

CITY OF SASKATOON

Water and Sewer Section



Sanitary Sewer Connection Repair Trainee Manual

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Introduction

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

Procedural Overview

The Clearances and Locations Work Group will acquire clearances for all utilities, (Gas, power, water, sewer, phone, cable, etc.) before the excavation begins. The Clearances and Locations Work Group will provide the required location numbers, job numbers, drawings and forms to the Supervisor IV as well as organize the removal of some site obstructions i.e. trees and utility poles. The Clearances and Locations Work Group will notify Railway Roadmasters (CN & CP) in advance of work progress near railroad corridors. All vehicles must be circle checked and the results logged before use.

The Supervisor IV or the Clearances and Locations Work Group representative will mark the water and sewer lines and meet the other utility representatives at the repair site. The Supervisor IV will request that the Sign Shop and/or the labourers install the required traffic control devices. The Supervisor IV will notify the public of restricted water use if required. The Supervisor IV will ensure that any buried utilities have been de-energized, if required. The Supervisor IV will coordinate, select and acquire all required equipment and materials and deploy their crew to the job site.

Before using the equipment the tandem axle truck and excavator/backhoe operators must perform circle checks, log results and ensure that the regular maintenance schedule for that equipment has been adhered to. The tandem truck operator will ensure that the trailers are clean and in proper working order. The tandem truck operator will haul shoring and crew trailers. The Supervisor IV will confirm the location of the sanitary sewer connection, decide the size of excavation and discuss with the excavator/backhoe operator the best method for excavating. All staff must wear the personal protective equipment required. The Supervisor IV will coordinate the plugging and/or diverting of the sewer main as required - with Sewer Operations. The Supervisor IV will be aware of other construction/maintenance activities in the immediate vicinity of the repair site that may be affected by the repair activities.

Asphalt and/or concrete must be stripped, separated and hauled to a designated reclamation site. Where possible, excavate parallel with the pipe being repaired. Consider the locations of other underground utilities. The labourers shall locate and expose (shallow buried) underground utilities by hand. The labourers shall communicate the location of all buried utilities to the excavator/backhoe operator. Support all buried utilities as required by their owner's specifications. The labourers shall inspect shoring before use. The Supervisor IV will confirm that the shoring is in proper working order and installation is in accordance with regulations. Personnel must stay clear when lifting and lowering shoring and/or materials. The shoring is installed with the assistance of the excavator/backhoe and the labourers in accordance with manufacturer's recommendations. Shoring must be placed in the excavation in such a manner as not to disturb any buried utilities. Shoring must be expanded to support trench walls - install endplates as required. The access/egress ladder must be in place while persons are in the excavation. Labourers shall observe the trench walls for signs of collapse throughout the repair. If at any time a bottom labourer is in danger the other labourers must immediately summon their exit from the excavation.

The labourers will ensure the tools and crew trailer are clean and in proper working order. The top labourer will assemble and pass all the required tools and material to the bottom labourer. The sanitary sewer connection is repaired in accordance with the Trainee's Manual. The Supervisor IV will determine the length of pipe to be replaced. Service connections must be reconnected to the sewer main with a service saddle. Replacement pipe must be coupled to existing pipe using approved couplers. The Supervisor IV will ensure the repair meets all specifications and recommended practices.

The top labourer will direct the tandem axle truck operator to dump the backfill material. Backfill all buried utilities as required by their owner's specifications and confirm backfill specifications have been met. The Supervisor IV ensures backfill material meets the requirements. Soil and granular material must be compacted to a standard proctor density minimum of 98% and be free from frozen or substandard backfill material. Non-shrink backfill must be used beneath concrete or paving stone sidewalks or driveways. Pavement cut will be left down if instructed by the Asphalt Supervisor. Final grade of all excavations must be smooth and level.

All tools and the excavator bucket must be disinfected. Driveways, road surfaces and sidewalks must be swept clean. The Supervisor IV will inspect the site for cleanliness and safety before leaving the site. All unnecessary traffic control devices will be removed from the roadway prior to leaving the site. The Supervisor IV will ensure that all the required forms and documentation are complete and submitted - at the end of the day the job is completed. The Clearances and Locations Work Group will update the manual and electronic records.

Method and Techniques

Pre-repair

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.

Notes:

 WATER & SEWER SECTION SEWER CLEANING SERVICE RECORD OF SERVICE		Nº 95701	
Sewer Trouble / Video Inspection / Auger / Telephone Number: 975-2481			
ADDRESS: _____		DATE: ____/____/____	
RESIDENT'S NAME (please print): _____			
PH(H): _____		PH(B): _____	
TIME: Arrived: _____		Depart: _____	
SERVICE REPRESENTATIVE: _____ AND _____			
SEVERITY OF BLOCKAGE: ☐ Not Draining ☐ Slow Draining ☐ Minimal Blockages ☐ Clear to Main			
PROBLEM LOCATED: ☐ Connection ☐ Internal ☐ Private ☐ City ☐ Main			
NATURE OF PROBLEM: ☐ Roots ☐ Grease ☐ Other (Specify) _____			
PIPE MATERIAL: ☐ Clay Tile ☐ Fibre ☐ PVC ☐ Other (Specify) _____			
STRUCTURAL:		GRADE:	
☐ Offset		☐ Back / From: _____ To: _____	
☐ Out of Round / Blistered		☐ Sag / From: _____ To: _____	
☐ Broken / Cracked		☐ Good	
ACTION TAKEN:			
☐ Tape Service ☐ Auger Service ☐ Flusher Service From ☐ Manhole ☐ House			
☐ Service Not Provided (Specify) _____			
☐ Video Inspection Service ☐ Contractor (Specify) _____			
LOCATION OF MAIN BLOCKAGE FROM CLEANOUT: _____			
CLEANOUT SIZE: _____		☐ Stack DISTANCE TO WALL: _____	
COMMENTS: _____			
VIDEO INSPECTION COMMENTS: _____			
RESIDENT'S SIGNATURE: _____			

Figure 1 - Sewer Cleaning Record of Service

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 obstructing the excavation, like trees and utility poles.

