| W1 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | 9/11 |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | PLUMBING CODE AND SYMBOLS |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO 1. Draft water distribution system**<br>- Draft hot and cold-water distribution systems according to plumbing and water codeS-**TLE_ICTTD9-12SP Iva-b-1** |
| **III. CONTENT/CORE CONTENT** | Plumbing code |

| **IV. LEARNING PHASES** | **Suggested Timeframe** | **Learning Activities** |
|---|---|---|

**A. Introduction** (Time Frame: 80 minutes)

In this lesson, the learners will familiarize themselves with the proper distribution of water system (hot and cold water) and the signs and symbols used which are based on the standard water code of the Philippines.
They are expected to:

a. draft hot and cold-water distribution systems according to plumbing and water codes.

The learners will be guided by the following questions based on the K-W-L. This is only to check what the learners already know about the lesson, the skills and competencies that are expected to learn and questions that need to be answered.

| What I know | What I want to Know | What I have Learned |
|---|---|---|
| What do you know about in drafting hot and cold-water distribution systems according to plumbing and water codes? | What do you want to know in drafting hot and cold-water distribution systems according to plumbing and water codes? | What have you learned? about in drafting hot and cold-water distribution systems according to plumbing and water codes? |

One of man's essential needs is water. He could live for days without food but not without water, which is a mixture of hydrogen and oxygen. Water appears in its natural state (liquid) or solid (ice) and gas (vapor) or steam

Water is 830 times heavier than air but is 133 times lighter in its gaseous state. Water can be sourced from: rainwater, natural surface water and underground water

Water is a necessity. It is conveyed from the source to the household through a system of pipes.

Water distribution systems for residential and commercial buildings are conveyed thru pipes, a PVC, Cast Iron or G.I. pipe.

Hot and cold water is supplied to the buildings by a series of pipes connected from the source under pressure to the building fixtures thru a water line distribution system.

Pipes used for water line distribution systems may be classified as:

1. Steel and wrought iron pipe
2. Cast iron pipe
3. Seamless brass and copper pipe
4. Copper tubing
5. Special pipes such as PVC (Polyvinyl Chloride), Aluminum and Stainless-Steel pipes, and CPV'C (Chlorinated Polyvinyl Chloride) pipe

Water main refers to the public sewer system along the streets or laid underground where the service to the house is connected. Water coming from it is under pressure but normally could serve only houses of moderate height. Otherwise, a pump is installed to augment the pressure, Pressure is the force required to move the water inside the pipe.

The size of the service pipe is governed by the demand for water, maximum demand is one factor, or the maximum water discharge for plumbing fixtures and the probable demand is another, which is the peak demand or peak load.

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

## Water Distribution System

- The water service pipe, water distribution pipes, and the necessary connecting pipes, fittings, controls valves and all appurtenances in or adjacent to the structure or premises.

**Parts of Water Distribution System**

- **Service Pipe** - The pipe from the water main of other source of portable water supply to the water distribution system of the building served.
- **Water Meter** - Device used to measure in liters or gallons the amount of water that passes through the water service.
- **Distribution Pipe / Supply Pipe** - A pipe within the structure or on the premises which conveys water from the water service pipe or meter to the point of utilization.
- **Riser** - A water supply pipe that extends one full story or more to convey water to branches or to a group of fixtures.
- **Fixture Branch** - The water supply pipe between the fixture supply pipe & the water distributing pipe.
- **Fixture Supply** - A water supply pipe connecting the fixture with the fixture branch.

### Cold Water Distribution System

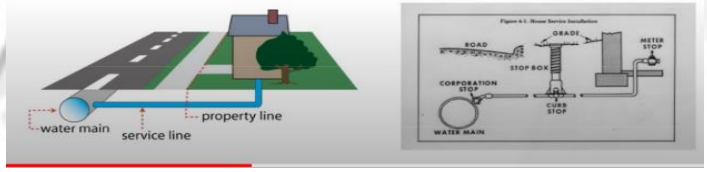
Types of Water Distribution

- Direct (Upfeed)
- Indirect
  - –Downfeed or Gravity System
  - –Hydro-pneumatic System (Air Pressure System)

### Cold Water Distribution System

Types of Water Distribution

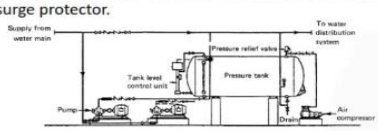
- Direct (Upfeed)
  - Water is provided by the city water companies using normal pressure from public water main




### Cold Water Distribution System

Types of Water Distribution

- Indirect
  - –Hydro Pneumatic System/ Air Pressure System
    - -Tanks that use water and air under pressure are referred to as a hydropneumatic tanks, or pressure tanks. Compressed air is used in these tanks as a buffer or cushion that allows a surge-free delivery process. There are three functions for hydropneumatic tanks. The first is as part of a water delivery system set to deliver water in a preset pressure range. The second uses the pressure setting to monitor a pump from turning on too often. The third is to buffer or lower pressure surges, much like a power surge protector.




### Water Supply and Distribution System

### Hot Water Distribution System

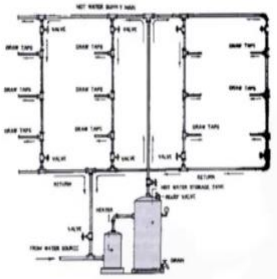
Types of Hot Water Distribution

- Upfeed and Gravity Return System
- Downfeed and Gravity Return System
- Pump Circuit System

### Hot Water Distribution System

Types of Hot Water Distribution

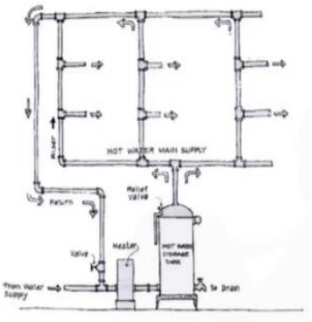
- Upfeed and Gravity Return System
  - – With a continuing network of pipes to provide constant circulation of water.
  - –Hot water rises on its own & does not need any pump for circulation.
  - –Hot water is immediately drawn from the fixture any time
  - –Provided economical circulating return of unused hot water.
  - –Larger pipe is installed at the top of the riser & the diminishing sizes passes through the lower floors of the building



### Hot Water Distribution System

Types of Hot Water Distribution

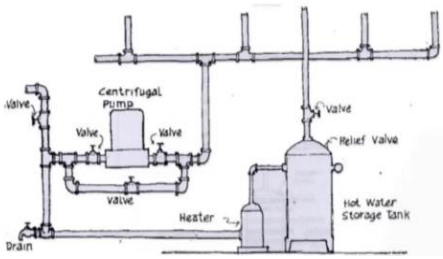
- Downfeed and Gravity Return System
  - –Hot water rises on to the highest point of the plumbing system and travels to the fixtures via gravity (closed pipe system)Water distribution is dependent on the expansion of hot water & gravity.
  - –Larger pipe is installed at the bottom of the riser & the diminishing sizes passes through the upper floors of the building




### Hot Water Distribution System

Types of Hot Water Distribution

- Pump Circuit System
  - –For a more efficient circulation of hot water to the upper floor levels of multi-storey buildings



| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

**B. Development** (Time Frame: 40 minutes)

**Activity 1**

**Direction: True or False:** Write **T** if the statement is true, then **F** if it is false. Answer this in your activity sheet.

_____1. Service pipe is the pipe from the water main or other source of potable water supply to the water distribution system of the building served.
_____2. Water meter is the device used to measure in tons the amount of water passes through the water service.
_____3. Riser is a water supply pipe that extends one full story or more convey water to branches or to a group of fixtures.
_____4. Fixture branch is the water supply pipe between the fixture supply and the oil distributing pipe.
_____5. Fixture supply is a water supply pipe connecting the fixture with the fixture branches.
_____6. The two types of water distribution are the direct and redirect.
_____7. Hot water is immediately drawn from the fixture anytime.
_____8. Larger pipe is installed at the top of the riser and the diminishing sizes passes through the lower floors of the building.
_____9. Hot water rises on its own and does not need any pump for circulation.
_____10. Water supply is affected by loss of pressure inside the tank in case of power interruption.

**C.**

**D. Engagement** (Time Frame: 40 minutes)

**Activity 2**
**Direction: Multiple Choice:** From the **plumbing code definitions**, choose the letter of the correct answer, write it your activity sheet.

**1**. A plumbing fixtures used for washing the middle part of the body, especially the genitals.
**a.** bidet **b.** blow-off **c**. bibb **d**. branch
**2**. A horizontal vent connecting one or more individual vertical back vents with the vent stack or stack vent.
**a**. branch interval **b**. branch vent **c.** bell **d**. brazed joint
**3**. A receptacle in which liquids are retained for a sufficient period to allow settleable material to deposit.
**a**. caulking **c**. catch basin **b**. cap **d**. cesspool
**4**. A vertical shaft for installation of different pipe stacks.
**a.** chase **b**. branch vent **c**. check valve **d**. bibb
**5**. The part of the plumbing system designed and installed to serve more than one (1) appliance, fixture, building or system.
**a**. confined space **b**. chase **c**. bidet **d**. common
**6.** A vertical pipe to convey rainwater.
**a.** court **b**. common **c**. downspout **d**. double-bend fitting
**7**. A pipe which carries ground and surface waters, storm water or wastewater into a building drainage system.
**a**. drain **b**. double offset **c**. dry vent **d**. downspout
**8**. A valve located at the end of a water pipe through of which water can be or held within the pipe.
**a**. common **b**. fixture **c**. faucet **d**. chase
**9**. Is a device located at the bottom of the tank for the purpose of flushing wastes closet and similar fixtures.
**a**. gate valve **b**. court **c**. flush valve **d**. fixture
**10**. the water that stands in or passes through the ground.
**a**. grease trap **b**. downspout **c**. flooded **d**. ground water

**D. Assimilation** (Time Frame: 40 minutes)

**Direction**: Definition of terms: Explain the following terms, write your answer in your activity sheet.

1. Water Distribution System –
2. Direct Water Distribution –
3. Down feed or Gravity System –
4. Hydro Pneumatic System/ Air Pressure System –
5. Down feed and Gravity Return System –

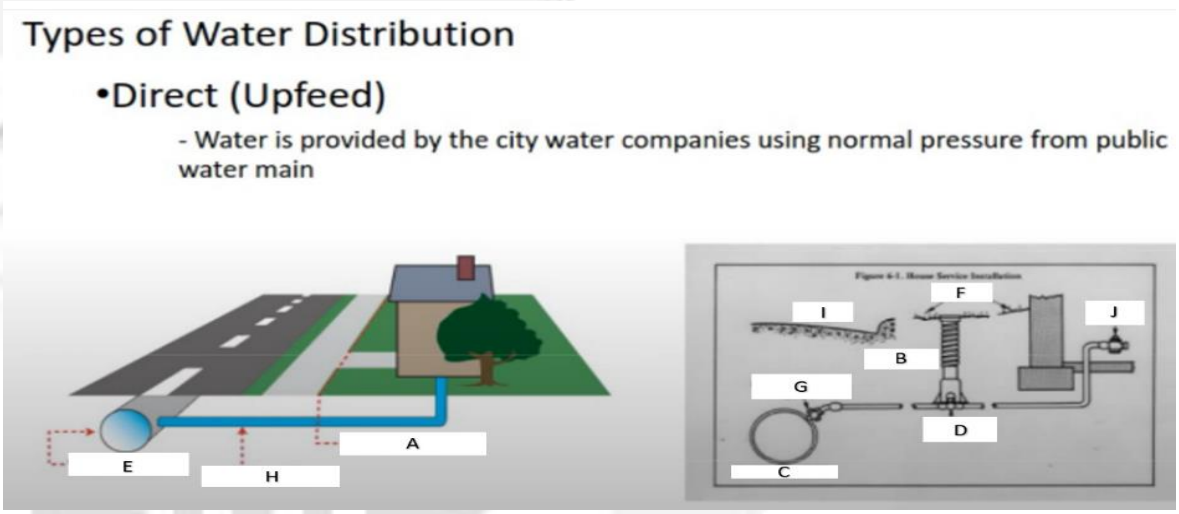
Your work will be graded based on the **Scoring Rubric below**

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

| Criteria | Excellent 5 | Very Good 4 | Good 3 | Fair 2 | Needs Improvement 1 |
|---|---|---|---|---|---|
| Student's content ideas and concepts are substantial and related to the topic. | | | | | |
| Student's organization of ideas are presented logically. | | | | | |
| Student's unique creativity in writing is presented clearly and logically | | | | | |

**V. ASSESSMENT** (Time Frame: 40 minutes )

**Direction:** Label the needed information on the image below, write your answer in your activity sheet.




a. _____ f. _____
b. _____ g._____
c. _____ h. _____
d. _____ i. _____
e. _____ j. _____

**VI. REFLECTION**

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

ʔ – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

**VII. REFERENCES**

**Link :** https://youtu.be/ZWtjqLHQqfg
Support link : https://youtu.be/Xc3s0DJAkYI By: Jimbo Constantino
file:///C:/Users/acer/Downloads/188541488-Revised-National-Plumbing-Code-of-the-Philippines.pdf
**Competency Based Learning Materials (CBLM)** Year 4 Module1-Sanitary and Plumbing Layout and Details –pp. 42

| Prepared by: | RUBEN M. MAGDANGAN | Checked by: | FREDERICK B. ZAIDE<br>MIRASOL F. DASIG<br>DR. RHODA M. MANUAL |
|---|---|---|---|

| W2 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | 9/11 |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | PLUMBING CODE AND SYMBOLS |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO 1. Draft water distribution system** Indicate signs and symbols according to sanitary and plumbing requirements -**TLE_ICTTD9-12SP Iva-b-1** |
| **III. CONTENT/CORE CONTENT** | Plumbing fixtures and fittings |

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

**A. Introduction** (Time Frame: 80 minutes)

In this lesson, the learners will learn the water distribution system for residential and commercial buildings. These are conveyed thru pipes, a PVC, Cast Iron or G.I. pipe.

