Job Planning Exercise Solution
Replace HVAC System Circuit Breaker

Maintenance Job Planning/Estimating Worksheet		
Planner: Sandy Slater	Work Order # 33-45586-01	Date:8/4/2016
Job Contact: Ben Driver	Job Location: Main storeroom	Equipment # 11210
Job Description: **Replace main storeroom HVAC system circuit breaker**		

Seq#	Description	Craft/Crew	# Crew	Est. Hrs
10	Replace circuit breaker. LOCKOUT/TAGOUT equipment in accordance with plant policies and procedures and test LOCKOUT/TAGOUT.	ELEC	2	2

Seq#	Material Data / Catalog # or (Description)	Quantity	Price	Sloc
10	Electrical cable	1	$ 5.00	
	120 amp, molded case, 480 VAC, 3-phase circuit breaker	1	$ 685.15	
	Electrical box	1	$ 14.29	
	Wire staples	8	$ 3.41	
	Nailing plates	4	$ 2.73	
	Wire nuts	4	$ 8.60	T12
	Cable clamps	4	$ 3.44	
		Total $	$ 790.00	

Safety Requirements						
Permit		Confined Space		Hot Work	Respirator	
SCBA		Asbestos Removal		Other	Fall protection	
Comments: fall protection is required when working at heights						

Tools:	
	Electrician toolbox:
	• Cable ripper
	• Wire stripper
	• Utility knife
	• Fish tape
	• Hammer
	• Power drill
	• Bender
	• Insulated screwdrivers
	• Neon voltage tester

Equipment:	
	12 ft. ladder

Operation:	
10	LOCKOUT/TAGOUT equipment in accordance with plant policies and procedures and test LOCKOUT/TAGOUT.
20	Remove the screws holding the face plate with a Philips screwdriver. Use the left hand when opening the panel to prevent injury in the event of an arc flash.
30	Confirm that power is shut off using a neon voltage tester. Hold one probe against the neutral bus bar while touching the other probe to both setscrews on a double-pole breaker. Do not touch the two black cables running to the main circuit breaker as they are always energized.
40	Remove one knockout slug from the side of the breaker panel.
50	Use a hammer to tap the knockout slug with a screwdriver. Use a pair of pliers to twist off the slug.
51	Insert a cable clamp into the open knockout.
52	Use a cable ripper to strip 12 inches of sheathing from the end of the cable. Cut off the excess sheathing with a utility knife.
53	Feed the cable through the cable clamp until there is a ½ inch of sheathed cable inside the breaker panel. Tighten the cable clamp to secure the cable.
54	Insert the end of the bare, copper-colored grounding wire into an open terminal in the grounding bus bar. Tighten the setscrew to secure the wire. • NOTE: If it is the main service panel and there is no separate grounding bus bar, connect the grounding wire to the neutral bus bar instead. Position the excess grounding wire so it runs along the inside edge of the panel, away from the bus bars.
60	Use a wire stripper to remove a ½ inch of insulation from the ends of both hot wires.
70	Insert the end of each hot wire, which will typically be black and red, into a terminal on the new circuit breaker, and tighten the setscrews. • NOTE: There is no neutral wire in this type of circuit.
71	Position the excess hot wires around the inside edge of the panel, away from the bus bars.
72	Use a pair of pliers to remove the breaker knockout on the panel cover that corresponds to the position of the new circuit breaker. • NOTE: With a double-pole circuit breaker, you will need to remove two knockouts.
80	Replace the panel cover and tighten the screws to reattach it to the panel housing.
90	Test the new breaker by switching on the main breaker and then switching on the individual circuit breakers, one by one.
100	Label the new circuit breaker on the breaker panel cover.
110	Test the HVAC system on the circuit to ensure the installation was successful.