Trainers Manual

B111

CITY OF SASKATOON

Water and Sewer Section

Sewer Main Repair Trainer's Manual

Version # 1-1-2

CITY OF SASKATOON

Sewer Main Repair Trainers Manual

Table of Contents

Preparation for Training

Resources for Training:

i. A list of the staff requiring training.
ii. Familiarization with trainer's manual.
iii. A meeting room.
iv. Copies of an "Uncontrolled" procedure, Work Method Checklist and Trainee Manual for each trainee. An "Uncontrolled" procedure has the word Uncontrolled watermarked across the pages (found in the trainer's tool kit).
v. The videos, *Submersible Solids Handling Pumps* and *Substance Abuse in the Workplace: Water Utilities at Risk*.
vi. Copies of f the City of Saskatoon Administrative Policy Alcohol and Drug Policy or each trainee manual, found at W:\Office\POLICIES\Administrative Policies/A04-021.doc
vii. Example copies of the following forms, for each trainee's manual (found in the trainer's tool kit):
    - Sewer and Water Maintenance Memo
    - Daily Work Report
    - Foreman's Job Report
    - Worksite – Safety Check Sheet
    - Deep Excavation Notification Form
    - Weekend Material Data Sheet
    - Confined Space Entry Inspection Form
    - Aggregate Tracking Ticket
viii. Presentation and presentation equipment.
ix. If showing a video in Session 5, a T.V. and V.C.R. will be required.
x. Certificates of completion for each staff member.
xi. Examples of all equipment and materials.
xii. Doughnuts and coffee.

Training Time Table

Session Number	Time	Activity	7:30am Start Time	8:00am Start Time
Session 1	15min	Introduction	7:30am	8:00am
Session 2	25min	Method and Techniques	7:45am	8:15am
	20min	Submersible Solids Handling Pumps	8:10am	8:40am
	30min	Method and Techniques	8:30am	9:00
	15min	Break	9:00am	9:30am
Session 3	30min	Finish Method and Techniques	9:15am	9:45am
	15min	Break	9:45am	10:15am
Session 4	90min	Review Equipment and Materials	10:00am	10:30am
	60min	Lunch	11:30pm	12:00pm
Session 5	30min	Video: Substance Abuse in the Workplace: Water Utilities at Risk	12:30pm	1:00pm
	30min	Video Discussion	1:00pm	1:30pm
	15min	Break	1:30pm	2:00pm
Session 6	90min	Review Procedure and Forms	1:45pm	2:15pm
		End of Day	3:15pm	3:45pm

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 the staff will be trained on. An example is given below.

Introduction

The objective of this course is to train staff on how to repair a sewer main in a timely, efficient manner, while minimizing disruption in service to the customer and insuring the sewer main meets current

standards. Should substandard conditions of the peripheral infrastructure be identified, further renovations will be performed. This training only applies to the repair of the sewer main at the point of excavation.

Session 2

Session 2 begins the slide presentation on the methods and techniques section of repairing a sewer main. The trainee's manual will be handed out at the beginning of this session. The overhead transparences 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. Due to time restriction try to get through about half of the slides before the break. A video will be shown in the first section of the slide presentation, watch the trainer's notes for the appropriate time.

Methods and Techniques

Slide 1.

To prepare for this section review each slide. Hand out the trainee manuals before starting the slide presentation.

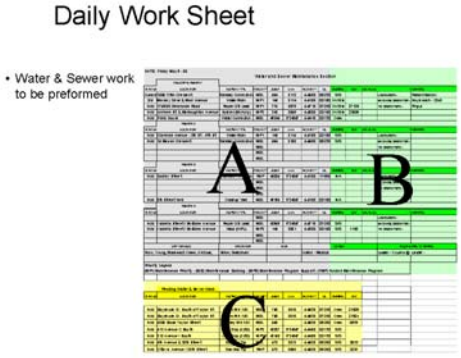
Slide 2.

