

052-12K-1062
Rough In a Gravity Flow Waste System
Status: Approved

Distribution Restriction: Approved for public release; distribution is unlimited.

Destruction Notice: None

Foreign Disclosure: FD1 - This training product has been reviewed by the training developers in coordination with the Fort Leonard Wood, MO foreign disclosure officer. This training product can be used to instruct international military students from all approved countries without restrictions.

Conditions: Given a mission to Rough in a gravity flow waste system, a structure with a service entrance water pipe, an excavated trench from the structure to the main sewer line, construction prints or field prints, specifications, complete Bill Of Materials (BOM), pipe fitters tool kit 2 1/2 to 4 inch, pipe-fitters tool kit 1/8 to 2 inch, carpenters squad level tool kit, pioneer engineer squad tool kit, special tools, goggles/safety glasses, gloves and appropriate doctrine. This task should not be trained in MOPP 4.

Standards: Rough in a gravity flow waste system according to the construction or field prints and specifications, without leaks when tested IAW doctrine and without damage to equipment, the environment or injury to personnel.

Special Conditions: None

Safety Risk: Medium

MOPP 4: Never

Task Statements

Cue: Soldier has been given a mission to rough in a waste system.

DANGER

None

WARNING

None

CAUTION

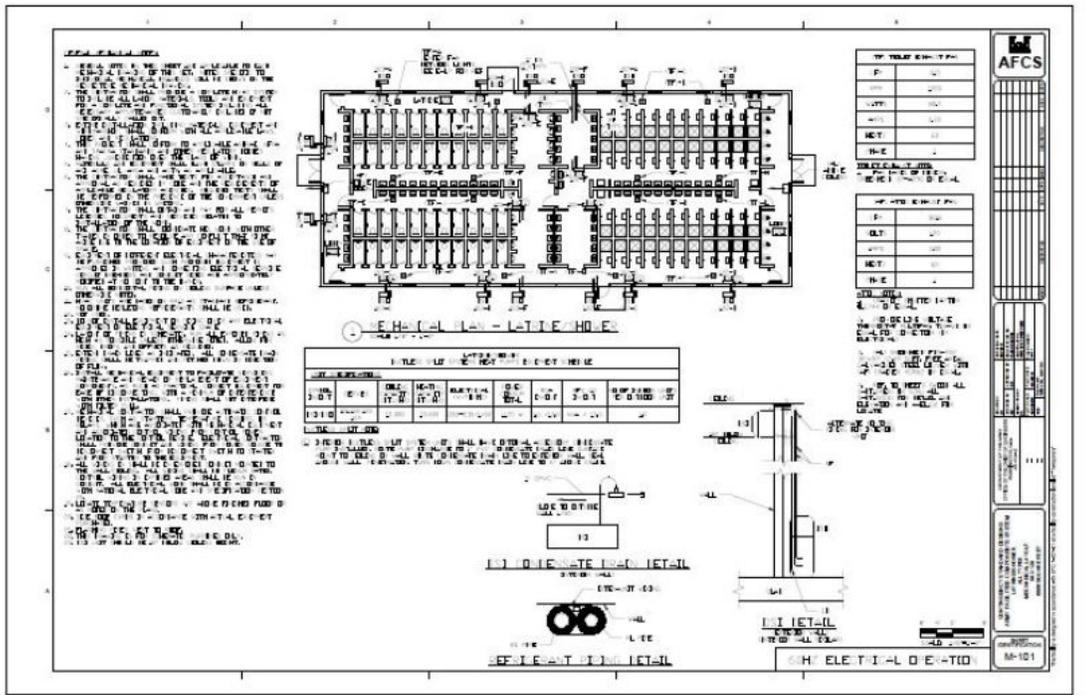
None

Remarks: None

Notes: None

Performance Steps

1. Review construction or field prints and specifications.
 - a. Identify the locations of waste water connections.
 - b. Identify the locations of water supply connections.
 - c. Identify the type of pipe and location of routing.



