CAYMAN ISLANDS GOVERNMENT

DEPARTMENT OF ENVIRONMENTAL HEALTH



ENVIRONMENTAL HEALTH ENGINEERING SECTION

DEVELOPMENT CONTROL GUIDELINES

(2009 REVISION)

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1.0 INTRODUCTION

Development control is a critical aspect of the engineering section's work. The Development and Planning Regulations (1998 Revision) Section 8(5) states that:

> …no use of land in residential zone shall be dangerous, obnoxious, toxic or cause offensive odours or conditions or otherwise create a nuisance or annoyance to others.

To this end the department reviews development applications and conduct final certificate of occupancy inspections to ensure that each development complies with the relevant environmental health laws, regulations, and guidelines. The review process represents a commitment by the regulatory authority to protect humans from the threat a polluted environment pose to human health, aesthetic and cultural enjoyment, and economic well-being. This process involves assessing the likely response of the environment to the various levels of contaminant loading and in weighing the various technical solutions that may be proposed.

Within the context of the existing laws and regulations the department provides a set of criteria, or guidelines that will assist architects, designers, contractors and owners in properly designing environmental pollution control systems that will ensure compliance with the relevant standards required in the Cayman Islands and facilitate good Environmental Engineering practice.

1.1 Legal Authority

Although there is no comprehensive environmental health development control regulation in the Cayman Islands, there are several laws which give the department the mandate control over environmental health issues and the prevention of public health nuisances. The following are some

of the major laws and regulations where the duties of the Chief Environmental Health Officer are defined:

- Public Health Law (2002 Revision)
- The Litter Law, 1982 (Law 12 of 1982)
- The Public Health (Infectious Waste) Regulations, 1991
- The Water Authority Law, 1982 (Law 18 of 1982)
- Water Authority Regulations, 1985
- The Public Health (Garbage and Refuse Disposal Regulations) (1995 Revision)
- The Town and Communities Law (Cap.169) (1995 Revision)
- Development and Planning Regulations (1998 Revision)

2.0 SUMMARY OF REGULATORY REQUIREMENTS

This section summarizes the current regulations that are applicable to development control. The following environmental health activities are covered under the regulations:

1. Solid waste management
2. Swimming pools
3. Noise pollution control
4. Lighting and ventilation
5. Sanitary facilities
6. Water supply
7. Hazardous waste
8. Air quality
9. Industrial hygiene

2.1 Solid Waste Management

Solid waste management encompasses several aspects but for the purposes of development control it focuses primarily on the provision of adequate facilities for the onsite management of solid waste to prevent the occurrence of a public health nuisance.

2.1.1 Nuisance and disease prevention

Public Health Law (2002 Revision) Part III – Nuisances Section 7(2) (m):

> For the purposes of this Law any -
>
> collection of water, sewage, rubbish, refuse, garbage or other fluid or solid matter which permits or facilitates the multiplication of parasites or man or animals or of organisms which carry parasites which may otherwise cause or facilitate the infection of man or animals by such parasites.

Public Health Law (2002 Revision) Part III – Nuisances Section 7(2) (q):

> For the purposes of this Law any -
>
> accumulation or deposit of refuse, garbage, offal, manure or other matter whatsoever which is prejudicial to health or a nuisance.

Public Health (Garbage and Refuse Disposal) Regulations (1995 Revision) Section 4(7)):

> Approval shall be obtained from the Department prior to construction of any special type of garbage or refuse storage bin or facility.

2.1.2 Types and quantities of bins

Public Health Law (2002 Revision) Part X – Removal and Disposal of Refuse and Garbage,

Section 53(1):

> The Chief Environmental Health Officer may, by notice require the owner or occupier of any building within the Islands to provide such reasonable number of covered dustbins for the reception of house refuse or garbage of such material size and construction as the Chief Environmental Health Officer may approve.

Public Health (Garbage and Refuse Disposal) Regulations (1995 Revision) Section 3(c) and (d):

> All occupiers of premises in service areas shall-
>
> (c) provide, for the collection of garbage, a water tight metal or plastic container or containers with tight fitting covers;
>
> (d) ensure that such containers are of the type and description approved by the Department

2.1.3 Location of enclosures

Public Health (Garbage and Refuse Disposal) Regulations (1995 Revision) Sections 3 (c) and (f)

> All occupiers of premises in service areas shall-
>
> (c) place the containers or bags for collection in front or at the side of the premises on streets abutting the premises or in such other place as may be approved by the Department.
>
> (f) so place containers as not to obstruct traffic.

Public Health (Garbage and Refuse Disposal) Regulations (1995 Revision):

> 9. Large containers specially approved by the Department shall be placed and serviced by the Department, and access to these containers shall be kept clear at all times….

2.1.4 Commercial establishments

Public Health (Garbage and Refuse Disposal) Regulations (1995 Revision)

> 4. (1) The use of garbage collection service in service areas is mandatory save for large commercial establishments specifically exempted by the Department.
>
> 4. (6) All commercial concerns shall provide for the proper storage of all garbage and refuse to prevent the harbourage of vermin and to prevent scattering by animals or by the wind.

2.1.5 Restricted waste

Public Health Law (2002 Revision) Part VI – Notification, Prevention and Suppression of Disease:

> 31. (1) Whoever, knowingly casts, causes or permits to be cast into any place designed for the reception of refuse, any rubbish infected by an infectious disease without previous disinfection, is guilty of an offence…

2.1.6 Transportation of solid waste

2.1.6.1 Spillage Prevention

Public Health (Garbage and Refuse Disposal) Regulations (1995 Revision)

6. All vehicles carrying garbage and refuse shall be so designed and loaded as to prevent spillage during transit.

2.1.7 Incineration

2.1.7.1 Minimum Combustion Temperature

The Public Health (Infectious Waste) Regulations, 1991 (Section 4):

…the CEHO must be satisfied that the incinerator is -

i. capable of a minimum combustion temperature of 180 degrees Fahrenheit for single chambers;
ii. in the case of multiple chamber units, capable of reaching a minimum of 1400 degrees Fahrenheit for the primary chamber and 1800 degree Fahrenheit for the secondary chambers.

2.7.1.2 Residence Time

The Public Health (Infectious Waste) Regulations, 1991 (Section 4):

> the CEHO must be satisfied that the incinerator is -
> (c) equipped with one-second residence time

2.7.1.3 Fuel Gas Temperature

The Public Health (Infectious Waste) Regulations, 1991 Section 4 Subsection (d):

> …the CEHO must be satisfied that the incinerator is -
> of a maximum fuel gas temperature of 300 degrees Fahrenheit.

2.7.1.4 Continuous Recorder

The Public Health (Infectious Waste) Regulations, 1991 Section 4 Subsection (e):

> …the CEHO must be satisfied that the incinerator is -
> equipped with a continuous recorder and log maintenance equipment

2.7.1.5 Testing Equipment

The Public Health (Infectious Waste) Regulations, 1991 Section 4 Subsection (f):

> …the CEHO must be satisfied that the incinerator is -
> equipped with an annual source testing for dioxins

2.2 Swimming Pools

2.2.1 Permit

Public Health Law (1996 Revision) Part VIII-Swimming Pools, Section 38:

> Where an application is made to the Central Planning Authority under the Development and Planning Regulations (1995 Revision) for approval for the construction of a swimming pool, such application should be refused unless it is accompanied by a certificate signed by the Senior Medical Officer of Health, certifying that he is satisfied that, if the swimming pool is constructed in accordance with the proposals contained in the application, it will conform with public health requirements as to:
>
> (a) site, and
> (b) purity of water supply.

2.3 Noise Pollution Control

2.3.1 Noise nuisance

The Public Health Law (1996Revision) PART III-Nuisances Section 7 Subsection (2) (w):

> For the purposes of this law any noise or vibration (other than noise or vibration caused by an aircraft), which is a nuisance, is a statutory nuisance.

2.3.2 Definition of nuisance

The term nuisance is defined in Part I-Preliminary as follows:

> "Nuisance" includes any act, omission, or thing occasioning or likely to occasion injury, annoyance, offence, harm, danger or damage to the sense of sight, smell or hearing, or which is or is likely to be dangerous or injurious to person or property.

2.3.3 Penalties

2.3.3.1 General Public

Town and Communities Law (Cap. 169) (1995 Revision) section 12 subsection (1):

> Any person who makes any noise in any town or district which is likely to cause annoyance or discomfort to any inhabitant of that town or district, after having been required by a constable to desist from making such noise, is guilty of an offense and liable on summary conviction to a fine of five hundred dollars for a first conviction, a fine of one thousand dollars for a second conviction and

a fine of five thousand dollars and imprisonment for six months for a third conviction or subsequent conviction.

2.3.3.2 Occupier of Premises

Town and Communities Law (Cap. 169) (1995 Revision) section 12 subsection (3):

> Any occupier of premises from which noise is emitted which is likely to cause annoyance or discomfort to any inhabitant of the town or district in which the premises are located, and who is requested by a constable to cease such noise, shall cease that noise forthwith, and if the noise is not ceased forthwith is guilty of an offence and liable on summary conviction to a fine of five hundred dollars for a first conviction, a fine of one thousand dollars for a second conviction and a fine of five thousand dollars and imprisonment for six months for a third conviction or subsequent conviction.

2.3.3.3 Forfeiture of Equipment

Town and Communities Law (Cap. 169) (1995 Revision) section 14:

> Upon conviction of an offence under section 12 or 13, in addition to any other penalty provided, the Court may order forfeiture of any equipment or device used in the commission of the offence.

2.3.4 Responsibility of occupier

Town and Communities Law (Cap. 169) (1995 Revision) section 12 subsection (2):

> The occupier of any premises upon which any contravention of subsection (1) takes place is guilty of an offense against subsection (1) unless he proves affirmatively either-
>
> (a) that he was not present upon the premises at the time of the contravention; or
>
> (b) that he took all reasonable steps to prevent the contravention of subsection (1),
>
> and liable on summary conviction to a fine of five hundred dollars for a first conviction, a fine of one thousand dollars for a second conviction and a fine of five thousand dollars and imprisonment for six months for a third conviction or subsequent conviction.

2.3.5 Authority of environmental health officer

Town and Communities Law (Cap. 169) (1995 Revision) section 13 subsection (1):

> Any person who generates noise or is the occupier of premises from which such noise is emitted in excess of the prescribed levels shall reduce such noise to within such prescribed levels if required to do so by a constable or an environmental health officer.

Town and Communities Law (Cap. 169) (1995 Revision) section 13 subsection (3):

> Any person who fails to comply with the request of a constable or an environmental health officer made under subsection (1) is guilty of an offence and liable on summary conviction to a fine of five hundred dollars for a first conviction, a fine of one thousand dollars for a second conviction and a fine of five thousand dollars and imprisonment for six months for a third conviction or subsequent conviction.

2.4 Lighting and Ventilation

2.4.1 Defective Lighting

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (a):

> For the purposed of this Law any -
> premises or part thereof so situated or so constructed or so dilapidated or so defective in lighting or ventilation as to be prejudicial to health or a nuisance… is a statutory nuisance.

2.5 Sanitary Facilities

2.5.1 Insufficient Sanitary Facilities

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (a):

> For the purposed of this Law any -
> premises which are occupied whether by day or night and not provided with, or so situated or constructed that they cannot be provided with sufficient sanitary latrines… is a statutory nuisance.

2.6 Overcrowding

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (c):

> For the purposed of this Law any -
> Premises or part thereof so overcrowded… as to be prejudicial to health… is a statutory nuisance.

2.7 Water Supply

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (d):

> For the purposed of this Law any -
> well or cistern or other source or means of storing water, whether public or private, the water from which is used or likely to be used by human beings for drinking or domestic purposes, or in connection with any dairy or place where food intended for human consumption is made or prepared, which is in a condition liable to render such water prejudicial to health or a nuisance … is a statutory nuisance.

2.8 Hazardous Waste

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (i):

> For the purposed of this Law any -
> noxious matter or waste flowing or discharged from any premises into any street, or into the gutter or side channel of any street, or into a gully, swamp, or watercourse, irrigation channel or bed thereof… is a statutory nuisance.

2.9 Air Quality

2.9.1 General Environmental

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (j):

> For the purposed of this Law any -
> furnace, chimney, fireplace, bonfire, or other place from which is emitted smoke or other unconsumed combustible matter in such quantity or in such a manner as to be prejudicial to health or a nuisance… is a statutory nuisance.

2.9.2 Industrial Sources

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (t):

> For the purposed of this Law any -
> factory, workshop or other trade premises causing or emitting effluvia, gases, vapour, dust or smoke in such a manner as to be offensive or prejudicial to health or a nuisance to persons either within or outside such premises…is a statutory nuisance.