They are expected to:

a. Indicate signs and symbols according to sanitary and plumbing requirements.

The learners will be guided by the following questions based on the K-W-L. This is only to check what the learners already know about the lesson, the skills and competencies that are expected to learn and questions that need to be answered.

| What I know | What I want to Know | What I have Learned |
|---|---|---|
| What do you know about in signs and symbols according to sanitary and plumbing requirements? | What do you want to know in signs and symbols according to sanitary and plumbing requirements? | What have you learned? about in signs and symbols according to sanitary and plumbing requirements? |

## Plumbing Fixtures

**Sinks Tubs Showers**

**Toilets Faucets Drains**

If you ask many people what a plumbing fixture is, they will probably reply faucet, but a plumbing fixture is actually any device that is connected to a plumbing system and interacts with water. Each plumbing feature will be designed for a particular use, and while design can vary, fixtures generally are designed with one function in mind.

The most common plumbing fixtures are bathtubs, sinks, showers, tubs, toilets, and faucets. Pipes, drains and valves are part of a home's plumbing system that supply water to each of the plumbing fixtures and also drains it away. Normal plumbing practice is to install a valve on each water supply line leading to the fixture, and is commonly called the "water supply valve" or "stop valve". The water supply to some fixtures is only cold water (such as a toilet), and some plumbing fixtures have both a cold and a hot water supply. The water supply valve is intended as a safety feature. If a plumbing fixture breaks or leaks, the water supply valve can be closed to stop unwanted water from accumulating and causing damage.

To turn the water supply off, locate the stop valve usually found on the flex or feed pipe leading into the fixture. Turn it clockwise until it stops. If you cannot locate a water supply valve, you may need to turn the water off at the main. This valve is typically located in front of the house just below the garden hose faucet. Sometimes the main is located in the water meter box, usually underground near the street. A street key is required for access, so you may need to call your local water department or our friendly staff at All About Plumbing for assistance.

To extend the life of your plumbing fixtures, keep them clean, watch for leaks, and make sure that your water pressure is checked by a master plumber periodically. Typically, water pressure should be around 60 PSI. All About Plumbing Services offers Professional Plumbing Maintenance Plans. Check out our Plumbing Maintenance Page for more information.

**SINKS**

A sink is a bowl-shaped plumbing fixture that is usually used for washing hands, dishes and other small objects.

**Shapes and varieties of sink**

* **Self rimming sinks (drop sinks)**- are designed to drop into the hole in your kitchen countertop or bathroom vanity.
* **Bottom mount sinks (under mount)**- are mounted below the countertop to add a seamless finish and sleek look to The kitchen workspace or bath.
* **Above counter sinks(vessel)** – sits on top of the counter rather than being mounted in or below the countertop.
* **Pedestal sinks** – offer more room in the bathroom but also offer little space for storage.
* **Wall mounted sinks** – like pedestal sink, wall mounted sink doesn't take up much space and offer little storage.
* **Farmhouse (Apron)** – this is designed for a lot of use and even rugged abuse.

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

* **Utility basin** – usually found in laundry rooms or garage, these are usually large sinks used for cleaning, mopping and Other chores requiring a deep basin or lots of water.
* **Bar sinks** – are very convenient and available in tons of sizes, models, and finishes.

**TUBS**

A bathtub is a large container that is filled with warm or hot water and allows a person to bathe while fully immersed in the water.

**Types of Bathtubs**

* **Western Style bathtubs** – found in most households, western style tubs are long and generally thin and allow the bather to be fully immersed.
* **Eastern Style bathtubs** – eastern tubs are shorter and deeper than the western tub and allow the person to bathe sitting or standing up.
* **Claw foot tub** – while antique claw foot tubs are made of cast iron, today claw foot tubs are made from modern materials such as acrylic and are less expensive.
* **Whirlpool tubs** – many newer homes come with a whirlpool tub. This incorporate nozzle that uses air or water to provide a relaxing massage.

**SHOWER**

A shower can be a part of the bath or a stand-alone stall. The standard shower common to most households is a plumbing Fixtures that use the house's water pressure to propel water through one or more shower heads.

**TOILETS**

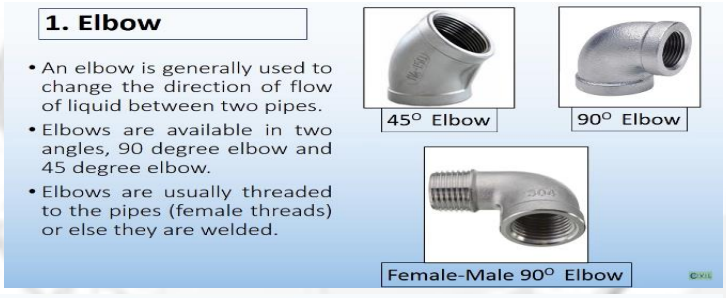
A toilet is probably the most important plumbing fixtures in any households. It uses a flush system to move waste out of us homes into a septic tank or a community sewage system.

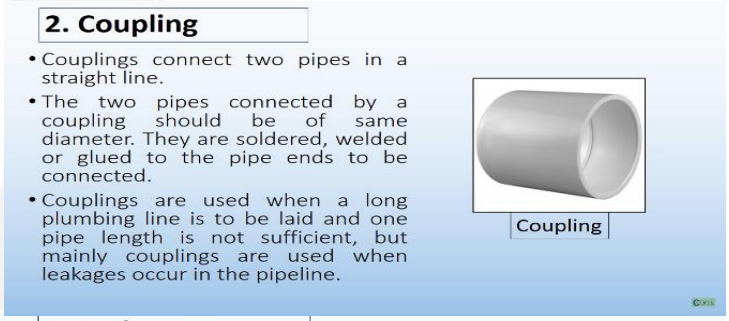
**FAUCETS**

A dripping faucet is one of the most common plumbing problems you will come across. Faucets are essentially a plumbing valve.

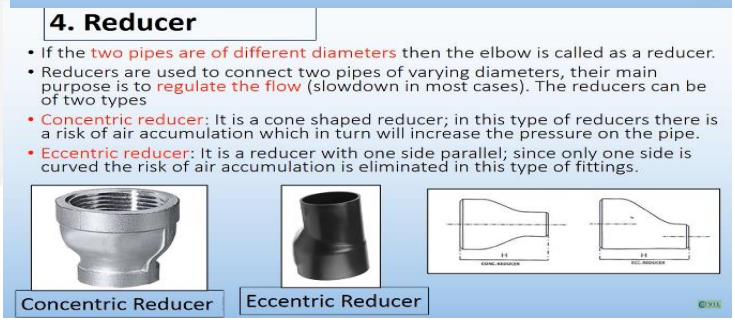
**DRAINS**

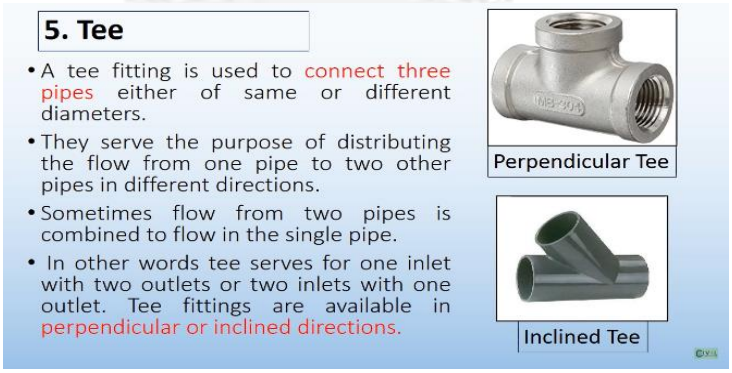
Most plumbing fixtures have drains. Unwanted water released from the plumbing fixture through the drain where it travels through the pipes for a septic system or community sewage system.

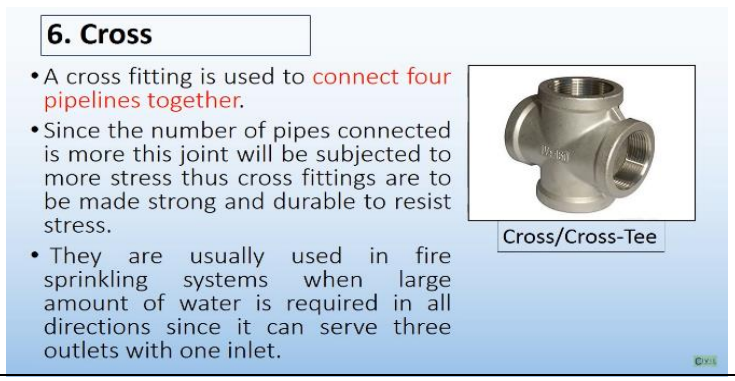






| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

### 7. Plug and Cap

- A plug and a cap are used to stop the flow in the pipe that is to close the pipe during repair works.
- They both serve the same purpose but the difference is in their structure, the plug is provided with male threads while the cap is provided with female threads.


Cap


Plug

### 8. Hose adapter

- When the ends of the pipes are not suitable to insert any pipe fittings or it is not desirably flat then adapters are used to make the ends flat.
- Adapters can be male threaded or female threaded in one end based on the purpose.
- The other end of the adapter is plain so it is welded or glued to the pipe ends.


Hose adapter

**A. Development** (Time Frame: 40 minutes)

**Activity 1**

**Direction:** Identify the different kinds of fittings. Choose the correct answer then write your answer in your activity sheet.

| | | | | |
|---|---|---|---|---|
| **- elbows** | **- tee** | **- cross** | **- couplings** | **- bushing** |
| **- reducers** | **- nipples** | **- cap** | **- plug** | **- union** |

**1.** 
**2.** 
**3.** 
**4.** 
**5.** 
**6.** 
**7.** 
**8.** 
**9.** 
**10.** 

**B. Engagement** (Time Frame: 40 minutes)

**Activity 2**
**Direction: Multiple choice:** Choose the letter of the correct answer, then write it in your activity sheet.

**1.** Found in most households, they are long and generally thin and allow the bather to be fully immersed.
**a.** Claw foot tub
**b.** Eastern Style bathtubs
**c.** Western Style bathtubs
**d.** whirlpool tubs

**2.** Many newer homes come with, this incorporate nozzle that use air or water to provide a relaxing massage.
**a.** Claw foot tub
**b.** Eastern Style bathtubs
**c.** Western Style bathtubs
**d.** whirlpool tubs

**3.** Are made of cast iron, today claw foot tubs are made from modern materials such as acrylic and are less expensive.
**a.** Claw foot tub
**b.** Eastern Style bathtubs
**c.** Western Style bathtubs
**d.** whirlpool tubs

**4.** Are shorter and deeper than the western tub and allow the person to bathe sitting or standing up.
**a.** Claw foot tub
**b.** Eastern Style bathtubs
**c.** Western Style bathtubs
**d.** whirlpool tubs

**5.** Is a bowl-shaped plumbing fixture that is usually used for washing hands, dishes, and other small objects.
**a.** whirlpool tubs
**b.** Eastern Style bathtubs
**c.** Western Style bathtubs
**d.** Sinks

**D. Assimilation** (Time Frame: 40 minutes)
**Direction**: Definition of terms: Explain the following terms, Write your answer in your activity sheet.

