

CITY OF SASKATOON

---

Water and Sewer Section



CITY OF SASKATOON

# Water Connection Repair Trainers Manual

---

© City of Saskatoon

# Table of Contents

<b>PREPARATION FOR TRAINING .....</b>	<b>1</b>
RESOURCES FOR TRAINING: .....	1
TRAINING TIME TABLE .....	2
<b>SESSION 1.....</b>	<b>2</b>
INTRODUCTION .....	3
<b>SESSION 2.....</b>	<b>3</b>
METHODS AND TECHNIQUES.....	3
<b>SESSION 3.....</b>	<b>15</b>
METHOD AND TECHNIQUES .....	15
<b>SESSION 4.....</b>	<b>29</b>
RESOURCES REQUIRED.....	29
<b>SESSION 5.....</b>	<b>42</b>
<b>SESSION 6.....</b>	<b>42</b>
PROCEDURE INTRODUCTION .....	42
WATER SERVICE DISRUPTION REPORT .....	42
DAILY WORK REPORT .....	43
FOREMAN'S JOB REPORT .....	43
WORKSITE – SAFETY CHECK SHEET.....	43
STANDARD DISTRIBUTION SYSTEM FLUSHING AND	
SAMPLING FORM .....	43
DEEP EXCAVATION NOTIFICATION FORM .....	43
WEEKEND MATERIAL DATA SHEET.....	43
CONFINED SPACE ENTRY INSPECTION FORM .....	43
WORK METHOD CHECKLIST .....	43
ADVISORY - EMERGENCY WATER SERVICE	
INTERRUPTION (DOOR HANGER) .....	43

## Preparation for Training

### Resources for Training:

- i. A list of the staff requiring training.
- ii. Familiarization with training manual.
- iii. A meeting room.
- iv. Copies of an “Uncontrolled” Procedure, Trainee Manual and Work Method Check List. An “Uncontrolled” document has the word Uncontrolled water marked across the page. There are copies of the uncontrolled documents in the trainer’s tool kit. Package the Procedure, Trainee Manual, Work Method Check List and copies of all the forms together for each trainee.
- v. Example copies of the following forms, for each trainee:
  - Water Service Disruption Report
  - Daily Work Report
  - Foreman’s Job Report
  - Worksite – Safety Check Sheet
  - Weekend Material Data Sheet
  - Work Method Checklist
  - Aggregate Tracking Ticket
  - Advisory - Emergency Water Service Interruption (Door Hanger)
- vi. Presentation and presentation equipment.
- vii. The video: Maintaining Water Quality in the Distribution System.
- viii. A T.V. and V.C.R.
- ix. Certificates of completion for each staff member.
- x. Examples of all equipment and materials.
- xi. Doughnuts and Coffee

Training Time Table

Session Number	Time	Activity	8:00am Start Time	8:30am Start Time
Session 1	15min	Introduction	8:00am	8:30am
Session 2	25min	Method and Techniques	8:15am	8:45am
	25min	Video, Personal Protective Equipment	8:40am	9:10am
	25min	Method and Techniques	9:05am	9:35am
	15min	Break	9:30am	10:00am
Session 3	90min	Finish Method and Techniques	9:45am	9:15am
	15min	Break	11:15am	11:45am
Session 4	45min	Review Equipment and Materials	11:30am	12:00am
	60min	Lunch	12:15pm	12:45pm
Session 5	30min	Video: Maintaining Water Quality I the Distribution System	1:45pm	2:15pm
	15min	Discussion	2:00pm	2:30pm
	15min	Break	2:15pm	2:45pm
Session 6	90min	Review Procedure and Forms	2:30pm	3:00 pm
		End of Day	4:00pm	4:30pm

## Session 1

Session 1 is the introduction. Start by introducing yourself, your name your position how long you have been with the City of Saskatoon and anything else you deem applicable. After your introduction discuss what they will be trained on, and example is given below. (If you have already introduced yourself to the group of staff many times, just give a brief explanation of the activity)

## Introduction

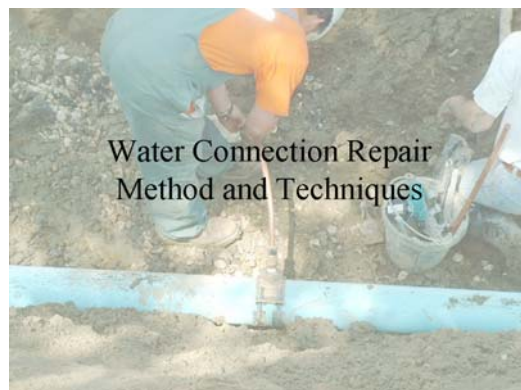
The objective of this course is to train staff on repairing a water connection in a timely, efficient manner while minimizing disruption in service to the customer and insuring the repair meets current standards. Should substandard conditions of the peripheral infrastructure be identified, further renovations will be performed.

## Session 2

Session 2 begins the slide presentation on the methods and techniques section of water connection repair. The trainee's manual will be handed out at the beginning of this session. The overhead transparencies or power point presentation will be used. Show the slide and read any notes in the trainer's copy of the presentation. Feel free to discuss the slide further, if required. Due to time restriction try to get through about half of the slides before the break.

## Methods and Techniques

### Slide 1



To prepare for this section familiarize yourself with the material. Hand out the trainee manuals prior to starting the presentation.

### Slide 2

#### Water Service Disruption Report

- Are prioritized then submitted to Clearances and Locations Work Group.

As the Water Service Disruption Reports appear, each request for repairs needs to be followed through.

## Slide 3

# Water Service Disruption Report

- Section A of the Water Service Disruption Report.

[illegible]

Section A of the Water Service Disruption Report. Contains the general data, the type of interruption, the units affected and all the valves out of service.

