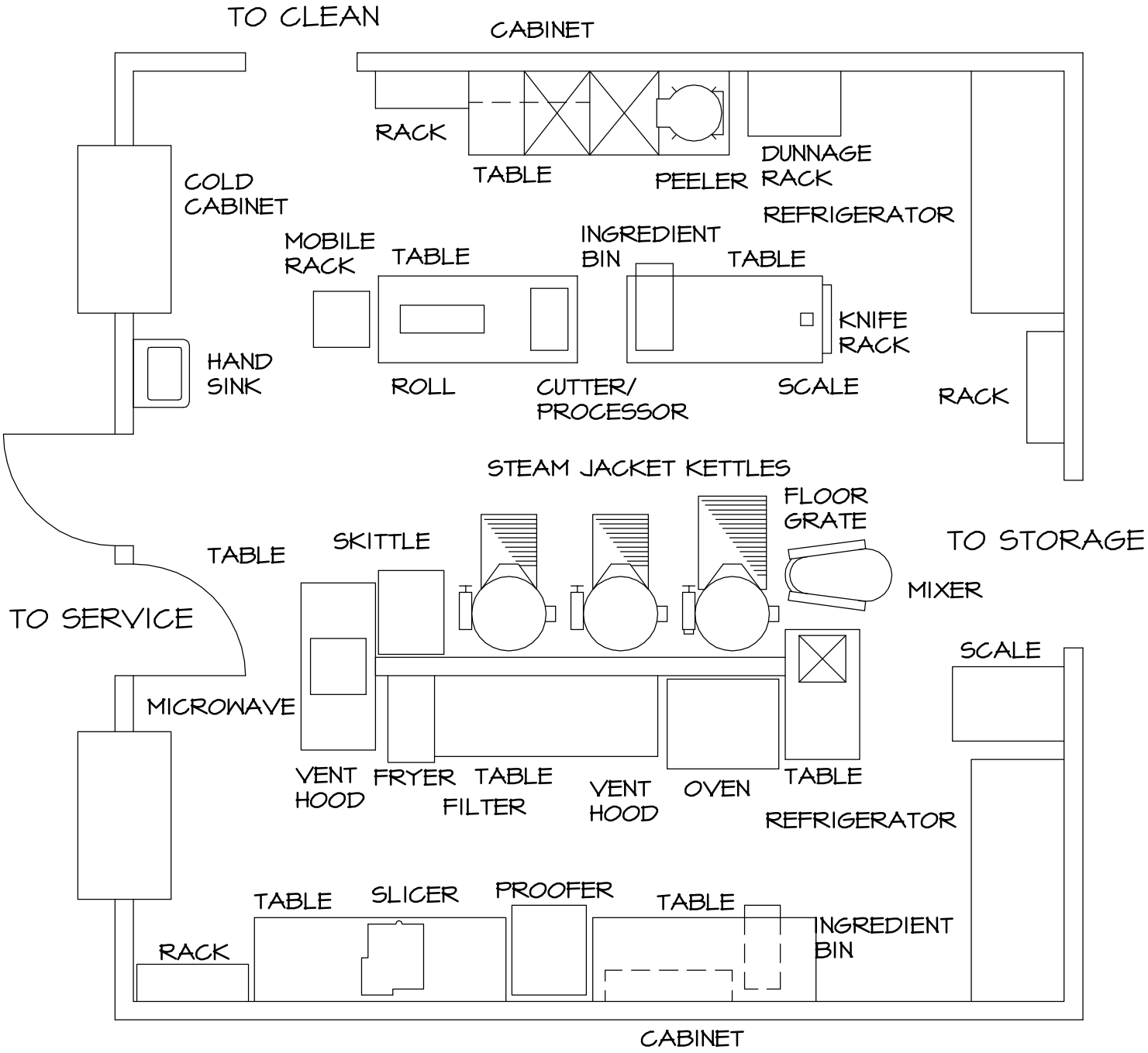


Figure 6-22 Notional Plan of Kitchen for Medium Dining Facility

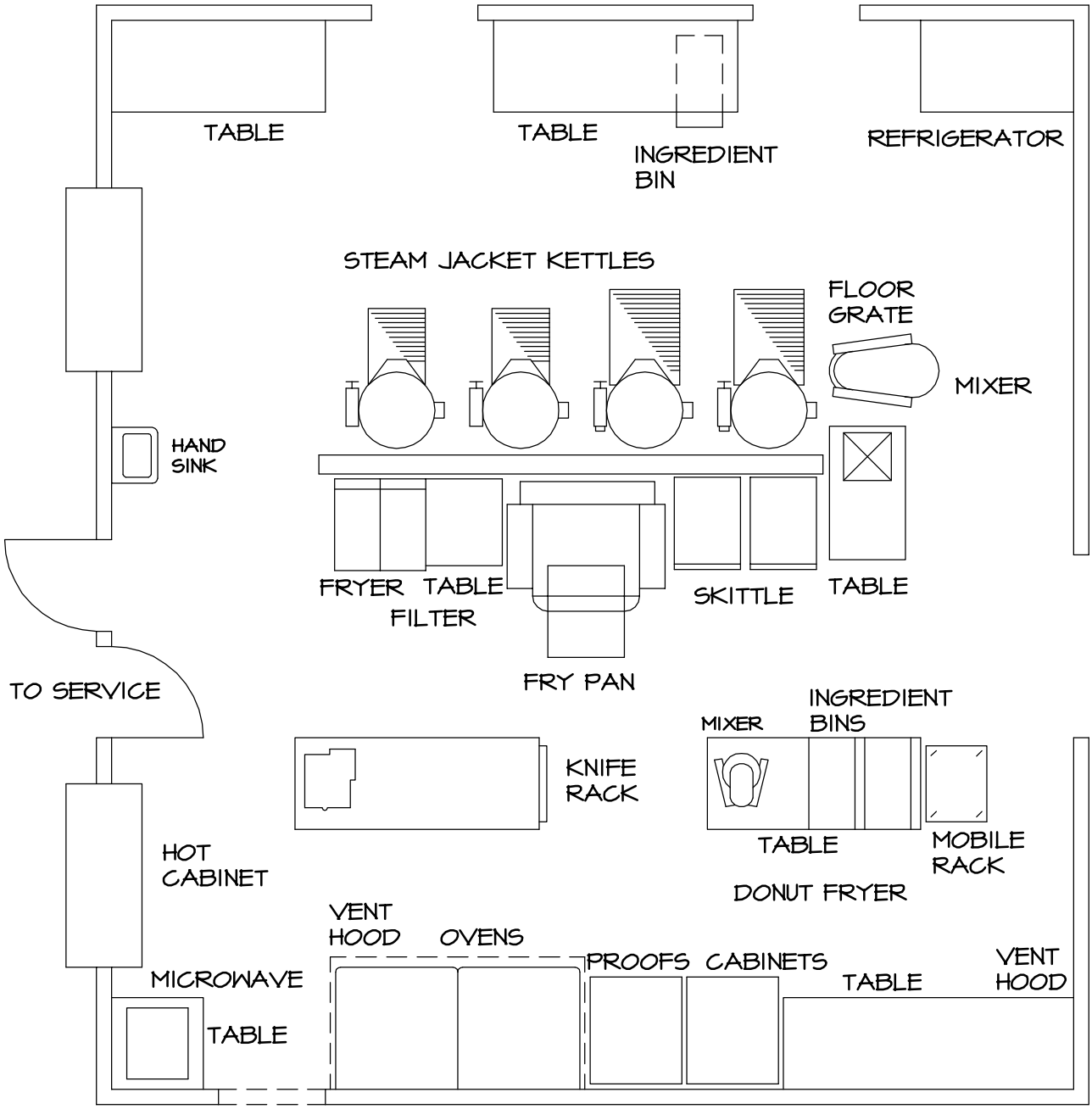
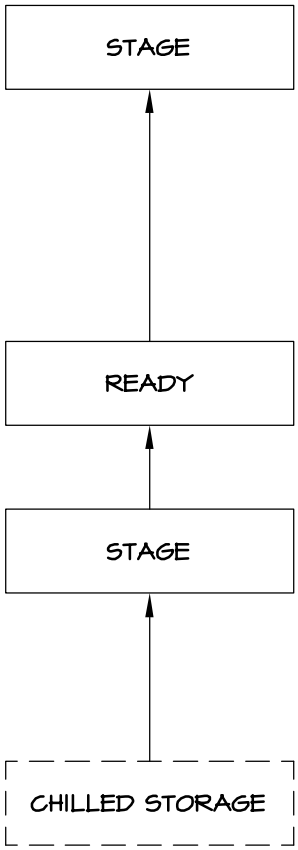


Figure 6-25 Vegetable Preparation Area Flow Concept Diagram



STAGE	Temporary holding prior to readying, processing or further preparation or service (ambient, hot, cold)
READY	Unpack, drain, wash
PROCESS	Measure, mix, assemble, form, cut, shape, fill, pan, load