Notes:



Figure 2 - Clearances and Locations Work Group

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

Notes:

DATE: Friday May 9 - 03												
Water and Sewer Maintenance Section												
PICOWAY-WASMT1												
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTIL-LOC:	STAFFING:	
Current	1006 Tiffin Crescent	Sanitary Connection	MBL	664	3112	5-6500	05-270	S/S			LABOURERS -	Parker/Klassen
2nd	Massey Drive & Marr Avenue	Water Main	MP1	146	3114	5-6100	02-150	On Site			BACKHOE OPERATOR -	Dmytrowich - 2343
Hold	175/303 Delaronde Road	Repair C/B Lead	MP1	775	3079	5-6710	07-310	On Site		27126	TIA OPERATORS -	Pingue
Hold	Arnhem St. & McNaughton Avenue	Hydrant (McAuley)	MP2	243	3059	5-6300	02-160	On Site		23535		
Hold	Field House	Water Connection	MBL	49246	1724067	5-6410	02-170	Crew				
-WASMT2-												
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTIL-LOC:	STAFFING:	
Hold	Clarence Avenue - 8th St - 9th St	Water Main	MP1	146	3115	5-6100	02-150	S/S			LABOURERS -	
Hold	15 Moxon Crescent	Sanitary Connection	MBL	664	3108	5-6500	05-270	S/S			BACKHOE OPERATOR -	
			MBL								TIA OPERATORS -	
			MBL									
			MBL									
-WASMT3-												
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTIL-LOC:	STAFFING:	
Hold	Dudley Street	Sanitary Connection	FMP	46806	1724067	5-6100	17-596	N/A			LABOURERS -	
			MBL								BACKHOE OPERATOR -	
			MBL								TIA OPERATORS -	
			MBL									
Hold	8th Street Yard	Cleanup Yard	MBL	49195	1724067	5-6100	02-150	N/A				
-WASMT4-												
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTIL-LOC:	STAFFING:	
Hold	Isabella Street / Eastlake Avenue	Repair C/B Lead	MBL	48959	1724067	5-6710	07-310	S/S			LABOURERS -	
Hold	Isabella Street / Eastlake Avenue	Valve (WPL)	MP2	146	3031	5-6200	02-150	S/S	1168		BACKHOE OPERATOR -	
			MBL								TIA OPERATORS -	
			MBL									
DAY OFF/DO				VACATION:		SICK:		OTHER:		ADDITIONAL STAFFING:		
Ross, Young, Maskwa & Crews, Olchow,				Hilton, Swidzinski				Collins - Medical		Loader - Cousins @ Landfill -		
Priority Legend												
(MP1) Maintenance Priority - (MBL) Maintenance Backlog - (MPS) Maintenance Program Support - (FMP) Funded Maintenance Program												
Pending Water & Sewer Work												
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTIL-LOC:	STAFFING:	
Hold	Boychuck Dr. South of Taylor St.	San MH F&C	MBL	760	3010	5-6620	07-310	Crew	21925			
Hold	Boychuck Dr. South of Taylor St.	San MH F&C	MBL	760	3010	5-6620	07-310	Crew	21924			
Hold	4200 Block Taylor Street	San MH F&C	MBL	563		5-6620	05-260	Crew	8575			
Hold	412 Avenue C South	Stop (C&S)	MP2	48237	1724067	5-6400	02-170	S/S				
Hold	213 Avenue I South	Stop (C&S)	MP2	48150	1724067	5-6400	02-170	S/S				
Hold	4th Avenue & 23th Street	San MH Top	MP1	573	3012	5-6620	05-260	S/S	3613			
Hold	Ottawa Avenue / 20th Street	San Bev Top	FMP	573	3068	5-6620	05-260	S/S	3231			

Figure 3 - Daily Work Sheet

Section A shows the tasks for each Supervisor IV. 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.

Notes:

DATE: Friday May 9 - 03							
Water and Sewer Maintenance Section							
PIECOWYEW&SMT1							
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL
Current	1006 Tiffin Crescent	Sanitary Connection	MBL	664	3112	5-6500	05-270
2nd	Massey Drive & Marr Avenue	Water Main	MP1	146	3114	5-6100	02-150
Hold	175/303 Delaronde Road	Repair C/B Lead	MP1	775	3079	5-6710	07-310
Hold	Arnhem St. & McNaughton Avenue	Hydrant (McAvity)	MP2	243	3059	5-6300	02-160
Hold	Field House	Water Connection	MBL	49246	1724067	5-6410	02-170
:W&SMT2							
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL
Hold	Clarence Avenue - 8th St. - 9th St.	Water Main	MP1	146	3115	5-6100	02-150
Hold	15 Moxon Crescent	Sanitary Connection	MBL	664	3108	5-6500	05-270
			MBL				
			MBL				
			MBL				
:W&SMT3							
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL
Hold	Dudley Street	Cathodic Protection	FMP	46806	1724067	5-6100	17-596
			MBL				
			MBL				
			MBL				
Hold	8th Street Yard	Cleanup Yard	MBL	49195	1724067	5-6100	02-150
:W&SMT4							
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL
Hold	Isabella Street / Eastlake Avenue	Repair C/B Lead	MBL	48959	1724067	5-6710	07-310
Hold	Isabella Street / Eastlake Avenue	Valve (WPL)	MP2	146	3031	5-6200	02-150
			MBL				
			MBL				
DAY OFF/DO		VACATION:		SICK:			
Ross, Young, Maskwa & Crews, Olchove,		Hilton, Swidzinski				Collins - Medical	
Priority Legend (MP1) Maintenance Priority - (MBL) Maintenance Backlog - (MPS) Maintenance Program Support - (FMP) F							