## Slide 4

## Water Service Disruption Report

- Section B of the Water Service Disruption Report

Location of Injury	7/19/99	8/2/99	8/10/99	8/17/99	8/24/99	8/31/99	9/7/99	9/14/99	9/21/99	9/28/99	10/5/99	10/12/99	10/19/99	10/26/99	11/2/99	11/9/99	11/16/99	11/23/99	11/30/99	12/7/99	12/14/99	12/21/99	12/28/99	1/4/00	1/11/00	1/18/00	1/25/00	2/1/00	2/8/00	2/15/00	2/22/00	2/29/00	3/7/00	3/14/00	3/21/00	3/28/00	4/4/00	4/11/00	4/18/00	4/25/00	5/2/00	5/9/00	5/16/00	5/23/00	5/30/00	6/6/00	6/13/00	6/20/00	6/27/00	7/4/00	7/11/00	7/18/00	7/25/00	8/1/00	8/8/00	8/15/00	8/22/00	8/29/00	9/5/00	9/12/00	9/19/00	9/26/00	10/3/00	10/10/00	10/17/00	10/24/00	10/31/00	11/7/00	11/14/00	11/21/00	11/28/00	12/5/00	12/12/00	12/19/00	12/26/00	1/2/01	1/9/01	1/16/01	1/23/01	1/30/01	2/6/01	2/13/01	2/20/01	2/27/01	3/5/01	3/12/01	3/19/01	3/26/01	4/2/01	4/9/01	4/16/01	4/23/01	4/30/01	5/7/01	5/14/01	5/21/01	5/28/01	6/4/01	6/11/01	6/18/01	6/25/01	7/2/01	7/9/01	7/16/01	7/23/01	7/30/01	8/6/01	8/13/01	8/20/01	8/27/01	9/3/01	9/10/01	9/17/01	9/24/01	10/1/01	10/8/01	10/15/01	10/22/01	10/29/01	11/5/01	11/12/01	11/19/01	11/26/01	12/3/01	12/10/01	12/17/01	12/24/01	12/31/01	1/7/02	1/14/02	1/21/02	1/28/02	2/4/02	2/11/02	2/18/02	2/25/02	3/4/02	3/11/02	3/18/02	3/25/02	4/1/02	4/8/02	4/15/02	4/22/02	4/29/02	5/6/02	5/13/02	5/20/02	5/27/02	6/3/02	6/10/02	6/17/02	6/24/02	7/1/02	7/8/02	7/15/02	7/22/02	7/29/02	8/5/02	8/12/02	8/19/02	8/26/02	9/2/02	9/9/02	9/16/02	9/23/02	9/30/02	10/7/02	10/14/02	10/21/02	10/28/02	11/4/02	11/11/02	11/18/02	11/25/02	12/2/02	12/9/02	12/16/02	12/23/02	12/30/02	1/6/03	1/13/03	1/20/03	1/27/03	2/3/03	2/10/03	2/17/03	2/24/03	3/3/03	3/10/03	3/17/03	3/24/03	3/31/03	4/7/03	4/14/03	4/21/03	4/28/03	5/5/03	5/12/03	5/19/03	5/26/03	6/2/03	6/9/03	6/16/03	6/23/03	6/30/03	7/7/03	7/14/03	7/21/03	7/28/03	8/4/03	8/11/03	8/18/03	8/25/03	9/1/03	9/8/03	9/15/03	9/22/03	9/29/03	10/6/03	10/13/03	10/20/03	10/27/03	11/3/03	11/10/03	11/17/03	11/24/03	12/1/03	12/8/03	12/15/03	12/22/03	12/29/03	1/5/04	1/12/04	1/19/04	1/26/04	2/2/04	2/9/04	2/16/04	2/23/04	3/1/04	3/8/04	3/15/04	3/22/04	3/29/04	4/5/04	4/12/04	4/19/04	4/26/04	5/3/04	5/10/04	5/17/04	5/24/04	5/31/04	6/7/04	6/14/04	6/21/04	6/28/04	7/5/04	7/12/04	7/19/04	7/26/04	8/2/04	8/9/04	8/16/04	8/23/04	8/30/04	9/6/04	9/13/04	9/20/04	9/27/04	10/4/04	10/11/04	10/18/04	10/25/04	11/1/04	11/8/04	11/15/04	11/22/04	11/29/04	12/6/04	12/13/04	12/20/04	12/27/04	1/3/05	1/10/05	1/17/05	1/24/05	2/1/05	2/8/05	2/15/05	2/22/05	3/1/05	3/8/05	3/15/05	3/22/05	3/29/05	4/5/05	4/12/05	4/19/05	4/26/05	5/3/05	5/10/05	5/17/05	5/24/05	5/31/05	6/7/05	6/14/05	6/21/05	6/28/05	7/5/05	7/12/05	7/19/05	7/26/05	8/2/0
--------------------	---------	--------	---------	---------	---------	---------	--------	---------	---------	---------	---------	----------	----------	----------	---------	---------	----------	----------	----------	---------	----------	----------	----------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	---------	----------	----------	----------	----------	---------	----------	----------	----------	---------	----------	----------	----------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	---------	---------	----------	----------	----------	---------	----------	----------	----------	---------	----------	----------	----------	----------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	---------	----------	----------	----------	---------	----------	----------	----------	---------	---------	----------	----------	----------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	---------	----------	----------	----------	---------	----------	----------	----------	---------	---------	----------	----------	----------	--------	---------	---------	---------	--------	--------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	---------	----------	----------	----------	---------	---------	----------	----------	----------	---------	----------	----------	----------	--------	---------	---------	---------	--------	--------	---------	---------	--------	--------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	---------	--------	---------	---------	---------	--------	---------	---------	---------	-------

Section B of the Water Service Disruption Report contains hydrant, excavation, temporary water, traffic controls and any additional information.

## Slide 5

## Clearances and Locations Work Group

- Provides: drawings, utility locations, location numbers and forms.
- Coordinates the removal of obstructions if required.



The Clearances and Locations Work Group will provide; drawings, utility locations, location numbers, and any required forms. If required the Clearances and Locations Work Group will coordinate the removal of objects obstruction the excavation like trees and utility poles.

## Slide 6

## Daily Work Sheet

- The daily work sheet is created to provide other departments with the location of the Water & Sewer work being performed.

