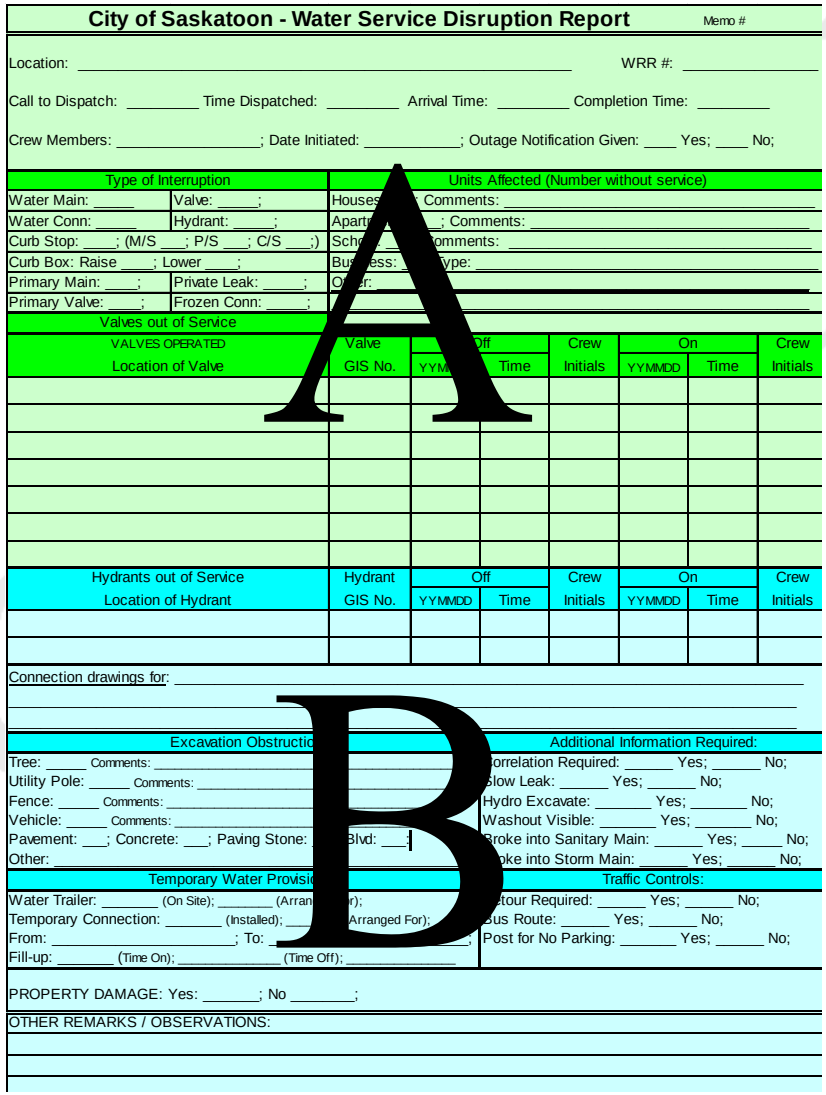
Water Main Repair Methods and Techniques

Water Service Disruption Report

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



City of Saskatoon - Water Service Disruption Report Memo #

Location: _____ WRR #: _____

Call to Dispatch: _____ Time Dispatched: _____ Arrival Time: _____ Completion Time: _____

Crew Members: _____; Date Initiated: _____; Outage Notification Given: ____ Yes; ____ No;

Type of Interruption		Units Affected (Number without service)
Water Main: _____	Valve: _____;	Houses: ___; Comments: _____
Water Conn: _____	Hydrant: _____;	Apartments: ___; Comments: _____
Curb Stop: ___; (M/S ___; P/S ___; C/S ___;)		Schools: ___; Comments: _____
Curb Box: Raise ____; Lower ____;		Business: ___; Type: _____
Primary Main: ____;	Private Leak: _____;	Other: _____
Primary Valve: ____;	Frozen Conn: _____;	

A

Valves out of Service

VALVES OPERATED Location of Valve	Valve GIS No.	Off YYMMDD	Off Time	Crew Initials	On YYMMDD	On Time	Crew Initials

Hydrants out of Service Location of Hydrant	Hydrant GIS No.	Off YYMMDD	Off Time	Crew Initials	On YYMMDD	On Time	Crew Initials

Connection drawings for: _____

B

Excavation Obstruction	Additional Information Required:
Tree: _____ Comments: _____	Correlation Required: _____ Yes; _____ No;
Utility Pole: _____ Comments: _____	Slow Leak: _____ Yes; _____ No;
Fence: _____ Comments: _____	Hydro Excavate: _____ Yes; _____ No;
Vehicle: _____ Comments: _____	Washout Visible: _____ Yes; _____ No;
Pavement: ___; Concrete: ___; Paving Stone: ___; Blvd: ___;	Broke into Sanitary Main: _____ Yes; _____ No;
Other: _____	Broke into Storm Main: _____ Yes; _____ No;
Temporary Water Provision	**Traffic Controls:**
Water Trailer: _____ (On Site); _____ (Arranged For);	Detour Required: _____ Yes; _____ No;
Temporary Connection: _____ (Installed); _____ (Arranged For);	Bus Route: _____ Yes; _____ No;
From: _____; To: _____;	Post for No Parking: _____ Yes; _____ No;
Fill-up: _____ (Time On); _____ (Time Off);	

PROPERTY DAMAGE: Yes: _____; No _____;

OTHER REMARKS / OBSERVATIONS:

Water Service Disruption Report

- Section A of the Water Service Disruption Report.

