

Introduction

This manual is for architects, building contractors, food service equipment dealers, food service operators, consultants and other interested professionals. The purpose of this manual is to help in the development of plans to meet the standards of the City of Rolling Meadows Health Department. Our goal is to provide you with helpful information that will enable you to design the best food service facility possible.

The City of Rolling Meadows Community Development Department have building, zoning, mechanical, electrical, plumbing and fire protection requirements. You should contact this organization before construction, for information on their regulations.

The purpose of our plan review is twofold. First, the plan review will help to eliminate complications in your facility's design, subsequent construction schedules and final approval before opening for business. Second, City of Rolling Meadows Ordinance Article IV. Sec. 50-176 requires a plan review for the construction or remodel of, or conversion of a building to, a food establishment. Our objective is for you to create a food service facility that is easy to maintain, has efficient food flow patterns, and is set up to handle the maximum number of customers.

The layout and design of the plans are to be based on HACCP (Hazard Analysis Critical Control Point) quality assurance concepts. A menu analysis, based on risk assessment, is part of the plan review process. Introduction Submit your menu with your plans for approval. The type and variety of foods served will influence the type of equipment required. Consider the steps you will use to produce the foods on your menu. This will aid in providing equipment best suited for your operation.

Some important points to remember:

- Anticipate your equipment needs to meet food storage, preparation, holding and serving demands.
- Install the equipment to be easily accessible for cleaning.
- Develop an efficient food flow, from the point of delivery to final service.

Should you have any questions during the planning or construction process, please contact the Health Department at (847) 394-8500.

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I. Plans, Inspections and Fees

A. Plan Review

Your plans must receive approval from this Department before you begin constructing, enlarging, altering or converting any building for use as a restaurant, tavern or food service facility. Provide a completed *Plan Review* form, including the *Exhaust Plan Review* form, and one set of detailed plans drawn to scale.

Include with your plans:

1. Food service equipment specifications with manufacturers' names and model numbers. You should also include equipment specification sheets.
2. Floor plans and food service equipment layouts. We may ask for equipment elevations if they are not shown on specification sheets.
3. Plumbing plans and layouts.
4. Room and area finish schedules for floors, coved surfaces, walls, doors and ceilings.
5. Mechanical kitchen ventilation exhaust plans.
6. A copy of your menu.

Plans that are incomplete will not receive approval.

If you want any changes after this Department has approved the plans, you must submit those changes and receive approval before construction.

Only finishes, fixtures, materials, equipment or installations that are *equal to or better than* the requirements outlined may be substituted after the review and approval process.

B. Inspections

During construction, the City of Rolling Meadows Health Department will make inspections of your facility's construction and the installation of your equipment.

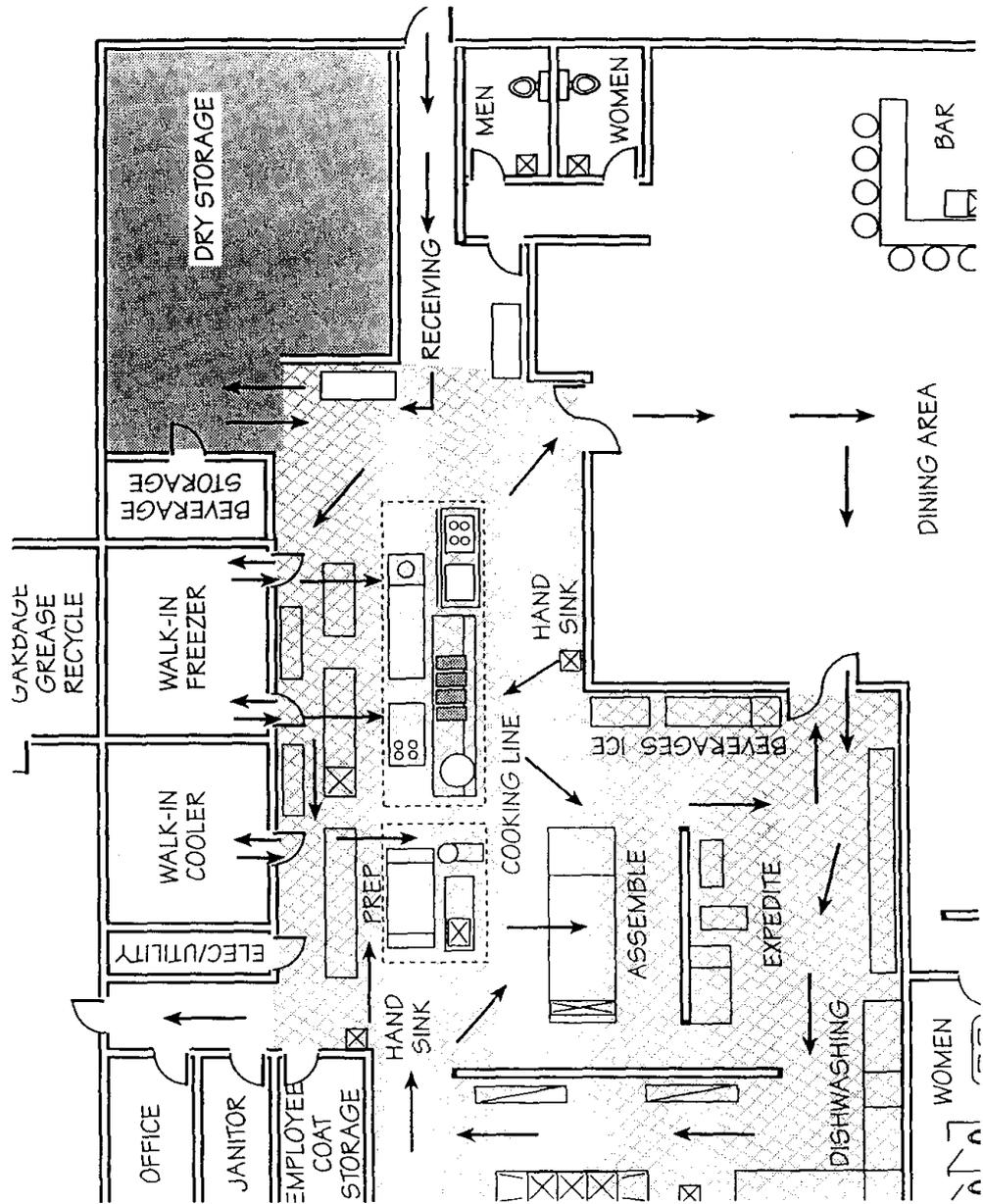
Plumbing rough-in, pre-final and final inspections are required. You may arrange these inspections, and additional inspections or field consultations, by calling the Health Department. We will issue a permit to the business owner after you have completed these steps and demonstrated compliance with applicable state and local codes.

Plan Review Process Checklist

Did you remember to:

- Submit complete plans?
- Review the Food Service Design and Construction Manual, and complete the Plan Review form?
- Do you have a State Certified Food Service Manager? You may request information on courses being offered near you. Remember, you only have three months from the date you open to become certified.
- Contacted the City of Rolling Meadows Building and Department.
- If you have any questions please call the City of Rolling Meadows Health Department at 394-8500 ext. 3018

Figure 1: Partial Kitchen Layout



II. Equipment

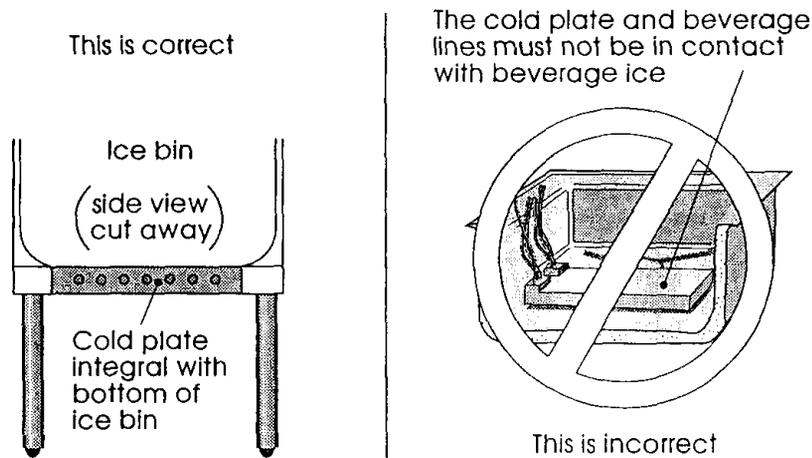
A. Materials and Design

All food service equipment is to be commercial and meet the standards regarding design, materials and workmanship of the National Sanitation Foundation International (NSF). An NSF or other recognized testing agency seal is usually a good indicator the equipment is approved. Unmarked equipment may not meet the standards. Include make and model numbers on your plans so that equipment approval can be verified.

B. Specialty Equipment

1. **Cold Plates:** When installed in ice bins, the cold plates must be an integral part of the bin. Drop-in cold plates are not allowed. Refer to Figure 2.