Figure 6-26 Notional Plan of Typical Vegetable Preparation

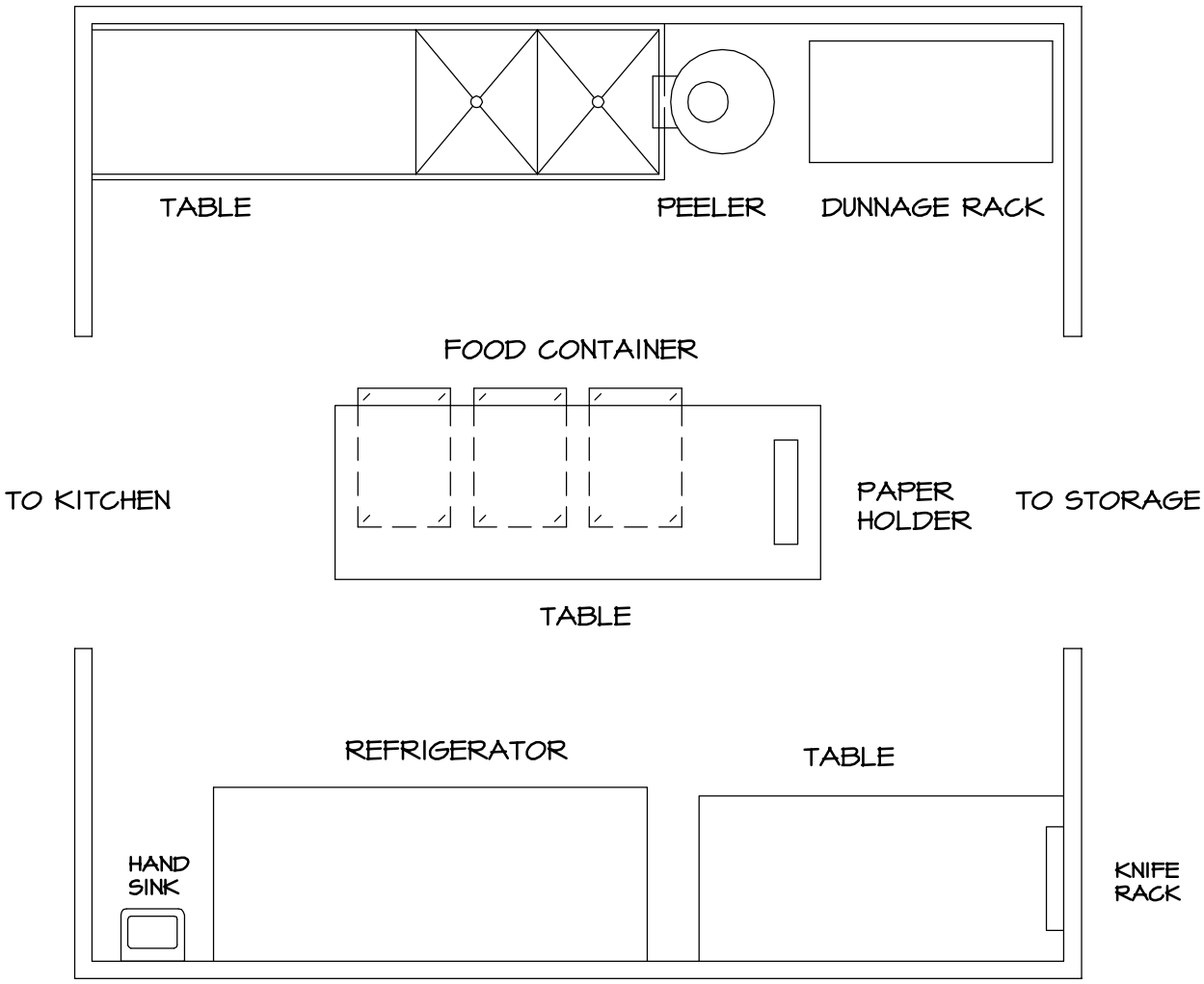
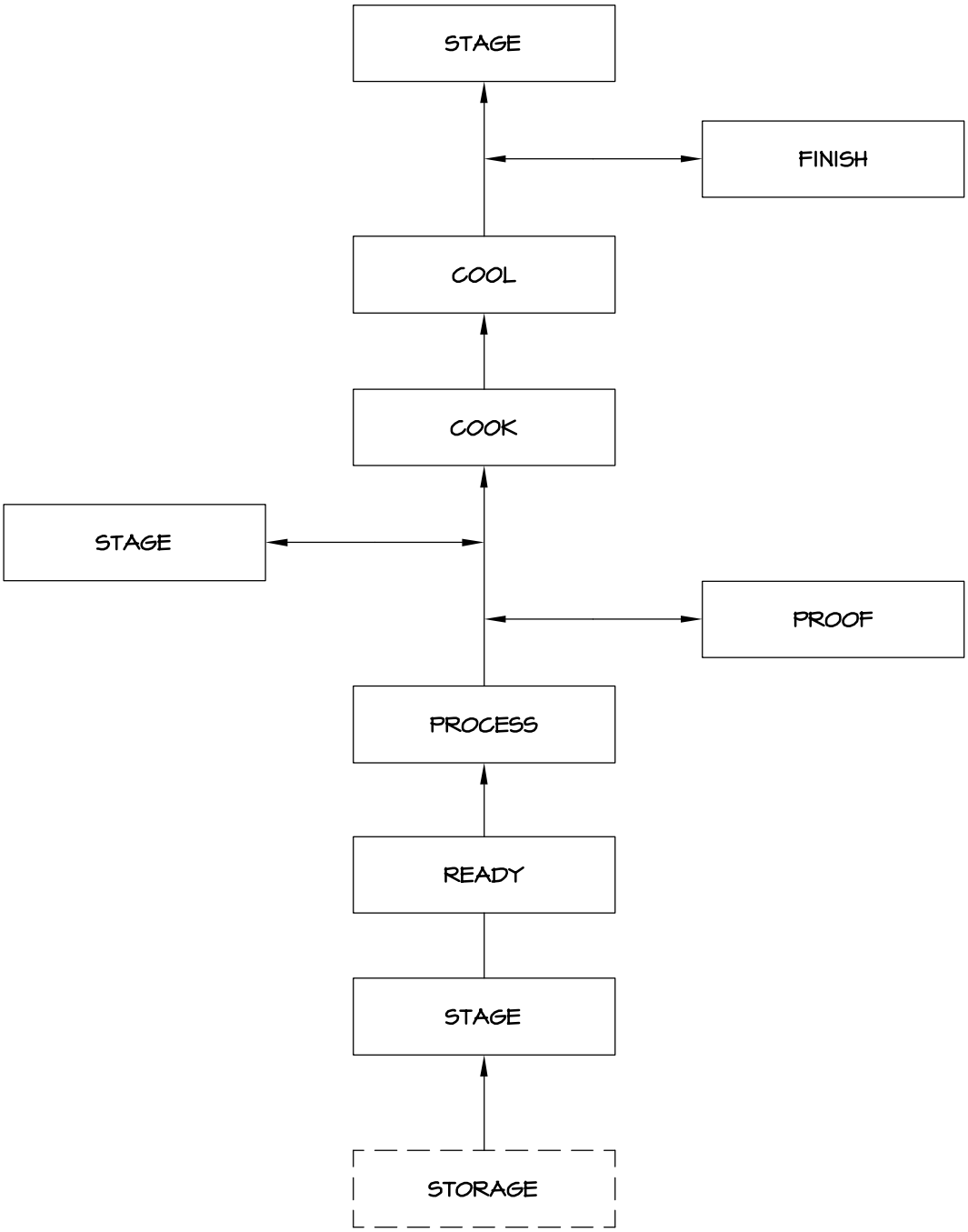


Figure 6-27 Bakery Area Flow Concept Diagram



STAGE	Temporary holding prior to readying, processing or further preparation or service (ambient, hot, cold)
READY	Unpack, drain, wash
PROCESS	Measure, mix, assemble, form, cut, shape, fill, pan, load
PROOF	Proof, arrest
COOK	Bake, simmer, fry
COOL	Lower temperature for finish
FINISH	Ice, glaze, top

Figure 6-28 Notional Plan of Typical Bakery

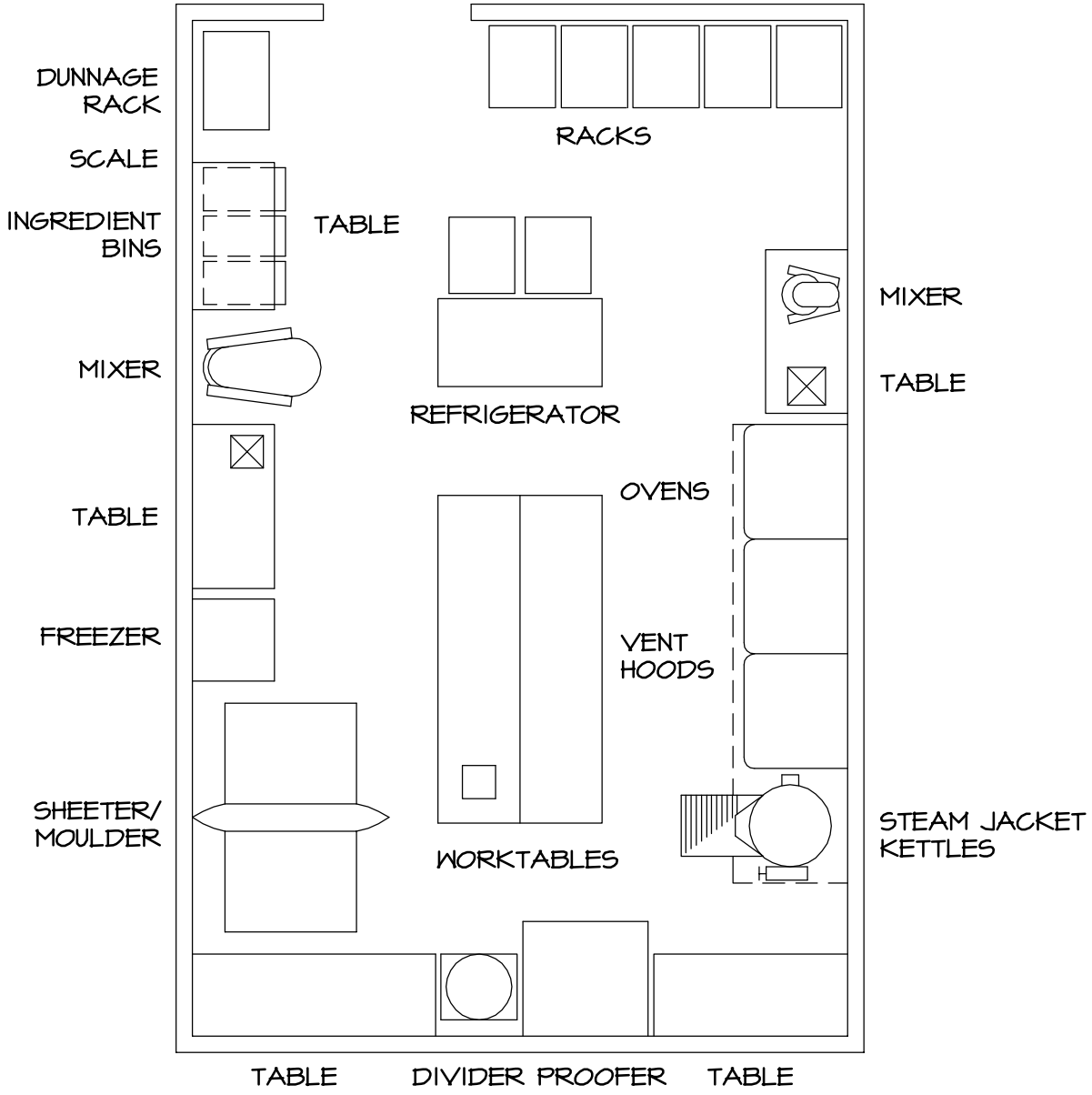
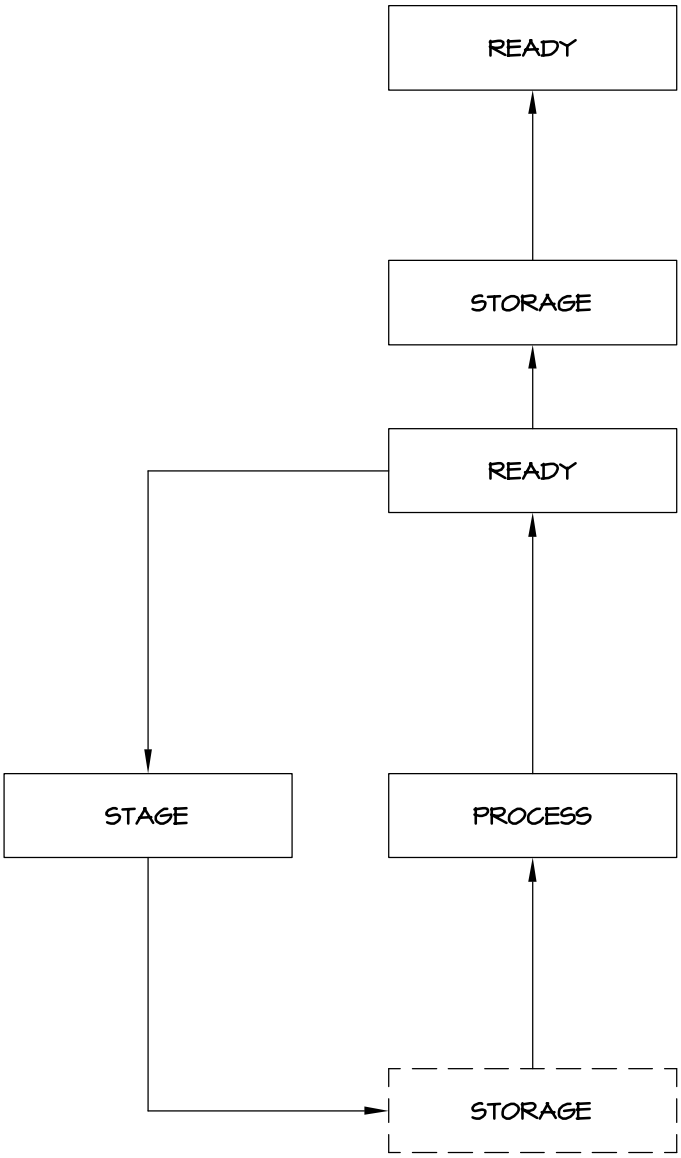


