

PLUMBING NC II TRAINING LESSON 1



SUNNY B. OJEDA, RMP
Technical Drafting / Plumbing Trainer
San Jose Del Monte National Trade School
SJDM City, Bulacan



TARGETS

- Plumbing Intro / Legal Issues (National Plumbing Code)
- Personal Protection
- Potential Work Area Safety Risks
- Important Tools
- Pipes, Fittings, & Fixtures
- 5'S (sort, systematize, sanitize, standardize, self-discipline)
- Emergency Evacuation / Mobilization Plan

HOUSE RULES

Attendance

Register attendance daily (Morning and Afternoon)
Attain 80% attendance of the required training duration

Time Management

Learning Sessions – 8:00AM to 5:00PM
Lunch Break – 12:00noon to 1:00PM

Dress Code

Be in proper attire
Wear ID at all times

Workshop Materials

Workshop materials / supplies are available with the Learning Resource Center

Documentation

Individual picture taking for ID

Action pictures – to be captured from time to time

Calls/Visitors

Refrain from leaving the session room

while the session is on going

Telephone calls / visitors must be entertained
during break time

Keep mobile phone in silent mode

Other Information

Consolidate your outputs /

training requirements for portfolio assessment

Institutional Assessment will be conducted right after
the training

National Assessment will be announce on or
before the end of the training

REMINDERS!!!

- *Come on time and do the required task immediately.*
- *Practice safety.*
- *Clean as you Go.*
- *Be considerate to others.*
- *Inform trainer / teacher if any problem occur.*
- *Do the task in an organized manner.*
- *Listen attentively to the trainer's instruction.*
- *Wear the proper PPE.*
- *Don't eat and drink inside the practical work area.*
- *Don't disassemble any peripherals inside the stations.*
- *Don't use any unnecessary gadgets and jewelries.*

Our Study & Work Areas

- **Practical work area**
- **Institutional Assessment Area**
- **Learning Resource Center**
- **Trainer's Resource Area**

INTRO & LEGAL ISSUES

What is plumbing?

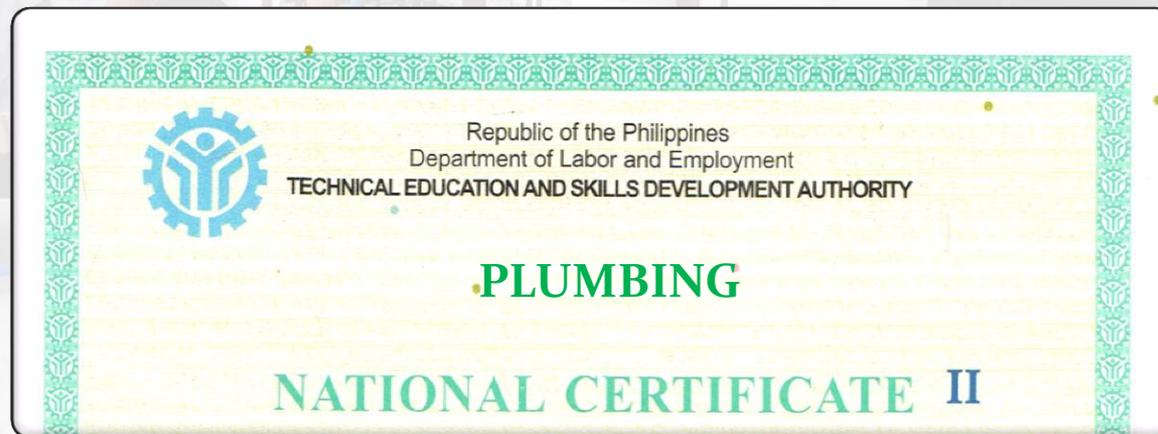
Is the art and technique of installing pipes, fixtures, and other apparatuses in buildings for bringing in the supply of liquids, substances and/or ingredients and removing waste such as water, liquid and other carried-wastes hazardous to health.

Plumbing Career Opportunities

*****PLUMBER** is a person who installs, repairs, and maintains plumbing fixtures or systems in businesses, industries or residences.

- **Apprentice Plumber**- a beginner at the trade who usually serves for 3 to 5 years as helper to a journeyman (*maybe a student with TESDA NC1 or NC2*).
- **Journeyman Plumber**- has served his apprenticeship and is competent to perform the tasks of installing and repairing plumbing system also called as plumbing foreman (with more than 5 years of experience and/or holder of *TESDA NC2 or NC3*).

- **Pipe Fitter** – a person who is competent to perform laying and fitting huge pipes. *Must be at least TESDA NC2 and/or NC3 Holder.*
- **Plumbing Fixtures & Tiles Store Owner**
- **Plumbing Supervisor / Contractor**
- **Septic Tank Siphoning Contractor**



- **Plumbing Teacher / Trainer** - is a Licensed Professional Teacher (LPT) authorized by the Professional Regulation Commission (PRC) with *plumbing technology training and at least holder of Plumbing NC2*.
- **Master Plumber** (soon to be called as Plumbing Engineer) - a person who is technically and legally qualified and licensed to practice the profession of Registered Master Plumber (RMP) without limitations in accordance with Republic Act 1378.

- Aside from the listed careers in plumbing, the trade is also associated with many different engineering careers such as:

Architectural Engineer/Architect

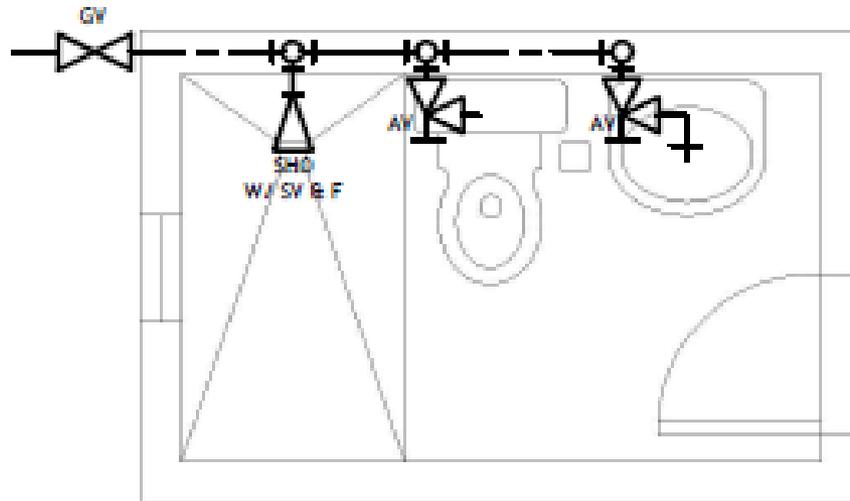
Civil Engineer & Mechanical Engineer

Electrical Engineer & Fire Protection Engineer

Safety Engineer & Sanitary Engineer

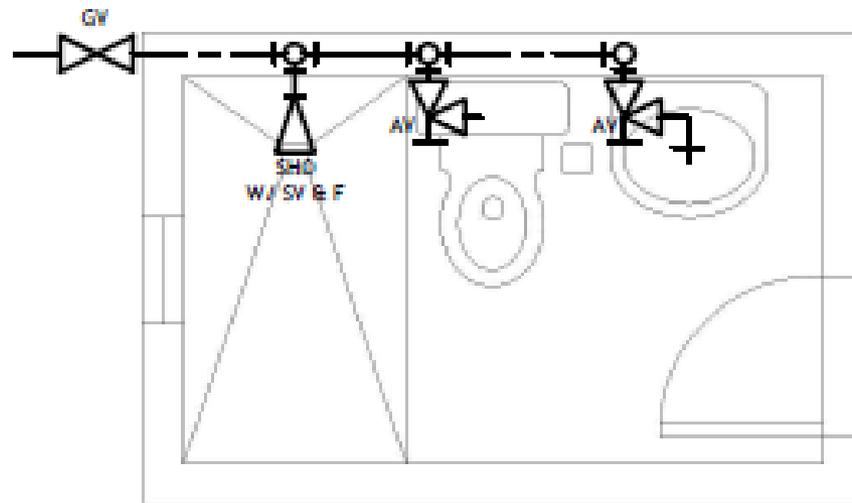
Legal Issues: Basic Principles

- **Principle No. 1** All premises intended for human habitation, occupancy or use shall be provided with a supply of **pure and wholesome water**, neither connected with unsafe water supplies nor subject to hazards of backflow or back-siphonage.



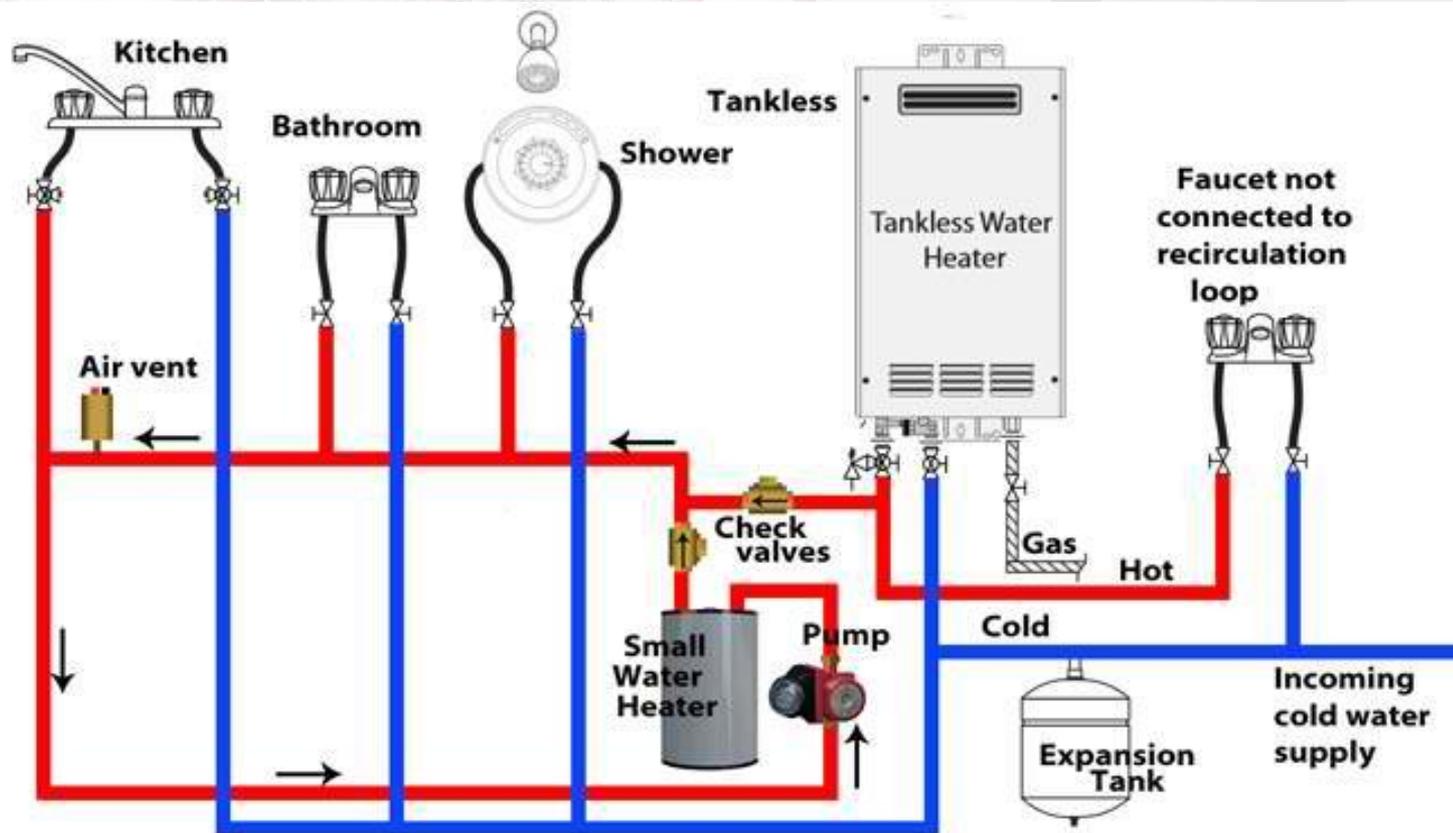
PARTIAL WATER DISTRIBUTION LAYOUT

- **Principle No. 2** Plumbing fixtures, devices and appurtenances shall be supplied with water in **sufficient volume and at pressure adequate** to enable them to function satisfactorily and without undue noise under all normal conditions of use.