Figure 2: Cold Plates

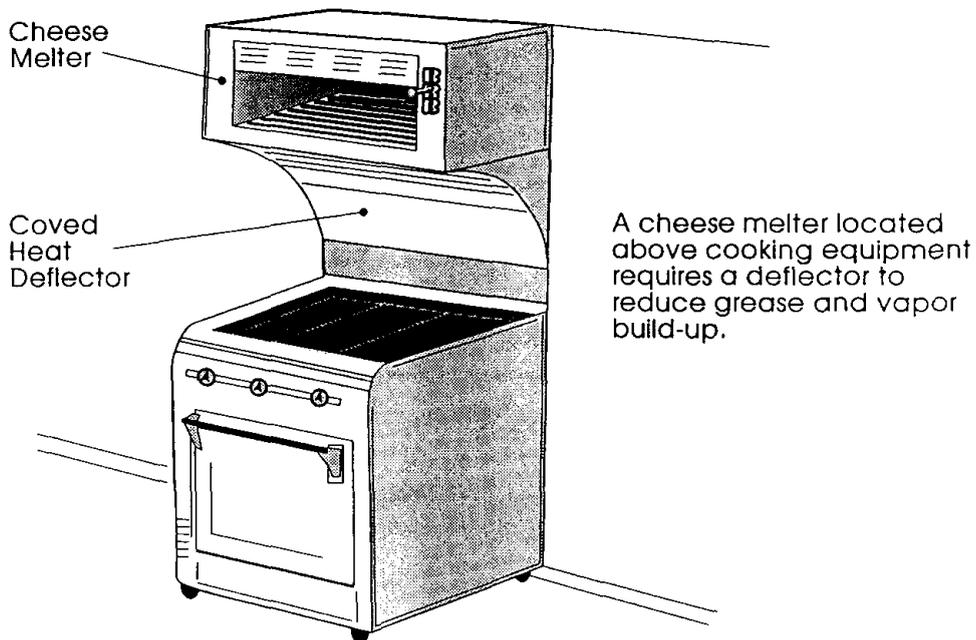


Equipment

2. **Dipper Wells:** Provide dipper wells with running water where you dispense bulk ice cream. Also consider using dipper wells with dispensing utensils for other bulk foods such as cooked rice, whipped butter, etc.
3. **Food Preparation Sink:** Install separate sinks designed for vegetable washing or food preparation only in the food preparation area. Options to be considered are multiple compartments, overhead spray faucets and drainboards. Refer to Figure 11.
4. **Single Service Dispensing Equipment:** Install equipment for properly handling single service items like paper cups, lids and straws.

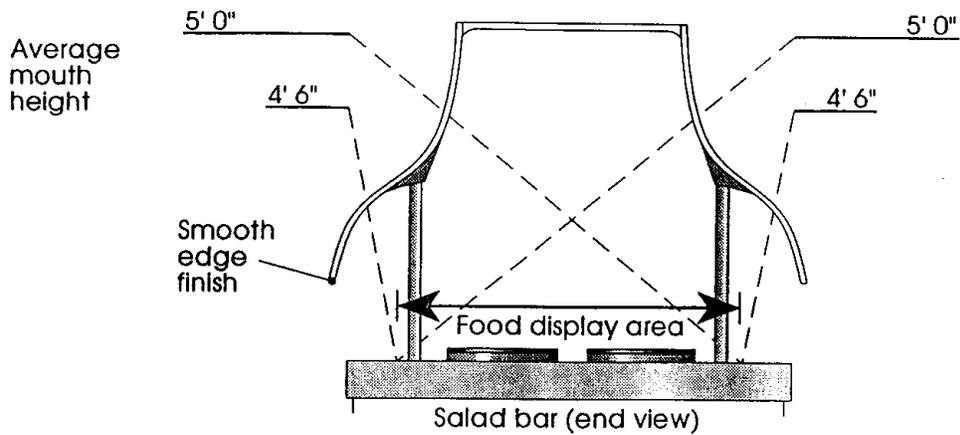
5. **Food Contact Surfaces:** Install work surfaces made of stainless steel. NSF approved cutting surfaces are acceptable where food is prepared and assembled. They must be durable under conditions of normal use and cleaning.
6. **Cheese Melters:** When installed, these must be under an exhaust ventilation system, and over non-cooking equipment or low heat producing equipment. If you install the cheese melter over cooking equipment, you must install an angled or coved deflector that completely encloses the bottom and sides of the cheese melter. The deflector must direct vapor and hot gases toward the front of the cheese melter. The deflector must be constructed of stainless steel. Refer to Figure 3.

Figure 3: Cheese Melter Installation



7. **Buffets**
 - a. **Open Food Display:** Protect food on display from consumer contamination by using easily cleanable sneeze shields, display cases and similar equipment. Design and install these devices to intercept a direct line between a customer's mouth and foods on display. Submit a scaled drawing of this equipment to this Department for approval. Refer to Figure 4.

Figure 4: Food Display Protection



- b. **Temperature Control:** Provide equipment to maintain all readily perishable foods at required temperatures. Provide thermometers in all hot and cold food holding units.
- 8. **Drive-Thru and Walk-Up Windows**
 - a. **Drawers:** Exterior food pass-thru drawers with removable pans having seamless coved corners are required.
 - b. **Windows:** Exterior food pass-thru windows:
 - 1) The counter surface of the pass-thru window should be smooth and easily cleanable.
 - 2) Window slide channels must be open-ended to provide for easy cleanability.

Equipment

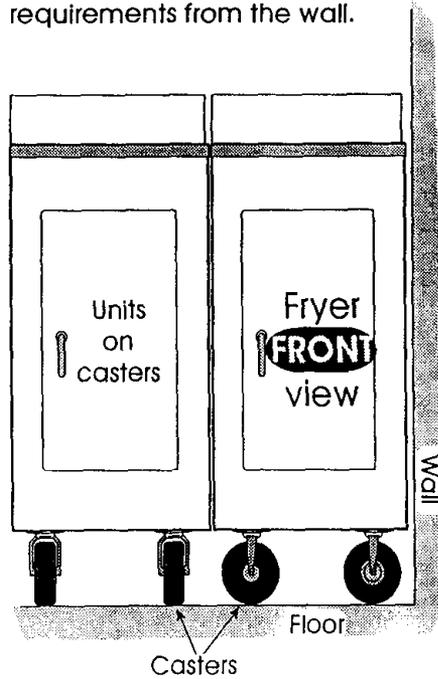
C. Equipment Installation Directions

- 1. **Table-Mounted Equipment:** Install table-mounted equipment on 4 inch legs, or seal the equipment to the table using silicone caulk, unless it is portable. Portable equipment weighs less than 75 pounds and has no rigid utility connections. Keep pieces of table-mounted equipment at least 6 inches apart to ensure access for cleaning.

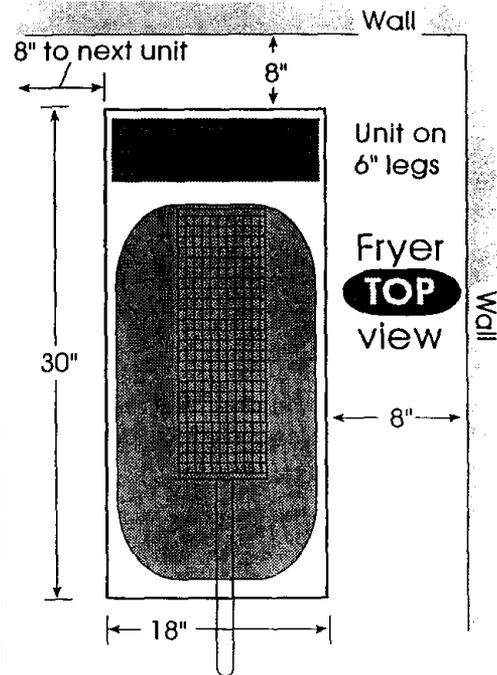
Figure 5: Comparing Caster & Leg Installation Methods

Fryers on casters take up less floor space and are easier to clean.

Equipment that you can roll on casters has no lateral spacing requirements from the wall.



Fryers on legs must meet minimum spacing requirements, according to their size.



2. Floor-Mounted Equipment: Install floor-mounted equipment using method a, b or c:

- a. Casters: The preferred method of installation is to put equipment on casters. Use coated steel, commercial-grade utility connections that are smooth and flexible with quick disconnects. They must meet NSF standards. Connections must be long enough to move the equipment so the area around and behind can be cleaned. When you cannot meet other equipment spacing criteria, you must mount the equipment on casters. Refer to Figure 5.

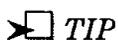
TIP

For long equipment banks, consider integrating moveable equipment on casters with stationary equipment on legs for cleaning and servicing access.

- b. Spacing: Install equipment, other than portable equipment, with sufficient space between adjacent equipment, floors, walls, cabinets and ceilings to facilitate proper cleaning. Floor-mounted equipment that you plan to install on legs must have a minimum

floor clearance of 6 inches. Measure this clearance from the lowest obstruction under the piece of equipment (i.e., drain lines, water lines, electric lines, etc.). The equipment's dimensions determine the space needed for cleaning access.

- 1) Maintain 8 inches of spacing when the area to be cleaned is less than 4 feet long.
 - 2) Maintain 18 inches of spacing when the area to be cleaned is 4 feet long or more.
- c. Sealing: Use 100 percent silicone caulk or cleanable trim to seal spaces. This includes spaces between non-portable equipment, accesses to cabinet voids, around pipes, around wall-mounted equipment, etc. The silicone bead must be smoothed and covered ($3/8$ inch radius). Avoid excessive application in large gaps. Refer to Figure 6.
- d. Seal cabinet, flooring and wall interfaces that are larger than $1/32$ inch and smaller than 6 inches. Seal all gaps, voids and protrusions using silicone caulk or trim that meets the finish material standard.

