Trainers Manual

B311

CITY OF SASKATOON

Water and Sewer Section

Sanitary Sewer Connection Repair Trainer's Manual

Version # 1-0-1

CITY OF SASKATOON

Sanitary Sewer Connection 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" documents have the word Uncontrolled watermarked across the pages (found in the trainer's tool kit).
v. The videos: Confined Space Entry (Canadian)
vi. Arrangements will be made with the OH&S representative for Public Works, for them to give a presentation on confined space entry.
vii. Example copies of the following forms, for each trainee's manual (found in the trainer's tool kit):
    - Sewer and Water Maintenance Memo
    - Sewer Cleaning Service – Report of Service
    - Daily Work Report
    - Foreman's Job Report
    - Worksite – Safety Check Sheet
    - 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	8:00am Start Time	8:30am Start Time
Session 1	15min	Introduction	8:00am	8:30am
Session 2	75min	Method and Techniques	8:15am	8:45am
	15min	Break	9:30am	10:00am
Session 3	30min	Finish Method and Techniques	9:45am	10:15am
	15min	Break	10:15am	10:45am
Session 4	90min	Review Equipment and Materials	10:30am	11:00am
	60min	Lunch	12:00pm	12:30pm
Session 5	30min	Video: Confined Space Entry	1:00pm	1:30pm
	60min	Confined Space Entry	1:30pm	2:00pm
	15min	Break	2:30pm	3:00pm
Session 6	90min	Review Procedure and Forms	2:45pm	3:15pm
		End of Day	4:15pm	4:45pm

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 connection in a timely, efficient manner, while minimizing disruption in service to the customer and insuring the sewer connection 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 repairing a sewer connection. 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.

Methods and Techniques

Slide 1

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

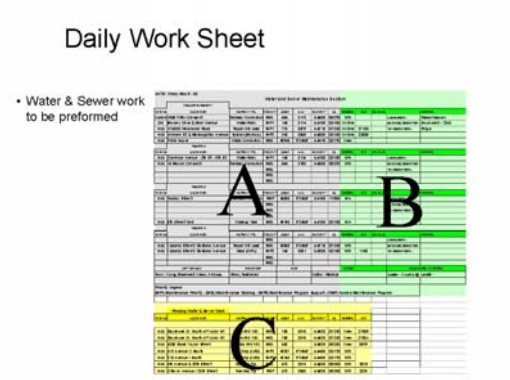
Slide 2

The sewer cleaning record of service will have all the information required to facilitate the sewer connection repair. This form is submitted to the Clearances and Locations Work Group.

Slide 3

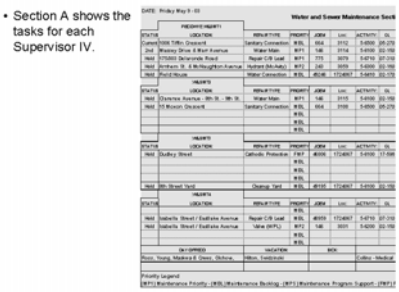
If required, the Clearances and Locations Work Group will coordinate the removal of objects obstructing the excavation, like trees and utility poles.

Slide 4



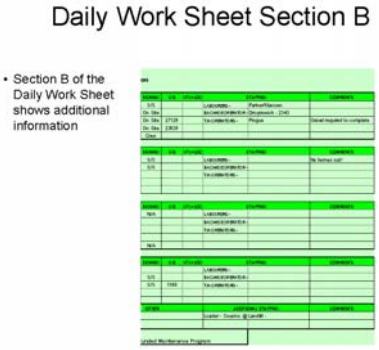
A daily work sheet is created to provide other departments of the location of Water & Sewer work being performed that day.

Slide 5



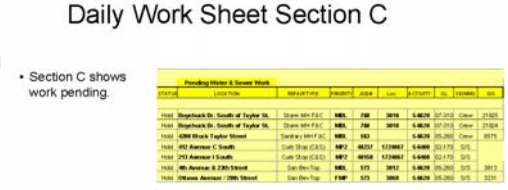
In this view status, location, repair type, priority, job#, location #, activity #, and GL# are shown. Staff not at work are listed at the bottom of the section.

