Retail Food Establishment Plan Review Form

The Colorado Revised Statutes (CRS) require that complete plans and specifications be submitted, reviewed, and approved before any construction and or remodeling can begin on a retail food establishment. The Colorado Retail Food Establishment Rules and Regulations can be read at https://cdphe.colorado.gov/retail-food/retail-food-resources and will help you answer questions when completing the plan review packet.

Submitting Plans

Arapahoe County Public Health is concerned about the time and expense involved in building a retail food establishment. **The enclosed form must be completely filled out including the finish schedule and equipment list. Notations of "see plans" will not be accepted. Failure to include all requested information may delay the review and/ or approval of your plans.**

Please verify that this establishment is within Arapahoe County.

One set of signed and dated plans, drawn to scale, must be submitted to this Department and include the following information:

a. Menu that includes all beverages
b. Facility floor plan with equipment layout (see example on page 17)
c. Manufacture specification sheets
d. Mechanical, plumbing, and electrical plans

A separate application form and fee must be submitted for each kitchen and concession stand at the same address. Bars and satellite wait station plans may be included with a kitchen application. Grocery stores are not required to submit separate applications for each department.

Plans should be submitted to Arapahoe County Public Health, 6162 S. Willow Dr, Ste 100, Greenwood Village, CO 80111.

Review of plans submitted to other Arapahoe County Public Health offices may be delayed.

Fees

A $100 plan review application fee must accompany each set of plans for the initial review. Plans without a fee attached will not be accepted.

In addition to the $100 plan review application fee, a fee based on $60 per hour will be assessed for our time spent conducting the plan review, consultations in the office or by phone, and pre-opening inspections.

Unless an operator is verified to be a specific type of non-profit, license fees range from $195–$855. Licenses expire on December 31 every year and are not pro-rated.

All fees must be paid in full prior to receiving an approval to operate.

Review Process

We do not offer an option to expedite the plan review. Plans are reviewed on a first come first serve basis.

The Requestor, on page 3 of this application, will be notified via email within 14 business days of the plan submittal if the plans were approved or if more information or changes are needed.

Non-approval of plans will require submission of revised plans and may take up to another 14 business days for notification.

Once a **written approval** of the plans is received by the Requestor, construction may begin. The plan review approval letter must remain on site until the completed construction is approved by this Department. It is the responsibility of the Requestor to make sure inspections are scheduled. **All inspections require a minimum 5 business day notice.**

If the plans change after they have been approved by this Department, the plans must be re-submitted for approval. This review may take up to another 14 business days for notification.

Requestor Responsibility and Required Inspections

It is the responsibility of the Requestor (on page 3 of this application form) or their designee to schedule at least two (2) inspections of the facility. All inspections require a minimum 5 business day notice. Inspections are to be scheduled by calling our Plan Review and Opening Inspection Hotline at 303-795-4584.

The first inspection is to be done approximately 2-3 weeks prior to the completion of the project. This inspection is done to assure the plans approved by this Department were followed and to look for other unexpected issues that may result in a delay in the approval to operate. The inspector will leave a "punch list" of items to comply with before having the second inspection conducted.

Unless the operation is exempt from licensing by the Colorado Retail Food Establishment Rules and Regulations, a Retail Food License is required in order for any exposed food to be handled or prepared. **This includes food handling for training purposes.**

The second inspection is to verify:

1. That all work is complete and in compliance with the Colorado Retail Food Establishment Rules and Regulations
2. The Retail Food Establishment has been thoroughly cleaned
3. All equipment is working properly (all refrigeration must be at 41° F or less)
4. All items noted during the first inspection have been corrected
5. The Colorado State Sales Tax license is provided to fill out the Retail Food License Application
6. All remaining plan review fees and the license fee are paid in full
7. At least one employee is a Certified Food Protection Manager. A certificate must be obtained through an accredited provider. See details at www.arapahoeco.gov/health

ARAPAHOE COUNTY
PUBLIC HEALTH

Food Establishment Specifications Form

New Establishment ❑ Remodel ❑ Addition ❑

Application Date: _____ Date of Planned Opening: _____ SR#: _____
(Office Use Only)

Establishment/Facility Information

Establishment Name: _____

Establishment Address: _____
(Full Address Required)
_____ Phone # : _____

Requestor Information

Name: _____

Mailing Address: _____
(Full Address Required)
Phone #: _____ Email Address (Required): _____

Business/Ownership Information

Name: _____ Phone #: _____

Mailing Address: _____
(Full Address Required)

Inspection Code

❑ Institution (Hospital, School, Jails)
❑ Grocery (Market w/wo deli, bakery, convenience)
❑ Restaurant (Full, quick, coffee, bars, concession)
❑ Other (incl. Temp Vendor, Mobiles)
❑ Processor/Warehouse (No Fees)
❑ Marijuana Edible Manufacturer

Service Type: ❑ Full Service ❑ Fast Food ❑ Bar ❑ Retail ❑ Convenience ❑ Other _____

Table Service Type: ❑ Multi-use flatware, glassware and plates ❑ Disposable flatware, glassware and plates

Seating Capacity: _____ Indoor _____ Outdoor _____ Square feet of establishment

INSTRUCTIONS FOR USE OF THIS FORM: Check the box in the "Requestor Use" column that indicates you have read and understand the requirements. Check the N/A box if the requirement is not applicable to your plan.