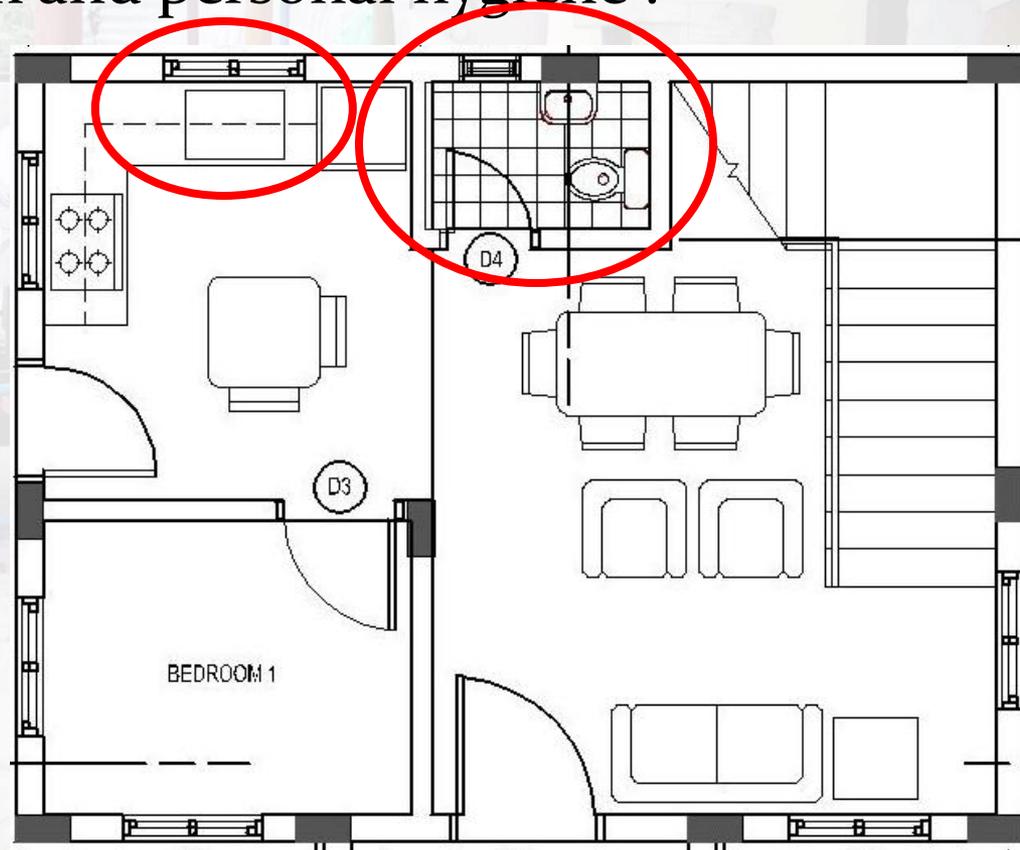


PARTIAL WATER DISTRIBUTION LAYOUT

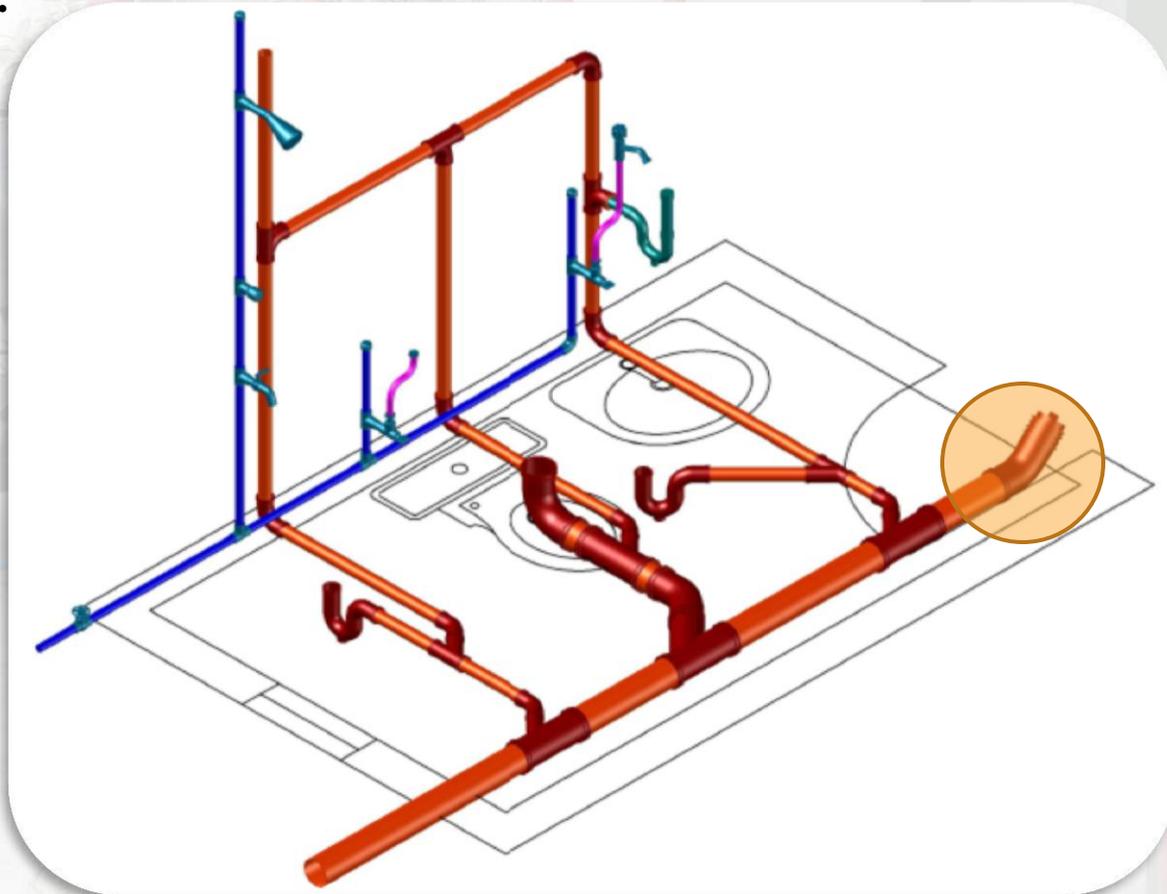
- **Principle No. 4** Devices for heating and storing water shall be so designed and installed as to **prevent dangers from explosion** through overheating.



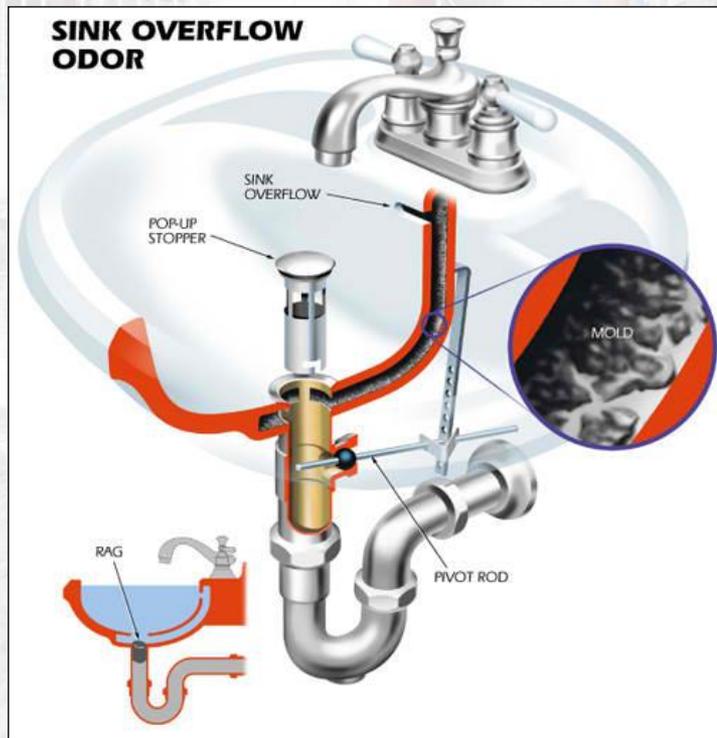
- **Principle No.6** Each family dwelling unit on premises abutting on a sewer or with a private sewage-disposal system shall have at least **one water closet and one kitchen** type sink. Further, a lavatory and bathtub or shower shall be installed to meet the basic requirements of sanitation and personal hygiene .



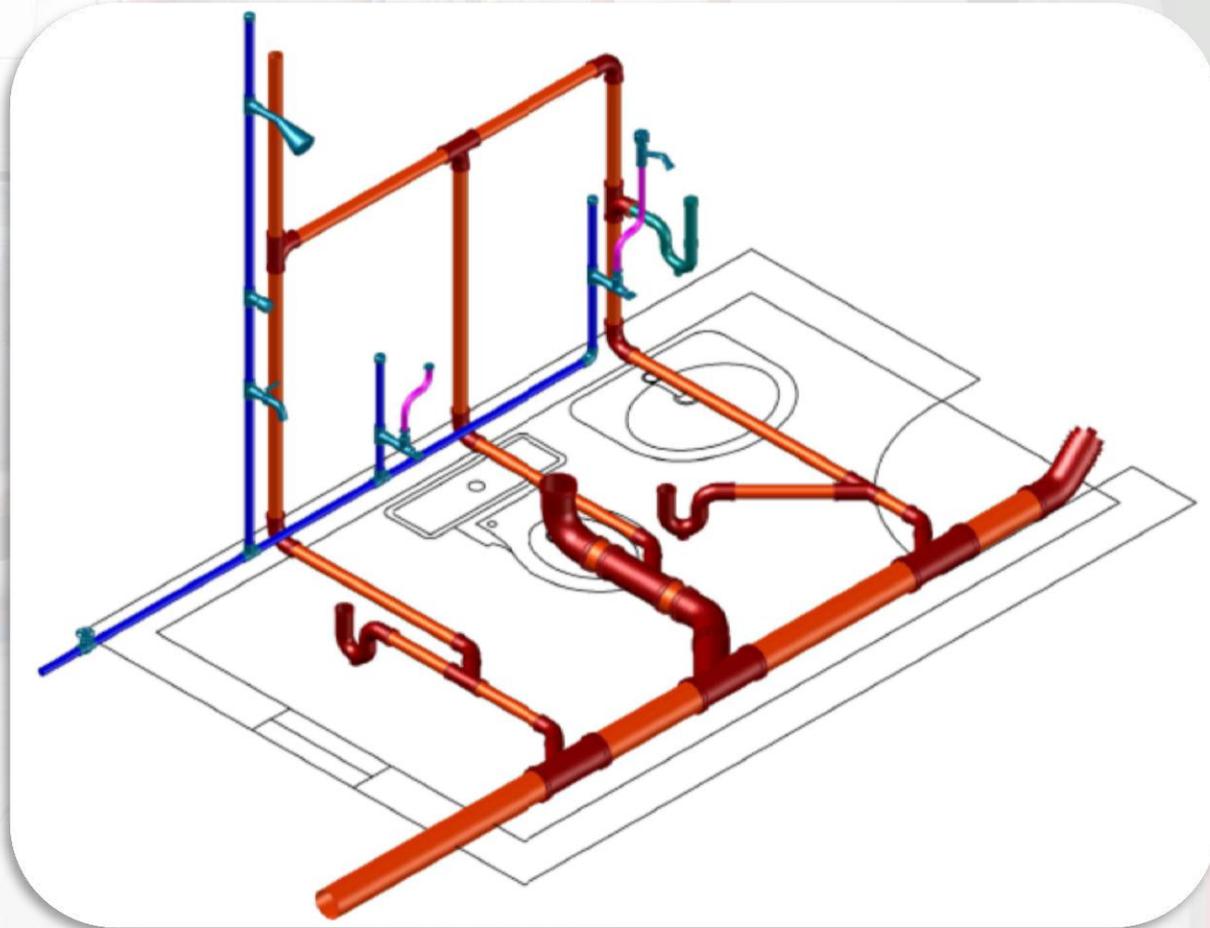
- **Principle No. 8** - The drainage system shall be designed, constructed and maintained to safeguard against **fouling, deposit of solids, clogging** and with **adequate cleanouts** so arranged that the pipes may be readily cleaned.