Slide 6



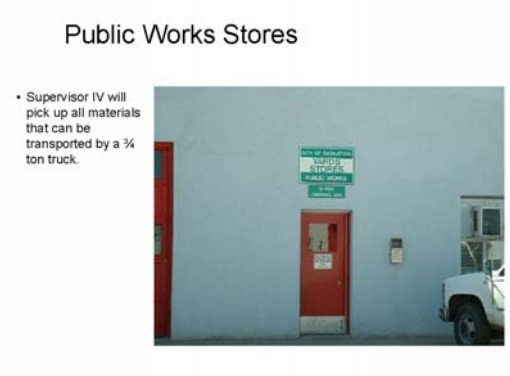
Section B of the Daily Work Sheet shows additional information on signing, GIS#, utility locations, staffing and comments.

Slide 7



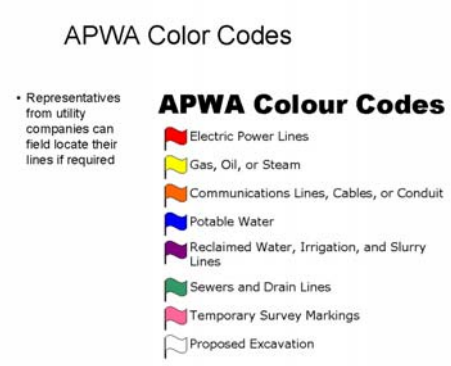
Section C shows work pending.

Slide 8



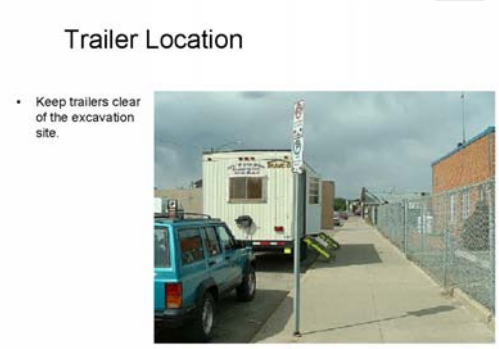
Supervisor IV will pick up all materials that can be transported by a ¾ ton truck. (For larger material a hoist truck or tandem truck will be used)

Slide 9



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



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

Slide 11

A good practice is to take a picture of the site prior to excavation this may avoid disagreements of property damage and assist landscaping crews in restoration.

Slide 12

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.

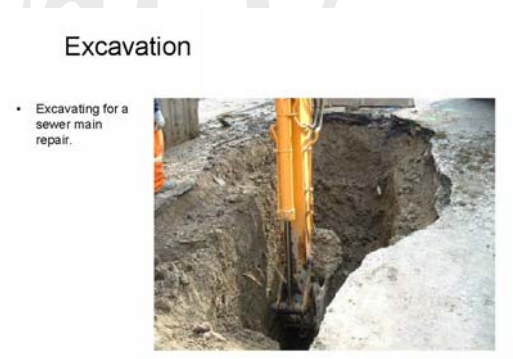
Slide 13

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

Slide 14

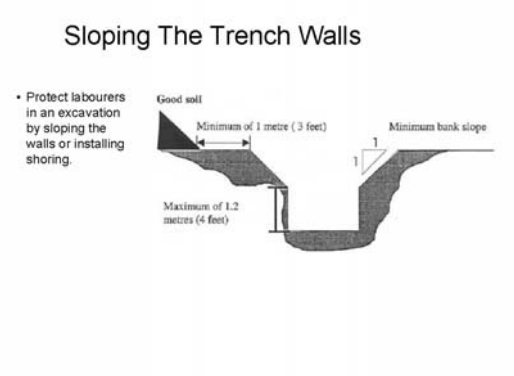
Excavator/backhoe and type of shoring will be chosen based on type and condition of soil, and the width and depth of excavation/trench.

Slide 15



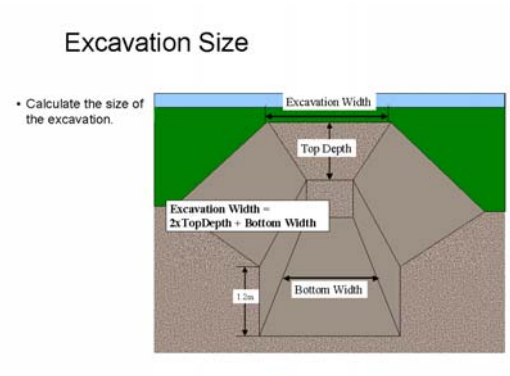
When excavating, watch the trench for any unmarked utilities. Note that the asphalt at this excavation has not been cut.