1. Elbows -
2. Reducer –
3. Cross –
4. Tee –
5. Plug and cap –

Your work will be graded based on the **Scoring Rubric**

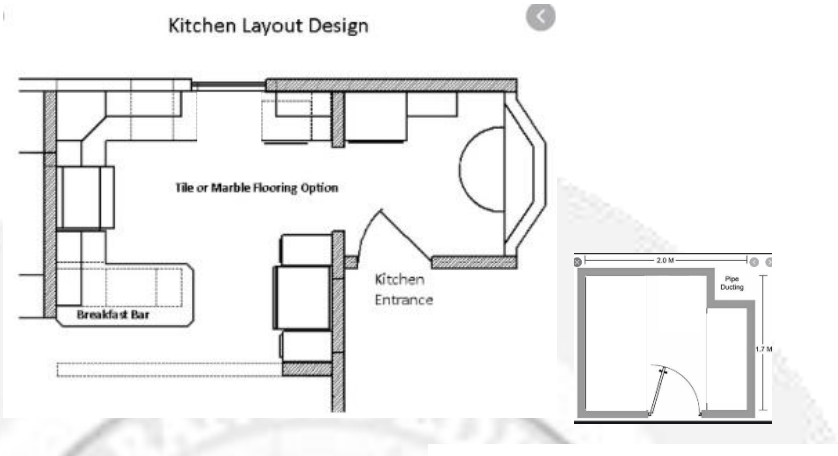
**Scoring Rubric**

| Criteria | Excellent 5 | Very Good 4 | Good 3 | Fair 2 | Needs Improvement 1 |
|---|---|---|---|---|---|
| Student's content ideas and concepts are substantial and related to the topic. | | | | | |
| Student's organization of ideas are presented logically. | | | | | |
| Student's unique creativity in writing is presented clearly and logically | | | | | |

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

**V. ASSESSMENT** (Time Frame: 40 minutes )

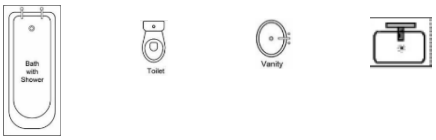
**Direction:** Draw inside the floor plan on their corresponding location of different plumbing fixtures. Do it in a short bond paper.







**Draw this inside the kitchen and bathroom plan**




Your work will be graded based on the **Scoring Rubric.**

**Performance Criteria:**

- **Accuracy**
  - 50 pts - The output is accurately done.
  - 45 pts - Two to five errors are observed on the output.
  - 40 pts. - Six to ten errors are observed on the output.
- **Neatness**
  - 30 pts. - No errors made on the output.
  - 25 pts - Two to three erasures made on the output.
  - 20 pts - Four or more erasures made on the output.
- **Lettering/Labeling**
  - 20 pts. - All information must be completely indicated and legibly printed.
  - 15 pts. - Pieces of information are legibly printed but some are missing.

**Scoring Rubrics**

| Criteria | Score (Tick the corresponding pts.) |
|---|---|
| Accuracy | |
| 50 | |
| 45 | |
| 40 | |
| Neatness | |
| 30 | |
| 25 | |
| 20 | |
| Lettering/Labeling | |
| 20 | |
| 15 | |
| Total | |

**VI. REFLECTION**

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

ʔ – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

**VII. REFERENCES**

**Link :** https://youtu.be/abF5E5w3-7E ( Fittings) by: Civil Engineering Basics

Link : Plumbing fixtures
https://www.allaboutplumbinganddrains.com/our-services/plumbing-repairs/bath-kitchen/plumbing-fixtures#:~:text=The%20most%20common%20plumbing%20fixtures,and%20also%20drains%20it%20away

Support link : https://youtu.be/mPSInWe0wJo ( Fittings demonstration) by: House Dr. Tutorial

**Competency Based Learning Materials (CBLM)** Year 4 Module1-Sanitary and Plumbing Layout and Details on pp. 1-62

| Prepared by: | RUBEN M. MAGDANGAN | Checked by: | FREDERICK B. ZAIDE<br>MIRASOL F. DASIG<br>DR. RHODA M. MANUAL |
|---|---|---|---|

| W3 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | Nine/Eleven |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | PLUMBING CODE AND SYMBOLS |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO 2. Draft sanitary and storm drainage**<br>Draw sewerage plan layout according to plumbing code.<br>-**TLE_ICTTD9-12SP-IVc-d-2** |
| **III. CONTENT/CORE CONTENT** | Plumbing symbols |

**IV. LEARNING PHASES AND LEARNING ACTIVITIES**

**A. Introduction** (Time Frame: 80 minutes)

In this lesson, the learners will learn the used of plumbing symbols which are used when drawing house plans and diagrams. The purpose of these symbols is to indicate where the different elements of your plumbing system are located. Some of these symbols are self-explanatory, but others might be more difficult to interpret, so this lesson will help them a lot.

They are expected to:

a. draw sewerage plan layout according to plumbing code.

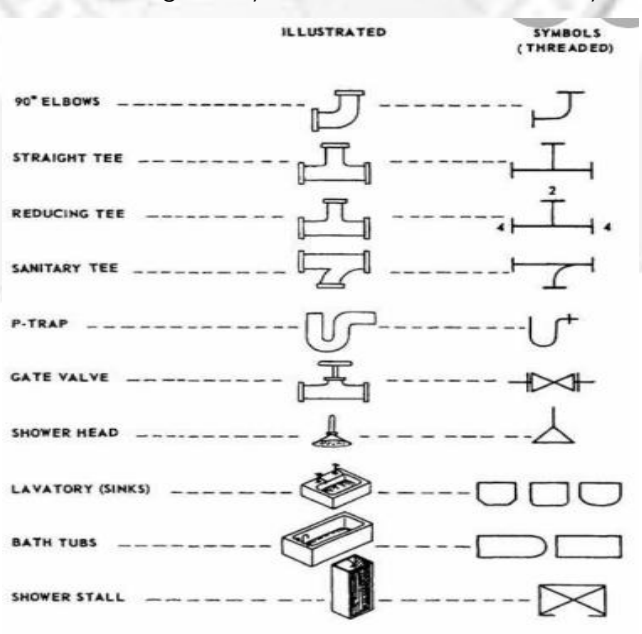
The learners will be guided by the following questions based on the K-W-L. This is only to check what the learners already know about the lesson, the skills and competencies that are expected to learn and questions that need to be answered.

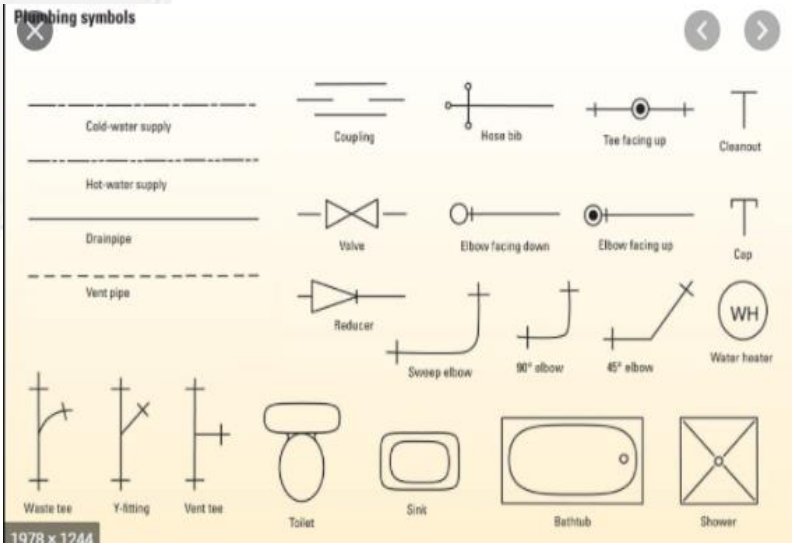
| What I know | What I want to Know | What I have Learned |
|---|---|---|
| What do you know about in drawing sewerage plan layout according to plumbing code? | What do you want to know in drawing sewerage plan layout according to plumbing code? | What have you learned about in drawing sewerage plan layout according to plumbing code? |

The plumbing system is important to the designer or draftsman. Although plumbing plans may be omitted on small residential dwellings, they are always included in larger projects for small residences; the plumbing layout is left to the contractor or the owner to decide.

Water distribution systems, whether hot or cold, are distributed by pipes from the source to the house. Amenities as discussed earlier, when tracing the path of the supply of water and fixtures fittings, the architectural designer uses symbols to indicate the distribution system and the different fixtures. The water distribution system is shown in an elevation, on plan and on isometric using the different symbols, hence this is called a schematic drawing.

In drawing the layout, here are the common symbols used for cold water line and sanitary layout.



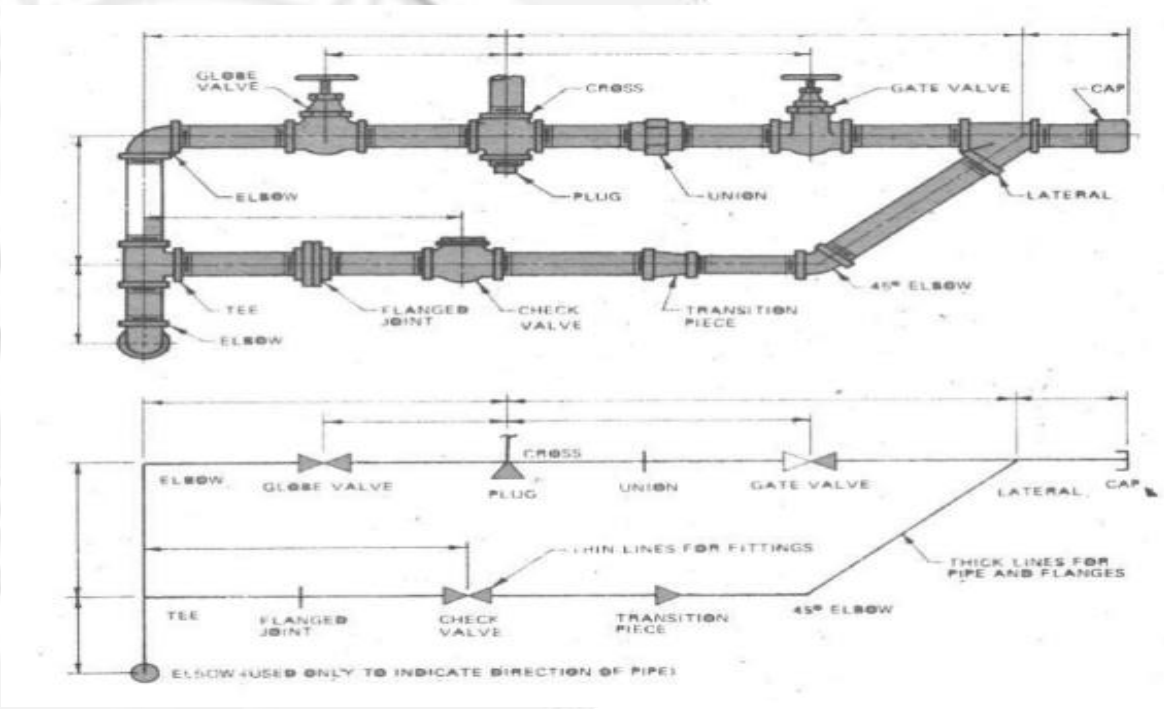



## IV. LEARNING PHASES AND LEARNING ACTIVITIES

| SANITARY & PLUMBING SYMBOLS | LEGEND/ABBREVIATION |
|---|---|
| Water Closet | WC |
| Vent at Ceiling | VAC |
| Vent Stack thru Roof | VSTR |
| Cold Water Line | CWL |
| Hot Water Line | HWL |
| Concrete Drain Pipe | CDP |
| Cast Iron Soil Pipe | CISP |
| Down Spout | DS |
| Cast Iron Vent Stack | CISS |
| Cast Iron Vent Stack | CIVS |
| Vent At Ceiling | VAC |
| Vent Stack Thru Roof | VSTR |
| Catch Basin | CB |
| Junction Box | JB |
| Water Meter | WM |
| Galvanize Iron Pipe Water Line | GIPWL |
| Cold Water Riser | CWR |
| Cold Water Down Feed | CWDF |
| Fire Line | FL |
| Deck Drain | DD |
| Canopy Drain | CD |
| Sprinkle Riser | SPR |
| Dry Stand Pipe Riser | DSPR |
| Fire Hose Cabinet | FHC |
| Lavatory | LAV |
| Water Closet | WC |
| Floor Drain | FD |
| Clean Out | CO |

Like most architectural drawings, plumbing drawings are drawn to a small scale. It would be unrealistic to draw all fixtures and lines on the drawing paper. Therefore schematic symbols are used for various plumbing fixtures and lines. They are used to show the type and location of fixtures, joints values and other devices.

The difference in appearance of an orthographic drawing of fixtures and other devices with that of a schematic drawing is shown in the figure below.