As the Water and Sewer Maintenance Requirement Memo's are created, each request for repairs needs to be followed through first by prioritizing them, then submitting them to the Clearances and Locations Work Group. The Memo must include a WRR#.

Slide 3.

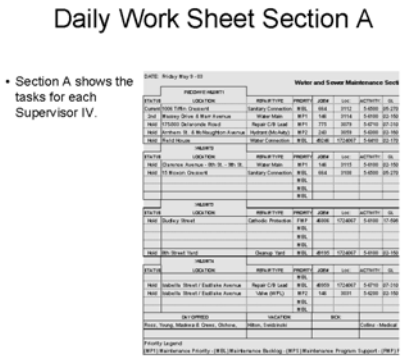
If required, the Clearances and Locations Work Group will coordinate the removal of objects obstructing the excavation, like trees and utility poles.

Slide 4.



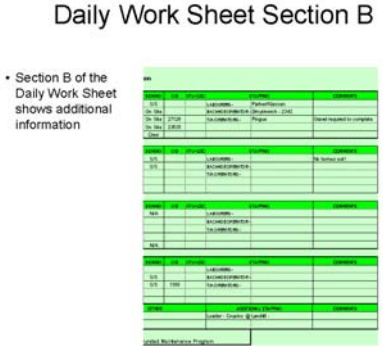
A daily work sheet is created to provide other departments of the location of Water & Sewer work being preformed that day.

Slide 5.



In this view status, location, repair type, priority, job#, location #, activity #, and GL# are shown. Staff not at work are listed at the bottom of the section.

Slide 6.



Section B of the Daily Work Sheet shows additional information on signing, GIS#, utility locations, staffing and comments.

Slide 7.

Daily Work Sheet Section C

- Section C shows work pending.

Section C shows work pending.

Slide 8.

Public Works Stores

- Supervisor IV will pick up all materials that can be transported by a ¾ ton truck.

Supervisor IV will pick up all materials that can be transported by a ¾ ton truck. (For larger material a truck hoist or tandem truck will be used)

Slide 9.

APWA Color 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 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 the determining factors in performing the excavation. Proposed excavation may be marked in pink or white paint.

Slide 10.

Cutting Asphalt

- Every effort should be made to cut the asphalt or concrete

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.

When using a saw, a face shield and goggles must be worn.

Slide 11.

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

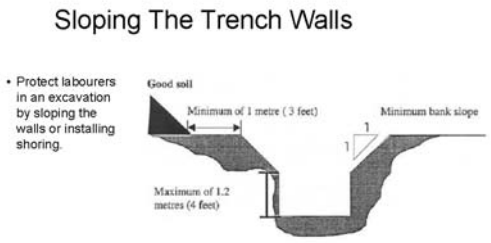
Slide 12.

Excavator/backhoe and type of shoring will be chosen based on type and condition of soil, and the width and depth of excavation/trench.

Slide 13.

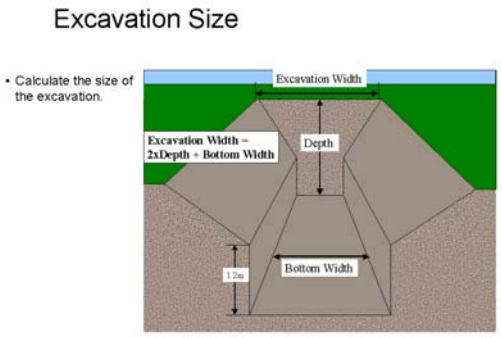
When excavating, watch the trench for any unmarked utilities. Note that the asphalt at this excavation has not been cut.

Slide 14.