City of Saskatoon - Water Service Disruption Report Memo #

Location: _____ WRR #: _____

Call to Dispatch: _____ Time Dispatched: _____ Arrival Time: _____ Completion Time: _____

Crew Members: _____; Date Initiated: _____; Outage Notification Given: ____ Yes; ____ No;

Type of Interruption		Units Affected (Number without service)
Water Main: _____	Valve: _____;	Houses: ___; Comments: _____
Water Conn: _____	Hydrant: _____;	Apartments: ___; Comments: _____
Curb Stop: ____; (M/S ___; P/S ___; C/S _		School: ___; Comments: _____
Curb Box: Raise ____; Lower ____;		Business: ___; Type: _____
Primary Main: ____;	Private Leak: _____;	Other: _____
Primary Valve: ____;	Frozen Conn: _____;	_____

Valves out of Service

VALVES OPERATED Location of Valve	Valve GIS No.	Off		Crew Initials	On		Crew Initials
		YYMMDD	Time		YYMMDD	Time	

Water Service Disruption Report

- Section B of the Water Service Disruption Report.

Hydrants out of Service Location of Hydrant	Hydrant GIS No.	Off		Crew Initials	On		Crew Initials
		YYMMDD	Time		YYMMDD	Time	

Connection drawings for: _____

_____

_____

Excavation Obstructions:	Additional Information Required:
Tree: _____ Comments: _____	Correlation Required: _____ Yes; _____ No;
Utility Pole: _____ Comments: _____	Slow Leak: _____ Yes; _____ No;
Fence: _____ Comments: _____	Hydro Excavate: _____ Yes; _____ No;
Vehicle: _____ Comments: _____	Washout Visible: _____ Yes; _____ No;
Pavement: ___; Concrete: ___; Paving Stone: ___; Blvd: ___:	Broke into Sanitary Main: _____ Yes; _____ No;
Other: _____	Broke into Storm Main: _____ Yes; _____ No;
Temporary Water Provisions:	**Traffic Controls:**
Water Trailer: _____ (On Site); _____ (Arranged For);	Detour Required: _____ Yes; _____ No;
Temporary Connection: _____ (Installed); _____ (Arranged For);	Bus Route: _____ Yes; _____ No;
From: _____; To: _____	Post for No Parking: _____ Yes; _____ No;
Fill-up: _____ (Time On); _____ (Time Off); _____	

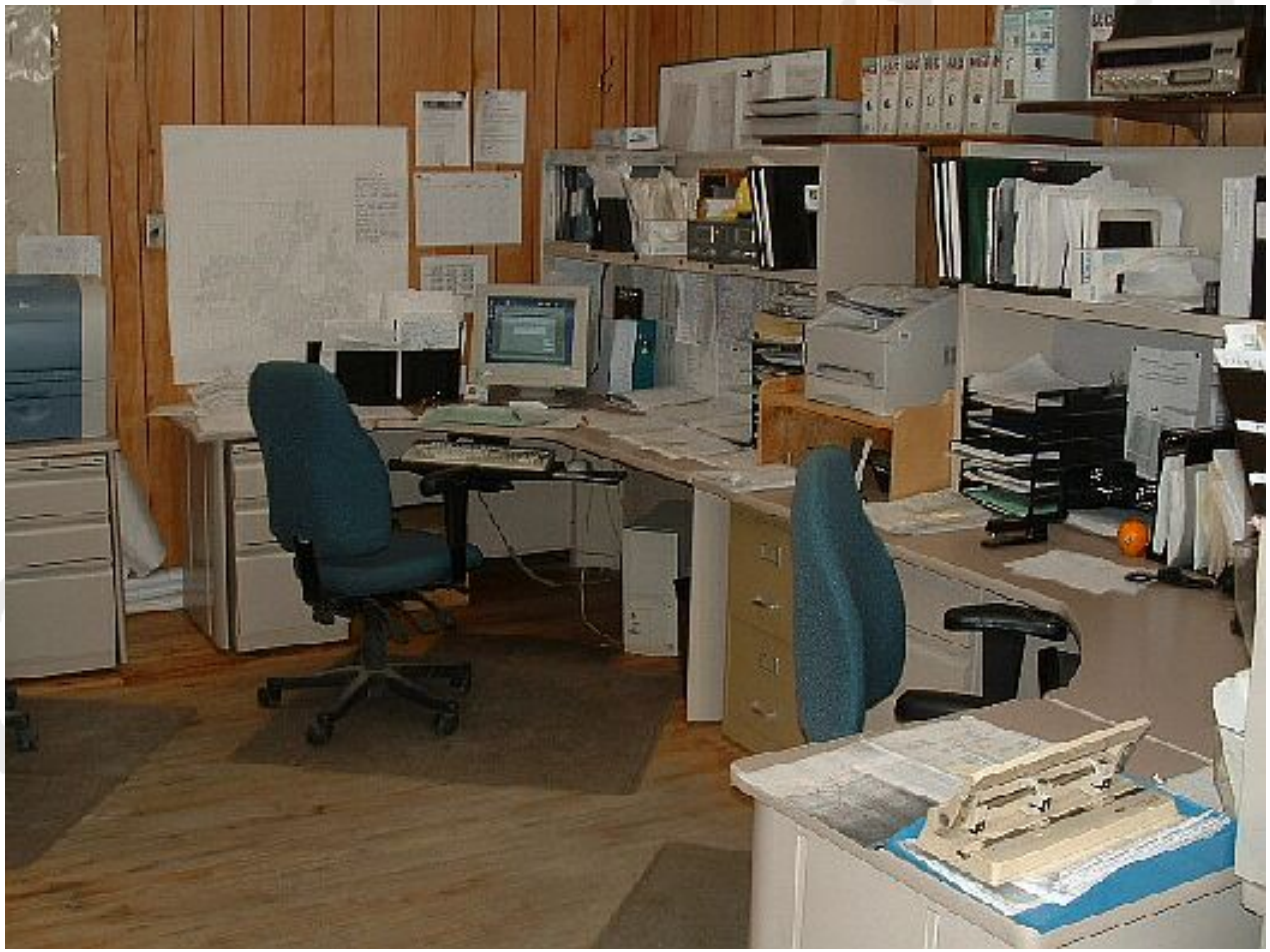
PROPERTY DAMAGE: Yes: _____; No _____;