Typical Waste System Plan
052-12K-1062-1

GENERAL NOTES:

1. PROVIDE ALL LABOR, MATERIAL AND EQUIPMENT REQUIRED FOR THE COMPLETION AND OPERATION OF ALL SYSTEMS IN THIS SECTION OF WORK IN ACCORDANCE WITH CONTRACT PLANS, AND ALL APPLICABLE CODES.
2. PROVIDE A COMPLETE SYSTEM OF HOT AND COLD WATER, WASTE AND VENT PIPING TO ALL FIXTURES WITHIN THE BUILDING.
3. ALL PIPING (WATER, WASTE) SHALL BE RUN EXPOSED.
4. ALL WASTE AND VENT PIPING SHALL BE PVC.
5. NOT USED.
6. ALL WATER PIPING SHALL BE PVC (COLD) OR CPVC (HOT).
7. ROUTING OF ALL PIPING SHALL BE COORDINATED WITH OTHER TRADES.
8. ROUTE ALL PLUMBING VENT PENETRATIONS TO CLEAR ANY ROOF MOUNTED EQUIPMENT BY A MINIMUM OF 15 FEET.
9. MAKE PROPER PIPING CONNECTIONS TO ALL FIXTURES EVEN THOUGH ALL BRANCH MAINS, ELBOWS, AND CONNECTIONS MAY NOT BE NOT SHOWN.
10. INSULATE ALL HOT AND COLD WATER PIPING WITH MINIMUM 1" THICK INSULATION WITH PVC JACKET AND FITTING COVERS.
11. ALL PIPING (WATER, WASTE, AND VENT) SHALL BE SUPPORTED WITHIN 12" OF BUILDING STRUCTURE.
12. REFER TO MANUFACTURERS INSTALLATION INSTRUCTIONS FOR ALL INSTALLATION REQUIREMENTS.

PLUMBING FIXTURE SCHED

MARK	FIXTURE	WASTE	VENT	CW	HW	MOUNT
P1	LAVATORY	1-1/4"	1"	1/2"	1/2"	WALL
T1	TOILET	3"	2"	1/2"	N/A	FLOOR
S1	SHOWER	2"	1-1/2"	1/2"	1/2"	WALL

NOTES:

1. REFER TO SPECIFICATION SECTION 33 11 00 (SP-132) FOR ADDITIONAL REQUIREMENTS.

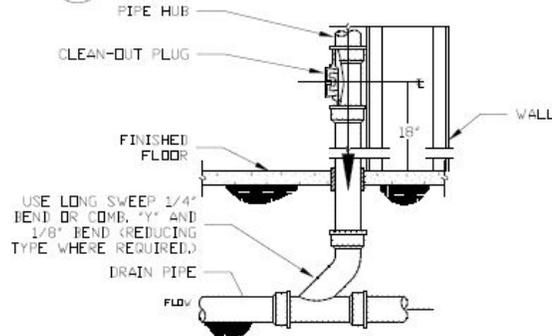
WATER HEATER SCHEDULE

MARK	LOCATION	STORAGE CAPACITY (GAL)	RECOVERY G/S @ 100° F (GAL)	ELECTRICAL REQUIREMENTS W	MC
WH	LOBBY/LATRINE	80	0.19	4,500	F

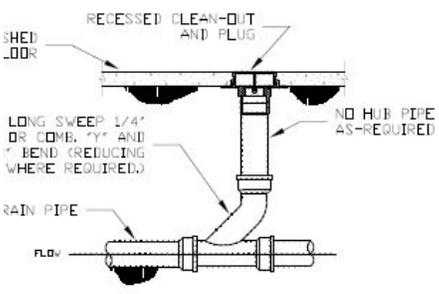
NOTES:

1. PROVIDE WITH DISCONNECT SWITCH.
2. POWER CONNECTION SHALL BE AS FOLLOWS:
FOR 60HZ ELECTRICAL SYSTEM - 230/208V, 1PH, 60HZ