Requestor Use
Read **N/A**

A. FINISH REQUIREMENTS: Using this chart (add separate sheet if needed), include all restrooms and rooms or areas used for food preparation and food storage (kitchen, bar, dishwashing area, dry storage, restrooms, wait stations, etc.).

1. FLOORS, WALLS AND CEILINGS ❑ ❑

Must be smooth and easily cleanable. Coved floor/wall junctures must be provided. **Brick and masonry construction located in restrooms, food preparation, and/or warewashing areas must have a smooth surface with all grout, mortar, pits, and cavities filled so as to provide a smooth surface, and sealed so as to be water repellant.**
NOTE: The inside and underside of the die bar must be smooth, nonabsorbent and easily cleanable.

ROOM FINISH SCHEDULE

Room Name	Floors		Wall Finishes				Ceiling	
	Finish Material	Type of Base	North	East	South	West	Material	Finish
Example KITCHEN	*QUARRY TILE*	*QUARRY TILE*	*FRP*	*FRP*	*FRP*	*STAINLESS*	*ACT*	*SMOOTH*

	Requestor Use Read	N/A
2. Utility Installation—In food preparation and warewashing areas, all plumbing and electrical conduit may not be unnecessarily exposed. Horizontal exposed water pipes, sewer lines, or electrical conduit running along floors are not approved and will not be accepted.	❑	❑
3. Condensate Lines—Must stand off of the wall no less than one half of an inch to facilitate cleaning or be sealed to the wall.	❑	❑

B. DOORS AND WINDOWS

All outside openings must be tight-fitting to exclude the entrance of insects and rodents. Service windows at concession stands must be provided with an air curtain, self-closing windows, or other effective means to preclude the entrance of insects. If there are unprotected openings, such as garage type doors, in the customer area, air curtains, self-closing doors, self-closing windows, or other effective means to prevent the entrance of insects must be provided on all entrances to the food handling areas. **This applies to all food establishments, including those at sporting and entertainment venues. This also applies to food establishments that open into an attached structure that has unprotected outer openings.**	❑	❑
Are there any garage-type or bi-folding doors in the customer area?	❑ Yes	❑ No

Opening windows:
Screened ❑ Air curtain ❑ Self-closing ❑

Outside doors:
Screened ❑ Air curtain ❑ Self-closing ❑

Drive thru windows:
Air curtain ❑ Self-closing ❑

C. LIGHTING REQUIREMENTS

Minimum 50 foot-candles of light on all working surfaces and equipment in food preparation, and work surfaces of equipment located under vent hoods.	❑	❑
Minimum 20 foot-candles of light inside reach-in and under-counter refrigerators, at self-service areas where food is sold or offered for consumption, at a distance of 30" from the floor in utensil and equipment storage areas, at all handsinks, in toilet rooms, and areas	❑	❑

	Requestor Use	
	Read	N/A
used for warewashing. (Please take into consideration the location of restroom stall partitions when locating ceiling fixtures.)		
Minimum 10 foot-candles of light at a distance of 30" from the floor in walk-in refrigeration and freezer units, dry food storage areas and in all other areas, including dining during periods of cleaning.	❑	❑
PLEASE NOTE: The standard single light fixture furnished with most walk-in refrigeration and freezer units does not provide the minimum 10 foot-candle power of light required.	❑	❑
Protective shielding for all light fixtures in food preparation, utensil and equipment washing, and other areas where food is stored or displayed. Shatterproof bulbs may be substituted. PAR and LED lamps do not require shielding.	❑	❑

D.	**GARBAGE, REFUSE, & RECYCLING STORAGE FACILITIES**		
	Outdoor storage containers must be stored on concrete or on rolled asphalt. Indoor storage areas must be finished to be easily cleanable.	❑	❑

E.	**VENTILATION**		
	Mechanical ventilation must be provided so that all areas, including restrooms, are kept free from excessive heat, steam, condensation, vapors, or objectionable odors.	❑	❑
	Ventilation systems must be exhausted to the outside air.	❑	❑
	Intake air ducts must be designed and located to prevent the entrance of dust, dirt, insects, exhausted air, etc.	❑	❑
	Ventilation system filters must be readily removable for cleaning.	❑	❑
	Ventilation hoods and devices must be designed to prevent grease or condensate from dripping into food or onto food contact surfaces.	❑	❑
	Fire prevention or extinguishing equipment must be installed so that it does not create a cleaning problem or compromise the integrity of original design of hood. Only vertical lines may be installed within the hood canopy, and must be either chrome plated or sleeved, or fabricated of stainless steel.	❑	❑
	The kitchen exhaust hood must overhang all equipment capable of producing grease vapors, steam, smoke and excessive heat not less than 6" beyond the edge of the cooking surface on all open sides; or be of other approved engineered design.	❑	❑