**SAMPLE SCHEMATIC DRAWING/DIAGRAM**

**B. Development** (Time Frame: 40 minutes )

**Activity 1**

**Direction:** Matching Type: Match column **A** with column **B**. Write your answer in your activity sheet.

| COLUMN A | COLUMN B |
|---|---|
| **1**. shower stall | a.  |
| **2**. bath tubs | b.  |
| **3.** lavatory (sinks) | c.  |
| **4.** shower head | d.  |

**IV. LEARNING PHASES AND LEARNING ACTIVITIES**

**5**. gate valve e. 

**6**. P-trap f. 

**7**. sanitary tee g. 

**8**. reducing tee h. 

**9.** straight tee i. 

**10**. 90° elbows i. 

**C. Engagement** (Time Frame: 40 minutes)

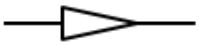
**Activity 2**

**Direction: Identification:** Identify the following legend/abbreviations. Write your answer in your activity sheet.

**1.** CB -
**2.** VAC -
**3.** CISS -
**4.** CISP -
**5.** HWL –
**6**. VSTR –
**7**. CIVS –
**8**. DS –
**9**. CDP –
**10**. CWL –

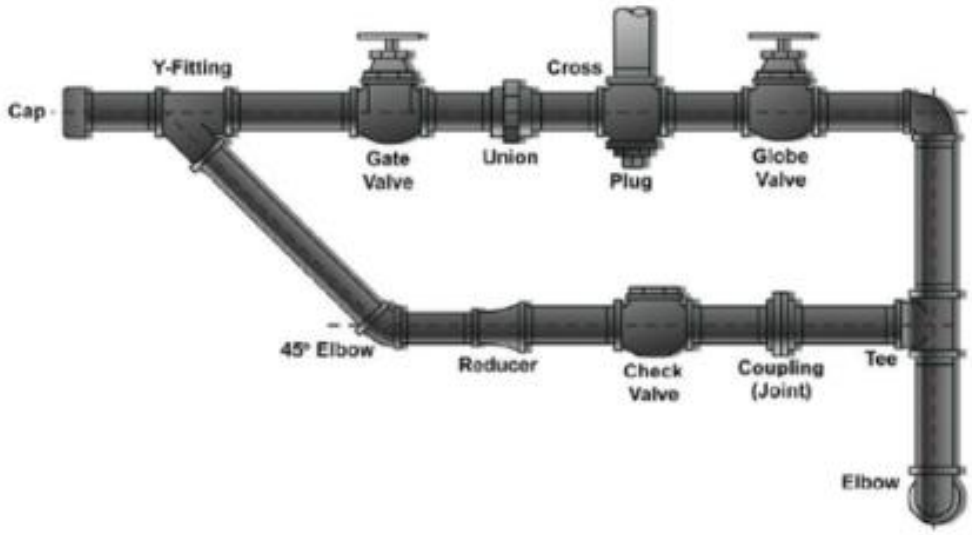
**D. Assimilation** ( Time Frame : 40 minutes)

**Direction**: Recall the following plumbing symbols, draw your answer in your activity sheet.

| | NAMES | SYMBOLS |
|---|---|---|
| SAMPLE | REDUCER |  |
| 1 | SAFETY VALVE | |
| 2 | HAND VALVE | |
| 3 | COUPLING | |
| 4 | TEE-900 | |
| 5 | LATERAL | |
| 6 | ELBOW 450 | |
| 7 | METER | |
| 8 | ELBOW FACING DOWN | |
| 9 | Y-FITTING | |
| 10 | GATE VALVE | |

**V. ASSESSMENT** (Time Frame: 40 minutes )

**Direction:** Draw the pipe diagram of this orthographic using the needed plumbing symbols. Do it in a short bond paper.




Double-line orthographic pipe drawing.

Your work will be graded based from the **Performance Assessment - Scoring Rubrics** (Please refer to **Competency Based Learning Materials (CBLM)** Fourth Year Drafting Technology –pp. 42

**VI. REFLECTION**

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

**VII. REFERENCES**

**Support link:** https://youtu.be/IvbQEmQEmQTUUO by: Ark Bok

Additional : https://youtu.be/4p3F2rMxRtA by: Piping Analysis

**Competency Based Learning Materials (CBLM)** Year 4 Module1-Sanitary and Plumbing Layout and Details –pp. 42


| | | | |
|---|---|---|---|
| **Prepared by:** | RUBEN M. MAGDANGAN<br>Teacher II – San Pedro Relocation Center National High School – Langgam Campus<br>(ruben.magdangan@deped.gov.ph) | **Checked/ evaluated by:** | MIRASOL F. DASIG<br>RHODA N. MANUAL, Ed.D<br>FREDERICK B. ZAIDE<br>TLE-ICT-TD9/11-w3 |

| W4 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | Nine/Eleven |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | PLUMBING CODE AND SYMBOLS |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO 1. Draft sanitary and storm drainage**<br>- Draft storm drainage plan according to plumbing code<br>- Draw details and symbols according to sanitary and plumbing code<br>**-TLE_ICTTD9-12SP IVc-d-2** |
| **III. CONTENT/CORE CONTENT** | -National building code<br>- Clean water act |

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

**A. Introduction** (Time Frame: 80 minutes)

In this lesson, the learners will learn the planning and design of pavement drainage systems. The complete system will be referred to as a storm drain system and will normally consist of curbs and/or gutters, inlets or catch basins, laterals or leads, trunk lines or mains, junction chambers, manholes, and ponds.

.

They are expected to:

a. draft storm drainage plan according to Plumbing Code,
b. Draw details and symbols according to sanitary and plumbing requirements.

The learners will be guided by the following questions based on the K-W-L. This is only to check what the learners already know about the lesson, the skills and competencies that are expected to learn and questions that need to be answered.

| What I know | What I want to Know | What I have Learned |
|---|---|---|
| What do you know about in drafting storm drainage plan according to Plumbing Code and drawing details and symbols according to sanitary and plumbing requirements? | What do you want to know in drafting storm drainage plan according to Plumbing Code and drawing details and symbols according to sanitary and plumbing requirements? | What have you learned about in drafting storm drainage plan according to Plumbing Code and drawing details and symbols according to sanitary and plumbing requirements? |

The sanitary installation is referred to as the network of pipes and fittings that carry off wastes and each plumbing fixture is titled with the appropriate pipe and fitting. The discharges are conveyed to the septic vault.

The storm drainage system, on the other hand, consists of pipes, fittings, catch basins, area drain and is intended for getting rid of water from the building roof and its surrounding and is conveyed to the street sewer. The storm drainage is considered part of the plumbing system.

The pipe used for sanitary and storm drainage most common to homeowners and contractors are the plastic pipe or Polyvinylchloride (PVC) pipes and the concrete pipe for area drain.

Wastewater is discharged by gravity through the disposal system. All pipes in this system therefore must slant in a downward direction so the weight of the waste will cause it to move down. Because of this gravity flow, waste lines are larger than water lines. The stacks are the vertical lines while the branches are the horizontal lines. Vents are also provided for air circulation and to permit sewer gases to escape thru the roof. This equalizes the air pressure in the drainage system.

The wastewater flows starting at the fixture trap, which is provided to stop gases from entering the building and each fixture has a separate trap or seal to prevent backflow of sewer gas, through the fixture branches to the main sewer line. Waste stacks carry only wastewater while solid wastes run thru the soil lines, which are the largest in the system and are flushed with water after each use.

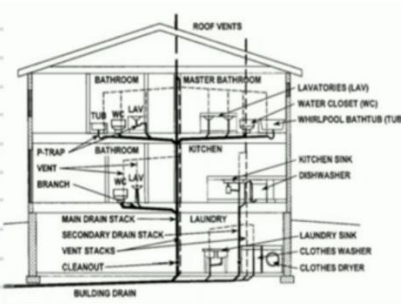
Piping systems are vital to modern society. Some systems may be complex; others may be simple such as in a residential dwelling unit. But they share some common elements, whether they are steel, plastic, copper pipes or tubing.

Sanitary and storm drainage for residential dwelling is either wrought – iron pipes, Polyvinylchloride (PVC) pipes and for drainage is either concrete pipe or PVC pipe. The more common today is the unplasticized Polyvinylchloride (uPVC) pipe.

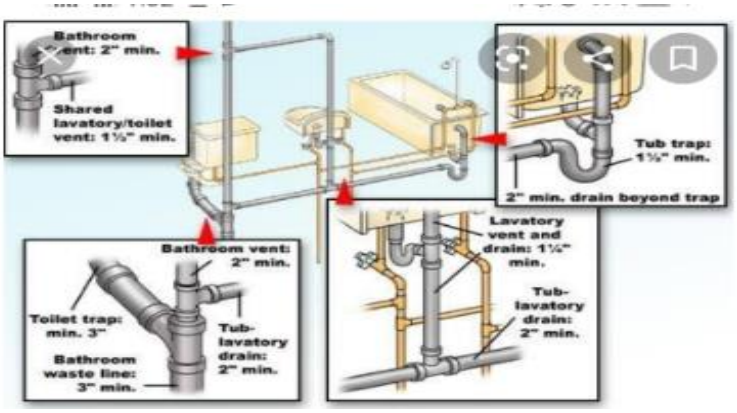
Polyvinyl pipe and fittings are available in commercial length of 3.0 meters and also available in schedule 40 and 80. They are usually assembled with slip joint fittings and solvent, both PVC and chlorinated Polyvinylchloride (cPVC) pipes are commonly available in sizes ranging from ½' to 4" inside diameter.

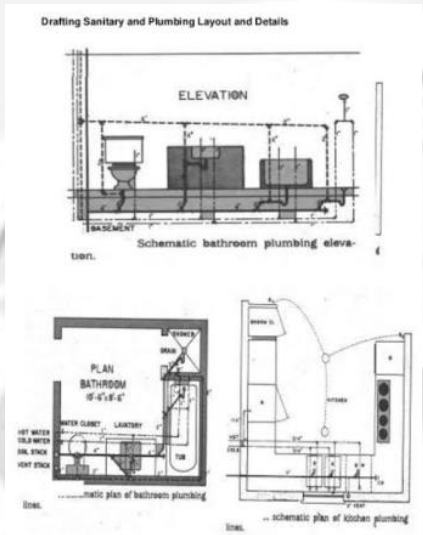
| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

A sanitary drainage and vent system, sometimes referred to as the drain, waste, and vent (DWV) system, is a network of pipes that remove wastewater from a building.



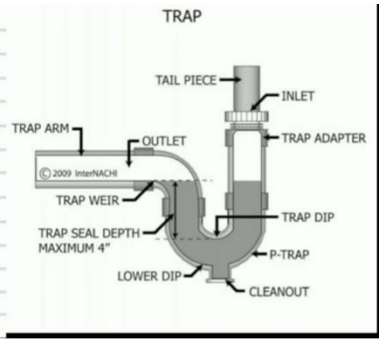

Basic parts of Residential Sanitary Drainage and Vent system





A trap is a U-shaped pipe that catches and holds a small quantity of wastewater that is poured down a fixture drain.




P-traps exit into the wall behind the sink. The traps are made from UPVC or cast-iron sheets. This trap also has a water seal and prevents entry of foul gases to the house.

This trap is used in toilet under water closet. It is almost similar to the S trap and is used in the upper story other than the ground floor.

The only difference between the P trap and the S trap is that the P trap is used for an outlet through the wall, whereas S-trap is used for an outlet through the floor.

Floor traps (Nahni Trap):

Running Trap

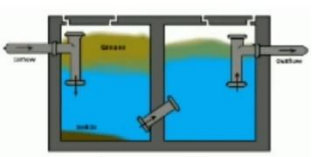
Gully Traps:

Straight-Through Trap

Intercepting Traps

Bottle Trap

Bell Trap



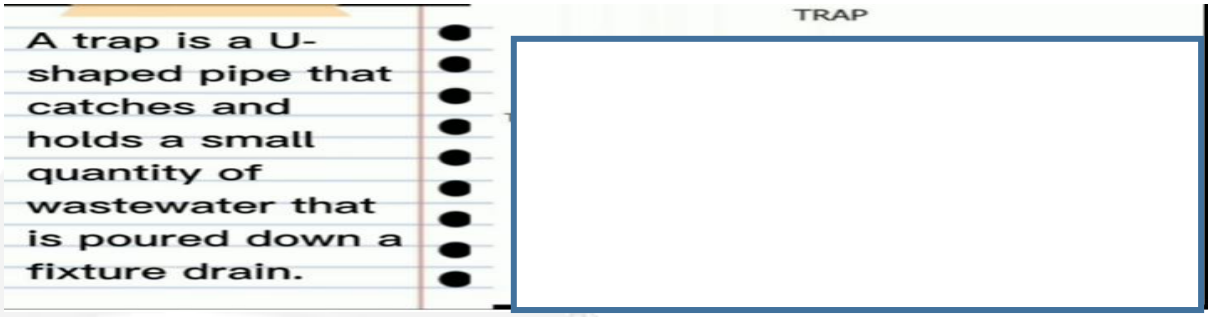
Grease Trap

Drum Trap

| IV. LEARNING PHASES | Suggested Timeframe | Learning Activities |
|---|---|---|

**B. Development** (Time Frame: 40 minutes)

**Activity 1**
**Direction:** Draw the trap inside the box then label its parts. Do it in a short bond paper.

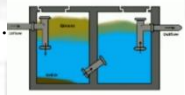
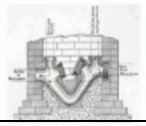



Your work will be graded based on the **Performance Assessment - Scoring Rubrics** (Please refer to **Competency Based Learning Materials (CBLM)** Fourth Year Drafting Technology –pp. 42

