



Retail and Medical Marijuana Products Manufacturing Facility Plan Review Form

Prior to inspection for approval and licensing of a retail or medical Marijuana Product Manufacturing Facility for a local municipality or a county, the local municipality or county may require that Tri-County Health Department (TCHD) conduct a plan review of the food or beverage manufacturing portion of the facility. As part of this plan review process, TCHD requires that complete plans and specifications be submitted, reviewed, and approved prior to inspection and recommendation to the local municipality or county for business licensing. The Colorado Department of Revenue Permanent Rules Related to the Colorado Retail Marijuana Code, 1 CCR 212-2; Section 604-D and the Colorado Department of Revenue Permanent Rules Related to the Colorado Medical Marijuana Code, 1 CCR 212-1; Section 407-B can be read at <https://www.sos.state.co.us/CCR/NumericalCCRDdocList.do?deptID=19&agencyID=185> and will help you answer questions when completing the plan review packet.

Submitting Plans

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 proposed Retail or Medical Marijuana Products Manufacturing Facility is within Adams, Arapahoe, or Douglas County, and the local municipality or county has preliminarily approved its construction prior to submitting plans and specifications to TCHD. Construction may not begin until plans have been reviewed and approved by TCHD.

One hard copy 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 food and beverages
- b. Facility floor plan with equipment layout
- c. Manufacture specification sheets
- d. Mechanical, plumbing, and electrical plans

A separate application must be submitted for each Retail and/or Medical Marijuana Product Manufacturing Facility located at the same address.

Plans should be submitted to:
Tri-County Health Department
6162 S. Willow Dr, Ste 100
Greenwood Village, CO 80111

Plans submitted to other Tri-County offices may delay their review.



Fees

The applicant will not pay any fees directly to TCHD. The following fees will be charged to the local municipality or county who licenses the facility (as of July 1, 2016):

- TCHD Plan Review Application Fee: \$100.00
- TCHD Plan Review Hourly Inspection and Plan Review Fee: \$55.00/hour
- Annual Sanitary Inspection Fee: \$500.00

Review Process

- TCHD does 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 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, permitting the local municipality or county has approved construction.
- 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.**
- Revision to plans made after approval by this Department 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 the TCHD Plan Review and Opening Inspection Hotline at 303-846-6230.

First Inspection:

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.

Second Inspection:

The second inspection is to verify:

1. That all work is complete and in compliance with the Colorado Department of Revenue Permanent Rules Related to the Colorado Marijuana Codes (Retail: 1 CCR 212-2; Section 604-D; Medical: 1 CCR 212-1; Section 407-B).
2. The Marijuana Product Manufacturing Facility 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 1st inspection have been corrected.



Retail and Medical Marijuana Products Manufacturing Facility 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 #: _____

County: Adams Arapahoe Douglas

****Requestor Information***

Name: _____

Mailing Address: _____
(Full Address Required)

Phone #: _____ Email Address: _____

Business/Ownership Information

Name: _____ Phone #: _____

Address: _____

Facility Type (Inspection Code)

Medical Marijuana Edible Manufacturer

Retail Marijuana Edible Manufacturer

Square feet of establishment: _____



INSTRUCTIONS FOR USE OF THIS FORM: Check the box in the “Requestor Use” column that indicates the requirements have been read and are understood. Check the N/A box if the requirement is not applicable to the plan submitted.

*M = Department of Revenue Marijuana Enforcement Division, Medical Marijuana Code 1 CCR 212-1

*R = Department of Revenue Marijuana Enforcement Division, Retail Marijuana Code 1 CCR 212-2

Requestor Use
Read N/A

A. FINISH REQUIREMENTS

1. FLOORS, WALLS AND CEILINGS: (*M 407(B)(5); *R 604(D)(6))

Must be smooth, durable, impervious, nonabsorbent 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 repellent. NOTE: The inside and underside of the die bar must be smooth, nonabsorbent and easily cleanable.

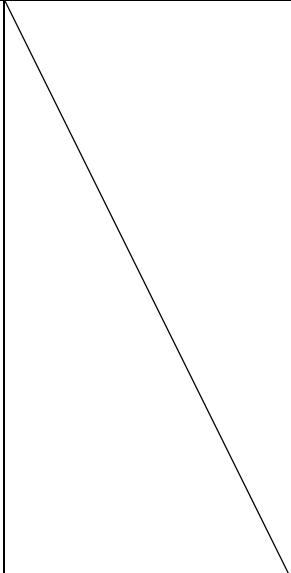
ROOM FINISH SCHEDULE

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.).

