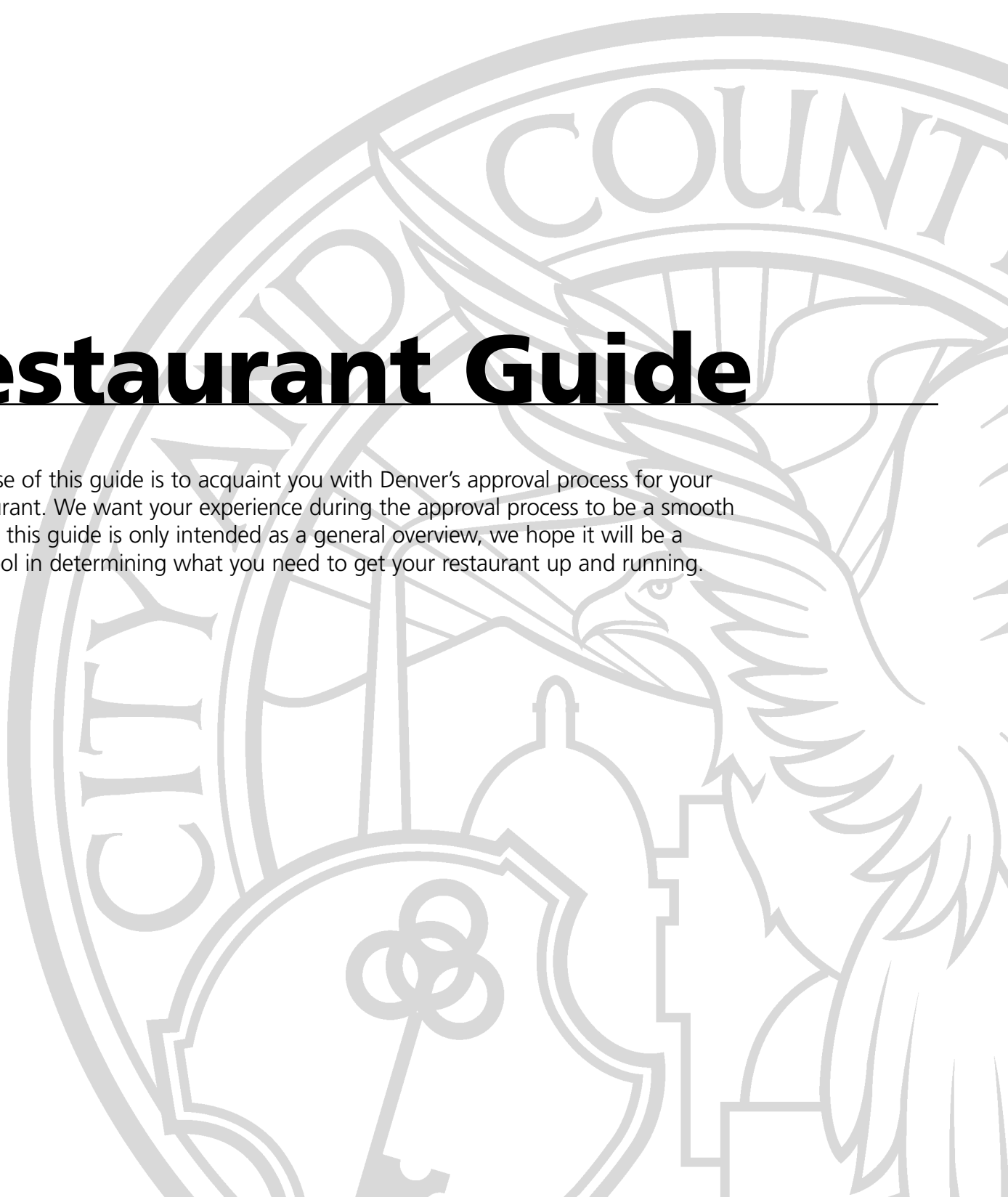


City & County of Denver
Community Planning & Development Agency
Building Inspection Division
201 W Colfax Ave. Dept. 205
Denver, CO 80202
Phone: 720.865.2832 (Don Peluso)
Fax: 720.865.2880
www.DenverGov.org

Restaurant Guide

The purpose of this guide is to acquaint you with Denver's approval process for your new restaurant. We want your experience during the approval process to be a smooth one. While this guide is only intended as a general overview, we hope it will be a valuable tool in determining what you need to get your restaurant up and running.