Slide 16



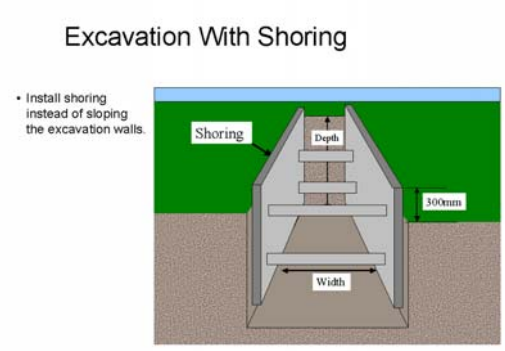
Protect labourers in an excavation by sloping the walls or installing shoring. A combination 1:1 (45 degree) slope and vertical face may be used, as long as the vertical face does not exceed 1.2m (4feet) and the overall depth of the excavation is not greater than 5m (15feet)

Slide 17



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 18



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

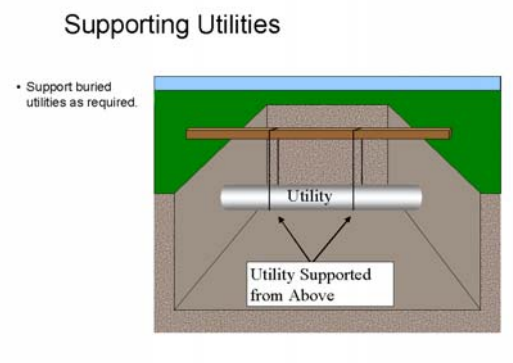
Slide 19

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 20

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 21



Buried utilities will be supported as required during the excavation.

Slide 22

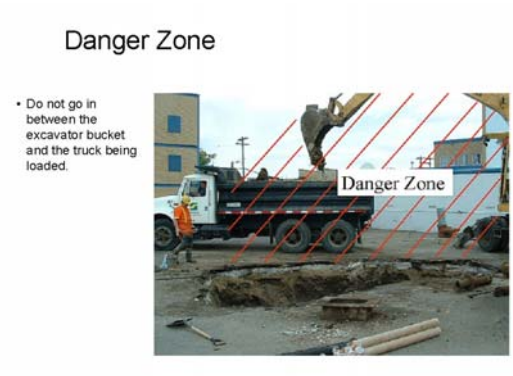
Slide 23

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 24

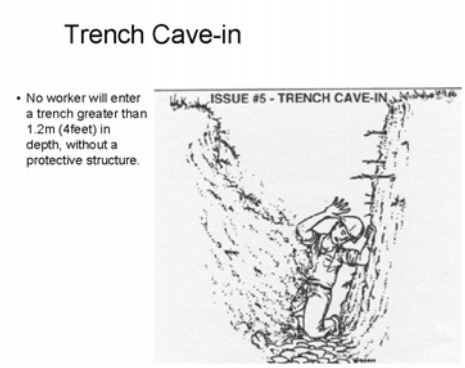
If the vehicle contacts overhead power lines do not exit the vehicle until the lines have been de-energized.

Slide 25



Do not go 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 26



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

Slide 27

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 28

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 29

Position the excavator/backhoe far enough back so that 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 30

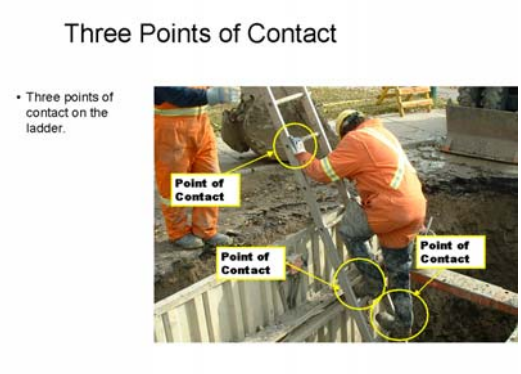
Once the shoring is in the excavation the side panels must be expanded hydraulically to be tight against the excavation walls. Endplates must be installed if the ends of the excavation are not sloped.

Slide 31

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 32



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

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.