Figure 4 - Daily Work Sheet Section A

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

Notes:

SIGNING:	GIS	UTL>LOC:	STAFFING:	COMMENTS:
S/S		LABOURERS -	Parker/Klassen	
On Site		BACKHOE OPERATOR -	Dmytrowich - 2343	
On Site	27126	T/A OPERATORS -	Pingue	Gravel required to complete
On Site	23535			
Crew				

SIGNING:	GIS	UTL>LOC:	STAFFING:	COMMENTS:
S/S		LABOURERS -		No homes out!
S/S		BACKHOE OPERATOR -		
		T/A OPERATORS -		

SIGNING:	GIS	UTL>LOC:	STAFFING:	COMMENTS:
N/A		LABOURERS -		
		BACKHOE OPERATOR -		
		T/A OPERATORS -		
N/A				

SIGNING:	GIS	UTL>LOC:	STAFFING:	COMMENTS:
		LABOURERS -		
S/S		BACKHOE OPERATOR -		
S/S	1168	T/A OPERATORS -		

OTHER:	ADDITIONAL STAFFING:	COMMENTS:
	Loader - Cousins @ Landfill -	

UNDERSERVED MAINTENANCE PROGRAM

Figure 5 - Daily Work Sheet Section B

Section C shows work pending.

Notes:

Pending Water & Sewer Work										
STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	
Hold	Boychuck Dr. South of Taylor St.	Storm MH F&C	MBL	760	3010	5-6620	07-310	Crew	21925	
Hold	Boychuck Dr. South of Taylor St.	Storm MH F&C	MBL	760	3010	5-6620	07-310	Crew	21924	
Hold	4200 Block Taylor Street	Sanitary MH F&C	MBL	563		5-6620	05-260	Crew	8575	
Hold	412 Avenue C South	Curb Stop (C&S)	MP2	48237	1724067	5-6400	02-170	S/S		
Hold	213 Avenue I South	Curb Stop (C&S)	MP2	48150	1724067	5-6400	02-170	S/S		
Hold	4th Avenue & 23th Street	San Bev Top	MBL	573	3012	5-6620	05-260	S/S	3813	
Hold	Ottawa Avenue / 20th Street	San Bev Top	FMP	573	3068	5-6620	05-260	S/S	3231	

Figure 6 - Daily Work Sheet Section C

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

Notes:



Figure 7 – Public Works Stores

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.

Notes:

APWA Colour Codes

-  Electric Power Lines
-  Gas, Oil, or Steam
-  Communications Lines, Cables, or Conduit
-  Potable Water
-  Reclaimed Water, Irrigation, and Slurry Lines
-  Sewers and Drain Lines
-  Temporary Survey Markings
-  Proposed Excavation

Figure 8 - APWA Colour Codes

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

Notes:



Figure 9 - Trailer Location

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.

Notes:



Figure 10 - Picture of Site.

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.

Notes:



Figure 11 – Cutting Asphalt

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

Notes:



Figure 12 – Recycling

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

Notes:



Figure 13 - Shoring on Trailer

When excavating, watch the trench for any unmarked utilities.

Notes:



Figure 14 - Excavating

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)

Notes:

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 following formula given in Figure 16 - Excavation Width Calculation

Notes:

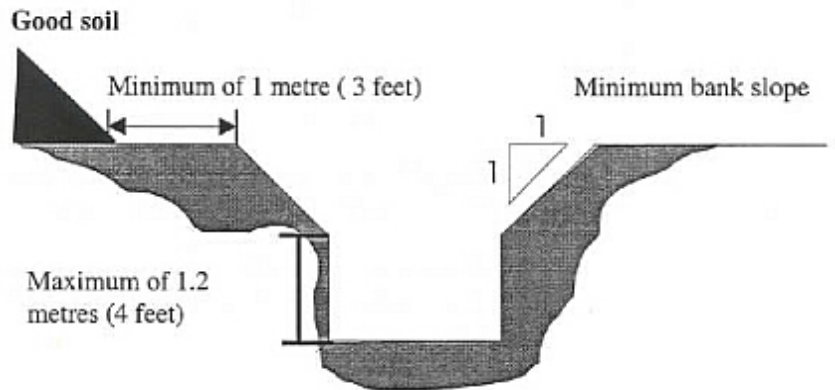


Figure 15 - Sloping the excavation walls.

