Dear Facility Operator:

Tri-County Health Department, is concerned about the time and expense involved in building a retail food establishment. To make the review procedure as quick and trouble-free as possible, please observe the following procedures:

1. **One** set of plans must be submitted to this Department and include the following information:
   a. Facility floor plan with equipment layout. Drawn to scale.
   b. Equipment list by manufacturer and model number
   c. Manufacturer's specification sheets
   d. Interior finish schedule
   e. Mechanical, plumbing and electrical schedules. Drawn to scale.
   f. Shop drawings of all custom fabricated equipment and cabinetry. Drawn to scale.
   g. Menu

2. **FILL OUT THE ENCLOSED FORM COMPLETELY, INCLUDING THE FINISH SCHEDULE AND EQUIPMENT LIST on PAGE 13 (Notations of "see plans" will not be accepted). FAILURE TO INCLUDE ALL REQUESTED INFORMATION MAY DELAY THE REVIEW AND/OR APPROVAL OF YOUR PLANS.**

3. Plans should be submitted to **Tri-County Health Department, 7100 E. Belleview Ave., Suite 102, Greenwood Village, CO, 80111**. Plans are reviewed at this office one day a week. Review of plans submitted to other Tri-County offices may be delayed.

4. A plan review application fee of $100.00 must accompany each set of plans submitted. You will also be assessed $45.00 per hour for our time spent conducting the plan review and pre-opening inspections. The fees for the plan review will be due at the time of your plan review and the inspection fees will be due at the final approval inspection prior to opening.

5. A separate application must be submitted for each individual concession stand or kitchen located at the same address. Only one application fee will be charged for multiple kitchens, under the same ownership, at the same address.

6. If you wish to make an appointment to meet with the Plan Review Specialist when your plans are reviewed, please call 303-783-7133.

7. You will be notified in writing of the results of the plan review. This letter will note changes and additional requirements for approval to operate your retail food establishment. **Please provide all names and mailing addresses requested on page 2.**

8. Final approval from this Department is necessary before you open for business

If you have any questions regarding your plan submittal or make any changes/modifications after your submittal, please contact the Plan Review and Opening Inspection Hotline at 303-846-6230.

_____ **New Establishment** _____ **Remodel** _____ **Addition**

Food Establishment Specifications Form

Prior to our review, the required $100.00 application fee for the plan review must be paid. The amount of the total plan review fee ($580.00 maximum) will be stated in the plan review approval letter. This amount is due and payable when the approval letter is received. An accurate and detailed plan and specification document is most important and critical for the proper construction and operation of your establishment.

Please take your time and fill out the following pages in detail, with accuracy, and completely, including the finish schedule and the equipment installation list. Notations of "see plans" will not be accepted. **YOUR APPLICATION WILL BE RETURNED IF THE REQUESTED INFORMATION IS NOT PROVIDED.**

Date _____ Date of Planned Opening _____

Establishment Name _____ Phone _____

Establishment Address _____
(Full Address Required) Street Name and Number City Zip

Party to Receive Correspondence _____ Phone _____

Mailing Address _____

Contractor _____ Phone _____

Mailing Address _____

Architect _____ Phone _____

Mailing Address _____

Owner _____ Phone _____

Mailing Address _____

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

Finish Requirements

INSTRUCTIONS FOR USE OF THIS FORM: Initial or mark n/a (if not applicable) in the "Owner Use" column.

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, etc.).

1. FLOORS, WALLS AND CEILINGS

Must be smooth, impervious, nonabsorbent and easily cleanable. Coved floor/wall junctures must be provided.
NOTE: The inside and underside of the die bar must be smooth, nonabsorbent and easily cleanable.

Name of Room or Food Area	Floor Material	Coving Material	Wall Material	Ceiling Material	Owner Use (initial or n/a)

Owner Use (initial or n/a)

2. Utility Installation — All plumbing and electrical conduit are to be installed within and behind walls and ceilings or below floors. Exposed water pipes, sewer lines, or electrical conduit running along walls, ceilings or floors are not approved and will not be accepted. _____

3. Condensate Lines — Must stand off of the wall no less that one half of an inch to facilitate cleaning. Condensate lines should exit the interior of the walk-in refrigerator or freezer box at as high an elevation as slope considerations will allow and descend down to a floor drain along an exterior wall of the walk-in refrigerator or freezer box. A minimum 2 inch air gap shall be provided between the end of the condensation line and the flood rim of the floor sink to facilitate use of cleaning implements. _____

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.