F.	**TOILET FACILITIES**	**Requestor Use** Read	N/A
	Facilities available to patrons must be accessible without passing through the food preparation, utensil washing, and storage areas.	❑	❑
	Facilities must be installed to comply with the requirements of the Plumbing Code adopted by the respective local jurisdiction	❑	❑
	A minimum of one toilet facility shall be required for employees.	❑	❑
	Toilet facilities must be accessible to employees at all times that the establishment is in operation.	❑	❑
	Easily cleanable receptacles must be provided for waste materials.	❑	❑
	If a toilet room opens directly into a retail food establishment, it must be completely enclosed with a self-closing door.	❑	❑

G.	**EMPLOYEE PERSONAL BELONGINGS**		
	Lockers or other suitable facilities shall be provided and used for employee clothing and other belongings.	❑	❑

H. WATER

Name of water supplier: _____

If private well, give depth and method of water treatment:_____and Water Quality CDPWS ID Number _____

	Hot and cold water under pressure must be supplied to all fixtures.	❑	❑
1.)	Public water systems must comply with all applicable laws, including being serviced by a water operator and maintaining records of chlorine residual, prior to receiving an approval from this Department. Non-public water systems must have:	❑	❑
	a. Residual chlorine ranging from 0.2 to 0.4 mg/liter at any fixture during the final opening inspection. b. Certified lab results for coliform and fecal coliform test. c. A DPD colorimetric drinking water test kit capable of testing free chlorine at an accuracy of 0.1 mg/ liter d. Water supplies under the direct influence of surface water must be filtered using approved equipment	❑	❑

I.	HANDSINKS	Requestor Use	
		Read	N/A
	Handsinks must be readily accessible and conveniently located in all food preparation areas, ware washing areas, bars, wait stations where ice is scooped, and in or immediately adjacent to toilet rooms. Employees must not have to leave their work area to wash their hands.	❑	❑
	Automatic handsinks must be approved. Automatic handwashing facilities may be substituted for handwashing sinks in a food establishment that has at least one additional handwashing sink that is easily accessible.	❑	❑
	All handsinks must be provided with hot and cold or tempered water under pressure. The hot water or tempered water must be at least 85°F.	❑	❑
	Each handsink must be provided with a conveniently located waste receptacle, soap and sanitary toweling or hand-drying device.	❑	❑
	Self-dispensing, spring-loaded, or metering faucets must provide a flow of water for at least fifteen seconds without the need to reactivate.	❑	❑

J.	DESIGN, CONSTRUCTION, AND INSTALLATION OF EQUIPMENT		
	All equipment and utensils must be designed and constructed to be durable and to retain their characteristic qualities under normal use conditions in a commercial setting. Food equipment that is certified or classified for sanitation by an American National Standards Institute (ANSI) accredited certification program is deemed to comply with the requirements.	❑	❑
	All drink ice bins must be provided with protective covers. Waste drain lines may not pass through a drink ice bin.	❑	❑
	Drop-in cold plates in ice machines or jockey boxes are not acceptable.	❑	❑
	If there is no specification sheet available, the equipment will only be accepted upon a field inspection to determine if it meets commercial and ANSI sanitation design criteria.	❑	❑
	Soda gun holsters must indirectly drain to the sewer.	❑	❑
	Running water dipper wells with indirect waste are needed for the storage of frozen dessert utensils.	❑	❑
	Will there be any self-service bulk food bins?	❑ Yes	❑ No

	Requestor Use	
	Read	N/A
If manual dispensing utensils must be used by customers at bulk food bins, the lid must be self-closing, the scoop must be tethered at a length that does not allow the scoop to contact the floor, and protective housing, attached to the bin or adjacent to the bin, must be provided to store the scoop. The access height of product modules must be at least 30" high and the container must be less than 18" deep. (C.R.S. 25-4-1306 Retail Food Store Sanitation Act)	❑	❑
When unwrapped food is placed on display (smorgasbord, salad bars, buffets, etc.), it shall be protected against contamination from customers by easily cleanable sneeze guards, cabinets, display cases, or other effective protective equipment.	❑	❑
Sneeze guards must be constructed and installed to meet current NSF standards.	❑	❑
Laundry facilities, if provided, may not be located in areas with exposed food.	❑	❑
Equipment used for food preparation or storage shall be installed so as to facilitate cleaning around and beneath each unit.	❑	❑
1. Equipment which is placed on tables or counters shall be readily movable, sealed there to or mounted on legs or feet at least 4" high to facilitate cleaning.	❑	❑
2. Floor mounted equipment, unless readily movable (on casters), shall be sealed to the floor, installed on raised platforms of concrete or masonry, or elevated at least 6" above the floor.	❑	❑
3. All floor mounted equipment and the space between adjoining units, and between a unit and an adjacent wall, must be either closed or sealed if exposed to seepage, or have sufficient space to facilitate easy cleaning between, behind and beside equipment.	❑	❑
4. Space requirements: a. Adequate spacing to allow for cleaning behind, above, and along the sides of equipment.	❑	❑
b. Spaced less than or equal to one-thirty second of an inch from equipment, ceilings and walls or sealed.	❑	❑
If equipment is installed on castors with flex fuel lines or quick disconnects, the space requirements listed above are not applicable. Fuel lines must be long enough to allow the equipment to be pulled away from the wall to permit easy cleaning. Equipment on castors must not be fixed in place.	❑	❑