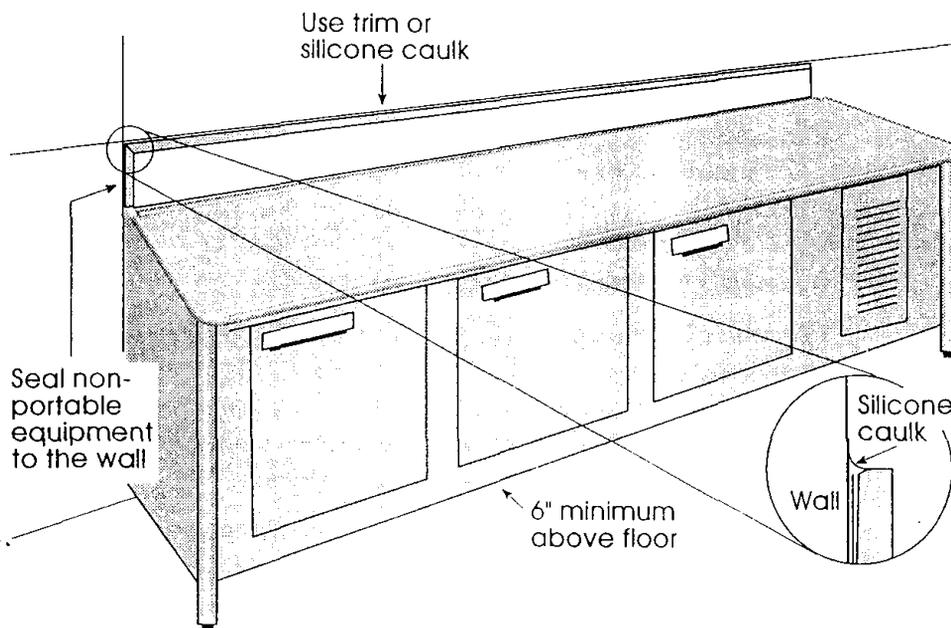


TIP

If you can slide a business card between the areas to be sealed, you can be sure that it needs to be sealed.

Equipment

Figure 6: Sealing in Place



- e. While allowed by code, raised floor platforms are not a recommended method of food service equipment installation.
3. Conduits: Keep all exposed utility lines (plumbing, gas, electrical, refrigeration, etc.) to a minimum. Keep exposed lines at least 6 inches off the floor, and at least 1/2 inch away from walls and ceilings.
4. Walk-In Coolers: Choose whether the space between the top of a walk-in refrigerator or freezer and the ceiling will be closed or open.
 - a. If closed, enclose the space with a panel (either fixed or removable).
 - b. If open, provide an unobstructed open space of at least 30 inches between the top of the unit and the ceiling.

III. Refrigeration

General Storage

Refrigeration and freezers are required to maintain potentially hazardous foods below 41°F and 0°F respectively. These units must meet NSF design and material standards. Therefore, domestic-type refrigerators and freezers are not approved for retail food service.

Refrigeration and freezer storage involves six major areas:

1. Storage for short-term holding of perishable and potentially hazardous food items.
2. Freezer storage for long-term storage.
3. Storage space for quick chilling of foods.
4. Space for assembling and processing of potentially hazardous foods.
5. Display storage.
6. Display storage for customer service.

Calculating the amount of refrigeration and freezer space should be based on menu and the expected food volume. The amount and location of refrigeration and freezer equipment should complement the food flow of the operation from receiving, storage and food processing, to the point of service.

When assessing the refrigeration needs, shelving space within refrigeration and freezer units should be designed to prevent the cross-contamination of foods. Consideration must be given

to separate raw meats and poultry from ready-to-eat foods such as produce and pre-prepared food items.

Thermometers must be conspicuously located in all units. Thermometer sensing elements should be located near the door(s). Additional measures such as high-temperature alarms should be installed when storing large quantities of potentially hazardous foods.

A. Walk-In Coolers

Walk-in coolers should be installed when there is a need for long-term storage of perishable and potentially hazardous foods or when quick chilling space is needed for prepared and cooked foods. These coolers should be located near delivery or receiving areas.

Remote outdoor walk-in refrigerators or freezers are not approved.

➤ **TIP** *When walk-in coolers are to be used for storage and to chill food quickly, it is recommended that portable racks be provided to help maximize usable floor space.*

B. Reach-In Refrigerators

These units are for short-term storage of perishable and potentially hazardous foods. These units should be considered to meet the daily demands of the kitchen operation. They are to be conveniently located at points of food preparation and food assembly. These units are not to be considered for the quick chilling of cooked and prepared foods.

➤ **TIP** *Locating refrigeration units under or adjacent to heat-generating pieces of equipment is not recommended.*

C. Freezers

Freezers are for long-term storage. They are not designed to be used as quick-chill units. These units should be located near delivery and dry storage areas.

Refrigeration

D. Blast Chillers

These units should be considered to handle large volumes of food that require quick chilling. A blast chiller is an efficient cooling mechanism for any amount of food to be chilled, and where refrigeration storage space is limited.

E. Refrigerated Worktables

These units are needed when the menu includes assembling potentially hazardous foods. These units provide easy access of foods from the top of the unit. These units are not designed for long-term storage or for quick chilling.

F. Refrigeration Processing Rooms

These areas should be considered when there is extensive handling of cold potentially hazardous foods.

G. Display Storage Refrigerators

These units are designed to display potentially hazardous foods under refrigeration. Examples of these units are deli display, fresh fish display, fresh meat and poultry display cases.

H. Customer Service Display Refrigerators and Freezers

These units are designed for holding foods under refrigeration for customer access. They are designed for short-term display and are not designed to quick-chill foods.

Beverage display coolers are not approved for storing potentially hazardous foods.

I. Cold Buffet Units

Cold buffets and salad bars are designed for short-term display. They should be mechanically refrigerated.

J. Ice Machines

If ice is to be used as a cooling medium, the unit should be adequately designed and sized to meet all operational needs.

IV. Storage

A. Dry Storage Area

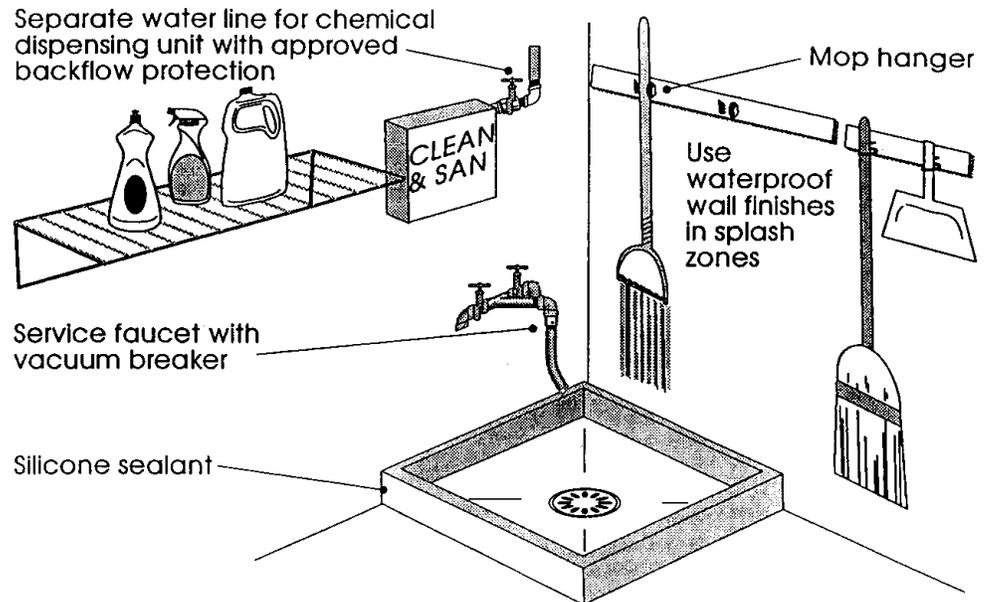
1. **General:** Provide suitable space on your plans for storing all food-related items. The minimum space required is 25 percent of all kitchen areas, based on wall-to-wall dimensions. Equip dry storage areas with adequate approved shelving. Storage space does not include floor areas where desks, equipment, ladders or other items may be placed. You should have an exterior door near the storage area so that delivery personnel do not have to walk through your food preparation area.
2. **Installation:** All shelving must be at least 6 inches above the floor.
3. **Liquor and Canned and Bottled Beverages:** The storage space must be increased to a minimum of 33 percent of the total food service area for storage when liquor and beverages are a part of your operation.

B. Storage Locations

1. **Cooking Utensils:** Designate an area for clean cooking utensils, cutting boards, glassware and dishware. Store them off the floor in a clean, dry location where they will be protected from dust and splash.
2. **Clean Linen:** Provide a storage area for linens, if you use them. Protect clean linens from contamination, and store them away from soiled linens.
3. **Soiled Linens:** Specify the location of covered, non-absorbent containers or washable laundry bags designated for holding damp or soiled linens, soiled uniforms, aprons, etc.
4. **Chemicals:** Designate an area for toxic materials storage that is away from food and clean utensils. Install cages, cabinets or physically separated shelves for storing chemicals in each of the two following categories:
 - a. **Pesticides approved for food service use:** These must be in a secured cabinet.
 - b. **Cleaners:** These include detergents, sanitizers, related cleaning or drying agents and caustics, acids, polishes and other chemicals.

Storage

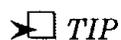
Figure 7: Janitorial Station



Storage

5. **Maintenance Equipment:** Designate an area for storing maintenance equipment and cleaning supplies. See Figure 7.
 - a. **Wall-Hung Storage:** Specify adequate broom racks to keep brooms, dust pans, etc., off the floor.
 - b. **Mop Hooks:** Install heavy-duty mop hooks that can support wet mops over the janitorial sink so that wet mops may drip dry into the sink basin.
 - c. **Shelving:** Provide open wire or solid metal shelving at each janitorial station for a working supply of cleaning items.
 - d. **Peg Board:** The use of peg board is unapproved.
6. **Firewood:** If firewood is used, designate an area for firewood separate from food service and storage areas. Provide special measures to ensure insect and rodent control.

C. Shelving

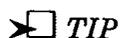


Consider the installation of high-density storage shelving to maximize your available floor space.

1. **General:** Kitchen shelving must meet NSF standards. Shelves should be constructed of metal or material which has been finished so as to have smooth, easily cleanable,

non-absorbent surfaces. Shelves subject to heat or moisture must be of rust-resistant metal. Shelving not approved by NSF may be used in dry storage provided:

- a. The particular area used is a separate room isolated from other food service operations.
 - b. Stored items do not consist of open foods.
 - c. Shelves are designed and fabricated in accordance with City of Rolling Meadows Food Service Sanitation Rules and Regulations.
 - d. Final approval is reserved for on-site inspection by the Area Sanitarian.
2. Refrigerators and Freezers: All shelving must meet NSF standards. In addition, shelving installed in refrigerators must be made of rust-resistant metal or other impervious material. The maximum height of a bottom shelf above the floor of a walk-in refrigerator or freezer is 8 inches.