**FIGURE 10-10** Using the SUM function

**A**

Country	Sales	Profit
USA	1000000	100000
Canada	500000	50000
France	750000	75000
Germany	600000	60000
Japan	800000	80000
UK	400000	40000
Italy	300000	30000
Spain	200000	20000
Sweden	150000	15000
Belgium	100000	10000
Switzerland	120000	12000
Australia	180000	18000
South Africa	140000	14000
India	250000	25000
China	350000	35000
South Korea	280000	28000
Taiwan	220000	22000
Hong Kong	180000	18000
Singapore	150000	15000
Malaysia	120000	12000
Thailand	100000	10000
Philippines	80000	8000
Indonesia	60000	6000
Brazil	40000	4000
Argentina	30000	3000
Colombia	20000	2000
Venezuela	15000	1500
Chile	10000	1000
Peru	8000	800
Ecuador	6000	600
Bolivia	4000	400
Paraguay	3000	300
Uruguay	2000	200
Costa Rica	1500	150
Panama	1000	100
Dominican Republic	800	80
Honduras	600	60
Nicaragua	400	40
El Salvador	300	30
Guatemala	200	20
Belize	150	15
Jamaica	100	10
Trinidad and Tobago	80	8
Grenada	60	6
St. Vincent and the Grenadines	40	4
St. Lucia	30	3
Barbados	20	2
Antigua and Barbuda	15	1.5
Aruba	10	1
Curaçao	8	0.8
Suriname	6	0.6
Guayana Francesa	4	0.4
Reunion	3	0.3
Mayotte	2	0.2
French Polynesia	1	0.1
Wallis and Futuna	0.5	0.05
French Southern Territories	0.2	0.02
Other	1000000	100000
<b>TOTAL</b>	<b>10000000</b>	<b>1000000</b>

**B**

Country	Sales	Profit
USA	1000000	100000
Canada	500000	50000
France	750000	75000
Germany	600000	60000
Japan	800000	80000
UK	400000	40000
Italy	300000	30000
Spain	200000	20000
Sweden	150000	15000
Belgium	100000	10000
Switzerland	120000	12000
Australia	180000	18000
South Africa	140000	14000
India	250000	25000
China	350000	35000
South Korea	280000	28000
Taiwan	220000	22000
Hong Kong	180000	18000
Singapore	150000	15000
Malaysia	120000	12000
Thailand	100000	10000
Philippines	80000	8000
Indonesia	60000	6000
Brazil	40000	4000
Argentina	30000	3000
Colombia	20000	2000
Venezuela	15000	1500
Chile	10000	1000
Peru	8000	800
Ecuador	6000	600
Bolivia	4000	400
Paraguay	3000	300
Uruguay	2000	200
Costa Rica	1500	150
Panama	1000	100
Dominican Republic	800	80
Honduras	600	60
Nicaragua	400	40
El Salvador	300	30
Guatemala	200	20
Belize	150	15
Jamaica	100	10
Trinidad and Tobago	80	8
Grenada	60	6
St. Vincent and the Grenadines	40	4
St. Lucia	30	3
Barbados	20	2
Antigua and Barbuda	15	1.5
Aruba	10	1
Curaçao	8	0.8
Suriname		

A daily work sheet is created to provide other departments with the location of the Water & Sewer work being performed that day.

## Slide 7

## Daily Work Sheet Section A

- Section A shows the tasks for each Supervisor IV.

[illegible]

Section A shows the tasks for each Supervisor IV. In this view status, location, repair type, priority, GIS #, job #, location #, activity #, and GL # are shown. The staff not at work are listed at the bottom of section A.

## Slide 8

## Daily Work Sheet Section B

- Section B shows additional information.

Category	Item	Value	Unit	Notes
Category 1	Item 1	100	kg	Weight of Item 1
Category 1	Item 2	200	kg	Weight of Item 2
Category 1	Item 3	300	kg	Weight of Item 3
Category 1	Item 4	400	kg	Weight of Item 4
Category 1	Item 5	500	kg	Weight of Item 5
Category 1	Item 6	600	kg	Weight of Item 6
Category 1	Item 7	700	kg	Weight of Item 7
Category 1	Item 8	800	kg	Weight of Item 8
Category 1	Item 9	900	kg	Weight of Item 9
Category 1	Item 10	1000	kg	Weight of Item 10
Category 2	Item 1	100	kg	Weight of Item 1
Category 2	Item 2	200	kg	Weight of Item 2
Category 2	Item 3	300	kg	Weight of Item 3
Category 2	Item 4	400	kg	Weight of Item 4
Category 2	Item 5	500	kg	Weight of Item 5
Category 2	Item 6	600	kg	Weight of Item 6
Category 2	Item 7	700	kg	Weight of Item 7
Category 2	Item 8	800	kg	Weight of Item 8
Category 2	Item 9	900	kg	Weight of Item 9
Category 2	Item 10	1000	kg	Weight of Item 10
Category 3	Item 1	100	kg	Weight of Item 1
Category 3	Item 2	200	kg	Weight of Item 2
Category 3	Item 3	300	kg	Weight of Item 3
Category 3	Item 4	400	kg	Weight of Item 4
Category 3	Item 5	500	kg	Weight of Item 5
Category 3	Item 6	600	kg	Weight of Item 6
Category 3	Item 7	700	kg	Weight of Item 7
Category 3	Item 8	800	kg	Weight of Item 8
Category 3	Item 9	900	kg	Weight of Item 9
Category 3	Item 10	1000	kg	Weight of Item 10
Category 4	Item 1	100	kg	Weight of Item 1
Category 4	Item 2	200	kg	Weight of Item 2
Category 4	Item 3	300	kg	Weight of Item 3
Category 4	Item 4	400	kg	Weight of Item 4
Category 4	Item 5	500	kg	Weight of Item 5
Category 4	Item 6	600	kg	Weight of Item 6
Category 4	Item 7	700	kg	Weight of Item 7
Category 4	Item 8	800	kg	Weight of Item 8
Category 4	Item 9	900	kg	Weight of Item 9
Category 4	Item 10	1000	kg	Weight of Item 10
Category 5	Item 1	100	kg	Weight of Item 1
Category 5	Item 2	200	kg	Weight of Item 2
Category 5	Item 3	300	kg	Weight of Item 3
Category 5	Item 4	400	kg	Weight of Item 4
Category 5	Item 5	500	kg	Weight of Item 5
Category 5	Item 6	600	kg	Weight of Item 6
Category 5	Item 7	700	kg	Weight of Item 7
Category 5	Item 8	800	kg	Weight of Item 8
Category 5	Item 9	900	kg	Weight of Item 9
Category 5	Item 10	1000	kg	Weight of Item 10

Section B shows additional information on signing, GIS#, utility locations, staffing and comments.