Are there any garage type doors in the customer area? ___Yes ___No _____

Opening windows: screened	_____	Air curtain	_____	Self-closing	___	Other	_____
Outside doors: self-closing	_____	Screens	_____	Air curtain	___	Other	_____
Drive thru windows	_____	Air curtain	_____	Self-closing	___		

_____

C. LIGHTING REQUIREMENTS

50 foot-candles of light on all working surfaces and equipment in food preparation and utensil washing area, including work surfaces of equipment located under vent hoods. _____

20 foot-candles of light at a distance of 30" from the floor in utensil and equipment storage areas and in handsink and toilet areas. (Please take into consideration the location of restroom stall partitions when locating ceiling fixtures.) _____

10 foot-candles of light in walk-in refrigeration and freezer units, dry food storage areas and in all other areas, including dining during operations. PLEASE NOTE: The standard single light fixture furnished with most walk-in refrigeration and freezer units does not provide the 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 lamps do not require shielding. _____

D. OUTSIDE TRASH STORAGE FACILITIES

Provided.

On concrete or on rolled asphalt. The trash enclosure 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 designed and constructed to meet the 2000 Uniform Mechanical Code.

Ventilation systems must be exhausted to the outside air.

Ventilation hoods and devices must be designed to prevent grease or condensate from dripping out of the hood or device.

Ventilation system filters must be readily removable for cleaning.

Details (shop drawings) indicating size (length and width) and type of all exhaust hoods must be provided.

Locations of all make-up air registers along with CFM ratings (of outside air).

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.**

Intake air ducts must be designed and located to prevent the entrance of dust, dirt, insects, exhausted air, etc.

PLEASE NOTE: The kitchen exhaust hood must be NSF approved or its equivalent; 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. Make-up air must be mechanically introduced into the establishment at a volume equal to or greater than what is being exhausted. The kitchen should be under a slight negative pressure so that make-up air can be exhausted through the kitchen exhaust system after it moves from the dining area into the kitchen. Make-up air must be distributed through several registers to establish necessary air patterns and so as not to short-circuit the exhaust system(s). Exhaust hood switch (es) must be interlocked with the make-up air system(s).

A ventilation hood is required above a high temperature dishwashing machine. A ventilation hood is required above a low temperature dishwashing machine by the Uniform Mechanical Code, however, this department does not enforce this requirement. If it is later found that low temperature dishwashing machine, installed without a ventilation hood, causes a condensation problem within the establishment, this department will then require a ventilation hood.

F. TOILET FACILITIES

Facilities must be available to patrons 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, or in the absence of such local requirements, fixtures must comply with the numbers listed in the 2000 Uniform Plumbing Code, table 4-1. _____

Separate toilet facilities shall be required for each sex in establishment with seating capacity in excess of 15 patrons or more than 15 employees. _____

Toilet facilities must be accessible at all times that the establishment is open. _____

Easily cleanable receptacles must be provided for waste materials. _____

Toilet rooms must be mechanically vented to the outside of the building. _____

G. EMPLOYEE PERSONAL BELONGINGS

Lockers or other suitable facilities shall be provided and used for employee clothing and other belongings. These may only be located in designated dressing rooms or area, food storage rooms or areas containing only packaged food and packaged single service articles. _____

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 and equipment requiring water. _____

If an establishment is supplied by a private well, the following must be provided in order to be approved to operate:

1. An approval letter from the Colorado Department of Public Health and Environment (CDPHE)
2. Letter of confirmation from an engineer stating the water system has been installed according to the approval letter from CDPHE
3. Certified lab results for coliform and fecal coliform test.

The system must have residual chlorine during the final opening inspection. _____

If an establishment is constructed within a private residence, adequate treatment must be provided on a continuous basis along with certified lab results for coliform and fecal coliform. _____

I. HANDSINKS

Handsinks must be readily accessible and conveniently located in all food preparation areas, ware washing areas, bars, and toilet rooms. _____

When installed in a counter top, handsink faucets shall be within 24 inches of the front edge of the counter top. _____

The flood rims of the handsinks must be 30 to 48 inches above the floor. _____

The diameter of the handsink basin must be a minimum of 10 inches in any direction. _____

The clearance between the flood rims of handsinks and the base or underside of overhead cabinets, shelves, or other equipment must be a minimum of 24 inches. _____

Handsink faucets must be installed on the side of the sink basin directly opposite the user. _____

All handsinks must be provided with hot and cold or tempered water under pressure. _____

Each handsink must be provided with soap and sanitary toweling or hand-drying device. _____

PLEASE NOTE: 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 meet National Sanitation Foundation Standards (NSF) or equivalent. Submit the make and model numbers of all equipment (see Appendix A). _____