K. CLEANING-SANITIZING OF EQUIPMENT AND UTENSILS (kitchen & tableware)

Requestor Use
Read N/A

1. MANUAL PROCESS
   a. A sink with at least 3 compartments shall be provided for manually cleaning and sanitizing. Sink compartments must be large enough to accommodate the largest piece of equipment or utensil used. ❑ ❑

2. MECHANICAL PROCESS
   a. **Dishmachine**:

   NSF approved ❑ or UL Classified for Sanitation ❑

   Make _____Model_____

   Does this dishmachine use heat ❑ or chemical to sanitize ❑

   Hot water requirements: _____gallons per hour at _____°F rise.

   Bar dishmachine:

   NSF approved ❑ or UL Classified for Sanitation ❑

   Make _____Model_____

   Does this dishmachine use heat ❑ or chemical to sanitize ❑

   Hot water requirements: _____gallons per hour at _____°F rise.

PLEASE NOTE: A direct connection may not exist between a sewage system and a drain originating from a warewashing machine or 3-compartment unless allowed by law. If a law allows the direct connection, the section of the code must be submitted with the plans. ❑ ❑

   b. Dishmachines must automatically dispense detergents and sanitizers. There must be a visual means or a visual or audible alarm to verify that detergents and sanitizers are delivered to the respective washing and sanitizing cycles. ❑ ❑

   c. Drainboards, utensil racks or tables installed for warewashing shall be sized to accommodate all soiled and cleaned items that may accumulate throughout the entirety of the operating period. ❑ ❑

   d. Drainboards must be large enough to accommodate the air drying of sanitized items. ❑ ❑

L. HOT WATER SUPPLY

	Requestor Use Read	N/A
Electric tankless water heater units will only be approved as a dedicated hot water supply to a single hand washing sink.	❑	❑
Please see pages 18 through 23 for calculating the required recovery rate for the water heater.	❑	❑

M. STORAGE AND HANDLING OF EQUIPMENT AND UTENSILS

No storage is allowed under exposed water or sewer lines.	❑	❑
All clean utensils and equipment must be stored at least 6" off the floor.	❑	❑

N. HOT AND COLD FOOD STORAGE

Sufficient mechanical hot and/or cold food storage units must be provided which are large enough to accommodate maximum food storage or holding during peak periods.	❑	❑
Hot holding units must be capable of holding foods at a minimum of 135° F.	❑	❑
Refrigeration equipment, ice baths and/or cooling wands must be provided for the rapid cooling of cooked food products.	❑	❑
All hot and cold holding and/or storage units must be provided with accurate, numerically scaled thermometers.	❑	❑
Refrigeration equipment must be designed and installed so refrigeration equipment can maintain foods below 41° F.	❑	❑
If food is transported to another location, it must be protected from contamination and held at proper holding temperature.	❑	❑

1. REFRIGERATOR AND FREEZER UNITS

Walk-ins must be constructed to NSF standards. Wooden shelves, pallets, or any wooden interior finishes are not permitted. Interior finishes must be smooth, nonabsorbent, and cleanable.	❑	❑
The space between the top of the walk-in and the ceiling must be at least 24", or the unit must be enclosed to the ceiling.	❑	❑

	Requestor Use Read	N/A
Floor drains are prohibited in walk-in coolers unless allowed by law. **Must provide section of code that permits this along with the plans.**	❑	❑
Domestic type reach-in refrigerators and freezers are not acceptable.	❑	❑
Glass door reach-in refrigerators may not be NSF approved for the storage of potentially hazardous foods and may be approved for the storage of bottled and packaged product only.	❑	❑

O. DRY FOOD STORAGE

Food and food products must be stored at least 6" off the floor, dry, and splash free. No storage is allowed under exposed sewer lines.	❑	❑
If the dry storage area is found to be inadequate at the time of operational inspections, more will be required.	❑	❑

P. CHEMICAL STORAGE

All toxic, poisonous materials, including cleaning chemicals, sanitizers, and pesticides must be stored physically separate from food and utensils.	❑	❑

Q. CLEANING EQUIPMENT

A service sink or a curbed cleaning facility must be provided.	❑	❑
Cleaning equipment; mops, brooms, buckets, etc., shall be stored in an area completely separate from food storage, food preparation, utensil washing, and utensil storage areas.	❑	❑
Approved trash can washing facilities must be provided or install the mop sink faucet approximately 36" above the floor.	❑	❑