2.10 Industrial Hygiene

Public Health Law (2002 Revision) PART III – NUISANCES Section 7 Subsection (2) (u):

> For the purposed of this Law any -
> factory, workshop or other trade premises not kept clean and free from offensive smells arising from their operation, latrines, or drains or so overcrowded, ill lighted or ventilated as to be prejudicial or a nuisance…is a statutory nuisance.

3.0 RECOMMENDED PROCEDURE FOR PLAN REVIEW

The review process as set out below provides a means of ensuring that the reviewer follows a proper order in the review of development applications. The aim is to eliminate a haphazard process, which could allow critical areas of assessment to be overlooked. The review procedure focuses on two areas: (1) the review of general data, and (2) the review for compliance with environmental health guidelines

3.1 General Review

General review of an application involves the determination of the occupancy classification, floor area, and the maximum occupancy of the proposed development.

3.1.1 Occupancy classification

The determination the occupancy classification of a building shall be in accordance with the latest edition of the Cayman Islands Building Code or the International Building Code. The procedure for determining occupancy classification is as follows:

1. Select the occupancy classification that most accurately fits the use of the building.
2. Where more than one type of occupancy is proposed, list them in the respective categories.

3.1.2 Total floor area

The building area can be divided into two: the gross building area, and the net building area. These are defined in the subsections below. For the purposes of calculating occupancy, the net building area is used.

3.1.3 Maximum occupancy

The maximum occupancy of any building shall be calculated using as stated in the latest edition of International Building Code.

3.2 Environmental Health Review

This section of the manual focuses on the review of plans and specifications to ensure compliance with the various environmental health regulations and guidelines as set out by the Department of Environmental Health. The following represent the major areas of concern in the review process:

- Noise and vibration pollution control
- Food Protection
- Recreational sanitation
- Solid waste management
- Hazardous waste management
- Water supply and treatment
- Wastewater collection, treatment, and disposal
- Air pollution control
- Indoor air quality
- Institutional sanitation
- Vector control
- Industrial hygiene

3.2.1 Food hygiene

The following items should be addressed in the review of all food processing and service operations:

- Location
- General layout
- Plant construction
- Equipment
- Plumbing and floor drainage

- Lighting and ventilation
- Water supply
- Solid waste management
- Wastewater collection, treatment, and disposal
- Specific requirements related to the type of operation

3.2.1.1 Restaurants and Commercial Kitchens

The review of restaurants and commercial kitchen should follow the below outline:

1. Determine the maximum population catered to per meal session.
2. Calculate the minimum space requirements for the kitchen given a maximum population per meal session.
3. Calculate the minimum required dry food and refrigerated food space.
4. Calculate the minimum hot water requirements for dish washing and food preparation activities and review design specifications for water heater.
5. Determine the type of dishwashing equipment needed and review specifications for dishwasher.
6. Evaluate the ventilation and heat extract systems.
7. Determine solid waste generation rates and review design of onsite storage facility.

3.2.2 Solid waste management

The types of solid waste can be classified into to categories: general municipal waste and hazardous waste.

3.2.2.1 General Municipal Waste

The review of facilities for the onsite management of general municipal solid waste should follow the outline below:

1. Calculate the total area of each occupancy category.
2. Estimate the refuse generation rates for each type of development.
3. Determine the number, type, and sizes of containers required.
4. Determine the type, and size of the refuse containment area.
5. Review design of facility for compliance with department's requirements including:
    - Dimensions
    - Water supply
    - Drainage
    - Turning area.
    - Clear space
    - Angle of entry
    - Overhead projections (e.g. electric wires, bridges etc)

3.2.2.2 Hazardous Solid Wastes

The procedure for reviewing developments that produce hazardous solid waste is as follows:

1. Classify the waste.
2. Estimate quantities.
3. Assess potential environmental and /or public health impacts of the waste.
4. Review proposed management procedures.
5. Determine the number, type, and sizes of containers required.
6. Review design of facility for compliance with department's requirements including:
    - Dimensions
    - Water supply
    - Drainage

- Turning area.
- Clear space
- Angle of entry
- Overhead projections (e.g. electric wires, bridges etc)

3.2.3 Swimming pools and spas

The review process for swimming pools, spas, and other similar facilities involves the review of several systems. These are categorized as: (1) general data, (2) recirculation system, (3) filtration system, and (4) disinfection system.

3.2.3.1 General Data

The following procedure shall be carried out to review the general data provided for the pool:

1. Calculate the pool perimeter
2. Calculate the pool surface area
3. Calculate the pool volume
4. Determine the deck width
5. Determine the deck slope
6. Estimate the bather load

3.2.3.2 Recirculation System

The review of the recirculation system shall follow the procedure outlined below:

1. Establish the required recirculation period.
2. Determine the required pumping rate
3. Determine the number of skimmers required or the length of gutter.
4. Determine the number of returns required.
5. Calculate the total dynamic head of the plumbing system

6. Determine the required horse power rating of the pump to meet the system operation point.
7. If a balance tank is used determine the required capacity.
8. Determine the distance between the main drain outlet
9. Determine the UL flow rating of the drain cover.
10. Determine the open area of the drain cover.
11. Calculate the flow velocity through the drain cover.
12. Determine the water velocity in the inlet and outlet pipes.

3.2.3.3 Filtration System

The review of the filtration system for the pool shall follow the procedure below:

1. Check the type of filter used.
2. Establish the maximum allowable filtration rate for the type of filter used.
3. Determine the minimum filter area required.
4. Calculate the filtration rate

3.2.3.4 Disinfection System

The review of the disinfection system shall follow the procedure below:

1. Determine the type of disinfection to be used.
2. Determine the required disinfection rate

3.2.4 Noise pollution control

The basic steps associated with the prediction of changes in the noise environment and assessment of the impact of these changes is as follows:

1. Identify potential noise sources.
2. Obtain data on the sound source.
3. Determine the anticipated impacts in the operational phase.

4. Compare the predicted noise levels with applicable standards.
5. If standards or criteria are exceeded, consider noise abatement methods to minimize the impacts.
6. Review the abatement methods to ensure desired criteria can be met.

3.2.5 Air pollution control

The basic steps associated with the prediction of changes in air quality and assessment of the impacts of these changes is as follows:

1. Identify the air pollutants emitted from the alternatives under consideration.
2. Describe or determine the existing air quality levels in the area.
3. Determine the air pollution dispersion potential for the area.
4. Summarize the basic meteorological data for the area.
5. Determine mesoscale impact due to the construction and operation of each alternative.
6. Calculate the ground level concentrations of air pollutants from the alternatives under varied meteorological conditions.
7. Consider mitigation or control measures if ambient air or emission standards are exceeded.

3.2.6 Industrial hygiene

The various environmental factors or stressors that may cause sickness, impaired health, significant discomfort, or inefficiency may be classified as chemical, physical, biological, or ergonomic. Chemical hazards arise from excessive air-borne concentrations of mist, dusts, gases, or fumes. Physical hazards include excessive levels of electromagnetic and ionizing radiation, noise, vibration, and extremes or temperature and pressure. Biological hazards include insects, molds, fungi, and bacteria. Ergonomic hazards include improperly designed tools or work areas, improper lifting or reaching, poor visual conditions, repeated motions in an awkward position.

The basic systematic procedure to be followed to recognize and evaluate environmental hazards answers the following questions:

1. What is produced?
2. What raw material is used?
3. What materials are added in the process?
4. What equipment is involved?
5. What is the cycle of operation?
6. What operational procedure is used?
7. Is there a written procedure for the safe handling and storage of materials?
8. Is there a written procedure for cleanup after spills?
9. How is waste stored on site or disposed of?
10. Is the ventilation and exhaust system adequate?
11. Does the plant layout minimize exposure?
12. Is the plant equipped with safety appliances such as showers, masks, eye fountains, respirators, etc?

For each process perform the following task:

1. Identify the contaminant in the process.
2. Find the permissible OSHA exposure level or safe exposure guidelines.
3. Determine the actual level of exposure to harmful agents.

The general methods used to control the harmful environmental factors should be evaluated. The methods typically used are as follows:

- Substitution of a less harmful material
- Change or alteration of a process
- Isolation or enclosure of a process
- Wet methods to reduce dust generation
- Local exhaust at the point of generation

- General dilution ventilation
- Personal protective equipment
- Good housekeeping
- Special control methods for specific hazards

4.0 GUIDELINES

The section details the requirements to be met in order for the various environmental health criteria to be satisfied.

4.1 Food Hygiene

For the purposes of these guidelines food processing and service operations shall be categorised as follows:

- Slaughtering operations
- Meat products processing
- Fish processing
- Fruit and vegetable processing
- Bakeries
- Granary and mills
- Fats and oil manufacturing or processing
- Dairy products manufacturing
- Beverages manufacturing
- Sugar and confectionary production
- Restaurant, cafeterias, and commercial kitchens

4.1.1 General requirements

When a food processing plant or food service is to be constructed or extensively remodelled, or when an existing structure is converted for use as a food processing plant or food service facility, properly prepared plans and specifications for such construction, remodelling or alteration shall be submitted for review and approval.

4.1.1.1 Data required for application. The plans and specifications required above shall include as a minimum: (1) site plan showing the property boundaries, location of all buildings, access roadways, fences and ancillary structures and separation distances from other industrial, commercial and residential buildings; (2) a building plan showing cross sections of the plant, floor plan of each level, the purpose for which each room is intended, location of walls, partitions, windows, doors, posts, conveyors and all equipment; (3) a plumbing plan that indicates the location of floor drains, potable water and sewer lines, and plumbing fixtures, the location of the sewage disposal system, and the source of water for potable use; (4) any other relevant information as required depending on the type of food hygiene establishment.

4.1.1.2 Plant location. Food processing plants shall be located in areas free from objectionable odours, smoke, flies, ash and dust or other contamination.

4.1.1.3 Vehicular access. Adequate dust-resistant access ways for all vehicular traffic, connecting loading and unloading areas of the plant to the public streets, shall be available.

4.1.1.4 Parking areas. Employee parking areas and access roads adjacent to the food processing plant shall be hard surfaced with a binder of tar, cement, asphalt, or other approved material.

4.1.1.5 Plant size. Product preparation and processing departments or areas shall be of sufficient size to permit the installation of all necessary equipment with ample space for plant operations and with unobstructed ways for conveyances of raw materials and processed products.

4.1.1.6 Process flow. The plant shall be so arranged that there is a proper flow of product, without undue congestion or back-tracking, from the time raw materials are received until the finished article is shipped from the plant.

4.1.1.6 Raw material storage. Raw material storage rooms and areas where preparatory operations (such as washing and peeling of fruits and vegetables and the preparation of meats) are carried on should be separate from rooms or areas wherein frozen or cooked food is formulated, processed and packaged.

4.1.1.7 Doors. Doors connecting various rooms or openings to the outside shall be tight-fitted, solid, and kept in a closed position by self-closing devices.

4.1.1.8 Refrigeration. Facilities for holding products under refrigeration until processed shall be provided. Facilities for quick-freezing the processed product efficiently shall be provided and so located as to be convenient to the food processing and packaging departments. Ample freezer storage shall be provided convenient to the quick freezing facilities: provided that when the frozen product is immediately removed from the establishment, such freezer storage shall not be required.

4.1.1.9 Inedible material storage. A separate room for storing inedible materials such as fruit and vegetable peels, feathers, bones and other food waste, pending removal from the plant, shall be provided in a location convenient to the various preparation and processing areas.

> **4.1.1.9.1 Room size**. The waste storage room shall be of sufficient size to permit the proper storage of filled and empty metal or other relatively non-absorbent refuse containers and their lids. Inedible product containers shall be identified with a distinctive color, such as orange. It shall be well ventilated and equipped with hot and cold water outlets and adequate floor drainage.

4.1.1.10 Packaging and labelling material storage. Packaging and labelling material shall be stored in a separately enclosed space convenient to the packaging department. Packaging and labelling material shall not be stored in the product processing and packaging departments. Only those small quantities of such supplies as are necessary for maintaining continuity of operations will be permitted in the processing and packaging departments.

4.1.1.11 Equipment cleaning room. A separate, well ventilated room or area and proper facilities for cleaning equipment such as trays, hand trucks and implements shall be provided in a location convenient to the processing department.

4.1.1.12 Loading docks. Dock areas shall be of adequate size, constructed of impervious materials and so drained as to minimize the entrance into the plant of dust, dirt and other contaminants from the receiving and shipping operations. If live animals are received, a separate dock shall be provided for this purpose.

4.1.1.13 Use of food room for sleeping. No food room shall be used as a sleeping place, and no sleeping place shall be used as a food room. No food room, which communicates directly with a sleeping place, shall be used for the handling of open food.

