

# OPERATIONS CHALLENGE 2019



## COLLECTION SYSTEM EVENT

### During the event, your team will complete the following:

The event simulates connecting a 4-inch PVC lateral sewer to an existing 8-inch PVC sewer pipe while in service and the programming of an automatic sampler

For questions please contact:

Coordinator Jeff Sober through the Ops Challenge Resource Center: [https://www.rmwea.org/oc\\_collections.php](https://www.rmwea.org/oc_collections.php)

### Table of Contents

Set-Up.....	1
What you will provide.....	1
Event Order.....	1
Event Simulator.....	2
Scoring.....	2
Required procedures.....	3
Rules.....	6
Hach AS950 Sampler Programming Instructions..	7
Collection System Simulator Layout.....	9

## SET-UP

The set-up of the event is attached to these rules.

The event includes the following:

-  The “wet pipe” table and pipe. This pipe starts with a small-leak in the pipe and represents the in-service pipe.
-  The “dry pipe” table and pipe. This pipe is the surplus material pipe and is used to make the repairs on the wet pipe.
-  A tool-box with tools
-  A sampler and sample designated area

## WHAT YOU WILL PROVIDE

-  Hard hat, safety glasses or goggles, safety boots or shoes, safety gloves. (Safety gloves must be cut resistant. Latex and rubber gloves are not sufficient)
-  Enthusiasm!

## EVENT ORDER

The event should be conducted in a similar order to this:

1. Drill a 4.5-inch diameter hole in the dry PVC pipe.
2. Install an Inserta Tee in the 4.5-inch hole, and secure with a hose clamp.
3. Cut out and remove a measured length of pipe from both the wet and dry PVC pipes. The section cut from the dry pipe will include the Inserta Tee and will be used to replace the section removed from the wet pipe.
4. Install the replacement length of dry PVC pipe (complete with Inserta Tee) into the wet PVC pipe, and secure with flexible repair couplings and hose clamps.
5. Program the automatic sampler per the defined procedure.
6. End with all tools in the tool-box

## EVENT SIMULATOR

### The provided event simulator includes the following items:

1. "Wet Pipe" - A 6-foot length of 8-inch SDR 35 PVC pipe strapped to a steel table, ready for cutting. Water will be flowing through this length of pipe during the event (the wet pipe). This pipe will start with a small hole, representing a leak.
2. "Dry Pipe" - A 6-foot length of 8-inch SDR 35 PVC pipe strapped to another steel stand, ready for cutting (the dry pipe).
3. Toolbox. The toolbox is made out of 3/4" plywood and is 19" H X 22" W X 39" L. The toolbox will contain:
  - a. Hand drill (non-ratcheting brace) with a LENOX 4.5-inch circular cutting blade (model 72L), or equivalent. Brace is a McMaster-Carr Ratchet-Bit Brace Hand Drill.  
<https://www.mcmaster.com/#hand-powered-drills/=16q283i>
  - b. One 4-inch IPS Sch 40 Inserta Tee, to include a rubber sleeve (ASTMF477), PVC hub (ASTM D3034), and stainless steel band
  - c. Spray bottle with lubrication soap solution (1 tsp of liquid dish soap and 16 oz of water)
  - d. Block of wood (Standard pine approximately 2-inch x 4-inch x16-inch).
  - e. Four-pound mallet/sledge hammer (Stanley Fatmax 4 lb anti-vibrate, or similar) (Approximate dimensions: 14.3-inch x 5-inch x 1.9-inch).
  - f. A short piece of pipe already installed in the Inserta Tee outlet so that the plug will seat properly.
  - g. Two flexible repair couplings with four bands (Model #B602 ALL 300 SS by Pipconx when ordering with the coupling OR Dynaflo Size 152 10, 51-224mm ALL SS), attached loosely around couplings. The bands are not quick release.
  - h. Two LENOX saw handles with two 18-inch PVC saw blades (model HS F180), or equivalent.
  - i. Two speed wrenches with sockets.
  - j. Tape measure and marker. Teams must use the supplied tape measure (Stanley Fat Max Keychain Tape Rule, 1/2-inch x 6 feet FMHT33706W) and marker (Sharpie fine point original 30001). Teams have the option to either carry the tape measure and marker into the event on their body or have the items placed in the toolbox during the three-minute set-up period. However, whichever way the team decides, the tape measure and marker must end the event in the tool box.
4. Hach Model AS950 automatic sampler with all required accessories.
  - k. Automatic sampler PROGRAMMING INSTRUCTIONS sheet. Instructions will be on a single sided sheet and will be located adjacent to the sampler during the event.