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



LIGHTING REQUIREMENTS (cont.)	Requestor Use	
	Read	N/A
<p>4. Shielding: (*M 407(B)(8); *R 604(D)(7)) 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.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>5. 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.</p>	<input type="checkbox"/>	<input type="checkbox"/>
D. GARBAGE, REFUSE, & RECYCLING STORAGE FACILITIES		
<p>1. Containers: (*M 407(B)(5); *R 604(D)(5)) Outdoor storage containers must be stored on concrete or on rolled asphalt. Indoor storage areas must be finished to be easily cleanable.</p>	<input type="checkbox"/>	<input type="checkbox"/>
E. VENTILATION		
<p>1. Provided: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Mechanical ventilation must be provided so that all areas, including restrooms, are kept free from excessive heat, steam, condensation, vapors, or objectionable odors.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>2. Designed: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Ventilation systems must be designed and constructed to meet the 2006 International Mechanical Code.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>3. Exhaust: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Ventilation systems must be exhausted to the outside air.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>4. Intake: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Intake air ducts must be designed and located to prevent the entrance of dust, dirt, insects, exhausted air, etc.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>5. Filters: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Ventilation system filters must be readily removable for cleaning.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>6. Food and Food Contact Surface Protection: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Ventilation hoods and devices must be designed to prevent grease or condensate from dripping into food or onto food contact surfaces.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>7. Fire Prevention Installation: (*M 407(B)(8, 10); *R 604(D)(9, 15)) 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.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>8. Approved: (*M 407(B)(8, 10); *R 604(D)(9, 15)) The kitchen exhaust hood must be NSF approved or its equivalent.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>9. Placement: (*M 407(B)(8, 10); *R 604(D)(9, 15)) 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.</p>	<input type="checkbox"/>	<input type="checkbox"/>

VENTILATION (cont.)	Requestor Use Read N/A	
<p>10. Dishwashing Machines: (*M 407(B)(8, 10); *R 604(D)(9, 15)) A ventilation hood is required above a high temperature dishwashing machine. This does not apply to under counter dish machines.</p>	<input type="checkbox"/>	<input type="checkbox"/>
F. TOILET FACILITITES		
<p>1. Available: (*M 407(B)(11); *R 604(D)(14)) Facilities must be available to employees.</p> <p>2. Plumbing Code: (*M 407(B)(11); *R 604(D)(14)) 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 2009 International Plumbing Code, table 4-1.</p> <p>3. Separate Facilities: (*M 407(B)(11); *R 604(D)(14)) Separate toilet facilities shall be required for each sex in establishments with a seating capacity in excess of more than 20 employees.</p> <p>4. Accessible: (*M 407(B)(11); *R 604(D)(14)) Toilet facilities must be accessible at all times that the establishment is open.</p> <p>5. Cleanable: (*M 407(B)(4, 7, 11); *R 604(D)(5, 8, 14)) Easily cleanable receptacles must be provided for waste materials.</p> <p>6. Self-Closing Door: (*M 407(B)(8, 11); *R 604(D)(9, 14)) If a toilet room opens directly into a marijuana products manufacturing facility, it must be completely enclosed with a self-closing door.</p>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
G. EMPLOYEE PERSONAL BELONGINGS		
<p>1. Lockers: (*M 407(B)(8, 10); *R 604(D)(9, 15)) Lockers or other suitable facilities shall be provided and used for employee clothing and other belongings.</p>	<input type="checkbox"/>	<input type="checkbox"/>
H. WATER		
<p>1. Name of water supplier: _____</p> <p>2. Private Well: If private well, give depth, method of water treatment and Water Quality CDPWS ID: _____</p> <p>If an establishment is supplied by a private well, the following must be provided in order to be approved to operate:</p> <ul style="list-style-type: none"> • An approval letter from the Colorado Department of Public Health and Environment (CDPHE). • Letter of confirmation from an engineer stating the water system has been installed according to the approval letter from CDPHE. • Certified lab results for coliform and fecal coliform test. The results must be negative for coliform and fecal coliform. • The system must have residual chlorine during the final opening. 		