R. PLUMBING

Vacuum breakers must be provided for submerged/enclosed inlets, hose connections, dishmachine rinse lines, etc.	❑	❑
Vacuum breakers may not be kept under pressure. Therefore, shut-off valves including sprayer nozzles, wye-valves with shut offs, garbage disposal solenoids, etc. may not be located downstream from the vacuum breaker.	❑	❑

	Requestor Use Read	N/A
All enclosed equipment in which food or equipment or utensils are placed shall not be directly connected to the sewer.	❑	❑
All equipment requiring indirect waste lines must be properly drained into floor drains or sinks.	❑	❑
Floor drains or sinks must be easily accessible for cleaning and maintenance. Easily accessible means without the need for tools. This includes those located under refrigerated cases in customer areas.	❑	❑
An ASSE 1022 dual check backflow preventer must be installed on the drinking water supply to all beverage dispensers. If this device is installed on a carbonator not provided with an air-gap, it shall be provided with a screen not less than 100 mesh to 1 inch and shall be installed downstream from any copper plumbing.	❑	❑
If this establishment is not on a public sewage system, an engineered individual sewage disposal system approved by Arapahoe County Public Health or the Colorado Department of Public Health and Environment is required. Will this facility have public sewer service?	❑ Yes	❑ No

S. CONSUMER ADVISORY REQUIREMENTS

The permit holder shall inform consumers of the significantly increased risk of consuming raw or undercooked menu items. All raw or undercooked foods on the menu should be identified by asterisking the food and providing a footnote that states: * These items may be served raw or undercooked, or contain raw or undercooked ingredients. Consuming raw or undercooked meats, poultry, seafood, shellfish or eggs may increase your risk of foodborne illness.	❑	❑
Failure to provide consumers with a consumer advisory will result in a violation and may require a reprint of your menu.	❑	❑

T. REQUIREMENTS FOR REMODELING

If this is a remodel, and the establishment will continue to operate during the remodel, please note that it is a requirement to have an employee restroom that complies with the regulations at all times. A portable restroom may not be used unless it contains a hand sink with hot and cold running water under pressure and all surfaces within are clean and easy to keep clean. If the restroom is not maintained in compliance with the regulations this establishment will be asked to close.

Areas that are being remodeled must be partitioned of with dust proof barriers at all times so that the food may not become contaminated.

Plumbing fixtures within operating areas must be operational and supplied with hot and cold running water and working sewer at all times during the remodeling. Please provide details as to how this is to be done below:

U. REQUESTOR SIGNATURE

Regulations are subject to change. If you wish to change plans that have already been approved, the changes must be submitted in writing to the department for approval. This application must be signed and dated below. Failure to sign this application will delay the review.

Requestor	Title	Date

APPENDIX A

Equipment Installation List					Installation Method					
					Floor Mounted			Counter/ Table-Mounted		
ID # On Plan	Equipment	NSF Approved (Y/N)	New (N) / Used (U)	Plumbing Required (Y/N)	Casters	Legs (at least 6 inches)	Sealed in Place	Portable	Legs (at least 4 inches)	Sealed in Place