OTHER REMARKS / OBSERVATIONS:

TWE 03/0401

Clearances and Locations Work Group

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



Daily Work Sheet

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

DATE: **Friday May 9 - 03**

Water and Sewer Maintenance Section

PIECOWYE:W&SMT1

STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTL>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		T/A OPERATORS -	Pingue
Hold	**Arnhem St. & McNaughton Avenue**	Hydrant (McAvity)	**MP2**	**243**	**3059**	**5-6300**	02-160	On Site	23535			
Hold	**Field House**	Water Connection	**MBL**	**49246**	**1724067**	**5-6410**	02-170	Crew				

:W&SMT2

STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTL>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								T/A OPERATORS -	
			MBL									
			MBL									

:W&SMT3

STATUS	LOCATION:	REPAIR T	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTL>LOC	STAFFING:	
Hold	**Dudley Street**	Cathodic Prot	**FMP**	**46806**	**1724067**	**5-6100**	17-596	N/A			OURERS	
			MBL								CKHOE OPERA	
			MBL								OPERATORS -	
			MBL									
Hold	**8th Street Yard**	Cleanup Yard	**MBL**	**49195**	**1724067**	**5-6100**	02-150	N/A				

:W&SMT4

STATUS	LOCATION:	REPAIR TYPE:	PRIORITY	JOB #	Loc:	ACTIVITY:	GL	SIGNING:	GIS	UTL>LOC:	STAFFING:	
			MBL								LABOURERS -	
Hold	**Isabella Street / Eastlake Avenue**	Repair C/B Lead	**MBL**	**48959**	**1724067**	**5-6710**	07-310	S/S			BACKHOE OPERATOR -	
Hold	**Isabella Street / Eastlake Avenue**	Valve (WPL)	**MP2**	**146**	**3031**	**5-6200**	02-150	S/S	1168		T/A OPERATORS -	
			MBL									
			MBL									

DAY OFF/EDO	VACATION:	SICK:		OTHER:	ADDITIONAL STAFFING:
Ross, Young, Maskwa & Crews, Olchove,	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
Hold	**Boychuck Dr. South of Taylor St.**	m MH F&C	**MBL**	**760**	**3010**	**5-6620**	07-310	Crew	21925
Hold	**Boychuck Dr. South of Taylor St.**	m MH F&C	**MBL**	**760**	**3010**	**5-6620**	07-310	Crew	21924
Hold	**4200 Block Taylor Street**	tary 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)	**MP1**	**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

A B C

Daily Work Sheet Section A

- Section A shows the tasks for each Supervisor IV.

DATE: **Friday May 9 - 03**

Water and Sewer Maintenance Secti

	PIECOWYE:W&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**
			MBL				
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/EDO	**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

Daily Work Sheet Section B

- Section B shows additional information.

on

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 -		

unded Maintenance Program

Daily Work Sheet Section C

- Section C shows work pending.

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

Pick up Materials

- The Supervisor IV will pick up the required materials

Choosing Equipment

- Choose the excavator/backhoe and shoring types based on size of excavation and soil condition.