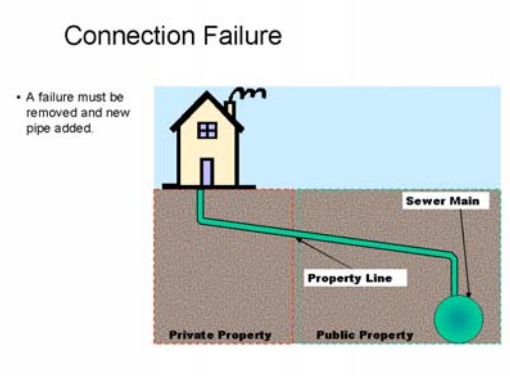
Methods and Techniques

Slide 33

Slide 34

If excavation exposes a curb stop, it must be inspected. The curb stop should be replaced if conditions warrant.

Slide 35



If the failure is located between the property line and the sewer main, the entire length of pipe shall be replaced with PVC, unless otherwise directed.

Slide 36

Once the excavation is complete assess the condition of the pipe for severity and extent of damage.

Slide 37

Clay tile pipe shall be cut with tile pipe cutters.

Slide 38

Fibre pipe shall be cut with a hacksaw or handsaw.

Slide 39

Cutting A/C Pipe

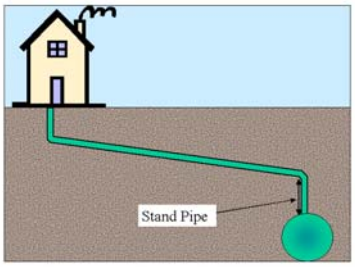
- Cut A/C with a tile cutters.

Asbestos concrete pipe will be cut with tile cutters. Keep pipe wet while cutting to minimize airborne particles. Appropriate respiration equipment must be used. A/C pieces under 5kgs must be double bagged and labelled for transport to the landfill. A dangerous goods carrier must transport A/C pieces over 5kg, and 24hr notice must be given to the landfill scale operators before delivering the A/C pipe.

Slide 40

Stand Pipe

- The stand pipe is a vertical drop from the elbow to the main.



All standpipes (risers) will be inspected and renovated as required.

Slide 41

Remove Pipe

- After cutting remove damaged section of pipe.

Remove failed existing pipe including elbow, standpipe (riser) & service lateral.

Slide 42

Block Pipe

- Prevent debris from entering the sewermain.

To prevent dirt and debris from entering the sewer main, insert rags into the pipe that is directly connected to the sewer main.

Slide 43

Before beginning the repair check the connection pipe for failures further up the line.

Slide 44

Clean both ends of existing pipe.

Slide 45

Slide 46

Depending on the existing pipe material, a coupler may be required to attach the elbow. If the existing pipe has the same outside diameter as the elbow, then the bell end of the pipe may be able to adequately connect them.

Slide 47

If the bell end of the pipe will not adequately connect the two pipes, a coupler must be used. A straight coupler will be used on pipe with the same out side diameter.

Slide 48

If the two pipe's outside diameters are not the same, a transition coupler shall be installed.

Slide 49

Install the coupler first on the existing pipe end. Push the coupler back on the pipe so the coupler is even with the pipe edge.

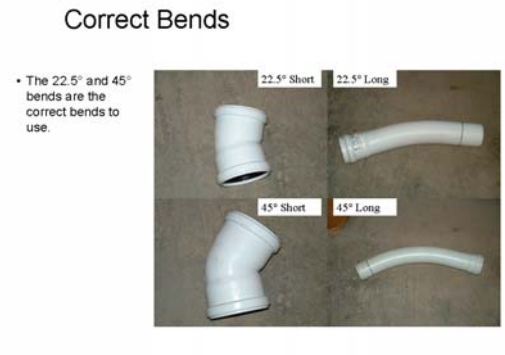
Slide 50

Install new elbow or pipe section into the coupler. Slide the coupler so it is evenly centred over the two pipes.

Slide 51

Ninety-degree elbows must not be used. Ninety-degree elbows become plugged easier and are much more likely damaged by cleaning equipment.

Slide 52



Insert one end of new pipe into elbow. Use pipe lubricant to assist.

Slide 53

Slide 54

Connect the elbow to the main with a sewer service saddle or onto the riser using a coupler. The service saddle will be secured to the sewer main with 2 stainless steel straps.

Slide 55

Place the gasket on the underside of the service saddle.