**C. Engagement** (Time Frame: 40 minutes)

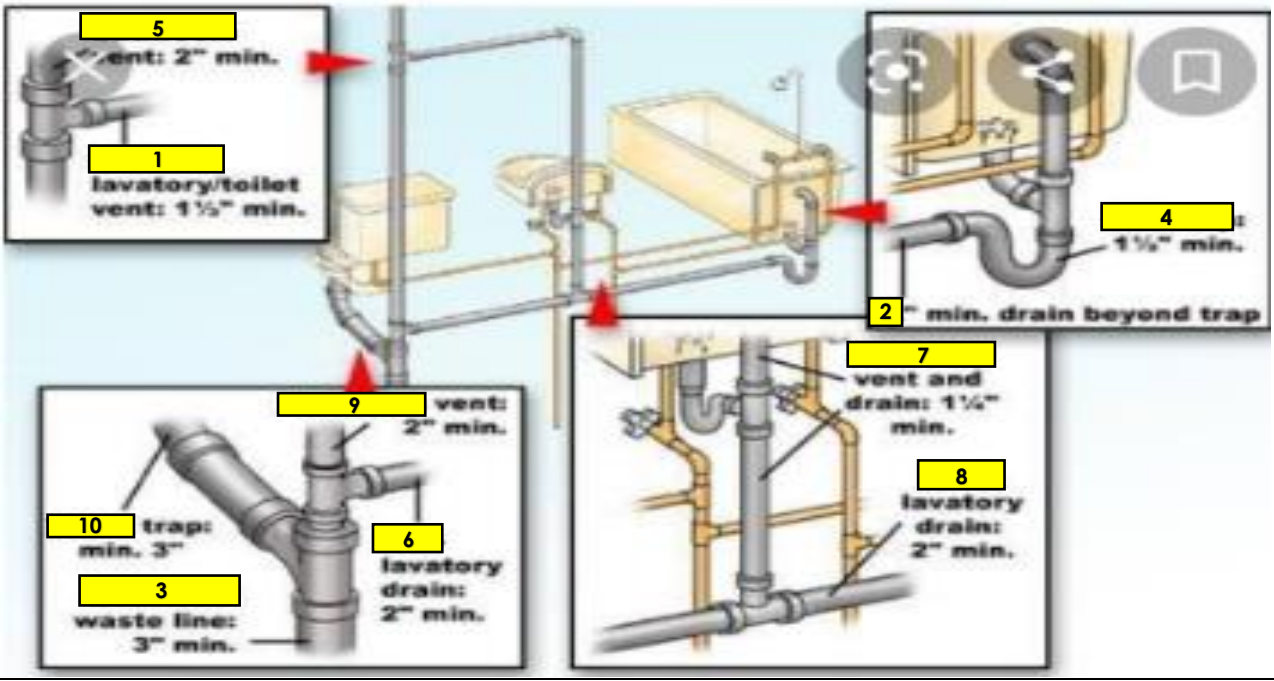
**Activity 2**

**Direction:** Identify the following images, write your answer in your activity sheet.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

**D. Assimilation** (Time Frame : 40 minutes)

**Direction**: Label the given diagram, write your answer in your activity sheet.



**V. ASSESSMENT** (Time Frame: 40 minutes )

**Direction**: True or False: Write **Pandemic** if the statement is True, then **Covid** if the statement is false. Write your answer In your activity sheet.

_____1. The sanitary installation is referred to as the network of pipes and fittings that carry off wastes and each plumbing fixture is titled with the appropriate pipe and fitting.
_____2. The storm drainage system consists of pipes, fittings, catch basins, area drain and is intended for getting rid of water from the building roof and its surrounding and is conveyed to the street sewer.
_____3. The pipe used for sanitary and storm drainage most common to homeowners and contractors are the plastic pipe or Polyvinylchloride (PVC) pipes and the concrete pipe for area drain.
_____4. Wastewater is discharged by technology through the disposal system.
_____5. The wastewater flows starting at the fixture trap, which is provided to stop gases from entering the building and each fixture has a separate trap or seal to prevent backflow of sewer gas, through the fixture branches to the main sewer line.

**VI. REFLECTION**

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.
✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.
ʔ – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

**VII. REFERENCES**

**Support link:** https://youtu.be/B_dBNhTcwtg by: Group 4 (CE-3A)

Additional link : https://youtu.be/jutPcZauUd0 by: Dennis Llena Ciriaco

**Competency Based Learning Materials (CBLM)** Year 4 Module1-Sanitary and Plumbing Layout and Details –pp. 42

| | | | |
|---|---|---|---|
| **Prepared by:** | RUBEN M. MAGDANGAN<br>Teacher II – San Pedro Relocation Center National High School – Langgam Campus<br>( **ruben.magdangan@deped.gov.ph**) | **Checked/ evaluated by:** | MIRASOL F. DASIG<br>RHODA N. MANUAL, Ed.D<br>FREDERICK B. ZAIDE<br>TLE-ICT-TD9/11-w4 |

| W6 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | 9/11 |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | MECHANICAL CODE, LAYOUT AND SYSTEM STANDARDS |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO 1. Draft heating, ventilating, and air-conditioning systems layout**<br>- Indicate signs and symbols according to mechanical layout and details requirements<br>-**TLE_ICTTD9-12ML IVe-f-1** |
| **III. CONTENT/CORE CONTENT** | - National Building Code |

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

**A. Introduction** (Time Frame: 80 minutes)

In this lesson, the learners will learn and show the location of the heating, cooling, and air-conditioning units as well as the piping and ducting diagrams. Graphical symbols on HVAC drawings are similar in pattern to those used for plumbing.

They are expected to:

a. Indicate and draw signs and symbols according to mechanical layout and details requirements.

The learners will be guided by the following questions based on the K-W-L. This is only to check what the learners already know about the lesson, the skills and competencies that are expected to learn and questions that need to be answered.

| What I know | What I want to Know | What I have Learned |
|---|---|---|
| What do you know about in indicating and drawing signs and symbols according to mechanical layout and details requirements? | What do you want to know in indicating and drawing signs and symbols according to mechanical layout and details requirements? | What have you learned about in indicating and drawing signs and symbols according to mechanical layout and details requirements? |

**Air Conditioning Equipment and Controls**

An air conditioning system has the following equipment and controls.

1. **Compressors**

Compressors used are of two types: a. Reciprocating is commonly referred to as piston type b. Centrifugal refers to two rotary type compressors For up to 100 tons, reciprocating units are used because centrifugal compressors are not manufactured in these sizes.

2. **Condensers**

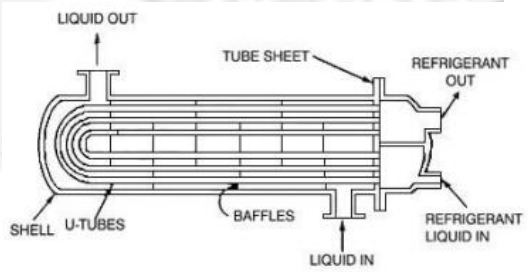
Condensers used for liquefying have three general designs:

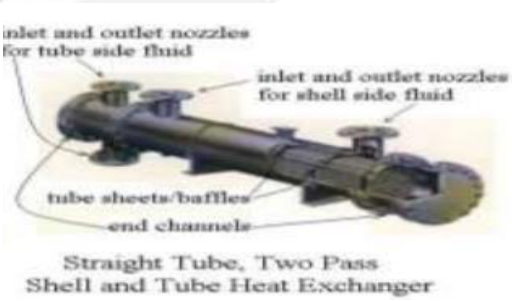
a. **Air cooled condensers**

Air cooled condensers are seldom used for capacities above 3 tons of refrigeration unless an adequate water supply is extremely difficult to obtain. The principal disadvantages of this kind are the high power cost and the reduction of capacity on hot days.

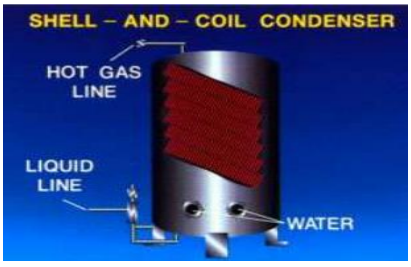
The conventional air-cooled condenser consists of the condenser coil, compressor, and condenser fan with motor, crankcase, heater, controls, service valves and filter drier.

b. **Water-Cooled condensers**




Straight Tube, Two Pass
Shell and Tube Heat Exchanger




*Water-cooled condenser*

Water cooled condensers are of three types:

1. **Double pipe condenser** Also double-tube type consists of two tubes, one inside the other. Water is supplied through the inner tube. The refrigerant is passed through a tube that encloses the inner tube. Refrigerant flows in the opposite direction than water.

2. **Shell and tube condensers** – Shell-and-tube condensers are the largest power version with a water-cooled condensers with a capacity from 10 up to 10 000 tons. They work on the same principle of " Shell-and-Coils, capacitors, i.e., with water flowing inside the pipes refrigerant flows outside the tube. You could tell these types that the water on the side of the tube condensers, while the refrigerant in the shell side.

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

3. **Shell and coil condensers** - Shell-and-Coils, capacitors have a welded or flanged outer shell with a coil inside are made of ribbed water tube. Coil inside the shell is continuous. Water flows through pipes of the coil, while the refrigerant flows above and beyond. The outer surface of the heat exchanger tubes and fins are in contact with the refrigerant. This is a vertical Shell-and-the condenser Coil. This can also be done in a horizontal position.

**c. Evaporative Condensers**

This type of condenser makes use of both air and water for cooling and is available in sizes up to 100 tons or more. It is applicable in areas where there is a high cost of water for condenser purposes. However, it uses only 3 to 5 percent of the amount if the condenser is entirely water cooled.

**3. Evaporation and Coolers**

A conventional evaporator of an air-conditioning system includes a evaporator coil, blowers, motors, control and filter.

There are several methods used for cooling in air conditioning:

a. **Direct evaporative cooling** - (open circuit) is used to lower the temperature of air by using latent heat of evaporation, changing liquid water to water vapor. In this process, the energy in the air does not change. Warm dry air is changed to cool moist air.

b. **Indirect evaporative cooling** - (closed circuit) is similar to direct evaporative cooling but uses some type of heat exchanger. The cooled moist air never comes in direct contact with the conditioned air.

c. **Hybrid** - Direct and Indirect cooling has been combined with vapor compression or absorption air conditioning to increase the overall efficiency and /or to reduce the temperature below the wet-bulb limit.

4. **Air cleaning equipment**

Air may contain large quantities of dust, cinders, soot, smoke, fumes, pollen, grit, bacteria and odor. These contaminating elements in the air are removed by filtration and by air washing.

Air-conditioning filters are of different types:

**a. Dry-filter** consists of wire frames or panels, enclosing felt, cotton, batting, cellulose pockets through which the air is screened.

**b. Viscous filters** consists of a series of metal deflecting plates or screens coated with viscous oil coming in contact with these surfaces. The air flow is abruptly changed in direction and the dust is trapped in the oil film and remains there.

**c. Automatic viscous filters**. It is a system consisting of two endless vertical filter curtains with a denser front curtain and passes downward through an oil reservoir with the rear curtain catching entrained oil in the air.

**d. Electric precipitators**. Consists of a positive electric field and negative grounded tubes which serves to remove from the air the fine dusts, mists, unburned particles in smoke and other matters which would pass through the dry and viscous filters.

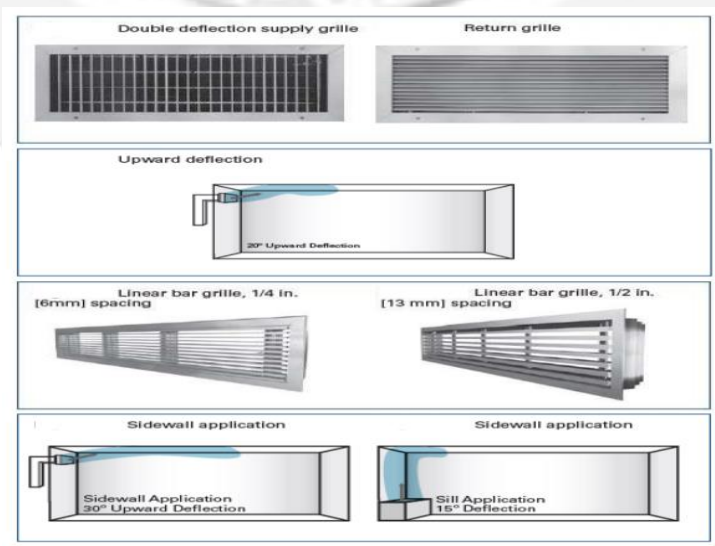
5. **Fans** - Fans used in Air-Conditioning are of two tubes:

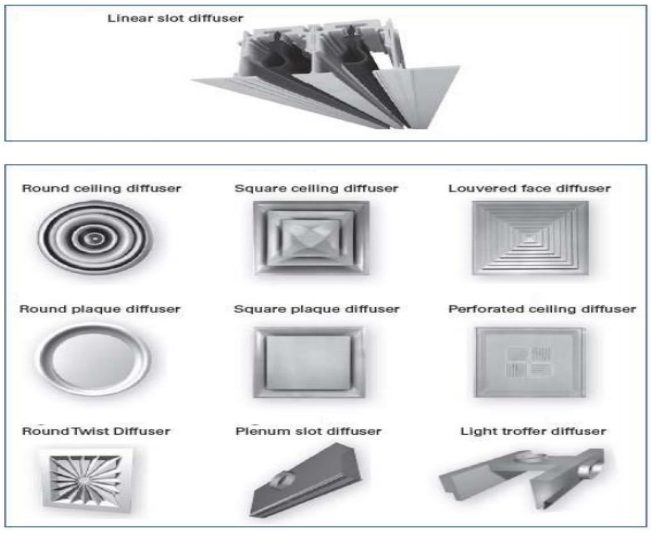
**a. Centrifugal Fans (Radial Type of Fan)**

The air enters at one side near the axis of the wheel and is discharged radially through the outlet placed at a tangent to the wheel.