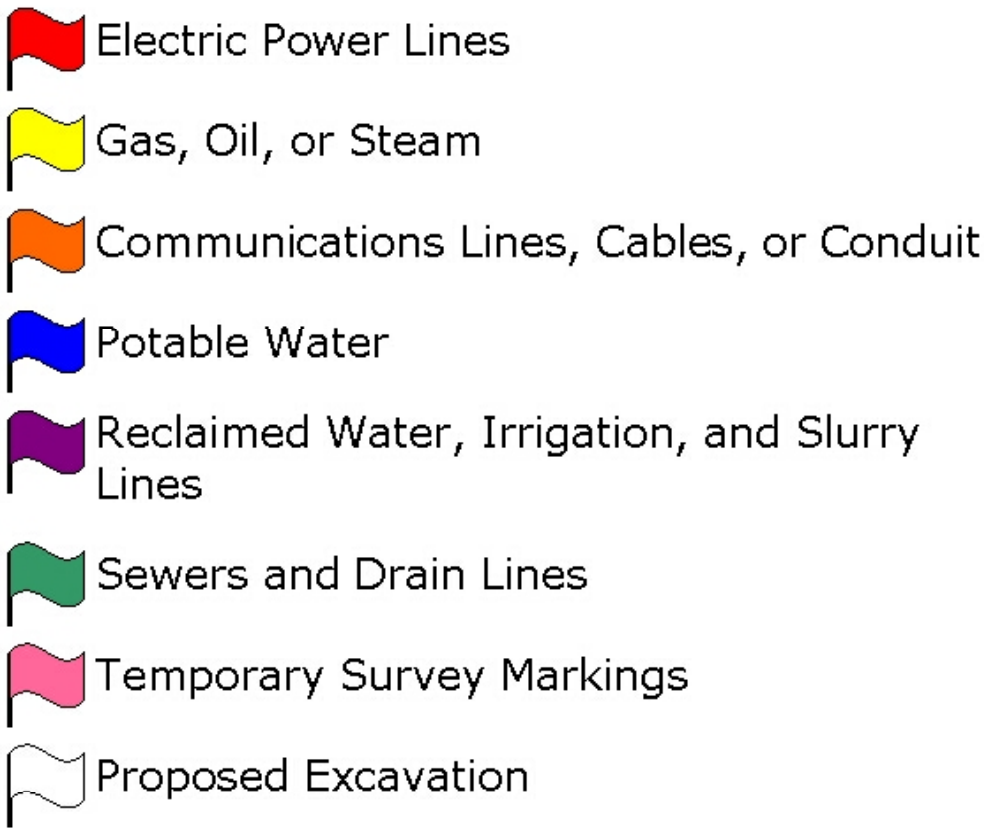
Trailer Placement

- Locate trailers clear of the excavation.

Marking Utilities

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

APWA Colour Codes

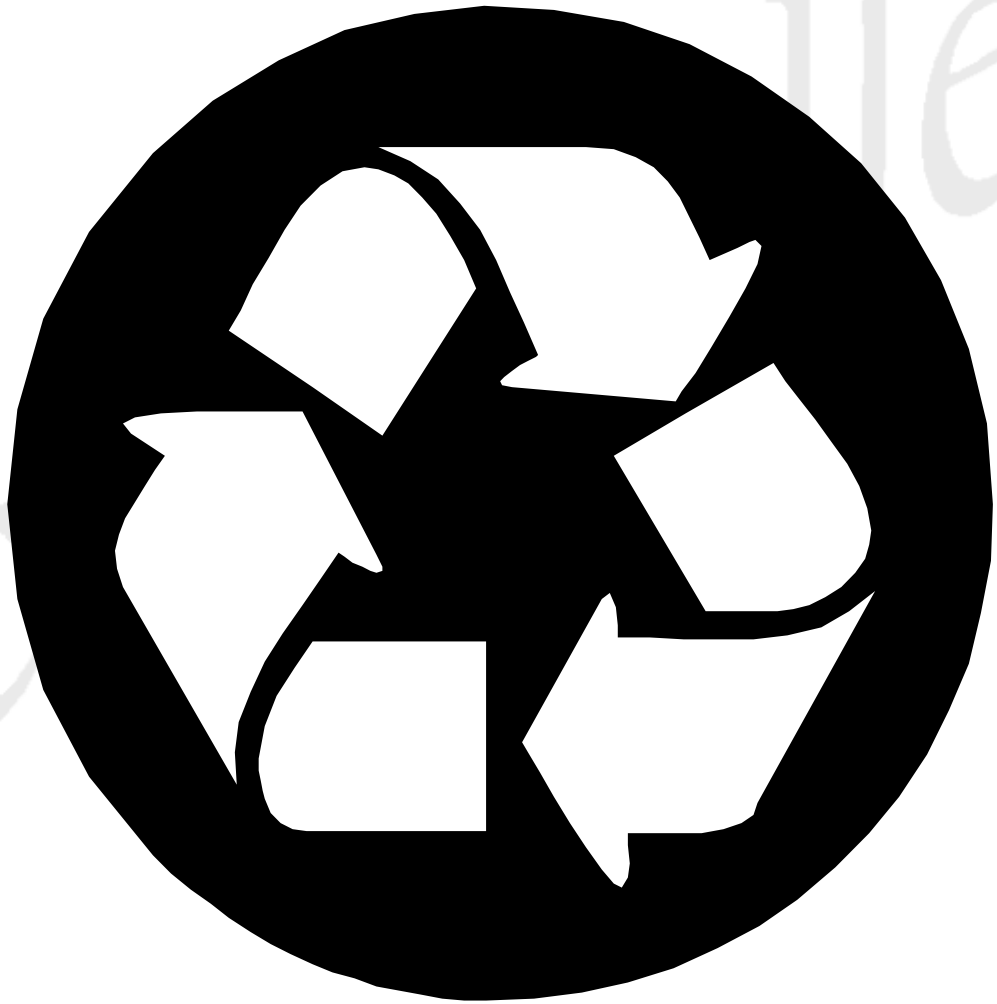


Cutting Asphalt or Concrete

- Cut the asphalt or concrete before excavating.

Recycling Asphalt or Concrete

- The asphalt or concrete can be recycled.



Emergency Water Supply Trailer

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

Excavation

- Excavate on the opposite side of the sewermain.