Figure 6-29 Storage Areas Flow Concept Diagram



PROCESS	Receive, unload
READY	Inspect, sort, distribute, issue
STORAGE	Hold for issue

Figure 6-30 Notional Plan of Typical Storage Areas

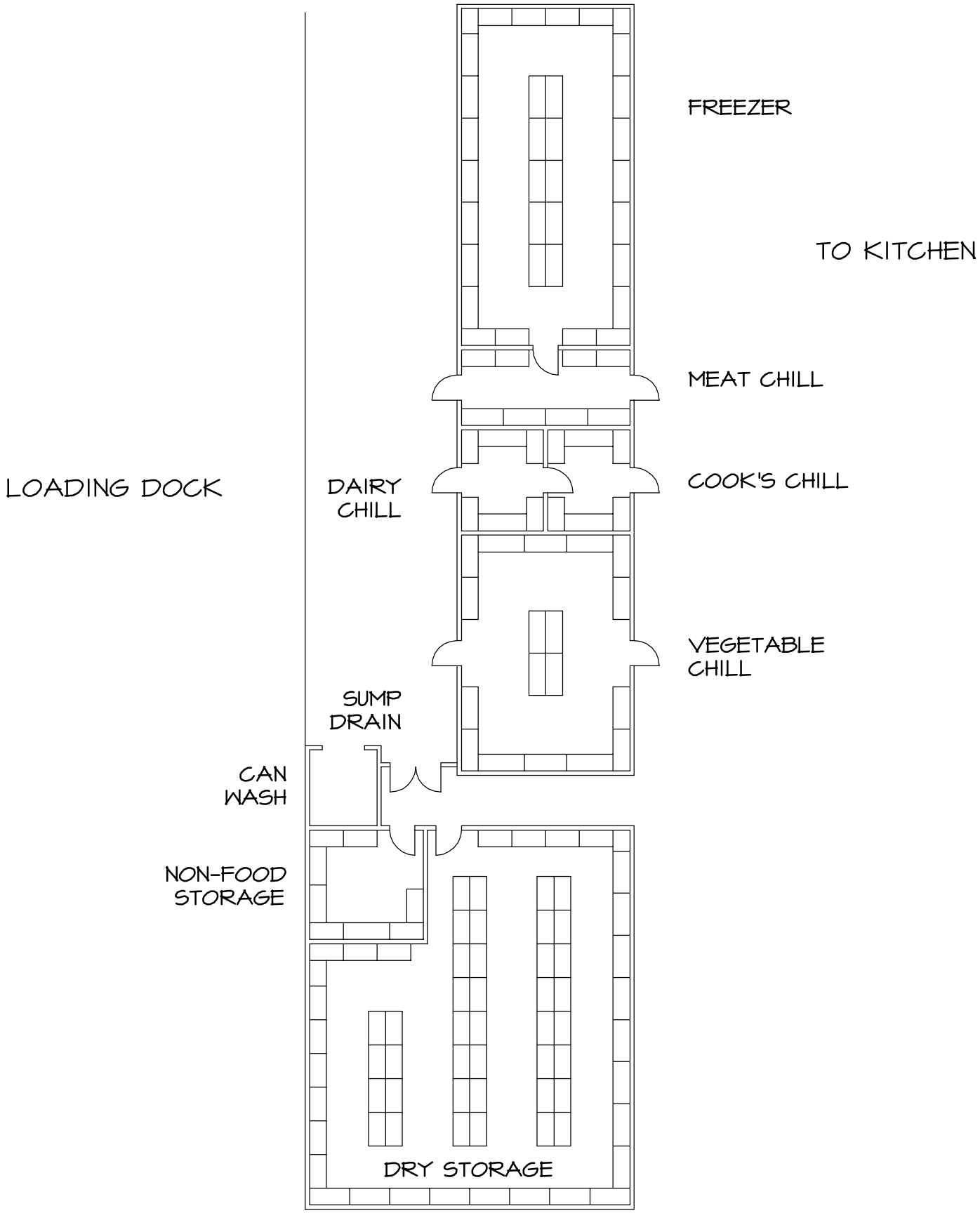
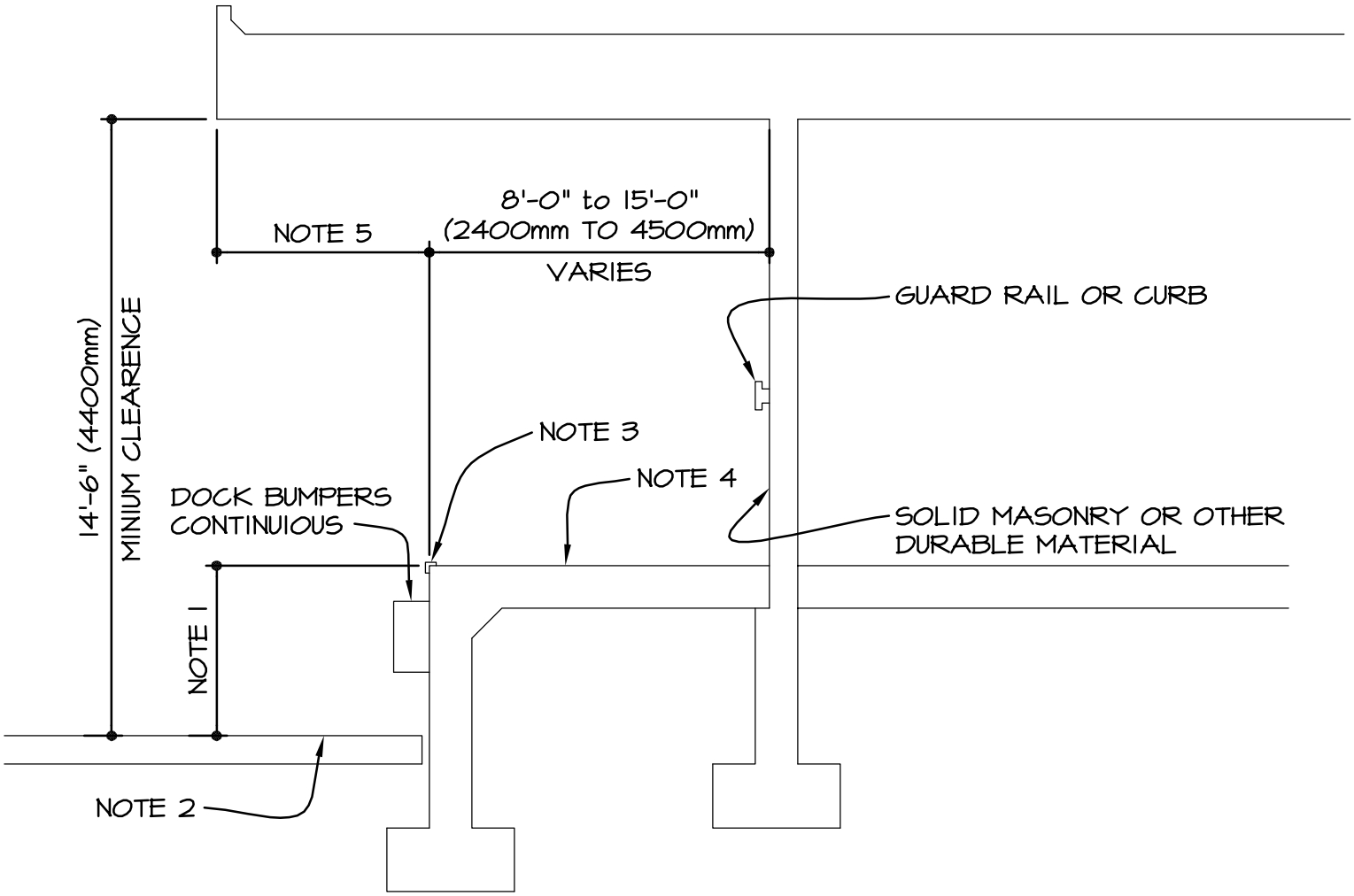


Figure 6-31 Loading Dock Criteria



1. Coordinate height of loading dock with size of vehicles servicing facility. Standard height for larger facilities is 4'-0" (1200mm).