Consider using heavy-duty dunnage racks for storing case products, heavy containers and bulk products.

V. Employee Areas, Restrooms and Hand Washing Sinks

A. Employee Area

1. Personal Belongings: Specify a coat rack, coat hooks or other suitable facilities for employees to store their clothing and other personal belongings. Consider installing lockers in designated area.
2. Dressing Rooms: If employees change clothes on-site, provide a dressing room where they may change and store their personal, non-work garments. This cannot be in areas used for storing, preparing or serving food, or for washing or storing utensils.
3. Break Area: Designate a separate break room or area away from food preparation and utensil washing areas if employees are not allowed to eat in the dining room.

Storage
—
Employee
Areas

Section
IV-V

B. Restrooms

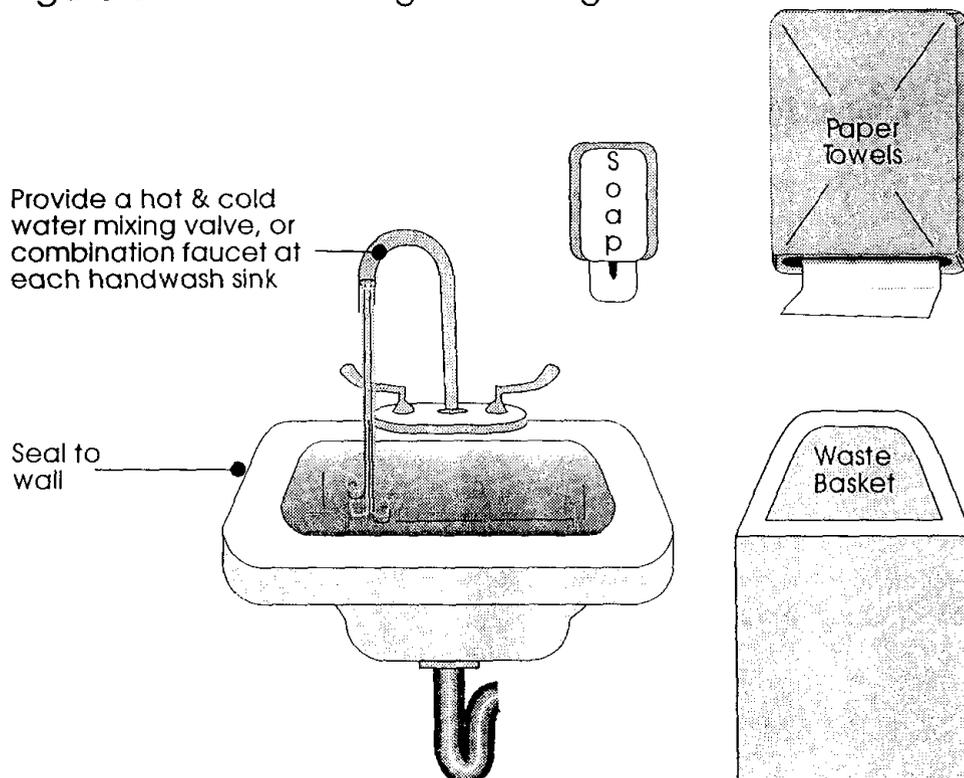
1. **Number:** Provide at least the minimum number of toilet facilities for employees required by the local Building Department.
2. **Location:** Restrooms must be conveniently placed and accessible to employees.
3. **Access:** Public access to restrooms through food preparation or utensil washing areas is prohibited.
4. **Fly Control:** Provide completely enclosed toilet rooms with tight-fitting, self-closing doors.
5. **Toilets and Urinals:** Equip flush tanks with anti-siphon ballcocks. Equip urinals with vacuum breakers on flush valves.
6. **Ventilation:** Mechanically vent restrooms to the outside of the building.
7. **Dispensers:** Each hand washing sink must have a supply of dispensed, hand cleansing soap. Also specify dispensed, disposable paper towels. Dispensers must be conveniently located near each hand washing sink. Hand washing sinks for public use may have hot air hand drying devices. If employees share restrooms, it is recommended to provide dispensed, disposable paper towels. Restrooms specifically for employees are to be provided with dispensed disposable paper towels only.
8. **Water Supply:** Provide each hand washing sink with hot and cold water by means of a mixing valve or combination faucet. Any self-closing, slow-closing, or metering faucet used must provide a flow of water for at least 15 seconds without the need to reactivate the faucet.
9. **Refuse Containers:** Provide refuse containers for the disposal of paper towels.
10. **Sanitary Containers:** Provide covered sanitary containers for the disposal of feminine hygiene products.
11. **Diaper Changing:** If you provide diaper changing tables, you must provide covered waste containers. We recommend the containers have tight-fitting lids.

C. Hand Washing Sinks

1. **Location:** Provide a sufficient number of hand washing sinks. Place hand washing sinks to allow convenient use in food preparation and utensil washing areas. Hand washing sinks are not accepted in counter tops. Porcelain hand sinks are approved for use.
2. **Bar Areas:** In bars where manual washing, rinsing and sanitizing of glassware is done, a separate hand washing sink is not required. Install a hand washing sink in bars with only mechanical glass washers.
3. **Water Supply:** Provide each hand washing sink with hot and cold water by means of mixing valve or combination faucet.
4. **Dispensers:** Provide a supply of dispensed, hand cleansing soap and a supply of dispensed, disposable paper towels at each kitchen hand washing sink. A waste receptacle should be near the sink. The use of common towels is not allowed. Hand drying devices using air are not allowed in food preparation and utensil washing areas. Hand sanitizers or gloves may be used in addition to conventional hand washing. They should be placed near your hand washing sinks. Refer to Figure 8.

Hand Washing Sinks

Figure 8: Handwashing Sink Design



5. **Mirrors:** The installation of mirrors and medicine cabinets is not allowed at hand washing sinks except if eye wash stations are installed.
6. **Splash Protection:** Splash guards are needed when a hand washing sink is less than 18 inches within a food contact surface, food storage shelves, food service areas, vegetable preparation sink or utensil washing sink. The splash guard must be at least 8 inches high. We suggest you use stainless steel. Securely fasten splash guards to the wall and counter top or sink. Allow 24 inches access front and adjacent to hand sink. Silicone seal the seam created by the splash guard.

VI. Plumbing

Install and maintain plumbing according to the Illinois State Plumbing Code and local requirements.

A. Water Supply

Provide an adequate supply of potable water to satisfy the needs of the food service establishment. Water must come from a public water supply or from a Health Department approved private water supply.

B. Sewage Disposal

All water-carried sewage must go to a public sewage system.

C. Grease Interceptors

The local Sanitary District determines the number and size of grease traps, grease interceptors or catch basins. If required, verify these installation requirements in your plans:

1. Install an outside grease catch basin with access for maintenance purposes.
2. If an outside grease catch basin is not feasible, install a recessed grease trap in the following manner:
 - a. The lid must be flush with the floor.
 - b. Inlets and outlets that are a minimum 3 inches in diameter are required.
 - c. The interceptor must be durable, corrosion-resistant and have a watertight lid securely fastened in place.
 - d. The lid and baffles must be easily accessible for maintenance.

D. Janitorial Sinks

1. **Design:** Provide janitorial stations for general clean up activities in all food handling facilities. Include either a floor basin sink or a janitorial sink. Installation of a tiled curb area will not be accepted. Connect the basin or sink with a drain to the sanitary sewer. Provide hot and cold water, under pressure, with a mixing faucet and approved backflow protection. Refer to Figure 7.
2. **Location:** Janitorial stations should be conveniently placed for maintaining food service areas. They should be separate from the food preparation and food storage areas. The janitorial basin or sink must be accessible for use during food service operations. More than one janitorial station may be necessary, depending on the size of the operation.
3. **Additional Equipment:** Other stationary equipment, such as water softeners or water filter systems may not obstruct the mop basin or sink. Allow for space adjacent to the mop sink for storage of mop buckets. Place chemical dispensing systems so they do not interfere with maintenance equipment storage or use. Install a separate water line for chemical cleaning systems and include appropriate backflow protection. If you suspend a hot water heater over the mop basin, maintain a minimum clearance of 80 inches to provide adequate space for the storage of wet mops.

Plumbing

E. Overhead Sewer Lines

1. **Location:** Waste lines and roof drains should not be directly above food preparation, food display, food storage and utensil washing areas.
2. **Shielding:** If you have sewer lines over any of these areas, provide seamless gutters under the pipes that will divert leakage away from the food or utensil zone. Gutters may have an open end at the wall.

F. Potable Water Backflow Protection

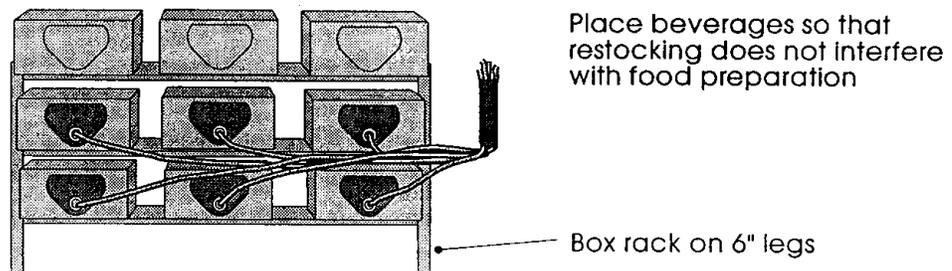
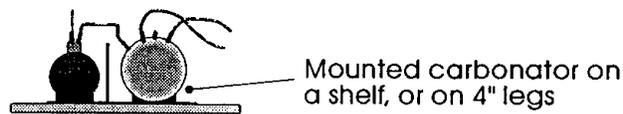
1. **Inlets:** All water inlets (faucets, etc.) must have an air gap between the water inlet and the fixture it is serving. The air gap must be twice the diameter of the water inlet or faucet. Any water inlet, faucet, etc., that does not meet this requirement is a submerged inlet. A water faucet that can have a hose attached to it is a submerged inlet.
2. **Vacuum Breakers:** Provide vacuum breakers on submerged inlets such as toilets, urinals, dish washing machine, garbage grinders and any threaded water outlets.