## Slide 9

## Daily Work Sheet Section C

- Section C shows work pending.

Expanding Water & Sewer Works									
DATE	LOCATION	WATER FLOW	WATER PRESS	WATER TEMP	WATER QUAL	WATER QTY	WATER QTY	WATER QTY	WATER QTY
10/1/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/2/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/3/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/4/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/5/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/6/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/7/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/8/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/9/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/10/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/11/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/12/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/13/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/14/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/15/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/16/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/17/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/18/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/19/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/20/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/21/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/22/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/23/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/24/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/25/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/26/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/27/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/28/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/29/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/30/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000
10/31/2010	Station 10+00	1000	100	10	10	1000	1000	1000	1000

Section C shows pending work.

## Slide 10

## Pick up Materials

- The Supervisor IV will pick up the required materials



The Supervisor IV will pick up all materials that can be transported with a  $\frac{3}{4}$  ton truck from Public Works Stores. (For larger material a truck hoist or tandem truck will be used)



Slide 11

Choosing Shoring

- Choose size and type of shoring based on type of soil, trench width and trench depth.



Excavator/backhoe and type of shoring will be chosen based on type of soil, and the width and depth of excavation/trench. The Supervisor IV will choose which equipment to be used.

Slide 12

Trailer Location

- Locate trailers clear of the excavation.



Upon arrival at the work site, an appropriate location for the trailers will be determined in order to keep them clear of the excavation site.

Slide 13

APWA Colour Codes

- Representatives from utility companies can field locate their lines if required.



Representatives from utility companies can field locate their lines if required. All buried and overhead utilities shall be identified and marked prior to beginning an excavation. The Clearances and Locations Work Group representative or the Supervisor IV will mark the city owned utilities. Locations of the utilities will be a determining factor in performing the excavation.

Slide 14

Cutting Asphalt

- Cut the asphalt with an earth saw (winter) or asphalt saw (summer)



Every effort should be made to cut the asphalt or concrete with an earth saw (winter), quickie saw or asphalt saw (summer), prior to excavating.

Slide 15

Asphalt / Concrete Recycling

- Asphalt or concrete will be stripped, separated and hauled away



Asphalt or concrete will be stripped, separated and hauled away to the designated reclamation site. Asphalt and concrete are to be recycled.

Slide 16

Emergency Water Supply Trailer

- Emergency water supply trailers and temporary hook ups are options to consider when there is a water outage.



Emergency water supply trailers can be used to supply water to residents during a water outage. It is important to ensure the emergency water supply trailer is kept clean.

Slide 17

Service Interruption Advisory

- Advisory door hangers are to assist in notifying residents of a water service interruption.



Service interruption advisories will be distributed in the case of a water disruption more than 1 hr but less than 36hr. Each affected residence will receive a door hanger on the main entrance door as well as a verbal message.

Slide 18

Service Interruption Advisory

- The back of the door hanger also has information on what to do when the water is turned back on.



The date and time of the start of the water disruption must be written or stamped on the back of the hanger. Apartments require hangers on the main doors only. Gated communities will require hangers on each residence if access is given to the community, if not hangers may be posted on the main entrances.

Slide 19

### Temporary Water Connection

- Temporary water connections connect to neighbouring residences.



Temporary water connections are sometimes used to supply water when a curb stop is being replaced. Temporary hook ups can be installed from neighbouring properties or a hydrant.

Slide 20

### Excavation

- Ensure excavation is on the opposite side of the sewer connection, - if possible.



It is not always possible to excavate on the opposite side of the sewer connection, but try to do so when ever possible.

Note that the asphalt has not been cut with an asphalt saw.

Slide 21

### Spoil Piles

- Keep 1.2 m (4ft) from the edge of the excavation to the toe of the spoil pile.

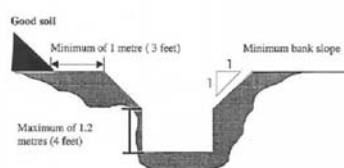


The trench will be sorted into salvageable material (wet or dry) and non-salvageable material. If stockpiling of salvageable material on site is not a viable option, a dumpsite will be used. The toe of the spoil piles must be a minimum of 1m (3feet 4inches) from the edge of the excavation.

Slide 22

### Sloping The Trench Walls

- Protect labourers in an excavation by sloping the walls or installing shoring.

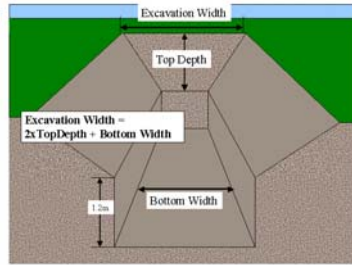


Protect labourers in an excavation by sloping the walls or installing shoring. A combination 1:1 (45 degree) slope and vertical face may be used, as long as the vertical face does not exceed 1.2m (4feet) and the overall depth of the excavation is not greater than 5m (15feet)

## Slide 23

## Excavation Size

- Calculate the size of the excavation.

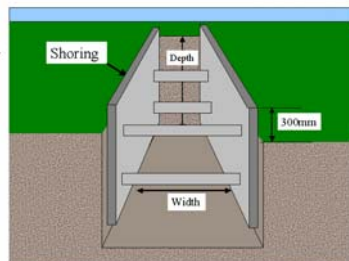


To calculate the size of the excavation if shoring is not used, determine the depth required. The depth can be determined by measuring manhole depths, valve casings, valve chambers etc. Use the formula shown.

## Slide 24

## Excavation With Shoring

- Install shoring instead of sloping the excavation walls.



It is best practice to minimize the size of the excavation by installing shoring instead of sloping the excavation walls.

## Slide 25

## Unknown Service Depth

- The Labourer shall probe for underground utilities using the feeling rod.