2. Pitch apron paving away from dock minimum ½" in 12".

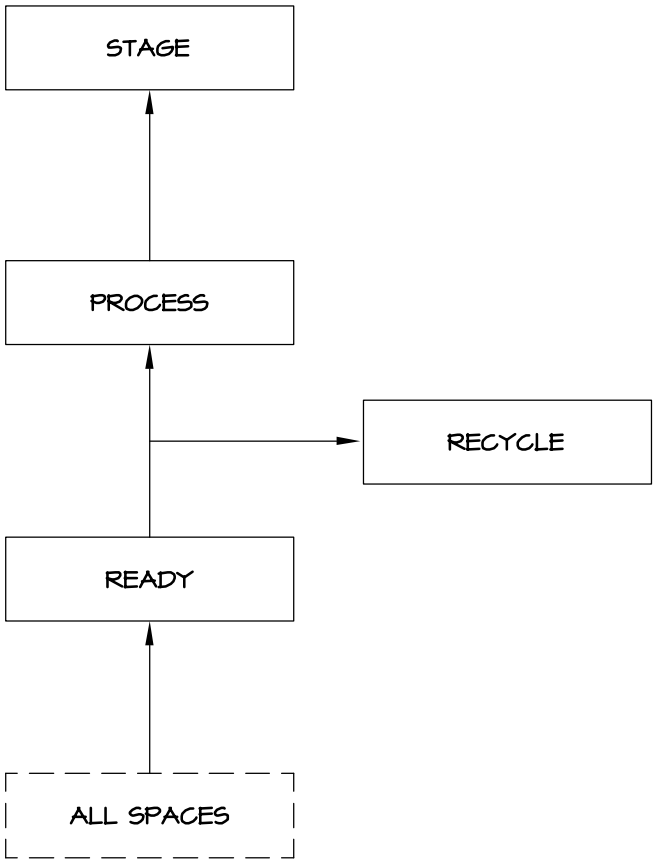
3. 2" (50MM) metal lip to protect concrete edge of dock and to prevent carts from rolling off edge.

4. Slope dock away from building 1/8" in 12". Dock is to be broom finish concrete.

5. Overhang as required for weather protection. In cold weather areas requiring enclosed loading docks use insulated rolling doors and dock seals omit overhang.

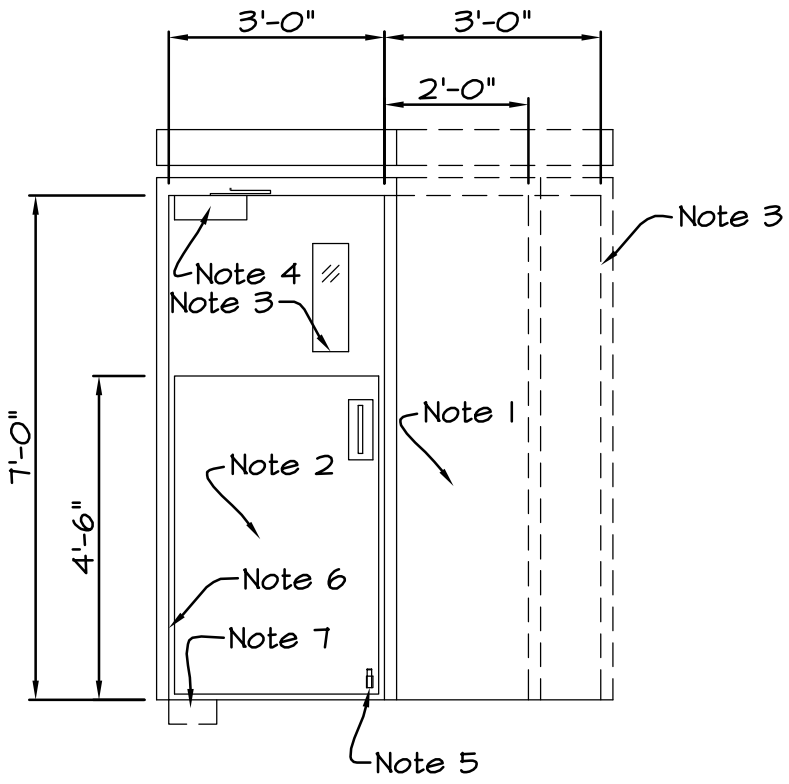
6. Provide concrete ramp from dock to vehicle area for hand cart access.

Figure 6-32 Support Areas Flow Concept Diagram



PROCESS	Remove trash, garbage
RECYCLE	Separate, store for pickup
READY	Wash, rise
STAGE	Temporary storage

Figure 6-33 Doors in Kitchen Area



1. All doors in the kitchen area shall be a minimum of 3'-0"x7'-0". Doors to storage and loading dock areas shall be 6'-0" wide double doors. If space limitations require the use of a 5'-0" door, the inactive leaf should be 2'-0".

2. Provide 16 Ga. stainless steel protection to all doors in areas having cart traffic.

3. Provide vision panel in all doors with two way traffic.

4. Provide heavy duty door closers with time delay closing feature at doors with heavy cart traffic.

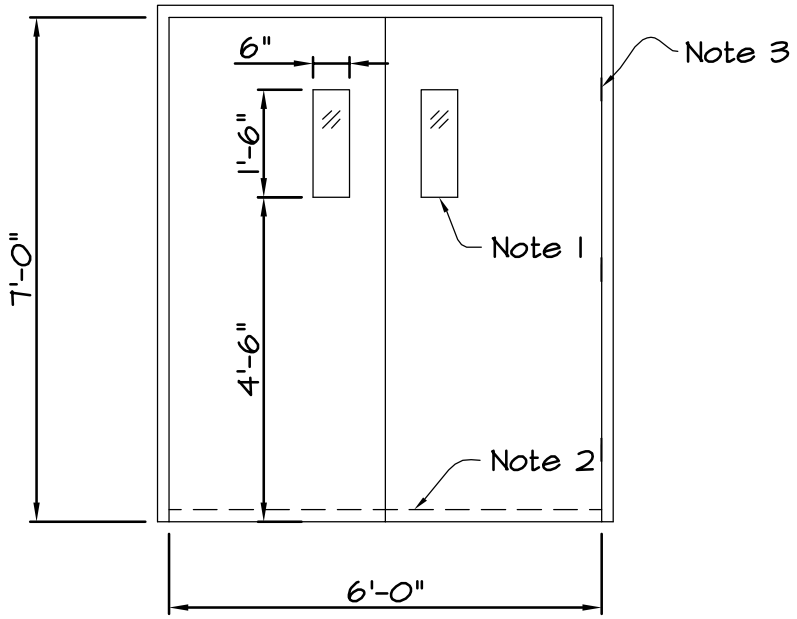
5. Provide hold open device, either concealed in door head or wall mounted. Floor mounted hold open devices are not approved.

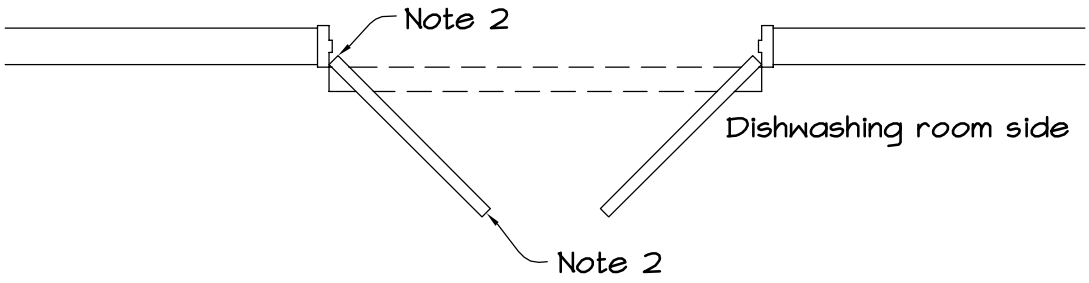
6. Provide heavy duty ball bearing hinges at all single swing doors.

7. Provide heavy duty recessed pivot hinges at all double swing doors.

8. Provide plastic closure flaps at all exterior doors in cold storage spaces.

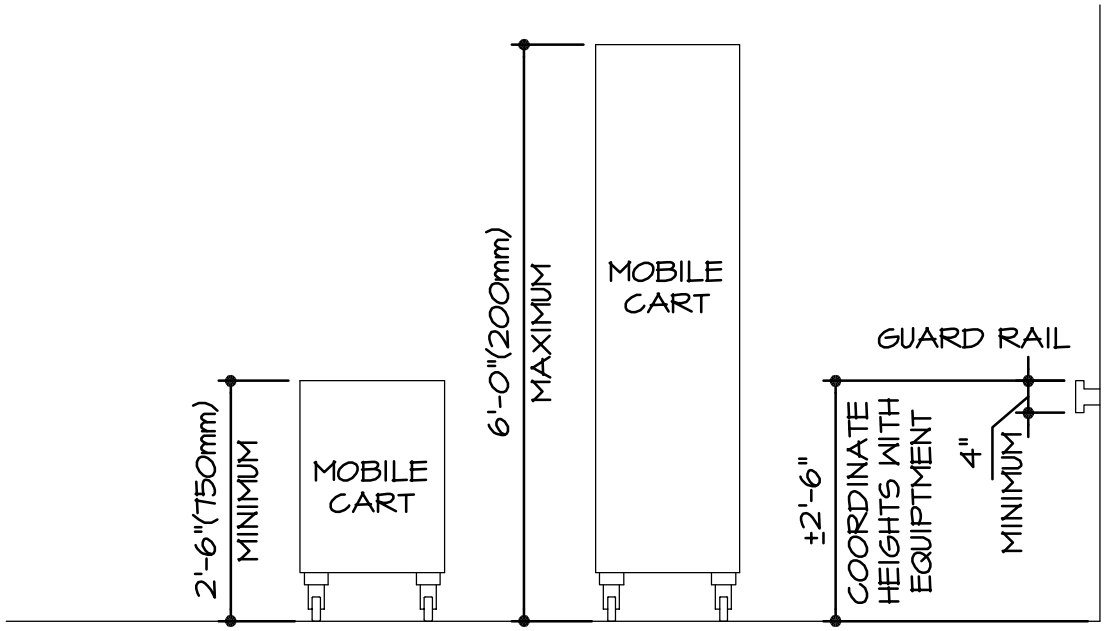
Figure 6-34 Double Doors at Dishwashing Station