Section

VI

3. Special Conditions: Provide double check valves with atmospheric vents or reduced pressure zone backflow preventers capable of being submerged on water inlets where you cannot install a vacuum breaker after the last shut-off valve or solenoid switch (i.e., pressure spray hoses).
4. Carbonators: Carbonators must have double check valves plus equipment to meet any other specific Plumbing Code requirements. Refer to Figure 9.

Figure 9: Bag in a Box & Carbonator



Plumbing

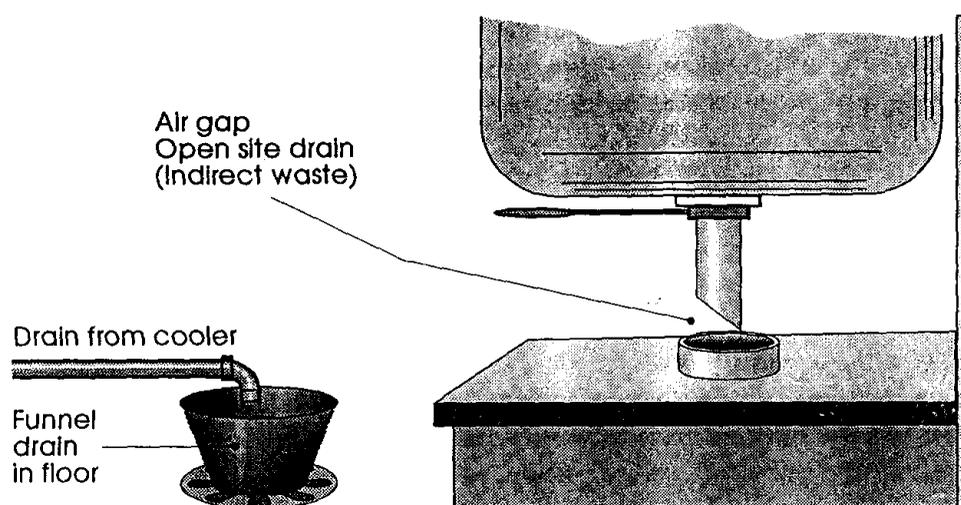
G. Indirect Waste Connections

1. Equipment Drains: Provide indirect wastes for dish washing machines, dish washing sinks, pot washing sinks, pre-rinse sinks, silverware sinks, bar sinks, soda fountain sinks, potato peelers, ice machines, steam tables, steam cookers, ice bins, salad bars, dipper wells, walk-in refrigerator or freezer condensate and other similar fixtures. Refer to Figure 10.
 - a. An indirect connection discharges waste through an air gap into the drainage system. Do not connect it directly with the drainage system.
 - b. The indirect piping from the fixture to the air gap must not exceed 5 feet.
 - c. Indirectly connected fixtures must discharge to a vented trap placed as close as possible to the fixture and in the same room. To avoid cross connections, each fixture will require a separate line.
 - d. Install receptors (floor sinks, etc.) receiving indirect wastes in accessible and ventilated areas. Design and

size receptors to prevent overflows and splashing. When installed inside cabinets, you must extend the drain hub receiving waste through the base of the cabinet and seal the base around the drain.

- e. Food service equipment, sinks or buckets cannot receive the discharge of an indirect waste pipe.

Figure 10: Air Gaps & Indirect Wastes



Plumbing

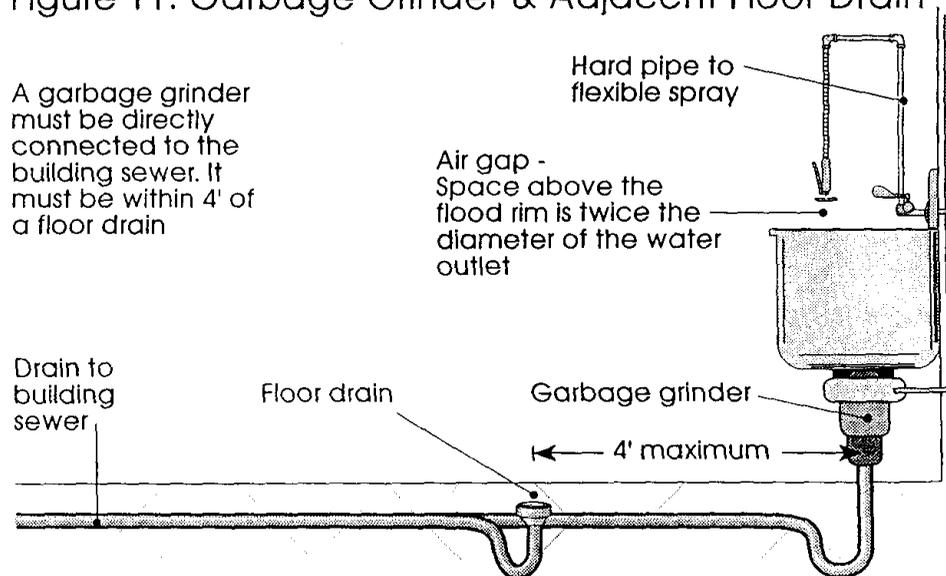
2. **Adjacent Floor Drain:** You may directly connect a utensil washing sink or a dish washing machine with a floor drain provided that the following conditions are met:
 - a. The floor drain is trapped and vented as required by the State of Illinois Plumbing Code.
 - b. The floor drain is placed within 4 feet horizontally of the utensil washing sink or dish washing machine, and in the same room.
 - c. Additional fixtures are not to be connected upstream from the floor drain trap, utensil washing sink or dish washing machine.
 - d. Garbage grinders, if installed, must meet the above provisions and be directly connected. Refer to Figure 11.

H. Floor Drains

1. **Number:** A sufficient number of floor drains should be located throughout the establishment to facilitate cleaning.
2. **Location:** Floor drains should be located in areas that require frequent water flushing to clean the floor or equipment. Floor drains must not be installed in walk-in refrigeration units except under the following conditions:
 - a. When required by another jurisdiction, the floor drain must have an approved backwater valve installed.
 - b. Floor drains may be located in refrigerated processing rooms or high moisture storage areas, such as produce coolers, provided that the doors to the area or room have been undercut or are swing doors.

Plumbing

Figure 11: Garbage Grinder & Adjacent Floor Drain



VII. Sanitizing Equipment

A. Hot Water System

1. **Minimum Size:** A 40-gallon minimum capacity water heater is required for a facility with a three-compartment sink, hand wash sink and utility sink. For limited facilities with less need for hot water, we can evaluate the capacity according to the type of fixtures provided.
2. **Dish Washing Machine Demand:** Facilities using a commercial dish washing machine must provide hot water (temperature and volume) to meet the maximum demand for the make and model of machine to be installed.
3. **Heat-On-Demand Units:** A hot water system that does not provide any storage capacity is not approved for use in food service facilities.

B. Manual Utensil Washing

1. **Design:** Provide a three-compartment, stainless steel sink with two integral drainboards where pots, pans or multi-use eating and drinking utensils are washed by hand. Install this sink to minimize cross-contamination to, or from, your janitorial station or food processing tables.
2. **Size:** Each compartment must be large enough to submerge the largest item to be washed. Each drainboard must equal the area of the largest compartment.

C. Mechanical Utensil Washing

1. **General Requirements**
 - a. All spray-type dish washing machines must comply with the current edition of *NSF Standard #3*.
 - b. A soiled dish table of adequate size is needed to handle soiled utensils before washing. The soiled dish table must not drain into the washing compartment of the dish washing machine. Install a table scupper across the entire flat section of the table to prevent soiled water and debris from draining into the wash tank. Install a pre-rinse sink as needed so that larger food particles can be rinsed off before entering the dish washing machine.
 - c. A clean dish table or drainboard large enough to allow water to evaporate from dishes and utensils is needed. This installation must provide room for the temporary storage of utensils and racks immediately after being

removed from dish machines. Slope the clean dish table to drain into the machine. It must be at least the size of the soiled dish table.

- d. Easily readable, numerically scaled indicating thermometers are needed. They must be accurate to $\pm 3^{\circ}\text{F}$ and show the temperature of the water in each tank of the machine, including the temperature of the final rinse water as it enters the manifold.
- e. Mechanical exhaust ventilation usually is needed over the dish washing machine to remove steam and vapors effectively.
- f. The installation of integral manual and mechanical dish washing drainboards will not be accepted due to cross-contamination concerns.