Drop-in cold plates in ice machine or jockey boxes are not acceptable. _____

All drink ice bins must be provided with protective covers. _____

Proper installation of mix and liquor guns (indirect waste). _____

Food prep sink with one 18" drain board must be provided if vegetables and salads are a standard menu item. Food prep sinks must be supplied with both hot and cold water and provided with an indirect waste to the sewer. _____

If a garbage disposal is installed in the drain board of a food preparation sink, the drain board shall be equipped with an indirectly drained scupper. A second approved 18" self draining drain board must then be provided. Installation of a garbage grinder in the basin of a food preparation sink is prohibited. _____

Running water dipper wells with indirect waste are needed for the storage of frozen dessert utensils. _____

A separate dump sink must be provided at bars, juice bars, and coffee bars. A knock box or other suitable methods for disposing of coffee grounds may be substituted for a dump sink in coffee bars. Dump sinks are not required in bars if no utensil washing facilities are installed in the bars. _____

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 thereto or mounted on legs or feet at least 4" high to facilitate easy cleaning.

_____

2. Floor mounted equipment, unless readily movable (on casters), shall be sealed to floor, installed on raised platforms of concrete or masonry, or elevated at least 6" above 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. If equipment is less than 24" wide, the space between equipment and a wall or adjacent equipment must be at least 6". _____

   b. If equipment is more than 24" but less than 72" wide, the space between equipment and a wall or adjacent equipment must be at least 12". _____

   c. If equipment is more than 72" wide, the space between equipment and a wall or adjacent equipment must be at least 18". _____

   d. 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. _____

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

1. MANUAL PROCESS

Note: A 3 compartment sink is required in all retail food establishments, even if equipped with a mechanical dishwashing machine.

a. A sink with at least 3 compartments must be provided for manually cleaning and sanitizing. This sink must waste indirectly to a floor sink. Sink compartments must be large enough to accommodate the largest piece of equipment or utensil used. Size of each compartment: _____ (length x height x depth). _____

   Drain boards must be as wide as adjoining sink compartments. Double 24" drain boards are required in establishment using single service utensils. Double 36" drain boards are required in establishment using multi-use utensils, and 18" double drain boards in bars. _____

PLEASE NOTE: If drain boards do not meet the above requirements, NSF approved or equivalent wire shelving installed over the 3-compartment sink may be substituted for the clean utensil drain board, and a bus cart may be substituted for the soiled utensil drain board.

2.MECHANICAL PROCESS

a. Dishmachine: NSF approved _____ or UL Classified for Sanitation_____
   Make _____ Model_____

   Hot water requirements: _____ gallons per hour at _____°F rise. If no pre-wash capabilities, there must be a manual pre-wash spray hose. Indirect waste line connection must be provided.

b. Booster Heater: Make _____ Model # _____
Hot water requirements: _____ gallons per hour or _____°F rise. Booster heater must be within 5 pipe feet of dishmachine or be fitted with an approved recirculation pump.

c. Detergent and/or sanitizer dispensing equipment: Make _____
Model # _____

d. Clean and soiled drain tables are to be provided at the dishmachine. _____

L. HOT WATER SUPPLY

Water Heater: Make _____ Model # _____.
Recovery Rate: _____gallons per hour at _____°F rise at sea level. BTU or KW rating _____. Storage Tank Capacity _____ gallons.
Thermal efficiency ____%. Hot Water requirement of this establishment is _____ gallons per hour based on usage requirements of all fixtures. (See pages 16 through 21). _____

Prior approval is required for the use of on-demand (also referred to as tankless or instantaneous) water heaters. Please see pages 20 and 21 for guidelines. _____

M. STORAGE AND HANDLING OF EQUIPMENT AND UTENSILS

All utensils and equipment must be stored at least 6" off the floor; clean, dry, and protected from splash and dust. _____

No storage under exposed water or sewer lines. _____

N. HOT AND COLD FOOD STORAGE

Hot and/or cold food storage units must be provided which are large enough to accommodate maximum food storage or holding during peak periods. Refrigeration equipment must be provided for the rapid cooling of cooked food products. _____

1. WALK-IN 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.

Units	#1	#2	#3	#4
Floors				
Walls				
Ceiling				
Size (sq. ft.)				