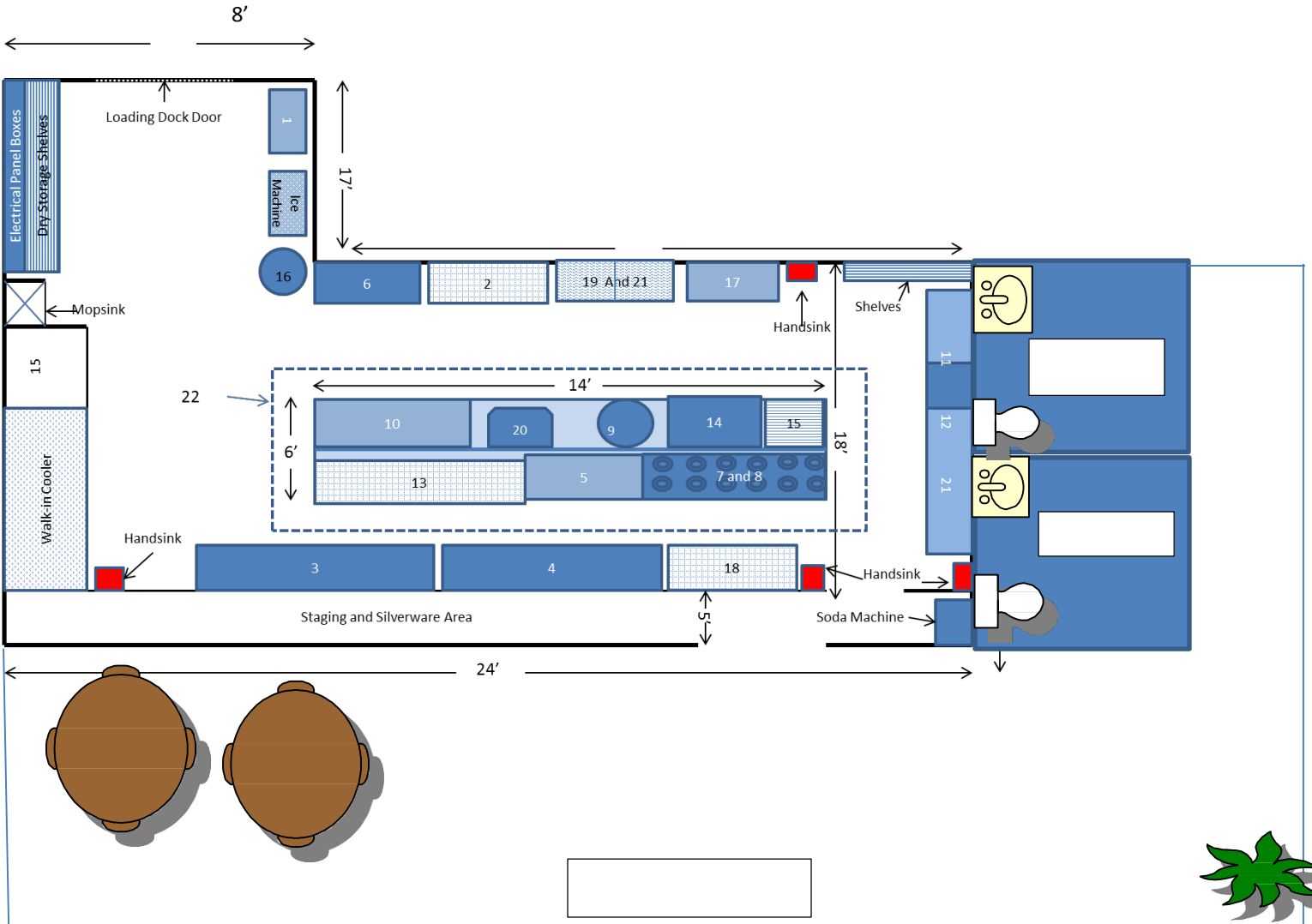
WATER (cont.)	Requestor Use	
	Read	N/A
<p>3. Pressure: (*M 407(B)(2); *R 604(D)(2,13)) Hot and cold water under pressure must be supplied to all fixtures.</p>	<input type="checkbox"/>	<input type="checkbox"/>
I. HANDSINKS		
<p>1. Accessible and Location: (*M 407(B)(2); *R 604(D)(2)) Handsinks must be readily accessible and conveniently located in all food preparation areas, ware washing areas, and toilet rooms. Employees must not have to leave their work area to wash their hands.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>2. Counter Installation: (*M 407(B)(2); *R 604(D)(2)) When installed in a counter top, handsink faucets should be within 24 inches of the front edge of the counter top.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>3. Clearance: (*M 407(B)(2); *R 604(D)(2)) The clearance between the flood rim of a handsink and the base or underside of any overhead cabinets, shelves, or other equipment should be a minimum of 24 inches. The flood rims of the handsinks should be 30 to 48 inches above the floor. Handsink faucets should be installed on the side of the sink basin directly opposite the user.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>4. Automatic Handsinks: (*M 407(B)(2); *R 604(D)(2)) Automatic handsinks must be approved. Automatic handwashing facilities may be substituted for handwashing sinks in an establishment that has at least one additional handwashing sink that is easily accessible.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>5. Hot and Cold Water Under Pressure: (*M 407(B)(2); *R 604(D)(2,13)) All handsinks must be provided with hot and cold or tempered water under pressure. The hot water or tempered water must be at least 100°F.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>6. Stocked: (*M 407(B)(2); *R 604(D)(2)) Each handsink must be provided with a conveniently located waste receptacle, soap and sanitary toweling or hand-drying device.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>7. Metering: (*M 407(B)(2); *R 604(D)(2)) Self-dispensing, spring-loaded, or metering faucets must provide a flow of water for at least fifteen seconds without the need to reactivate.</p>	<input type="checkbox"/>	<input type="checkbox"/>
J. DESIGN, CONSTRUCTION, AND INSTALLATION OF EQUIPMENT		
<p>1. Commercial Design: (*M 407(B)(10); *R 604(D)(10)) All equipment and utensils must be of commercial design that is certified or classified for sanitation by an American National Standards Institute (ANSI) accredited certification program or equivalent. Submit the description of all equipment. Appendix A must be completed for at least all of the large floor mounted equipment as long as there is a complete equipment list within the plans. 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.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>2. Ice Bins: (*M 407(B)(10); *R 604(D)(10)) All ice bins must be provided with protective covers and be drained indirectly to the sewer when the ice will be used as part of a recipe or come into contact with food.</p>	<input type="checkbox"/>	<input type="checkbox"/>