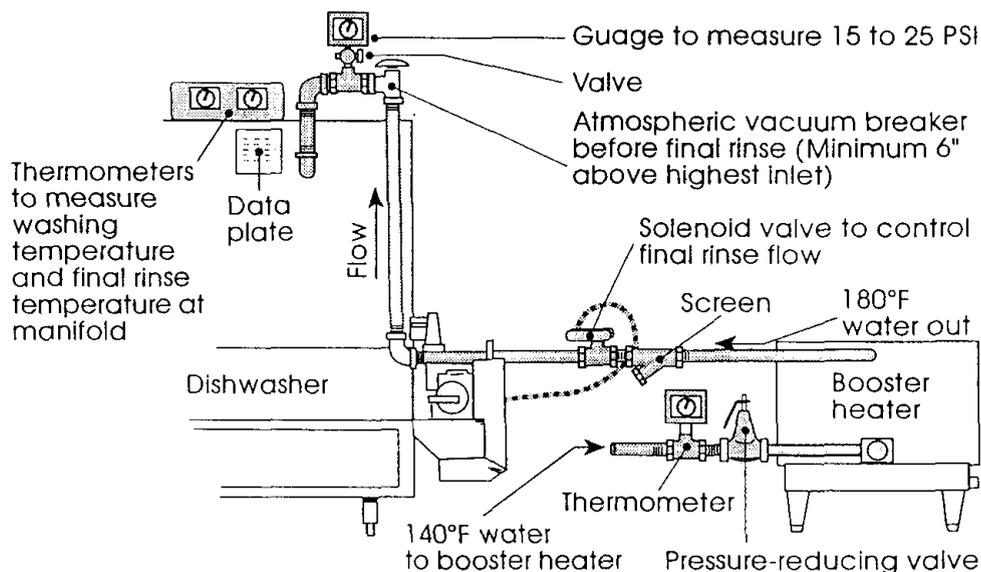
2. Chemical Sanitizing Machines

- a. A sanitizer alert system which includes a visual and audible alarm, designed and approved for the specific machine installed, is needed to warn the user automatically when the sanitizer supply has depleted.
- b. Additional drainboards or dish tables for air drying utensils after being washed in a low-temperature machine will be needed.

3. Hot Water Sanitizing Machines

- a. A booster heater is needed to heat 140°F water to at least 180°F for the final rinse of the dish washing machine. The temperature rise demand of the dish washing machine will determine the heater size.

Figure 12: Hot Water Sanitizing Machine



- b. A temperature gauge on the service line just before the booster heater is required.
- c. Installation of the hot water heater and the booster heater should be as close as possible to the dish washing machine to avoid heat loss in the lines.
- d. The water system should deliver hot water to the final rinse when the rinse valve opens. Machines designed for intermittent operation will require special equipment. When the length of the line from the booster to this type machine exceeds 50 feet, the system should be recirculating.
- e. A pressure regulator is needed on the final rinse line. The flow pressure needs to be 15 to 25 pounds per square inch.
- f. A thermometer and pressure gauge on the final rinse line is needed. You must install the pressure gauge after the pressure regulator as close to the manifold as possible. Install a valve with standard threads upon which you may attach a pressure gauge to check flow pressure. Refer to Figure 12.

VIII. Lighting

A. Food Service Areas

Food preparation and utensil washing areas must be well lit. A light intensity of 100 footcandles measured 30 inches above the floor is necessary.

B. Walk-In Refrigerators and Freezers

Walk-in units must be well lit to provide at least 50 footcandles of light throughout. Install fluorescent lights with cold-tolerant ballasts and vapor-proof fixtures. Install lights so that lighting will not be obstructed by food stored on shelves.

C. Storage and Restrooms

Provide at least 30 footcandles of light, measured 30 inches above the floor, in storage rooms and restrooms.

D. Bars

Dimmer switches may be a suitable alternative for use in bar areas. Provide additional lighting for clean-up purposes.

E. Protection Against Breakage

Protective shielding for light fixtures is needed over all food preparation, display, service, storage and utensil washing areas. Explosion tubes with end caps or shatterproof fixture lenses may be used. Protect heat lamps against breakage with a shield surrounding and extending beyond the bulb, leaving only the face of the bulb exposed. You may use coated, shatterproof bulbs instead of shielding.

IX. Laundry

A. Location

Install laundry in a separate room with a door to separate food service operations from any laundry area. We recommend that you provide a vented door grill to exhaust heat from the room.

B. Clothes Dryer

If you provide a clothes washing machine, you must also provide a dryer. Dryers must be vented to the outside.

C. Linens

For clean and soiled linen storage, see Section *IV. B, Storage Locations*.

X. Room and Area Finishes

A. Food Preparation and Food Storage Areas

1. Floors: Floor finishes must be of durable, light-colored, waterproof, grease-resistant and easily cleanable material. Commercial grade vinyl composition flooring is the minimum grade material acceptable. The use of poured monolithic floors may require specific approval for kitchen applications.
2. Coving: A 3/8 inch base coving must be provided at the juncture of the floor and wall or cabinet.
3. Walls: Construct walls with a smooth and easily cleanable material that has a light-colored finish.
4. Ceilings: Install smooth, non-absorbent and light-colored ceilings that can withstand frequent cleaning. Exposed joists, studs or other support structures will not be accepted.

B. Cookline

Wall finishes behind the cookline must be of stainless steel or its equivalent.

C. Utensil Washing and Janitorial Station Areas

Finishes must meet the same requirements as Section X. A, *Food Preparation and Food Storage Areas*. In addition, the splash areas must be finished with a durable and waterproof material such as fiberglass reinforced panels (FRP) or stainless steel. Painted drywall is not acceptable.

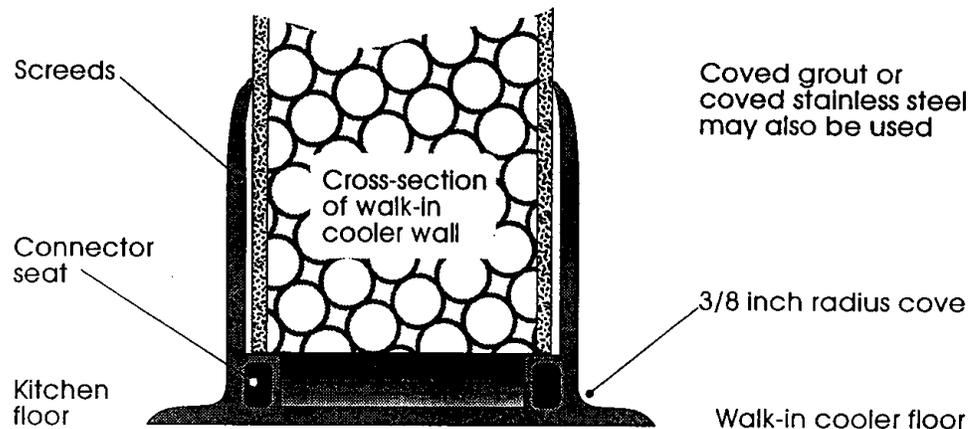
D. Walk-In Refrigerator or Freezer Units

✎ **TIP:** *Galvanized metal will rust when used as a finish in a walk-in cooler. It is not recommended.*

1. Floors, Walls and Ceiling: Fabricate and install finishes that are NSF approved, waterproof, corrosion resistant, free of difficult-to-clean internal corners and crevices, and durable under conditions of normal use.
2. Coving: We recommend the installation of screeds so that you have an effective 3/8 inch radius cove on both the interior and exterior of the unit. Other approved methods include a

grout radius as an integral part of the flooring material or corrosion-resistant metals. Because of breakage and separation problems, you should avoid using tile or vinyl base as coving. Refer to Figure 13.

Figure 13: Screeds in Walk-Ins



E. Server, Pick-Up or Wait Stations

Server stations without plumbing connections, located within a dining room, may use the same wall and ceiling finishes as the dining room. Server stations with plumbing connections or those extending from the kitchen must utilize the same room and area finishes as stated in Section X. A, *Food Preparation and Storage Areas*, with the following modifications.

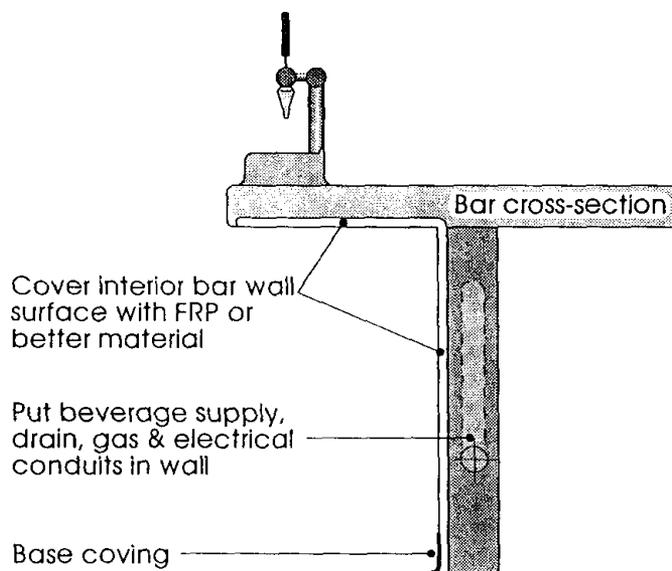
1. Floors: In food pick-up stations or wait stations with plumbing, specify floors of durable, waterproof and easily cleanable material extending a minimum of 3 feet from the counter.
2. Coving: A 3/8 inch base coving must be provided at the juncture of the floor and wall or cabinet. Kick plates are not to be used because they do not adequately seal the area from the entrance of debris.
3. Walls: Walls must be easily cleanable.
4. Ceilings: Smooth, non-absorbent and light-colored ceilings that can withstand frequent cleaning must be installed at any station where food is picked up.

Room and Area Finishes

F. Bar

1. Floors: Floor finishes must be of durable, light-colored, waterproof, grease-resistant and easily cleanable material.
2. Coving: A 3/8 inch base coving must be provided at the juncture of the floor and wall or cabinet.
3. Walls: Walls may have the same finish as the rest of the room except that the interior bar wall surfaces and undersides of the bar counter tops must have smooth, non-absorbent and light-colored finishes that can withstand frequent cleaning. Exposed joints or other support structures will not be accepted. In addition, the splash areas must be finished with a durable and waterproof material such as ceramic tile, FRP or stainless steel. Refer to Figure 14.
4. Ceilings: Ceilings may be of the same finish as the dining room.

Figure 14: Interior Bar Wall Surface



Room and
Area Finishes

G. Restrooms, Dressing and Locker Rooms

1. Floors: Floor finishes must be of durable, light-colored, waterproof, grease-resistant and easily cleanable material.
2. Coving: A 3/8 inch base coving must be provided at the juncture of the floor and wall or cabinet.
3. Walls: Construct walls with a smooth and easily cleanable material that has a light-colored finish. In addition, partitions and wall finishes behind fixtures subject to splash such as toilets and urinals are to be upgraded using waterproof materials such as stainless steel, FRP or ceramic tile.