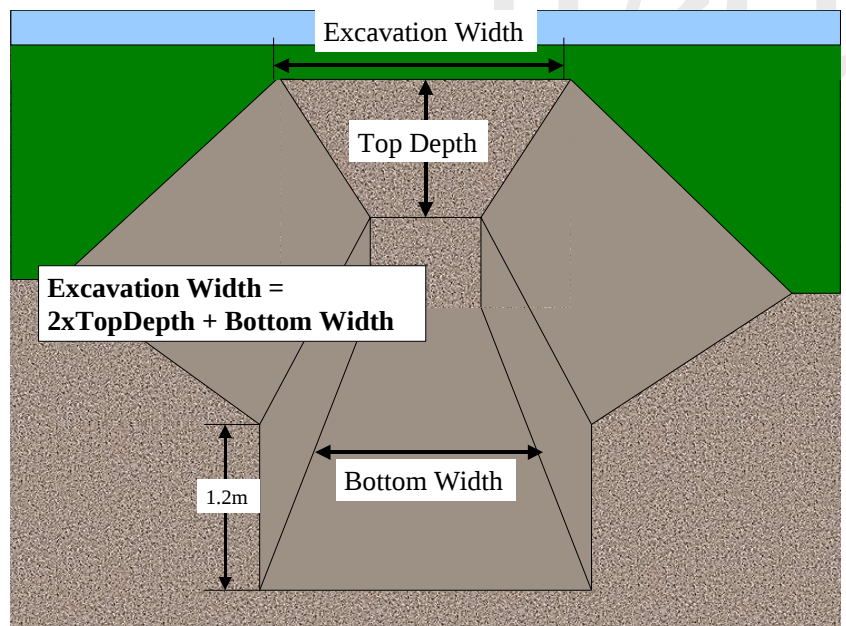


Figure 16 - Excavation Width Calculation

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

Notes:

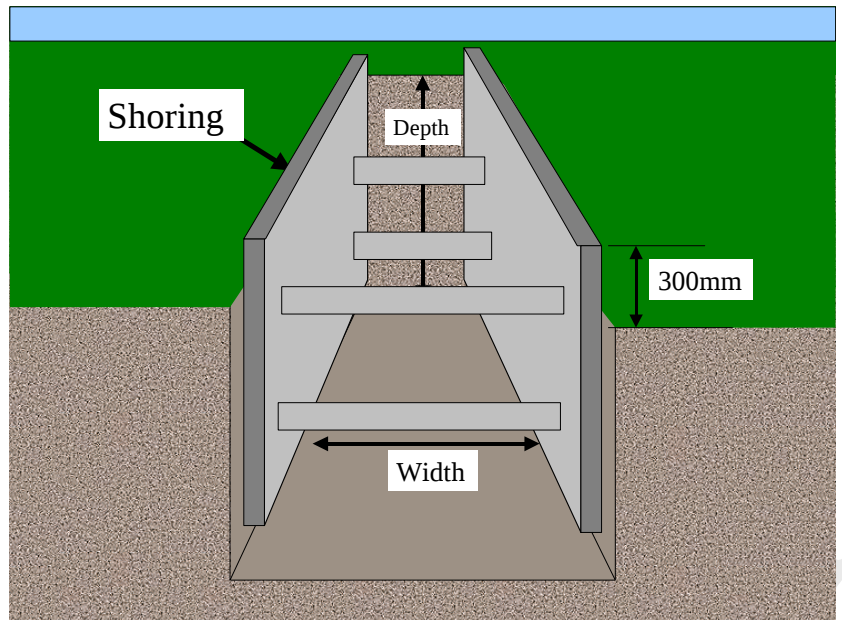


Figure 17 - Excavation With Shoring

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.

Notes:



Figure 18 – Spoil Pile

While locating a buried utility deeper than 1.2m (4feet), shoring **must be** placed in excavation prior to worker probing for the utility.

Notes:



Figure 19 - Feeling Rod

Buried utilities will be supported as required during the excavation.

Notes:

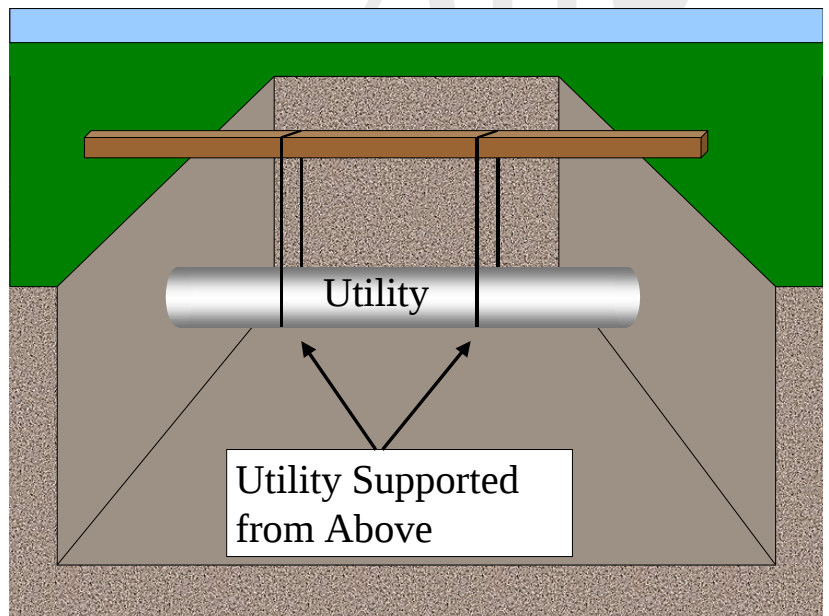


Figure 20 - Supported Utility

General Excavation Safety

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).

Notes:



Figure 21 - Excavator/Backhoe on fire.

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

Notes:



Figure 22 - Truck contacting overhead power lines.

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.