Licensing

All restaurants in the City and County of Denver require a business license from the Excise and License Department. If you're anticipating a restaurant purchase or change of license status (for example: change of ownership, adding space, adding or changing alcohol or entertainment services), you begin by going to Excise and License. They will explain the license(s) needed, the application, and approval process.

A restaurant and/or liquor license application requires information about yourself, the type of restaurant and the type of license(s) you're applying for. After collecting this information, Excise and License will send you to the Zoning Administration to see if you need a Use Permit. You will also receive an "Approval Card" for Excise and License which will have to be signed by Denver's Health and Hospitals, Building Inspection, Zoning Administration, and Fire Department. Inspectors from these departments will inspect the premises and sign the card to indicate their approval. Once you've got the Use Permit and signatures, and Excise and License approves the application, you're in business.

In some cases, a department might withhold its approval because issues are identified, and you'll need to address those issues. Liquor license applications usually have additional requirements.

After receiving a license, it is renewed annually. City departments will inspect your restaurant regularly to make sure it is operated in a safe and sanitary manner.

Permitting

Construction in your new restaurant requires permits from the Building Inspection Department, and perhaps other city departments as well. Construction typically involves remodeling the interior space or changing the facilities to meet your needs. There is a three-phase approval process: developing a set of plans, getting permits, and field inspections.

A. Plans You need a licensed Colorado architect or engineer to develop a set of plans of the proposed construction work. Construction must be done in accordance with present city codes. There are procedures which allow you to request a variance if you don't have the capability to construct everything to code. In brief, requirements to meet code and areas to examine can include:

- Handicapped Accessibility
- Structural Integrity
- Bathrooms and Plumbing
- Fire Protection
- Electrical
- Ventilation
- Exiting
- Grease Traps
- Range Hoods and Vent Systems
- Size and Location of Kitchen Equipment and Food Preparation Areas
- Approximately Sized and Located Cleaning/Sanitary Equipment

B. Permits Construction Permits based on your plans are issued by the Building Inspection Department. Before submitting your plans to Building, check with Zoning to see if a Use or Construction Permit (Form 21) is required. Plans are submitted to the Building Inspection Department. They will assist you in coordinating the responses from the Fire Prevention, Health and Hospitals, and Wastewater Management Departments. When plans are approved, you receive the permit(s) and you can start construction.

C. Inspections Inspections are required during and after construction to insure the work represents the approved plans. When all the inspectors have signed off on the Inspection Card, you've completed the permitting process.

Summary

We want you to have a successful business. While this guide is organized by Licensing and Permitting, both approval processes typically occur together. It is essential that you contact the departments listed for further information. If you're planning to buy an existing restaurant, call Health and Hospitals at 720-865-5479 for a courtesy inspection. They can tell you if changes need to be made to meet health codes, which can save you money and time. Good luck!

Contacts

Denver Excise and License

201 W. Colfax Ave. Dept. 206
Denver, CO 80202
Business Licenses: 720.865.2740
Fax: 720.865.2760

Denver Building Inspection Division

201 W. Colfax Ave. Dept. 205
Denver, CO 80202
Don Peluso: 720.865.2832

Denver Zoning Administration

201 W. Colfax Ave. Dept. 205
Denver, CO 80202
720.865.3000

Denver Fire Prevention Bureau

Main Office: 745 W. Colfax Ave.
Denver, CO 80202
720.913.3414

Wastwater Management Division

Main Office: 2000 W. 3rd Ave.
Denver, CO 80223
303.446.3759

Automated Inspection Requests:

720.570.2501

Inspections/Administration Desk:

720.865.2500

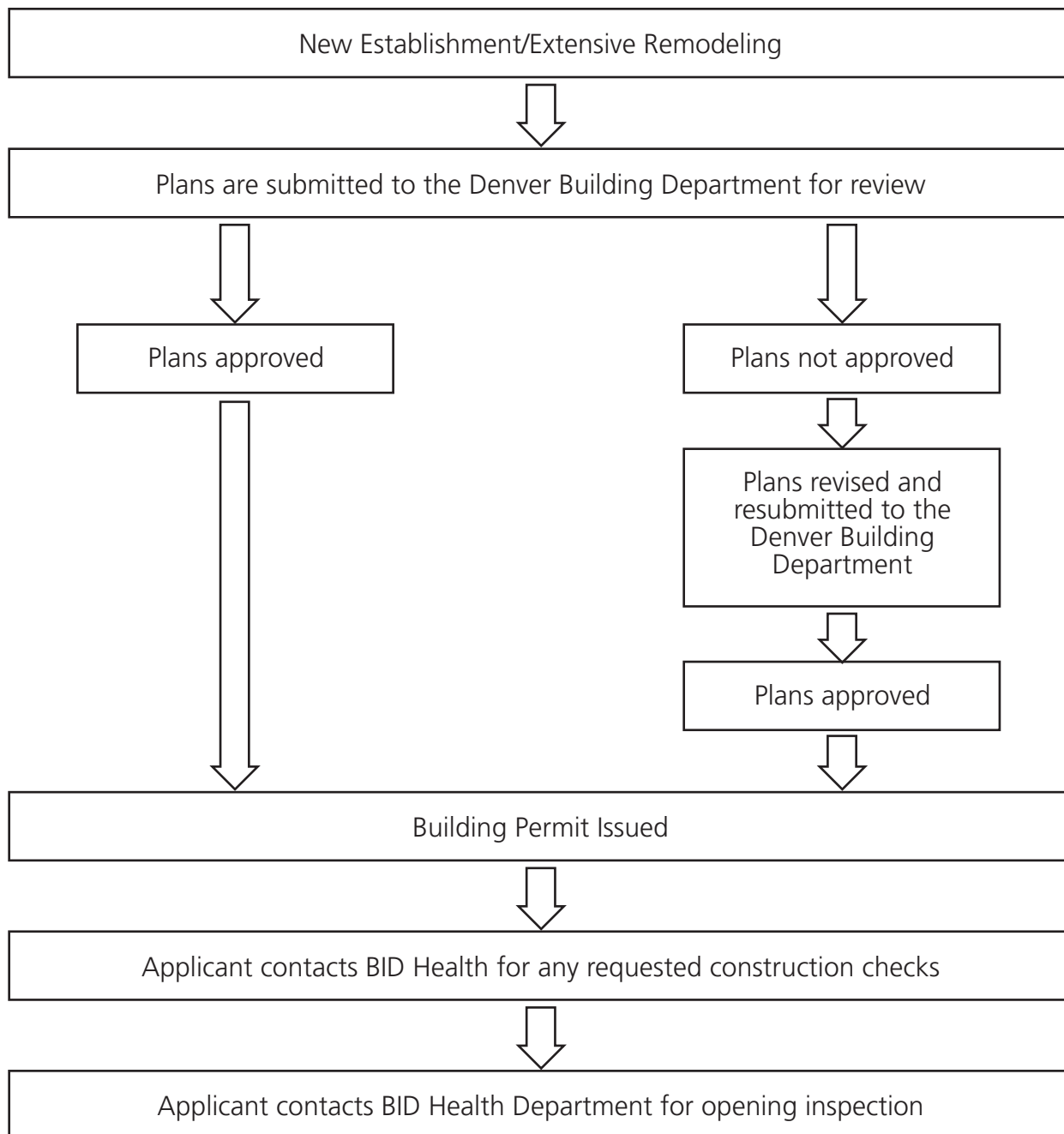
For State and Federal requirements, call the State's Small Business Hotline:

303.592.5920

APPENDIX C - Plan Review Application Template

The Denver Revised Municipal Code requires complete plans and specifications to be submitted to, and be reviewed and approved by, the Denver Building Department prior to starting construction. The plan review application fee must be paid at the time the plans are submitted for review. The submitted application must be complete and accurate; plans must be drawn to scale and must include details as outlined in the application, supporting specifications and required schedules for the Denver Building Department to conduct the required review. Failure to provide complete, accurate information will delay review and approval of the plans.

Plan Review Process Flow Chart



Name of Establishment: _____ Phone: _____
Address: _____ Cell: _____
City: _____ State: _____ Zip: _____
Email: _____ Fax: _____

Name of Operator (owner): _____ Phone: _____
Address: _____ Cell: _____
City: _____ State: _____ Zip: _____
Email: _____ Fax: _____

Local Contact: _____ Phone: _____
Address: _____ Cell: _____
City: _____ State: _____ Zip: _____
Email: _____ Fax: _____

Name of Architect: _____ Phone: _____
Address: _____ Cell: _____
City: _____ State: _____ Zip: _____
Email: _____ Fax: _____

Name of Contactor: _____ Phone: _____
Address: _____ Cell: _____
City: _____ State: _____ Zip: _____
Email: _____ Fax: _____

Check boxes for individuals to receive copies of BID Health Department plan review letters and other correspondence.