Section
X

H. Dining Rooms

Carpeting, if used as a floor covering, must be of closely woven construction, properly installed, easily cleanable and maintained in good repair.

I. Buffets, Salad Bars and Beverage Stations

1. Floors in Dining Areas: Floor finishes must be of durable, light-colored, waterproof, grease-resistant and cleanable materials extending at least 3 feet from the serving side(s) of buffets, salad bars and beverage stations.
2. Coving: A 3/8 inch base coving must be provided at the juncture of the floor and wall or cabinet.
3. Walls: When the buffet is placed against a wall, the wall must be smooth and non-absorbent.
4. Ceilings: You may use the same finish as the dining room.

J. Areas with Multiple Uses

Any area used for a combination of previously defined activities must meet the more stringent requirements imposed on that area or activity.

K. Summary of Room and Area Finishes

See Table 1.

1. Floors: Quarry tile is a preferred flooring because of its durability. The use of diamond-plate steel or corrosion-resistant aluminum as flooring under beer kegs, or where durability is essential, should be considered.
2. Walls: Stainless steel, fiberglass reinforced panel (FRP), and ceramic tile meet the standard for durability and being waterproof in splash zones. Oil-based epoxy paints are appropriate in food preparation areas. High-gloss enamel paints work well in most other areas. We recommend stainless steel corner guards in high-traffic areas.
3. Ceiling: Lay-in smooth, non-fissured, vinyl-clad gypsum board for dropped ceilings. Drywall painted with a washable finish may also be used.

Table 1: Summary of Room and Area Finishes

Room or Area Examples	Floors	Coving	Walls	Ceilings
Food Preparation Food Storage Cookline	<ul style="list-style-type: none"> •Light colored •Waterproof •Grease resistant •Easily cleanable •Durable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed 	<ul style="list-style-type: none"> •Light colored •Easily cleanable •Stainless steel behind cookline 	<ul style="list-style-type: none"> •Light colored •Non-absorbent •Smooth •Durable
Utensil Washing Janitorial Stations	<ul style="list-style-type: none"> •Light colored •Waterproof •Grease resistant •Easily cleanable •Durable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed 	<ul style="list-style-type: none"> •Light colored •Easily cleanable •Durable •Waterproof in splash zones 	<ul style="list-style-type: none"> •Light colored •Non-absorbent •Smooth •Durable in splash areas
Walk-In Coolers Refrigerators & Freezers	<ul style="list-style-type: none"> •Corrosion resistant •Waterproof •Easily cleanable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed •Inside & outside unit 	<ul style="list-style-type: none"> •Corrosion resistant •Easily cleanable 	<ul style="list-style-type: none"> •Corrosion resistant •Waterproof •Easily cleanable
Server Areas	<ul style="list-style-type: none"> •Within 3 ft of counter: •Waterproof •Easily cleanable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed •Include cabinets 	<ul style="list-style-type: none"> •Easily cleanable 	<ul style="list-style-type: none"> •Light colored •Smooth •Durable
Bar	<ul style="list-style-type: none"> •Light colored •Grease resistant •Easily cleanable •Durable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed 	<ul style="list-style-type: none"> •Back of the bar & under bar top: •Light colored •Waterproof •Easily cleanable •Durable 	<ul style="list-style-type: none"> •May be the same as the dining room
Restrooms Dressing Areas Locker Rooms	<ul style="list-style-type: none"> •Light colored •Waterproof •Grease resistant •Easily cleanable •Durable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed 	<ul style="list-style-type: none"> •Light colored •Waterproof •Easily cleanable •Durable •Water resistant 	
Buffets Salad Bars Beverage Stations	<ul style="list-style-type: none"> •Within 3 ft of counter: •Light colored •Waterproof •Grease resistant •Easily cleanable •Durable 	<ul style="list-style-type: none"> •3/8" radius cove •Sealed 	<ul style="list-style-type: none"> •If placed against a wall: •Smooth •Waterproof 	<ul style="list-style-type: none"> •May be the same as the dining room
Combination Areas	Any area used for a combination of activities must meet the more stringent requirements			

Room and Area Finishes

XI. Insect and Rodent Control

A. Building

1. All masonry or cement foundations must be rodent proof.
2. Cover all building vents with a minimum of 16 mesh per inch wire screen.
3. Seal openings into the foundations and exterior walls around pipes, wires or conduits.
4. Tightly seal the opening around conduits or pipelines entering a wall, ceiling or floor.

B. Delivery Doors

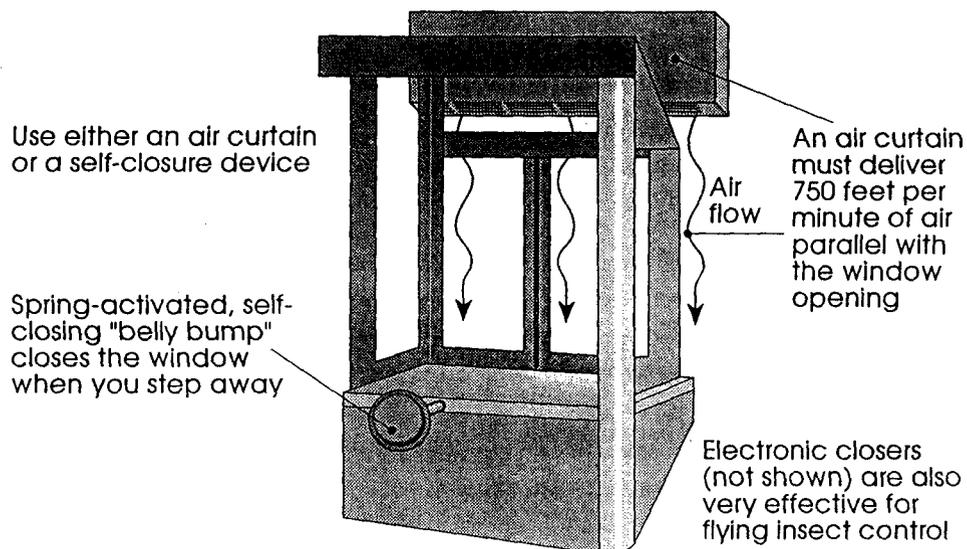
1. Pest Control: All delivery doors leading to the outside must be self-closing and tight fitting.
2. Garage Doors: Vertically-opening, garage-type delivery doors must be protected against pests. They should have an overhead air curtain with a minimum velocity of 750 feet of air per minute measured 3 feet above the floor. We will consider suitable alternatives for pest control for this type of door.
3. Entrance Doors: Make all outside customer doors self-closing and tight fitting. You may need to adjust the threshold sweep to prevent the entrance of insects and rodents.

C. Windows

1. Screen all openable windows, except drive-thru or walk-up windows, with at least 16 mesh to the inch screening.
2. Provide fly protection by one or more of the following methods:
 - a.. Self-Closing: Equip windows with a self-closure device, such as a spring-loaded bump pad or an electronic opener. Refer to Figure 15.
 - b. Air Curtain: Install an air curtain so that a layer of fast moving air is produced vertically downward. The air flow runs parallel with the window and within 1 inch (inside or outside) of the window opening. The air curtain must protect the entire width of the window opening. Minimum air velocity is 750 feet per minute, measured at the furthest point in the window opening from the air curtain. Use a solenoid switch to activate the unit. Manual switches will not be accepted.

- c. Fly Fans: Mount one fan, within 12 inches of the wall, over each window. Each fan must produce a minimum downward air velocity of 750 feet per minute along the entire horizontal width of the window opening.

Figure 15: Drive-Thru Windows



**Insect and
Rodent
Control**
—
**Garbage
and Refuse**

XII. Garbage and Refuse

A. Garbage Containers

1. Number: Each food facility is to secure their own garbage service. Remember to provide sufficient garbage containers, sized to hold any garbage or refuse in a nuisance-free manner, until it can be picked up by a disposal company.
2. Trash Compactors: Consideration as to the cleaning and proper disposal of the liquid waste requirements may vary from municipality to municipality.
3. Incinerators: Incinerators must have EPA approval and comply with all state and local regulations, if operated.

B. Garbage Area

1. **Outside Storage:** Place outside refuse containers and compactor systems on smooth surfaces of non-absorbent material such as concrete or machine-laid asphalt. Use a concrete pad for storing grease containers. These areas should be as far as possible from the building's doors and windows.
2. **Pest Control:** When outside refuse containers are within 20 feet of the food facility's door or window, install an air curtain, in addition to a self-closure device on doors. Air curtains must maintain a minimum velocity of 750 feet of air per minute measured 3 feet above the floor.
3. **Enclosures:** If you propose a garbage enclosure, construct it of durable, non-absorbent materials and a washable interior finish able to withstand frequent cleaning.
4. **Recycling:** If you plan to recycle, check with your local municipality or waste management company for additional rules, guidelines or details. You should plan for possible mandatory recycling and make arrangements for future outside storage of the recycled materials.
5. **Inside Storage, Interior Garbage Storage, Refuse Rooms, Grease Storage:**
 - a. If used, garbage room and area finishes must meet the same requirements as the food preparation area. See Section X. A, *Food Preparation and Food Storage Areas*.
 - b. Indoor garbage temperatures of 50°F or less should be maintained to eliminate fly breeding.

XIII. Exhaust Hood Ventilation for Cookline Equipment

A. Exhaust Plans Submittal

1. **Specifications:** Complete the *Exhaust Plan Review* form(s) for new exhaust system installations, or modifications to existing systems for approval (one form per hood).
2. **Equipment:** Submit exhaust plans indicating the type of equipment being proposed for installation under the cookline exhaust hood.