DESIGN, CONSTRUCTION, AND INSTALLATION OF EQUIPMENT (cont.)	Requestor Use	
	Read	N/A
<p>3. Food Preparation Sink: (*M 407(B)(10); *R 604(D)(15)) A food preparation sink with one 18 inch self-draining drain board must be provided if there will be food items that require washing. Food preparation sinks must be supplied with both hot and cold water and provided with an indirect waste to the sewer.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>4. Garbage Disposal: (*M 407(B)(10); *R 604(D)(15)) 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 inch self-draining drain board must then be provided. Installation of a garbage grinder in the basin of a food preparation sink is prohibited.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>5. Dipper Wells: (*M 407(B)(10); *R 604(D)(13)) If installed, dipper wells must be indirectly connected to the sewer.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>6. Dump Sink: (*M 407(B)(10); *R 604(D)(15)) A separate dump sink must be provided where soiled glasses, pitchers and blenders are emptied and/or staged for washing. Dump sinks must have hot and cold running water and be fitted with a removable strainer.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>7. Laundry: (*M 407(B)(10); *R 604(D)(15)) Laundry facilities, if provided, may not be located in a food preparation area.</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p>8. Equipment Spacing: (*M 407(B)(10); *R 604(D)(4)) Equipment used for food preparation or storage shall be installed so as to facilitate cleaning around and beneath each unit.</p> <ul style="list-style-type: none"> a. Equipment which is placed on tables or counters shall be readily movable, sealed thereto or mounted on legs or feet at least 4 inches high to facilitate cleaning. b. 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 inches above the floor. c. 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. d. Space requirements: <ul style="list-style-type: none"> i. If equipment is less than 24 inches wide, the space between equipment and a wall or adjacent equipment must be at least 6 inches. ii. If equipment is more than 24 inches but less than 72 inches wide, the space between equipment and a wall or adjacent equipment must be at least 12 inches. iii. If equipment is more than 72 inches wide, the space between equipment and a wall or adjacent equipment must be at least 18 inches. 	<input type="checkbox"/>	<input type="checkbox"/>
<p>9. Fuel Lines: (*M 407(B)(10); *R 604(D)(15)) 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.</p>	<input type="checkbox"/>	<input type="checkbox"/>