1 PLUMBING SCHEDULE-LATRINE/SHOWER
SCALE: 1/2" = 1'-0"

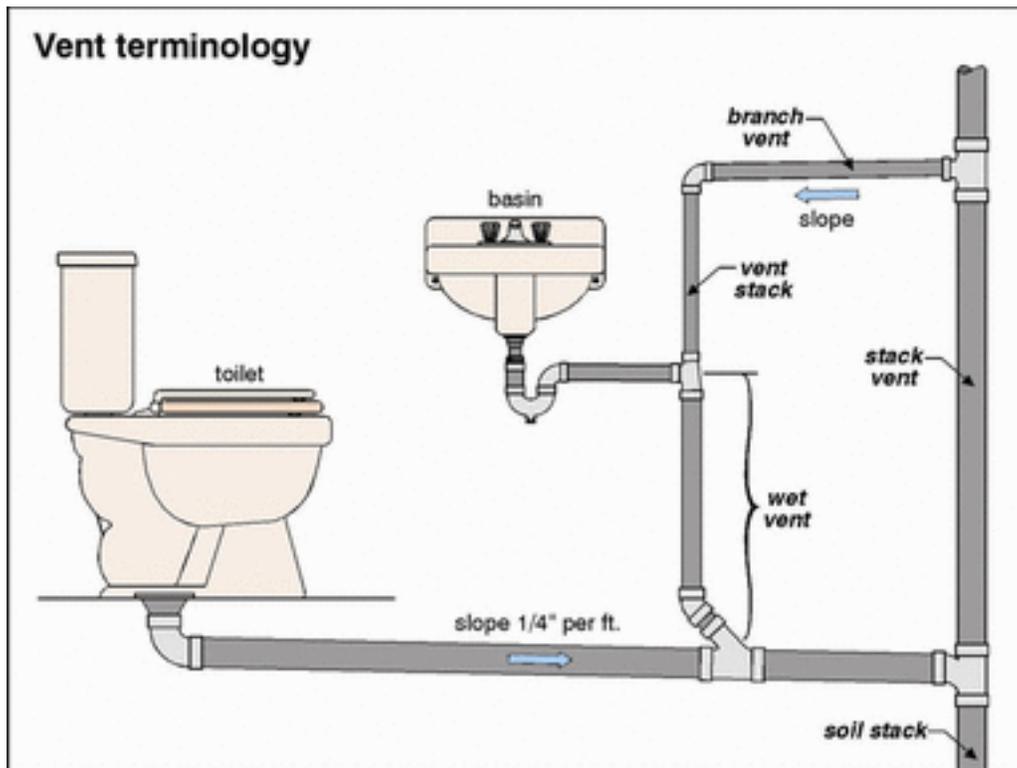


4 WALL CLEAN-OUT DETAIL
P-103 SCALE: N.T.S.



3 INTERIOR CLEANOUT DETAIL
P-103 SCALE: N.T.S.

Typical Waste System Detail
052-12K-1062-2



Simple Vent and Waste Detail
05212K-1062-3

2. Verify BOM.

- a. Verify the proper type of pipes by size and rating are available.
- b. Verify the proper fittings are available.
- c. Verify all pipe hangers, fasteners, cleaners, glue and items required by the plans and specifications are available.

3. Install the interior portion of the waste system.

Note: - All rough in stub outs should extend 3" to 4" past the finished surface and be capped.

