Notes:

Pipe Sizing Table

	Pipe Type	Hydraulic Load Served (fixture units)	Size (in.)	Code Reference
A	Horizontal branch	2 + 1.5 = 3.5	2	7.4.9.1.(1)
B	Soil stack	13.5 + 13.5 = 27	3	Table 7.4.10.6.
C	Soil stack	27 + 13.5 + 13.5 = 54	4	7.4.9.2.(3)
D	Building drain	54 + 5 = 59 + 13.5 = 72.5	4	7.4.9.4.(1)
E	Vent stack	54 + 13.5 = 67.5 + 5 = 72.5	3	Table 7.5.8.4.

END OF MODULE

MODULE CONTENTS **PAGE**

SIZING THE SANITARY DRAINAGE PIPING

The OBC includes tables in Subsection 7.4.10. that show the maximum hydraulic loads horizontal and vertical drainage pipes can carry. It is important that you are able to interpret these tables in order to calculate pipe sizes and verify pipe sizes.

Three tables in Subsection 7.4.10. show the maximum hydraulic loads for horizontal and vertical sanitary drainage pipes. These tables deal with horizontal sanitary drainage pipes: those that are less than 3 inches, and those that are 3 inches or larger where the slope of the pipe must be known.

Review Subsection 7.4.10 and complete Exercise 2-5.

EXERCISE 2-5

Fill in the table on the next page as a summary of the OBC sizing tables for sanitary drainage piping. List the information that is needed to size the pipe.

OBC Tables for Sizing Sanitary Drainage Piping

Table	Type of Pipe Table Applies To	Information Required to Use Table
7.4.10.6.		
7.4.10.7.		
7.4.10.8.		

STOP

Washroom C:

2 - 1¼" lavatories	-	fixture units
2 bathtubs	-	fixture units
2 flush tank water closet	-	fixture units
2 shower stalls	-	fixture units
Total Hydraulic Load		fixture units

2. What is the minimum slope of the horizontal drainage pipes?

_____

Code Ref: _____

3. Determine Minimum Size of Branches

Branch A @ 1:100 slope:
Reason:
Code Ref:

Branch B @ 1:50 slope:
Reason:
Code Ref:

Branch C @ 1:50 slope:
Reason:
Code Ref:

Branch D @ 1:100 slope:
Reason:
Code Ref:

TESTING

The OBC requires after a section of drainage system has been roughed in and before any piping is covered, a water or an air test must be conducted. However, Sentence 7.3.6.1.(6) states a sewer lateral extension need not be tested and inspected if the sewer lateral extension was constructed, tested and inspected at the time of installation of the public sewer. A sewer lateral extension is defined in Article 1.4.1.2. of Division A of the OBC;

Sewer lateral extension means the portion of a storm building sewer or sanitary building sewer that extends from the public sewer up to 1.5 m into the property.

EXERCISE 2-13

Subsection 7.3.6 states which tests may be done on the drainage and venting system. Read through this Subsection; spend five minutes discussing the following questions with your group. Use your flipchart.

1. Which of the four tests outlined in this Subsection are suitable during inspection of drainage and venting system?

_____

_____

_____

Code Ref: _____

2. Which tests must be done at the wastes and stacks inspection?

_____

_____

Code Ref: _____

MODULE 2 QUIZ

1. A Fixture unit (as applying to the drainage system) is
   a) unit of measure based on the rate of discharge
   b) unit of measure based on the rate of supply
   c) a plumbing appliance
   d) a plumbing receptacle

Code Ref: _____

2. Sanitary sewage means liquid or water borne wastes of:
   a) industrial or commercial origin
   b) domestic origin
   c) toilet or other bathroom waste
   d) residential occupancies

Code Ref: _____

3. When can a minimum sized soil pipe be connected to a smaller drainage pipe?
   a) when the discharge is not from a sanitary unit
   b) when a horizontal branch draining 3 water closets connects to a 3" soil stack
   c) connection of any horizontal branch to a vertical stack
   d) a connection to a smaller sized drainage pipe is not permitted

Code Ref: _____

4. The maximum number of water closets that may be served by a 3" horizontal branch is::
   a) 1
   b) 2
   c) 3
   d) 5

Code Ref: _____

9. The sequence of valves on a discharge pipe from a sewage ejector is:

   a) union, check valve, shut off

   b) shut off, union, check valve

   c) check valve, shut off, union

   d) it doesn't matter as long as all three are installed

Code Ref: _____

10. The maximum loading on horizontal drainage pipe is:

    a) 30%

    b) 29%

    c) 65%

    d) 100%

Code Ref: _____

11. What is the minimum one size vertical stack serving 4 storeys with the following loading:

    - First Floor – 6 Fixture units
    - Second Floor – 6 fixture units
    - Third Floor – 4 fixture units
    - Fourth Floor – 4 fixture units