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. _____

Metal shelving must be of an approved metal wire construction, solid metal shelving in walk-ins are not approved. _____

2. REACH-IN REFRIGERATOR AND FREEZER UNITS

Refrigerator Units: Number _____, Approximate cubic feet total _____
Freezer Units: Number _____, Approximate cubic feet total _____
Domestic type units are not acceptable. _____

3. HOT FOOD HOLDING UNITS

Must be capable or holding foods at a minimum of 135° F. List number and type: _____

_____ _____

_____ _____

_____ _____

All hot and cold holding and/or storage units must be provided with accurate, numerically scaled thermometers. _____

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. Sufficient mechanical hot or cold food facilities shall be available to maintain the required temperature of potentially hazardous food on display. _____

PLEASE NOTE: Refrigeration equipment when installed in conjunction with heat producing cooking 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. List equipment used, if applicable. _____

O. DRY STORAGE FOOD AND FOOD PRODUCTS

Food and food products must be stored at least 6" off the floor; dry, splash free, and not exposed to water or sewer lines. _____

PLEASE NOTE: If the dry storage 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 floor mounted mop sink 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. _____

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. **A separate dedicated hose bib to supply the chemical tower will eliminate the need to use a wye valve on the mop sink faucet, and is recommended.** _____

All enclosed equipment in which food or portable equipment or utensils are placed shall not be directly connected to the drainage system (sewer line). _____

All equipment requiring indirect waste lines must be properly drained into floor drains or sinks. _____

Floor drains or sinks accessible for cleaning and maintenance. _____

IF THIS ESTABLISHMENT IS NOT ON A PUBLIC SEWAGE SYSTEM, AN ENGINEERED INDIVIDUAL SEWAGE DISPOSAL SYSTEM APPROVED BY THE TRI-COUNTY HEALTH DEPARTMENT OR THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONEMENT IS REQUIRED.

REQUEST FOR INSPECTIONS—Two inspection are required prior to opening:

1. A construction inspection is done when interior finishes are complete, but prior to the installation of equipment.

2. An opening inspection will be done when all remodeling or construction is complete, the facility has been cleaned and is ready to operate.

You <u>must</u> notify Tri-County at least one (1) week in advance for each inspection. Inspections are scheduled on a first-come, first serve basis. Inspections requested on a short notice may result in a delay of approval to operate.

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.

Representative	Title	Date

Appendix A
Equipment Installation List

NOTE: This section (or a computer generated replica on an 8 1/2 x 11 paper) must be completed. (see examples on page 14 and 15)

Item Description	IDENTIFICATION COCE ON PLAN (BY DESCRIPTION)	Installation Methods							
		At Floor			At Wall		Adjacent Equipment		
		MASONARY ISLANDS	APPROVED LEGS	CASTERS	ATTACHED	SEPARATION	ATTACHED	SEPARATION	PORTABLE