Notes:



Figure 23 – Danger Zone

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

Notes:

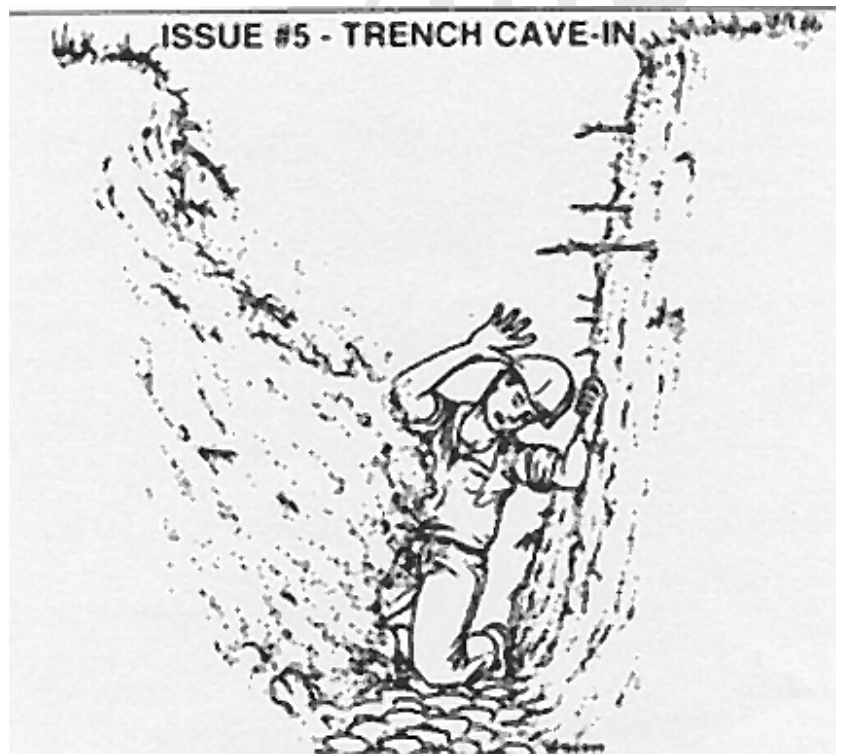


Figure 24 - Trench Cave-in

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).

Notes:



Figure 25 - Shoring on Trailer.

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

Notes:



Figure 26 - Shoring being lifted off the trailer.

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.

Notes:



Figure 27 - Shoring Installation

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.

Notes:



Figure 28 – Shoring with Endplates.

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.

Notes:



Figure 29 - Entering Excavation

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

Notes:

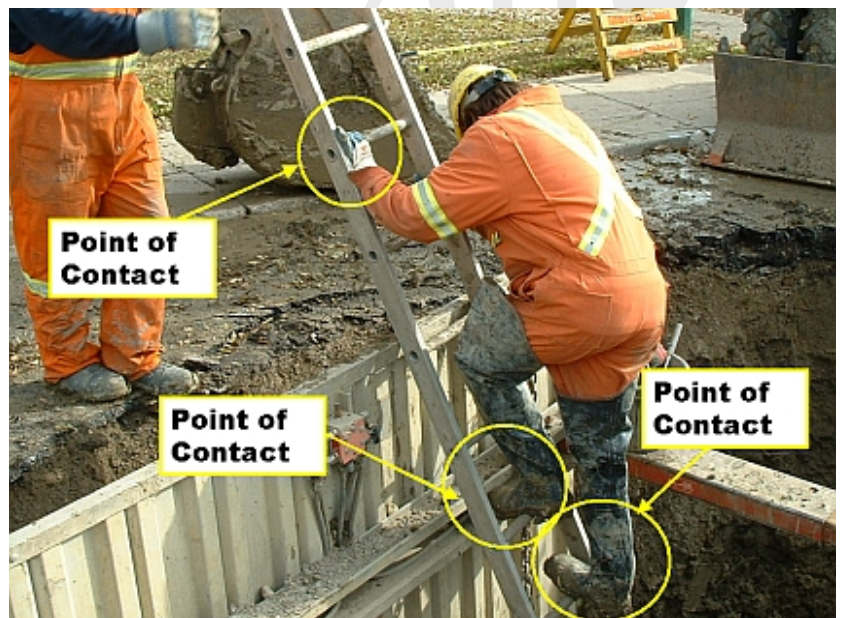


Figure 30 - Three Point Contact

Sewer Connection Repair

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

Notes:



Figure 31 - Curb Stop

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.

Notes:

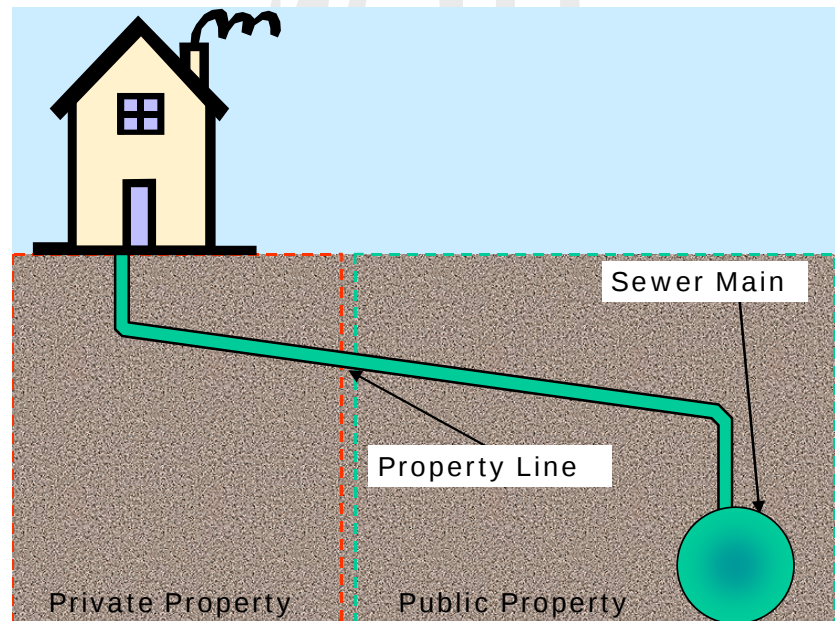


Figure 32 - Sewer Connection

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

Notes:



Figure 33 - Hole in Pipe

Clay tile pipe shall be cut with tile pipe cutters.

Notes:



Figure 34 - Tile Cutters

Fibre pipe shall be cut with a hacksaw or handsaw.

Notes:



Figure 35 - Hacksaw

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.

Notes:



Figure 36 - Tile Cutters

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

Notes:

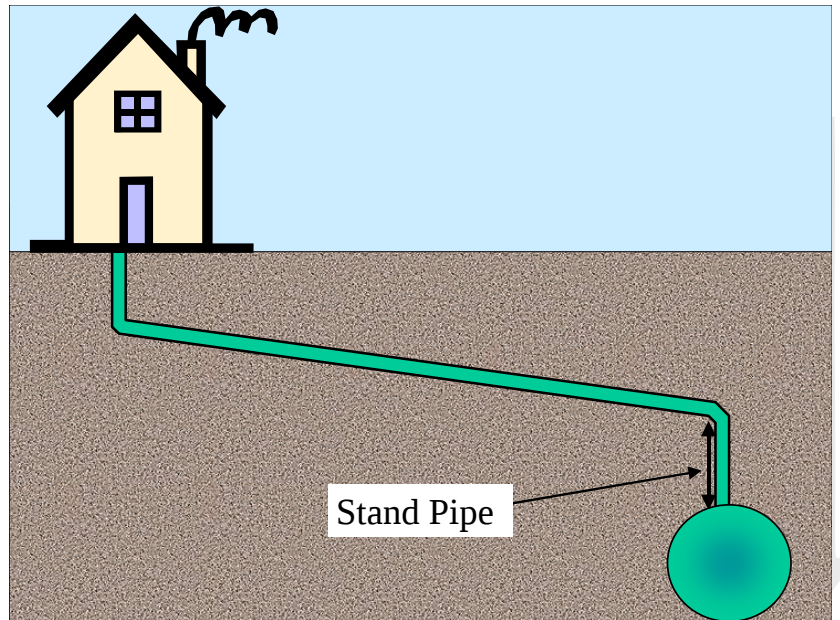


Figure 37 - Stand Pipe

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

Notes:



Figure 38 - Remove Pipe

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

Notes:



Figure 39 - Rag in Pipe

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

Notes:



Figure 40 - Inspect Sewer Pipe

Clean both ends of existing pipe.

Notes:



Figure 41 - Clean Pipe

Connecting to Existing Pipe

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.

Notes:



Figure 42 - Connecting Elbows

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.

Notes:



Figure 43 - Straight Coupler

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

Notes:



Figure 44 - Transition Coupler

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.

Notes:



Figure 45 - Install Coupler

Install new elbow section into the coupler. Slide the coupler so it is evenly centred over the elbow and the existing pipe.

Notes:



Figure 46 - Coupler Installed

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

Notes:



Figure 47 – 90° Elbow

Instead of a 90° elbow, any combination of long or short 45° or 22.5° elbows must be used.

Note:



Figure 48 - 45° and 22.5° Elbows

Connecting to the Sewer Main

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.

Notes:



Figure 49 - Sewer Service Saddle

Place the gasket on the underside of the service saddle.

Notes:

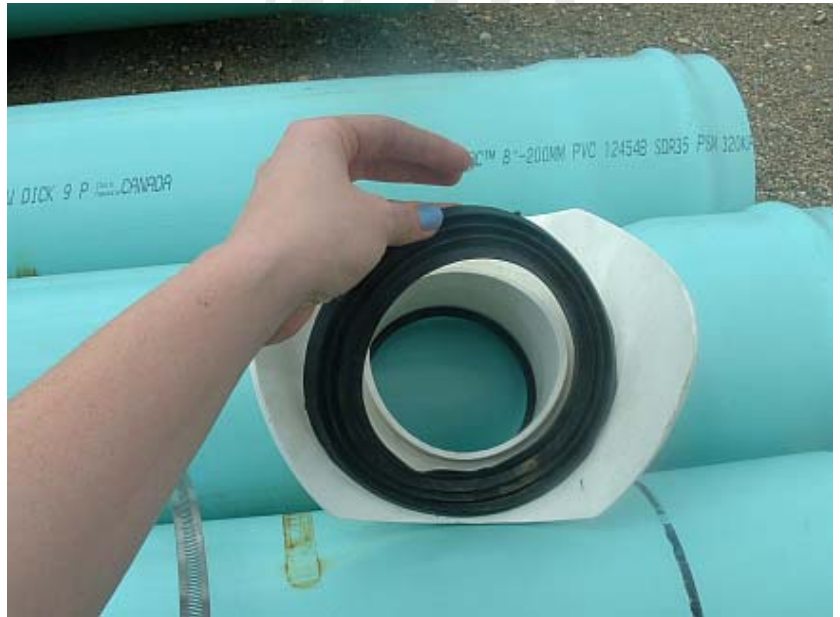


Figure 50 - Service Saddle Gasket

Set the service saddle on top of the sewermain pipe.