4.1.1.14 Materials and finishes. Floors shall be constructed of durable material, which is easily cleanable, non-skid, resistant to oil and grease and shall be sloped to a drain outlet. Interior walls shall have a smooth and washable surface applied to a suitable base. Coves with radii sufficient to promote sanitation shall be installed at the juncture of floors and walls in all rooms. Ceilings shall be of adequate height and of smooth, washable material. Window ledges shall be sloped at least 45` to the interior to promote sanitation. Hollow walls and partitions shall not be provided and the walls shall be tiled above the splash level

4.1.1.15 Rodent and insect control. Plants shall be so constructed as to be rodent resistant. All exterior window and door openings shall be equipped with effective insect and rodent screens. Where doors in outside walls of food handling areas are used for loading or unloading, "fly chaser" fans and ducts or other effective means shall be provided at such doors to prevent the entrance of insects.

4.1.1.16 Food processing equipment. The design, materials, construction and installation of food preparation and processing equipment shall be easily accessible for cleaning and sanitizing and in compliance with current applicable specifications and standards for food equipment as developed by official agencies. All plant equipment and utensils shall be suitable for their intended use.

4.1.1.17 Water supply. The plant shall have an adequate supply of potable water. Where a public system is available, connection must be made thereto; otherwise, the water shall be obtained from a supply meeting the requirements of the department.

4.1.1.17.1 Non-potable water. If a non-potable water supply is necessary it shall not be used in a manner, which will bring it into contact with the product or product zone of equipment.

4.1.1.17.2 Hot and cold water. Hot and cold water in ample supply shall be provided for all plant clean-up needs. Hoses used for clean up shall be stored on racks or reels when not in use.

4.1.1.17.3 Plumbing. All plumbing shall be in compliance with the current standard International Plumbing Code and good engineering practice.

4.1.1.18 Sanitary Facilities. Sanitary facilities shall be provided in accordance with most the International Plumbing Code

4.1.1.18.1 Fresh air intake. No fresh air intake of any ventilation pipe included in the soil drainage system of food premises shall be situated in a food room. Every inlet into such system situated in any such room shall be trapped.

4.1.1.18.2 Cistern for sanitary facility. No cistern for the supply of water in a food room shall supply a sanitary facility otherwise than through an efficient flushing cistern or some other flushing apparatus equally efficient and suitable for the prevention of contamination of water supplies.

4.1.1.18.3 Location. Every sanitary facility shall be so placed that no offensive odour there from can penetrate into any food room. No room or other place, which contains a sanitary facility or where a sanitary facility opens directly onto it, shall be used for a food room. No room, which communicates directly with a room or other place, which contains a sanitary facility, shall be used for the handling of open food. No room, which communicates directly with a room or other place which contains a sanitary facility for the cleaning of equipment used in any food business in the course of which food is handled.

4.1.1.18.4 Ventilation. Any room or other place, which contains a sanitary facility, shall be suitably and sufficiently lighted and ventilated.

4.1.1.18.5 Hand wash notice. For sanitary facilities used by food handlers, there shall be affixed and maintained in a prominent and suitable position near every sanitary facility situated on any food premises a clearly legible notice requesting users to wash their hands after using a facility.

4.1.1.18.6 Water supply. A supply of water sufficient in quantity to adequately supply the sanitary facilities shall be provided and maintained in all food premises. Any supply of water provided for the said purposes shall be clean and

wholesome. All wash-hand basins shall have an adequate supply of hot and cold running water.

4.1.1.18.7 Hand soap and towels. At or near every wash-hand basin available there shall be provided and maintained for the use of persons engaged in handling of food on the food premises adequate supplies of soap or other suitable detergent, nail brushes and clean towels or other suitable drying facilities, which shall be used only for securing the personal cleanliness of such persons.

4.1.1.18.8 Waste container. Each set of sanitary facilities shall be fitted with at least one approved container for the storage of solid waste.

4.1.1.19 Locker facilities. Except where adequate provision is made elsewhere than in a food room, suitable and sufficient cupboard or locker accommodation shall be provided and maintained in all food premises, other than food premises in which no open food is handled, for the clothing and footwear not worn during working hours of all persons engaged in the handling of food on those premises.

4.1.1.20 Washing facilities. There shall be provided and maintained to the satisfaction of the Chief Environmental Health Officer in all food premises suitable and sufficient sink or other facilities (not being wash hand basins) for washing food and equipment used in the food business.

4.1.1.21 Hot and cold water. For every such sink or other facility there shall be provided and maintained an adequate supply either of hot (at a suitable controlled temperature) and cold water but a supply of cold water shall be sufficient for any sink or other facility not used for any other purpose than the washing of fish, tripe, animal casings, fruit or vegetables.

4.1.1.22 Lighting and ventilation. Suitable and sufficient means of lighting shall be provided in every food room. Except in the case of a humidity-controlled or temperature-controlled chamber, suitable and sufficient means of ventilation shall be provided and maintained in every food room.

4.1.1.22.1 Moisture control. There shall be sufficient ventilation in each room and compartment thereof to prevent excessive condensation of moisture, control visible mould, control objectionable odors, and to insure sanitary and suitable processing and operating conditions.

4.1.1.22.2 Movement of air. Fans, blowers or air-cooling systems shall not move air from raw material or preparation rooms into processing rooms.

4.1.1.22.3 Re-entrainment. The discharge from the exhaust system, if used, shall be located well away from fresh air inlets into the plant.

4.1.1.22.4 Filtration. Air sources for ventilation shall be designed and maintained to prevent the entrance of dust, dirt, insects, and other contaminating materials.

4.1.1.23 Control of insects, birds, and animals. Birds, rodents, insects, and other pestiferous animals shall be excluded from the plant. Effective measures for the control of insects and rodents shall be maintained at all times.

4.1.1.23.1 Space around doors and windows. To exclude rodents, space around doors and windows shall not exceed 1/8 inch. Wooden sills and doors at ground level must be sheeted in 26 gauge or heavier sheet metal.

4.1.1.23.2 Vents. All openings, vents, or holes entering into the storage area larger than 1/4 inch shall be closed or covered (including gratings around all piping, wire conduits, beams, and fire walls) with either 26 gauge or heavier sheet metal, 1/4 inch mesh hardware cloth or neat cement as required to make rat-proof.

4.1.1.23.3 Storage of pesticides. All insecticides and rodenticides shall be stored in a separate room away from food storage and processing areas.

4.1.2 Restaurants and commercial kitchens

A commercial kitchen is a kitchen where food is prepared for mass public consumption but not necessarily for sale.

4.1.2.1 Plans. A detailed fully labelled floor plan of the kitchen showing the layout of all equipment, technical specification for equipment, and engineering details for all engineering systems related to the handling, and preparation of food for human consumption.

4.1.2.1.1 Exhaust system details. Full details of the exhaust ventilation system for all cooking equipment shall be provide and shall include: (1) The length and width of the hood; (2) The designed exhaust rate; (3) The total area of the grease filters; and (4) A section through the hood showing the angle of installation for the filters and the location of the drip pans.

4.1.2.1.2 Hot water system. The plans submitted shall include design specifications for the hot water system which shall include: (1) The type of heater proposed, (2) The minimum designed hot water requirements, (3) The storage capacity of the heater in gallons, (4) The percentage thermal efficiency of the heater, (5) The BTU rating of the heater, and (6) The recovery rate of the heater in gallons per hour.

4.1.2.1.3 Dishwasher. If a mechanical dishwashing system is provided then the following minimum information shall be included: (1) the type of dishwasher, (2) The size of the racks, (3) the capacity of the dishwasher in terms of number of racks per hour, (4) the water volume in the wash cycle of the machine, (5) the

minimum wash cycle time, (6) the minimum pump capacity for the wash cycle (7) The minimum volume of water for the rinse cycle, (8) the minimum rinse cycle time, and (9) rinse water flow pressure on line at machine.

4.1.2.1.4 Onsite solid waste storage facility. Design details for the onsite storage of solid waste shall be included in the plans submitted. The following information is the minimum required to be submitted with the application: (1) a site plan showing the proposed location of the facility, (2) the distance to the nearest structure immediately in front of the facility, (3) the proposed area to allow the service vehicle to turn on site, (4) a floor plan of the onsite solid waste facility showing the length and width dimension, floor drain, (5) a front and side elevation showing the height dimension of the enclosure, and the height of any structures located in the vicinity, (6) any other information deemed relevant by the department to assist in the assessment of the adequacy of onsite solid waste management.

4.1.2.2 Kitchen layout. The kitchen area shall be designed to provide a work flow that: (1) is continuous and progresses in a uniform direction from raw material to finished product; (2) adequately separates the clean and dirty processes; (3) eliminates cross-contamination; (4) facilitates effective cleaning; (5) provides aisle spaces shall not be less than 36 inches; and (6) spaces the equipment so that they can be easily cleaned.

4.1.2.3 Lighting on food preparation surfaces. A minimum lighting of 70 foot-candles on all food preparation surfaces shall be provided.

4.1.2.4 Sewer pipes. Pipe work and ducting shall be bracketed at least 6 inches from walls to facilitate cleaning. Pipes passing through external walls must be effectively

sealed to prevent the ingress of pests. Sewer pipes shall not pass overhead in food storage areas.

4.1.2.5 Working space. Sufficient working space must be provided if safety and sanitation is to be maintained in the food preparation facility. An area of 15 sq ft per person shall be used in determining the maximum dining occupancy for a restaurant with table service.

4.1.2.5.1 Calculation of meals per day. The maximum number of meals to be served per day shall be estimated by calculating the maximum occupancy of the dining area times the number of meal sessions per day times the length of each meal session.

M = SHP

Where:

M = meals per day
S = meal sessions per day
H = hours per meal session
P = persons served per hour

In order to estimate the number of meals served per day the following serving rate should be used:

Type of Food Service	Typical Serving Rates (person per hour)
Line	300
Counter service	4
Table service	2 * seating capacity

4.1.2.5.2 Kitchen and storage area. The estimated number of meals served per day shall determine the minimum kitchen area required. A minimum area of 2 sq ft per meal served per day shall be used to compute the total kitchen area required. The storage room shall provide a minimum floor area of 1.5 sq ft per meal served per day with a minimum aisle space of 3 ft provided.

4.1.2.6 Dry food storage. The location of the dry storage areas shall be adjacent to the food preparation area and convenient to receiving. The storage room shall be adequately ventilated and protected against entrance of insects and rodents. The storeroom shall be free of uninsulated steam and water pipes, water heaters, transformers, refrigeration condensing units, steam generators or other heat producing equipment. The store room shall, as far as practicable, be maintained at temperatures of 50°F to 70°F.

4.1.2.6.1 Shelving. Shelving can be constructed of suitably finished hard wood, durable plastic or preferably of corrosion resistant metal. The highest shelf for practical use is shall not be more than 7' and the lowest one shall not be less than 6" from the floor. Clearance between the shelves shall be at least 15".

4.1.2.6.2 Lighting intensity. Artificial lighting shall be provided with a minimum intensity of 20-foot candles.

4.1.2.6.3 Storage of hazardous materials. Pesticides, cleaning compounds, disinfectants, lubricating oil, and other hazardous materials shall not be stored in rooms designed for the storage of food.

4.1.2.7 Refrigeration. The plan must provide adequate refrigeration facilities for the proper storage, transportation, display, and service of potentially hazardous foods. All refrigerators must be capable of maintaining potentially hazardous foods (PHF) at 41°F or below.

4.1.2.7.1 Recording device. A suitable indicating or recording instrument shall be used to measure the temperature of the refrigeration system.

4.1.2.7.2 Rapid cooling facilities. The capacity of the rapid cooling facilities must be sufficient to accommodate the volume of food to be cooled to 41°F within 6 hours.

4.1.2.7.3 Point-of-use refrigerators. Point-of-use refrigerators and freezers shall be provided at workstations for operations requiring preparation and handling of potentially hazardous foods.

4.1.2.7.4 Location of units. Refrigeration units, unless designed for such use, shall not be located directly adjacent to cooking equipment or other high heat producing equipment, which may tax the cooling system's operation. Refrigeration units shall not be installed exterior to the building if non-packaged foods will be transported from the unit to the food establishment.

4.1.2.7.5 Capacity. In determining the required reserve refrigerated storage space a value of 0.25 cu ft per meal served shall be used.

4.1.2.7.6 Shelving. Shelving for walk-in and reach-in refrigeration units shall be equipment that is certified or classified for sanitation by an ANSI accredited certification program.

4.1.2.7.7 Interior finishes. Interior finishes of walk-in and reach-in refrigeration units shall be certified or classified for sanitation by an ANSI accredited certification program. Galvanized metal is not recommended because of its tendency to rust.