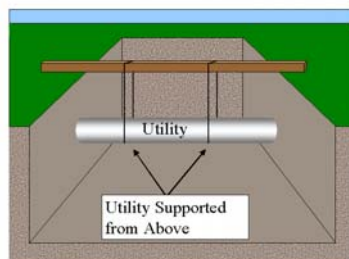


When locating a buried utility deeper than 1.2meters (4feet), shoring must be placed in excavation prior to worker probing for the utility. The feeling rod can be used from outside of the excavation. Underground services within 600mm (2feet) of the excavation must be exposed by hand or other approved systems (hydro excavation).

## Slide 26

## Supported Utility

- Other Utilities must be supported



Buried utilities will be supported as required during excavation.



Slide 27

Excavator/Backhoe Safety

- In the event of hitting a natural gas line turn off all equipment immediately.



In the event that a natural gas line is hit, the machine must be immediately turned off as the engine may ignite the gas (especially in calm conditions). In this photo the excavator hit an underground propane line.

Slide 28

Power Line Safety

- Do not exit equipment if it has contacted a power line.



If the vehicle contacts overhead power lines do not exit the vehicle until told it is safe to do so by qualified personnel. If a fallen live wire lies across the vehicle or the equipment, stay in place until the utility owner arrives. Do not attempt to move fallen wires. Always assume that the wires are energized and capable of injuring or killing. Inform Clearances and Locations Work Group and the Supervisor IV of the damaged utility.

Slide 29

Excavation Safety

- Keep everyone out of the Danger Zone.



Do not go in between the excavator bucket and the truck being loaded. Do not stand under the bucket of the excavator/backhoe. Keep clear of the swing of the turntable and reach of the excavator/backhoe.

Slide 30

Excavation Safety

- Do not enter an excavation until all safety requirements have been followed.



No worker will enter a trench greater than 1.2m (4feet) in depth, without the installation of a temporary protective structure.

Slide 31

Submersible Pump

- A submersible pump may be used to remove water.



Should excess amounts of water be observed in the trench, prepare sump and install a submersible pump.

Slide 32

Shoring and Trailer

- Inspect the shoring before use.



Make sure shoring and trailer, are clean and in proper working order for transporting. Shoring trailers shall not be used to transport material unless designated for such use. Park trailer where there are no overhead lines or tree branches. Check for cracks on the shoring eyebolts and chains. Ensure that tie down straps are in good condition (Not frayed or torn).

Slide 33

Unloading Shoring

- Hook up chain of adequate length so as not to crowd lift or flexibility.



Hook up chain appropriately so as not to crowd lift or flexibility. Keep the chain short when transporting the shoring from the trailer to the excavation, this prevents the shoring from swinging excessively.

Slide 34

Shoring Installation

- Use the excavator/backhoe to install shoring.
- Naturally frozen soil is not a substitute for shoring.



Position the excavator/backhoe far enough back so the shoring can be lifted and lowered safely. Use tag lines wherever possible. Naturally frozen soil is not considered safe and therefore must be shored.

Slide 35

Shoring Endplates

- Endplates must be installed if the excavation ends are not sloped



Once the shoring is in the excavation the side panels must be expanded hydraulically to be tight against the excavation walls. Endplates must be installed if the ends of the excavation are not sloped.

Slide 36

Tool Disinfection

- All tools must be disinfected prior to use.



All tools must be disinfected prior to use on a water connection repair, especially if they have been previously used on a sewer repair. Ensure that a proper disinfectant applicator is used.

Slide 37

Tool Disinfection

- Soak items with disinfectant solution (Minimum 5% sodium hypochlorite solution).



Clean off excess dirt with a rag and wire brush prior to soaking with disinfectant. Soak items with disinfectant solution (Min 5% Sodium Hypo-chlorite solution), let soak for a minimum of 7 seconds. Scrub item with a clean rag, and then rinse clean with disinfectant solution. Let tools dry before use.

Slide 38

Entering Excavation

- Wear personal protective equipment.
- Lower tools with a bucket and rope.



After shoring is in place, install and secure the ladder in the excavation. Labourers must wear all the required personal protective equipment.

All hand tools are lowered into the excavation using a bucket and rope. **Never** throw tools into the excavation.

---

Slide 39

Using Ladder

Three points of contact must be kept on the ladder when in use.

- Three points of contact.



---

Slide 40

Excavation By Hand

Expose pipe by removing soil with tunnelling shovel

- Clear area around the pipe with a shovel.



---

Slide 41

Wash Pipe

Pipe should be washed in order to inspect condition and to determine what method and materials will be used to perform repairs.

- Wash and inspect condition of pipe.



---

Slide 42

Water Connection Repair

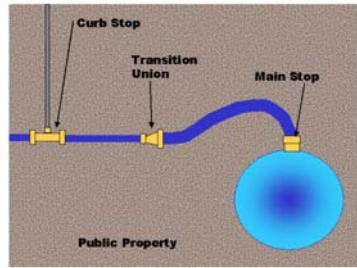




Slide 43

Water Connection

- Water connection repairs include anything from the main to the curb stop.

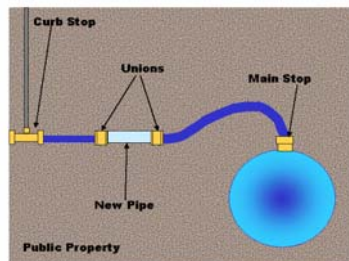


Water connection repairs include anything from the main stop to the curb stop. The repair can be the replacement of a section of pipe or the replacement of the main stop and the connection pipe.

Slide 44

Replacing Pipe

- Small damaged sections of pipe can be replaced, and connected with unions.

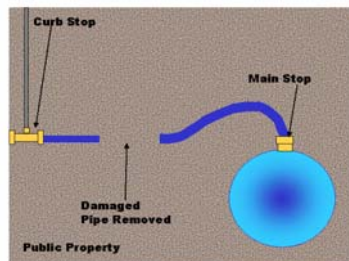


If a small section of pipe is damaged it can be replaced with a new section of pipe and two unions

Slide 45

Remove Damaged Pipe

- Cut out damaged pipe.



Remove the damaged pipe section and cut new pipe to fit.

Slide 46

Polyethylene Insert

- Inserts shall be used on polyethylene pipe.



If using polyethylene pipe, polyethylene inserts must be put into the pipe prior to inserting it into the union.

---

Slide 47

Union

- The union will be used to connect the new pipe to the existing pipe.