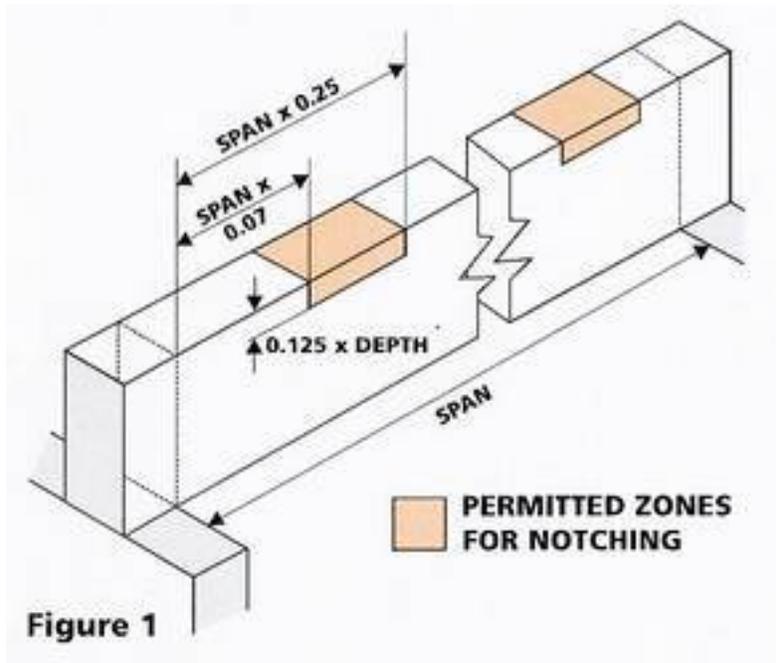
a. Hang pipe temporarily in its intended path and dry-fit any fittings to ensure proper orientation. Adjust hangers to achieve proper alignment and maintain 1/4" per foot slope for drainage.

Note: For slab on grade construction with pipes placed below grade, an initial dry-fit with adequate pipe support must be used before joining sections, testing and back filling.

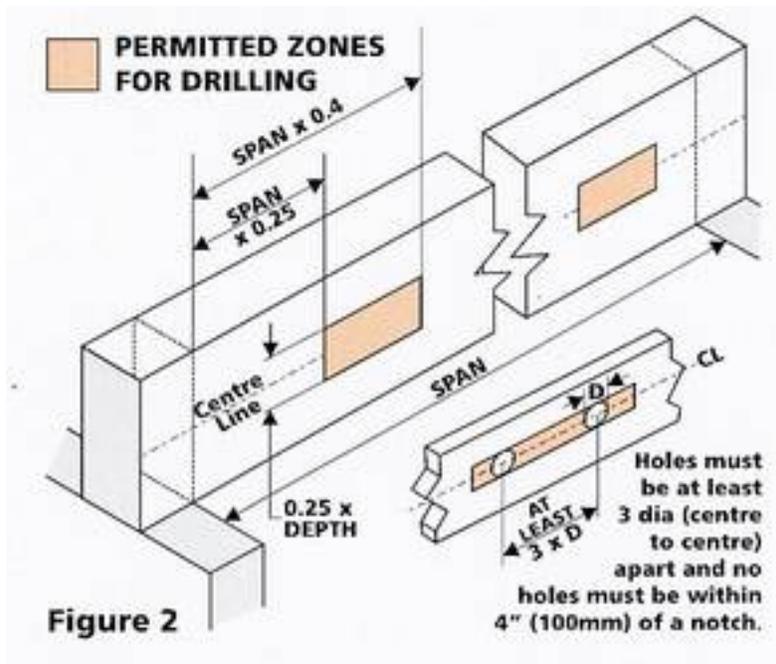
WARNING

- Structural failure can occur from modifications made to framing members for the purpose of accommodating pipes, ducts and wires. Supervisor and Engineer approval must be obtained for cutting or drilling of framing and support members that go beyond the scope of the plans, specifications or guidance. (See examples in figures 052-12K-1026-2, 3 & 4)

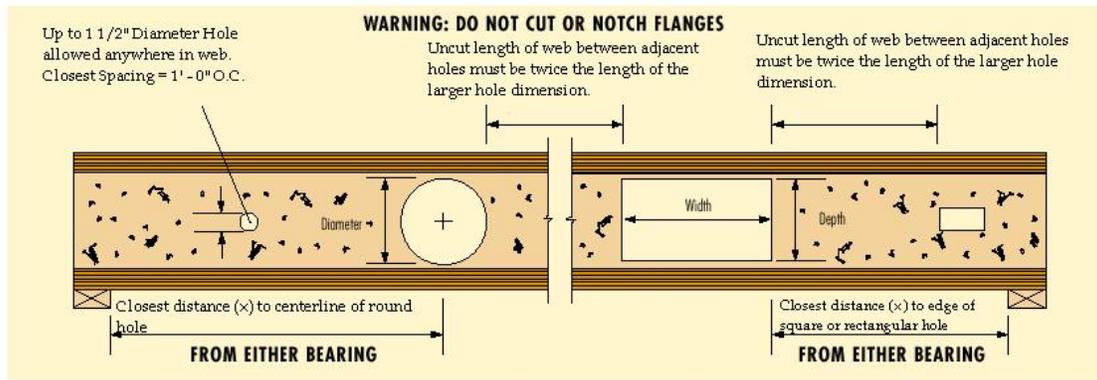
- b. Mark and cut the floor joists and wall studs along the predetermine route for the system (052-12K-1062-4, 5 & 6).