4.1.2.7.7 Indicating thermometers. All refrigeration units must have numerically scaled indicating thermometers accurate to $\pm$ 3°F. The temperature-sensing device must be located in the unit to measure air temperature in the warmest part. All such thermometers shall have an externally mounted indicator to facilitate easy reading of the temperature of the unit.

4.1.2.7.8 Coving. For walk in refrigeration an approved coving shall be provided at the juncture of the walls and floor.

4.1.2.7.9 Fixed equipment. Fixed equipment shall be spaced to allow for cleaning along the sides and behind, or sealed to adjoining equipment or walls.

4.1.2.7.10 Floors. If the floors of walk-in refrigeration units are water-flushed for cleaning or receive the discharge of liquid waste or excessive melt water, the floors shall be non-absorbent (i.e. quarry tile or equal) with silicone or epoxy impregnated grout and, sloped to drain.

4.1.2.7.11 Lighting. Each walk-in refrigeration unit shall be equipped with lighting that provides 10-foot candles of light throughout the unit when it is full of product.

4.1.2.8 Hot water system. The hot water supply shall be sufficient to satisfy the continuous and peak hot water demands of the establishment. A peak hot water consumption of not less than 1.8 gallons of 180^{o}F water per meal shall be used in calculating hot water requirements for all restaurants. All hot water generating equipment shall conform to internationally recognized standards. The manufacturer's specification sheets (cut sheets) shall be consulted for hot water supply requirements.

4.1.2.8.1 Heater recovery rate. For food facilities that utilize multi-service eating and drinking utensils, the water heater shall have a recovery rate equal to or greater than 100% of the computed hourly hot water demand, in gallons per hour. For food facilities that use only single-service eating and drinking utensils, or don't use utensils at all, the water heater shall have a recovery rate equal to or greater than 80% of the computed hourly hot water demand, in gallons per hour. The recovery rate of a water heater is computed as follows:

$$R = (V / 0.75) (1 / T)$$

Where:

R = heater recovery rate, gph
V = heater tank volume, gals
T = time available to heat the water, hr

4.1.2.8.2 Water temperature. For the purposes of these guidelines a tap water temperature of 70° Fahrenheit will be assumed. A 120% degree-rise in temperature shall be used in calculating hot water recovery.

4.1.2.8.3 Water heater thermal efficiency. The thermal efficiency for gas water heaters, unless otherwise listed by NSF International or other nationally recognized testing laboratories, will be assumed to be 75%. The thermal efficiency for electric water heaters, unless otherwise listed by NSF International or other nationally recognized testing laboratories, will be assumed to be 98%.

4.1.2.8.4 Calculation of heater capacity. The required heater capacity shall be determine from the formula:

BTU = (H * 8.3 * 100) / E

Where:

BTU = British thermal unit
H = Total hot water required, gph
E = Heater efficiency as a fraction

KW-hr = BTU / 3412

Where:

BTU = British thermal unit
KW-hr = Kilowatt hour

4.1.2.8.5 Instantaneous water heaters. Instantaneous water heaters may be used in food service facilities such as grilles, sandwich shops, and snack shops. When hot water is utilized at several locations at the same time the flow of hot water to each fixture can be severely restricted. As a result of the restricted output of instantaneous water heaters, more than one unit may be required, depending on the numbers and types of sinks and equipment present. Instantaneous water

heaters must be sized to provide hot water of at least 120° Fahrenheit, and at a rate of at least two gallons per minute (GPM), to each sink and fixture that utilizes hot water with the exception of hand lavatories, which must receive at least 1/2 GPM.

4.1.2.8.6 Booster heaters. When a hot water sanitizing ware-washing machine is used, a booster heater must be provided that will raise the incoming general purpose hot water up to at least 180° Fahrenheit for the final sanitizing rinse cycle. When sizing a booster heater, the hot water demand for the ware-washing final sanitizing rinse cycle shall be obtained from the NSF International listings or listings established by other nationally recognized testing laboratories. When a booster heater is installed below a drain board, it shall be installed at least six inches above the floor and away from the wall, and in a manner that will allow accessibility for proper cleaning and servicing.

4.1.2.8.7 Recirculation pumps. Where fixtures are located more than sixty feet from the water heater, a recirculation pump must be installed, in order to ensure that water reaches the fixture at a temperature of at least 120° Fahrenheit or smaller water heater for remote fixtures, such as for restroom hand sinks shall be installed.

4.1.2.9 Dishwashing. Manual or mechanical facilities can be provided for the washing and sanitizing of utensils.

4.1.2.9.1 Manual dishwashing. For manual washing and sanitizing of utensils, provide a stainless steel sink with no fewer than 3-compartments. The sink compartments shall be large enough to hold the largest pot, pan or piece of equipment. Each compartment shall be supplied with adequate hot and cold

potable running water. Integral drain boards of adequate size shall be provided on both sides of the sink for cleaned and soiled utensils. When approved, 2-compartment sinks may be allowable under certain conditions.

4.1.2.9.1.1 Drain boards. Pitch the drain boards and dish tables a minimum of 1/8" per foot and direct the drainage into the sink. Drain boards shall generally be at least the same size as that of the sink compartments. Recommended size is 36-48" long and 30" wide.

4.1.2.9.1.2 Storage racks. Adequate facilities shall be provided to air-dry washed utensils and equipment. Storage facilities shall be provided to store cleaned and sanitized utensils and equipment at least 12" above the floor on fixed shelves or in enclosed cabinets protected from splash, dust, overhead plumbing or other contamination.

4.1.2.9.1.3 Pre-flushing. Provide adequate facilities for pre-flushing or pre-scraping equipment and utensils.

4.1.2.9.1.4 Chemical test kit. An approved chemical test kit for determining sanitizer strength shall be available and used.

4.1.2.9.1.5 Cleaners and sanitizers. A working supply of cleaners and sanitizers must be stored in an approved location.

4.1.2.9.2 Mechanical dishwashing. A mechanical dish washer can be used lieu of, or in addition to a manual dishwashing system.

4.1.2.9.2.1 Dishwasher capacity The capacity of the dishwashing machines shall be based on the maximum number of utensils that must be washed per hour. The maximum number of pieces to be washed per hour shall be determined by from the number of meals to be served, the

amount of time available for dishwashing, and the capacity of the rack. The number of pieces to be washed is determined as follows:

P = (M * 4) / (R * T)

Where:

P = Number of pieces to be washed per hour
M = Number of meals
R = Pieces per rack
T = Time available for washing, hr

4.1.2.9.2.2 Dishwasher rack capacity. The capacity of a dishwasher rack shall be obtained from the manufacturer's specification. Where this data is not available the capacity can be estimated as follows: for a 20 x 20 in rack 24 pieces, for an 18 x 18 rack 20 pieces, for a 16 x 16 rack 16 pieces.

4.1.2.9.2.3 Chemical sanitization Chemical dishwashing machines shall meet nationally recognized standards and be certified or classified by an ANSI accredited certification program. The chemical sanitizing feeder must meet an internationally recognized standards and be certified or classified by an ANSI accredited certification program and be compatible with the specific make and model of machine in question. An approved chemical test kit for determining sanitizer strength shall be available and used. A visual flow indicator must be provided to monitor the operation of the sanitizing agent feeder. The flow indication devices must be installed so as to be conspicuous to the operator.

4.1.2.9.2.4 Hot water sanitization. A commercial dishwashing machine for mechanical ware washing utilizing hot water for sanitization shall be

provided that is in compliance with the relevant international standards or an ANSI accredited certification program.

4.1.2.10 Hand washing facilities. A separate hand washing sink; hand drying device, or disposable towels; supply of hand cleaning agent; and waste receptacle shall be provided for each food preparation area. A hand wash sink shall be located within 25 feet of a workstation. Hand washing sinks may not be used for purposes other than hand washing. Each hand-washing sink shall be provided with hot and cold water tempered by means of a mixing valve or a combination faucet to provide water at a temperature of at 120°F. Any self-closing, slow-closing or metering faucet shall be designed to provide a flow of water for at least 15 seconds without the need to reactivate the faucet. Splash from a hand wash sink may not contaminate food, equipment or utensils. Splashguard protection is required if adequate spacing to adjoining food, food preparation, food contact surfaces, and utensil washing area surfaces (drain boards) is insufficient.

4.1.2.12 Kitchen hoods. Commercial kitchen hoods shall be installed at or above all cooking appliances and be designed to capture and confine cooking vapours and residues. Type I hoods shall be installed where cooking appliances produce grease or smoke, such as occurs with griddles, fryers, broilers, ovens, ranges, and wok ranges. Type II hoods shall be installed where cooking or dishwashing appliances produce heat, steam, or products of combustion and do not produce grease or smoke, such as steamers, kettles, pasta cookers and dishwashing machines.

4.1.2.12.1 Automatic activation of exhaust system. The exhaust system shall operate during cooking operation and shall be designed to automatically activate the exhaust fan when cooking operations occur. The activation of the exhaust system shall occur through an interlock with the cooking appliance by means of heat sensors or by other approved means.

4.1.2.12.2 Air velocity. Grease duct systems shall be designed and installed to provide an air velocity within the duct system of not less than 500cfm.

4.1.2.12.3 Grease filters. Hoods shall be equipped with listed grease filters designed for the specific purpose. Filters shall be of such size, type and arrangement as will permit the required quantity of air to pass through such units at rates not exceeding those for which the filter or unit was designed or approved. Filter units shall be installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Removable filters shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or food preparation surfaces. Filters shall be installed at an angle of not less than 45 degrees from the horizontal.

4.1.2.12.4 Canopy size and location. Hoods shall be installed at or above all commercial cooking appliances. The inside lower edge shall overhang or extend a horizontal distance of not less than 6 inches beyond the edge of the top horizontal surface of the appliance on all open sides. The vertical distance between the front lower lip of the hood and such surface shall not exceed 4 feet.

4.1.2.12.5 Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity air as outlined below. The net quantity air shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood and shall be calculated as follows:

Type of appliance	Type of hood	CFM per linear foot o f hood
Extra-heavy-duty	Backshelf / pass-over	Not allowed
Extra-heavy-duty	Double island canopy (per side)	550
Extra-heavy-duty	Eyebrow	Not allowed
Extra-heavy-duty	Single island canopy	700
Extra-heavy-duty	Wall-mounted	550

Heavy-duty	Backshelf / pass-over	400
Heavy-duty	Double island canopy (per side)	400
Heavy-duty	Eyebrow	Not allowed
Heavy-duty	Single island canopy	600
Heavy-duty	Wall-mounted	400
Medium-duty	Backshelf / pass-over	300
Medium-duty	Double island canopy (per side)	300
Medium-duty	Eyebrow	250
Medium-duty	Single island canopy	500
Medium-duty	Wall-mounted	300
Light-duty	Backshelf / pass-over	250
Light-duty	Double island canopy (per side)	250
Light-duty	Eyebrow	250
Light-duty	Single island canopy	400
Light-duty	Wall-mounted	200

4.1.3 The Processing and Bottling of Drinking Water

4.1.3.1 Separate bottling room. The bottling room shall be separated from other plant operations or storage areas by tight walls, ceilings, and self-closing doors.

4.1.3.2 Ventilation. Adequate ventilation shall be provided in processing rooms, bottling rooms, and in container washing and sanitizing areas.

4.1.3.3 Bottle washing. The washing and sanitizing of containers for bottled drinking water shall be performed in an enclosed room.

4.1.3.4 Location in relation to rooms for domestic purposes. Rooms in which product water is handled, processed, or held or in which containers, utensils, or equipment are washed or held shall not open directly into any room used for domestic household purposes.

4.1.3.5 Suitable equipment. All plant equipment and utensils shall be suitable for their intended use. This includes all collection and storage tanks, piping, fittings, connections, bottle washers, fillers, cappers, and other equipment which may be used to store, handle, process, package or transport product water.

4.1.3.6 Sanitizing. All product water-contact surfaces shall be constructed such that cleaning and sanitizing can be adequately accomplished. Sanitizing operations, including those performed by chemical means or by any other means such as circulation of life steam or hot water, shall be adequate to effect sanitization of the intended product water-contact surfaces and any other critical area.

4.1.4 Fish Processing Plants

4.1.4.1 Processing rooms. Processing rooms shall he so arranged that inedibles, upon separation from the edible product, shall not be transferred to the contact surfaces of equipment used in processing or packaging and packing of the edible item.

4.1.4.2 Lighting. There shall be sufficient light consistent with the use to which the particular portion of the building is devoted; and to provide for efficient cleaning. Light bulbs, fixtures, skylights, or other glass suspended in the ice room or over exposed food in any step of preparation shall be of the safety type or otherwise protected to prevent food contamination in case of breakage.