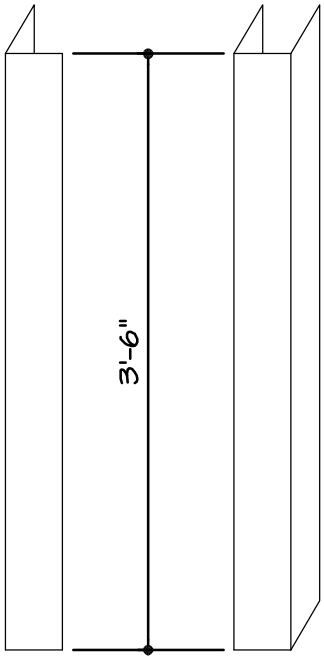




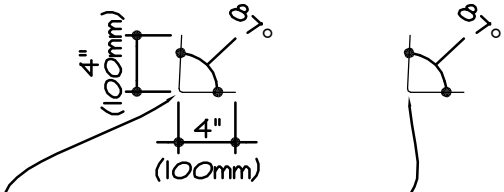
1. Provide vision panels as indicated.
2. Provide sound seal hardware at all door edges.
3. Heavy duty ball bearing type hinges.

Figure 6-35 Miscellaneous Guard Rail Locations and Corner Guards



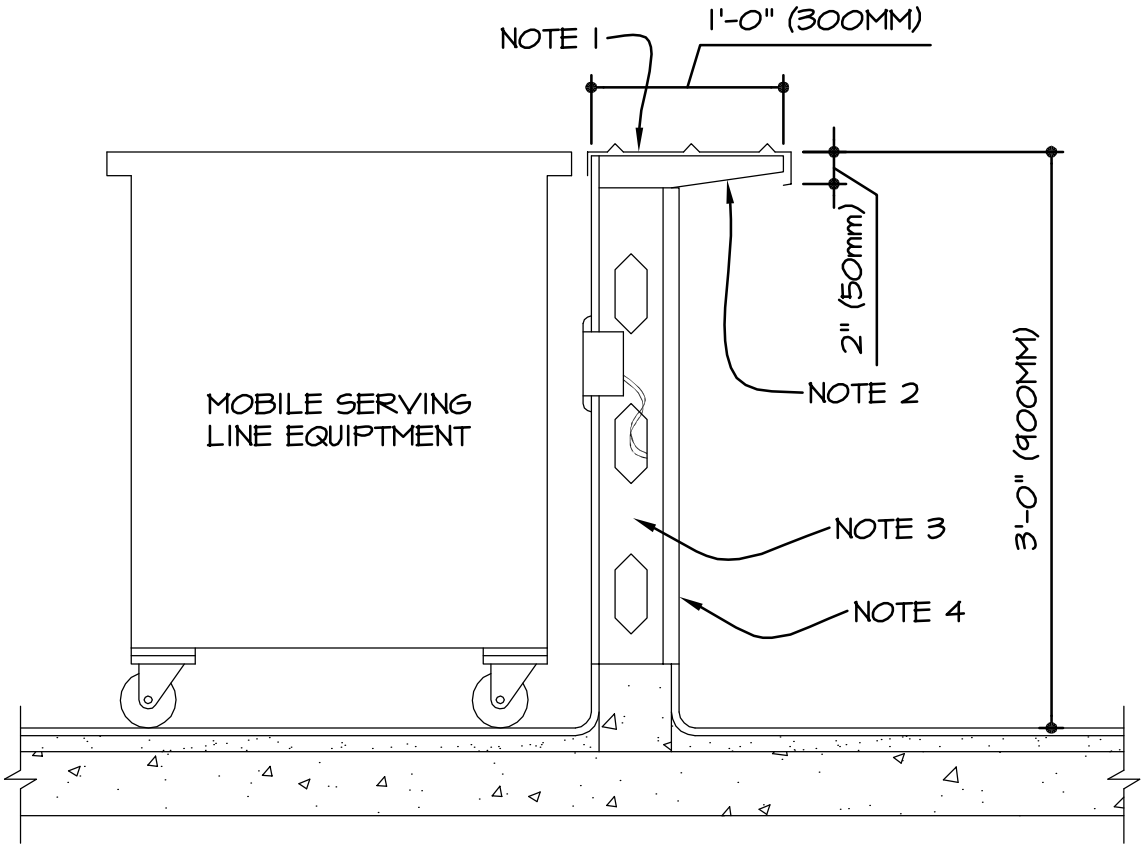


MOUNT 14 GA. (1.90mm) STAINLESS STEEL CORNER GUARDS FLUSH WITH BASE. ATTACH WITH STAINLESS STEEL FASTENERS AND CAULK WITH SILICONE SEALENT.



RADIUS OF BEND SHALL BE COORDINATED WITH CORNER TO BE PROTECTED TO ASSURE SNUG FIT.

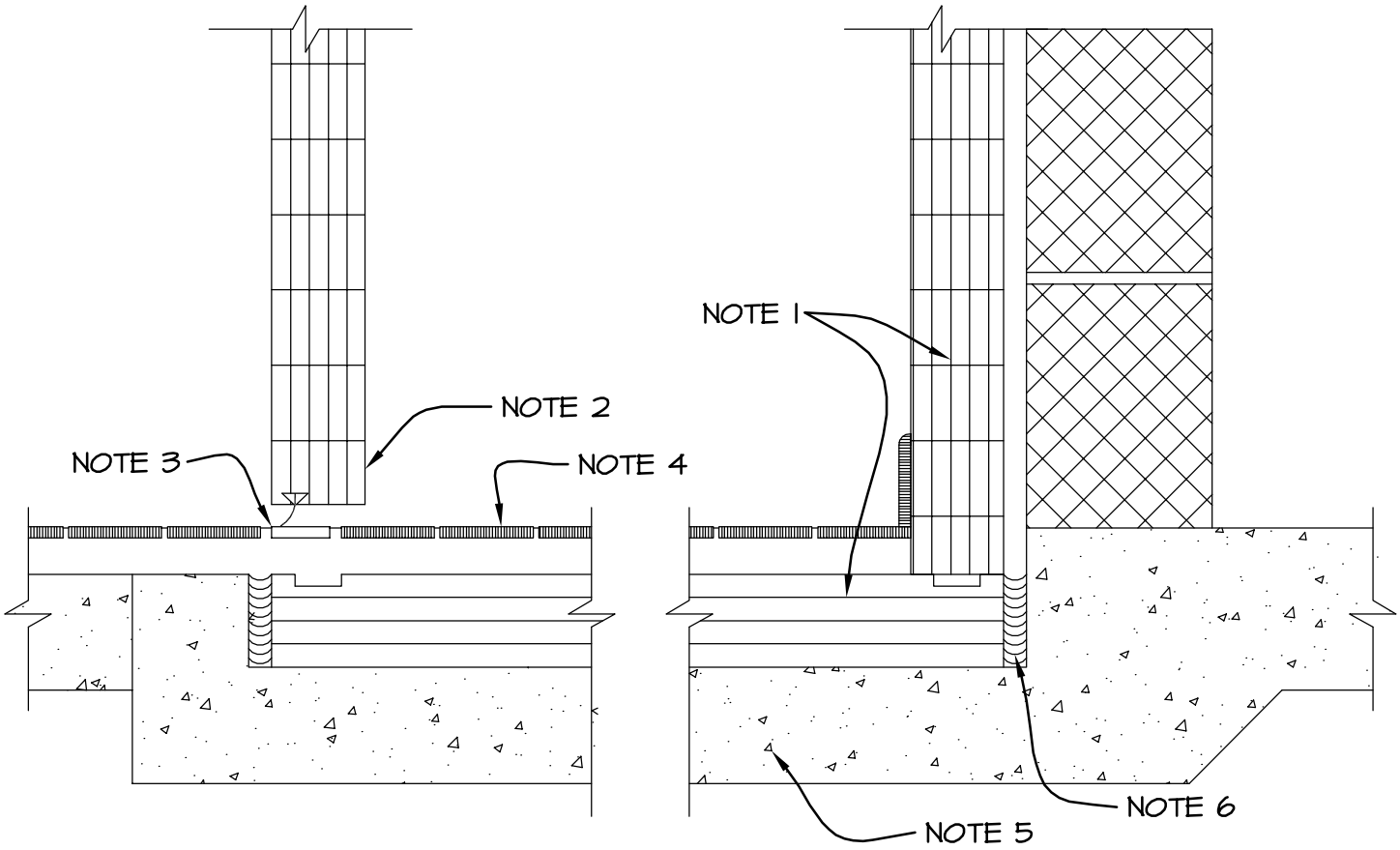
Figure 6-36 Serving Line Tray Slide



NOTE: For more information on trayslide details contact Navy Food Service System office for current standard drawing.