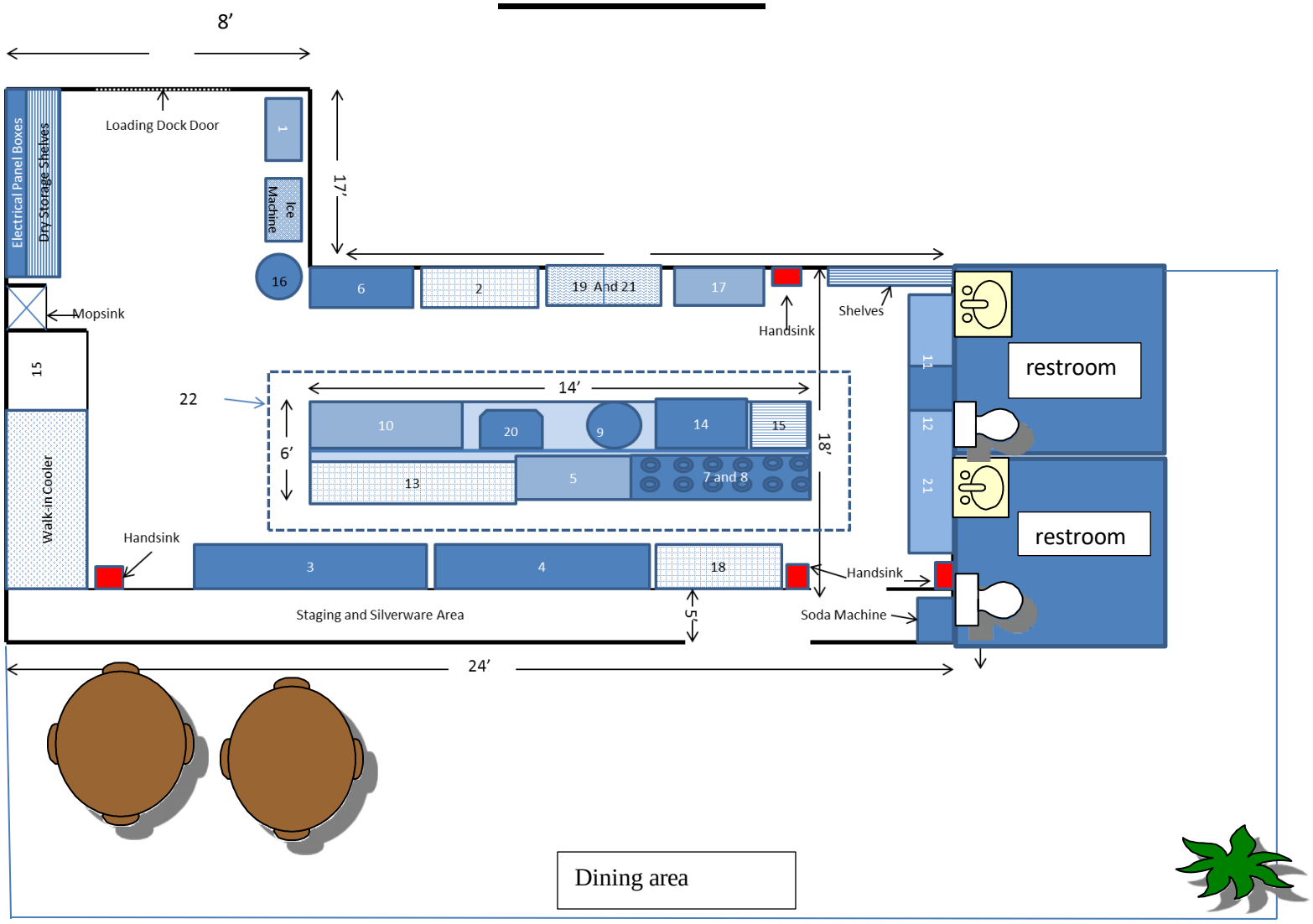
APPENDIX A

EXAMPLE **Equipment Installation List**					**Installation Method**					
					Floor Mounted			**Counter/ Table-Mounted**		
ID # On Plan	**Equipment**	**NSF Approved (Y/N)**	**New (N) / Used (U)**	**Plumbing Required (Y/N)**	**Casters**	**Legs (at least 6 inches)**	**Sealed in Place**	**Portable**	**Legs (at least 4 inches)**	**Sealed in Place**
1	Reach-in Refrigerator	Y	N	N	✓					
2	Reach-in freezer	Y	U	N	✓					
3	Steam Table	Y	N	N		✓				
4	Cold Top Refrigerator	Y	N	Y	✓					
5	Flat Griddle	Y	U	Y	✓					
6	Shelves	N	N	N	✓					
7	Wok Stove	Y	N	Y		✓	✓			
	EXAMPLE									

APPENDIX B

EQUIPMENT LOCATION

EXAMPLE



Number each piece of equipment to correspond to your listing in Appendix A. This must be drawn to scale.

PLEASE NOTE: This is not intended as a model layout, but only to illustrate a procedure for submitting plans and data for approval.

Worksheets for Calculating Minimum Water Heater Requirements

The following worksheet is provided to assist operators in calculating hot water demand and sizing of the water heater system required for the operation.

Standard Tank Type Systems (see page 22 for tankless or instantaneous water heaters):

I. **Calculate Total Hot Water Demand Required By All Fixtures:**

A. Three compartment sink calculation of hot water demand:

1. Measure dimensions, in inches, of a sink basin; if all compartments are the same dimensions, and insert into the equation below.

Basin length: _____" Basin width: _____" Basin depth: _____"

[(sink basin length) x (sink basin width) x (sink basin depth) x 3 x 0.375] ÷ 231 = _____GPH

Note: If the sizes of the sink basins are not equal, use the formula below to calculate the hot water demand for each sink basin, and total the GPH's for all three sink basins for the hot water demand for the three compartment sink:

[(sink basin #1 length) x (sink basin #1 width) x (sink basin#1 depth) x 0.375] ÷ 231 = _____ GPH #1

[(sink basin #2 length) x (sink basin #2 width) x (sink basin#2 depth) x 0.375] ÷ 231 = _____GPH #2

[(sink basin #3 length) x (sink basin #3 width) x (sink basin#3 depth) x 0.375] ÷ 231 = _____GPH #3

(GPH of sink basin #1) + (GPH of sink basin #2) + GPH of sink basin #3) = _____GPH total

Note: If a handheld sprayer is located over a basin(s) of the 3-compartment sink, the minimum hot water needed for the 3-compartment sink is 16 gph unless the calculation in section above exceeds 16 gph.

Enter number into the attached "Table to Calculate Total Hot Water Demand of All Fixtures," found on page 20.