Code Ref: _____

Stack No.	Fixtures	F.U.s	Total F.U.s
Soil Stack 1	6 - bathroom groups		
	6 - kitchen sinks		
Waste Stack 1	6 – 3 in. floor drains		
	6 – 1 ½ in auto washers		
Soil Stack 2	3 – bathroom groups		
	3 – kitchen sinks		
Waste Stack 2	3 – 2 in. floor drains		
	3 – 1 ½ in. auto washers		
Soil Stack 3	2 – bathroom groups		
	2 – kitchen sinks		
	2 – 2 in. floor drains		
	2 – 1 ½ auto washers		

Location	Fixture Units/Sizing Considerations	Pipe Size
A	22 fu, 2WCs	
B	10.5 fu, no WCs, Table 7.4.10.6.	
C	22.5 fu, 3WCs	
D	27 fu, no WCs, but 3 in floor drains require 3 in. drain 7.4.9.1.(1)	
E	45 fu, 6 WCs, 7.4.9.2.(3) not yet applicable, max 2 WC per floor so 3 in. horizontal branches, Table 7.4.10.6. requires 3 in.	
1	22 fu, 2 WCs, building drain min 4 in. 7.4.9.4.(1)	
2	B+C = 33 fu, 3 WCs, downstream of 3rd WC fixture drain, 7.4.9.2.(2)	
3	A+B+C = 55 fu, 5 WCs, building drain min 4 in. 7.4.9.4.(1), also not lesser than upstream drainage pipes 7.4.9.1.(1)	
4	D+E = 72 fu, 6WCs, 3 in. pipes upstream, Table 7.4.10.8	
5	A+B+C+D+E or 3+4 = 127 fu, 11 WCs, building drain min 4 in. 7.4.9.4.(1), 4 in. ok Table 7.4.10.8.	

or other fixture, so that water from that fixture will feed into the floor drain trap. Prefabricated floor drains are often equipped with tapping to connect to a primer line.

Leakage of a trap can also cause trap seal loss. The leak could be caused by a number of things. Improper installation, clean out plug not tightened, etc.

High winds blowing over the stack terminal can cause rapid fluctuations of air pressure within the drainage and vent system. This causes **oscillating** (back and forth rocking) movement of trap seals with some spillage into the waste pipe each time the water slops up and over the trap weir. This is usually a temporary condition due to weather. There is not much that can be done other than relocating the stack terminal.

Capillary action is caused by suspension of a foreign object such as hair, a rag, string or lint into the trap seal extending over the trap weir. It soaks up water until it drops from the end reaching into the outlet of the trap.

Momentum is caused where a vertical section of fixture outlet pipe is excessive. The maximum developed length of a fixture outlet pipe shall not exceed 1 200 mm. It is possible to pull the trap seal if the vertical distance is more.

Step 1. Determine the hydraulic loads of each fixture.

Find these from Table 7.4.9.3.

Lavatory Basin	1 fixture unit
Kitchen Sink	1.5 fixture units
2 head shower	3 fixture units
WC (flush tank)	4 fixture units

Step 2. Determine the hydraulic load carried by the wet vent.

The wet vent does not drain the water closet, so this is not included in the calculation, as per Sentence 7.5.8.1.(2). But the wet vent must consider the hydraulic load of the kitchen sink that drains to the trap arm of the water closet as per 7.5.2.1.(f).

Wet vent hydraulic load = lavatory + lavatory + 2-head shower + 2-head shower + kitchen sink = 9.5 fixture units

Step 3. Size the wet vent.

From Table 7.5.8.1., the wet vent is serving a water closet, so Column 3 is used. Since the hydraulic load is 9.5 fixture units, the wet vent pipe size is 4 in.

Step 4. Determine the hydraulic load served by the continuous vent.

Use only the hydraulic load that is wet vented as per Clause 7.5.2.1.(1)(g). The kitchen sink is separately vented, and is not included in the calculation.

Continuous vent hydraulic load = lavatory + lavatory + 2-head shower + 2-head shower + flush tank WC = 12 fixture units

Step 5. Size the continuous vent.

From Table 7.5.8.3., a hydraulic load of 12 fixture units and a length of 4 metres will be adequately served by a 1 ¼ in. vent pipe. However, since the wet vent serves a water closet with a 3 in. trap, the continuous vent is required to be 1 1/2 in.