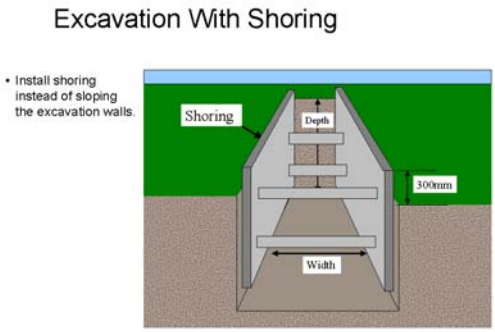
Protect labourers in an excavation by sloping the walls or installing shoring. A combination 1:1 (45 degree) slope and vertical face may be used, as long as the vertical face does not exceed 1.2m (4feet) and the overall depth of the excavation is not greater than 5m (15feet)

Slide 15.



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 16.



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

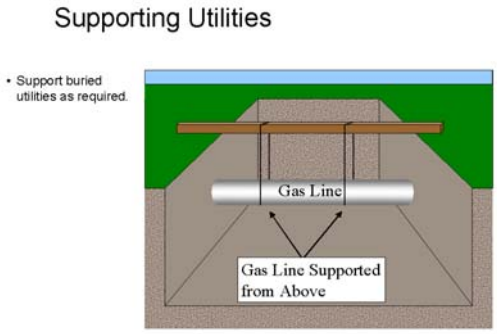
Slide 17.

Material from 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) from the edge of the excavation.

Slide 18.

When locating a buried utility deeper than 1.2meters (4feet), shoring should be installed in the excavation prior to worker probing for the utility.

Slide 19.



Buried utilities will be supported as required during the excavation.

Slide 20.

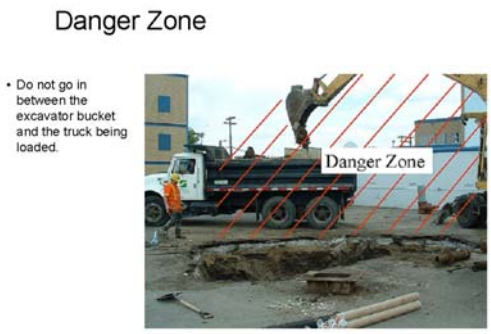
Slide 21.

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).

Slide 22.

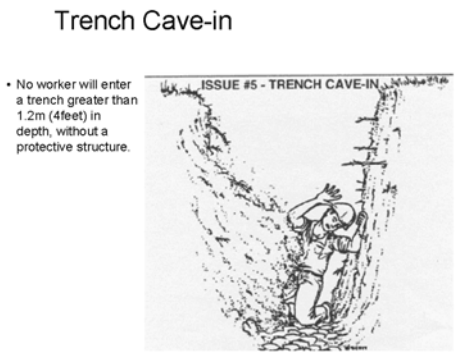
If the vehicle contacts overhead power lines do not exit the vehicle until the lines have been de-energized.

Slide 23.



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 24.



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

Slide 25.

To prepare for this section review each slide. Hand out the trainee manuals before starting the slide presentation.

Stop Slide Presentation

Show Video: Submersible Solids Handling Pumps

Slide 26.

If required the Sewer Operations Section will set up a sewer diversion.

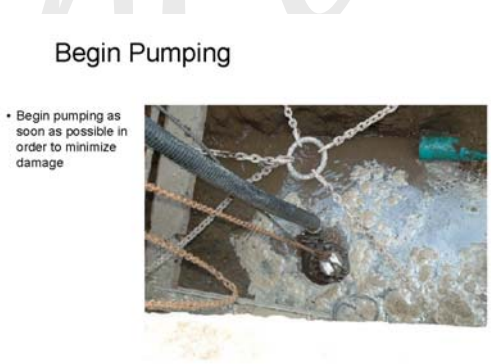
Slide 27.

A sewer plug is installed in the sewer main, and the sewer pumped to the next available manhole to eliminate the flow of sewage at the repair.

Slide 28.

Lower a pump into the manhole upstream of the sewer repair. Connect and place the discharge hose in to the nearest manhole that will not interfere with the repair work.

Slide 29.



Begin pumping as soon as possible in order to minimize damage and continue until the repair is completed and pumping is no longer required. Periodically monitor the pump while in use to ensure proper operation.

Slide 30.