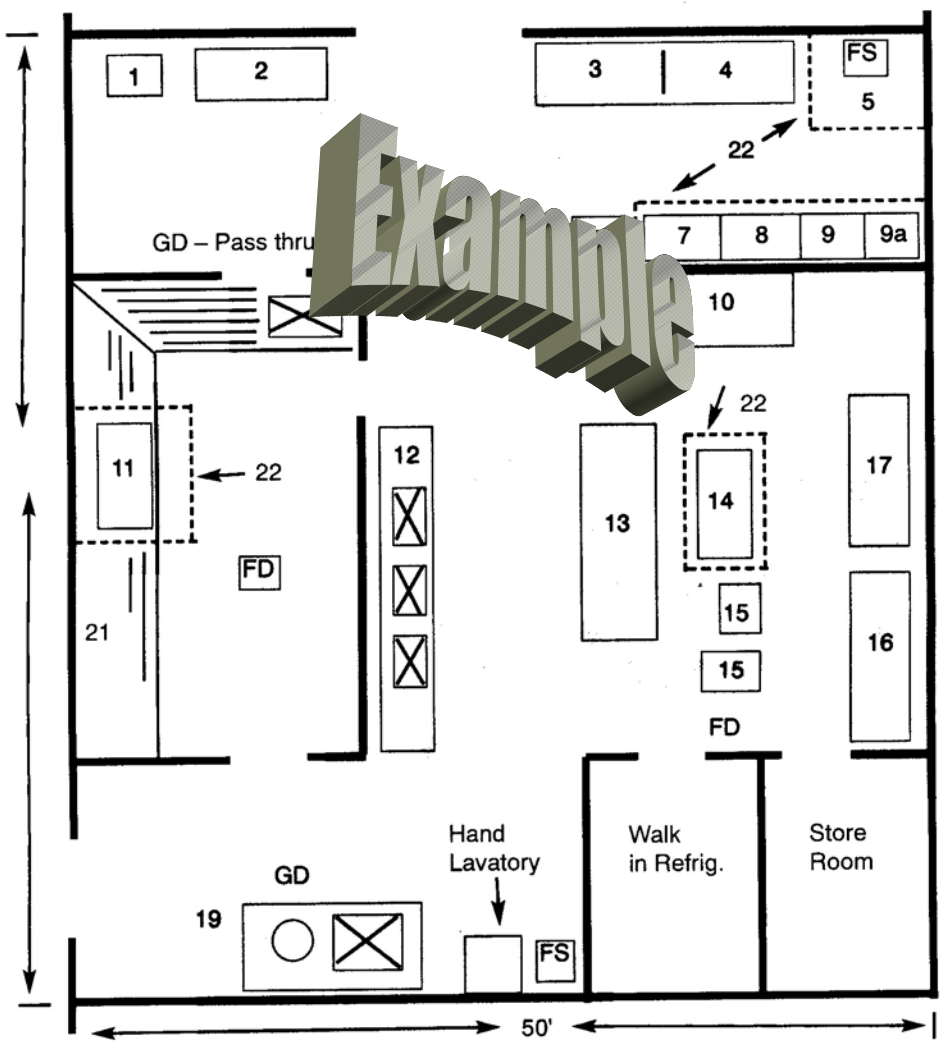
Appendix A
Equipment Installation List

EXAMPLE

Item Description	IDENTIFICATION COCE ON PLAN (BY DESCRIPTION)	Installation Methods							
		At Floor			At Wall		Adjacent Equipment		
		MASONARY ISLANDS	APPROVED LEGS	CASTERS	ATTACHED	SEPARATION	ATTACHED	SEPARATION	PORTABLE
Reach-in refrigerator	1		X			6”		36”	
Salad and sandwich table	2		X			6”		36”	
Work table S/S top	3				X		X		
Steam table (portable cutting board)	4				X		X	6”	
Steam cooker	5		X			6”		6”	
Reach-in refrigerator	6		X		X			6”	
Heavy duty range	7	X			X		X		
Heavy duty range	8	X			X		X		
Deep fat fryer	9	X			X		X		
Work table S/S top	10								
Dishwashing machine	11		X				X		
Pot sink	12		X		X				
Work table	13				X			18”	
Bake oven	14							6”	
Proofing cabinet	15			X				6”	
Vertical mixer	16							6”	
Baker’s table	17		X		X				
Freezer	18		X		X				
Vegetable preparation sink	19		X		X			6”	
Vegetable peeler	20							6”	
Drain boards	21		X		X		X		
Hood	22								

APPENDIX B

EQUIPMENT LOCATION
EXAMPLE



Each piece of equipment is numbered to correspond to the listing on Appendix A (example page). Floor drains-FD, floor sinks-FS, garbage disposers-GD, and hoods (ex. ---- at or over equipment). ¼" scale (reduced).

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.

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 (see page 22 for on-demand (a.k.a. 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 32 gph unless the calculation in section above exceeds 32 gph.

Enter number into the attached "Table to Calculate Total Hot Water Demand of All Fixtures," found on page 18.

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 18.

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 18.

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 18.

E. Use the gallon per hour rating for each type of fixture found in the "Table to Calculate Total Water Demand of 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 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.

C. Insert the value determined in Step A or B in section L, Tri-County Plan Review Specifications Form, Page 9. This value is the minimum recovery rate of the water heater which should be provided for the facility.

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

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

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

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

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

*If there is no high temperature dishwashing machine or other fixtures requiring input water temperature of 140°F (100°F rise) or more, then 80°F rise can be used.

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

Manufacturer: _____ ; Model #: _____

BTU or Kilowatt Rating: _____Thermal Efficiency _____%

Recovery rate: _____ gallons per hour

Table 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*
3-compartment sink			
3-compartment sink (bar)			
Utensil soak sink			
Dishmachine			
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 hot water demand (GPH) required by all fixtures:			

*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 19.

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 18		GPM standard flow rate		new water use value to be entered into Table to Calculate Total Hot Water Demand of All Fixtures on page 18	

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 18		GPM standard flow rate		new water use value to be entered into Table to Calculate Total Hot Water Demand of All Fixtures on page 18

1.14 GPH would be entered into the "Table to Calculate Total Hot Water Demand of All Fixtures," found on page 18 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*	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†			
Cloths 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 @ 100ºF or 80°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. 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: _____ 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. 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 100ºF rise**:_____ GPM

BTU Rating: _____ BTU***

** If there are no high temperature dishwashing machine or other fixtures requiring input water temperature of 140°F (100°F rise) or more, then 80°F rise can be used.

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