Spoil Pile

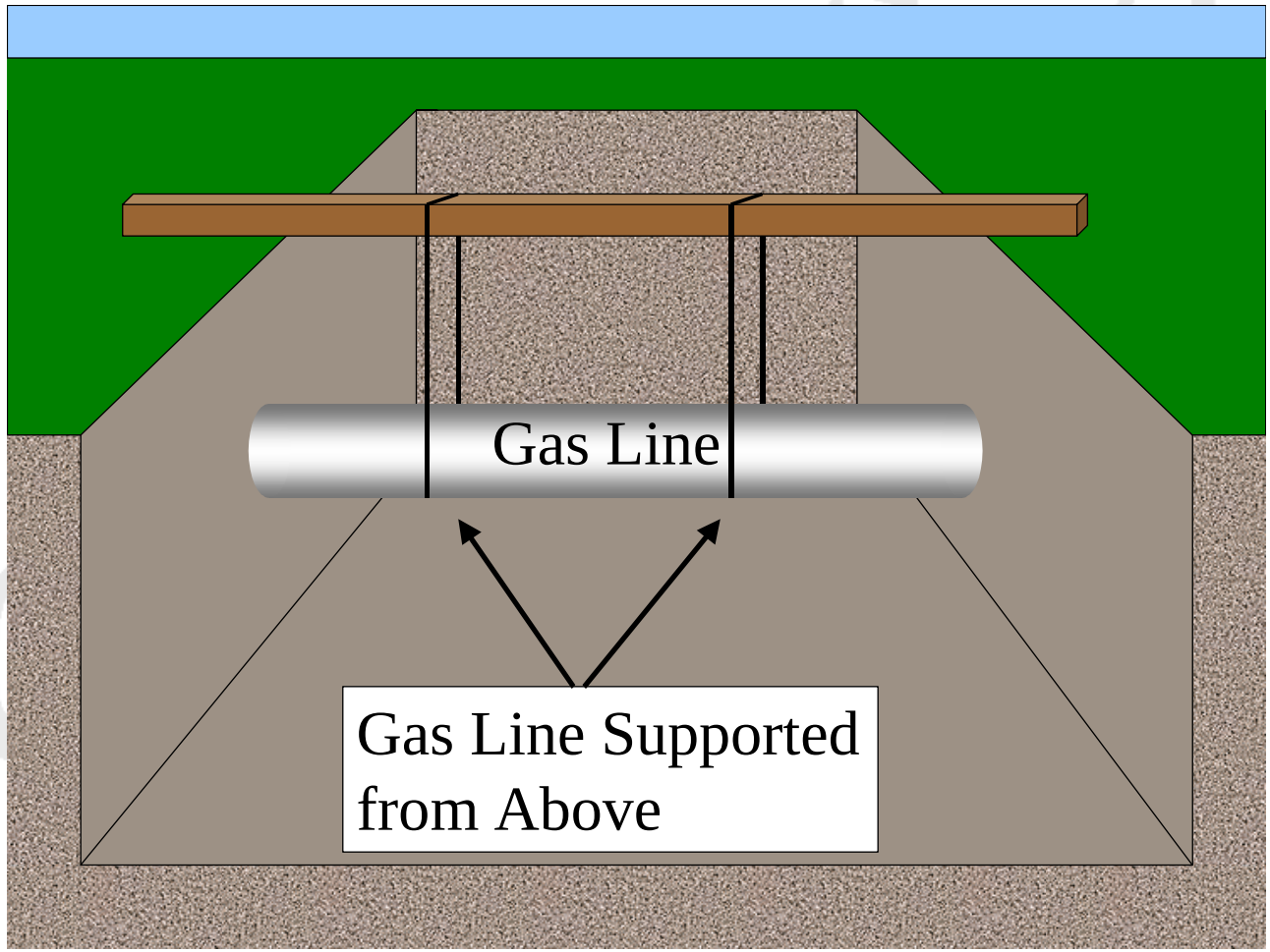
- The trench will be sorted into salvageable material and non-salvageable material.

Utility Depths

- Establish utility depths using the feeling rod.

Supported Utility

- Other Utilities must be supported



Gas Line Safety

- In the event of a natural gas line hit the machine shall be immediately turned off

Power Line Safety

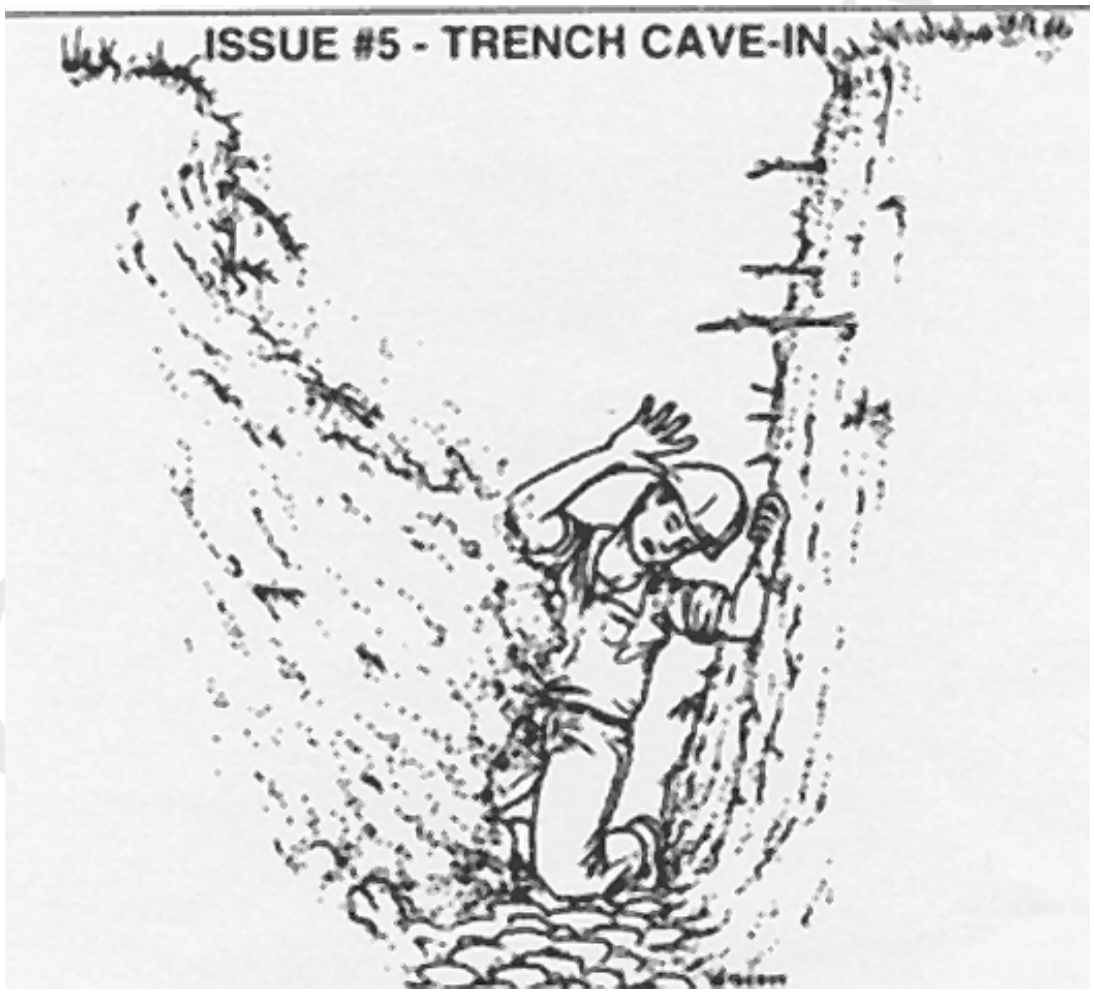
- Should a power line come to rest on the equipment, do not exit the equipment