De-energize and/or remove water main if it is in the excavation and cannot be properly supported during the sewer main repair. Additional preventative measures and disinfection must be adhered to, to prevent contamination of the water main.

Slide 31.

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. Look for cracks on eyebolts and chains. Ensure that tie down straps are in good condition (Not frayed or torn).

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.

Slide 32.

Hook up chains appropriately. Keep the chain short when transporting the shoring from the trailer to the excavation, this prevents shoring from swinging excessively.

Slide 33.

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 34.

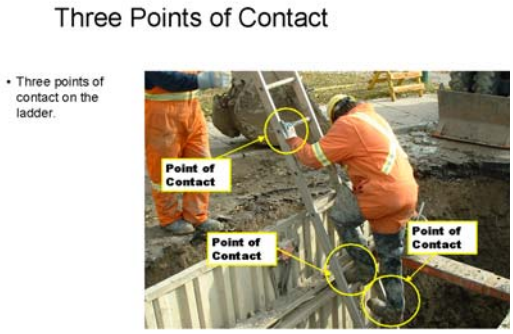
Once the shoring is in the excavation the side panels must be expanded hydraulically to be tight against the excavation walls. Endplates must be installed if the ends of the excavation are not sloped.

Slide 35.

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

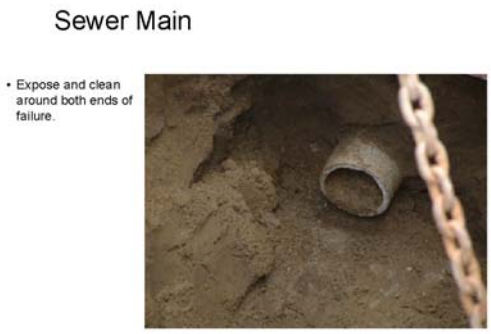
All hand tools are lowered into the excavation using a bucket and rope. Never throw tools into or out of the excavation.

Slide 36.



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

Slide 37.

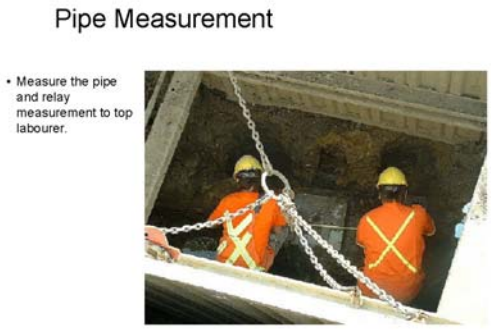


Expose and clean around both ends of failure, (inside and outside).

Slide 38.

Cut pipe and roll out of bedding. Pipe may be removed later or broken into small pieces.

Slide 39.



Measure between the ends of existing pipe and relay measurement to top labourer. It is beneficial to take measurements from the invert and top of pipe (pipe may not be square) to ensure that the new pipe is cut to the proper length.

Slide 40.

Cut the replacement sewer pipe with the quickie saw. Safety goggles and a facemask must be worn when using the quickie saw.

Slide 41.

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

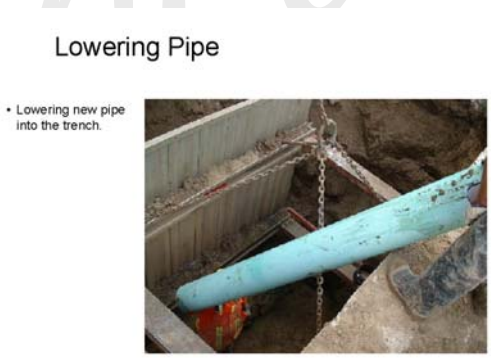
Slide 42.

Proper preparation of bedding is critical. The Supervisor IV will approve the bedding before the pipe is installed.

Slide 43.

Place bedding over top of the pipe and compact. A walk behind tamper will be required for this process.

Slide 44.



Lower the new pipe into the trench with a rope or any other safe method that will not endanger the labourers below.

Slide 45.

Slip coupler over the end of the replacement pipe.

Slide 46.