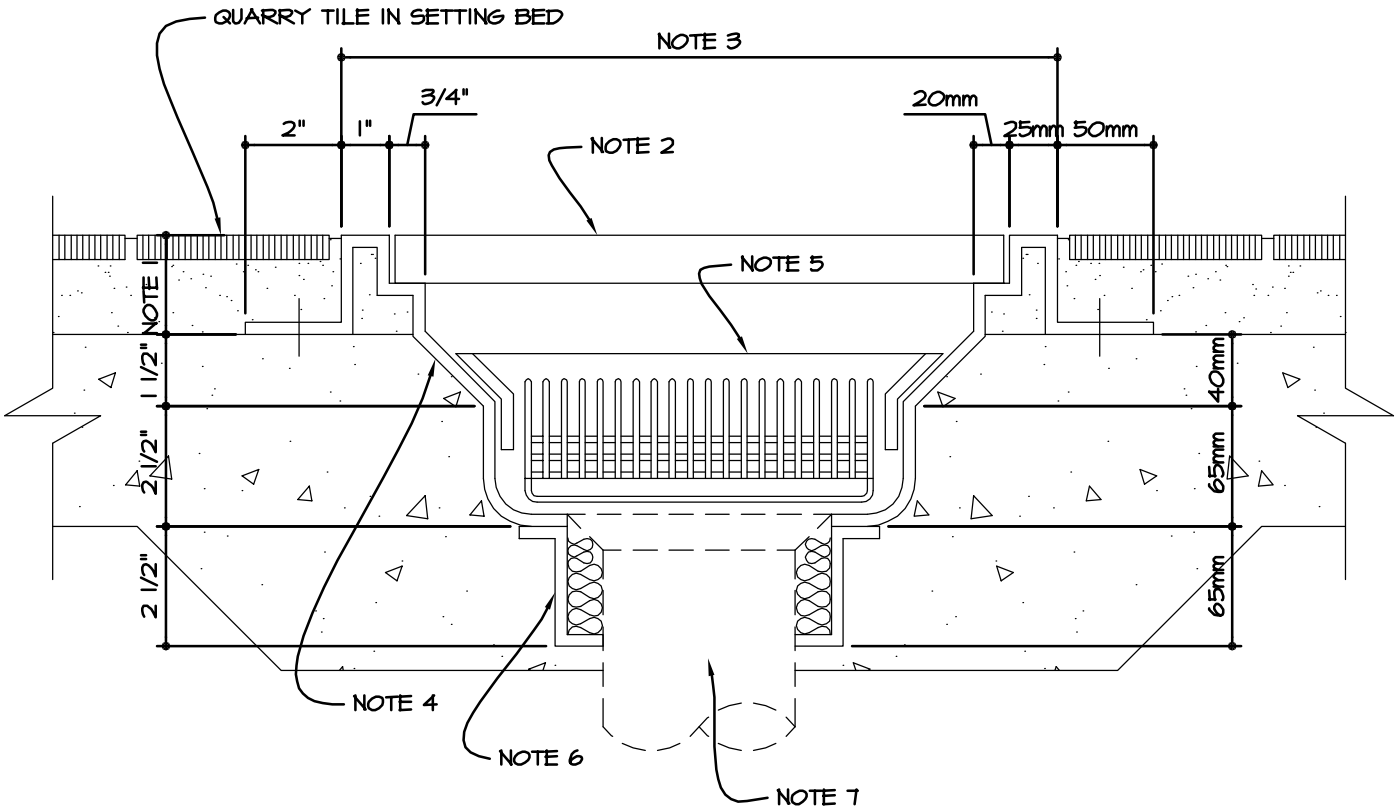
1. 14 Ga. (1.9mm) stainless steel trayslide secured to bracket with welded studs.
2. Stainless tell trayslide bracket welded to continuous stainless steel channel at 4'-0: (1200mm) on center.
3. 16 Ga. (1.50mm) structural steel stud frame at 16"(400mm) on center, anchor bolted to concrete curb. Frame shall turn corner at ends and run 2'-6: (750mm) to stabilize free standing ends. Openings in stud work shall be used as raceway for electrical wiring and other utilities as required.
4. Face panels may be plastic laminate, ceramic tile or other approved wall surfaces.
5. Manufactured trayslide systems proving similar features to the above may be submitted for approval.

Figure 6-37 Cold Storage Slab Insulation



1. Metal covered insulated wall and floor panels.
2. Metal covered insulated walk-in door with adjustable floor wiper gasket.
3. Anti-sweat heater.
4. Quarry tile-insetting bed. Set tile dead level.
5. Recessed concrete slab on polyethelene vapor barrier. Depth of recess hall be equal to thickness of insulated panel as specified and quarry tile and setting bed.
6. Provide sealant at edges of slab as indicated.
7. At freezer locations, if any portion of the slab is greater than 20'-0" (6000mm) from the perimeter, the slab must be heated to prevent freezing.

Figure 6-38 Sump Drain - Pan Type



1. Coordinate depth of frame with depth of quarry tile setting bed.

2. Grating to be ¼" x 1" (6x25mm) stainless steel bars fully welded at all connections. Allow 1/8" clearance on all sides.

3. Size of grating to be determined by designer.

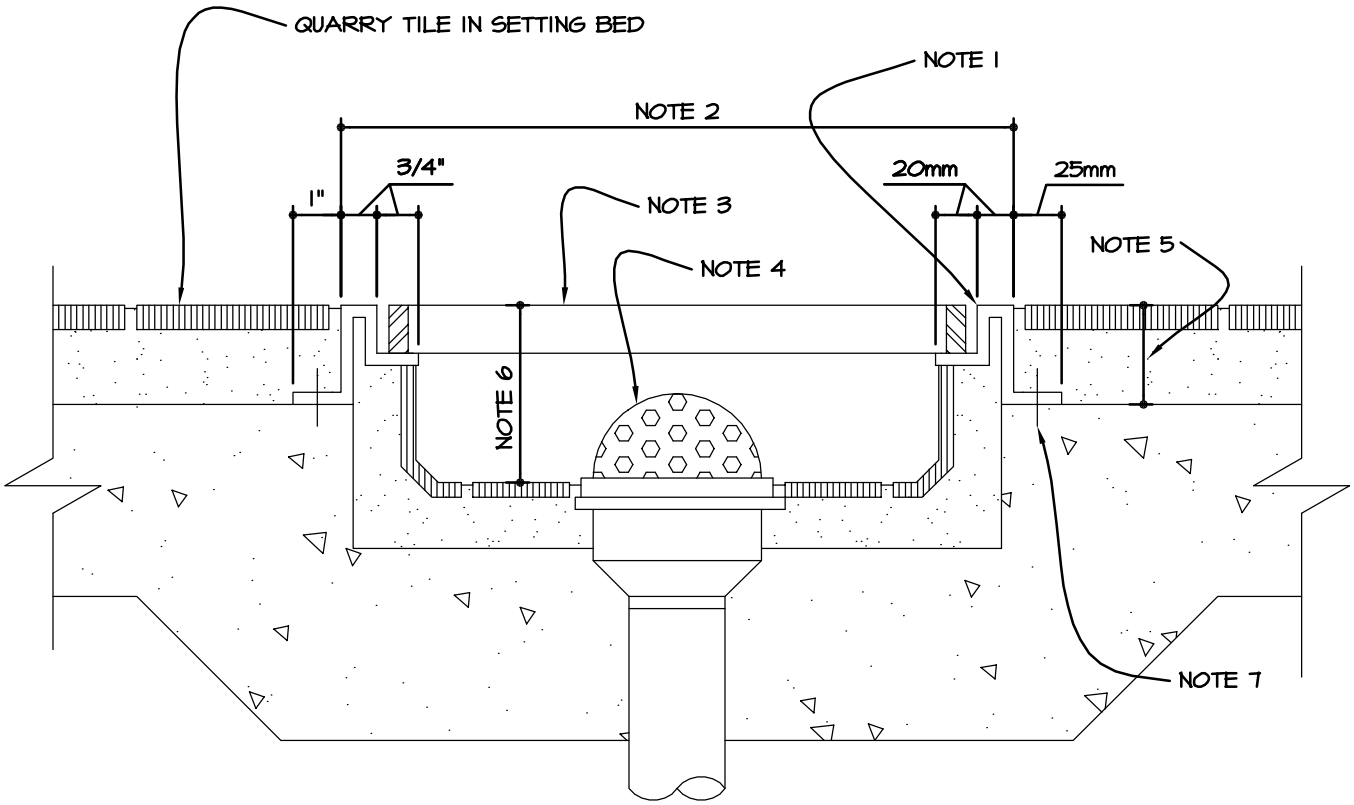
4. 14 Ga. (1.90mm) stainless steel pan with all coved corners and fully welded seamless construction.

5. Removable mesh basket of #4 (5.75mm) stainless steel wire mesh reinforced at top with 16 Ga.
   50mm) stainless steel perimeter frame.

6. 12 Ga. (2.65mm) stainless steel stuffing box.

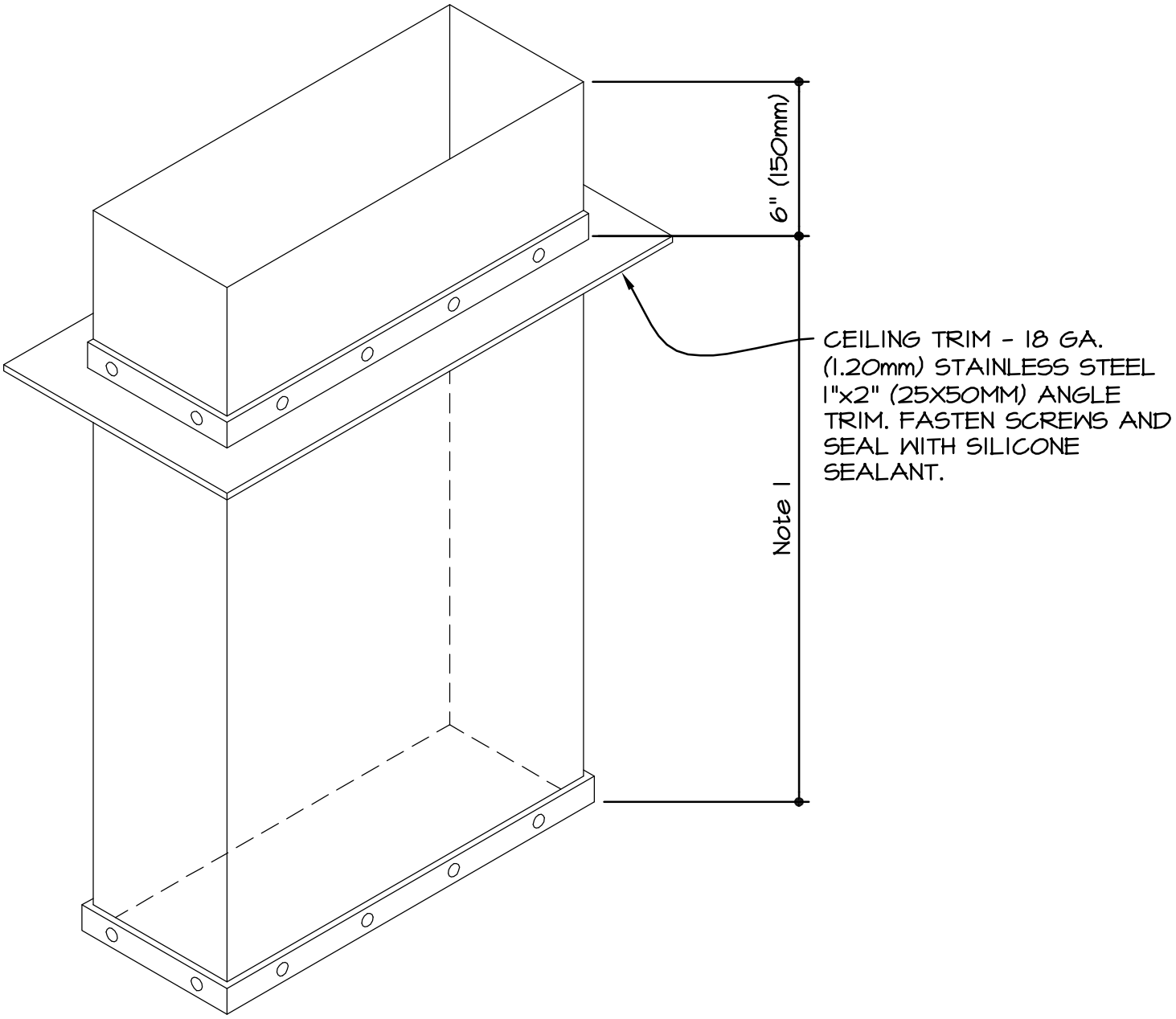
7. 4" (100mm) waste plumbing with bell hub inside of stuffing box.