## SCORING

### The event scoring will be based on the following:

- 🔩 The time taken to complete the event.
- 🔩 The leakiness of the wet pipe after being repaired. The wet pipe connections will be checked for water tightness at 3 psig for 30 seconds.
- 🔩 The accuracy of the automatic sampler programming and sample taking.
- 🔩 Compliance with all provided instructions.
- 🔩 **Ability to perform the event safely.**

## REQUIRED PROCEDURES

- 1) A three-minute event set-up period is provided to ensure that all necessary tools and equipment are provided and satisfactory. It is the team's responsibility during this time to complete the following:
  - One competitor must go with the sampler judge to the sampler. The sampler judge will complete a factory settings default in front of one of the team members.
  - Check and confirm that all equipment, including bands, to be used in the event are in satisfactory condition.
  - Mark the wet pipe, if desired (only the wet pipe).
  - Bands will already be placed loosely around couplings.
  - Confirm the pipe table and clamps are appropriate for the team, and modify as needed.
  - Oversee lubrication of the saw blades and hole saw, if desired.
  - The Inserta Tee must be completely put together (this is how the Inserta Tee will start) (defined by the PVC being seated in the rubber coupling appropriately to the noted insertion point with the stainless band around the rubber coupling without falling off) or completely apart inside the tool box.
  - Pre-lubrication of the Inserta Tee is not allowed.
  - At the end of the three-minute set-up period, all tools and equipment must be placed flat (free standing with its own support) in the toolbox. None of the tools can be stacked on top of each other (No overlapping of any component in the toolbox, whether touching or not) or left leaning against the toolbox. The judges will confirm the tool box is set appropriately before the event begins. If it is not set appropriately, the Team Captain will be asked to reset the box and latch the padlock. If the box is not set by the end of three minutes, a penalty will be assessed.
    - "Leaning" is defined as "support of the vertical walls of the toolbox or other equipment is necessary to keep the item in the current position."
    - "Overlap" occurs when the tool/equipment cannot be lifted straight out without impacting another tool or equipment.
- 2) Each team member is required to wear all of the required safety gear throughout the event, and compete in a safe manner.
- 3) The team member(s) programming the sampler may remove their safety gloves, but only while programming the sampler and in the sampler area. Gloves must be put back on prior to leaving the sampler area. The sampler area is approximately 4 ft. x 4 ft. and will be marked with tape on the floor surrounding the sampler.
- 4) The PVC pipe sections strapped to the tables may not be moved laterally by the competitors.
- 5) The 4.5-inch hole must be drilled in the section originating from the dry PVC pipe, using the hole saw provided.
- 6) Install the Inserta Tee using the following steps. (The order is not dictated.) All steps must be completed to be considered a proper procedure:
  - Core a 4.5-inch hole with the hole saw provided and clean the edges.

- Install the rubber sleeve with the gold band perpendicular to the pipe. Check to be sure the inside and outside segments are flush to the pipe.
  - Place the stainless steel band over the rubber sleeve, but do not tighten.
  - Spray the soap solution inside the sleeve and on the plastic hub.
  - Align vertical red line on the plastic hub with the gold line on the sleeve and insert by hand.
  - Place a wood block on the plastic hub and drive the hub into the sleeve with the hammer.
  - The hub should be installed so that the horizontal red line is at the top of the rubber sleeve.
  - Tighten the stainless steel band, near the top of the rubber sleeve.
- 7) The lengths of PVC pipe must be cut out using the LENOX saws provided. All cuts must be completed within the framework of the pipe table.
  - 8) The PVC repair segment with the Inserta Tee should be moved to the wet table to begin the repair process with the flexible couplings. The Inserta Tee must be installed in a perpendicular position from the table, facing straight up, with the opening in the Inserta Tee facing the ceiling.
  - 9) The automatic sampler must be programmed correctly using the data provided on the attached instruction sheet. All teams shall enter the site ID as the two digits "55" in the last two available columns of the site ID entry (far right). The sampler will be reset to Factory Defaults between each team's run of the event.
  - 10) When replacing tools in the toolbox, the tools must be placed in the tool box and not thrown or dropped from a level above the height of the sides of the box. The toolbox lid is to be closed and latched with the padlock. The free end of the lock shackle must be placed through the hasp and over the body of the lock. A majority of the shackle's free end must be within the plane of the lock body. Do not close the lock.
  - 11) The team captain will determine the end of the event by signaling the judges both visually and audibly. The event time will continue until all four (4) team members have exited the event area regardless of the signal from the team captain.
  - 12) After the event ends, the team captain should remain just outside of the event area.
  - 13) The team captain will witness the pressure test and review of sampler programming entry if Sampler Judge requires a review.
  - 14) The team captain will be presented with the event time, along with any penalties.
  - 15) The team captain will sign the score sheet to conclude the event.