Notes:



Figure 51 - Service Saddle on Pipe

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

Notes:



Figure 52 - Service Saddle Clamp

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

Notes:



Figure 53 - Service Saddle Strap

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

Notes:



Figure 54 - Service Saddle Installed

Installing a Section of Pipe

Measure the length of pipe required.

Notes:



Figure 55 - Measure Pipe Length

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

Notes:

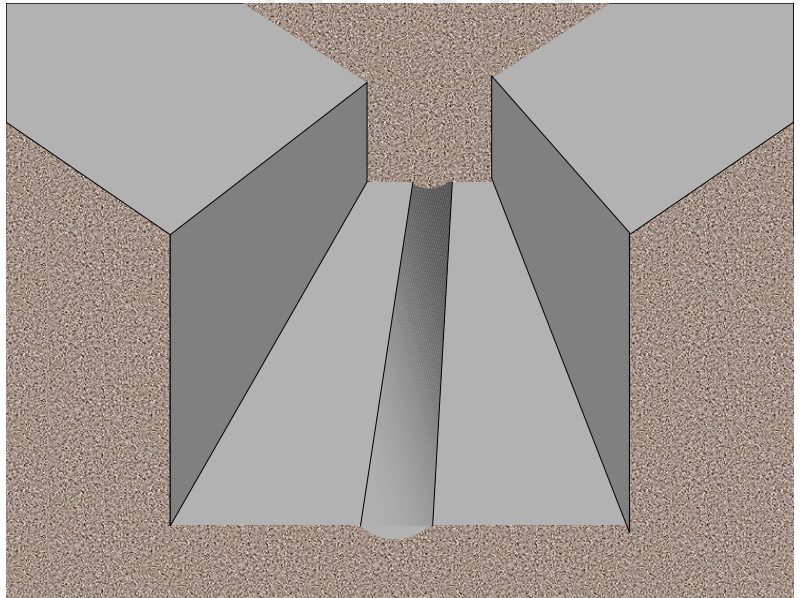


Figure 56 - Pipe Foundation

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.

Notes:

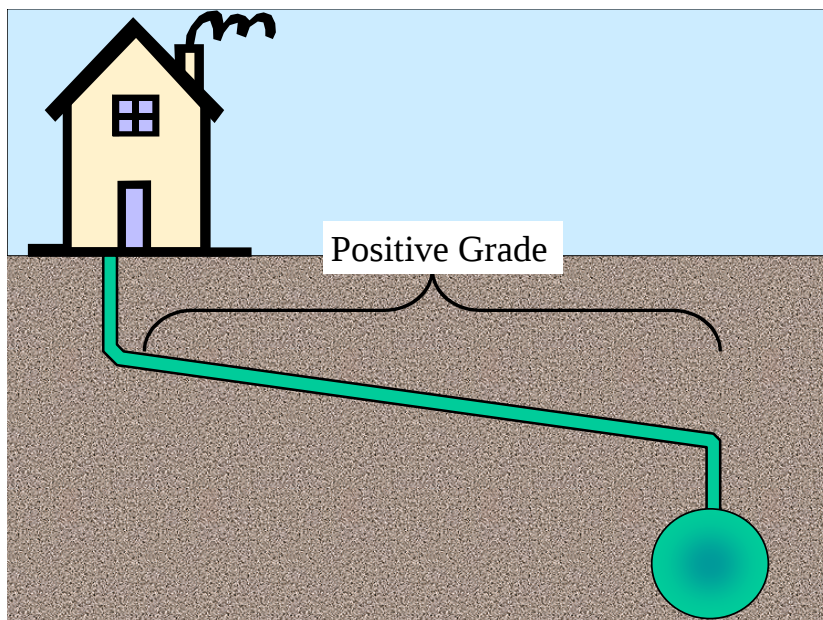


Figure 57 - Positive Pipe Grade

Cut the required length of replacement pipe.

Notes:



Figure 58 - Cutting Pipe

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

Notes:



Figure 59 - Inserting Pipe

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.

Notes:



Figure 60 - Aligning the Coupler

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

Notes:

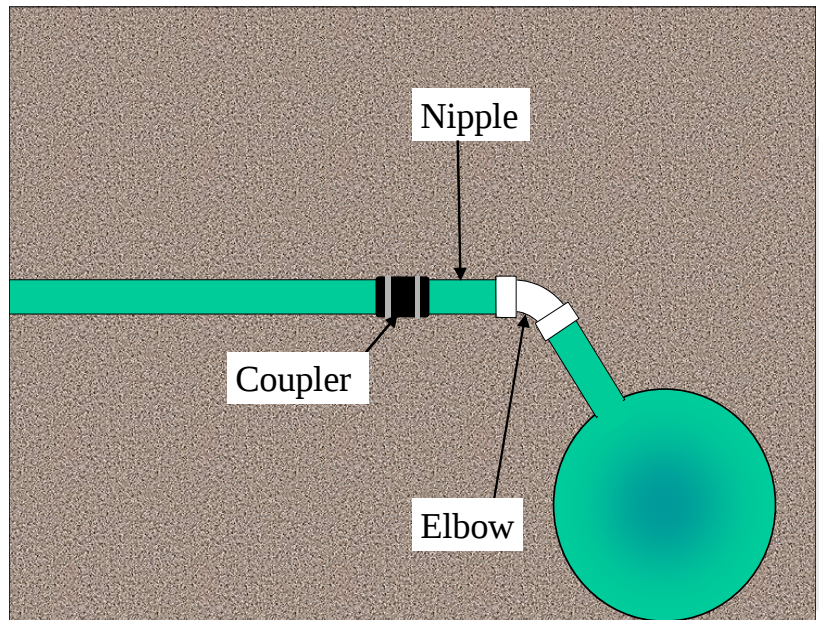


Figure 61 - Pipe Nipple

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

Notes:



Figure 62 - Tighten Coupler

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

Notes:

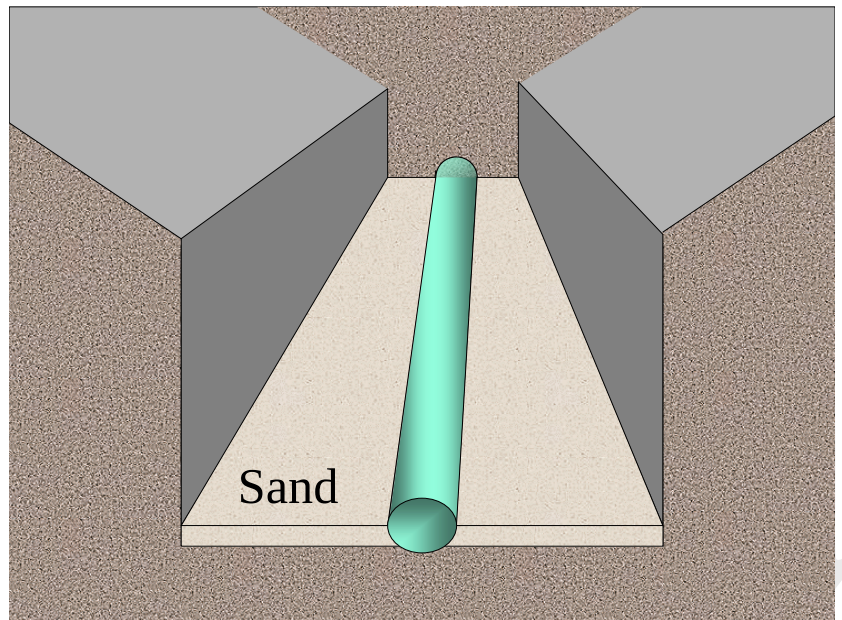


Figure 63 - Pipe Bedding

Cover remaining pipe with gravel and compact.

Notes:



Figure 64 - Backfilling Sewer Connection

Backfill, General Information

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.

Notes:

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.

Notes:



Figure 65 - Backfill



Figure 66 - Non-shrink backfill

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.

Notes:



Figure 67 - Backfilling with shovel

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

Notes:



Figure 68 - Backfill Material

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

Notes:



Figure 69 - Compactor

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

Notes:



Figure 70 - Hydraulic Tamper (Excavator Attachment)

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

Notes:



Figure 71 - Walk Behind Vibratory Compactor

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.

Notes:



Figure 72 - Handheld Plate Tamper

Bucket tamping is not an approved method of compacting.

Notes:



Figure 73 - Excavator/Backhoe backfilling

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

Notes:



Figure 74 - Finished Backfill

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

Notes:



Figure 75 - Disinfectant Applicator

Excess dirt will 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.

Notes:



Figure 76 - Disinfecting

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

Notes:



Figure 77 – Traffic Control Devices

Others will perform site restoration.

Notes:



Figure 78 - Site Restoration

Resources

People

- 1 – Supervisor IV
- 2 – Labourers
- 1 - Excavator/Backhoe Operator
- 2 - Tandem Axle Truck Operators
- 1 - Loader Operator



Equipment



Figure 79 - Feeling Rod

Notes:



Figure 80 - Tunnelling Shovel

Notes:



Figure 81 – Shovels

Notes:



Figure 82 – Broom

Notes:



Figure 83 - Scraper

Notes:



Figure 84 - Rasp / File

Notes:



Figure 85 - Nut Driver

Notes:



Figure 86 - Flathead Screwdriver

Notes:



Figure 87 - Sledge Hammer

Notes:



Figure 88 - Pick Axe

Notes:



Figure 89 - Disinfectant Sprayer

Notes:



Figure 90 – Asphalt/Concrete Saw

Notes:



Figure 91 - Quickie Saw

Notes:



Figure 92 - Tile Cutter

Notes:



Figure 93 - Crew Trailer

Notes:



Figure 94 - Excavator/Backhoe

Notes:



Figure 95 - Shoring & Trailer

Notes:



Figure 96 - Truck

Notes:



Figure 97 - Front End Loader

Notes:



Figure 98 - Hydraulic Tamper [excavator attachment]

Notes:



Figure 99 - Vibratory Compactor

Notes:



Figure 100 - Handheld Plate Tamper

Notes:



Figure 101 – Hacksaw

Notes:

Materials



Figure 102 - PVC Sewer Pipes

Notes:



Figure 103 - Straight Coupler

Notes:



Figure 104 - Transition Coupler

Notes:



Figure 105 - Short 22.5° Elbow

Notes:



Figure 106 - Long 22.5° Elbow

Notes:



Figure 107 - Short 45° Elbow

Notes:



Figure 108 - Long 45° Elbow

Notes:



Figure 109 - Treated Blocks

Notes:



Figure 110 - Cleaning Rags

Notes:



Figure 111 Service Saddle with Clamps

Notes:

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