Excavation Safety

- Don't get between the excavator bucket and the truck being loaded.

Trench Cave-in

- Protective structures must be used.



Submersible Pump

- Should an excess amount of water be observed in the trench, install a submersible pump.

Shoring on Trailer

- Inspect the shoring before use.

Unloading Shoring

- Hook up shoring lifting chains appropriately

Hydraulic Expansion of Shoring

- Expand shoring side panels to be tight against the excavation walls.

Shoring Installation

- Use excavator/backhoe to install shoring.

Tool Disinfection

- All tools must be disinfected prior to use on a water main.

Tool Disinfection

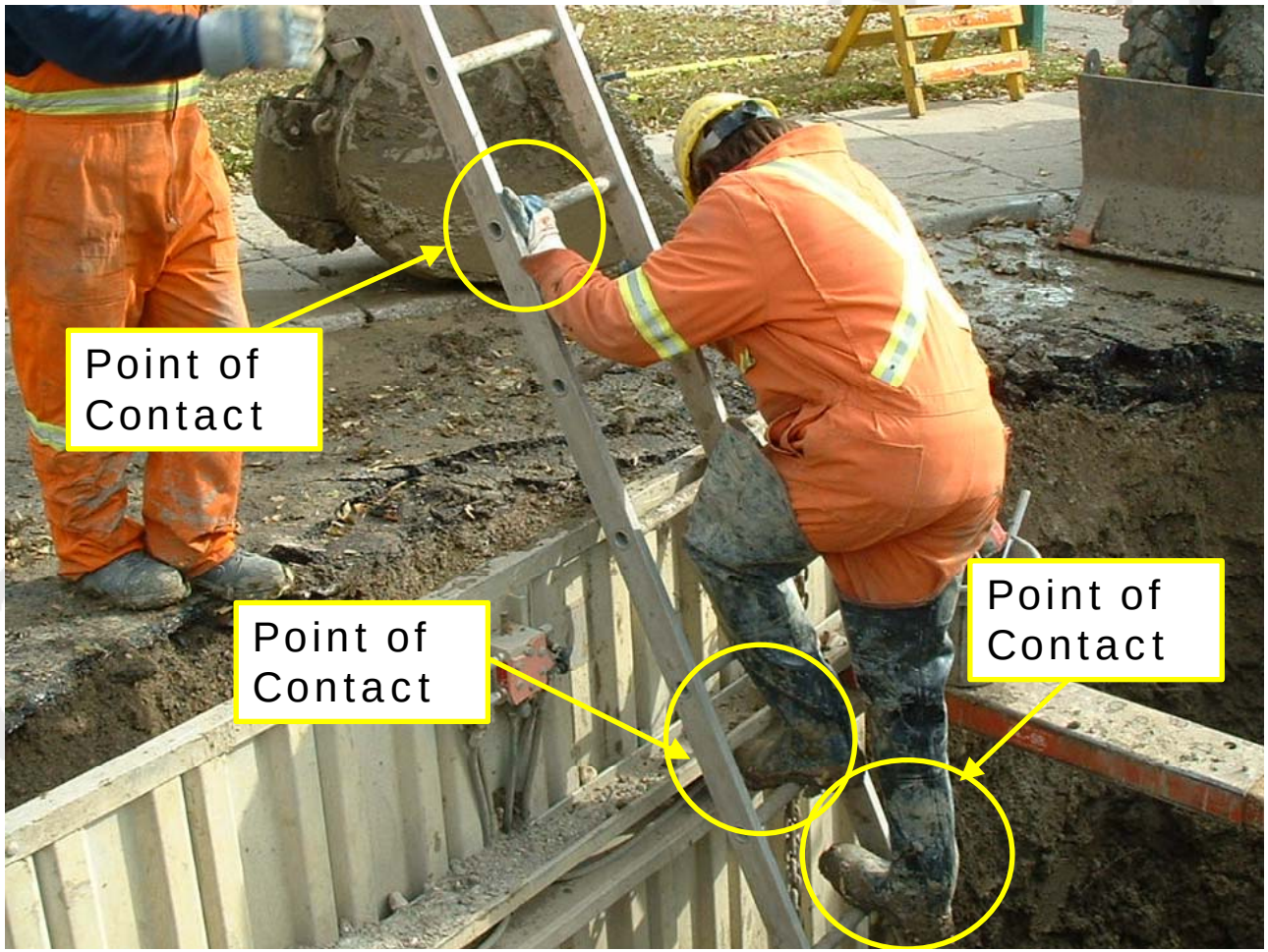
- Soak items with disinfectant solution (Min 5% Sodium Hypo-chlorite solution).