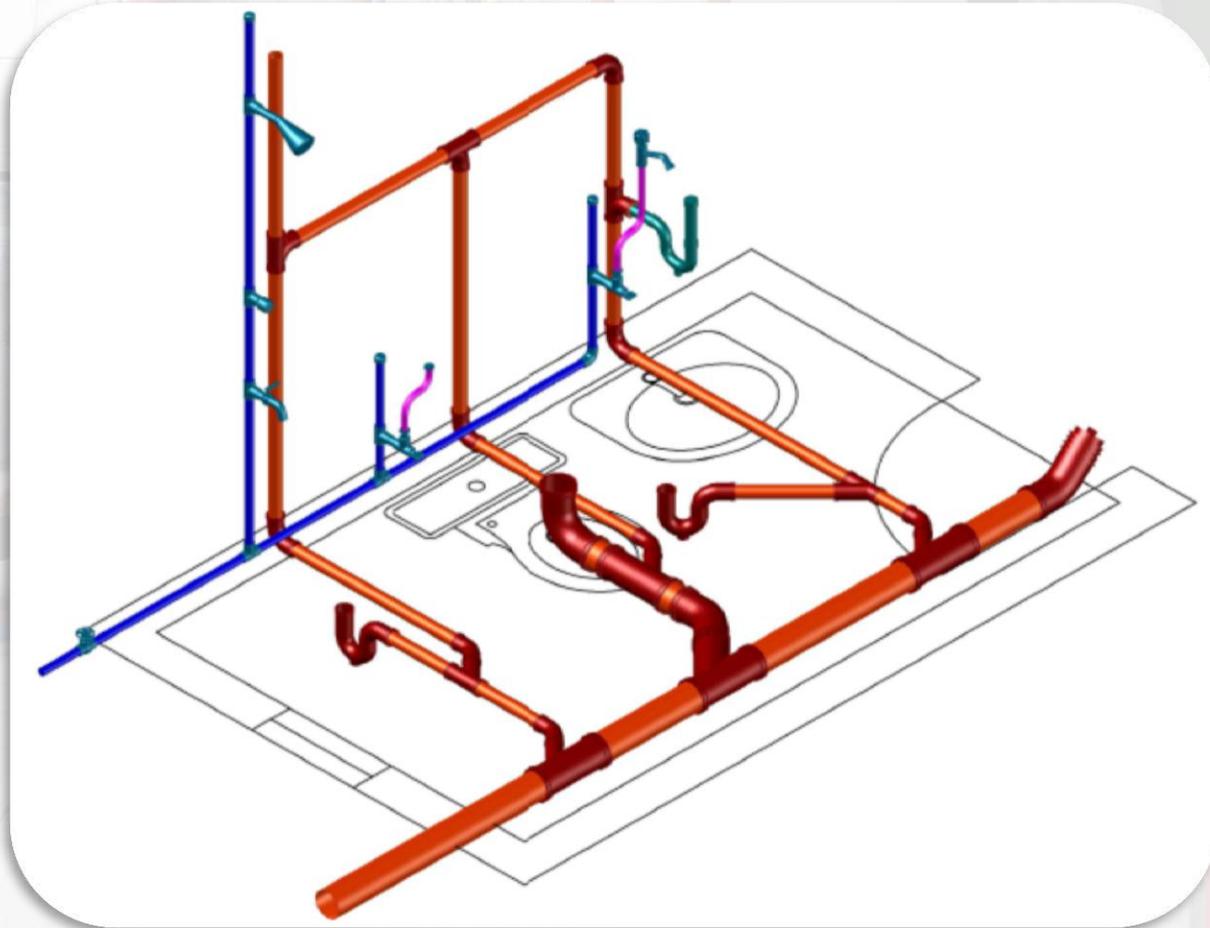
- **Principle No. 10** - Each fixture directly connected to the drainage system shall be equipped with a water-sealed trap.



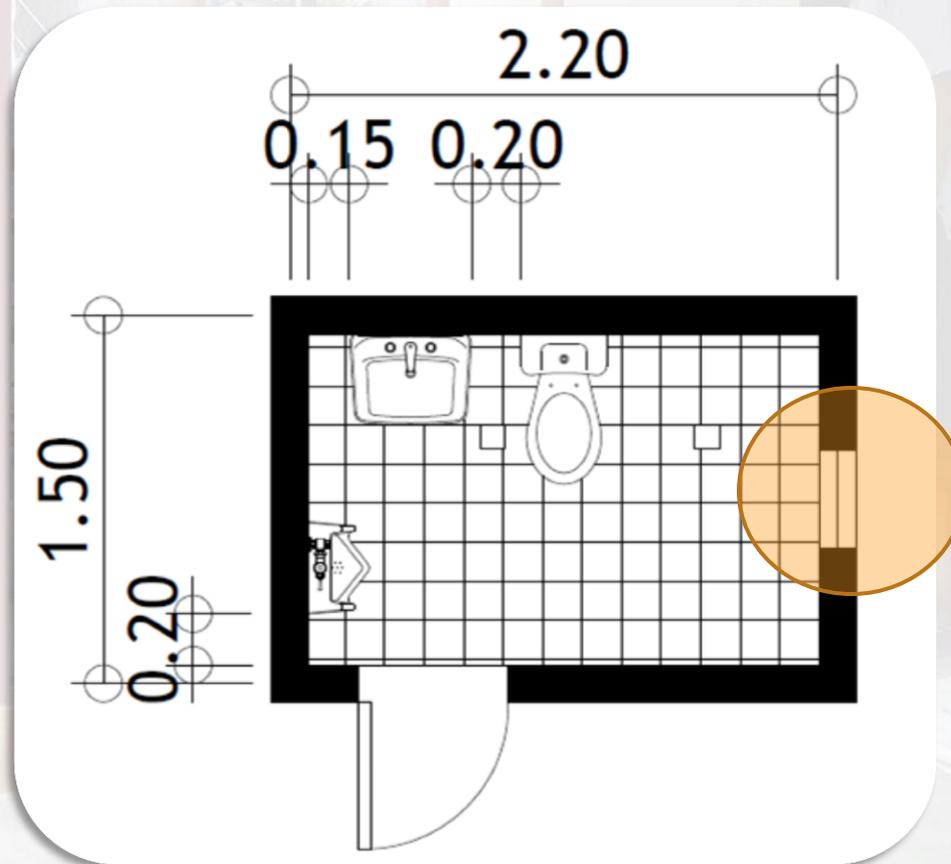
- **Principle No. 11** - The drainage piping system shall be designed to provide adequate circulation of air free from siphonage, aspiration or forcing of trap seals under ordinary use.



- **Principle No. 13** - Plumbing systems shall be subjected to such tests to effectively disclose all leaks and defects in the workmanship.



- **Principle No. 16** - No water closet shall be located in a room or compartment which is not properly lighted and ventilated.



Section 102- APPLICATION FOR PERMIT

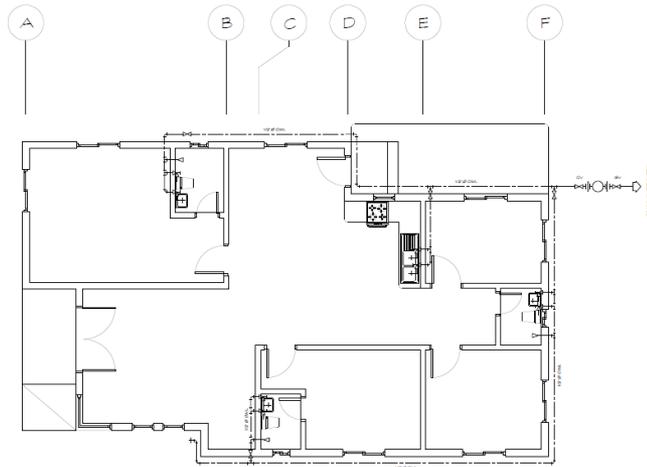
- **102 .1 Application** - A Registered and Licensed Master Plumber shall file an application at the Office of the Building Official in behalf of the building Owner for whom such work shall be done and shall fill out the forms provided for that purpose. Every application shall:
 - 102.1.1 Identify and describe the plumbing work to be covered by the permit for which an application is made;
 - 102.1.2 Describe the land upon which the proposed plumbing work is to be done, legal description, street address or similar description that will readily identify and locate the proposed building or work;

- 102.1.3 Indicate the use or occupancy for which the proposed plumbing work is intended.
- 102.1.4 Be accompanied by plan drawings, diagrams, computations, technical specifications, and other data as required in Subsection 102.2.
- 102.1.5 Give such other data and information as required by the Administrative Authority;
- 102.1.6 Be signed by Owner or permittee, who is required to submit evidence to indicate such authority; and
- 102.1.7 Be signed and sealed by the Registered and Licensed Master Plumber.