Date Construction Will Begin: _____ Date of Planned Opening: _____

New Establishment: Yes No

Remodel: Yes No

Type of establishment (check all that apply):

Full Service

Bar

Convenience Store

Deli

Caterer

School

Fast Food

Other (please specify) _____

Coffee Shop

Market (Grocery)

Fish Market

Meat Market

Concession

Specialty Shop

Manufacture with Retail Sales

Seating Capacity—Indoor: _____ Outdoor: _____

Total Square Feet in Establishment: _____ Total Square Feet in Kitchen Area: _____

Square Feet of the Food Preparation and Dishwashing: _____

Linear Feet of Dry Storage Shelving: _____

Square Feet of Retail Sales Area (Markets): _____

If the establishment is to operate in a multi-story structure please indicate on which floors satellite food and beverage operations will be conducted and where storage areas are to be located:

Have these plans been submitted, or do you intend to submit these plans to other counties in the State of Colorado? Yes No If yes, which counties? _____

If operation is seasonal, list the months of operation: _____

Days and Hours of operation: Days: _____ Hours: _____

Projected daily maximum number of meals to be served: Breakfast: _____ Lunch: _____ Dinner: _____

Number of Staff (maximum per shift): _____

The following documents are necessary and must be included in order to complete the plan review. Lack of complete information may delay review plan approval.

- I. Menu and Food Handling**
 - A. Proposed menu, procedure manuals, standard operating procedures (SOPs) and a description of how food and equipment temperatures will be monitored, descriptions of proposed cooling, reheating, and thawing processes.
 - B. Employee hygiene plan. Include sick employee policies, glove use, wound care.
 - C. Descriptions of specialized operations including catering, cooling of hot foods, produce preparation and vacuum packaging.

- II. Floor Plan**
 - A. Plan must be drawn to scale.
 - B. Plan must show the locations of all rooms, locations of equipment and fixtures, floor sinks and floor drains.
 - C. Finish schedule for each room in the establishment.

- III. Equipment Specifications**
 - A. Specifications for equipment and fixtures, shop drawing of custom made or fabricated equipment and cabinets.
 - B. Refrigeration and hot food holding equipment.
 - C. Specifications for food display equipment.
 - D. Specifications for dump sinks, food preparation sinks, garbage disposals and dish washing equipment.
 - E. Description of how equipment is to be installed.

- IV. Plumbing, mechanical and electrical plans and schedules.**
 - A. Plumbing plans showing locations of floor sinks and drains, hand sinks, dishwashing sinks, preparations sinks, dump sinks, mops sinks, water heaters and how equipment is plumbed to water and drained to sewer.
 - B. Details as to how sinks, fixtures and equipment are to be drained to sewer.
 - C. Water heating systems specifications including BTU / KW ratings, recovery rate and piping diagrams.
 - D. Mechanical plans showing all exhaust hoods, exhaust vents and all supply air diffusers.
 - E. Electrical plans including a reflective ceiling plan showing types and location of lighting fixtures.

- V. Premises Plan**
 - A. Indicates location of the business in the building and the location of the building on site including alleys, streets and the location of any outside facility such as dumpsters, walk-in units and grease interceptors.

- VI. Location of chemical and personal belongings storage.**

I. Menu and Food Handling Process

- A.** Submit Menu. Include appetizers, entrees, lunches, dinners, sides, salads and beverages.
- B.** Are there Standard Operating Practices (SOP), a Hazard Analysis Critical Control Point (HACCP) plan or a Food Handling Procedure Manual available that describes preparation, cooling, reheating, cooking of foods and the handling of leftovers?
 Yes No If yes, please submit with plans.
- C.** Please describe how the temperature of potentially hazardous foods will be monitored. Detail frequency of temperature checks, what foods and/or equipment will be monitored. Please attach copies of logs that will be used to help manage proper food temperatures.

- D.** List the foods that will be prepared more than 12 hours in advance of service. Include foods that are made from scratch such as soups, sauces, potato salad, pasta salads, chili, pasta noodles, roasts, casseroles, etc.

- E.** Will potentially hazardous foods be cooled to 41°F (5°C) or below? Yes No If yes, please explain how they will be cooled:

Technique:

Indicate the size of and the material of the containers that food will be placed in during cooling.

Are foods covered during the cooling process? Yes No

Please describe how cooling processes are going to be monitored.

- F.** Will potentially hazardous foods be reheated and then held hot before being served?