L. HOT WATER SUPPLY	Requestor Use Read N/A	
<p>1. Tankless: (*M 407(B)(2,1 0); *R 604(D)(2, 10, 15)) Electric tankless water heater units will only be approved as a dedicated hot water supply to a single hand washing sink.</p> <p>Please see pages 18 through 25 for calculating the required recovery rate for the water heater (standard and tankless).</p>	<input type="checkbox"/>	<input type="checkbox"/>
M. STORAGE AND HANDLING OF EQUIPMENT AND UTENSILS		
<p>1. Water and Sewer Lines: (*M 407(B)(10); *R 604(D)(10, 15)) No storage is allowed under exposed sewer lines or water lines that leak.</p> <p>2. Off the Floor: (*M 407(B)(10); *R 604(D)(10, 15)) All clean utensils and equipment must be stored at least 6 inches off the floor</p>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
N. HOT AND COLD FOOD STORAGE		
<p>1. Sufficient Amount: (*M 407(B)(12); *R 604(D)(16, 17)) 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.</p> <p>2. Adequate Hot Holding: (*M 407(B)(12); *R 604(D)(16, 17)) Hot holding units must be capable of holding foods at a minimum of 135°F.</p> <p>3. Cooling: (*M 407(B)(12); *R 604(D)(16, 17)) Refrigeration equipment must be provided for the rapid cooling of cooked food products.</p> <p>4. Thermometer Provided: (*M 407(B)(10); *R 604(D)(15)) All hot and cold holding and/or storage units must be provided with accurate, numerically scaled thermometers.</p> <p>5. Adequate Refrigeration: (*M 407(B)(12); *R 604(D)(16, 17)) Refrigeration equipment must be designed and installed so refrigeration equipment can maintain foods below 41° F.</p> <p>6. Transport: (*M 407(B)(12); *R 604(D)(16, 17)) If food is transported to another location, it must be protected from contamination and held at proper holding temperature.</p> <p>7. Refrigerator and Freezer Units: (*M 407(B)(5,8, 10, 12); *R 604(D)(6, 9, 10, 13, 15, 16))</p> <ul style="list-style-type: none"> a. 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. b. The space between the top of the walk-in and the ceiling must be at least 24 inches, or the unit must be enclosed to the ceiling. c. Floor drains are prohibited in walk-in coolers unless they drain through an air gap outside of the walk-in cooler into a floor drain or sink or through a backwater valve and an air break outside of the walk-in cooler. d. Domestic type reach-in refrigerators and freezers are not acceptable. e. 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. 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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 applicants with a step-by-step method of calculation for hot water demand and sizing of the water heater system required for the operation.

A. Standard Hot Water Tank Type Systems

- a. **Step 1:** Calculate the total hot water demand that is required by all fixtures plumbed with hot water in the facility (Gallons per Hour, GPH).

i. THREE-COMPARTMENT SINK:

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

- a. Enter number into the attached *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.

Basin length (in.)	×	Basin width (in.)	×	Basin depth (in.)	×	3	×	0.375	÷	231	=	<input style="width: 40px; height: 20px;" type="text"/> GPH
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2. Measure dimensions, in inches, of a sink basin if all compartments are NOT the same dimension, and insert the measurement into the equation below*

- a. Enter “GPH Total” number into the attached *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.

Basin #1 length (in.)	×	Basin #1 width (in.)	×	Basin #1 depth (in.)	×	3	×	0.375	÷	231	=	<input style="width: 40px; height: 20px;" type="text"/> #1 GPH
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Basin #2 length (in.)	×	Basin #2 width (in.)	×	Basin #2 depth (in.)	×	3	×	0.375	÷	231	=	<input style="width: 40px; height: 20px;" type="text"/> #2 GPH
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Basin #3 length (in.)	×	Basin #3 width (in.)	×	Basin #3 depth (in.)	×	3	×	0.375	÷	231	=	<input style="width: 40px; height: 20px;" type="text"/> #3 GPH
--------------------------	---	-------------------------	---	-------------------------	---	---	---	-------	---	-----	---	---

GPH #1 + GPH #2 + GPH #3 =	<input style="width: 40px; height: 20px;" type="text"/> GPH Total
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**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.*



ii. UTENSIL SOAK SINK:

1. Measure dimensions, in inches, of the sink, and insert into the equation below:
 - a. Enter number into the Table to Calculate Total Hot Water Demand of All Fixtures for *STANDARD TANK SYSTEMS*, found on page 20.