Figure 6-39 Sump Drain - Tile Type



1. Gate frame is to be 12 Ga. (2.65mm) stainless steel.
2. Width and configuration of trench drain is to be determined by designer.
3. Floor grate is to be pressure locked stainless steel grating as required to fit trench configuration. Maximum size of individual grate to be the lesser of 3'-0" (900 mm) or 30 lbs. (14 kg).
4. Adjustable beehive strainer.
5. Coordinate height of frame with specified depth of setting bed.
6. Finished depth of trench to be 4" (100mm).
7. Fasten to slab with ram set concrete anchors.
8. Pitch trench at 1/8" per foot to drain.

Figure 6-40 Disher Duct Vent



1. Ducts over 60" (150mm) shall be cross creased for rigidity.
2. When dishwasher vents are not equipped with dampers, duct shall be provided with an 18 GA. (1.20 mm) stainless steel damper and locking quadrant located between the louvers and the dishwasher vent.

Figure 6-41 Notional Plan of SCATTER SYSTEM serving line

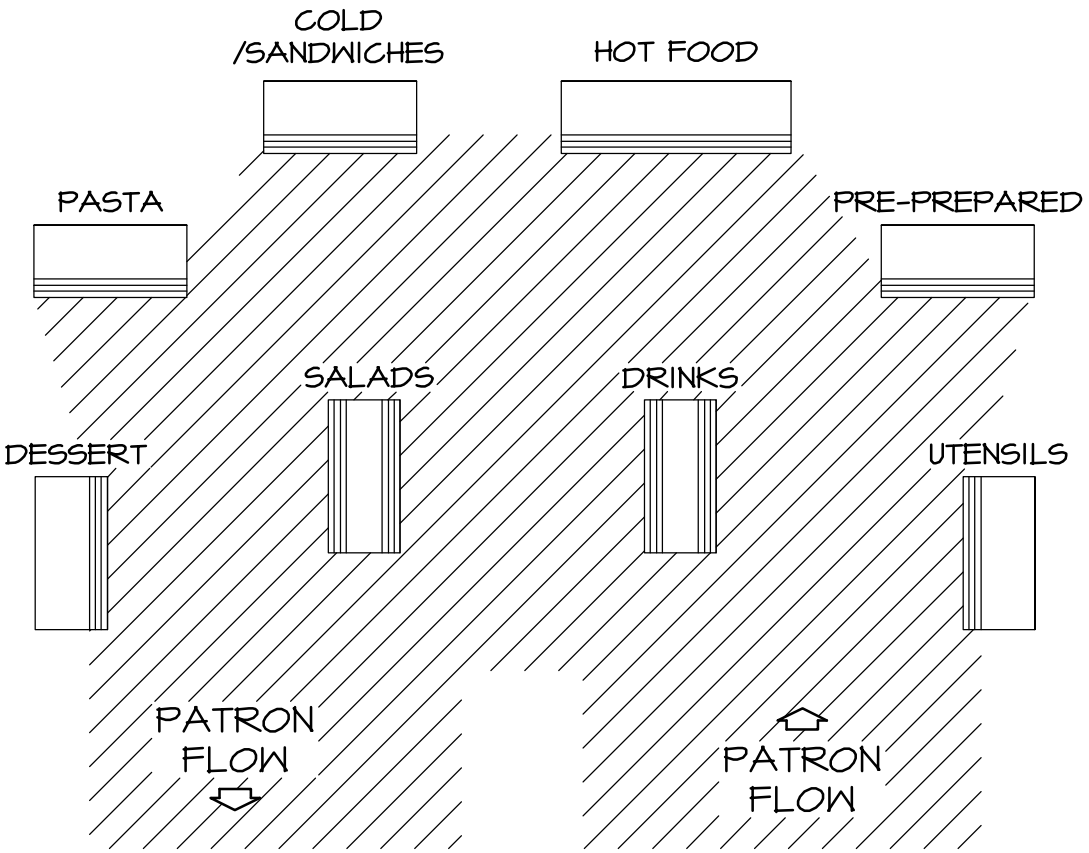


Figure 6-42 Notional Plan of Horseshoe shaped serving line

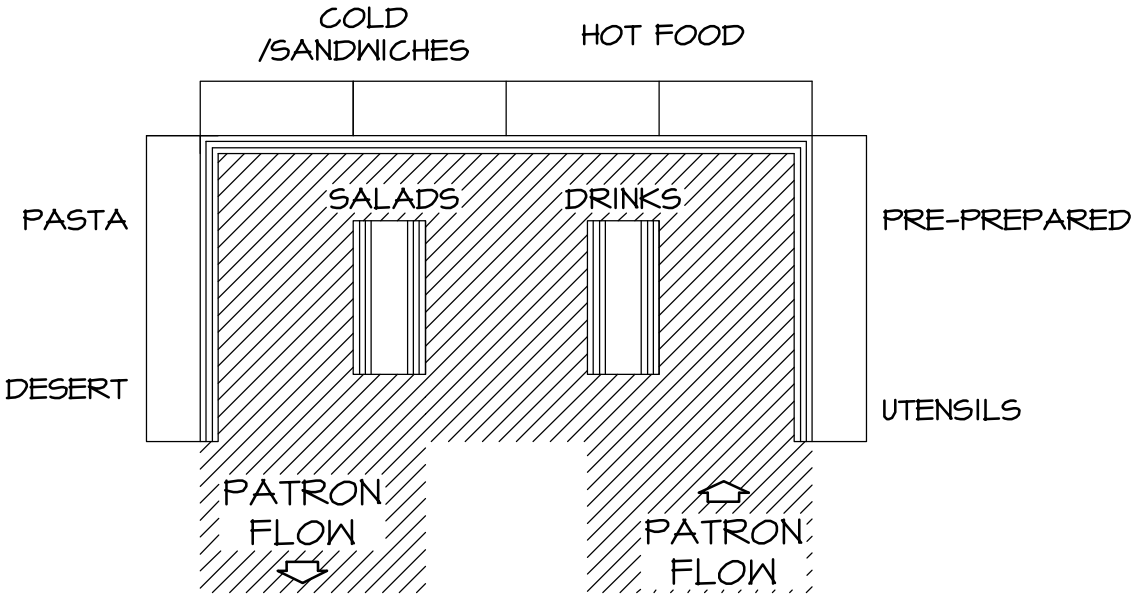


Figure 6-43 Notional Plan of TEE shaped serving line

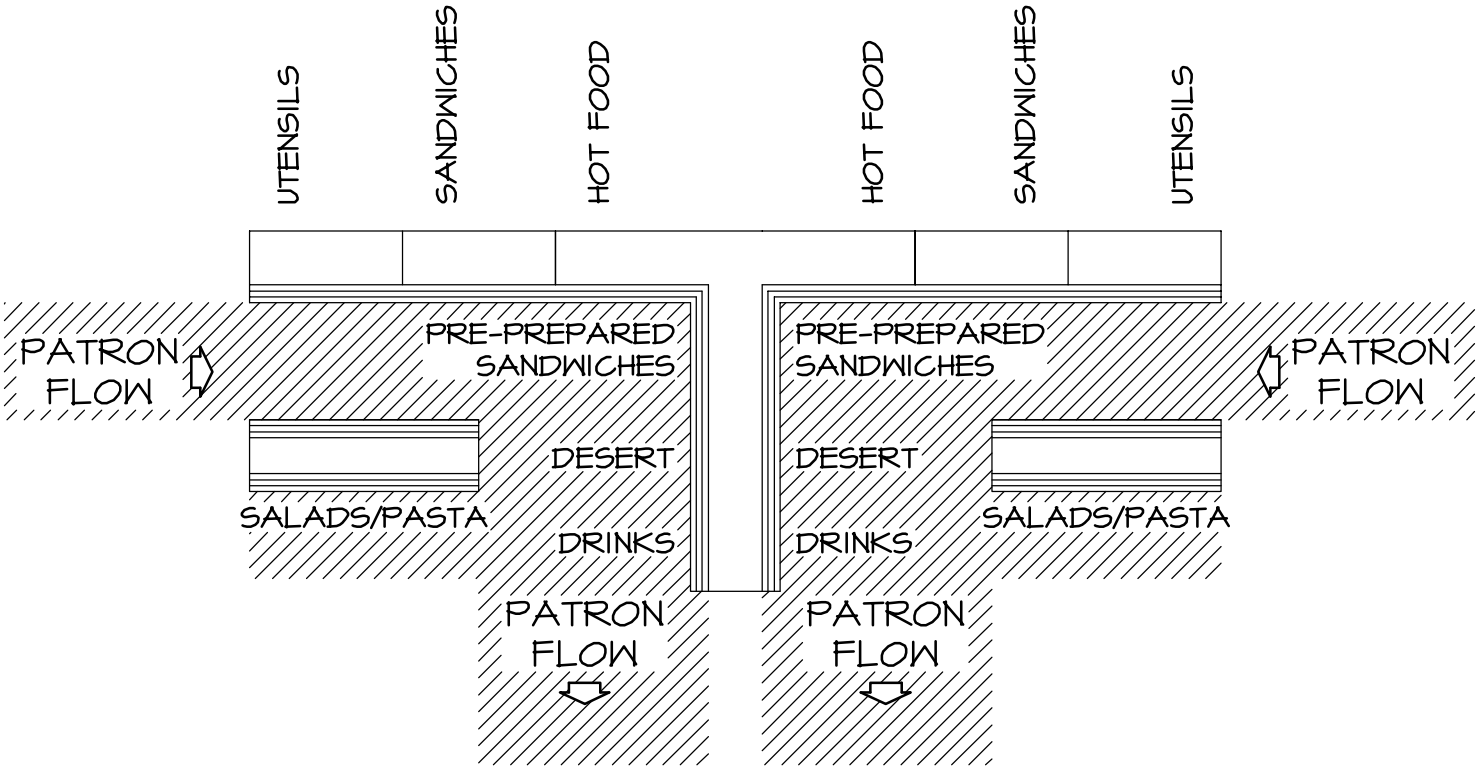
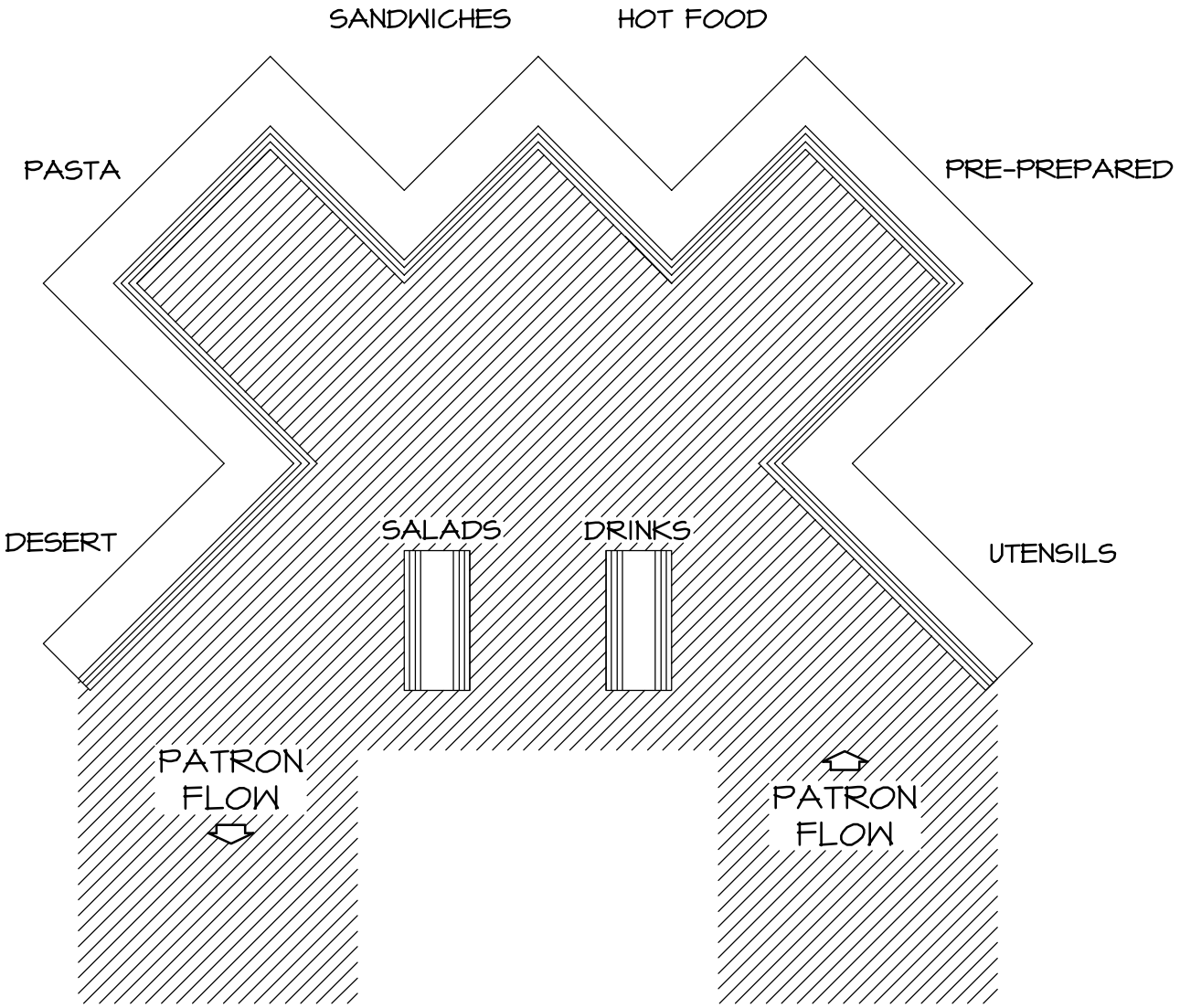


Figure 6-44 Notional Plan of SAWTOOTH shaped serving line



APPENDIX A

REFERENCES

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http://65.204.17.188//report/doc_ufc.html

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UFC 3-400-02, Design: Engineering Weather Data

UFC 3-520-01, Interior Electrical Systems

UFC 3-600-01, Fire Protection for Facilities Engineering, Design and Construction

UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings

UFGS 11400A, Food Service Equipment

UFGS 11400N, Food Service Equipment

UFGS 15910N, Direct digital Control Systems

UFGS 15951A, Direct Digital Control for HVAC

2. Naval Facilities Engineering Command (NAVFAC)
Engineering Innovation and Criteria Office (EICO)
1510 Gilbert Street
Norfolk, VA 23511-2669
Phone: (757) 322-4200
Fax; (757) 322-4416
http://citeria.navfac.navy.mil

Cost Engineering Web Site (www.uscost.net/costengineering)

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MIL-HDBK-1004/6, Lightning Protection

MIL-HDBK-1004/10, Electrical Engineering Cathodic Protection

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P-80, Planning Criteria for Navy and Marine Corps Shore Installations

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P-905, Planting and Establishment of Trees, Shrubs, Ground Cover and Vines

Interim Technical Guidance, ITG

	FY98-1, International Mechanical Code, May 1998.
Regional requirements may be found at:	
Atlantic Division, NAVFACENGCOM	www.lantdiv.navfac.navy.mil
Pacific Division, NAVFACENGCOM	http://www.efdpac.navfac.navy.mil/
Southern Division, NAVFACENGCOM	http://www.efdsouth.navfac.navy.mil/
Southwest Division, NAVFACENGCOM	http://www.efdsw.navfac.navy.mil/