Yes No. If yes, please explain how they will be reheated to above 165°F (74°C):

List the equipment that will be used for reheating:

Please describe how reheating processes are going to be monitored.

Please list the foods that are to be held hot at or above 135°F (57°C).

- G.** Describe how frozen foods will be thawed. In a refrigerator, under running water, cooking process, or microwave?

- H.** Attach copies of policies or describe procedures that will be used to exclude or restrict workers who are ill. The policies or procedures need to describe when ill workers will be excluded or restricted due to illness or infection, need to outline when exclusions and restrictions are to be lifted and the controls that will be implemented when workers return to work.
- I.** Attach copies of policies or describe procedures that will be used to address restrictions and management of workers that have cuts, burns or other open sores on their hands and arms.
- J.** Attach copies of policies or describe procedures that will be used to prevent bare hand contact with ready to eat foods.

- K.** Will raw meats, poultry, or seafood be stored/displayed in the same refrigerator(s) and freezer(s) with cooked, ready-to-eat foods? Yes No If yes please indicate on the plans which refrigerator(s) and freezer(s) will be used for this storage.

- L.** Will catering be conducted? Yes No
- M.** Will food be transported or delivered to another location? Yes No If yes, please list the equipment that will be provided to maintain food at proper temperatures during transport.

- N.** Will foods such as Caesar salads, steak Diane or desserts be prepared tableside in dining areas? Yes No If yes please list the foods that are intended for tableside preparation.

- O.** Will a salad bar, buffet line, omelet station, sauté station, beverage bar or customer self service areas be operated? Yes No If yes please indicate location(s) on floor plan.
- P.** Will food product used in the establishment be washed in the establishment, or will all product be received pre-washed?

- Q.** Will vacuum packaging or reduced atmospheric packaging be conducted in the establishment? Yes No If yes, please provide specifications sheets for the equipment that will be used and a copy of the required HACCP plan for each category of food to be processed in this manner.
- R.** Will the establishment prepare foods that will be sold wholesale? Yes No If yes please list the foods that are intended for wholesale.

III. Equipment Specifications

A. Submit equipment specification sheets, including make and model numbers of the equipment. If the specification sheet lists more than one piece of equipment, identify the specific equipment to be used. **If there is no specification sheet available, the equipment will only be accepted upon a field inspection to determine if it meets commercial design criteria.**

B. Submit shop drawings of all custom fabricated equipment and cabinetry. Drawn to scale.

C. Refrigeration/Freezer Capacities - Complete the following table:

TYPE OF UNIT	# OF UNITS PROVIDED	TOTAL CUBIC FEET
Walk-in Refrigeration		
Walk-in Freezer		
Reach-in Cooler		
Open Top Sandwich Cooler		
Reach-in Freezer		
Blast Chiller		
Retail Display		
Other		

D. Hot Food Holding Capacities

TYPE OF UNIT	# OF UNITS PROVIDED	TOTAL CUBIC FEET
Steam Tables		
Hot Box		
Cook & Hold Units		
Other		

E. Displayed Food Items:

- Will bulk food items such as candy, trail mix, etc. be sold in a retail manner to the public?
 Yes No. If yes, submit equipment specifications for bulk food bins. Indicate location of bulk food sales on floor plan. Include all vendor-provided bulk dispensing equipment. (See Appendix I for bulk food dispensing criteria)
- Food shields and sneeze guards. Submit the type and location(s) If custom design, please submit shop drawings.

F. Indicate the locations of drink dump sink(s) and/or knock boxes(s) installed in bars, coffee bars, wait and bus stations where soiled drink glasses, cups and coffee grounds baskets will be dumped and pre-scraped prior to dishwashing. The first compartment of a 4-compartment bar sink may be utilized as a dump sink.

F. Indicate the locations of drink dump sink(s) and/or knock boxes(s) installed in bars, coffee bars, wait and bus stations where soiled drink glasses, cups and coffee grounds baskets will be dumped and pre-scraped prior to dishwashing. The first compartment of a 4-compartment bar sink may be utilized as a dump sink.

G. Is a food preparation sink provided? Yes No. If yes please attach a specification sheet for the sink(s) and provide the following information.

- ID or code(s) on plans: _____
- Length x width x depth of sink's compartment(s): _____
length x width x depth
- Length of drainboard(s): _____ in. _____ in.