B. Utensil soak sink

1. Measure dimensions, in inches, of the sink, and insert into the equation below:

[(sink basin length) x (sink basin width) x (sink basin depth) x 0.375] ÷ 231 = _____GPH

Enter number into the attached "Table to Calculate Total Hot Water Demand of All Fixtures," found on page 20.

C. Dishmachine and conveyor pre-rinse water usage:

Use manufacturer's rating in gallons per hour. Enter number into attached "Table to Calculate Total Hot Water Demand Required By All Fixtures," found on page 20.

D. Clothes washer water usage.

- Use manufacturer's rating: _____, or
- 32 GPH for 9-12 pound washer, or
- 42 GPH for 16 pound washer.

Enter number into the attached "Table to Calculate Total Hot Water Demand of All Fixtures," found on page 20.

II. Calculate Maximum Hourly Hot Water Usage

If gas water heater is used go to Step A; if electric, Step B.

A. **Gas Water Heater Altitude Adjustment:** If a gas water heater is to be used, calculate the maximum hourly hot water demand for the facility by adjusting the total water required by all fixtures for altitude. The altitude adjustment is 4% per 1000 feet of elevation, or 20% at 5000 feet.

Use the following equations to determine the maximum hourly hot water demand when a gas powered water heater is to be used:

Altitude-adjusted total hourly hot water demand =

[(0.04 x (elevation of facility) ÷ 1000) + 1] x [hourly hot water demand of all fixtures]

Example, if the total gallon per hour usage for an establishment at an elevation of 5000 feet is 100 GPH, a water heater with 120 GPH recovery rate would be required.

Use this value in the equation to calculate the minimum BTU rating of the water heater.

B. **Electric Water Heater:** If an electric water heater is to be used, the maximum hourly demand for the operation is the same as the total water required by all fixtures. Use this value in the equation to calculate the minimum Kilowatt (KW) rating of the water heater.

III. Calculate the minimum BTU or Kilowatt rating of water heater:

A. For gas water heater, calculate the minimum BTU rating (use gallons per hour and degree rise from tables on page 20):

$$\frac{\text{(max hourly demand as calculated above) x (°F rise*) x (8.33)}}{0.80 \text{ or use manufacturer's thermal efficiency}} = \text{minimum BTU rating} = \_\_\_\_\_ \text{BTU's}$$

B. For electric water heater, calculate the minimum Kilowatt rating (use gallons per hour and degree rise from tables on page 20):

$$\frac{\text{(max hourly demand as calculated above) x (°F rise*) x (8.33)}}{3412} = \text{minimum kW rating} = \_\_\_\_\_ \text{kW}$$

*Degree rise can be used to determine hot water demands of a specific fixture based on an incoming water temperature of 45° F. Handsinks and showers may be calculated using a 65° F rise, dishmachines may be calculated based on the specifications for required incoming water temperature and all other fixtures may have a 75° F rise.

C. Select water heater based upon BTU or Kilowatt rating.

Manufacturer: _____; Model #: _____

BTU or Kilowatt Rating: _____Thermal Efficiency _____%

Tables to Calculate Total Hot Water Demand of All Fixtures.

Plumbing Fixture	Water Usage (gallons per hour)	Number of Fixtures	Maximum Hourly Hot Water Demand Per Type of Fixture (gallons per hour)
***example**: dishwashing machine*	*50*	*1*	*50*
***example**: handsink(s)*	*5*	*4*	*(5 x 4 =) 20*
Target Temperature of 120° F (75°F rise)			
3-compartment sink (kitchen)			
3-compartment sink (bar)			
Utensil soak sink			
Mop/utility sinks	7		
Garbage can washer	35		
Clothes washer			
Hand operated pre-rinse sprayer*	16		
Hose bib used for cleaning (if used while in operation)	35		
Total hot water demand (GPH) @75° F rise			
Use Manufacturers specifications (required incoming water temperature - 45° F = degree rise)			
Kitchen Dishwashing machine			
Bar Dishwashing machine			
Total hot water demand (GPH) @ ° rise			
Target Temperature of 95° F (50° F rise)			
Showers*	14		
Hand washing sinks (including restrooms)*	5		
Total hot water demand (GPH) @ 65° F rise			

*A hot water demand reduction may be calculated for water saving devices used on hand operated pre-rinse sprayers, hand washing sinks and showers by utilizing the calculations on page 21.