Unscrew the nuts on the ends of the union. Slide the nut onto the pipe, and then slide the pipe into the union until it hits the centring stop.

---

Slide 48

Install Union

- Install union on the pipe.



Tighten the nut on the union. Repeat the process with the other pipe end.

---

## Session 3

Session 3 completes the review of the methods and techniques section of the slide presentation. You should be able to finish reviewing the slides during this session. Try to leave a little time at the end for a question period. Do not go on to the resources required section of the presentation, this will be covered in the next session.

### Method and Techniques

---

Slide 49



Slide 50

Replacing a Main Stop

- A service clamp or tapping sleeve must be used when replacing a main stop.



If the main stop requires replacement it must not be inserted into old direct taps, instead a service clamp or tapping saddle must be used.

Slide 51

Remove Existing Main Stop

- To remove the main stop, disconnect the pipe, then unscrew the main stop from the main.



To remove the existing main-stop loosen the brass nut on the main stop and pull existing pipe out. Unscrew the main stop from the main, service clamp or tapping sleeve.

Slide 52

Protect Water Supply

- Tie a rag around the end of the pipe to prevent debris from entering.



Move the existing pipe to make room for the repair. Tie a rag around the end to prevent debris from entering the pipe.

Slide 53

Wash the Watermain

- Clean the entire circumference of the watermain.



Clean entire circumference of water main, attention should be given to area around tapping hole. This will ensure the gasket seals properly.

---

Slide 54

**Install Service Saddle**

- Put the top section of the service saddle on the pipe.



Set the top section of the service saddle on the pipe. Slip the strap under the pipe.

---

Slide 55

**Connect Straps**

- Attach the straps to the service saddle.



Slip the second strap under the pipe. Feed the threaded section of the straps through the top section.

---

Slide 56

**Affix Nuts**

- Hand tighten the nuts to the bolts on the straps.



Hand tighten the service saddle nuts onto the threaded sections of the straps.

---

Slide 57

**Tighten Nuts**

- Tighten the nuts alternately.



Tighten the nuts with the strong arm.



Slide 58

**Tighten Clamp or Sleeve**

- Tighten the clamp or sleeve with the drill.



Tighten new service clamp or tapping sleeve over cleaned pipe. Make certain the holes line up with water main and service clamp or tapping sleeve

Slide 59

**Tighten Alternately**

- The nuts must be tightened alternately.



Alternately tighten bolts to ensure even torque and periodically check alignment of the tapping. The service saddle shall be torqued to 45 ft-lbs and the tapping sleeve is torqued to 30-35 ft-lbs.

Slide 60

**Install Main Stop**

- Thread the main stop into the clamp or sleeve.



Install main stop into service clamp or tapping sleeve. Threads of main stop should be covered with Teflon tape. Tighten with pipe a wrench.

Slide 61

**Installing Pipe**

- If using existing pipe, check it for damage prior to inserting into the main stop.



If the existing water connection pipe is copper or polyethylene than it can be reconnected to the curb stop. Ensure the pipe is checked for damage prior to re-connecting it.

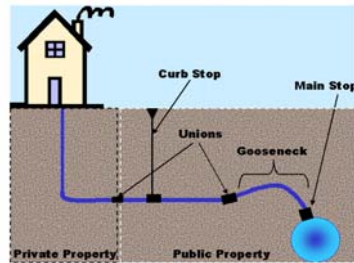
Slide 62



Slide 63

Gooseneck

- Install a gooseneck section from the main stop.



If the existing water connection pipe is not copper or polyethylene the pipe must be cut back and a “goose necked” section of copper pipe will be installed from the main stop.

Slide 64

Cut Pipe

- Cut pipe back 1m (3ft), to allow for gooseneck.



Cut existing pipe back approximately 1m (3ft). Make sure the new copper pipe is not flattened or deformed.

Slide 65

Cut Copper Pipe

- Cut the copper pipe with the copper pipe cutters.



Cut a new piece of copper pipe with the copper pipe cutters.

---

Slide 66

**Bend Copper Pipe**

- Bend the copper pipe until it has an angle of approximately 85°.



Bend the pipe slowly so it angles about 85°.

---

Slide 67

**Join Gooseneck**

- Connect gooseneck and existing pipe together with a union.



Join the two pieces of pipe (existing and gooseneck) together by means of a brass compression fitting or union

---

Slide 68

**Connect Gooseneck to Main**

- Slide the compression nut onto the pipe.



Connect the gooseneck pipe section to the water main. Take compression nut off main stop and slide over new copper

---

Slide 69

**Insert Pipe Into Main Stop**

- Insert pipe and thread compression nut.



Insert pipe into main stop and slide nut back to hand start threads. Caution must be taken not to cross thread the nut. If having difficulty starting threads, wiggle copper pipe to align threads.

---

Slide 70

**Tighten Compression Nut**

Tighten the compression nut onto the main stop, using crescent wrenches.

- Tighten the compression nut using crescent wrenches.



---

Slide 71

**Open Main Stop**

After both union and main stop have been tightened open main stop slowly.

- Slowly turn the main stop to the open position.



---

Slide 72

**Inspect For Leaks**

Check the main stop and connection pipe for leaks.

- Inspect the new repair for leaks.



---

Slide 73

**Anode Installation**





---

Slide 74

12 lb Anode

- The 12lb anode is used on copper connection pipe.



A 12lb anode must be installed on copper service connections, connected to non-metallic water mains.

---

Slide 75

Brass Clamp

- A brass clamp will connect the anode wire to the pipe.



A brass anode clamp will be used to connect the anode to copper pipe. Loose the screws and open as shown in Figure 70 - Open Anode Clamp.

---

Slide 76

Install Clamp

- Install clamp and tighten.



Install clamp onto pipe and tighten screws.

---

Slide 77

Top Screw

- Loosen the screw on the top of the clamp.



Loosen the top screw.

---

Slide 78

Anode Wire

Insert the anode wire under the top screw of the clamp.

- Insert Anode wire into clamp.



---

Slide 79

Tighten Screw

Tighten the top screw.

- Tighten the top screw with the anode wire in place.



---

Slide 80

Wet Anode

In order for the anode to work, the cardboard packaging must be wet. Depending of the ground conditions, it can take several months to a year before a dry anode will soak up enough groundwater to work efficiently. In order to allow the anode to function sooner, it is standard practice to soak the anodes with water before backfilling.