H. Is a garbage disposal provided? Yes No If yes, indicate number to be provided and their location(s):

I. Submit the following dishwashing information:

- Manual - Include the size of each compartment (length x width x depth) for each 3- compartment utensil washing sink that will be provided in the establishment. Also indicate the length of the drainboards attached to the 3-compartment sink. Indicate if a pre-rinse spray hose will be installed at each sink.

_____	_____ in.	_____ in.	_____ in.	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>ID or code on plans</i>	<i>length of left drainboard</i>	<i>length x width x depth of each sink compartment</i>	<i>length of right drainboard</i>	<i>Pre-rinse hose</i>
_____	_____ in.	_____ in.	_____ in.	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>ID or code on plans</i>	<i>length of left drainboard</i>	<i>length x width x depth of each sink compartment</i>	<i>length of right drainboard</i>	<i>Pre-rinse hose</i>
_____	_____ in.	_____ in.	_____ in.	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>ID or code on plans</i>	<i>length of left drainboard</i>	<i>length x width x depth of each sink compartment</i>	<i>length of right drainboard</i>	<i>Pre-rinse hose</i>
_____	_____ in.	_____ in.	_____ in.	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>ID or code on plans</i>	<i>length of left drainboard</i>	<i>length x width x depth of each sink compartment</i>	<i>length of right drainboard</i>	<i>Pre-rinse hose</i>

- **PLEASE NOTE:** If the establishment does not have a 3-compartment dishwashing sink, the dishwashing machine must be large enough to accommodate the largest piece of equipment or utensils used. Furthermore, if the dishwashing machine malfunctions, the establishment may be asked to close.

Mechanical - Include the make, model number, and attach a specification sheet(s) of each dishwashing machine that will be provided in the establishment. Please indicate if the machine(s) are heat or chemical sanitizing. If a booster heater is provided with the machine, submit the make, model number, BTU or kW rating, and recovery rate of the booster heater, as well as the distance between the dishwashing machine and the booster heater. Also, indicate the length of the drainboards attached to the dishwashing machines, and if a pre-rinse spray hose and slop sink are provided.

	Machine #	Machine #	Machine #
	_____	_____	_____
Make:	_____	_____	_____
Model #	_____	_____	_____
How does Machine Sanitize?	Heat / Chemical	Heat / Chemical	Heat / Chemical
Booster Heater Provided?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Make of Booster:	_____	_____	_____
Model #	_____	_____	_____
KW/BTU	_____	_____	_____
Distance from Machine	_____ ft.	_____ ft.	_____ ft.
Length of Left Drainboard	_____ in.	_____ in.	_____ in.
Length of Right Drainboard	_____ in.	_____ in.	_____ in.
Pre-Rinse Spray Hose Provided?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Utensil Soak Sink Provided?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
• If yes, Indicate:	_____	_____	_____
	<i>length x width x depth</i>	<i>length x width x depth</i>	<i>length x width x depth</i>

D. Provide the following water heater information:

- Provide a piping diagram for the water heater(s) installation. The diagram must show cold and hot water inlets and outlets, storage tanks, re-circulating pumps and aqua stats that may be installed.
- See Appendix D for criteria for sizing water heating systems.
- Number of water heaters or water heating systems to be installed: _____. If more than one water heater is to be installed indicate what fixtures each heater or system will service.

- Standard Tank Type Heater:

Make: _____ ; Model #: _____

BTU or Kilowatt Rating: _____

Recovery rate: _____ gallons per hour at 100°F rise at sea level.

- Heat reclaim systems:

Make: _____ ; Model #: _____

BTU Rating: _____

Recovery rate: _____ gallons per hour at 100°F rise at sea level.

- Instantaneous/tank-less systems Manufacturer: _____

Model #: _____

Flow Rate in Gallons Per Minute (GPM) at 100°F rise: _____ GPM

BTU Rating: _____ BTU

Storage tank capacity in gallons: _____

V. PREMISES:

Submit a site plan which includes the following:

- Refuse enclosures and trash compactors.
- Outside walk-in cooler(s) / freezer(s).
- Location of wells, water supply line servicing the building.
- On site waste water treatment systems and sewer lines servicing the building.
- Grease interceptors.
- Streets, alley ways, parking areas.
- Outside storage areas.

VI. CHEMICAL AND PERSONAL ITEM STORAGE:

- A.** Submit the proposed locations where bulk supplies of cleansers, detergents, sanitizers, and other toxics will be stored.
- B.** Submit the proposed location where employees' coats, hand bags, and other personal belongings will be stored.