4.1.4.3 Ice. Ice shall be made from a supply of potable sanitary water. It shall be manufactured, handled, stored and used in a sanitary manner as specified by the Department of Environmental Health.

4.1.4.4 Materials. The product contact surfaces of all equipment, containers, and utensils shall be constructed from suitable, smooth, impervious, nontoxic materials that are corrosion--resistant. All scales, filleting tables, scale tables, packing tables, benches and similar equipment, where it is practicable, shall be made of non-corrosive material.

4.1.4.5 Vehicles. Vehicles and transportation facilities shall be constructed and operated to protect contents from contamination and deterioration.

4.1.5 Dairy Processing Plants

4.1.5.1 Floors, walls and ceilings. The floors of all rooms in which dairy products are processed, pasteurized, manufactured or stored must be constructed of sealed concrete or other impervious material with a smooth surface and sloped 1/4 inch per foot to adequately trapped drains. The floor /wall joints are to be coved for ease of cleaning and maintenance. Walls and ceiling of rooms in which dairy products are processed, pasteurized, manufactured, packaged or stored shall be smooth, light coloured and impervious to moisture.

4.1.5.2 Drains. Drains should be properly trapped and covered floor drains with removable covers are should be provided in all areas of the plant. The drains must be of an adequate size and be kept clean.

4.1.5.3 Overhead lines. All overhead utility lines should be installed in such a manner as to avoid contamination of products below. They should be insulated where necessary and be designed and finished to prevent the accumulation of dirt and minimize condensation, mould development and flaking. They must be easy to clean.

4.1.5.4 Lighting and ventilation. All plants should provide adequate lighting, which is shielded with shatterproof coverings to ensure clean and efficient plant operation. Adequate ventilation is required in all plants to prevent excessive heat, dust accumulation, odours or condensation and to provide a proper work environment for employees. The direction of airflow should be from the processing area outward to other areas of the plant.

4.1.5.5 Water supply. Complete details on the proposed water supply should be submitted for review and should include: the source and a description of the proposed treatment (when necessary. Professionally engineered water systems may be required depending on source and type of dairy products being processed. An adequate supply of

hot and cold water under pressure should be provided in all plants. The operator must assure that the water is bacteriologically and chemically safe.

4.1.5.6 Sewage disposal. Sewage disposal facilities (either municipal or private systems) must be provided at all dairy plants and should be designed and maintained to meet the local requirements.

4.1.5.7 Refrigeration. Refrigerated storage facilities must be provided for all dairy products. The facilities should be designed to meet the temperature requirement of 4°C (40°F) or less but above 0°C (32°F) for coolers and raw milk storage tanks, and less than -18°C (0°F) for freezers.

4.1.5.8 Equipment. Equipment used in the receiving, processing, pasteurizing, manufacturing, packaging, storing, dispensing, transporting or marketing of a dairy product should be of an approved type. The equipment must not be defective, unsuitable or unsanitary. All equipment, including CIP lines, used in the processing, manufacturing, or packaging of dairy products shall be designed, installed and operated so as to insure that there is no possibility of cross contamination between pasteurized dairy products, unpasteurized dairy products, chemicals, water or wastes.

4.1.5.9 Employee facilities. Employee's facilities should include a suitably designed dressing room and lunchroom. Conveniently located sanitary toilets for male and female employees should be provided exclusively for the use of dairy plant personnel and should not open directly into an area used for the processing or packaging of dairy products. Adequate and conveniently located facilities for hand washing and drying must be provided wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided.

4.1.5.10 Public access. Dairy plants should be designed so that public access can be controlled and to prevent unauthorized entry to dairy processing areas.

4.1.5.11 Dairy products for other uses. All dairy products that are to be sold or supplied for feed for livestock or for other similar purposes shall at all times be handled, treated, processed and stored away from milk products intended for human consumption.

4.1.5.12 Cleaning material storage. All cleaning chemicals must be stored safely in a controlled area away from milk products, ingredients and food storage containers.

4.2 Swimming Pools and Spas

4.2.1 Permit required. No swimming pool installation, alteration or repair work shall be commenced until a permit shall first be obtained from the administrative authority.

4.2.2 Application for permit. Any person who desires a permit to install, alter, or repair a swimming pool shall make an application on the forms provided for that purpose. Two or more copies of specifications, and drawings drawn to a scale with sufficient clarity and detail to indicate the nature and character of the work, shall accompany every application.

4.2.3 Plans. The plans to be submitted shall include at least a plot plan, structural plan, and a mechanical plan

4.3.2.1 Plot plan. A plot plan shall be submitted showing site grades, dimensioned, and drawn to a scale of not less the 1/8th of an inch to a foot and showing at least the following: (1) property lines, (2) proposed pool shape, (3) setbacks, (4) side yards, and (5) clearance from existing structures adjacent to the pool, (6) the proposed deckwork configuration, showing anticipated drainage, (7) anticipated overall drainage of the pool site, and (8) the proposed location of the mechanical equipment room .

4.3.2.2 Structural plan. A structural plan shall be submitted showing at least: (1) type of pool construction, (2) pool dimensions, including depth, and adequate cross-sections, and (3) interior finishes, (4) A dimensioned floor plan and section of the mechanical room showing clearances for the equipment and access for inspection.

4.3.2.3 Mechanical plan. A mechanical plan shall be submitted showing at least the following: (1) the volume, system flow rate in gallons per minute, and turnover in hours, (2) the type and size of filtration systems and means of waste disposal, (3) the type and size of pool heater, if included, (4) The pool piping layout with all sizes shown and types of material to be used, and showing the location of the main outlets, surface skimmers, and inlets, (5) the rated capacity of the pool pump in gpm at the design head with the size and type of motor indicated, (6) the means of adding makeup water, and (7) the layout of the pool room.

4.3.2.4 Pump curves. A copy of the pump curves shall be submitted as part of the specifications for the swimming pool. Where more than one curve is given on a single graph the curve corresponding to the pump to be used shall be clearly identified.

4.2.4 Issuance of permit. If the administrative authority determines that the plans, specifications, drawings, descriptions, or information furnished by the applicant is in compliance with the code, a permit will be issued to that effect.

4.2.5 Inspection. All swimming pool installations or alterations including equipment, piping and appliances shall be subject to inspection by the administrative authority to ensure by the permit, to notify the administrative authority, that the said work is ready for inspection.

4.2.6 Notification. It shall be the duty of the person doing the work authorized by the permit, to notify the administrative authority, that the said work is ready for inspection.

4.2.7 Mechanical requirements.

4.2.7.1 Circulation system. Every swimming pool shall be equipped with a circulation system consisting of pumps, piping, return inlets, suction outlets, filters, and other necessary equipment for a complete circulation of water. Wading pools and spas shall have separate dedicated filtering systems. Wading pools shall be physically separated from the main pool.

4.2.7.2 Water velocity. Pool piping shall be designed so that the water velocity will not exceed 10 feet per second for discharge piping and 6 feet per second for suction piping and 1.5 feet per second flow rate through the suction grates.

4.2.7.3 Recirculation time. The equipment shall be of adequate size to turn over the entire pool volume as required for the type of pool. The system shall be designed to give the proper turnover rate based on the manufacturer's recommended maximum pressure and flow rate of the filter with a clean media.

4.2.7.4 Access to system components. The circulation system components that require replacement or servicing shall be accessible for inspection, repair, or replacement and shall be installed in accordance with the manufacturer's specifications.

4.2.7.5 Pool piping. The pool piping shall be sized to permit the rated flows for filtering and cleaning without exceeding the operating head of the pump. The pipe and fittings shall be made of non toxic materials and designed to withstand the operating pressure and conditions of the swimming pool.

4.2.7.6 Flow-measuring devices and pressure gauges. Pools shall be equipped with a flow-measuring device that indicates the rate of flow through the filter system. The flow rate measuring device shall read out in gallons per minute and shall be selected and installed to be accurate within 10% actual flow. Pressure gauges shall be provided on filter influent and effluent lines.

4.2.7.7 Water clarity and chemistry. The circulation system shall be designed to maintain water clarity and to distribute chemicals as required for pool sanitation. The pool water shall circulate during all hours the pool is open for use, plus any additional time necessary to ensure continuous water clarity and chemical distribution.

4.2.7.8 Filters. Filters shall be sized to accommodate or exceed the design flow rate of the system and provide water clarity. Filter piping should be valved so that filters can be washed individually and so that each filter can be isolated for repairs while the other units are in service.

4.2.7.9 Pumps and motors. A pump and motor shall be provided for circulation of the pool water. The pump shall be capable of providing the flow required for filtering the pool water in accordance with the turnover rate required against the total dynamic head developed in the complete system. The horsepower rating and labelling shall not exceed the brake horsepower of the motor. Pumps and motors shall be accessible for inspection. Pumps should have design capacity at the following heads:

- Pressure diatomaceous earth filters - at least 60 feet.
- Vacuum diatomaceous earth filters - 20 inches vacuum on the suction side and 40 feet total head.
- Rapid sand filter- at least 45 feet.
- High rate sand filter- at least 60 feet.
- Cartridge filters - at least 40 feet

4.2.7.10 Strainers. A cleanable strainer or screen shall be provided, upstream of the circulation pumps to remove solids, debris, hair, lint etc.

4.2.7.11 Inlets and outlets. Inlets and outlet (s) shall be provided and arranged to produce a uniform circulation of water and maintain the distribution of sanitation of water

and maintain the distribution of sanitizer residual throughout the pool. Inlets should be placed at least 12 inches below the water line, not more than 15 feet apart.

4.2.7.11.1 Entrapment avoidance. The suction outlet (s) including covers, fittings, and hardware shall be designed in accordance with the manufacturer's specifications to provide protection from body and hair entrapment. A minimum of two drain outlets shall be provided and these shall be placed at least 3 ft apart.

If a suction outlet system has suction outlets that are capable of being isolated by valves, each suction outlet shall protect against bather entrapment by any of the following:

- An anti-entrapment cover that complies with the most recent edition of ASME/ANSI A112.19.8M
- A 12 inch x 12 inch grate or larger, which allows a maximum flow rate not exceeding 1.5 feet per second; or
- An alternate designs or means that produce equivalent protection

4.2.7.11.2 Number of inlets. The number of return inlets shall be based on a minimum of one inlet per 15 feet of pool perimeter. Return inlet fittings shall be of sufficient size or quantity to allow a full turnover rate of the circulation system in accordance with the manufacturer's specifications for return inlets.

4.2.7.12 Surface skimming systems. A surface skimming system shall be provided and shall be designed and constructed to skim the pool surface when the later level is maintained within operational system. When equalizer lines are used they shall have an anti-entrapment cover or other entrapment protection in accordance with ASME/ANSI A112.19.8M.

4.2.7.12.1 Automatic surface skimmers. Where automatic skimmers are used as the sole overflow system, at least one surface skimmer shall be provided for each 500 square feet or fraction thereof of the water surface area.

4.2.7.12.2 Capacity of skimmer system. A skimmer system shall be designed to handle a minimum of 100% of the pool turnover rate through the skimmers.

4.2.7.12.3 Perimeter surface skimmers. When a perimeter-type surface skimming system is used as the sole surface skimming system, it shall extend around a minimum of 50% of the pool. It shall be connected to the circulation system with a system surge capacity of not less than 1 gallon for each square foot of pool surface area. The hydraulic capacity of the surface overflow system shall be capable of handling 100% of the circulation flow.

4.2.8 Water supply. The water supply serving the pool shall be from a potable source. No direct mechanical connection shall be made between the potable waster supply and the swimming pool, chlorinating equipment, or the system of piping for the pool, unless it is protected against backflow and back-siphonage in a manner approved by the local authority.

4.2.9 Waste water disposal. Backwash water or pool drainage water shall be discharged to the sanitary or storm sewer, or into an approved disposal system on the premise, or by other means approved by the state or local authority. No direct connection shall be made between the end of the backwash line and the disposal system.

4.2.10 Sanitizing equipment. Sanitizing equipment shall be capable of introducing a sufficient of sanitizer to maintain the appropriate levels under all conditions of intended use. All swimming pools when in use shall be continuously treated with a sanitizer to ensure that one of the following shall be met:

- There is a residual of free chlorine maintained ideally between 2ppm and 4 ppm but shall not be less than 1 ppm or more than 10 ppm. Combined chlorine levels shall not exceed 0.2 ppm.
- There is a residual of total bromine in all parts maintained preferably between 4 ppm and 6 ppm but not less than 2 ppm and more than 10 ppm.
- The pH of the water should be maintained between 7.4 and 7.6, but shall not exceed 7.8 or less than 7.2
- Bacteria level shall not exceed those set by the local health department.