Example Floor Joist Notching
052-12K-1062-4



Example Floor Joist Drilling
052-12K-1062-5



Example Engineered Floor Joist
052-12K-1062-6

c. Cut PVC (Polyvinyl chloride) pipe.

(1) Determine the length of pipe required, and mark it for cutting.

(2) Place the pipe in a miter box or a jig, and squarely cut the pipe.

(3) Remove burrs from the cut end of the pipe (inside and out) by scraping it with a pocket knife. If a pocket knife is not available, sand it with sandpaper.

d. Join (Glue) solvent-cement welded fittings.

Note: - Joining a solvent-cement weld joint is a sequential, time sensitive task. The manufacture instructions must be strictly followed.

- A system dry fit (no cleaner, primer or solvent cement) should be performed to prevent accumulative error and to ensure quality and accuracy of cuts and measurements as well as compliance with construction plans or field prints.

(1) Inspect the pipe end for burrs and the fittings for cracks.

(2) Clean the pipe and the inside of the fitting with an authorized cleaner and a clean rag.

(3) Coat the outside of the pipe's end and the inside of the fitting with primer.

(4) Coat the outside of the pipe's end and the inside of the fitting with solvent cement.

(5) Push the pipe quickly into the fitting as far as it will go. A small bead of cement should be visible.

(6) Give the fitting a one-quarter turn to spread the solvent cement evenly.

(7) Hold the joint connection for about 30 seconds to be sure it is solidly set.

(8) Wipe off the excess cement.

4. Test the system IAW doctrine using either the water or air test after the main soil and waste stack and the house drain are completed.

Note: - To test Galvanized-Iron/Steel, Copper and Plastic piping choose either the water or air test.

- Cast Iron piping requires a 12 hour test to swell the oakum prior to performing a water or air test.

a. Perform a 12-hour test.

(1) Seal all branches and vent lines, and place a test plug/ball in the test T.

(2) Fill the system with water from the top of the main soil and waste vent. Keep it filled for at least 12 hours to allow the oakum in the joints to swell and form a watertight seal.

(3) Drain the system, and perform a water test.

b. Perform a water test.

- (1) Seal all of the branches and the vent lines, and place a test plug in the test T.
- (2) Fill the system with water, and check the system for leaks.
- (3) Check the system for leaks if the water level drops more than 4 inches in 30 minutes.
- (4) Remove the water from the system, and repair any leaks.

c. Perform an air test.

- (1) Seal off all openings, leaving one for the test equipment and the gauge.
- (2) Apply air pressure of 5 pounds per square inch (psi).

Note: A drop in the mercury column on the gauge shows a leaky joint. In a satisfactory test, the line should hold 5 psi for 15 minutes.

(3) Listen for the sound of escaping air to help locate any leaks. If no sound is heard and the pressure is falling, apply a soap solution to the joints in the area of the leak.

- (4) Remove the water from the system, and repair any leaks.

DANGER

All underground plumbing must be laid at least 12 inches from any underground electrical cable. Failure to do so could result in physical injury, death, and/or destruction of equipment.

5. Connect the house sewer to the sewer main.

Note: - When possible, house sewers should be graded to a slope of $\frac{1}{4}$ inch per foot. Trenches for house sewers may be graded with surveying instruments or with a carpenter's level. The drain is graded toward the main sewer with the hub end of the pipe lying upgrade.