APPENDIX D - Worksheets for Calculating Minimum Hot Water Requirements

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

What is the distance between the water heating system(s) and the fixture that is farthest from the heating system?

Fixture: Feet from water heating system: _____

Standard Tank Type Systems:

I. Calculate Total Water Required By All Fixtures:

A. Three compartment sink calculation of water usage:

1. Measure dimensions, in inches, of each compartment, if compartments are not the same dimensions see note below.

Length = _____ Width = _____ Depth = _____

2. Insert measurements into equation:

$$\left(\frac{\text{length}}{\text{length}} \times \frac{\text{width}}{\text{width}} \times \frac{\text{depth}}{\text{depth}} \times 3 \times 0.5 \right) \div 2.31 = \frac{\text{water usage}}{\text{water usage}} \text{ GPH}$$

Note: If all the compartment sizes of the sink are not the same, then 3 is taken out of the equation, and the above calculation is done for each compartment. The volumes are added to obtain the total gallons per hour of hot water used in the sink.

Enter number into the attached "Table to Calculate Total Water Required By All Fixtures," **found on page Appendix D-4.**

B. Utensil soak sink

1. Measure dimensions, in inches, of the sink

Length = _____ Width = _____ Depth = _____ GPH

2. Insert measurements into equation:

$$\left(\frac{\text{length}}{\text{length}} \times \frac{\text{width}}{\text{width}} \times \frac{\text{depth}}{\text{depth}} \times 0.5 \right) \div 2.31 = \frac{\text{water usage}}{\text{water usage}}$$

Enter number into the attached "Table to Calculate Total Water Required By All Fixtures," **found on page Appendix D-4.**

C. Dish machine and conveyor pre-rinse water usage:

1. Use manufacturer's rating in gallons per hour. Enter number into attached "Table to Calculate Total Water Required By All Fixtures," found on page Appendix D-4.

2. 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 Water Required By All Fixtures," found on page Appendix D-4.

D. "Calculate Total Water Required By All Fixtures" and the number of fixtures in the operation to determine maximum hourly usage for each type of fixture in the operation.

Total water (GPH) required by all fixtures: _____ GPH.

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: If a gas water heater is to be used, calculate the maximum hourly hot water usage for the facility by adjusting the total water required by all fixtures for altitude. The altitude adjustment factor for Denver is 1.2.

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

$$\frac{\text{adjustment factor}}{\text{by all fixtures}} \times \frac{\text{total water required}}{\text{hot water usage}} = \frac{\text{maximum hourly}}{\text{GPH}}$$

Example, if the total gallon per hour usage for an establishment at an elevation of 5000 feet is 100 GPH, the adjustment factor is 1.2. Therefore, 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 usage 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.

C. Insert the value determined in Step A or B above into III D (3), **Appendix C, Plan Review Form, Page Appendix C-6**. This value is the minimum recovery rate of the water heater which should be provided for the facility.

D. Heat reclaim systems:

Brand of water heater: _____ ; Model number: _____

BTU Rating: _____

Recovery rate: _____ gallons per hour at 100°F rise at sea level.

Table to Calculate Total Water Required For All Fixtures.

Plumbing Fixture	Water Usage (gallons per hour)	Number of Fixtures	Maximum Hourly Water Usage Per Type of Fixture (gallon per hour)
<i>example: dish-washing machine</i>	50	1	50
<i>example: hand-sink(s)</i>	5	4	(5 x 4 =) 20
3-compartment sink			
3-compartment sink (bar)			
Utensil soak sink			
Dishwashing machine			
Dishwashing machine conveyor pre-rinse			
Clothes washer			
Hand operated pre-rinse sprayer*	32		
Hand washing sinks (including restrooms)*	5		
Mop/utility sinks	7		
Garbage can washer	35		
Showers*	14		
Hose bib used for cleaning	35		
Total water (GPH) required by all fixtures:			

*A hot water use reduction can be calculated for water saving devices used on hand operated pre-rinse sprayers, hand washing sinks and showers by doing the following calculations.