Enter Excavation

- Bottom Labourer may enter excavation.

Three Points of Contact

- Keep three point of contact with the ladder.



Expose Pipe

- Remove soil with tunnelling shovel.

Break Identification

- Pipe is washed and inspected.

Split Pipe

- A split pipe is longitudinal cracks in the pipe.

Hole Break in Pipe

- Hole pipe breaks occur due to pipe corrosion.

Shear Pipe Break

- Shear breaks occur due to soil movement.


Repair Clamp Installation

Pipe Cleaning

- Clean each side of the break with rasp or scraper.

Pipe Washing

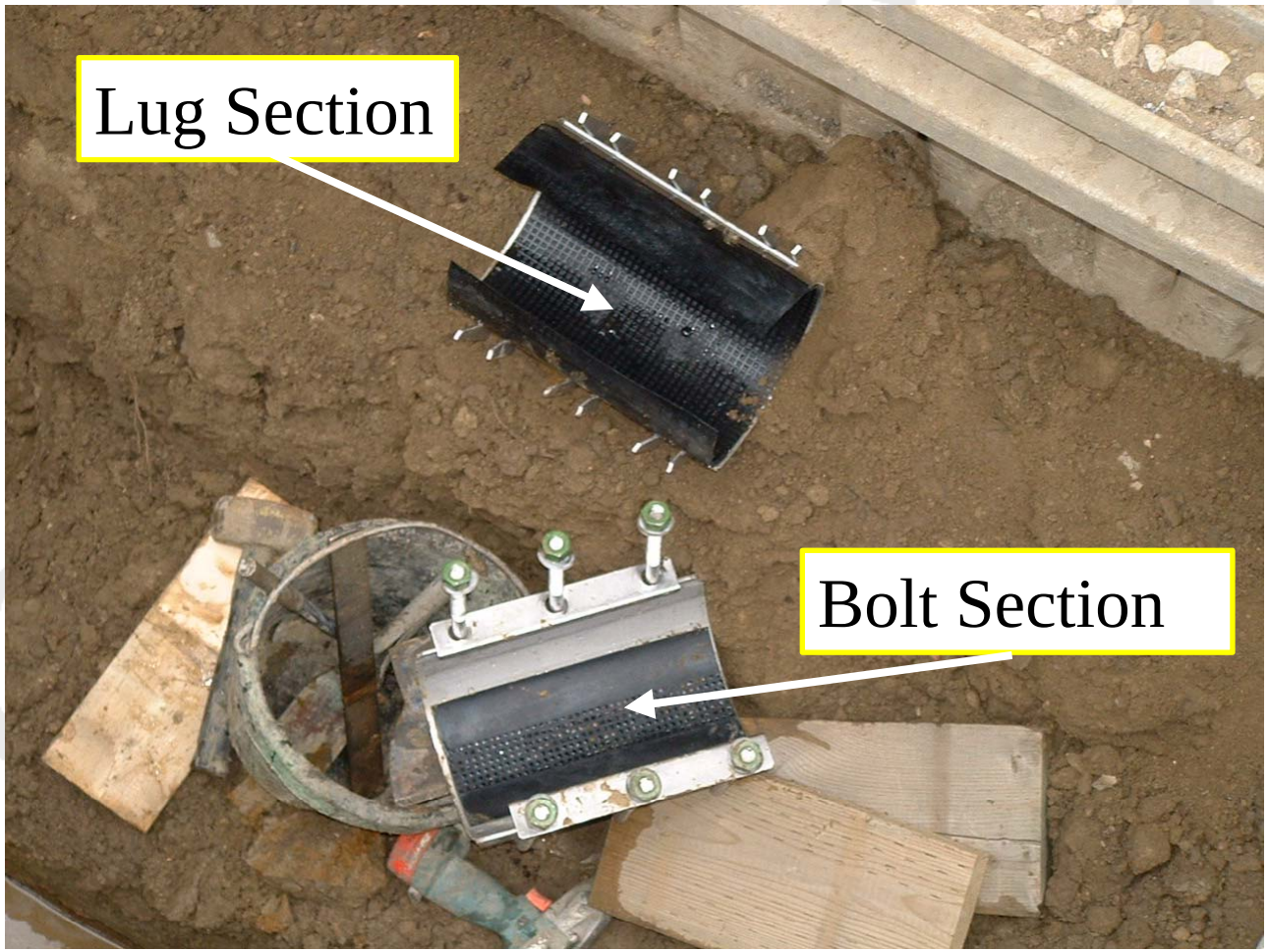
- Wash the pipe toughly before installing the repair clamp.

Repair Clamps

- Back off all nuts to the end of each stud.

Preparing Repair Clamp

- Pull the two-piece clamp apart.



Placement of Repair Clamp

- Place lug section of the clamp onto the pipe
- Ensure that the tapered gasket ends are not folded over.
- Slide the bolt section of the clamp under the pipe.

Connecting Repair Clamp

- Grab the lifter bar on each side of the bolt section.
- Gently spread and pull upwards until they snap into place.

Run Down The Nuts

- Uniformly run down the nuts on each side of the clamp.

Tighten the Nuts

- Alternately tighten all nuts in uniform steps.

Torque Bolts

- Torque up to 75 - 80 ft-lbs.
- The clamp is now installed.

Torque Wrench

- Shows torque in ft-lbs.

Treated Block

- Install treated blocks under pipe.

Sacrificial Anode

- The 36-lb. sacrificial anode must be installed on metallic pipe.