**The judges will:**

- Record the elapsed time. The average of the stopwatches will be used to set the raw time.
- Check the sewer service replacement section for water tightness. The wet PVC pipe will be allowed to fill until water flows from the outlet end. At this point, the discharge valve will be closed and the pressure increased to 3 psi. Time penalties will be added for any leakage that occurs within 30 seconds. The team captain will be asked to witness the leak test.
- Check the accuracy of the programming of the automatic sampler and verify that a proper sample was taken.
- Any penalties and the associated penalty times must be approved and signed by the head judge.
- Add any penalty times to the raw time on the score sheet.

- Meet with the team captain to discuss the raw time and any penalties. The team captain will sign this sheet.
- Sign the score sheet.

## RULES

- 1) If a team member is injured during the event due to their own actions, the event will come to an immediate end so that aid can be provided to the injured team member. The team will then be given a default time of 8 minutes (480 sec) and will not be allowed to restart or rerun the event.
- 2) All of the procedures listed above must be fully completed, including programming the sampler. Any team found to be in violation of this rule known as “short-cutting” will be given a penalty time of 5 minutes (300 sec).
- 3) All procedures on the inserta tee must be followed.
- 4) While sawing and drilling activity is occurring on a pipe table by one team member, no other activity is permitted on the same table. This means no touching the pipe, the pipe table, the pipe clamps, or the person cutting the pipe and includes not setting tools on the table while active cutting is occurring.
- 5) Only one person (at a time) may operate the brace and bit assembly used to drill the 4.5-inch hole, with no additional forces being transmitted to the tool in use by any other team member(s).
- 6) Team members may not place their hand inside the hole created by the hole saw while the dry pipe is still being cut.
- 7) No punching of the 4.5-inch hole saw coupon in any way.
- 8) No running or jumping.
- 9) No collisions between team members.
- 10) Kicking or the use of one’s feet to move tools (even on accident), equipment or material (including the coupon) is not permitted.
- 11) Sliding tools to a team member or from table to table across the floor is not permitted.
- 12) Stepping on a tool is considered tool misuse.
- 13) You may adjust the pipe clamps during the run, if necessary, but no other activity can occur on the table while the clamps are being adjusted. The Team is responsible for the clamps being tight enough to hold the pipe during the pressure test. The judges will not adjust the clamps. Clamps may not be adjusted after the run is complete.
- 14) The Inserta Tee must be installed with the opening facing the ceiling, straight up. The edge of the Inserta Tee must not break the plane of the pipe, drawing perpendicular from the table, as a tangent to the pipe. This arrangement is perpendicular, or very near perpendicular. See schematic attached.
- 15) Team members may reach under and over the wet pipe and table, but no body part may cross the cut ends of the wet pipe. The pipe is considered continuous, with no ends. Team members are allowed to be at the ends of the wet table as long as they do not cross the end of the pipe or any plane of the pipe.
- 16) When the wet pipe cuts are complete, the team must invert the wet pipe 90 degrees in an attempt to remove water from the pipe while over the wet table. Large spillage of water is not allowed and a penalty will be assessed.
- 17) Teams are not allowed to lubricate the inserta tee during the 3 minute walkthrough.
- 18) All items in the toolbox are considered to be tools.
- 19) The inserta-tee must be properly inserted.