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

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

Make: _____ ; Model #: _____

Manufacturer's Flow Rating: _____GPM

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

Make: _____ ; Model #: _____

Manufacturer's Flow Rating: _____GPM

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

Make: _____ ; Model #: _____

Manufacturer's Flow Rating: _____GPM

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

$$\left(\frac{\text{_____}}{\text{manufacturer's flow rate}} \times \frac{\text{_____}}{\text{water use value from Table to Calculate Total Water Required for All Fixtures on page D-4(?)}} \right) \div \frac{\text{_____}}{\text{GPM standard flow rate}} = \frac{\text{_____}}{\text{new water use value to be entered into Table to Calculate Total Water Required for All Fixtures on page D-4(?)}}$$

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

$$\left(\frac{0.5 \text{ GPM}}{\text{manufacturer's flow rate}} \times \frac{5 \text{ GPM}}{\text{water use value from Table to Calculate Total Water Required for All Fixtures on page D-4(?)}} \right) \div \frac{2.2 \text{ GPM}}{\text{GPM standard flow rate}} = \frac{1.14 \text{ GPH}}{\text{new water use value to be entered into Table to Calculate Total Water Required for All Fixtures on page D-4(?)}}$$

1.14 GPH would be entered into the "Table to Calculate Total Water Required for All Fixtures," **found on page Appendix D-3** in place of the 5 GPH for hand washing sinks.

Requirements for Dishwashing Machine Booster Heaters:

I. Dishwashing Machine

Manufacturer: _____

Model Number: _____

Gallons Per Hour Water Consumption: _____ GPH

II. Calculate the minimum BTU or Kilowatt rating of the booster heater:

A. For gas booster heater, calculate the minimum BTU rating:

(Gallons Per Hour Water Consumption) x (333) = minimum BTU rating
.80 or use manufacturer's thermal efficiency

B. For electric booster heater, calculate the minimum Kilowatt rating :

(Gallons Per Hour Water Consumption) x (333) = minimum KW rating
3412

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

Brand of booster heater: _____ ; Model #: _____

BTU or Kilowatt Rating: _____

Recovery rate: _____ gallons per hour at 40°F rise at sea level.

Tank-less or Instantaneous Systems

I. Heater Specifications:

Manufacturer: _____

Model Number: _____

Flow Rate in Gallons Per Minute (GPM) at 100°F rise: _____ GPM

BTU Rating: _____ BTU**

*Units must be designed for commercial use.

**Electric units will only be approved as a dedicated hot water supply to a single hand washing sink.

II. Calculate the total hot water demand flow rate in Gallons Per Minute (GPM) using this table.

Plumbing Fixture	Water Usage (gallons per hour)	Number of Fixtures	Maximum Hourly Water Usage Per Type of Fixture (gallon per hour)
example: dish-washing machine **Hobart AM 14	8.0	1	$(8.0 \times 1) = 8.0$
example: hand-sink(s)	0.5	4	$(0.5 \times 4 =) 2.0$
3-compartment sink*	2.0 for each faucet		
3-compartment sink (bar)*	2.0 for each faucet		
Utensil soak sink	1.0		
Dishwashing machine**			
Dishwashing machine conveyor pre-rinse**			
Clothes washer	2.0		
Hand operated pre-rinse	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 water (GPM) required by all fixtures:			

*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.

III. Calculate the maximum flow rate for the establishment. The thermal efficiency of the water heating units must be adjusted for altitude. The altitude adjustment for Denver is 1.2.

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

$$(0.04 \times \frac{\text{elevation of facility}}{\text{adjustment factor}} \div 1000) + 1 = \frac{\text{adjustment factor}}{\text{adjustment factor}}$$

$$\frac{\text{adjustment factor}}{\text{adjustment factor}} \times \frac{\text{total water demand for all fixtures calculated in II}}{\text{adjustment factor}} = \frac{\text{maximum GPM hot water usage}}{\text{adjustment factor}}$$

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

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

$$\frac{\text{maximum demand (GPM) calculated in III}}{\text{maximum demand (GPM) calculated in III}} \div \frac{\text{manufacturer's flow rate in GPM @ 100°F in I}}{\text{manufacturer's flow rate in GPM @ 100°F in I}} = \frac{\text{number of heating units required*}}{\text{number of heating units required*}}$$

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

V. Storage Tank Sizing:

If a dishwashing machine(s) is to be installed the instantaneous water heating system must include a storage tank. The storage tank must be at least 25 gallons or at least 25% of the gallons per hour (GPH) demand of the dishwashing machine(s). The larger value of the two is the required storage tank size.

Dishwashing Machine*

Manufacturer: _____ Model Number: _____

Gallons Per Hour Water Consumption: $\frac{\text{storage tank capacity in gallons}}{\text{storage tank capacity in gallons}} \times 0.25 = \text{_____}$

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. A recirculation line and aqua stat (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).