Note that the branch drain downstream of the wet vent is sized based on the hydraulic load served. Branch hydraulic load = 2 lavatories, 2 2-head showers + kitchen sink + flush tank WC = 13.5 fixture units. The minimum size for this pipe is 3 inches based on Table 7.4.10.8. However 7.4.9.1.(1) prohibits a drainage pipe to drain to one of lesser size, so the branch drain downstream is required to be 4 in.

STOP
EXERCISE 4-19

Calculate the size of the wet vent and the continuous vent serving the wet vent in the Figure 4:24. The continuous vent is 4 metres long. The lavatories have 1 1/4 in. traps.

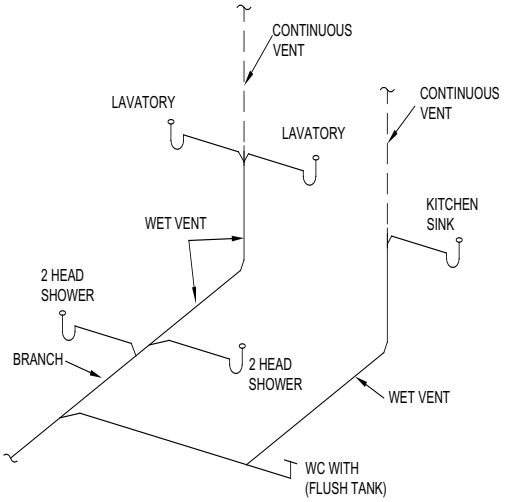

FIGURE 4:24 SIZING A WET VENT AND CONTINUOUS VENT (EX.4-19)

Same as 4-18, except the kitchen sink is now wet venting the WC, so there are now 2 wet vents.

"Lavatory Wet Vent"

Wet vent hydraulic load = lavatory + lavatory + 2-head shower = ____ fixture units.

From Table 7.5.8.1., the wet vent is not serving a water closet, so Column 2 is used. Since the hydraulic load is 5 fixture units, the wet vent pipe size is ____ in.

This module illustrates how to use the NPC sizing method to size a water pipe system.

STOP

DRINKING WATER SYSTEMS

Potable water systems are supplied by **drinking-water systems**, a term that has the same meaning as defined in the Safe Drinking Water Act, 2002:

> "drinking-water system" means a system of works, excluding plumbing, that is established for the purpose of providing users of the system with drinking water and that includes,
>
> (a) any thing used for the collection, production, treatment, storage, supply or distribution of water,
>
> (b) any thing related to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the treatment system, and
>
> (c) a well or intake that serves as the source or entry point of raw water supply for the system.

Sentence 7.2.10.17(1) of the OBC requires all drinking water treatment systems or devices to be certified to CAN/CSA-B483.1, "Drinking Water Treatment Systems" within a plumbing system (i.e. NOT in a drinking water system). Examples of drinking water treatment systems or devices are;

- Reverse osmosis
- Ultra violet lights

OBJECTIVES AND FUNCTIONAL STATEMENTS

The objectives of the 2012 OBC are set out in Division A, Sentence 2.2.1.1(1). Some key objectives linked to potable water systems and water supply pipe sizing are listed below.

EXERCISE 5-1

Complete the following exercise by filling in the blanks, then discuss your answers with your group. The first objective is completed as an example.

9. The maximum permitted single flush cycle water closet cannot be more than 4.8 Litres if it serves

   a) an assembly occupancy

   b) a residential occupancy

   c) a business and personal services occupancy

   d) an industrial occupancy

Code Ref: _____

10. Where the hot water supply is controlled by a master thermostatic-mixing valve, the shower valves:

   a) must be pressure-balanced valves

   b) must be thermostatic-mixing valves

   c) must be either pressure-balanced or thermostatic-mixing valves

   d) do not require to be either pressure-balanced or thermostatic-mixing valves

Code Ref: _____

11. Copper joints using compression type fittings:

   a) must be used under a building

   b) must be used within a building

   c) must not be used underground outside a building

   d) must not be used under a building

Code Ref: _____

END OF MODULE

9. In a dwelling unit, an adequate supply of service hot water with a temperature range from

   a) 40 °C to 60 °C

   b) 45 °C to 60 °C

   c) 49 °C to 60 °C

   d) 40 °C to 49 °C

Code Ref: _____

10. Normally closed backwater valves are permitted to be installed on:

   a) a building sewer

   b) a horizontal branch

   c) a building drain

   d) no drainage piping; backwater valves are not permitted to be normally closed

Code Ref: _____

END OF MODULE