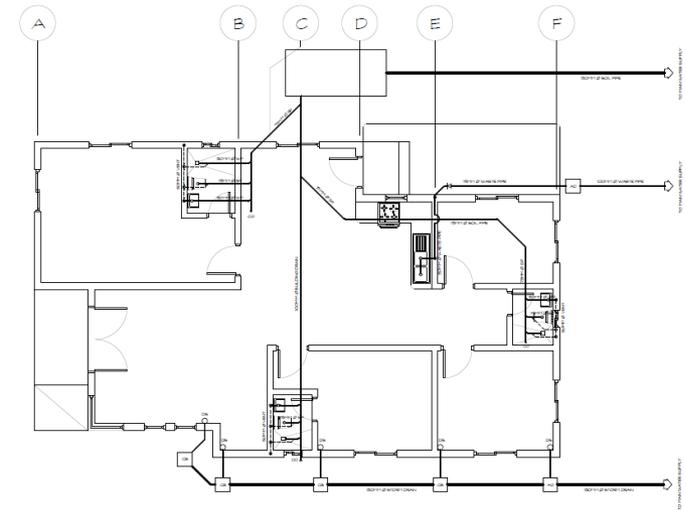
SAMPLE PLUMBING PLAN

LEGEND OF PLUMBING SYMBOLS

	CWL	COLD WATER LINE
	HWL	HOT WATER LINE
	GV	GATE VALVE NORMALLY OPEN
	GV	GATE VALVE NORMALLY CLOSED
	CV	CHECK VALVE
	LSV	LOCK SHIELD VALVE
	AV	AIR VALVE
	ASC	AIR SPRING CAP
	BV	BACKFLOW VALVE
	CV	CHECK VALVE
	PRV	PRESSURE RELIEF REDUCER VALVE
	GV	GLOBE VALVE
	BV	BALL VALVE
	BV	BUTTERFLY VALVE
	HBF	HOSE BIBB/FAUCET
	WM	WATER METER
	WSM	WATER METER SUB-WATER METER
	WB	WASH BASIN
	FV	FLOOD VALVE
	SFO	SANITARY FLOOR W/CLEAN OUT
	BUB	BUBBLER
	VAC	VENT ABOVE CEILING
	VSR	VENT STACK TO ROOFTOP
	BPCV	BACKFLOW PREVENTER/CHECK VALVE
	CO	CROSS OVER
	PU	PIPE UP
	PD	PIPE DOWN
	TEE	TEE
	WYE	WYE
	RD1/2	REDUCTION OF 1/2 B/D
	ER	ELBOW REDUCER
	RD1/8	REDUCTION OF 1/8 B/D
	LAV	LAVATORY
	WC	WATER CLOSET (TANK TYPE)
	WC	WATER CLOSET (FLUSH VALVE)
	KUS	KITCHEN SINK/UTILITY SINK
	UR	URINAL
	SH	SHOWER HEAD
	EW	ELECTRIC WATER HEATER
	PU	PUMP
	DTJ	DRAIN/TRAP JUNCTION BOX
	LD	LAUNDRY DRAIN/PLUMBERS BOX DRAIN
	SD	SILL DRAIN/BUTTER DRAIN/DOOR DRAIN
	FD	FLOOR DRAIN/OVER DRAIN
	AD/CB	AREA DRAIN/CATCH BASIN
	RD	RECESS DRAIN
	FD	FLOOR DRAIN



WATER DISTRIBUTION LAYOUT
SCALE: 1/8"



STORM AND SANITARY LAYOUT
SCALE: 1/8"

MASTER PLUMBER / PLUMBING ENGINEER:	PROJECT TITLE:	OWNER:	CAD BY:	REVISIONS:	SHEET CONTENTS:	SHEET NO.:
SUNNY B. OJEDA	A PROPOSED BUNGALOW TYPE RESIDENCE	MR. & MRS. GUILLERMO M. MONTERO JR.	BRUN		WATER DISTRIBUTION LAYOUT STORM & SANITARY LAYOUT LEGEND OF PLUMBING SYMBOLS	PL-01
PRC / REG NO. 008226			DESIGNED BY: BRD 326			
DATE OF EXPIRATION: 11/01/2019			CHECKED BY: ARCH. B. OJEDA			
PTR NO.:	LOCATION: BRGY. CALAMPTAO, MAGA-AO, ILOILO					
DATE:						
PLACE: CITY OF SAN JOSE DEL MONTE						

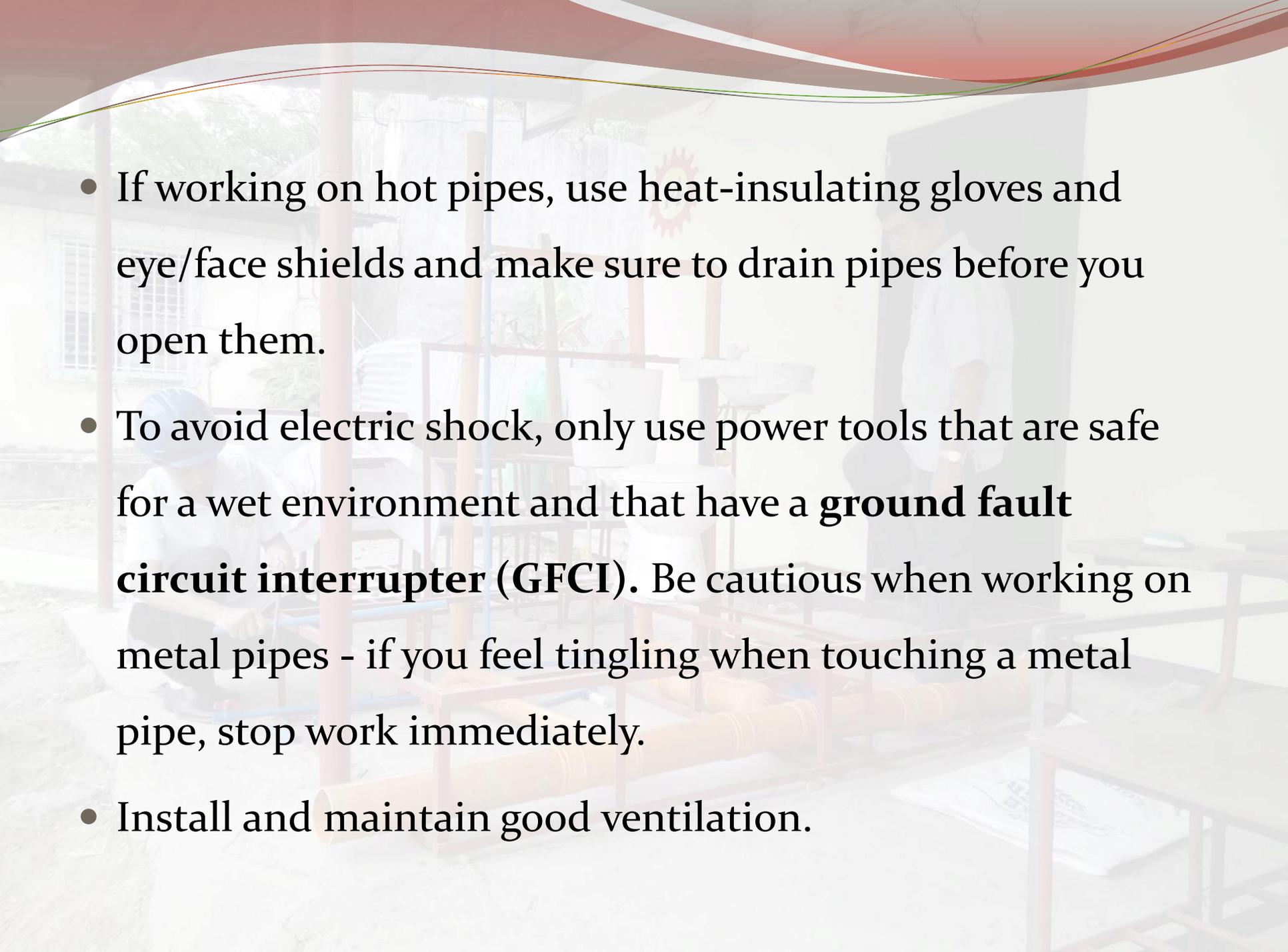
- **102.2 Plans and Specifications** - All plumbing plans, drawings, diagrams, design analyses/computations as required, technical specifications, bills of materials and other required documents for all types of occupancy shall be prepared, signed and sealed by a Registered and Licensed Master Plumber, without limitations, pursuant to Republic Act 1378, as amended. and shall be submitted in **six (6) sets** of the aforementioned requirements with each application for a permit.

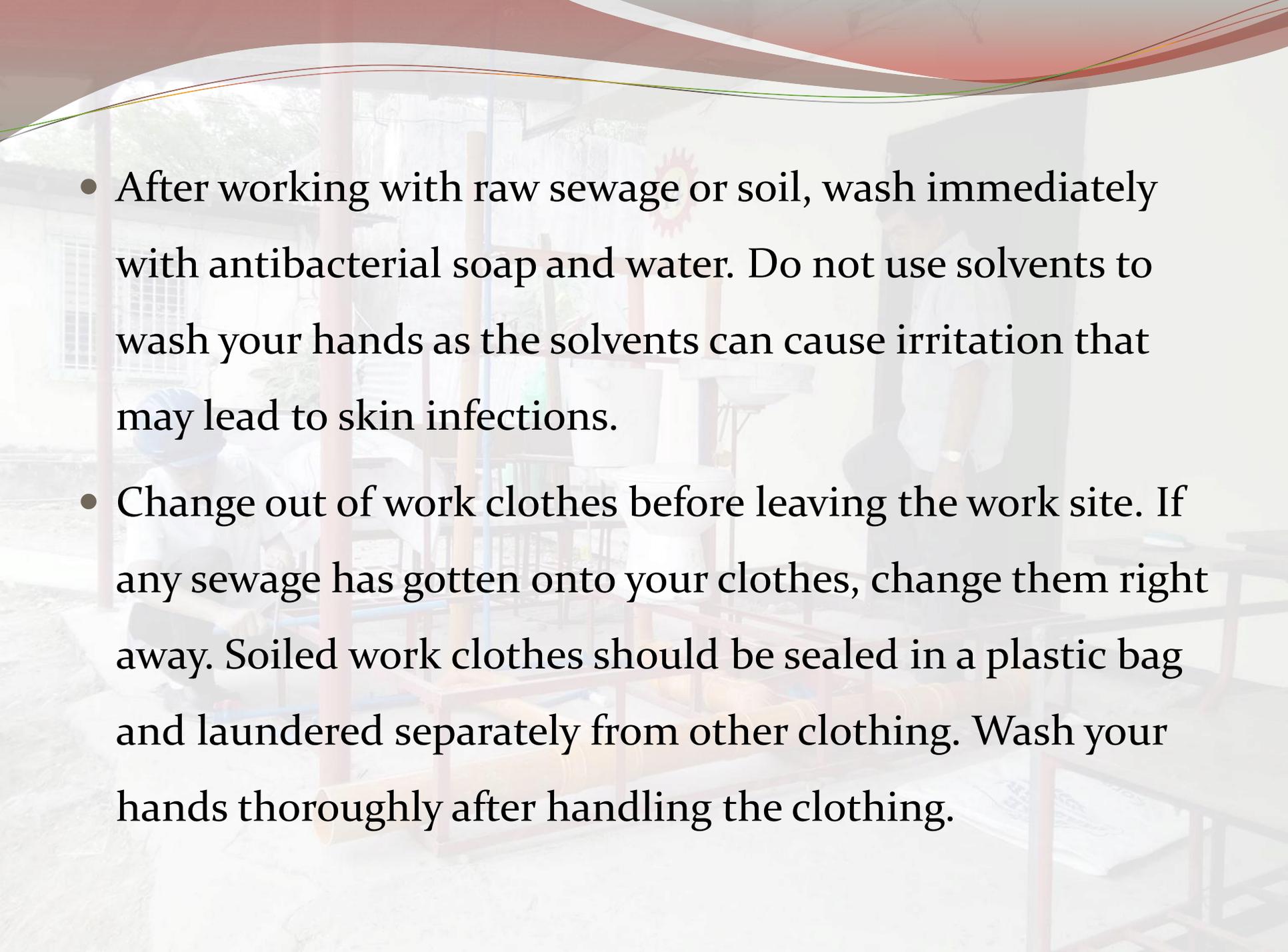
- **103.2 Retention of Plans** - One set of approved plans, specifications, computations and related data shall be retained by the Administrative Authority. **Two (2) sets of approved plans, specifications and data shall be returned to the applicant and Owner, one (1) set of which shall be kept at the jobsite at all times while the work is in progress.**

- **103.4 Expiration** - A plumbing permit issued under the provisions of this Code shall expire and become null and void if the plumbing work authorized therein **not commenced within one year from the date of such permit or abandoned at any time after having been commenced for a period of 120 days.** In case of renewal of a plumbing permit, a fee equivalent to **one-half the amount of the original fee** shall be paid.