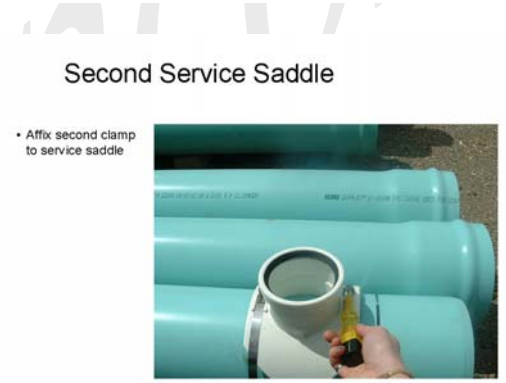
Slide 56

Set the service saddle on top of the sewermain pipe.

Slide 57

Wrap and secure the first clamp around the service saddle and pipe and tighten.

Slide 58



Wrap and secure the other clamp around the pipe and service saddle and tighten.

Slide 59

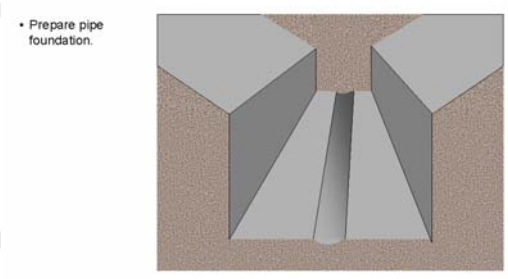
Ensure the clamps are between the ridged guides on the service saddle.

Slide 60

Slide 61

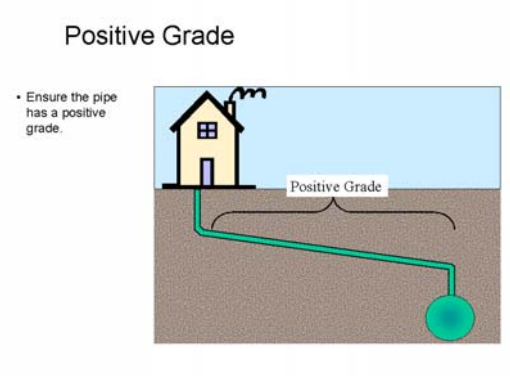
Measure the length of pipe required.

Slide 62



Prepare the foundation for the pipe in sub-grade, as shown.

Slide 63



Ensure the section of replacement pipe has positive grade to the sewer main. In other words, the pipe on the house side should be higher than the pipe on the sewermain side.

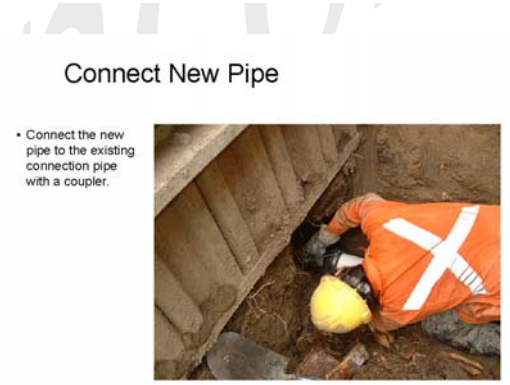
Slide 64

Cut the required length of replacement pipe.

Slide 65

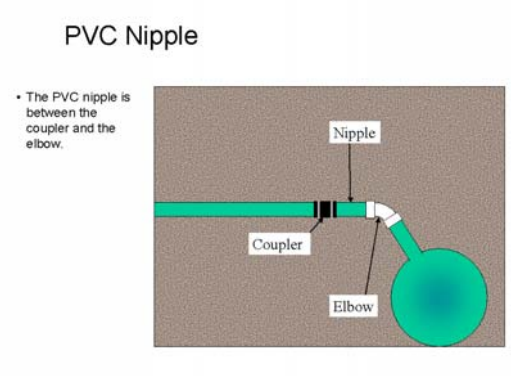
Insert one end of new pipe into elbow. Use pipe lubricant to assist in inserting the pipe (into elbow).

Slide 66



Slip coupler on to the other end of the new pipe. Align the new pipe with the existing pipe. Slip the coupler back so it is centred over the existing and replacement pipe.

Slide 67

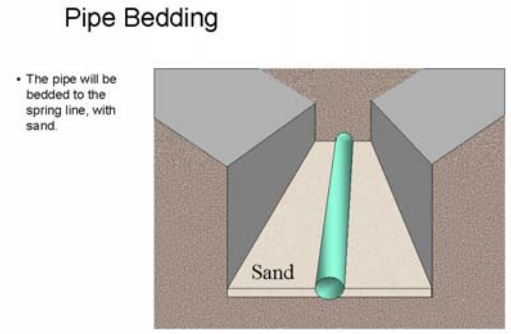


A PVC nipple is a short length of pipe used to connect the elbow to the existing pipe.