- The house sewer must be connected to the sewer main at a 45 degree angle. The house sewer flow must enter with the flow of the sewer main to help prevent waste from backing up into the house sewer.

- When applicable the depth of the sewer must be below the frost line.

- For connections to sewer main, choose applicable method below.

a. Connect the PVC house sewer to the sewer main using a thimble.

(1) Tap gently around the circumference of the main sewer to find the depth of flow for placing the thimble. A dull sound results from tapping below the sewer level and a ringing sound results from tapping above the sewer level.

(2) Use the thimble as a pattern for marking the size of the hole with chalk.

(3) Make the cut on this line with a small, cold chisel and an 8-ounce ball peen hammer. Use light blows to prevent damage to the main sewer.

(4) Work around the cut until a depth of $\frac{1}{8}$ to $\frac{3}{16}$ inch is reached.

(5) Make a small hole in the center of the area to be removed.

(6) Enlarge the hole into an oval shape as near the size of the sewer thimble as possible.

(7) Place the thimble in the proper position and pack oakum around the edges of the flange.

(8) Complete the thimble installation by packing a rich Portland cement mortar (one part sand to one part cement) around the thimble.

Note: - Use enough mortar under the thimble, on the bottom of the tap, and on the top and sides. Support the joint until the mortar sets.

b. Connect the PVC house sewer to the sewer main using a saddle, see fig 052-12K-1062-7.

Note: - This type of saddle should only be used on a gravity feed system. Using this type of saddle on a pressurized system will cause the seal to fail.



PVC to Ceramic/Sewer Connection
052-12K-1062-7

(1) Perform task steps 5.a.1-6 listed in this task.

(2) Attach the tap saddle to the ceramic sewer main with large stainless steel line clamps.

c. Continue to place the pipe in the excavated ditch, bell end towards structure ensuring the pipe is laid to grade.

Note: Grade the sewer line to a slope of 1/4 inch per foot using a 2-foot carpenter's level and a 1/2-inch-thick board.

(1) Place the level on the sewer pipe with the block under the end of the level away from the building, closer to the main sewer line.

(2) Center the bubble between the two lines in the center vial to correctly slope the pipe. Make adjustments by removing or adding block supports under the pipes.

6. Continue placing the house sewer pipe until the connection is made with the house drain ensuring the pipe is laid to grade.

(Asterisks indicates a leader performance step.)

Evaluation Guidance: Score the Soldier GO if all performance measures are passed (P). Score the Soldier NO GO if any performance measure is failed (F). If the Soldier scores NO GO, show the Soldier what was done wrong and how to do it correctly.

Evaluation Preparation: Provide the soldier with the items listed in the conditions. Brief soldier: Tell the soldier that he will be required to complete the performance measures according to the standards set forth in the task.

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Reviewed construction or field prints.			
2. Verified BOM.			
3. Installed the interior portion of the waste system through structural openings routing the piping and the fittings between the building's framework.			
4. Tested the system IAW doctrine using either the water or air test after the main soil and waste stack and the house drain are completed.			
5. Connected the house sewer to the main sewer.			
6. Continued placing the house sewer pipe until the connection was made with the house drain ensuring the pipe is laid to grade.			

Supporting Reference(s):

Step Number	Reference ID	Reference Name	Required	Primary
	TM 3-34.70	Plumbing, Pipe Fitting, and Sewerage	Yes	No

TADSS : None

Equipment Items (LIN):

LIN	Name
W48622	Tool Kit Pipefitters: 1/8 to 2 Inch Pipe
W48348	Tool Kit Pioneer Engineer Squad: Land Clearing and Building Erection
W48759	Tool Kit Pipefitters: 2-12 to 4 Inch Pipe
W34648	Tool Kit, Carpenters, Engineer Squad with Chest

Material Items (NSN) :