Align the replacement pipe and the existing pipe and tighten the 2 stainless steel clamps.

Slide 47.

Block couplers so they will not offset during backfilling

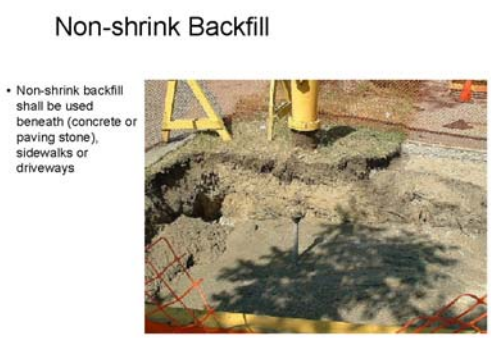
Slide 48.

Arrange to have the sewer bypass removed.

Slide 49.

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

Slide 50.



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

Slide 51.

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 52.

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

Slide 53.

Compactors

- Mechanical Methods of compaction are required.

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

Slide 54.

Hydraulic Tamper

- The hydraulic tamper is a excavator attachment

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

Slide 55.

Walk Behind Tamper

- Backfill in 150mm (6inches) lifts.

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

Slide 56.

Handheld Plate Tamper

- Backfill in 150mm (6inches) lifts.

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

Slide 57.

Vibratory Sheep's foot packer must be used for larger excavations. Backfill shall be placed in 150mm (6inch) lifts.

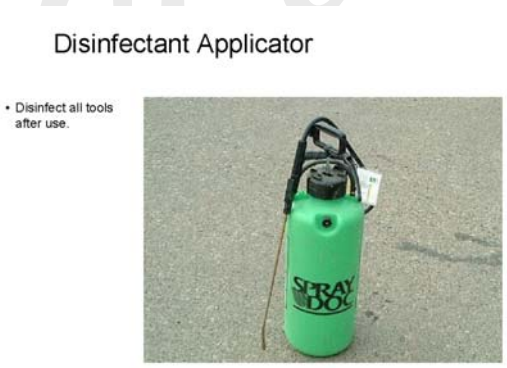
Slide 58.

Bucket tamping is not an approved method of compacting.

Slide 59.

Leave adequate room for asphalt or concrete as per the Roadway Section's instruction. If on grass do not leave topsoil higher than existing grade to accommodate turf.

Slide 60.



All tools must be disinfected after use on a sewer repair. Ensure that the proper disinfectant applicator is used.

Slide 61.

Excess dirt should be cleaned with a wire brush and a rag 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 then rinse clean with disinfectant solution. Let tools dry before storing.

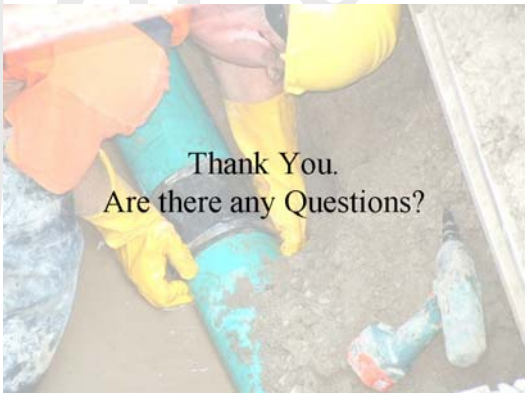
Slide 62.

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

Slide 63.

Others will perform site restoration.

Slide 64.



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

Slide 2

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

Slide 3

1 – Supervisor IV

There is one Supervisor IV for each sewer main repair.

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 Supervisor IV will fill the role of top labourer and both labourers will be in the excavation.

Slide 5

1 - Backhoe operator

One backhoe/excavator operator will be required for each sewer main repair.

Slide 6

2 - Tandem axle truck operators

Two tandem axle truck operators will be required.

Slide 7

1 - Loader operator (as required)

Occasionally a loader operator is required.

Slide 8

Get the box of sample tools ready to be passed 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

Scraper

The scraper is used for cleaning off the pipe.