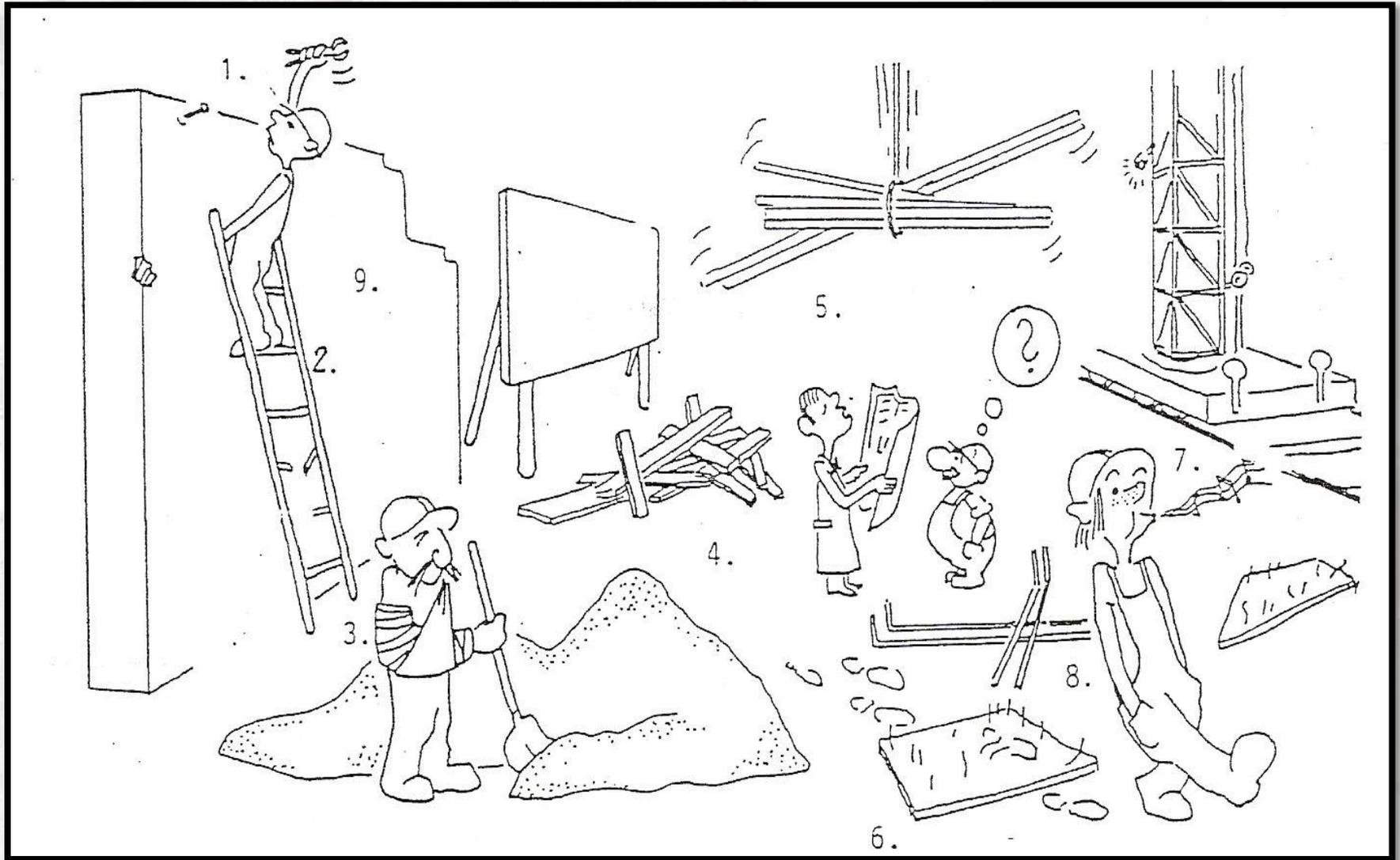
PERSONAL PROTECTION

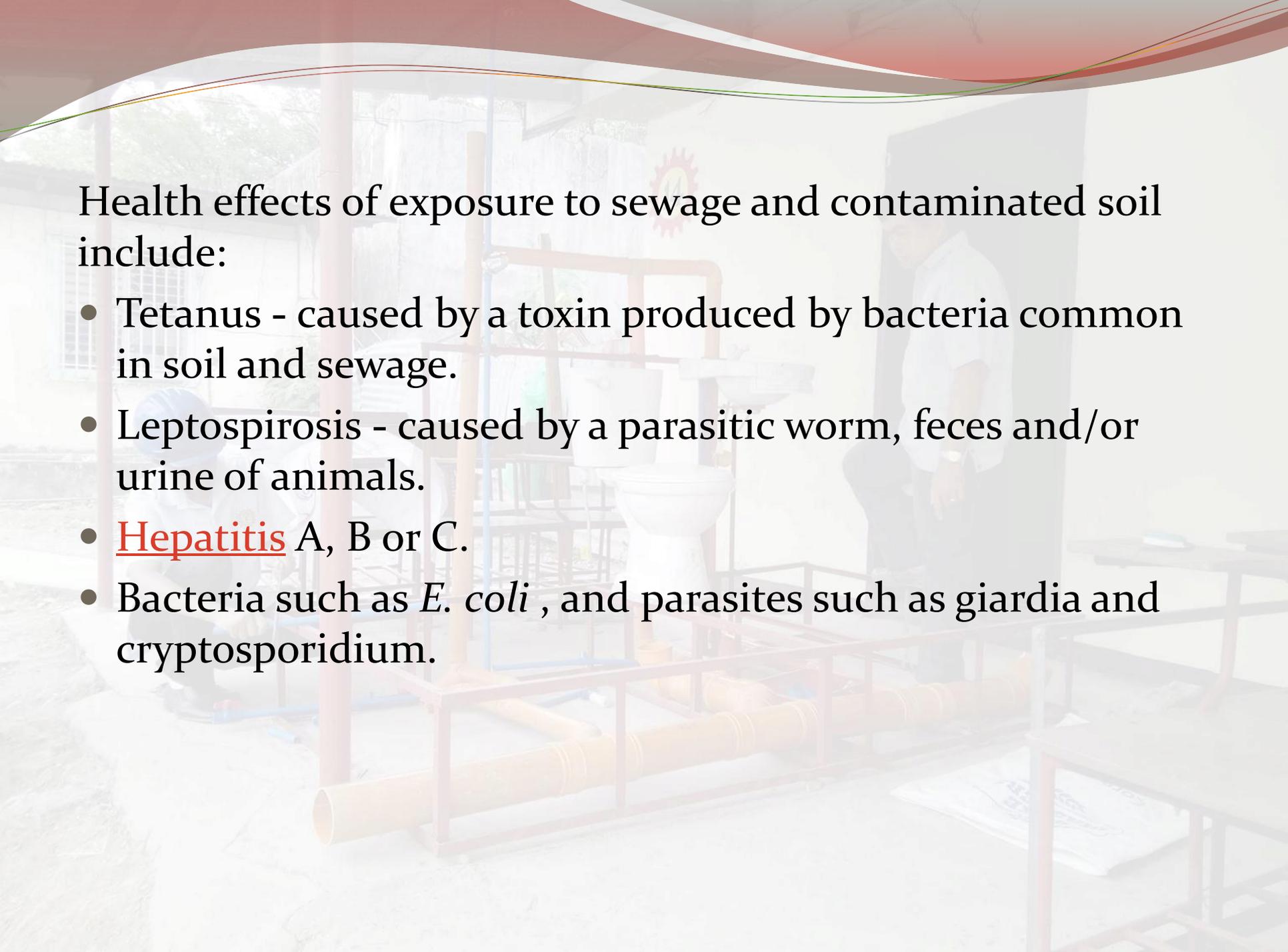
- Use fall protection and other precautions when working at heights.
- Use eye protection when cutting or grinding to avoid eye injuries from flying particles.
- Use appropriate personal protective equipment for the task (e.g. hard hats, eye protection, face protection).
- Wear appropriate footwear (sturdy shoe with a protective toe box and a non-slip sole)

- 
- The background of the slide is a faded image of a classroom. In the foreground, there are several wooden desks with papers on them. In the middle ground, a teacher in a white shirt is standing and talking to a group of students. One student in the foreground is wearing a blue hard hat and a white shirt, looking towards the teacher. The classroom has large windows on the left side, and a red gear-shaped logo is visible on the wall in the background.
- If working on hot pipes, use heat-insulating gloves and eye/face shields and make sure to drain pipes before you open them.
 - To avoid electric shock, only use power tools that are safe for a wet environment and that have a **ground fault circuit interrupter (GFCI)**. Be cautious when working on metal pipes - if you feel tingling when touching a metal pipe, stop work immediately.
 - Install and maintain good ventilation.

- 
- After working with raw sewage or soil, wash immediately with antibacterial soap and water. Do not use solvents to wash your hands as the solvents can cause irritation that may lead to skin infections.
 - Change out of work clothes before leaving the work site. If any sewage has gotten onto your clothes, change them right away. Soiled work clothes should be sealed in a plastic bag and laundered separately from other clothing. Wash your hands thoroughly after handling the clothing.