B. When Exhaust Hoods Are Required

1. **General:** Commercial cooking or display equipment, which when used produces smoke, steam, grease, mists, particulate matter, odors, or create sanitation or indoor air quality problems, will require a hood.
2. **Exceptions:** A commercial exhaust hood is required for each cooking appliance, with the following exceptions:
 - a. Completely enclosed ovens
 - b. Steam tables
 - c. Auxiliary cooking equipment that does not create a sanitation or indoor air quality problem, for example: Toasters, coffee makers, sandwich makers, electric rice cookers, electric cheese melters and soup wells.
 - d. Table side cooking
 - e. Special event set ups
 - f. Temporary events (less than 14 day set ups)

➤ **TIP:** Providing a hood for dish washing machines often improves comfort and performance.

3. **Other Examples:** Non-traditional equipment that would require installation under a hood include: Kettles, pasta cookers, hot plates, salamanders, gas cooking equipment.

**Exhaust
Hood
Ventilation**

C. Type of Exhaust Hood

1. **Canopy Coverage:** Each wall-hung canopy or island canopy hood must be designed as an overhead hood that completely covers the equipment it is designed to serve. The hood must overhang all open sides by at least 12 inches.
2. **Ventilators:** Any ventilator-type non-canopy hood must be designed as a wall hood that has a maximum height of 3 feet above the cooking surface. This hood is often referred to as a low sidewall hood.
3. **Water Wash Hoods:** Water wash hood systems must be designed to include the following additional requirements:
 - a. Provide a floor drain.
 - b. Keep exposed piping below the filter bank to a minimum. Do not install exposed horizontal piping.
 - c. Drain through the building grease trap, or provide an additional grease trap specifically for the hood system.
 - d. Install an RPZ (Reduced Pressure Zone backflow preventor) on the potable water supply. Locate the RPZ to be accessible for inspection.
4. **Steam Only:** Box condensate hoods must be designed for removing steam and vapor only and include all or part of additional requirements.
 - a. Provide a floor drain.
 - b. Provide duct work with a fan.
5. **Filters and Durability:** Exhaust hoods must be designed for collecting vapors, mists, particulate matter, grease, steam, heat and smoke before entering the exhaust duct via filters or extractors. The hood is to be fabricated and reinforced to withstand the actions of normal use without buckling, cracking or significantly distorting.

D. Size of the Exhaust Hood

Determining the Performance of the System: Use the formulas on the *Exhaust Plan Review* form. The area of the open-faced portion of the hood will determine the cubic feet per minute (CFM) required by the entire system.

1. **Wall-Mounted Hoods:** Canopy hoods attached to a wall must have a minimum air removal of 100 CFM per square foot of open-faced portions of the hood.
2. **Island Hoods:** Canopy hoods exposed on all sides must have a minimum air removal of 150 CFM per square foot of open-faced portions of the hood.

3. **Ventilators:** Non-canopy hoods must have a minimum air removal of 300 CFM per linear foot of hood length.
4. **Skirted Hoods:** Wall-mounted canopy hoods, which are less than 6 feet in length and have only one side exposed, must have a minimum air removal of 50 CFM per square foot of the open-faced portion of the hood.
5. **General:** All exhaust hood systems must maintain a minimum of 50 feet per minute (FPM) capture velocity at the cooking surface. Factory engineered cookline exhaust systems must follow the manufacturer's recommendations in the performance of new systems to have optimum grease removal, air movement and air velocity, in addition to meeting the above criteria. A letter stating that this standard will be met must accompany documentation supporting compliance with NSF criteria, C-2.

E. Exhaust Ducts

Use the formula on the *Exhaust Plan Review* form.

1. **Construction:** All ducts should be constructed with a minimum of bends. Ducts are to be smooth, easily cleanable and made of a corrosion-resistant metal.
2. **Number:** Multiple takeoff ducts are required for all hoods 10 feet or more in length. When required, multiple ducts must be equally spaced. Refer to Table 2.
3. **Velocity:** Duct air velocity must be a minimum of 1,500 feet per minute, with a maximum of 2,200 feet per minute.
4. **Outside Exhaust:** Kitchen exhaust systems must be designed and constructed to exhaust the air through duct(s) directly to the outside atmosphere in a safe and nuisance-free manner.
5. **Interference With Other Fuel-Burning Equipment:** Kitchen hoods and ducts must be designed so they will not interfere

Exhaust Hood Ventilation

Table 2: Multiple Take-off Ducts

Hood Length	Number of Ducts
10 ft. or less	1
10 ft. to 16 ft.	2
16 ft. to 24 ft.	3
24 ft. to 32 ft.	4
32 ft. to 40 ft.	5
40 ft. or more	Consult local authority

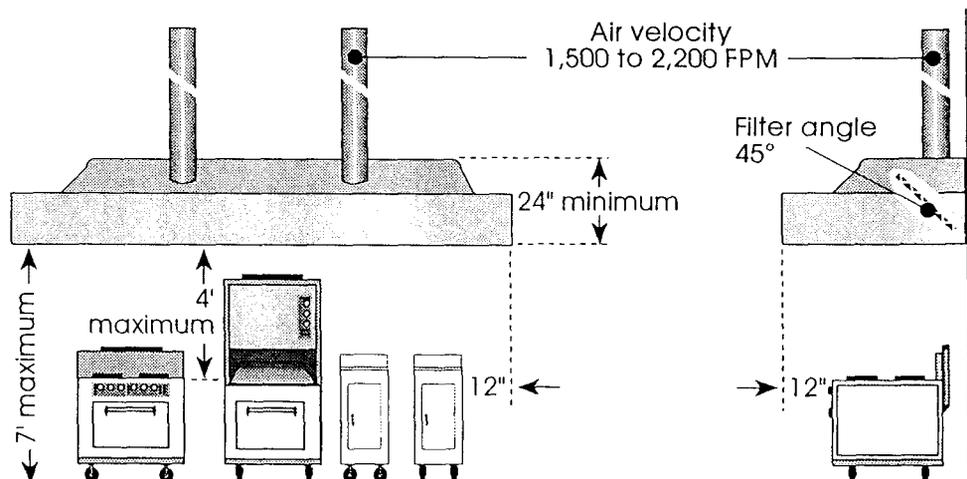
with normal combustion processes or combustion exhausts from commercial cooking or heating equipment. Locating a water heater or a furnace near the kitchen exhaust system is not recommended.

F. Exhaust Filter

1. **Size:** All exhausted air, before entering the duct work, must pass through approved, removable filters or extractors. Calculate the appropriate number of filters needed, based on the length of the filter bank.
2. **Design:** Grease filters or extractors must be installed at a 45 degree angle to horizontal, and be sized appropriately to fit the filter bank.
3. **Type:** Filters or extractors specified must be of the same type so they will not adversely affect the static pressure of the total system.
4. **Grease Extractors:** Kitchen exhaust systems using grease extractors must follow the manufacturer's recommendations in the design and construction of new systems so as to have optimal grease removal, air movement and air velocity.

Exhaust Hood Ventilation

Figure 16: Typical Hood Installation



G. Exhaust Fan

1. **Size:** The number and size of the fan(s) specified are required to remove the total CFM of exhausted air as determined by the type of hood at a specified static pressure.
2. **Specifications:** All fan specifications (make and model) need to be included on the *Exhaust Plan Review* form and indicated on the plans.
3. **Location:** All fans must be located to direct exhaust away from the building.

H. Make-Up Air

1. **Balanced Air Flow:** Exhaust systems with air removal of over 1,500 CFM must be provided with sufficient make-up air equal to or slightly less than the total CFM to be exhausted.
2. **Tempering:** The make-up air is to be introduced in a manner which will not interfere with the capture characteristics of the exhaust system nor create discomfort to the employees. It is recommended that the temperature differential between the make-up air and air in the conditioned space should not exceed 10°F.
3. **Quality:** The air supplied to the kitchen and food preparation areas must be free from contamination by dust, vapors or gases. Screening must be provided to prevent ingress of foreign matter.

Exhaust Hood Ventilation

I. Construction and Criteria Checklist

1. The maximum distance between the bottom edge of hood and the floor is 7 feet.
2. The maximum height of the bottom edge of the hood above the cooking surface is 4 feet.
3. The minimum height of the hood itself is 24 inches.
4. The minimum static pressure is 1/2 inch.
5. Hoods less than 18 inches from the ceiling or wall must be closed with approved material to the ceiling and wall. *Closed* means having an opening of not more than 1/32 of an inch.
6. The minimum distance between the lowest edge of a grease filter or extractor and the cooking or heating surface is:
 - a. For exposed or unexposed flame units, 3 feet.
 - b. For charcoal, 4 feet.

7. There must be no horizontal runs of piping, electrical conduit or fusible links of the fire protection system exposed below the filter bank in the hood or the make-up air plenum. All piping, including electrical conduit, exposed on the exterior of the exhaust hood must be spaced 1/2 inch to 1 inch away from all surfaces.
8. Air intakes must be located at least 10 feet from any exhaust outlet or vent.
9. Insulation must not be applied on the interior of the duct work.
10. All installations must be in complete accordance with all municipal, county, state, fire and building department requirements and recommendations. Note: Many local fire departments require compliance with National Fire Protection Association (NFPA) pamphlet 96.
11. For all proposed installations that are not of conventional design, a detailed review and conference may be required with design engineers to determine the system's adequacy.
12. Field approval must be obtained. A smoke test may be performed.
13. A hood cleaning schedule may be requested. The schedule must indicate methods of cleaning, and the time interval between cleanings.
14. Fire suppression tanks must not be located over food preparation areas.

XIV. The Illinois Clean Indoor Air Act

Smoking: Any food service facility, which is by definition a public place, may choose to provide designated smoking areas. This is subject to utilizing physical elements of the premises to minimize the intrusion of smoke into the non-smoking areas.

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