Basin length (in.)	×	Basin width (in.)	×	Basin depth (in.)	×	3	×	0.375	÷	231	=	<div style="border-bottom: 1px solid black; width: 50px; margin: 0 auto;"></div> GPH
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iii. DISHMACHINE:

1. Use manufacturer’s rating in gallons per hour.
 - a. Enter number into the *Table to Calculate Total Hot Water Demand Required of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.

iv. CLOTHES WASHER:

1. Use manufacturer’s rating:, or
 - a. 32 GPH for 9-12 pound washer, or
 - b. 42 GPH for 16 pound washer.
2. Enter number into the *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.

v. MISCELLANEOUS

1. Use the gallon per hour rating for each type of fixture found in the table below to calculate total water demand for miscellaneous fixtures. Enter number into the attached *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.

Fixture Type:	GPH (per fixture)
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

**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.*

2. Enter the numbers into the attached *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.



b. **Step 2:** Enter all information collected above into the table below, *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS:*

Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS

Plumbing Fixture	Water Usage (gallons per hour)	Number of Fixtures	Maximum Hourly Hot Water Demand Per Type of Fixture (gallons per hour)
<i>example: dishwashing machine</i>	50	1	50
<i>example: handsink(s)</i>	5	4	(5 x 4 =) 20
3-compartment sink (kitchen)			
3-compartment sink (bar)			
Utensil soak sink			
Kitchen Dishwashing machine			
Bar Dishwashing machine			
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 21.*



- c. **Step 3:** Complete the table below for any water savings devices that will be used, if applicable. If water saving devices will not be used, skip to **Step 4**.

Hand operated pre-rinse sprayers with flow rate less than 3.5 GPM standard flow rate	
Manufacturer:	Model #:
Manufacturer's Flow Rating:	GPM

Hand washing sink faucet or aerator with flow rate less than 2.2 GPM standard flow rate	
Manufacturer:	Model #:
Manufacturer's Flow Rating:	GPM

Shower head with flow rate less than 2.5 GPM standard flow rate.	
Manufacturer:	Model #:
Manufacturer's Flow Rating:	GPM

- i. Use the information collected in the table above to complete the formula below. Enter the new value obtained into the *Table Hot Water Demand of All to Calculate Total Hot Water Fixtures* on page 20.

$$\left(\begin{array}{c} \text{Manufacturer's Flow} \\ \text{Rate} \end{array} \times \begin{array}{c} \text{Water Usage} \\ \text{Value*} \end{array} \right) \div \begin{array}{c} \text{GPM Standard Flow} \\ \text{Rate} \end{array} = \text{New Value} \underline{\hspace{2cm}}$$

* Water Usage Value: from Table to Calculate Total flow rate to be entered into *Table to Calculate Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS* on page 20

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

$$\left(\begin{array}{c} \text{0.5 GPM} \\ \text{Manufacturer's Flow} \\ \text{Rate} \end{array} \times \begin{array}{c} \text{5 GPH} \\ \text{Water Usage} \\ \text{Value} \end{array} \right) \div \begin{array}{c} \text{2.2 GPM} \\ \text{GPM Standard Flow} \\ \text{Rate} \end{array} = \text{New Value: } \underline{\text{1.14 GPM}}$$

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



d. **Step 4:** Calculate the maximum hourly hot water usage:

- i. Gas Water Heater Altitude Adjustment (Skip to **Step 5** if using electric):
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.
- ii. 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 = _____

$\left[\left(0.04 \times \frac{\text{Elevation of Facility}}{1000} \right) \pm 1 \right] \times$	Hourly hot water demand of all fixtures (from Step 2)	=	Altitude-adjusted total hourly hot water demand (Enter in Space Above)
--	---	---	--

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.