3. U.S. Army Corps of Engineers (USACE) P.O. Box 1600 Huntsville, AL 35807-4301 4820 University Square Huntsville, AL 35816-1822 http://www.hnd.usace.army.mil/techinfo/	AR 30-22, Army Food Service ETL 1110-3-491, Sustainable Design for Military Facilities, 1 May 2001 TB MED 530, Food Sanitation TI-800-01, Design Criteria TI-809-04, Seismic Design for Buildings TI-809-05, Seismic Design and Rehabilitation for Buildings TM-5-803-15, Landscape Design and Planting Criteria TM-5-810-5, Plumbing TM 5-853-1,2 and 3/AFMAN 32-1071, Security Engineering Manuals
4. Air Force 202-404-2758 http://www.e-publishing.af.mil/	Air Force Interior Design Guide Air Force Sustainable Facilities Guide AFH 32-1089, Economic Analysis Guidance Manual AFI 32-1063, Electric Power

	Systems
	AFI 32-1066, Plumbing System
	AFI 32-1068, Heating Systems and Unfired Pressure Vessels
	AFM 32-1083, Electrical Interior Facilities
	AFMAN 32-1071/TM 5-853-1,2 and 3, Security Engineering Manual
	AFH 32-1084, Facility Requirements
	AFOSHSTD 91-300, Food Services Operations
	AFMAN 32-1008, Installation Design
	AFPAM 31-1010, Land Use Planning
	Overseas Environmental Baseline Guidance Document (OEBGD)
	USAF Landscape Design Guide
5. Commandant of the Marine Corps Headquarters, U.S. Marine Corps (ARSE) 2 Navy Annex, Washington, D.C. 20380-177 http://www.usmc.mil/directiv.nsf/web+orders	MCO 5530.14, Marine Corps Physical Security Program
6. Department of the Navy DODSSP BUILDING 4 / SECTION D 700 ROBBINS AVENUE PHILADELPHIA PA 19111-5094 http://neds.nebt.daps.mil/usndirs.htm	OPNAVINST 5530.14C, Navy Physical Security
	OPNAVINST 5090.1B, Navy Environmental and Natural Resources Program Manual
	Executive Order 13123, Greening the Government Through Efficient Energy Management

7. Navy Bureau of Medicine and Surgery (NAVBUMED) 2300 E. Street, N.W. Washington DC 20372-5300 http://navymedicine.med.navy.mil/default.cfm	P-5010, Manual of Navy Preventive Medicine
8. Architectural and Transportation Barriers Compliance Board (Access Board) Office of Technical and Information Services 1331 F Street, NW, Suite 1000 Washington, DC 20004-1111 Phone: (800) 872-2253 Fax: (202) 272-0081 http://www.access-board.gov/indexes/accessindex.htm	Uniform Federal Accessibility Standards (UFAS) American's with Disabilities Act Accessibility Guidelines (ADAAG)

NON-GOVERNMENT PUBLICATIONS

1. American Society of Heating Refrigeration and Air-Conditioning Engineers , INC (ASHRAE) 1791 Tullie Circle, N.E., Atlanta, GA 30329 Phone: (404)636-8400 Fax: (404)321-5478 http://www.ashrae.org/	Standard 90.1-2001, Energy Standard for Buildings Except Low-Rise Residential Buildings Standard 62-2001, Ventilation of Acceptable Indoor Air Quality
2. National Fire Protection Association (NFPA) 1 Batterymarch Park Quincy, MA 02269-9101 Phone: (617) 770-3000 Fax: (617) 770-0700 http://www.nfpa.org/Home/index.asp	NFPA 54, National Fuel Gas Code NFPA 58, Liquefied Petroleum Gas Code NFPA 70, National Electrical Code NFPA 96, Standard for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment NFPA 101, Life Safety Code

3. International Code Council (IC C)	International Plumbing Code
4. American Conference of Industrial Hygienists 1330 Kemper Meadow Drive Cincinnati, Ohio 45240, Phone (513) 742-2020 http://www.acgih.org/	Industrial Ventilation – A Manual of Recommended Practice