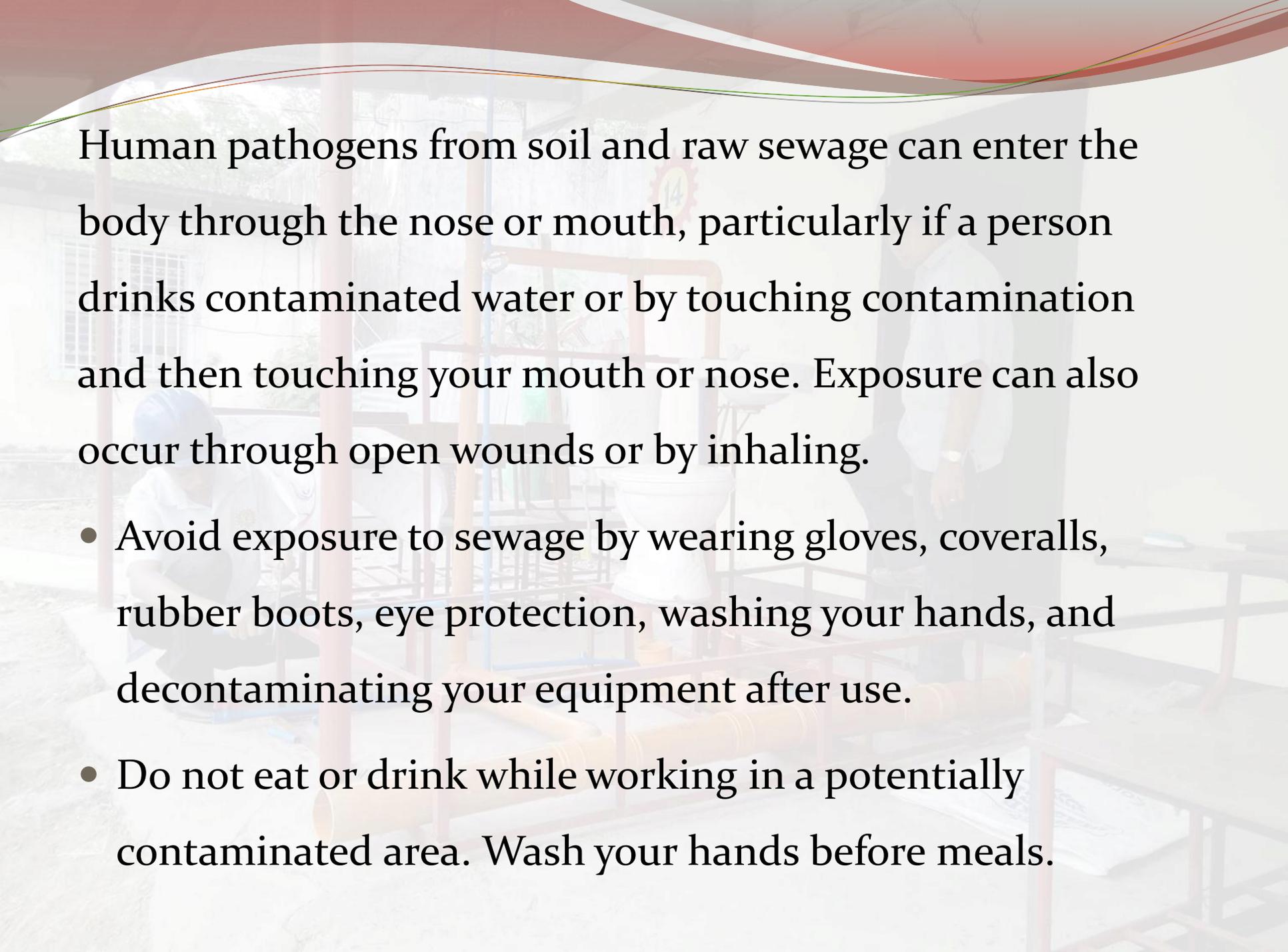
Potential Work Area Safety Risks





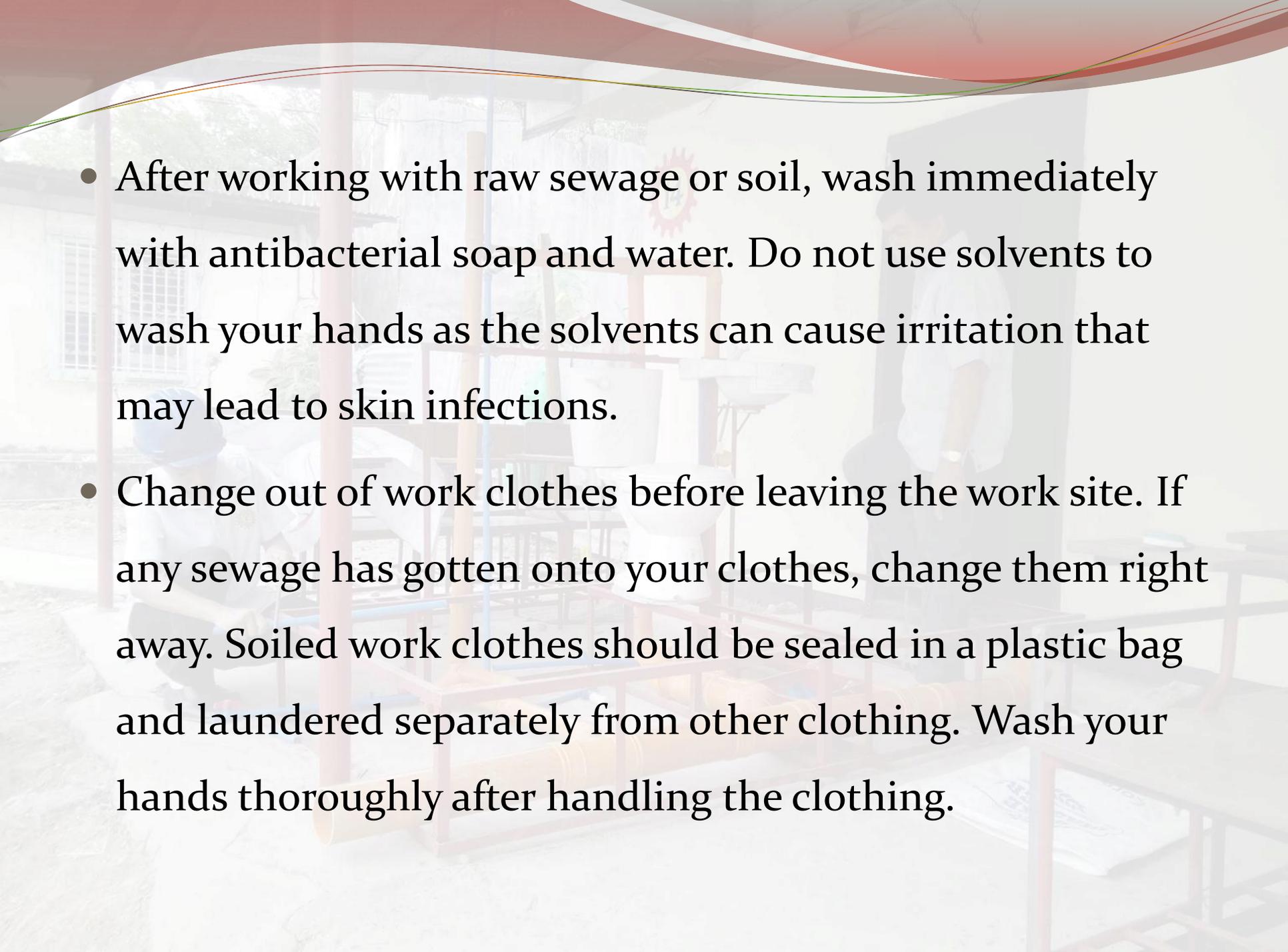
Health effects of exposure to sewage and contaminated soil include:

- Tetanus - caused by a toxin produced by bacteria common in soil and sewage.
- Leptospirosis - caused by a parasitic worm, feces and/or urine of animals.
- Hepatitis A, B or C.
- Bacteria such as *E. coli* , and parasites such as giardia and cryptosporidium.



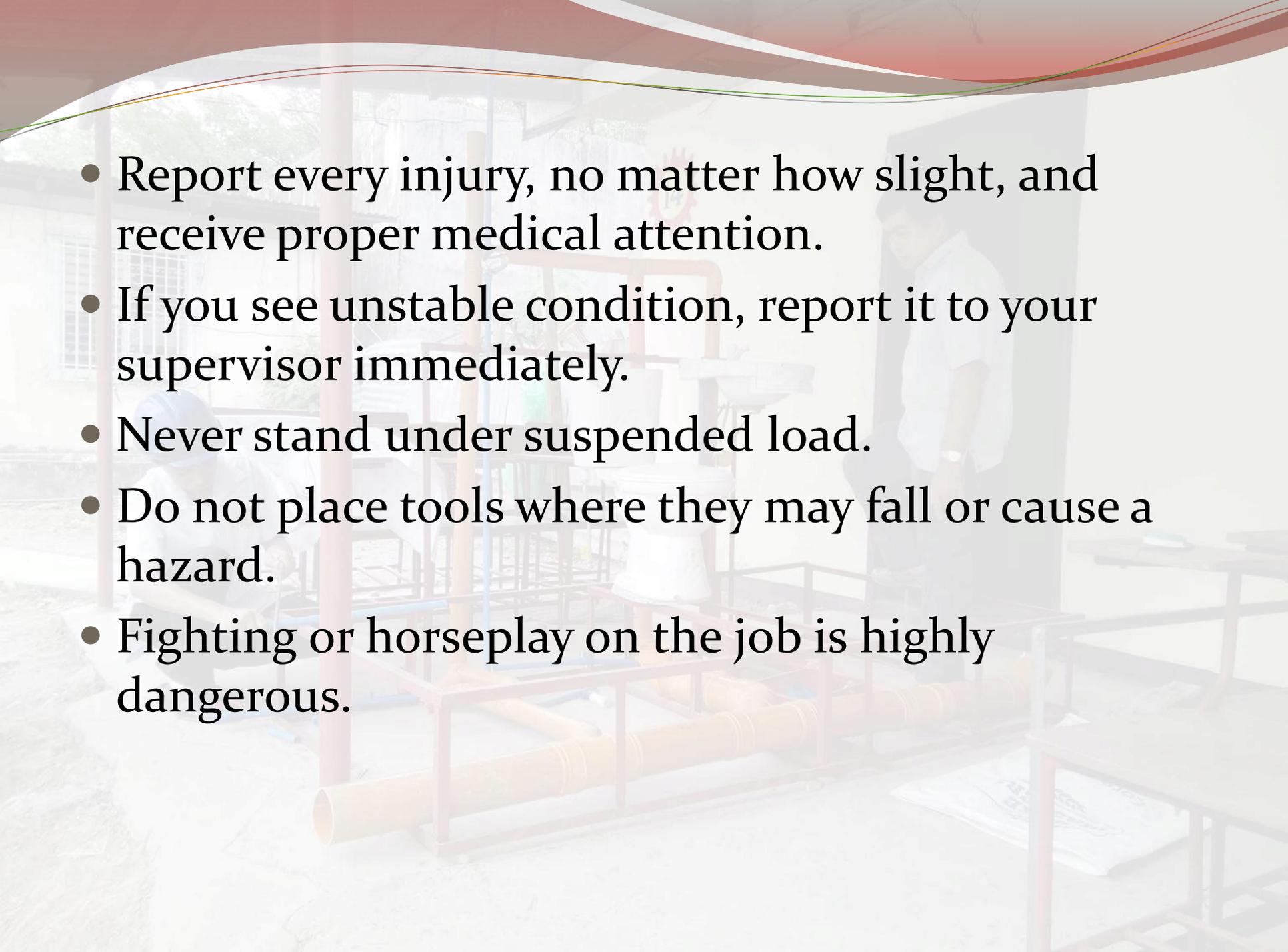
Human pathogens from soil and raw sewage can enter the body through the nose or mouth, particularly if a person drinks contaminated water or by touching contamination and then touching your mouth or nose. Exposure can also occur through open wounds or by inhaling.

