Scenario 1:

Room 113 is affected by a power outage and all the lights are off. First I look for a breaker to see if it’s tripped, but I can’t find it. So I got a voltmeter, climbed on top of a ladder, opened a junction box to test the connection. I used a hot stick to test to see if voltage is coming through the wires, then I used a voltmeter to read the actual voltage. It read 119 volts, and I had to go to the next step. This means checking the lamp and the ballast. Once we changed the ballast the lights came on.

Scenario 2:

Q: How do you trace something inside a wall?

We are trying to trace a circuit through a wall; We know that power is on the east side of the room and we want to get it to the west side. WE normally use visualization to find wires. We know there is a junction box we can check because there is a rule stating they must be placed very couple of feet. This gives you a general idea of the wire location. If you’re trying to find a certain place in the wall, there is no tried and true method. So it ends up being very hit or miss. Most electricians are taught the run wire horizontal and vertical, which helps.

The general process includes opening up various junction boxes, looking of same color and size wire. Usually the same color and sizes should be consistent, but this is not always guaranteed. If they are not then all the wires must be traced and measured with an ohmmeter, but ohmmeters only work on a continuous circuit, so it is not effective in this situation. When a job gets this complex, it cannot be done alone.

Scenario 3:

In the CULC on the second floor by Starbucks the outlets were not working. I checked the panel, which showed power, but the circuit did not read any power. There is not junction box in this scenario because the wires are run through the ground. This is due to the CULC being a concrete building. To solve this I go to the blueprint to see the floor plans. I pulled the wire of from the source to discover that it was broken, which mostly likely occurred during some drilling.

Q: Are there any tools to trace a wire in the ground?

There are circuit tracers that trace for open circuits, but they are not reliable. An ohmmeter can help, but it does not tell you where the problem is occurring. For circuits around 20,00 to 30,00 volts there is a machine called a thumper that solves this problem, but not for a normal commercial building which uses voltage up to 600.

Scenario 4:

There was another power outage on Saturday in the ES&T building. We walk into the server room and instantly smell smoke. We open the Leeber unit, a type of AC unit, and find that this is the source of the smoke. Now most AC units produce condensation, which we pump out of the building. It turns out the overflow valve of the unit was stuck due to the power outage, so the condensation is overflowing onto the floor. We first test it with a power meter after confirming that that power has returned to the room. We get the valve working again, but now we must address the smoke. This could be anything from a broken belt to a burning motor. Since the smoke smelled of rubber we determined that it was due to a belt, but found out that there is another motor towards the back of the unit. This was the actual sources of the smell.

Scenario 5:

We get a call that the BME building is getting power to the lights, but not the receptacles. We check the breaker box, see that it has been tripped, reset it, but it just trips again. Now I test every disconnect center to test for a short. When we find the problem area, it turns out that a room is ankle deep in water. This caused a shortage in all the receptacles. That gets resolved and the building has power again.

Scenario 6:

The toilets are not flushing in the EBB building. This building uses rainwater to flush and is run by an electrical system. I first stick my hand in a 600 gallon talk to find a valve to make sure its working. Then we trace the circuits to find out which one is preventing the pumps from working. In a general scenario, you need to figure out what portion of the system is failing. You test if the pumps are working; is there enough water in the tank to make pumps work; is there any water in the tank at all. You must test for a clogged filter. For an easy example, I check to see if there is any water in the tank and it is full. So I check the water pressure and realize that is not my problem. So I flush the closest toilet part of the system, see that it has no effect. Upon further inspection, I see that the valve in the bottom of the tank is not opening. It turns out the tank was overfilled so the system turned off to prevent an over spill. I override the system to get the pump working temporarily, and flush the toilet a few times to get it back on track.

Scenario 7:

The Smith dorm reports that it doesn’t have any heating, cooling or water. We go to the mechanical room and find that its knee deep underwater. I put on rubber boots and gloves and put a submersible pump to direct the water to a shower.

Scenario 8:

Room 303 in ESN is not cooling properly. We go up various ladders to reach the roof and harness up to a lifeline. Some units might be on the edge of the roof, so we need protection from falling. After accessing the unit, we use a voltmeter to find where the circuit is giving out. Then we check for a fan not operating correctly, the fan being burnt out, garbage in the squirrel cage, the coil is not distributing the refrigerant properly, etc. If the refrigerant is not working, we return to the shop to get a recovery machine and pump. We empty out the coolant reserve with pump and refill it with the recovery machine.

Q: What’s the process of figuring out the problem?

We check to see of the machine is running and listen to the noises the compressor, fan motor, and the air flow. If it was the fan motor, need to decide if the motor is bad or if there is an electrical problem. So you open up the electrical contact box and check for the contactor. If power is going to the fan, then we determine that the fan motor is the problem.

If you get to the roof and don’t hear anything you need to check if the power is reaching the roof at all. Like all scenarios, you must find the breaker to test it with a voltmeter.

Scenario 9:

The lights are flickering in Skiles. While testing the motion sensors we get a call that in lights in Wardlaw are also flickering. I know that these two buildings are on the same high voltage circuit, but shouldn’t be tied together at any other place. Just by looking at the light set up, I know that they lost a phase. After testing the breaker I confirm that the building lost B phase. To troubleshoot, I walk through every building along this circuit testing the phase to find the source. I eventually make it to the student center to find other workers testing the system. It turns out they were using an inductive meter, not a contact meter, to test the voltage and were getting the wrong readings. This whole process took two hours.