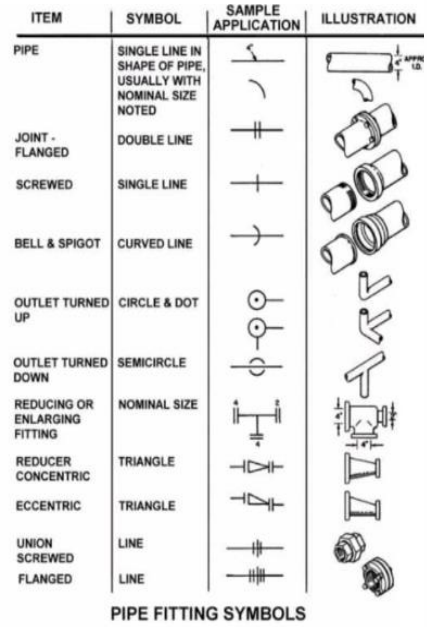
**b. Propeller Fans (Axial Type of Fan)** The air enters at the rear of the fan and emerges at the front in a line parallel to the axis of rotation.

6. **Air Outlets** - An important step in efficient space comfort conditioning is the proper selection of air outlets. This section presents generalized descriptions and Drafting Mechanical Layout and Details 367 characteristics of the types of grilles, registers and diffusers commonly used in commercial air distribution applications today.



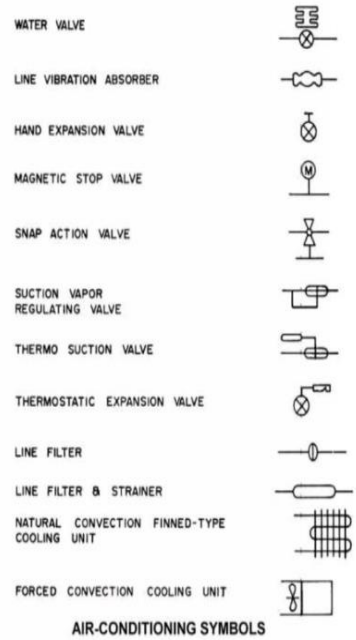
## IV. LEARNING PHASES AND LEARNING ACTIVITIES



| ITEM | SYMBOL | SAMPLE APPLICATION | ILLUSTRATION |
|---|---|---|---|
| PIPE | SINGLE LINE IN SHAPE OF PIPE, USUALLY WITH NOMINAL SIZE NOTED | | |
| JOINT - FLANGED | DOUBLE LINE | | |
| SCREWED | SINGLE LINE | | |
| BELL & SPIGOT | CURVED LINE | | |
| OUTLET TURNED UP | CIRCLE & DOT | | |
| OUTLET TURNED DOWN | SEMICIRCLE | | |
| REDUCING OR ENLARGING FITTING | NOMINAL SIZE | | |
| REDUCER CONCENTRIC | TRIANGLE | | |
| ECCENTRIC | TRIANGLE | | |
| UNION SCREWED | LINE | | |
| FLANGED | LINE | | |

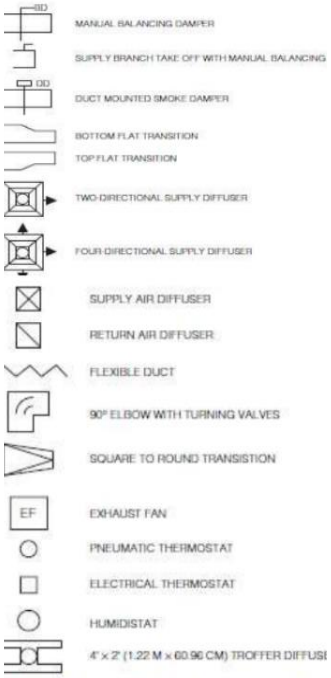
PIPE FITTING SYMBOLS

Figure 8.11C Examples of typical pipe fitting symbols showing sample




AIR-CONDITIONING SYMBOLS

Figure 8.12A Common air conditioning symbols in general use




YMBOLS AND ABBREVIATIONS Figure 20. Common HVAC symbols

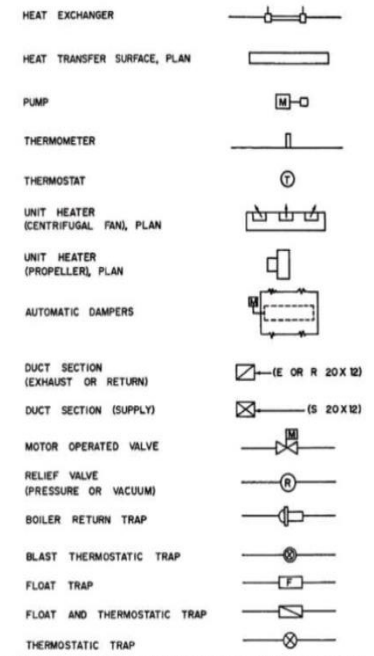



Figure 8.12B Examples of heating symbols in general use.

**B. Development** (Time Frame: 30 minutes)

**Activity**

**Direction:** Multiple Choice: Select the letter of the correct answer, write your answer in your activity sheet.

**1.** These condensers are seldom used for capacities above 3 tons of refrigeration unless an adequate water supply is extremely difficult to obtain.
- **a**. Water-cooled condensers
- **b**. Air cooled condenser
- **c**. Double pipe condenser
- **d**. Shell and coil condensers

**2**. This type of condenser makes use of both air and water for cooling and is available in sizes up to 100 tons or more.
- **a**. Water-cooled condensers
- **b**. Air cooled condenser
- **c**. Evaporative condenser
- **d**. Shell and coil condensers

**3**. This filter consists of wire frames or panels, enclosing felt, cotton, batting, cellulose pockets through which the air is screened.
- **a**. dry filter
- **b**. Air cooled condenser
- **c**. Evaporative filter
- **d**. Shell and coil condensers

**4.** The kind of fans in which the air enters at the rear of the fan and emerges at the front in a line parallel to the axis of rotation.
- **a**. centrifugal fans
- **b**. dry filter fan
- **c**. propeller fans
- **d**. Shell and coil fans

**5**. The condensers which are the largest power version with a water-cooled condensers with a capacity from 10 up to 10 000 tons.
- **a**. Shell and tube condenser
- **b**. evaporative condensers
- **c**. double pipe condenser
- **d**. propeller condenser

**C. Engagement** (Time Frame: 30 minutes)

**Activity 2**

**Direction:** Identify the following images , write your answer in your activity sheet.

**1.** 

**2.** 

**3.** 

**4.** 

**5.** 

**6.** 

**7.** 

**8.** 

**9.** 

**10.** 

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

**D. Assimilation** (Time Frame : 50 minutes)

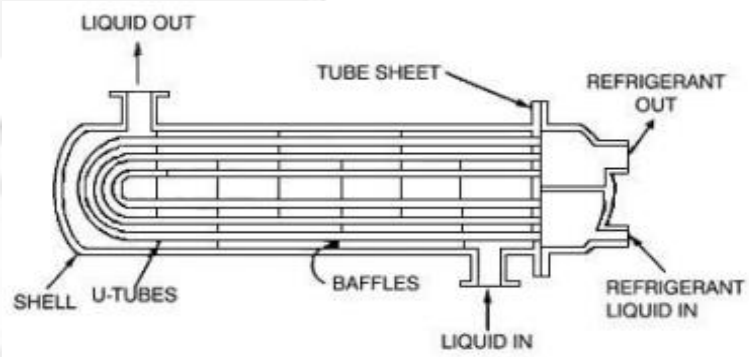
**Direction**: Draw the following Air-conditioning symbols. Do it in a short bond paper then label each drawings.

1. Magnetic stop valve
2. Thermo suction valve
3. Snap action valve
4. Line vibrating absorber
5. Water valve
6. Line filter & strainer
7. Hand expansion valve
8. Suction vapor
9. Natural convection finned-type
10. Line filter

**Note: Your score will be based on the Soring rubrics**
Your work will be graded based on the **Performance Assessment – Scoring Rubrics** (Please refer to **Competency Based Learning Materials (CBLM)** Fourth Year Drafting Technology –pp. 42

## V. ASSESSMENT (Time Frame: 50 minutes )

**Direction:** Draw the given image of Water-cooled condenser, color your drawing. Draw your work in a short bond paper.




***Water-cooled condenser***

Your work will be graded based from the **Performance Assessment - Scoring Rubrics** (Please refer to **Competency Based Learning Materials (CBLM)** Fourth Year Drafting Technology –pp. 42

## VI. REFLECTION

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.
✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.
? – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

## VII. REFERENCES

**Competency Based Learning Materials (CBLM)** Year 4
Drafting Technology – Drafting Mechanical Layout and Details
**For Scoring rubrics**
**Competency Based Learning Materials (CBLM)** Year 4 Module1-Sanitary and Plumbing Layout and Details –pp. 42

| | | | |
|---|---|---|---|
| **Prepared by:** | RUBEN M. MAGDANGAN<br>Teacher II – San Pedro Relocation Center National High School – Langgam Campus<br>(**ruben.magdangan@deped.gov.ph**) | **Checked/ Evaluated by:** | MIRASOL F. DASIG<br>RHODA N. MANUAL, Ed.D<br>FREDERICK B. ZAIDE<br>TLE-ICT-TD9/11-w6 |

| W7 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | 9/11 |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | DRAFTING MECHANICAL LAYOUT AND DETAILS (ML) |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO2: Draft mechanical details and conveyor system**<br>- Draw elevator, escalators, dumbwaiter, and moving ramp systems according to Mechanical Code;<br>- Draw details of mechanical conveyor system according to mechanical layout and detail requirements.<br>- **-TLE_ICTTD9-12ML IVg-h-2** |
| **III. CONTENT/CORE CONTENT** | Conveyor system Standards |

**IV. LEARNING PHASES AND LEARNING ACTIVITIES**

**A. Introduction** (Time Frame: 40 minutes)

A conveyor system is often the lifeline to company's ability to effectively move its product in a timely fashion. The steps that a company can take to ensure that it performs at peak capacity, include regular inspections, close monitoring of motors and reducers, keeping key parts in stock, and proper training of personnel.

Increasing the service life of your conveyor system involves choosing the right conveyor type, the right system design and paying attention to regular maintenance practices.

A conveyor system that is designed properly will last a long time with proper maintenance. Here are some of the biggest problems to watch for in overhead type conveyor systems, including I-beam monorails, enclosed track conveyors and power and free conveyors.

Listed below are some of the most important skills that you must gain in order to draft a quality floor plan. On the right side of the matrix lists the skills expected of you to master. Rate yourself by checking "Not Much", if you are not so familiar yet, "A little" and/or "A lot", if you are already familiar with the skills. Don't feel bad if you checked "Not much" in all of the skills. Keep in mind that this is being administered to determine your pre-entry knowledge of and skills on the lesson to be presented.

| Skills in drafting mechanical details of conveyor system | Not Much | A Little | A Lot |
|---|---|---|---|
| • I can layout draw elevator, escalators, dumbwaiter, and moving ramp systems according to Mechanical Code | | | |
| • I can draw details of mechanical conveyor system according to mechanical layout and details requirements | | | |

**Drafting Mechanical Layout and Details**
**Escalators, Conveyors and Elevators**

An **escalator** is a moving stairway; thus it is sometimes called a moving stairway or an electric stairway. There are two classes of escalators available – the 32 inches and the 48 inches. The normal speed is 90 Ft/Min. (FPM) the 120 FPM speed is used for express escalators. Angle of inclination is normally 30˚.

- **The major components of an escalator installation are:**
  - **a. Truss** – is a wielded steel frame which supports the moving stairway equipment.
  - **b. Track** – refers to the steel angles attached to the truss on which the step rollers are guided, thus controlling the motion of the steps.
  - **c. Controller** – consist of the contractors, relay and circuit breaker.
  - **d. Sprocket Assemblies, Chains and Machine** – provide the motive power for the unit.
  - **e. Handrail** – is driven by two sheaves and is powdered from the top sprocket assembly.
  - **f. The balustrade assembly.**
- **Arrangement of Escalators**
  1. Parallel Arrangement
  2. Crisscross Arrangement

The crisscross arrangement is generally favored because of lower cost, minimum floor space occupied and lower structural requirement.

**Moving walks and ramps** are different from moving stairways. While moving stairways (escalators) have the primary function of moving a large number of people vertically, moving walk or ramp serves a dual function, that is, horizontal transportation only, or a combined function of horizontal and vertical transportation not only of people but also of wheeled vehicles and large parcels.

An **elevator** or **lift** (in British English) is a vertical transport vehicle that efficiently moves people or goods between floors of a building. They are generally powered by electric motors that either drive traction cables and counterweight systems, or pump hydraulic fluid to raise a cylindrical piston.

- **The elements of an electrical elevator installation are:**

1. **Hoist way** – is the shaft or vertical passageway of the car and its counterweights.