- Wet the cardboard anode packing before backfilling.



---

Slide 81

Post Replacement



Slide 82

Labourer Exiting Excavation

- Remove all hand tools from excavation.
- Exit and remove ladder.



All hand tools and ladder are removed from excavation after the replacement is complete. **Never** throw tools out of excavation. Clean tools prior to storing.

Slide 83

Connection Flushing

- Flush through the private connection tap.



The water connection will be flushed through a private tap for approximately 5min. If it is believed that the watermain has been contaminated the main will be flushed through the appropriate hydrant.

Slide 84

Tap Aerator

- Remove the aerator from the tap before flushing.



If a water sample is taken at a private tap, remove the aerator, flush the tap and then take the sample. Ensure the address and location of the taps is recorded.

Slide 85

Flushing Through Hydrant

- The repair may require flushing through the hydrant.



If unable to flush the connection through a private tap or if it is believed the water main has become contaminated then use a hydrant for flushing. Disinfect throttle valve and hydrant port with disinfectant solution. Attach throttle valve and hose onto hydrant. Ensure throttle valve is open and run hose to the storm manhole or catch basin; alternately a diffuser can be used.

Slide 86

Water Quality Testing

- Test for turbidity and chlorine.
- Take a water sample in water sample jar.



Test for turbidity and chlorine. Flush until turbidity and chlorine levels have been met. Take a water sample with the water sample jar. Deliver water sample to the water treatment plant for bacteriological testing. Follow the procedures in the water quality SOP.

Slide 87

Test Results

- Keep repair isolated until test results are received.



If the repair requires testing it will be left isolated from the rest of the water system until bacteriological results have been received.

Slide 88

Removal of Shoring

- The shoring should be removed and placed on it's trailer.



Shoring is removed from excavation by the Excavator/Backhoe and placed on the trailer. Ensure shoring equipment and the trailer are cleaned, serviced, repaired or replaced and are ready for the next job. End plates must be stored in proper place on the trailer.

Slide 89

Backfill, General Information





---

Slide 90

**Saturated or Unsuitable Soil**

- Remove unsuitable material



If soil conditions at base of excavation are unstable, remove unsuitable material and replace with crushed rock and/or granular material.

---

Slide 91

**Backfill Materials**

- Cover and compact services connection and mains with 150mm (6inches) of granular material.



Cover services connection and mains with 150mm (6inches) of granular material and compact. Use spoil material if suitable. If not bring in clean backfill material.

---

Slide 92

**Non-shrink Backfill Materials**

- Non-shrink backfill shall be used beneath concrete or paving stone.



Non-shrink backfill shall be used beneath (concrete or paving stone), sidewalks or driveways. Leave non-shrink backfill a minimum of 300mm (12inches) below grade.

---

Slide 93

**Backfilling Other Utilities**

- Ensure utilities are supported according to the specifications of the owner of the utility.



Ensure utilities are backfilled according to the specifications of the owner of the utility. A representative from the utility may be required to inspect and approve the bedding.

---

Slide 94

**Backfill Material**

- Backfill material must conform to City of Saskatoon standards.



Backfill material should be free from loam [fertile material] sod, boulders, foreign material and frozen lumps.

---

Slide 95

**Compactors**

- Method of compaction to be used will be decided based on suitability.



There are many different types of equipment used for compacting. The equipment commonly used by the City of Saskatoon is given in the next slides.

---

Slide 96

**Handheld Plate Tamper**

- Handheld plate tampers are to be used for compacting in the pipe zone, around manholes etc.



Handheld plate tampers are to be used for compacting in the pipe zone, around manholes etc. Backfill shall be placed in 150mm (6inches) lifts.

---

Slide 97

**Hydraulic Tamper**

- Hydraulic tamper is an attachment for the excavator.



Hydraulic tamper [excavator attachment] cannot be used closer than 1m (3feet) directly above pipe or service. Use with 150mm (6inches) lifts.

---

Slide 98

Walk Behind Tamper

- Walk behind vibratory compactor.



Walk behind vibratory compactor can be used around mains, connections and manhole barrels etc. Backfill shall be placed in 150mm (6inch) lifts.

---

Slide 99

Tamping with Excavator/Backhoe

- Tamping using excavator/backhoe bucket is not an approved method of compacting.



Bucket tamping is not an approved method of compacting.

---

Slide 100

Traffic Control

- Remove all unnecessary traffic control devices.



Before leaving the site all unnecessary traffic control devices will be removed, as per traffic control manual.

---

Slide 101

Site Restoration

- Re-sodding



Others will perform site restoration.

Slide 102



## Session 4

Session 4 reviews the last section of the slide presentation on resources required. Get the examples of the equipment out and ready to pass around. When discussing each piece of equipment have it passed around. It is easiest to have all the equipment laid out on a table in the same order as the slides. You should be able to finish reviewing the slides during this session. Try to leave a little time at the end for a question period.

### Resources Required

Slide 1



To prepare for this section familiarize yourself with the equipment and material.

Slide 2



The number or staff required may vary depending on the size of the job.



Slide 3

There is one Supervisor IV.

1 – Supervisor IV



Slide 4

2 - Labourers



Two labourers are required, one will work out of the excavation (top labourer) and one will work in the excavation (bottom labourer). Occasionally the (working) Supervisor IV will fulfill the role of top or bottom labourer.

Slide 5

1 - Backhoe Operator



One backhoe/excavator operator will be required.

Slide 6

2 - Tandem Axle Truck Operators



Two tandem axle truck operators may be required.

Slide 7

1 - Loader Operator



Occasionally a loader operator is required.

Slide 8



(If included) Get the box of example tools ready to pass around. Pass each tool out when you come to that slide.

Slide 9

Feeling Rod



The feeling rod is used for finding buried utilities.

Slide 10

Tunnelling Shovel



The tunnelling shovel is used for digging around the pipe.

Slide 11

Shovel



The shovel is used for digging.

Slide 12

Broom



The broom is used for site clean up.

Slide 13

Drill with 1-1/16" Deep Socket



The drill is used to tighten the bolts on the service clamps or tapping sleeve.