Slide 68

Tighten the clamps on the coupler with a flat head screwdriver and/or nut driver.

Slide 69



All sewer connection pipes on City of Saskatoon property will be bedded with sand up to the spring line.

Slide 70

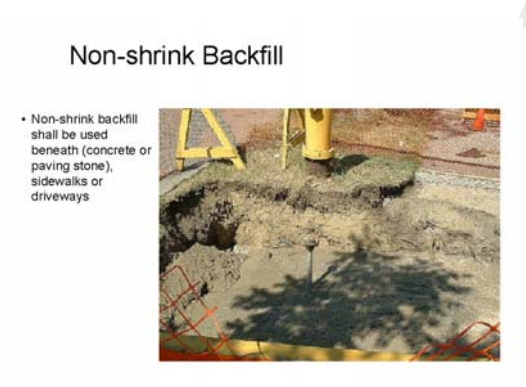
Cover remaining pipe with gravel and compact.

Slide 71

Slide 72

Cover service connection and mains with 150mm (6inch) of class-2 backfill material and compact. Use spoil material if suitable. If not bring in clean backfill material.

Slide 73



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.

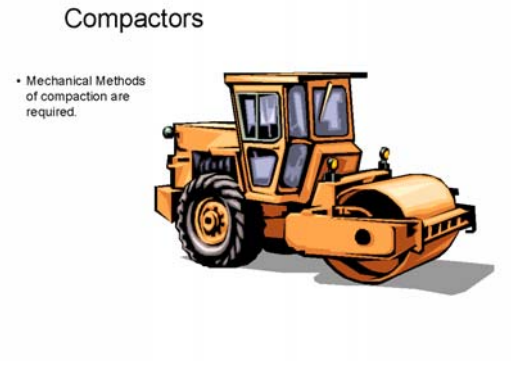
Slide 74

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 75

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

Slide 76



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

Slide 77

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

Slide 78

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

Slide 79

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 80

Bucket tamping is not an approved method of compacting.

Slide 81

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

Slide 82

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

Slide 83

Excess dirt shall be removed 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 84

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

Slide 85

Others will perform site restoration.

Slide 86

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 review each slide.

Slide 2

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

Slide 3

There is one Supervisor IV for each water main repair.

Slide 4

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

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

Slide 6

Two tandem axle truck operators will be required.

Slide 7

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

The feeling rod is used for finding buried utilities.

Slide 10

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

Quickie Saw

Quickie saw is used to cut sewer pipe.

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

Vibratory Compactor

Vibratory compactors are used for small areas.

Slide 30

Handheld Plate Tamper

Handheld plate tampers are used to compact small areas.

Slide 31

Hacksaw

The hacksaw will be used to cut fibre sewer pipe.

Slide 32

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

Slide 33

Crew Trailer

The sewer connection pipe used is presently PVC, and is often white in colour.

Slide 34

Straight Coupler

The straight coupler can be used to connect pipe with the same outside diameter.

Slide 35

Transition Coupler

The transition coupler can be used to connect pipe of different outside diameters but the same inside diameter.

Slide 36

Short 22.5° Elbow

The elbows are used to adjust the pipe height from the sewer connection to the sewermain.

Slide 37

Long 22.5° Elbow

The long 22.5-degree elbow is preferred to the short bend.

Slide 38

Short 45° Elbow

The short 45-degree elbow is also used to adjust pipe height.

Slide 39

Long 45° Elbow

The long 45-degree elbow is better than the short.

Slide 40

Treated Block

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

Slide 41

Cleaning Rags

Clean rags are used to clean the pipe.

Slide 42

Service Saddle

The service saddle is used to connect the private connection to the sewermain.

Slide 43

Session 5

Session 5 will include the video: Confined Space Entry (Canadian) from Electrolab training systems.

Arrange for the Occupational Health and Safety personnel to come and give an hour talk on confined space entry. If the OH & S personnel are not available continue with the Session 6 following 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 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.

Sewer Cleaning Service –Record of Service

This form is completed when a sewer service has been cleaned. Failures of sewer connections often occur or are discovered during cleans. This form has all the information required to prepare to repair the sewer connection.

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.

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.