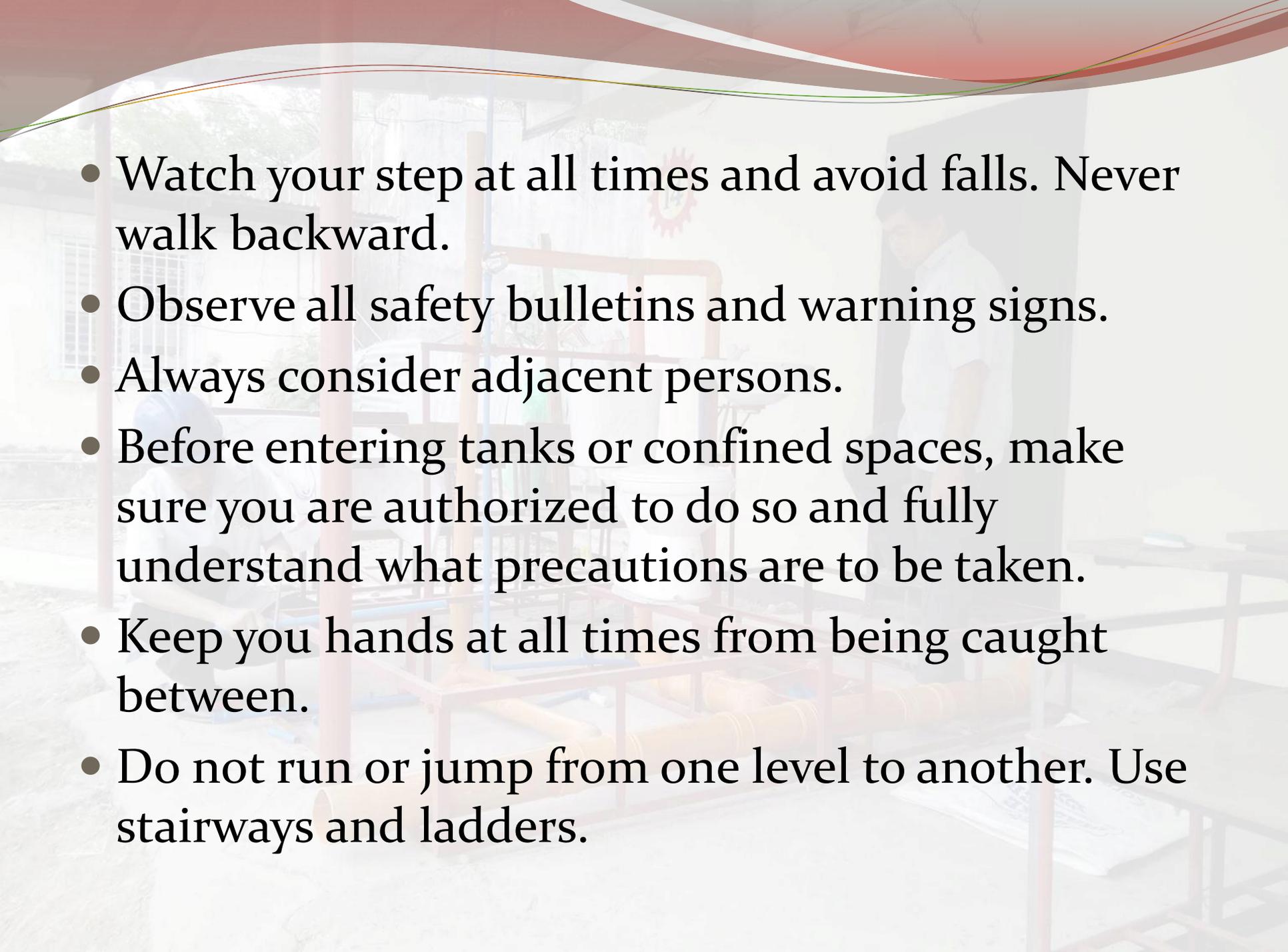
- Avoid exposure to sewage by wearing gloves, coveralls, rubber boots, eye protection, washing your hands, and decontaminating your equipment after use.
- Do not eat or drink while working in a potentially contaminated area. Wash your hands before meals.

- 
- The background of the slide is a faded image of a laboratory or classroom. A person in a white lab coat is visible in the background, standing near a workstation. There are various pieces of equipment, including what looks like a sink and some shelving. The overall scene is brightly lit, suggesting an indoor environment with large windows.
- After working with raw sewage or soil, wash immediately with antibacterial soap and water. Do not use solvents to wash your hands as the solvents can cause irritation that may lead to skin infections.
 - Change out of work clothes before leaving the work site. If any sewage has gotten onto your clothes, change them right away. Soiled work clothes should be sealed in a plastic bag and laundered separately from other clothing. Wash your hands thoroughly after handling the clothing.

GENERAL PRACTICES FOR SAFETY

- Most injuries can be prevented using good judgment and being always alert.
- Know your job. If in doubt about any part of your work. Ask your supervisor.
- Do not use unsafe methods and thus take chances.
- Should you have a physical handicap or illness such as diabetes, hernia, or impaired hearing, inform your supervisor so that you will not be assigned to work where you may injure yourself or cause injury to others.

- 
- Report every injury, no matter how slight, and receive proper medical attention.
 - If you see unstable condition, report it to your supervisor immediately.
 - Never stand under suspended load.
 - Do not place tools where they may fall or cause a hazard.
 - Fighting or horseplay on the job is highly dangerous.

- 
- Watch your step at all times and avoid falls. Never walk backward.
 - Observe all safety bulletins and warning signs.
 - Always consider adjacent persons.
 - Before entering tanks or confined spaces, make sure you are authorized to do so and fully understand what precautions are to be taken.
 - Keep your hands at all times from being caught between.
 - Do not run or jump from one level to another. Use stairways and ladders.

PRINCIPLES OF LIFTING

- Utilizing the strong leg muscles for lifting rather than the weaker muscles of the back.
- Using the momentum of the body weight to start horizontal movement.
 - Back straight
 - Correct hold
 - Correct position of feet
 - Position of arm
 - Position of head
 - Use of body weight

TOOLS

PIPE WRENCH



Also known as a monkey wrench or 'bobbejaan spanner'. It is best to have two pipe wrenches in your toolbox when doing DIY plumbing. However, do not use them on nuts as you will damage them. The wrenches are designed for firmly gripping couplings and thick-walled pipes.

SHIFTING SPANNER



Also known as an adjustable wrench. The jaws are flat and can be used on nuts and bolts as well as copper compression fittings.

BASIN WRENCH



Also known as a sink wrench, the jaws are perpendicular to the handle. Designed for use in awkward or small spaces.

SLIP-JOINT PLIERS



Also known as water-pump pliers, the slip-joint pivot of these allows for a wider range of sizes to be gripped.

IMPORTANT TOOLS FOR PLUMBER

Plastic Pipe Cutter

Pipe Wrench 10" & 14" and Water Pump Plier

Bench Vise / Pipe or Yoke Vise

Adjustable Wrench & Basin Wrench

Vice Grip

Hack saw (Lagareng Pangbakal)

Trowel

Screw Drivers & Pliers

Pull Push Rule (Metro)

Claw (Martilyo) and Sledge (Maso) Hammer

Spirit Level and Pressure Gauge

Crow Bar (Kabra) and Pick Mattock (Piko)

Drill , Grinder, and Fusion Machine

Pipe Threader (Rigid) for 1/2" and 3/4" G.I. Pipes





❑ PIPE LEAK TESTING EQUIPMENT & MTLs

- ❖ Infra Red Camera
- ❖ Radio Detection
- ❖ Pressure Test Kit
- ❖ Pressure Test Pump
- ❖ Dye Technique
- ❖ Liquid Soap Technique



PIPES, FITTINGS, & FIXTURES

MOLPEX BLUE

Guaranteed **safe** and **clean** potable
water piping system



Pipe 32 mm



Pipe 25mm



Pipe 20mm



Reducer
25mm x 20mm



FTA 20mm



MTA 20mm



Elbow 20mm



Tee 20mm



Socket 20 mm



MOLPEX
PRODUCTS INC.



MOLDEX

HOT AND COLD

WATER PIPING SYSTEM

Polypropylene Random, Type 3



Reducer 25mm x 20mm



Pipe 32mm



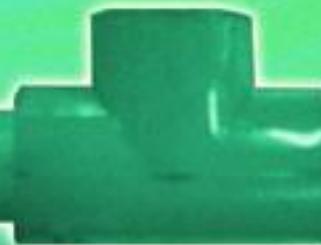
Pipe 25mm



Pipe 20mm



Elbow 90 x 20mm



Equal Tee 20mm



Socket 20mm



PEX Piping
(Cross-linked Polyethylene)

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20	82	82	50	250
25	97	97	30	150
32	106	106	20	100
50	160	160	8	40
63	220	220	5	25

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20x1/2"	78	66	50	300
25x1/2"	92	73	50	250
25x3/4"	92	73	50	250
32x3/4"	96	84	30	150
32x1"	101	84	30	150

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20x1/2"	73	66	50	300
20x3/4"	73	66	50	300
25x1/2"	75	73	50	250
25x3/4"	75	73	50	250
25x1"	75	73	50	250
32x3/4"	91	85	30	150
32x1"	95	85	30	150

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20	81	116	30	150
25	96	133	20	100
32	106	144	15	60
50	160	215	5	25
63	195	270	3	15

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
25x20	80	136	20	100
32x20	101	137	15	75
32x25	106	137	15	75

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20x1/2"	67	117	30	180
20x3/4"	67	117	30	180
25x1/2"	73	133	20	120
25x3/4"	73	133	20	120
32x3/4"	83	137	15	90
32x1"	83	137	15	90



Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20	46	86	50	250
25	54	102	30	180
32	64	113	20	120
50	90	165	10	50
63	110	200	6	30

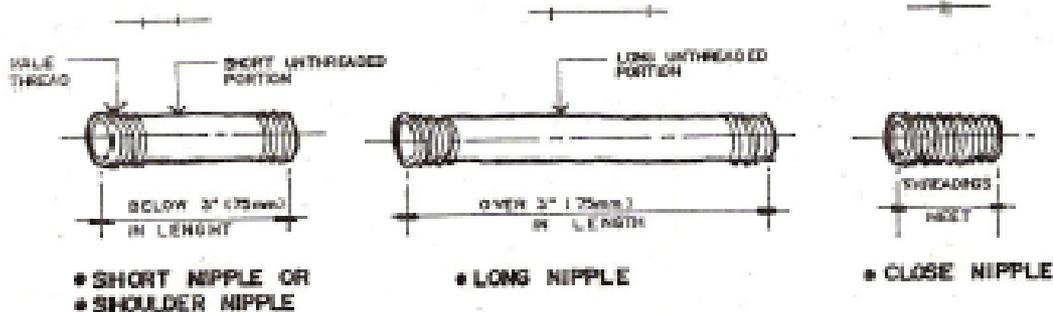
Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20x1/2"	46	66	100	400
25x1/2"	54	73	80	320
25x3/4"	54	73	80	320
32x3/4"	64	80	30	180
32x1"	64	80	30	180
50x1/2"	90	115	15	60
63x2"	110	130	8	40

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20x1/2"	46	72	100	500
20x3/4"	46	72	100	500
25x1/2"	54	75	50	300
25x3/4"	54	75	50	300
25x1"	54	75	50	300
32x3/4"	64	78	40	200
32x1"	64	78	40	200
50x1/2"	90	110	20	80
63x2"	110	130	10	50

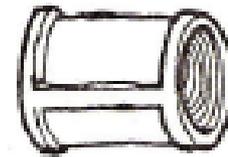
Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
25x20	54	96	50	200
32x20	64	100	30	150
32x25	64	108	30	150

Size(mm)	a (mm)	b (mm)	Pcs/ Pack	Pcs/ Bag
20x1/2"	65	117	30	180
20x3/4"	65	117	30	180
25x1/2"	72	133	20	120
25x3/4"	72	133	20	120
25x1"	72	133	20	120
32x3/4"	75	137	15	90
32x1"	75	137	15	90

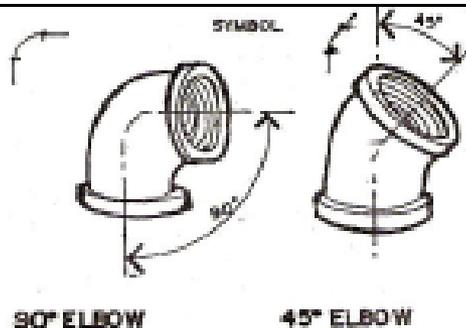




NIPPLE- a short piece of pipe, threaded on the outside (male threads) at both ends, used to join couplings or other fittings.