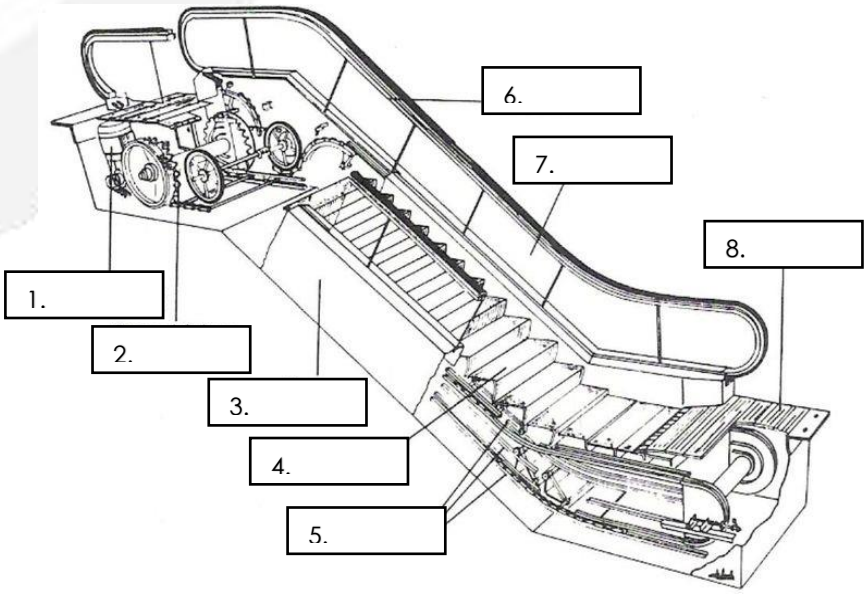
## IV. LEARNING PHASES AND LEARNING ACTIVITIES

2. **Elevator Car** – is a cage of light metal supported on a structural frame to the top member of which the cables are fastened. The car is fixed on its vertical travel in the shaft by means of a rail shoes on the guide rails.
3. **Cables** – which lift the car usually 3 to 8 in number are placed in parallel, the weight of the car is being equally distributed over the cables which are fastened to the top of the car by cables socket.
4. **Elevator machine** – turns the sheave and thus lifts or lowers the car. In most modern installations, the electric driving motor receives its energy from a separate motor-generator set.
5. **Machine Room** – is the place where the elevators machine is housed, usually directly above the elevator shaft or hoist way.
6. **Counterweights** – are rectangular blocks of cast iron stacked in one frame which is supported at the opposite ends of the cables to which the car is fastened.
7. **Guide rails** – are the vertical tracks that guide the car and its counterweight.
8. **Control Equipment** – is a combination of push buttons contacts, relays, cams and devices which are operated manually or automatically to initiate door opening, starting, acceleration, leveling and stopping of the car.

- **Safety devices include;**
  - a. **Main Brake** – is mounted directly on the shaft of the elevator machine.
  - b. **Safety System** – is controlled by the speed governor mounted on or near the elevator machine.
  - c. **Electrical Final Limit Switches** – de-energize the traction motor and set the main brake if the car over travels.
  - d. **Oil or Spring Buffers** – are always placed in the elevators pit. Their purpose is not to stop a falling car but to bring it to a partially cushioned stop if it over travels the lower terminal.
- **Two types of Elevator Machines**
  - a. Gearless traction Machine
  - b. Geared traction Machine
- **Systems of Elevator Operation and Supervision**
  - a. **Single Automatic Push Button Control.** This is the simplest since it handles only one call at a time, providing for an uninterrupted trip for each call.
  - b. **Collective Control.** It is arranged to collect all waiting "up" calls on the trip up and all waiting "down" calls on the trip down, the control system "store" all calls until they are answered and automatically reverses the direction of travel at the highest and lowest calls.
  - c. **Electronic Group Supervisory Dispatching and Controlling -** Under this system, the entire group or bank of cars in a given group of elevators is in automatic operation at peak periods; and automatically shuts down successively as the number of car passengers become very low and electronic control system performs all commands, thus no operator is needed.
- **Kinds of elevators**
  1. **Freight Elevators** – They are of two types.
     - a. General Purpose Freight Elevator
     - b. Light Duty Freight Elevators
     - c. Sidewalk Elevators
  2. **Dumbwaiters** – they are small freight for the transport of relatively small articles between levels.
  3. **Plunger Elevators** – These are oil-hydraulic elevators which are raised and lowered by means of a movable rod rigidly fixed at the bottom of the car. The system is hydraulic and operates the same as a hydraulic jack.

**B. Development** (Time Frame: 80 minutes)

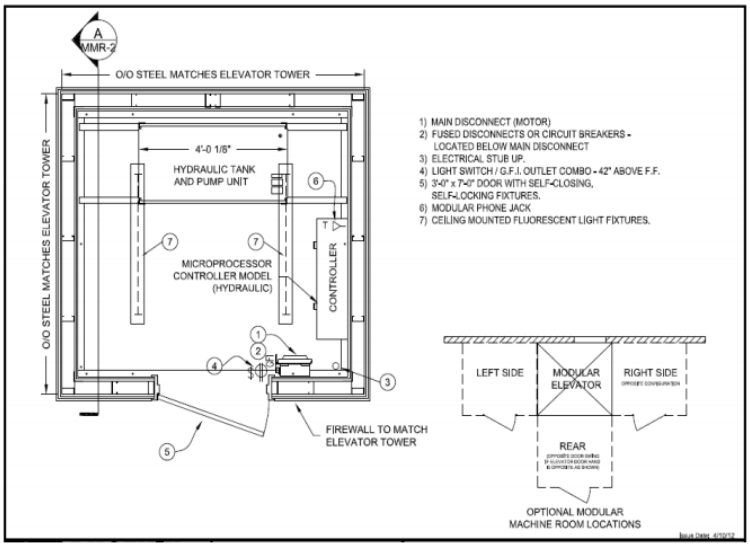
**Activity:**
**IDENTIFICATION**
**Direction:** Identify the different parts of an escalator and write the use or function of each part.



## IV. LEARNING PHASES AND LEARNING ACTIVITIES

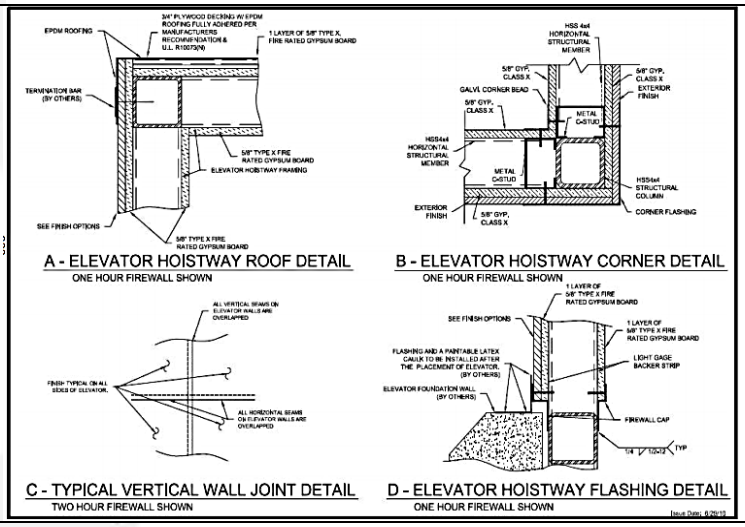
**Learning Task 1: STANDARD BED ELEVATOR**
**Direction:** Draft the illustrated sample of a standard bed elevator. Follow the detailed requirements included on the illustration. Use a clean sheet of paper for your drawing. Your work will be graded using the following criteria shown on learning task 3.

***You are great!***
You completed learning task 1 you are now ready to be engaged with our next activity.




**C. Engagement** (Time Frame: 30 minutes)

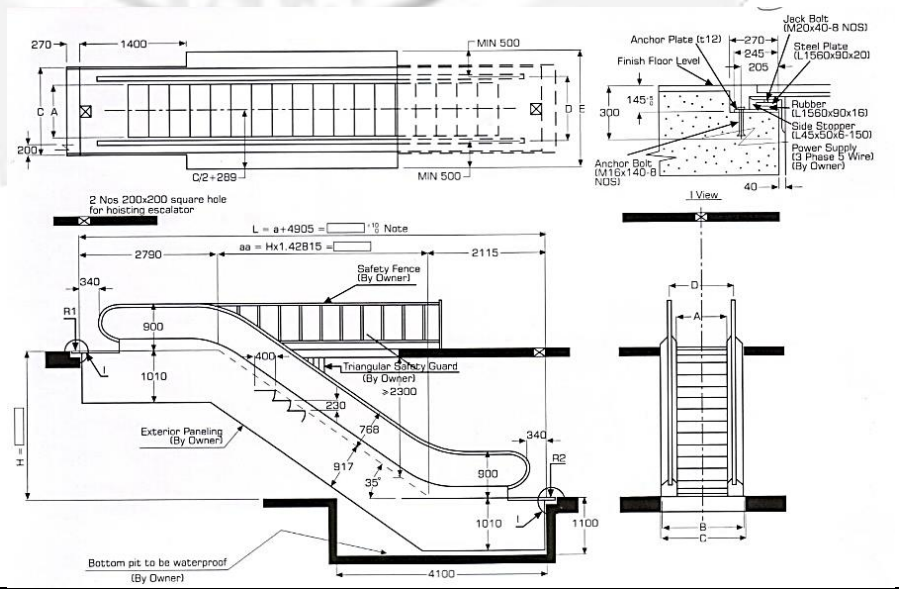
**Learning Task 2: ELEVATOR HOISTWAY**
**Direction:** Draft the illustrated sample of an elevator hoist way including the roof detail, corner detail, joint detail and flashing detail. Follow the detailed requirements included on the illustration. Use a clean sheet of paper for your drawing. Your work will be graded using the Scoring Rubrics for performance Assessment.




**D. Assimilation** (Time Frame: 50 minutes)

**DRAFTING OF AN ESCALATOR**

**Direction:** Draft the illustrated sample of escalator. Follow the detailed requirements included on the illustration. Use a clean sheet of paper for your drawing. Your work will be evaluated using the rubric shown on learning task 3



## IV. LEARNING PHASES AND LEARNING ACTIVITIES

Your output will be evaluated using the Scoring Rubrics for performance Assessment below:

**SCORING RUBRICS FOR PERFORMANCE ASSESSMENT**

| Criteria | VS (5) | S (4) | FS (3) | US (2) | VUS (1) | Score | Equivalent |
|---|---|---|---|---|---|---|---|
| Details | | | | | | 25 | 100 |
| Accuracy | | | | | | 24 | 98 |
| Workmanship | | | | | | 22-23 | 95 |
| Speed | | | | | | 20-21 | 92 |
| Neatness | | | | | | 18-19 | 89 |
| TOTAL | | | | | | 16-17 | 86 |
| TOTAL SCORE | | | | | | 15 below | 83 |
| Comments/Remarks: | | | | | | | |

**V. ASSESSMENT** (Time Frame: 40 minutes )

**Test I: Multiple Choice**

**Direction:** Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. It is sometimes called a moving stairway or an electric stairway.
   a. Elevator b. escalator c. conveyor
2. It is used to carry passenger traffic in buildings.
   a. Elevator b. escalator c. conveyor
3. It is the standard angle of inclination of an elevator.
   a. 30 degrees b. 60 degrees c. 90 degrees
4. Normal speed of an escalator
   a. 90 FPM b. 100 FPM c. 80 FPM
5. A vertical transport vehicle that efficiently moves people or goods between floors of a building.
   a. Elevator b. escalator c. conveyor

**Test II: Enumeration**

**Direction:** Write your answer on a separate sheet of paper.

1-3. Systems of Elevator Operation and Supervision

4-5. Types of elevator machines

## VI. REFLECTION

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

## VII. REFERENCES

**Competency Based Learning Materials (CBLM)** Year 4
Drafting Technology – Drafting Mechanical Layout and Details
- Module 7 – Drafting Mechanical Layout and Details
Information and Communication Technology
Technical Drafting pages 379-389

| | | | |
|---|---|---|---|
| **Prepared by:** | KRIS ANNE J. SAN SEBASTIAN<br>Gov Felicisimo T San Luis Integrated SHS | **Checked/ Evaluated by:** | MIRASOL F. DASIG<br>RHODA N. MANUAL, Ed.D<br>FREDERICK B. ZAIDE<br>TLE-ICT-TD9/11-w7 |

| W8 | Learning Area | TVL-ICT TECHNICAL DRAFTING | Grade Level | 9/11 |
|---|---|---|---|---|
| | Quarter | Fourth | Date | |

| | |
|---|---|
| **I. LESSON TITLE** | DRAFTING MECHANICAL LAYOUT AND DETAILS (ML) |
| **II. MOST ESSENTIAL LEARNING COMPETENCIES (MELCs)** | **LO3: Draft fire protection systems**<br>2.1 Draw fire sprinkler system according to Fire Code;<br>2.2 Draw signs and symbols of fire protection systems according to fire protection requirements.<br>**-TLE_ICTTD9-12ML IVi-j-3** |
| **III. CONTENT/CORE CONTENT** | - Fire Code<br>- National Building Code and<br>- Fire Protection Equipment and Installation |

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

**A. Introduction** (Time Frame: 30 minutes)

**Draft Fire Protection Systems**

An objective conceptual planning is to create an environment in which the user can be as safe as possible. Many of the accidents that frequently occur in homes, schools, offices and elsewhere are due to the facility design and to user errors. Safety considerations applicable to all architectural systems must be considered such as fire protection and alarm system. The provision of fire sprinkler and alarm as embodied in the National Building Code and Fire Code of the Philippines should be implemented. Listed below are some of the most important skills that you must gain in order to draft a quality floor plan. On the right side of the matrix lists the skills expected of you to master. Rate yourself by checking "Not Much", if you are not so familiar yet, "A little" and/or "A lot", if you are already familiar with the skills. Don't feel bad if you checked "Not much" in all of the skills. Keep in mind that this is being administered to determine your pre-entry knowledge of and skills on the lesson to be presented.

| Skills in drafting mechanical details of conveyor system | Not Much | A Little | A Lot |
|---|---|---|---|
| • I can draw fire sprinkler plan according to Fire Code | | | |
| • I can draw signs and symbols of fire protection systems according to fire protection requirements | | | |

**Requirements for Fire Safety:**

a. There must be at least two means of exit in every residential room (such as a doorway or window).
b. Exit doors must be at least 0.60 m wide.
c. Occupied rooms must be accessible.
d. All door locking devices must be easily disengaged from the inside by quick release catches.
e. The path travel from any room to an exit must not be through another room subject to locking.
f. Passages from sleeping rooms to exits must be at least 0.90 wide.
g. Stairs must be at least 0.90 m wide.
h. Every sleeping room must have at least a window which can be easily opened from the inside.
i. Storm windows, screens, burglar guards must have quick opening devices.
j. Combustion heaters and stoves must not be located to block escape in case of malfunction.