Slide 14

Rasp / File

The rasp is used to file the pipe.

Slide 15

Nut Driver

The nut driver is used to tighten the clamps on the coupler.

Slide 16

Flathead Screwdriver

The flathead screwdriver is used to tighten the coupler clamp.

Slide 17

Sledge Hammer

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

Slide 18

Pick Axe

The pickaxe is used to break up hard soil.

Slide 19

Disinfectant Sprayer

Disinfectant sprayer is used to apply disinfectant (Min 5% Sodium Hypo-chlorite solution).

Slide 20

Asphalt/Concrete Saw

The Asphalt/Concrete saw is used to cut asphalt concrete.

Slide 21

Pipe Cuter

Pipe cutter is used to cut all types of sewer and water pipes.

Slide 22

Tile Cutter

Tile cutters can be used to cut pipe.

Slide 23

Crew Trailer

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

Slide 24

Excavator/Backhoe

The excavator/backhoe is used to excavate but can also be used to lift heavy equipment like shoring into and from excavations.

Slide 25

Shoring & Trailer

Shoring is used to protect workers from the excavation collapsing. Shoring type depends on the quality of soil, width and depth of trenches.

The trailer is used to transport the shoring from and to the excavation area.

Slide 26

Truck

The trucks are used to haul material and tow trailers.

Slide 27

Front End Loader

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

Slide 28

Hydraulic Tamper

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

Slide 29

Vibrator Roller Packer

Vibratory roller packer is a compactor used in large excavations.

Slide 30

Handheld Plate Tamper

Handheld plate tampers are compactors uses to compact small areas.

Slide 31

Vibratory Compactor

Vibratory compactors are compactors used for small areas.

Slide 32

Bypass Pump

The large sewer bypass pump can be used in high flow areas.

Slide 33

Vac-Truck

Vac-Truck is used to pump out and collect water and other liquid waste from the excavated area of damaged sewer line.

Slide 34

Non-collapsible Hose

Non-collapsible Hose is connected to the outlet port of submersible pump or inlet port of an above ground pump. It is then lowered into the flooded excavated area or manhole and used for pumping out the sewer water.

Slide 35

Collapsible Hose

Collapsible hose is connected to the outlet of an above ground pump. It can be used on the outlet side of a submersible pump if pumping horizontally.

Slide 36

Sewer Plug

The sewer plug is used to stop flow in the sewer.

Slide 37

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

Slide 38

PVC Sewer Pipes

PVC (Poly Vinyl Chloride) pipe is the sewer main pipe used at the City of Saskatoon.

Slide 39

Straight Coupler

This type of coupler is used to connect pipe in a gravity flow system i.e. the sanitary sewer system.

Slide 40

Transition Coupler

This type of coupler is used to connect pipe of different outside diameters.

Slide 41

Treated Blocks

The treated wooden blocks are used to support pipes, clamps and coupler.

Slide 42

Cleaning Rags

Clean rags are used to clean the pipe.

Slide 43

Session 5

Session 5 will include the video *Substance Abuse in the Workplace: Water Utilities at Risk*. Following the video discuss the problems and impacts of substance abuse. The City of Saskatoon Alcohol and Drug Policy can be found in W:\Office\POLICIES\Administrative Policies/A04-021.doc. Read through the policy with the staff.

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 for use while the task is being preformed.

Sewer and Water Maintenance Memo

This form is used to initiate maintenance. It is given to the Clearances and Locations Work Group.

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. The Clearances and Locations Work Group gives it to the Supervisor IV with the worksite safety check sheet.

Worksite – Safety Check Sheet

This report lists all the safety requirements that must be met. It is handed out with the Forman's Job Report.

Deep Excavation Notification Form

This form is filled out for excavations deeper than 5 meters. The form is sent to Saskatchewan Labour and 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 staff's immediate 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.

Aggregate Tracking Ticket

Aggregate Tracking Tickets are completed by the tandem truck operators. The form is used to track the aggregate.