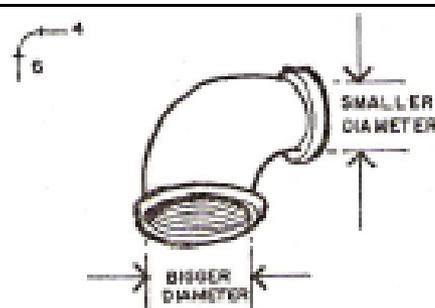


COUPLING- a short internally threaded (female thread) at both ends and used to connect two pipes in a straight line.

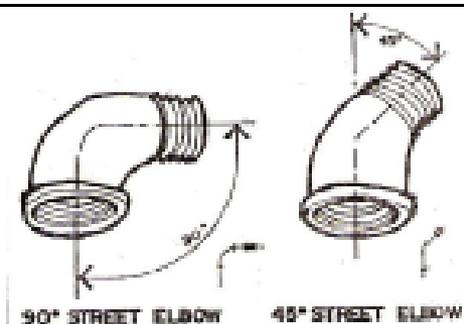


ELBOW- a pipe fitting having a bend and makes an angle between adjacent pipes for a change in direction.

Also know as ELL

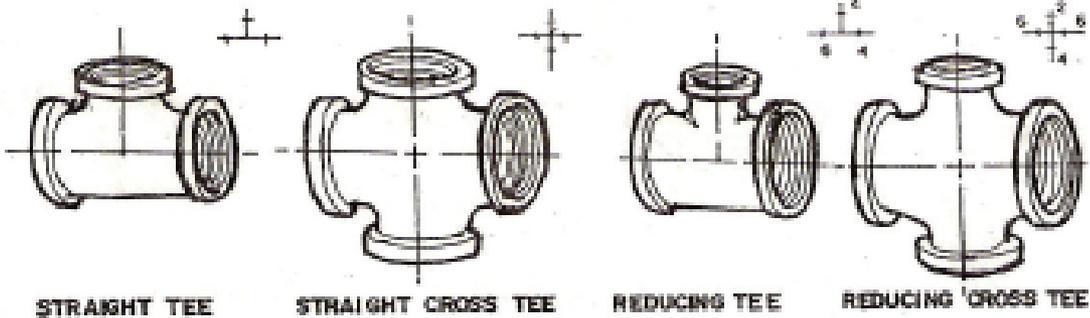


REDUCING ELBOW- joins two pipes of different diameters at right angle of each other. When specifying reducer fittings the bigger is stated first, followed by the smaller diameter.
(example: reducing elbow 25mm x 20 mm)

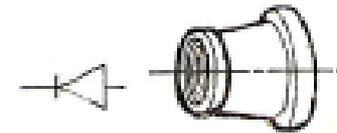


STREET ELBOW- a pipe fitting having 45° and 90° bend with an inside thread on one end and an outside thread on the other.

It is also known as **SERVICE ELL** or **STREET ELL**

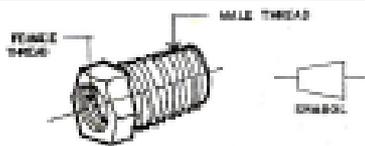


TEE- a t-shaped pipe fitting that joins 3 or 4 pipes at perpendicular directions.

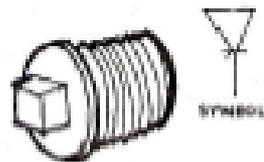


REDUCER- a pipe coupling, with inside threads, having one end with smaller diameter than the other and used for connecting pipes of different size.

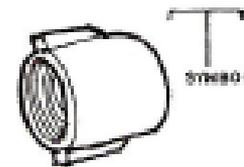
Both openings have the same center line.



BUSHING- a pipe fitting which is threaded on both the inside and the outside and used to reduce the size of the pipe opening to receive a pipe or fitting of a different size



PLUG- is used to close an opening in a fitting.



CAP- is used to close the end of a pipe

PIPE SIZE

- 6mm (1/4")
- 9mm (3/8")
- 12mm (1/2")
- 19mm (3/4")
- 25mm (1")
- 32 mm (1 1/4")
- 37mm (1 1/2")
- 50mm (2")

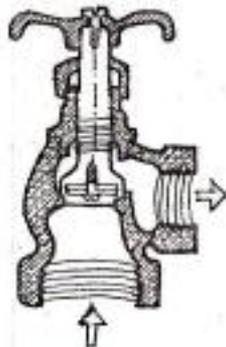


UNION- a three piece pipe fitting used to connect the ends of two pipes, neither of which can be turned. It is also used on pipes that are to be taken down Occasionally.



FLANGE- a ring shaped plate screwed on the end of a pipe and provided with holes for bolts; to allow joining the pipe to a similarly equipped adjoining pipe.

The resulting joint is a flanged joint.

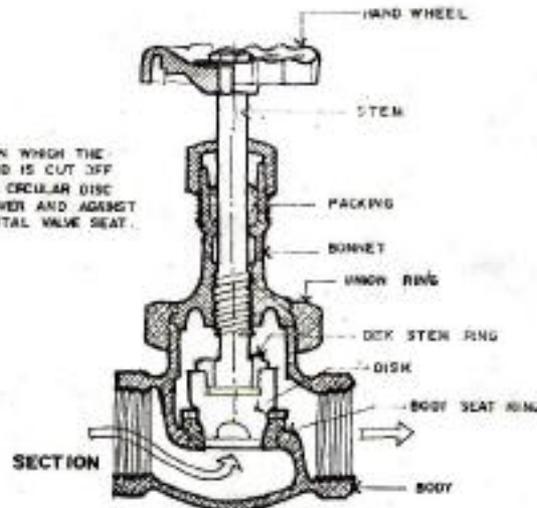


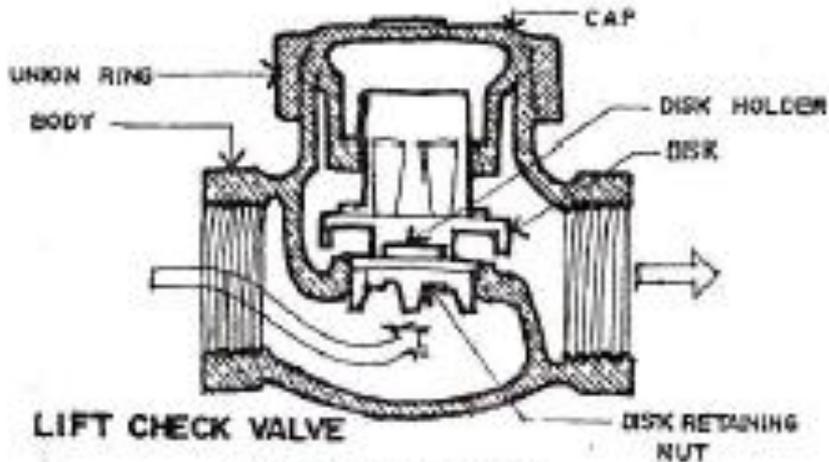
ANGLE VALVE



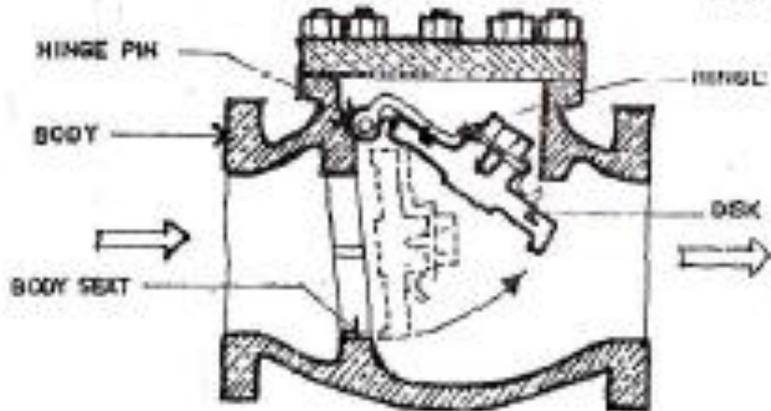
GLOBE VALVE

A VALVE IN WHICH THE FLOW OF FLUID IS CUT OFF BY MEANS OF CIRCULAR DISC THAT FITS OVER AND AGAINST THE HORIZONTAL VALVE SEAT.

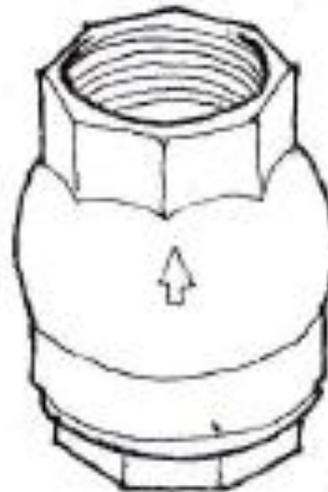




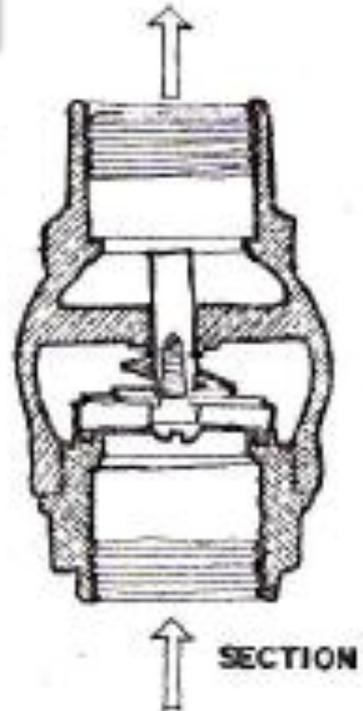
LIFT CHECK VALVE



SWING CHECK VALVE



SPRING - LOADED CHECK VALVE



CHECK VALVES

A VALVE THAT AUTOMATICALLY CLOSURE TO PREVENT THE FLOW OF LIQUID OR GAS IN A REVERSE DIRECTION.

SANILINE SEWERLINE SANIGUARD SEWERGUARD







Installation of a new customer water service line.



5'S (sort, systematize, sanitize, standardize, self- discipline)

The 5 Steps are as follows:

- **Sort:** Sort out & separate that which is needed & not needed in the area.
- **Systematize:** Arrange items that are needed so that they are ready & easy to use. Clearly identify locations for all items so that anyone can find them & return them once the task is completed.
- **Sanitize:** Clean the workplace & equipment on a regular basis in order to maintain standards & identify defects.
- **Standardize:** Revisit the first three of the 5S on a frequent basis and confirm the condition of the Gemba using standard procedures.
- **Self-discipline:** Keep to the rules to maintain the standard & continue to improve every day.

Reporting

Safety

Loss

Training and
Procedures

Emergency Evacuation

Elements of an Evacuation

1. Conditions for evacuation or shelter-in-place;
2. Clear chain of command;
3. Specific evacuation procedures, including routes & exits;
4. A system for accounting for people after evacuation;
5. Designation of employees that will perform critical duties during an evacuation; and
6. Procedures for assisting people with disabilities.