Slide 14

Strong Arm



The strong arm is used for tightening the bolts on the service clamps or tapping sleeve.

Slide 15

Sledge Hammer



The sledgehammer can be used for knocking the support block into place.

Slide 16

Pick Axe



The pickaxe is used to break up hard soil.

Slide 17

Valve Key



The valve key is used to open and close valves.

Slide 18

Disinfectant Sprayer



The disinfectant sprayer is used to spray disinfectant solution on contaminated tools and equipment.

---

Slide 19

Asphalt Saw



The asphalt saw is used to cut asphalt or concrete.

---

Slide 20

Emergency Water Supply Trailer



The emergency water supply trailer is used to supply water to customers.

---

Slide 21

Crew Trailer



The crew trailers are used for storage and as a mobile office.

---

Slide 22

Excavator/Backhoe



The excavator/backhoe is used to excavate, but it can also be used to lift heavy equipment like shoring.



---

Slide 23

Shoring & Trailer



Shoring is used in excavation to protect workers from the excavation collapsing.

---

Slide 24

Truck



The trucks are used to haul material and tow trailers.

---

Slide 25

Front End Loader



The front-end loader is used to load trucks with backfilling materials.

---

Slide 26

Hydrant Key



The hydrant key is used to open and close hydrants.

Slide 27

Hydrant Hose



The hydrant hose can be used for hydrant flushing.

Slide 28

Diffuser



The hydrant diffuser is used to lessen the discharge from the hydrant.

Slide 29

Hydraulic Tamper



Hydraulic tamper is a attachment for the excavator. It is used to compact the soil.

Slide 30

Vibratory Compactor



Vibratory compactors are compactors used for small areas.

Slide 31

Handheld Plate Tamper



Handheld plate tampers are compactors also used to compact small areas.

Slide 32

Turbidity Meter



Turbidity is a measurement of particles in the water sample.  
The more particles in the water, the higher the turbidity.

Slide 33

Chlorine Tester



The chlorine tester is used to test how much chlorine is in the water after the main has been disinfected and flushed.

Slide 34

Crescent Wrench



The crescent wrench can be used to tighten all fittings, and to open and close the main stop.



Slide 35

Copper Pipe Cutters



The copper pipe cutter is used to cut copper pipe.

Slide 36

Hacksaw



The hacksaw is used to cut the polyethylene or lead pipe.

Slide 37

Pipe Wrench



The pipe wrench can be used to tighten fittings.

Slide 38

Levelling Rake



The levelling rake is use to smooth and level the backfill

Slide 39

Torque Wrench



The torque wrench is used to supply a precise amount of torque.

Slide 40

Copper Pipe Bender



The copper pipe bender is used to precisely bend the copper pipe for the goose neck.

Slide 41



To prepare for the next section get the box of example materials ready to pass around.

Slide 42

Service Saddle



The service saddle is used to connect a water connection to the watermain.

Slide 43

Tapping Sleeve



The tapping sleeve is also used to connect the water connection to the watermain.

Slide 44

Polyethylene Pipe Insert



The polyethylene pipe insert is used to prevent kinking of the polyethylene pipe at the curb stops or unions.

Slide 45

Copper Pipe



Copper pipe is used by the City on water connections.

Slide 46

Brass Union



The brass union is used to connect copper and/or polyethylene pipe.

Slide 47

Transition Union



Transition unions are used to connect pipe with different outside diameters, like lead and copper pipes.

Slide 48

Water Sample Jar



The sample jar is used to take water samples to the water treatment plant for testing.

Slide 49

Cleaning Rags



Clean rags are used to clean the pipe.

Slide 50

Treated Wooden Blocks



The treated wooden blocks are used to support unions and the curb stop.

Slide 51



## Session 5

Session 5 will include a work exercise and discussion. For an exercise, show a video and then discuss.

Show the Video: Maintaining Water Quality In the Distribution System.

Discuss any discrepancies noticed in the video.

## Session 6

Session 6 will review the procedure and all the required forms. Start by handing out the procedure and review it. Hand out all the required forms, then review each. A general overview of the procedure and each form is given below.

### Procedure Introduction

The procedure is a document that focuses: the roles and responsibilities of the required persons, for a specific task and the critical steps of the task.

Procedures are used primarily during training for a task, and then mainly as a reference document. Procedures should be auditable by either inspection during the process or by review of an audit trail upon completion of the process. Procedures are not intended to be used while the task is being preformed.

### Water Service Disruption Report

This form is used to initiate maintenance. It has replaced the sewer and water maintenance memo. It is given to the locations department.



## Daily Work Report

This is a list of all the work being performed or to be performed and who is performing the work. This form comes from the supervisor VI and goes out to all the supervisors IV and departments involved in a task.

## Foreman's job report

This report details the work that has been completed. It is given to the supervisor IV with the worksite safety check sheet, by the locations department.

## Worksite – Safety Check Sheet

This report lists all the safety requirements that must be met. It is handed out with the Foreman's job report.

## Standard Distribution System Flushing and Sampling Form

This is for tasks that require water quality testing. This form is taken with the water sample to the water treatment plant for testing.

## Deep Excavation Notification Form

This form is filled out for excavations deeper than 5 meters. The form is sent to Sask. labour and Occupational Safety Superintendent (Charlie Cairns) from Corporate Services - Employee Services.

## Weekend Material Data Sheet

This form is filled out on the weekend when supplies are taken from central or engineering stores. The form is given to stores.

## Confined Space Entry Inspection Form

This form is filled out when staff enters a confined space, such as manholes and valve chambers. The form should be given to the supervisor.

## Work Method Checklist

This form is taken to the job site and the critical steps are checked off as they are completed. The purpose of this form is to ensure none of the important steps are forgotten and to understand how each crew performs each task.

## Advisory - Emergency Water Service Interruption (Door Hanger)

These hangers are to be distributed in instances where water service will be disrupted for more than one hour but less than 36 hours. These hangers will be given in conjunction with the conversation or left in the event that there is no one on hand to speak to. Using either the stamps in the kit or an ink pen, mark the

date and time on the top of the back of the advisory. Each home in the affected area should receive one door hanger on the doorknob of the main entry into the home or another visible access into the building.

Uncontrolled