4.2.11 Safety features.

4.2.11.1 Handhold. Public pools shall be provided with a handhold around the perimeter in areas where the depth exceeds 3 feet 6 inches. Handholds can be: (1) coping, ledges, deck along the immediate top edge of the pool located not more than 12 inches from the water line; (2) ladders, stairs, or seat ledges, and (3) a secure rope or railing place not more than 12 inches above the waterline.

4.2.11.2 Depth markers. Depth markers in feet shall be plainly and conspicuously marked on the vertical pool wall at or above the water line. Depth markers on the vertical wall shall be positioned to be read from the water side and allow the numerical value to be visible above the waterline. Depth markers on the pool deck shall be within 18 inches of the water edge and positioned to be read while standing on the deck facing the water. Depth markers shall be installed at the maximum and minimum water depth and at all changes in slope. Depth markers shall be arranged uniformly on both sides and both ends of the pool. Depth markers shall have a 4 inch minimum height and the numbers shall be of contrasting colour to the background on which they are applied and the colour shall be of a permanent nature.

4.2.11.3 Lifesaving equipment. Lifesaving equipment shall be conspicuously and conveniently placed and on had at all times. A swimming pool accessory pole, including a body hook, shall be a minimum of 12 feet long. A minimum ¼ inch diameter throwing rope as long as 1.5 times the maximum width of the pool or 50 feet, whichever is less, to which is attached a ring buoy with an outside diameter of at least 15 inches shall be provided, or a similar flotation device.

4.2.11.4 Safety sign. Safety signage shall be erected to provide effective visual observation by users.

4.2.12 Pool deck. A paved deck should be provided around the perimeter of the pool. The deck should be at least four feet wide and sloped away from the pool. The minimum slope of the deck should be ¼ inch to a foot.

4.2.13 Public pool

4.2.13.1 Definition. A public swimming pool and spa is one used for bathing and operated by an owner, licensee, or concessionaire, regardless of whether a fee is charged for use. Public swimming pools include: (1) pools intended for competitive aquatic sports; (2) pools intended for public or semi-public recreational swimming; (3) pools intended for use for apartments, condominiums, property owners associations, multi-family owned pools; (4) pools operated solely for or in conjunction with lodgings such as hotels and motels; (5) pools used for physical therapy; and (6) wading pools.

4.2.13.2 Turnover time. Pumps, filters, chemical feeders and all pipes, connections, fittings, and appurtenances thereto shall be of a size or capacity to enable circulating, filtering and disinfecting of the entire pool contents in 8 hours or less. The system shall be designed for continuous 24 hour circulation, filtration, and disinfection of water.

4.2.13.3 Filtration rates.

4.2.13.3.1 Pressure sand filters. The rate of filtration shall not exceed 15 gallons per minute per square foot of filter area.

4.2.13.3.2 Diatomaceous earth filters. The rate of filtration shall not exceed 2 gallons per minute per square foot of filter area.

4.2.13.3.3 Cartridge filters. The rate of filtration shall not exceed 0.375 gallons per minute per square foot of filter area.

4.2.13.3.4 Other filters. Other filters may be permitted when performance has been proven as a result of full scale operation of similar units under normal conditions of use.

4.2.13.4 Overflow gutters. Where pools have overflow gutters, a surge tank shall be provided which will effectively maintain pool water level so as to produce continuous surface skimming.

4.2.13.4.1 Diameter of pipe. The minimum diameter of gutter drainage piping shall be 2.5 inches. The drainage pipe shall be placed at 15-foot centers.

4.2.13.4.2 Strainers or grates. All inlets to gutter drainage piping shall be provided with strainer or grates and the openings for each strainer or grate shall be at least 1.5 times the cross sectional area of the outlet pipe.

4.2.13.5 Balance tank. If a balance tank is provided it shall be designed to meet the following criteria:

- The tank shall be open to the atmosphere, and must be sized to provide an adequate reservoir for pump suction.
- The tank shall hold reserve, as a minimum, the water that has been displaced by bathers when the pool is at maximum use.

- A minimum volume of 20 gallons per bather shall be used to calculate the required tank volume

4.2.13.6 Sanitary facilities. Adequate dressing rooms and sanitary facilities shall be provided for all public swimming pools. Omission of part or all of the poolside toilet facilities may be approved when such facilities are available within 300 feet and no more than one floor level above or below the swimming pool. Sanitary facilities to be used simultaneously by both sexes shall be divided into two parts, each appropriately designated for men and women and separated by a tight partition. The entrances and exits shall be screened to break the line of sight.

4.2.13.6.1 Sign. All public swimming pools shall post a sign visible upon entering the pool enclosure directing pool users to shower before entering the pool.

4.2.13.6.2 Internal Finishes. Floors of the sanitary facilities shall be of smooth-finished material with non-slip surfaces, impervious to moisture, easily cleanable and sloped at least one-fourth inch per foot to drains. Carpeting shall not be permitted in shower and toilet areas. Junctions between walls and floors shall be coved and of smooth, impervious materials, free from cracks or open joints. Partitions between dressing cubicles shall terminate at least 10 inches above the floor, or shall be placed on continuous raised masonry or concrete bases at least four inches high. Lockers shall be set either on solid masonry or concrete bases at least four inches above the floor. Lockers shall be vented.

4.2.13.6.3 Towels. Where towels and/or swimming suits are provided, facilities shall be provided to adequately launder, store and sanitize these items after each usage.

4.2.13.6.4 Wash down facilities. Hose bibs shall be provided such that all parts of the sanitary facility interior can be reached with a 50 foot hose to enable the entire area to be flushed with a hose. Hose bibs shall be provided with anti-siphonage devices.

4.2.13.6.4 Sanitary supplies. Soap dispensers with either liquid or powdered soap shall be provided at each lavatory or required shower. The dispenser shall be of all metal or plastic type, with no glass permitted in these units. An adequate supply of warm water within the temperature range of 95 to 100 degrees Fahrenheit is required for all showers and lavatories. Toilet paper holders with toilet paper shall be provided at each water closet.

4.2.14 Private pool

4.2.14.1 Definition. A private swimming pool and spa is one used for swimming and recreational bathing which is intended for single family use, by homeowner, members of the homeowner's family, or their invited guests.

4.2.14.2 Turnover time. Pumps, filters, chemical feeders and all pipes, connections, fittings, and appurtenances thereto shall be of a size or capacity to enable circulating, filtering and disinfecting of the entire pool contents in 12 hours or less. The pool water shall circulate during all hours the pool is open for use, plus any additional time necessary to ensure continuous water clarity and chemical distribution.

4.2.14.3 Filtration rates.

4.2.14.3.1 Pressure sand filters. The rate of filtration shall not exceed 20 gallons per minute per square foot of filter area.

4.2.14.3.2 Diatomaceous earth filters. The rate of filtration shall not exceed 2.5 gallons per minute per square foot of filter area.

4.2.14.3.3 Cartridge filters. The rate of filtration shall not exceed 1 gallon per minute per square foot of filter area.

4.2.14.3.4 Other filters. Other filters may be permitted when performance has been proven as a result of full scale operation of similar units under normal conditions of use.

4.2.15 Spas

4.2.15.1 Plans. Prior to construction, rehabilitation, or alteration of a spa, plans and specifications shall be submitted to the DEH for review and approval. No changes shall be made to an approved spa without written approval by the Chief Environmental Health Officer.

4.2.15.2 Water depth. The maximum water depth of a spa shall be 4 feet measured from the waterline.

4.2.15.3 Roof or canopies. Roofs or canopies over spas shall be constructed so that water run-off does not drain into the spa.

4.2.15.4 Drainage. Site drainage shall direct all deck drainage as well as general site and roof drainage away from the spa. Where required, yard drains shall be installed to prevent the accumulation or puddling of site water in the general area of the deck.

4.2.15.5 Unobstructed deck. A minimum 4 foot continuous, unobstructed deck, including the coping, shall be provided around at least 50 percent of the spa. The deck shall be sloped to effectively drain towards the perimeter areas or to deck drains.

4.2.15.6 Circulation. A circulation system consisting of pumps, piping, returns, suction outlets, filters, and other necessary equipment shall be provided for circulation of water throughout the spa and shall be located such that they are accessible for inspection and repair. For public spas the system shall be designed to turn over the entire spa water

capacity at a minimum of once every 30 minutes and shall run continuously. For residential spas the system shall be designed to turn over the entire spa water capacity at a minimum of once every 1 hour. Timer switches are allowed for residential spas but should be designed to run continuously for a minimum of 2 hours prior to use, during use, and a minimum of 2 hours after use.

4.2.15.7 Pressure or vacuum gauge. A pressure gauge (located downstream from the pump on the pressure system), vacuum gauge (located after the filter and before the pump on the vacuum system) or other means of indicating system condition shall be provided in the circulation system in an easily readable location.

4.2.15.8 Suction outlets. Spa suction outlets shall be provided with a cover that has been tested and accepted by a nationally recognized testing laboratory and comply with ANSI/ASME A112.19.8M "Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathtubs Appliances."

4.2.15.9 Entrapment avoidance. Vacuum systems shall have access fittings mounted outside the spa. The access fittings shall not be accessible to the user.

4.2.15.10 Outlets per pump. A minimum of 2 suction outlets shall be provided for each pump in the suction outlet system, separated by a minimum of three feet or located on 2 different planes. These suction outlets shall be plumbed such that water is drawn through them simultaneously through a common line to the pump.

4.2.15.11 Skimming devices. Skimming devices shall be provided and shall be designed and constructed to skim the spa surface when the water level is maintained within the operational parameters of the system's rim or weir device. At least 1 surface skimmer shall be installed for each 150 square feet, or a fraction thereof, of the water surface area.

4.2.15.12 Chemical feeders. Chemical feeders, if used, shall be installed downstream from the filter and heater unless the equipment is designed to feed to the suction side of the pump. Chemical feed pumps shall be wired so they cannot operate unless the filter pump is running. If the device has an independent timer, the filter and chemical feed pump timers shall be interlocked.

4.2.15.13 Disconnect and timer switches. Disconnecting means shall be accessible, located within sight of the spa and shall be located at least 5 feet horizontally from the inside wall of the spa. The disconnect switch shall be clearly labelled as a safety disconnect switch use only. It is not used for emergency. Fifteen-minute timer switches that activate blower pumps should be installed and should be located at a distance that would require the bather to exit the spa to restart the timer.

4.2.15.14 Water temperature. The maximum temperature in the spa should not exceed 104^{o}F.

4.2.15.15 Filtration system. Pressure sand filters for spas shall be designed for a maximum filtration rate of 10 gallons per minute per square foot of filter media. Diatomaceous earth filters for spas should be designed for a maximum filtration rate of 1.5 gallons per minute per square foot of filter area. Cartridge filters for spas should be designed for a maximum filtration rate of 0.375 gallons per minute per square foot of filter area.

4.2.15.16 Bather load. The bather load of the pool shall be calculated using the universally accepted standard of one bather per 10 sq ft of surface area. To assist in controlling the bathing load the spa should be designed with one bench-level jet per bather up to the maximum load.

4.2.15.17 Disinfection and chemical balance. An automatic sensor control chemical feeder should be installed to control the dosage of disinfectant and regulate the spa's pH. The free chlorine residual should be kept at a minimum of 2.0 mg/l and a maximum of 10 mg/l. The pH level should be between 7.2 and 7.6 when the spa is in use. The free chlorine or bromine residual and pH should be measured every two hours when the spa is in use. Total alkalinity should be kept between 100 and 140 mg/l, and must be measured at least weekly. The total dissolved solids must be measured daily, with results recorded in the spa's log. A spa, including a hot tub, must be completely drained whenever the operator determines that the water requires replacement or, the total dissolved solids reach 1,500ppm.

4.3 Solid Waste Management

4.3.1 Onsite solid storage. Every development shall provide a facility for the storage of solid waste which has been approved by the Department of Environmental Health. The facility can be designed for manual or mechanical collection depending on the type of development and the estimated volume of waste to be generated.

4.3.2 Manual Collection. A facility for manual collection shall be provided for all single family dwelling, multi-family dwellings with less than 10 units, or commercial entities that generate less than 1.0 cubic yards of waste per week.

4.3.2.1 Bin size and materials. A bin used for manual collection shall have a capacity of 33 gallons. The bin shall be a water tight metal or plastic container or containers with tight fitting covers should be provided for the storage of solid waste and should be of such type and description as approved by the Department.