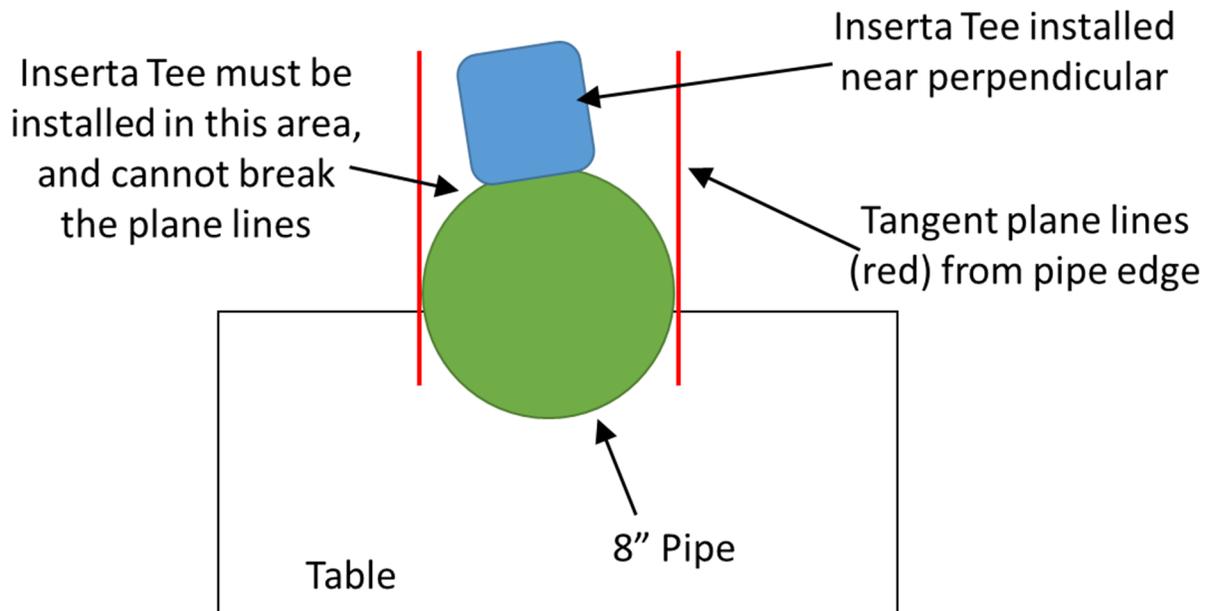
## HACH AS950 SAMPLER PROGRAMMING INSTRUCTIONS

1. Press <b>ANY</b> key on keypad to wake the sampler
2. Press <b>MENU</b> key on keypad
3. Navigate to <b>Hardware Setup</b> (Use arrow keys to navigate)
4. Select <b>Hardware Setup</b> (Press black soft key)
5. Navigate to and select <b>Sampler</b> (Navigate with arrow keys and press black soft key to select)
6. Navigate to and select <b>Site ID</b>
7. Enter "55" in the site ID field (Use arrow keys)
8. Select <b>OK</b>
9. Select <b>Sample Retries</b>
10. Enter "1"
11. Select <b>OK</b>
12. Select <b>Rinses</b>
13. Enter "0"
14. Select <b>OK</b>
15. Press <b>MENU</b> key on keypad
16. Navigate to <b>Programming</b>
17. Select <b>Programming</b>
18. Navigate to and select <b>Sampler Programming</b>
19. Select <b>Total Bottles</b> enter "1" and select <b>OK</b>
20. Select <b>Bottle Volume</b> enter "3 gallon" and select <b>OK</b>
21. Select <b>Tubing</b> enter "8 feet" and select <b>OK</b>
22. Select <b>Pacing</b> then select <b>Time Weighted</b> , select <b>NEXT</b>
23. With <b>Time Weighted</b> highlighted select <b>Edit</b> , enter "1 minute" select <b>OK</b>
24. Select <b>Take First</b> . Select <b>Edit</b> , select <b>Immediately</b> select <b>Back</b>
25. Select <b>Sample Volume</b> , select <b>Fixed</b>
26. Select <b>Volume</b> enter "100 ml", select <b>OK</b> , select <b>Back</b>
27. Select <b>Program Start</b> , select <b>Immediately on 'Run'</b> , select <b>Next</b>
28. Select <b>Program End</b> , select <b>Edit</b> , select <b>After Samples</b> , press <b>Select</b>
29. Highlight <b>Samples</b> , select <b>Edit</b> , enter "1" select <b>OK</b> , select <b>Back</b>
30. Select <b>RUN/HALT</b> key on keypad
31. Select <b>Start Program</b>
32. If warned about clearing data, affirm by selecting <b>OK</b>
33. Sampler is now Running