Step ID	NSN	LIN	Title	Qty
	5110-00-497-5437		Chisel, Cold, Hand	1
	5180-00-596-1501	W48622	Tool Kit Pipefitters, 1/8 to 2 Inch Pipe	1
	5210-00-239-0892		Level and Plumb, Aluminum, 24 Inches Long, Nonadjustable, 2 Level, 4 Plumb	1
	4240-00-052-3776		Goggles, Industrial	1
	8415-00-268-7868	J68064	Gloves Leather: Men's Work Cream Color Strap Closure Gauntlet Cuff, Size 5	1

Environment: Environmental protection is not just the law but the right thing to do. It is a continual process and starts with deliberate planning. Always be alert to ways to protect our environment during training and missions. In doing so, you will contribute to the sustainment of our training resources while protecting people and the environment from harmful effects. Refer to the current Environmental Considerations manual and the current GTA Environmental-related Risk Assessment card. Comply with unit Standing Operating Procedures (SOP), Operations Orders (OPORD), local regulations, and/or host nation laws for disposal of solid waste (i.e. scrap steel, plastic and copper pipe etc) generated by construction tasks.

Safety: In a training environment, leaders must perform a risk assessment in accordance with ATP 5-19, Risk Management. Leaders will complete the current Deliberate Risk Assessment Worksheet in accordance with the TRADOC Safety Officer during the planning and completion of each task and sub-task by assessing mission, enemy, terrain and weather, troops and support available-time available and civil considerations, (METT-TC). Note: During MOPP training, leaders must ensure personnel are monitored for potential heat injury. Local policies and procedures must be followed during times of increased heat category in order to avoid heat related injury. Consider the MOPP work/rest cycles and water replacement guidelines IAW FM 3-11.4, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection, FM 3-11.5, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination. Soldier will wear all safety items while performing this task. All tool's and un-used material will be picked-up and put back in their right places.

Prerequisite Individual Tasks : None

Supporting Individual Tasks :

Task Number	Title	Proponent	Status
052-248-1056	Prepare a Plumbing-Materials Takeoff List	052 - Engineer (Individual)	Approved
052-12K-1000	Test Water System	052 - Engineer (Individual)	Approved
052-12K-1061	Maintain Plumbing Tools	052 - Engineer (Individual)	Approved

Supported Individual Tasks :

Task Number	Title	Proponent	Status
052-12K-1061	Maintain Plumbing Tools	052 - Engineer (Individual)	Approved
052-248-1012	Clear Waste-System Stoppages	052 - Engineer (Individual)	Superseded
052-248-1010	Install Urinals	052 - Engineer (Individual)	Approved
052-248-1007	Test Waste and Water Systems	052 - Engineer (Individual)	Superseded
052-248-1040	Interpret Plumbing Prints and Drawings	052 - Engineer (Individual)	Approved
052-248-1056	Prepare a Plumbing-Materials Takeoff List	052 - Engineer (Individual)	Approved
052-248-1050	Install a Lavatory	052 - Engineer (Individual)	Superseded

Supported Collective Tasks :

Task Number	Title	Proponent	Status
05-PLT-5210	Construct a Sewerage System	05 - Engineers (Collective)	Approved

Knowledges :

Knowledge ID	Knowledge Name
052-K-01075	Know Backfill Requirements in a Plumbing Trench
052-K-00443	Know How to Interpret Construction Project Plans and Specifications
052-K-00840	Know the Uses of Basic Plumbing Tools and References

Skills :

Skill ID	Skill Name
052-S-00273	Ability to Take Measurements with String/Twine
052-S-00272	Ability to Take Measurements with Measuring Tape
052-S-00307	Read and Comprehend Construction Plans

ICTL Data :

ICTL Title	Personnel Type	MOS Data
Created Ictl from: 12K10, Plumber, Skill Level 1	Enlisted	MOS: 12K, Skill Level: SL1, Duty Pos: KFW
Created Ictl from: 12K10, Plumber, Skill Level 1	Enlisted	MOS: 12K, Skill Level: SL1, Duty Pos: KFW
18C ICTL Created on Wed Oct 23 07:51:10 EDT 2013	Enlisted	MOS: 18C, Skill Level: SL3
12K10, Plumber, Skill Level 1	Enlisted	MOS: 12K, Skill Level: SL1, Duty Pos: KFW