- iii. Use the altitude-adjusted total hourly hot water demand calculated in this equation to calculate the minimum BTU rating needed for a water heater in **Step 5**.

e. **Step 5:** Calculate the minimum BTU or Kilowatt rating needed for a water heater:

- i. Gas Water Heater: _____ BTU's

$\left[\left(\frac{\text{Maximum hourly demand calculated in STEP 2}}{\text{Maximum hourly demand calculated in STEP 2}} \times \text{°F rise}^* \times 8.33 \right) \right] \div$	0.80 or use manufacturer's thermal efficiency	=	Minimum BTU Rating (Enter in Space Above)
--	---	---	---

* °F rise: Use 80 °F. If there is a high-temperature dishwashing machine or other fixtures requiring input of water temperature of 140°F, use 100 °F

- ii. Electric Water Heater: _____ kW

$\left[\left(\frac{\text{Maximum hourly demand calculated in STEP 2}}{\text{Maximum hourly demand calculated in STEP 2}} \times \text{°F rise}^* \times 8.33 \right) \right] \div 3412 =$	Minimum kW Rating (Enter in Space Above)
---	--

* °F rise: Use 80 °F. If there is a high-temperature dishwashing machine or other fixtures requiring input of water temperature of 140°F, use 100 °F

- f. **Step 6:** Select a water heater based upon the BTU (gas) or Kilowatt (electric) rating that meets or exceeds the minimum calculated in **Step 5**.

Manufacturer:	Model #:
BTU or kW Rating:	Thermal Efficiency %



B. Tankless or On-Demand Hot Water Tank Type Systems

- a. **Step 1:** Complete the table on page 22 for all fixtures plumbed with hot water in the facility (Gallons per Minute, GPM).
 - i. 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.

**Table to Calculate Total Hot Water Demand of All Fixtures for
TANKLESS OR ON-DEMAND SYSTEMS**

Plumbing Fixture	Hot Water Usage (gallons per minute)	Number of Fixtures	Hot Water Demand Flow Rate in Gallons Per Minute
<i>example: dishwashing machine</i>	8.0	1	$(8.0 \times 1) = 8.0$
<i>example: handsink(s)</i>	0.5	4	$(0.5 \times 4) = 2.0$
3-compartment sink (kitchen)*	2.0 for each faucet		
3-compartment sink (bar)*	2.0 for each faucet		
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	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 manufacturers flow rate listed for the faucet or faucets aerator.

† Use manufacturers flow rate in GPM for specific make and model of dishwashing machine.



- b. **Step 2:** Calculate the maximum hot water flow rate for the establishment
- i. 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.
 - ii. Use the following equation to determine the establishment's maximum flow rate in GPM

Maximum GPM Hot Water Usage = _____

$\left[\left(0.04 \times \text{Elevation of Facility} \right) \div 1000 \right] \pm 1 = \text{Adjustment Factor (next formula)}$
--

$\text{Adjustment Factor} \times \text{Total hourly hot water demand of all fixtures (from Step 1)} = \text{Maximum GPM Hot Water Usage (Enter in Space Above)}$
--

- iii. Use the Maximum GPM Hot Water Usage calculated in this equation to calculate the minimum BTU rating needed for a water heater in **Step 3**.
- c. **Step 3:** Determine the number of heating units that will be needed to meet the required flow rate:

Number of Heating Units Required* = _____

$\text{Maximum demand (GPM) calculated in Step 2} \times \text{Manufacturer's flow rate in GPM @ 100°F or 80°F} = \text{Number of Heating Units Required* (Enter in Space Above)}$
--

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

- d. **Step 4:** Determine the size of the storage tank (if applicable):
- i. 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.
 - ii. The storage tank must be at least 25 gallons; or
 - iii. The storage tank must be at least 25% of the Total Hot Water Demand (GPH).
 1. Total Hot Water Demand: Calculated by using the *Table to Calculate Total Hot Water Demand of All Fixtures for STANDARD TANK SYSTEMS*, found on page 20.
 - iv. Use the following formulas and tables to determine tank size:
 1. The larger value of the two is the required storage tank size.



Total Hot Water Demand _____	x	0.25	=	Calculated Storage Tank Capacity in Gallons _____
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Calculated Storage Tank Capacity in Gallons _____	vs	25 Gallon Storage Tank
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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).

e. Heater Specifications

Manufacturer:	Model #:
Flow Rate in Gallons Per Minute (GPM) at 100 °F 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.