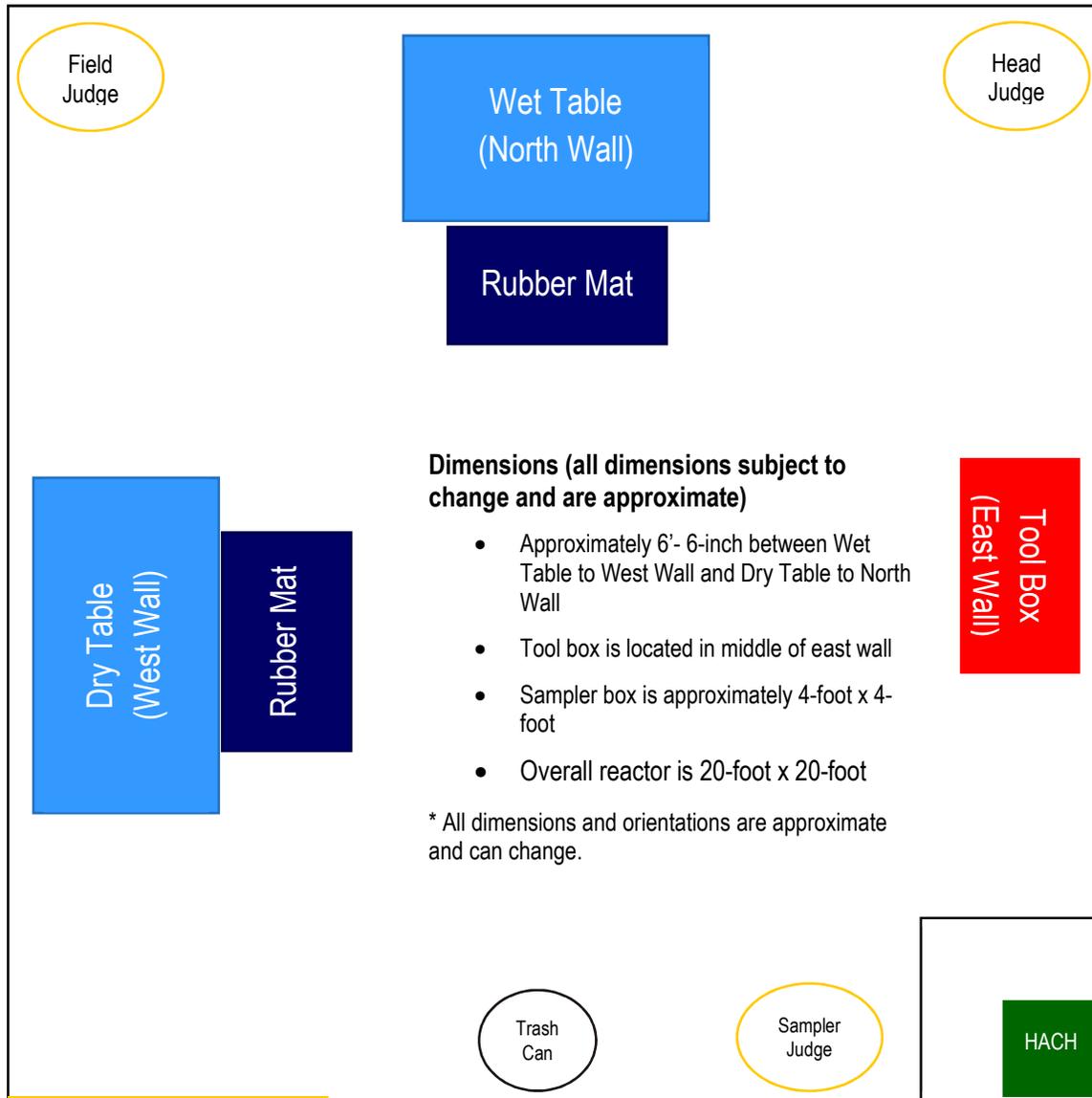
The purpose of this procedure is to create a sampling program for a composite sample (1 bottle), with a volume of 3 gallons, with an intake tube length of 8 ft., intake tube type 3/8-inch Vinyl, with no Program Lock (Disabled), with no program delay, type of sampling or collection Time-Proportional, at an interval of 1 minute, taking the sample immediately, and stopping after the last sample, samples to collect 1, and a sample volume of 100ml, 0 intake rinses, 1 sample retry, and Select Site ID by entering your team number. No Advanced options are needed.

After the sampling sequence is completed the sampling history will show Sampling Complete.

## INSERTA TEE INSTALLATION SCHEMATIC



## COLLECTION SYSTEM SIMULATOR LAYOUT



Team Start and Stop