4.3.2.2 Dimension of enclosure. A minimum dimension of 2 feet 6 inches by 2 feet 6 inches shall be provided for each bin required. The minimum dimension for a manual collection enclosure shall be as shown in the table below:

Minimum Enclosure Dimensions for Manual Collection

Number of Containers	Minimum Dimensions (ft)		
	Width	Length	Height
1	2.50	2.50	2.50
2	2.50	5.00	2.50
3	2.50	7.50	2.50
4	5.00	5.00	2.50
5	5.00	7.50	2.50
6	5.00	7.50	2.50
7	5.00	10.00	2.50
8	5.00	10.00	2.50
9	5.00	12.50	2.50

4.3.2.3 Construction of enclosure. The enclosure shall be made of durable and easily cleaned materials. Where the enclosure is made with a concrete base the floor shall have a minimum slope of ¼ in to a foot and be provided with a drain to an approved disposal system. Where the enclosure is made of wood or other durable material, the bottom of the enclosure shall be a minimum of 6 in from the ground. The members shall be space not less than ¼ inches and not more than 1 inch apart. The enclosure shall be fixed securely to ensure that it can not be overturned under the weight of a child. Where no door is provided for the enclosure the height of the enclosure shall not be more than 3 feet.

4.3.2.4 Location of and access to the enclosure. The enclosure shall be located as close as practicable to the curb. The enclosure shall be easily accessible for collection. The enclosures shall not obstruct the flow of traffic or restrict the view of traffic.

4.3.3 Mechanical collection. Provision shall be made for the mechanical collection of solid waste for all developments that do not fall under paragraph 4.3.2. All containers to be serviced by the

Department of Environmental Health shall be provided by the department or meet the minimum specifications as determined by the department and must be approved by the Chief Environmental Health Officer.

4.3.3.1 Size and number of containers. The minimum size and number of mechanically serviced containers required for a development shall be as indicated in the following table. This assumes a minimum of two services per week. However, the number of services can be increased to allow for a smaller container to be used depending on the circumstances.

Minimum Sizes and Number of Containers Required

Estimated Solid Waste Generation (cu yd / wk)	**Container Required** (cu yd)	**Minimum Number of Container Required**
1.0 – 4	2	1
4 – 8	4	1
8 – 16	8	1
16 – 32	8	2
> 32	26	1

4.3.3.2 Enclosure design. The floor slab should be constructed of reinforced concrete with a minimum thickness of 6 inches. The enclosure shall be constructed of suitable material and shall have a minimum height of 5 ft 6 in. The floor slab shall have a floor drain located at the center of the slab, or some other convenient point. This drain shall discharge into a deep well or other approved liquid waste disposal system. The facility shall be provided with water under pressure. A tap and hose shall be provided to facilitate wash down. When an enclosure is designed for a push-out container (2 cu yd) a ramp

shall be provided from the enclosure to the roadside. The gradient of the ramp shall not be greater than 10%. Built-in garbage or in-ground solid waste containers are not allowed

4.3.3.3 Specifications for enclosures. The minimum dimensions and other requirements for enclosures for the various size containers shall be as given in the table below:

Specifications for Onsite Solid Waste Enclosures

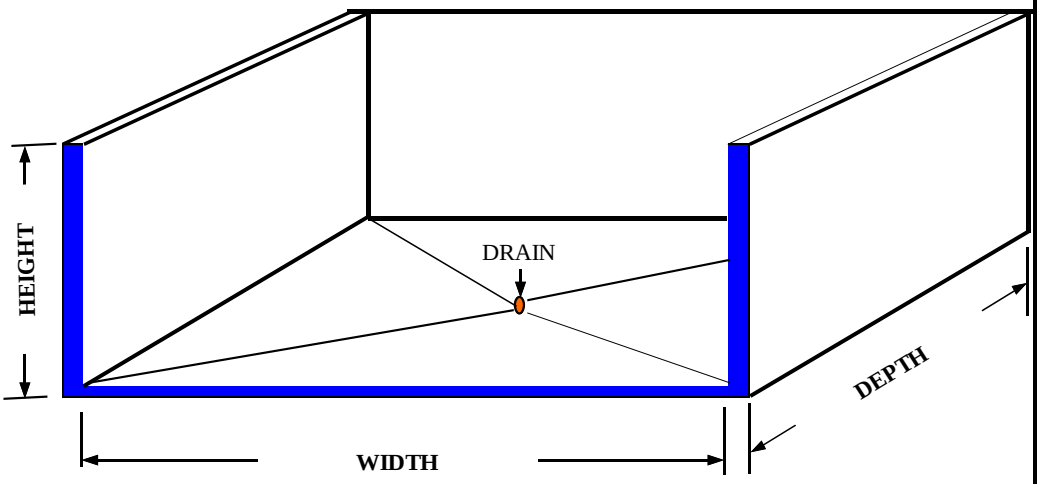
Container Size (cu ft)	**Width** (ft)	**Depth** (ft)	**Height** (ft)	**Slab Thickness** (ft)	**Requirements**
2	10	5	5.5	0.5	Water, drain, deep well or other approved disposal method
4	10	8	5.5	0.5	Water, drain, deep well, or other approved disposal method
8	10	10	5.5	0.5	Water, drain, deep well or other approved disposal method
20	20	24	5.6	0.5	Water, drain, deep well or other approved disposal method, Guide rails
26	20	24	5.5	0.5	220V, 3-phase, 3.5 amps power source; Water, drain, deep well or other approved disposal method; Guide rails

4.3.3.4 Typical container dimensions. The minimum dimensions presented below are typical for the various front loading containers used by the department and should be used for the design of enclosures. The minimum front dimension shall be at least 10 feet for all types of containers except for 20 and 26 cubic yard containers which shall be 20 feet.

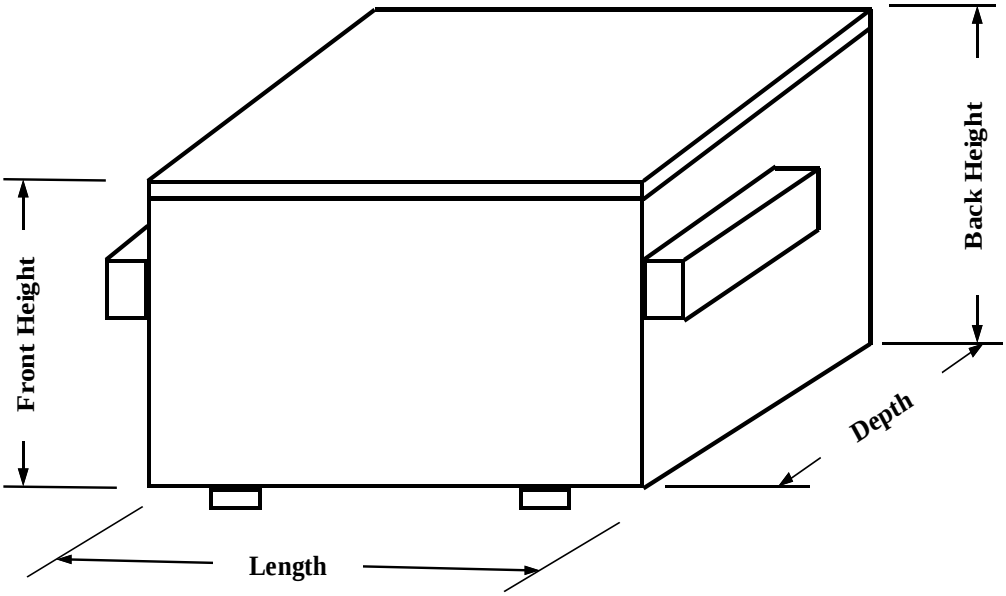
Typical Front Loading Container Dimensions

Dimension ID*	**Type of Container**			
	2 cu yd	**4 cu yd**	**6 cu yd**	**8 cu yd**
Front Height	36	48	46	46
Back Height	44	60	51	59
Depth	37	55	72	79
Length	72	72	72	72

***** All dimensions are in inches

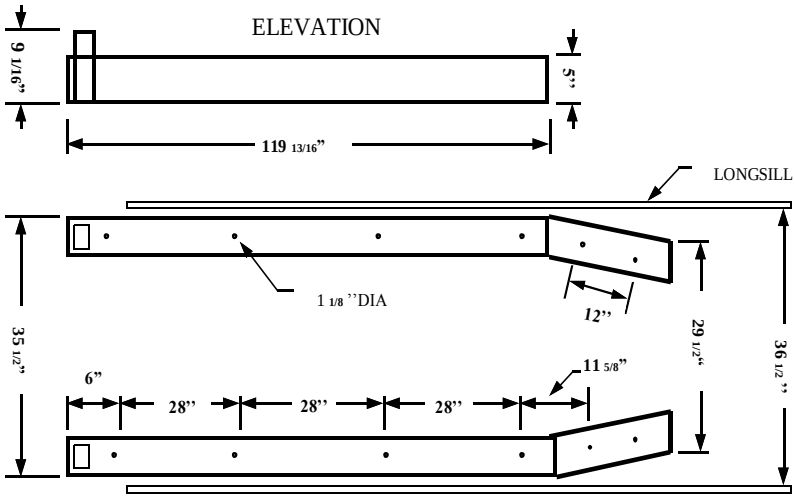


TYPICAL ONSITE SOLID WASTE ENCLOSURE FOR MECHANICAL SYSTEM



TYPICAL FRONT LOADING CONTAINER DIMENSIONS

4.3.3.5 Slab design for compactors. Guide rails are provided for compactor units. The guide rails shall be installed as shown in the drawing below.



PLAN

COMPACTOR GUIDE LAYOUT

4.3.4 Estimation of solid waste generation. The estimation of solid waste generation for each occupancy classification shall be based on generation rates as given below:

Occupancy Classification	Unit Waste Factor
Industrial	10.6 lbs per capita
Mercantile	0.013 lbs per sq ft
Institutional	6.0 lbs per capita
Business (Offices)	1.5 lbs per capita
Educational	0.25 lbs per capita
Residential	4.0 lbs per capita
Concentrated Assembly	0.75 lbs per capita
Unconcentrated Assembly	2.0 lbs per capita
Warehouse	0.02 lbs per sq ft

4.3.4.1 Per capita generation. The estimated solid waste generation per week for per capita generators shall be calculated using the following equation:

G = (P * F * 7) / 150

Where:

P = Number of persons
F = Unit waste factor, lbs / person
G = weekly generation, cu yd

4.3.4.2 Area-based generation. The estimated solid waste generation per week for area based generators should be calculated using the following equation:

G = (A * F * 7) / 150

Where:

A = net floor area, sq ft
F = Unit waste factor, lbs / sq ft
G = weekly generation, cu yd

4.3.5 Location of enclosure. The location of all mechanically serviced containers shall be approved by the Department of Environmental Health. The applicant shall submit plans showing the proposed location of the enclosure. The enclosure shall be placed such that access to the enclosure can be kept clear at all times. The enclosure shall be centrally located, and so placed, as to allow easy access for servicing by the Department's vehicles. The enclosure shall be located so that the vehicle can access the container directly and have adequate room to lift it into the discharge position. The enclosure shall be located such that the vehicle will not impede normal vehicular flow or create potentially dangerous traffic situations while the container is being serviced.

4.3.5.1 Minimum vertical clearance. A minimum vertical clearance of 32 feet above the enclosure itself or where the bin will be serviced is required.

4.3.5.2 Access to enclosure. The service vehicles shall be able to enter and exit the site without having to reverse onto the highway. The enclosure shall be located away from

overhead power lines and other protrusions that can cause electrical shock, injury, or other difficulties during servicing. A vertical clearance of at least 15 feet is required over the entire approach to and from the enclosure. A minimum straight approach of 50 feet should be provided directly in front of the facility to allow the vehicle sufficient area to back out of the facility. A turn around or separate exit that allows the truck to move forward rather than backwards is required. A minimum backup distance of 50 feet is required for any manoeuvre and must be in a straight line. The driveway shall be constructed to withstand trucks weighing up to 62,000 lbs.

4.3.5.3 Angle of approach. Generally the service shall be able to approach the container directly. Where an enclosure is located at the side of an access way the angle of approach made with the access way shall not exceed 22.5 degrees.

4.3.5.4 Turning radius. The turning radius required for access to the enclosure must be adequate a 3-axil truck. The over overall length of the truck is 36 feet and the overall width is 8 feet. A minimum outside turning radius of 46 feet is required. The minimum inside radius shall be 33 feet.

4.4 Noise Pollution Control

4.4.1 Assessment report. A noise assessment report for a proposed development shall be submitted where it is anticipated that there will be a negative impact on the community caused by the either the construction or operational phases of the development. Where a developer is required to submit a noise impact assessment report the report shall:

- Identify the noise levels for all the alternatives under consideration during both the construction and operational phases.
- Determine the existing noise levels in the project area.