Water Savings Device

I. Obtain manufacturer's flow rate for each device. The manufacture's flow rate must be less than what is listed below to be considered:

A. Hand operated pre-rinse sprayers with flow rate less than 3.5 GPM standard flow rate.

Manufacturer: _____; Model #: _____

Manufacturer's Flow Rating: _____GPM

B. Hand washing sink faucet or aerator with flow rate less than 2.2 GPM standard flow rate.

Manufacturer: _____; Model #: _____

Manufacturer's Flow Rating: _____GPM

C. Shower head with flow rate less than 2.5 GPM standard flow rate.

Manufacturer: _____; Model #: _____

Manufacturer's Flow Rating: _____GPM

II. Use the following equation to determine the reduced hourly hot water usage for each of the three types of fixtures:

(		x		) ÷		=	
Manufacturer's flow rate		Water use value from Table to Calculate Total Hot Water Demand of All Fixtures on page 20		GPM standard flow rate		New water use value to be entered into Table to Calculate Total Hot Water Demand of All Fixtures on page 20	

Example calculation for a hand washing sink that has an aerator with a manufacturer's flow rate of 0.5 gpm:

(	0.5 GPM	x	5 GPH	) ÷	2.2 GPM	=	1.14 GPH
Manufacturer's flow rate		Water use value from Table to Calculate Total Hot Water Demand of All Fixtures on page 20		GPM standard flow rate		New water use value to be entered into Table to Calculate Total Hot Water Demand of All Fixtures on page 20	

1.14 GPH would be entered into the "Table to Calculate Total Hot Water Demand of All Fixtures," found on page 20 in place of the 5 GPH for hand washing sinks.

Tankless or On-Demand Systems

I. **Calculate the total hot water demand flow rate in Gallons Per Minute (GPM) using this table.** If the heater manufacturer has sizing, installation and system design criteria, then their criteria may be used as long as they have been previously submitted and approved by the department. Otherwise, use the following to calculate hot water demand.

Plumbing Fixture	Hot Water Usage (gallons per minute)	Number of Fixtures	Hot Water Demand Flow Rate in Gallons Per Minute
example: dishwashing machine †Hobart AM 14	*8.0*	*1*	*(8.0 x 1) = 8.0*
example: handsink(s)	*0.5*	*4*	*(0.5 x 4) = 2.0*
3-compartment sink (kitchen)*	2.0		
3-compartment sink (bar)*	2.0		
Utensil soak sink	1.0		
Kitchen Dishwashing machine†			
Bar Dishwashing machine †			
Clothes washer	2.0		
Hand operated pre-rinse sprayer*	2.0		
Food preparation sink(s) *	1.0		
Hand washing sinks (including restrooms) *	0.5		
Mop/Utility sinks	2.0		
Garbage can washer	1.0		
Showers*	1.0		
Hose bib used for cleaning	5.0		
Total Hot Water Demand (GPM) required:			

*A flow rate reduction can be used for low flow water faucets installed on 3-compartment sinks, hand operated pre-rinse sprayers, food preparation sinks, hand washing sinks and showers by entering the manufacturer's flow rate listed for the faucet or faucet's aerator.

†Use manufacturer's flow rate in GPM for specific make and model of dishwashing machine.

II. Calculate the maximum hot water flow rate for the establishment.

The thermal efficiency of the water heating units must be adjusted for altitude. The altitude adjustment is 4% per 1000 feet of elevation, or 20% at 5000 feet.

Use the following equation to determine the establishment's maximum flow rate in GPM:

(0.04 x _____ ÷ 1000) + 1 = _____
elevation of facility — adjustment factor

_____ x _____ = _____
adjustment factor — total hot water demand of all fixtures calculated in I — maximum GPM hot water usage

Use calculated maximum GPM hot water usage value in this equation to determine the minimum number of heating units that will be required in III below.

III. Determine the number of heating units that will be needed to meet the required flow rate.

_____ ÷ _____ = _____
maximum demand (GPM) calculated in II — manufacturer's flow rate in GPM @ 95ºF or 75°F — number of heating units required*

*Multiple units must be installed and plumbed to operate in a parallel configuration.

IV. Storage Tank Sizing:

If a dishwashing machine(s)* is to be installed, the on-demand water heating system must include a storage tank or recirculation line between the heaters and the dishmachine. The storage tank must be at least 25 gallons or at least 25% of the total hot water demand using gallons per hour (GPH) from page 20. The larger value of the two is the required storage tank size.

Total hot water demand: _____ x 0.25 = _____storage tank capacity in gallons

Calculated Storage Tank Capacity: _____ vs. 25 Gallons Storage Tank

Enter the larger of the two:_____ Required Storage Tank Capacity**

*High temperature, heat sanitizing dishwashing machines must be provided with a separate booster heater. Use of an instantaneous unit is not allowed for use as a booster heater.

**The storage tank must be installed in the hot water supply line located between the heater unit(s) and the hot water distribution line. If the tank is not heated, a recirculation line and aquastat, (water thermostat) must be installed at the storage tank to assure the water in the tank remains at the appropriate temperature (120-140°F). The recirculation line must be connected between the storage tank and the cold water supply line at the heater unit(s).

V. Heater Specifications:

Manufacturer: _____Model Number: _____

Flow Rate in Gallons Per Minute (GPM) at 95ºF rise**:_____GPM

BTU Rating: _____BTU

** If there are no high temperature dishwashing machine or other fixtures requiring input water temperature of 140°F (95°F rise) or more, then 75°F rise can be used.