**Building Classifications**

Building code requirements vary as to such factors such as type of occupancy, building contents, type of construction, location and fire extinguishing system. The code permits "tradeoffs" between these classifications with the goal of obtaining public safety as can.

**Classification by Occupancy**

1. Assembly
2. Educational
3. Institutional
4. Residential
5. Mercantile
6. Offices
7. Industrial
8. Storage

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

**Classification by Content**

1. Ordinary Hazard Content
2. Extra Hazard Content
3. Light Hazard Content

**Classification by Construction Type**

Type I – Fire resistive construction
Type II – Heavy timber construction
Type III – Non-combustible construction
Type IV – Ordinary construction
Type V – Wood frame construction

**Classification by Location**

Buildings constructed in closely packed communities are threat to the general public than buildings located in an open area. Thereof, building codes establish fire limits or fire zones within the limits of a fire zone. All buildings must be designed so that a fire will remain contained.

**Fire Extinguishing System**

Building codes often require automatic water sprinkler systems, for they give excellent fire protection in all types of buildings.

A sprinkler system consist of a network of piping placed under the ceiling. It is provided with a number of nozzles called sprinklers when activated, the sprinklers spray water in a hemispherical pattern.

**Types of Sprinkler System**

1. Fixed Temperature System in classified into two kinds:
   a. Wet Pipe refers to when water is stored in the piping.
   b. Dry Pipe refers to when no water is in the pipe.
2. Rate-of-Rise Sprinkler System. Detectors open valves upon any abnormal increase of temperature. It is also classified as:
   a. Deluge System is used for extra hazard condition.
   b. Pre-Action System is used to reduce the possibility of accidental water damage.

**Sprinkler Layout**

The layout of a sprinkler system is classified into three types:

1. Light hazard is where protection area per sprinkler does not exceed 200 sq.ft.
2. Ordinary hazard is where protection area per sprinkler does not exceed 130 sq.ft.
3. Extra hazard is where protection area per sprinkler does not exceed 90 sq.ft.

Standpipes are vertical water pipes with fire-hose outlets at each floor. They are located so that any fire can be reached by a stream from not more 75' of small hose or 100' of large hose.

***Congratulations!***
You completed the Introduction of our lesson. You can now proceed to the next session.

**B. Development** (Time Frame: 80 minutes)
**Activity**

**Learning Task 1: FLOOR PLANNING**
**Direction:** Draft the floor plan of your house. Indicate what type of Fire Protection System is used on your house. Your work will be evaluated using the rubric seen on learning task 4.

**Learning Task 2: DRAFTING OWN FIRE PROTECTION SYSTEM**

**Direction:** Using the floor plan you draw on learning task 1, draft each of the fire protection systems with color coding suggested below. Work will also be evaluated using the rubric shown on learning task 4.

a. Fire Sprinkler System – RED
b. Fire Standpipes System – GREEN
c. Diagram Connecting Fixtures – YELLOW
d. Diagram Connecting Water Source – BLUE

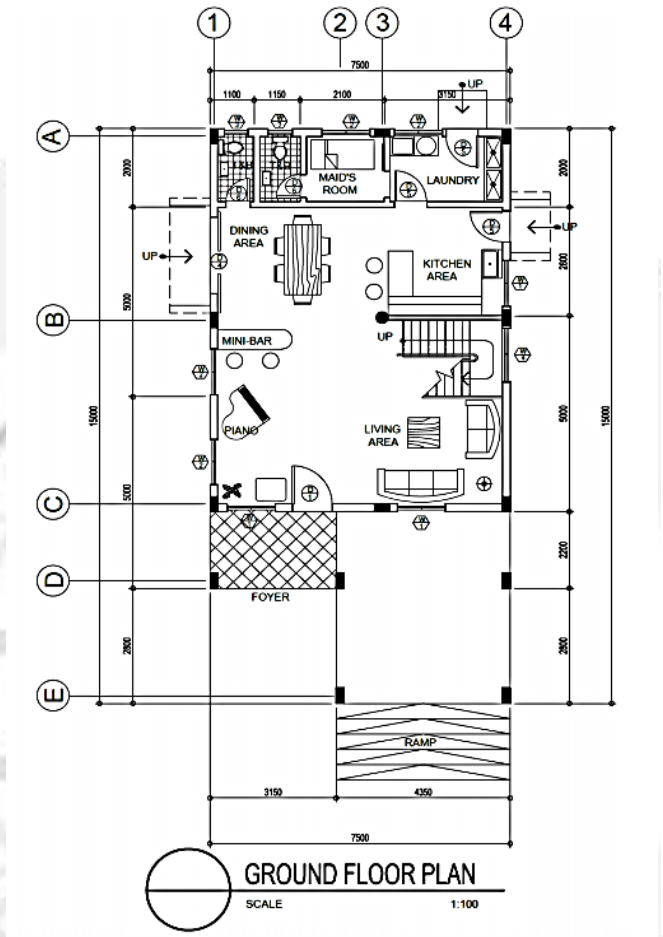
***You are great!***
You completed learning task 1 and 2, you are now ready to be engaged with our next activity.

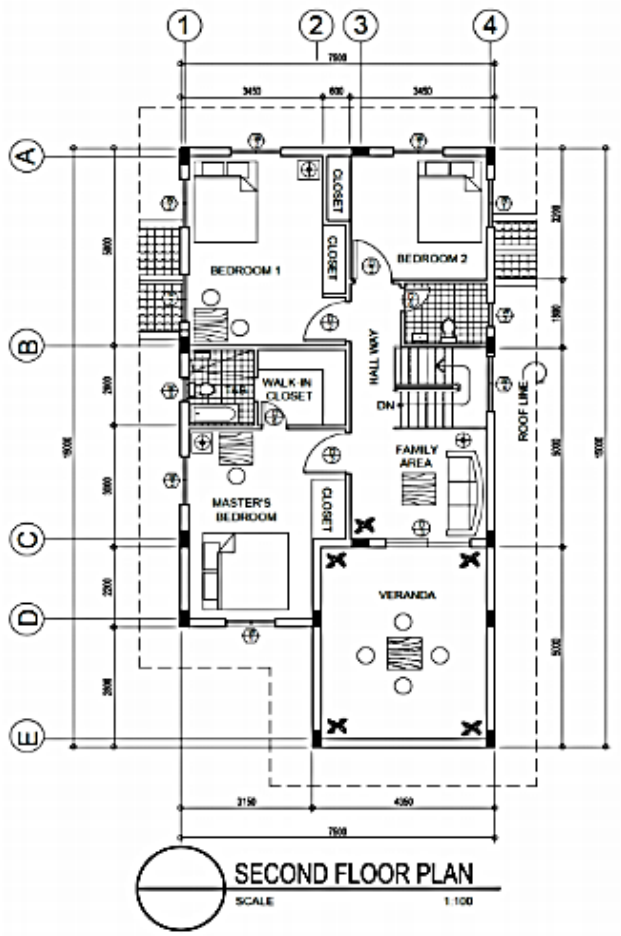
## IV. LEARNING PHASES AND LEARNING ACTIVITIES

**C. Engagement** (Time Frame: 80 minutes)

**Learning Task 3:**
**SYSTEM IDENTIFICATION**
**Direction:** Locate/indicate the following based on the floor plan specified below:

1. Fire Sprinklers
2. Standpipes




**Learning Task 4:**
**DRAFTING FIRE PROTECTION SYSTEMS**
**Directions:** Draft Fire Protection System based on the floor plan used in Learning Task 3.

1. Finalize the fire sprinkler system by drawing a diagram connecting the fixtures.
2. Finalize the fire protection system by drawing a diagram connecting the fixtures from the water source.

**Performance Criteria:**

- **Accuracy**
  - 50 pts - The output is accurately done.
  - 45 pts - Two to five errors are observed on the output.
  - 40 pts. - Six to ten errors are observed on the output.
- **Neatness**
  - 30 pts. - No errors made on the output.
  - 25 pts - Two to three erasures made on the output.
  - 20 pts - Four or more erasures made on the output.
- **Lettering/Labeling**
  - 20 pts. - All information must be completely indicated and legibly printed.
  - 15 pts. - Pieces of information are legibly printed but some are missing.

**Scoring Rubrics**

| Criteria | Score (Tick the corresponding pts.) |
|---|---|
| Accuracy | |
| 50 | |
| 45 | |
| 40 | |
| Neatness | |
| 30 | |
| 25 | |
| 20 | |
| Lettering/Labeling | |
| 20 | |
| 15 | |
| Total | |

## IV. LEARNING PHASES AND LEARNING ACTIVITIES

**D. Assimilation** (Time Frame: 30 minutes)

**Direction:** Research for the different signs and symbols used for fire protection system according to fire protection requirements. Indicate the name of the sign and symbol and how it is used. Compile it on a folder with a title "FIRE PROTECTION SYSTEM SIGNS AND SYMBOLS".

Your work will be graded based on the **Scoring Rubrics used in Learning Task 4**

## V. ASSESSMENT (Time Frame: 20 minutes)

**FORMATIVE TEST**

**Test I: True or False**

**Direction:** Write A if the statement is correct and write B if is not. Use a separate sheet of paper.

1. There must be at least two means of exit in every residential room.
2. Exit doors must be at least 0.30 m wide.
3. Passages from sleeping rooms to exits must be at least 0.40 m wide.
4. Every sleeping room must have at least a window which can be easily opened from the inside.
5. Storm windows, screens, burglar guards must have quick opening devices.

**Test II: Classification**

**Direction:** Group each of the words from the pool below to classify them according to content, occupancy and construction type.

| | | |
|---|---|---|
| Fire Resistive<br>Heavy Timber<br>Offices | Industrial<br>Ordinary Hazard<br>Extra Hazard | Educational<br>Residential<br>Non-Combustible<br>Ordinary |

| Content | Occupancy | Construction Type |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

## VI. REFLECTION

Communicate your personal assessment as indicated in the Learner's Assessment Card.

**Personal Assessment on Learner's Level of Performance**

Using the symbols below, choose one which best describes your experience in working on each given task. Draw it in the column for Level of Performance (LP). Be guided by the descriptions below:

☆ - I was able to do/perform the task without any difficulty. The task helped me in understanding the target content/ lesson.

✓ - I was able to do/perform the task. It was quite challenging, but it still helped me in understanding the target content/lesson.

? – I was not able to do/perform the task. It was extremely difficult. I need additional enrichment activities to be able to do/perform this task.

| Learning Task | LP | Learning Task | LP | Learning Task | LP | Learning Task | LP |
|---|---|---|---|---|---|---|---|
| Number 1 | | Number 3 | | Number 5 | | Number 7 | |
| Number 2 | | Number 4 | | Number 6 | | Number 8 | |

## VII. REFERENCES

**For Scoring rubrics, Competency Based Learning Materials (CBLM)** Year 4 Module1-Sanitary and Plumbing Layout and Details –pp. 42

- Module 7 – Drafting Mechanical Layout and Details Information and Communication Technology Technical Drafting pages 391-395

| | | | |
|---|---|---|---|
| **Prepared by:** | KRIS ANNE J. SAN SEBASTIAN<br>Gov Felicisimo T San Luis Integrated SHS | **Checked/ Evaluated by:** | MIRASOL F. DASIG<br>RHODA N. MANUAL, Ed.D<br>FREDERICK B. ZAIDE<br>TLE-ICT-TD9/11-w8 |