- Identify unique noise sources in the area as well as unique places where noise levels must be minimized.
- State the applicable noise standards and criteria for the area.
- Determine the microscale impact by predicting the anticipated noise levels for each alternative during both the construction and operational phases.

4.4.2 Noise report. A noise report may be required where there is an existing noise source which is deemed to be creating a statutory nuisance. The results of all noise measurements and evaluation shall be presented in a report and submitted to the Chief Environmental Health Officer as outlined in 4.4.2.1.

4.4.2.1 Presentation of noise report. The results of measurement of environmental noise shall be recorded in a report of the investigation of compliance with noise limits, which shall include the following information:

- The relevant noise criteria.
- The date and time of measurements.
- The location of measurements.
- The instrumentation used details of its calibration and the type of analyses carried out.
- The meteorological conditions during the measurements (wind direction, wind speed, relative humidity, temperature, recent precipitation, etc).
- Operating and loading conditions of the sound source.
- Calculation methods used in evaluating the measurements.
- Results and interpretation from an acoustical point of view.
- Any other relevant information required by the authority.

4.4.3 Criteria for community noise. The guideline values are summarized with regard to specific environments and effects. For each environment and situation, the guideline values take into consideration the identified health effects and are set, based on the lowest levels of noise that affect health (critical health effect). Guideline values typically correspond to the lowest effect level for general populations, such as those for indoor speech intelligibility. The guideline values for annoyance represents daytime levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed, respectively. Any noise source that impacts on the community should not exceed the limits given in table below.

Guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	LAeq [dB]	Time base [hours]	LAmax , fast [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	45
Inside bedrooms	Sleep disturbance, night-time	30	8	
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School class rooms and pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	during class	-
Pre-school bedrooms, indoors	Sleep disturbance	30	sleeping-time	45
School, playground outdoor	Annoyance (external source)	55	during play	-
Hospital, ward rooms, indoors	Sleep disturbance, night-time	30	8	40
	Sleep disturbance, daytime and evenings	30	16	-
Hospitals, treatment rooms, indoors	Interference with rest and recovery	#1		
Industrial, commercial shopping and traffic areas, indoors and outdoors	Hearing impairment	70	24	110

Ceremonies, festivals and entertainment events	Hearing impairment (patrons:<5 times/year)	100	4	110
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music through headphones / earphones	Hearing impairment (free-field value)	85 #4	1	110
Impulse sounds from toys, fireworks and firearms	Hearing impairment (adults)	-	-	140 #2
	Hearing impairment (children)	-	-	120 #2
Outdoors in parkland and conservation areas	Disruption of tranquility	#3		

#1: as low as possible;
#2: peak sound pressure (not LAmax, fast), measured 100 mm from the ear;
#3: existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low;
#4: under headphones, adapted to free-field values

4.5 Dormitories

4.5.1 Space requirements. The number of lodgers received at any one time in a lodging house or barrack and the number of persons permitted to sleep in any room therein shall not be greater than will allow forty square feet of floor space for each person over the age of ten years and twenty square feet for persons of ten years of age and under. If the sleeping facilities provided are in the form of bunks constructed in tiers, sufficient air space shall be available for the occupier of each bunk to have not less than 300 cubic feet of air space.

4.5.2 Calculation of floor area. In calculating the floor area, no part of a floor under a ceiling of less than eight feet in height shall be taken into account, and in calculating air space no ceiling of less than eight feet or of more than fourteen feet in height shall be taken into account.

4.5.3 Space between bunks. The owner, keeper or person in charge of a lodging house or barrack shall to the satisfaction of the Chief Environmental Health Officer provided sufficient and suitable beds or bunks for all persons permitted to occupy any room therein, and where there is

more than one such bed or bunk in a room there shall be a clear space of not less than two feet six inches between such bed or bunk and another.

4.5.4 Tiered bunks. If the sleeping facilities provided are in the form of bunks constructed in tiers, the following provisions shall apply:

- No tier shall consist of more than three bunks;
- The lowest bunk shall be no less than eighteen inches above the level of the floor;
- The vertical distance between any two bunks in a tier shall not be less than three feet;
- There shall be a space of not less than two feet six inches between any two tiers of bunks.

4.5.5 Separate sleeping accommodation. Where persons of both sexes are to be accommodated in a lodging house or barrack, the owner, keeper or person in charge of the lodging house or barrack shall provide separate sleeping accommodation for persons of each sex who are over the age of seven years.

4.5.6 Sanitary facilities, lighting, and ventilation. Any lodging house or barracks shall, to the satisfaction of the Chief Environmental Health Officer, be provided with adequate sanitary facilities, lighting, ventilation, and water supply.

4.6 Barber Shops and Beauty Salons

4.6.1 Definition. For the purpose of these guidelines beauty salons include, but are not limited to, the following:

- Acrylic Nails Mud Baths
- Body Branding Sauna
- Body Piercing Shaving
- Colonic Irrigation Skin Care (Aesthetics)
- Electrolysis Spas (Health or Fitness Clubs)

- Face Painting Steam Baths
- Flotation Tanks Tanning
- Hair Services Tattooing
- Laser Therapy Therapeutic Touch Techniques
- Manicure/Pedicure Waxing

4.6.2 Application. Prior to commencing construction and operation, facilities and an application for the establishment shall be submitted to the Chief Environmental Health Officer for review and approval. The drawings shall include a floor plan showing the layout of the facility and all equipment adequately labeled.

4.6.3 Sanitary facilities. Toilet facilities shall be provided in accordance with the latest edition of the International Plumbing Code. Hand basins with hot and cold running water and toilets in a convenient location and accessible to patrons and operators shall be provided.

4.6.4 Materials of construction. The floors, walls and ceilings shall be constructed of easily cleanable material. All tables, counter tops, cabinets and other furniture shall be constructed of non- absorbent, easily cleanable material.

4.6.5 Backflow prevention. Backflow prevention devices shall be provided in all situations where contaminated water has the potential of entering the potable water system.

4.6.6 Incompatible usage. All premises use as barber shops or beauty salons shall be entirely separated from any premises used for living, sleeping purposes, any food storage, preparation, delivery premises, and any other incompatible businesses;

4.6.7 Equipment storage. Sufficient space for storage of equipment, supplies and instruments shall be provided.

4.6.8 Lighting and ventilation. The premises shall be adequately lighted and ventilated and designed specifically for the particular service provided. A suitable ventilation system shall be

designed and installed. If local exhaust ventilation is required, details plans and specifications for the system shall be submitted for review and approval.

4.6.9 Equipment disinfection. Provision shall be made for the disinfection of equipment. Details of the proposed methods of disinfection shall be submitted for review and approval.

4.7 Rainwater Harvesting Systems

4.7.1 Engineered systems. All rainwater harvesting systems proposed for use in commercial structures must be engineered and site specific. Engineered systems shall be installed as detailed in the approved plans and specifications.

4.7.2 Application. The following information must be provided with each permit application for a rainwater harvesting system:

- Site or plot plan, including site elevations.
- A water budget consisting of:
- System demand.
- Potential production based on 0.623 gallons/square foot/inch of precipitation, considering the average rainfall for the system location.
- Isometric drawing of rainwater harvesting system (including piping and section diagrams) and domestic potable water systems, including sizing and dimensions.
- Specifications and manufacturer's installation instructions for:
    - Cistern(s).
    - Pump.
    - Filtration and/or disinfection.
    - Roof washing or pre-filtration systems.

- Information in addition to that listed above may be necessary in some instances. The size and complexity of the building, site and system will determine the necessity for additional information.

4.7.3 Uses of rainwater. Harvested rainwater may only be used for water closets, urinals, industrial applications, irrigation purposes, and water feature uses unless it has been approved for domestic use by the Chief Environmental Health Officer.

4.7.4 Harvest areas. Rainwater shall only be harvested from roof surfaces. Harvest shall not occur from the following locations:

- Any vehicular or pedestrian area;
- Surface water runoff; or
- Bodies of standing water.

4.7.5 Primary treatment. Rainwater harvested from roof surfaces shall be pre-treated by either a roof washing system or other filtration system of no more than 50 microns. The quantity of the first flush generated by the rainwater harvesting system during any rain event shall be diverted away from the cistern. A first flush is not required where a post storage filtration or treatment system is installed and approved by the Chief Environmental Health Officer.

4.7.6 Requirements for system components

4.7.6.1. The roof surface may be constructed of any material accepted by the Chief Environmental Health Officer as being suitable for collection of rainwater.

4.7.6.2 The Roof Drainage System. Gutters and downspouts used to collect rainwater shall comply with the following:

Gutters and downspouts may be manufactured of any material accepted by the Chief Environmental Health Officer as being suitable for collection of rainwater.

Gutter and downspout systems leading to the cistern shall be fitted with debris excluders.

4.7.6.3 Roof washers and pre-filtration. All rainwater harvesting systems using impervious roof surfaces shall have at least one roof washer or pre-filtration system. A roof washer or pre-filtration system is not required for pervious roof surfaces such as eco-roofs. Roof washers and pre-filtration systems shall meet the following design requirements:

- All collected rainwater shall pass through a roof washer or pre-filtration system before the water enters the cistern(s).
- If more than one cistern is used, a roof washer or pre-filtration system shall be provided for each cistern except where a series of cisterns are interconnected to supply water to a single system.
- The inlet to the roof washer shall be provided with a debris screen that protects the roof washer from the intrusion of waste and vermin. The debris screen shall be corrosion resistant and shall have openings no larger than 0.5 inches and no smaller than 0.25 inches nominal.
- The roof washer shall automatically divert a minimum of the first 0.02 inch of rainfall per 24-hour period per square feet of roof area from each rainfall event away from the cistern. The device shall not rely on manually operated valves or other devices to do the diversion.
- The roof washer shall have minimum dimensions of 30 inches tall, and 24 inches in diameter or 24 inches square.
- The roof washer shall contain 6 inches of pea gravel. The entire surface of the gravel shall be covered with and approved filter fabric. The filter fabric shall be topped with 18 inches of sand.

- The roof wash drain shall be located at the bottom of the roof washer. The outlet pipe shall be 0.5 inches nominal, capped with 3/16 inch drain hole and the discharge shall be directed to an approved location.
- The outlet pipe to the cistern shall be located within the pea gravel layer of the roof washer. The pipe shall be 4 inch nominal, or equal in area to the total area of downspouts supplying the roof washer, and shall be fitted with an approved clean-out fitting. Access to the clean-out fitting shall be provided.
- The pipe entering the cistern shall terminate in a return elbow a minimum of 4 inches below the overflow.
- Roof washers shall be readily accessible for regular maintenance.
- Pre-filtration screens or filters shall be maintained consistent with manufacturer's specifications.

4.8 Cisterns

4.8.1 General requirements. Cisterns used for potable water supply shall be clearly identified as such. The plumbing system shall be designed and installed to prevent cross contamination. Provision shall be made to have access to allow inspection and cleaning. Below grade cisterns shall be provided with manhole risers a minimum of 8 inches above surrounding grade. All cistern openings shall be protected from unintentional entry by humans or vermin. Manhole covers shall be provided and shall be secured and locked to prevent tampering.

4.8.2 Size. Any cistern shall be sized adequately for the intended use of the water. The sizing of the cistern shall take into account the required minimum storage time in days, and the average daily usage in gallons per day.

4.8.3 Overflow. The cistern shall be equipped with an overflow device. The overflow device shall consist of a pipe 4 inches in diameter minimum or a pipe with a cross sectional area equal to or greater than the total of all downspouts. The overflow device shall be located within 2 inches of the top of the cistern. The overflow outlet shall be protected with a screen having openings no greater than 0.25 inches.

4.8.4 Pump. Where a pump is provided in conjunction with the rainwater harvesting system, the pump shall meet the following provisions:

- The pump and all other pump components shall be listed and approved for use with potable water systems.
- The pump shall be capable of delivering a minimum of 15psi residual pressure at the highest outlet served. Minimum pump pressure shall allow for friction and other pressure losses. Maximum pressures shall not exceed 80psi.

4.8.5 Piping. There shall be no direct connection of any rainwater harvesting pipe system and any domestic potable water pipe system. Both piping and fittings shall be installed as required by applicable code and standards. Where rainwater harvesting pipe and potable water pipe are installed in the same trench, wall cavity, or other location, the potable water pipe shall be separated by a minimum distance of twelve inches (12") above the rainwater harvesting pipe.

4.8.6 Labelling. Every water closet or urinal supply, hose bib or irrigation outlet supplied by cistern water that is not potable shall be permanently identified with an indelibly marked placard stating: "CAUTION: NON-POTABLE WATER, DO NOT DRINK".