Preparation for Anode Installation

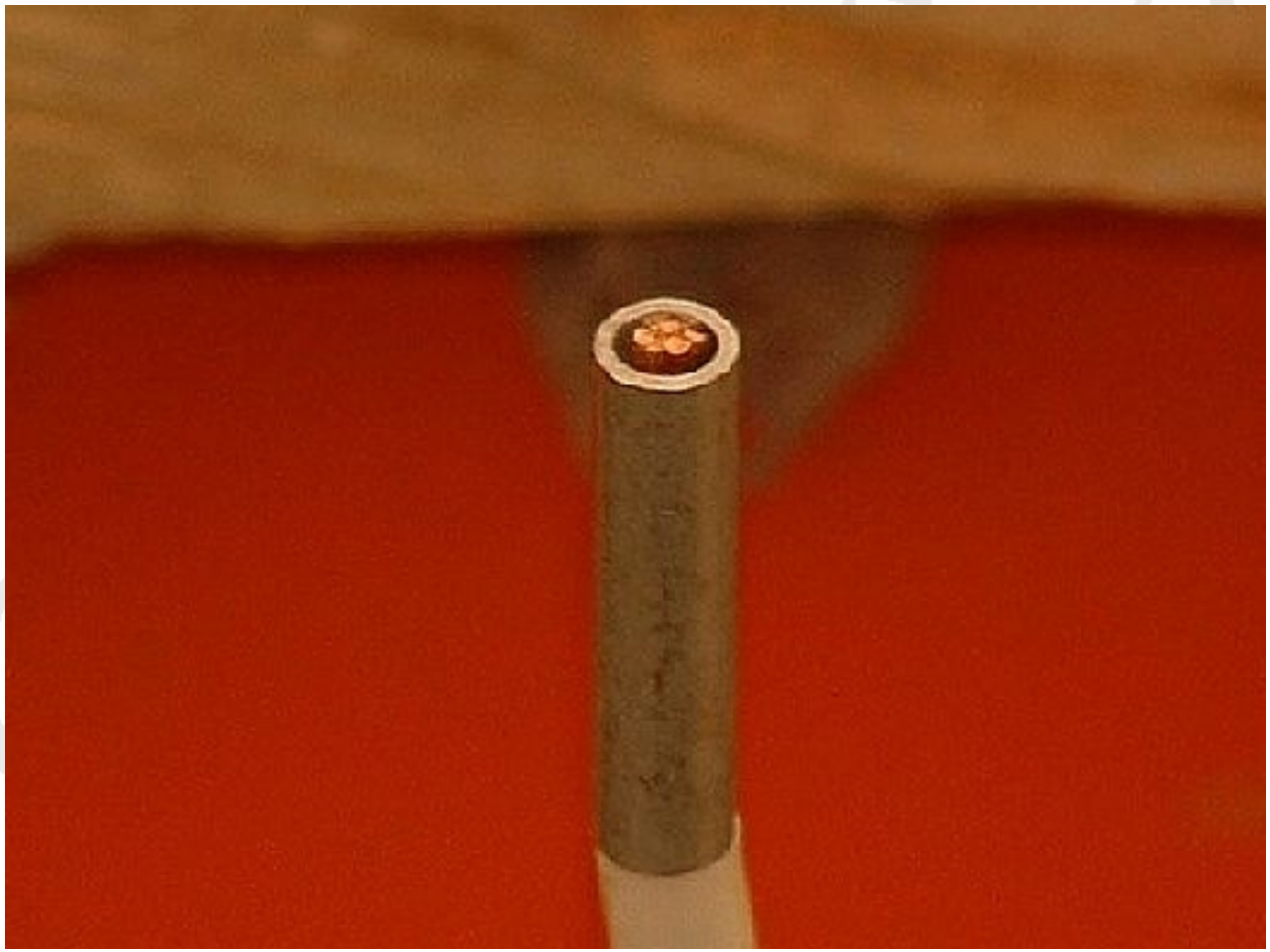
- File pipe to bare metal at the point of anode wire attachment.

Cadweld Charge

- Prep Cadweld with charge.

Anode Wire Sleeve

- Insert stripped anode wire into sleeve



Attach Wire to Pipe

- Attach the anode's wire to pipe, with the Cadweld connector.

Lighting Cadweld

- Prepare to light Cadweld.
- A face shield and goggles must be worn when igniting the Cadweld.

Ignite Charge

- Cadweld lit.

Check Weld

- Check that weld is attached.

Protect Weld

- Protect the weld from corrosion.

Wet Anode

- Soak anodes with water before backfilling.

Pipe Replacement

Quickie Saw

- Use a quickie saw to cut the pipe.
- A face shield and goggles must be worn.

Cutting Pipe

- When cutting pipe, start at the bottom of pipe and work your way to the top.

Cutting A/C Pipe

- Tile cutters shall be used for A/C pipe.
- Keep pipe wet while cutting to minimize airborne particles.

Hydraulic Pipe Cutters

- Hydraulic cutters can be used on CI pipe.

Removing Cut Pipe

- After cutting both ends of failure, a crowbar may be used to dislodge flawed pipe from existing bedding,
- Check both ends of cut pipe for corrosion or cracks.

Lifting Pipe From Excavation

- Safely remove pipe from excavation.

Measuring Pipe

- Take overall measurement of the space between existing pipes.

Cutting Pipe

- Cut the new pipe.

Couplers and Clamps

- Approved couplers may be used.
- Repair clamps are not to be used as couplers!

Transition Coupler

- Reducing or transition couplers.

Maxi-fit Coupler

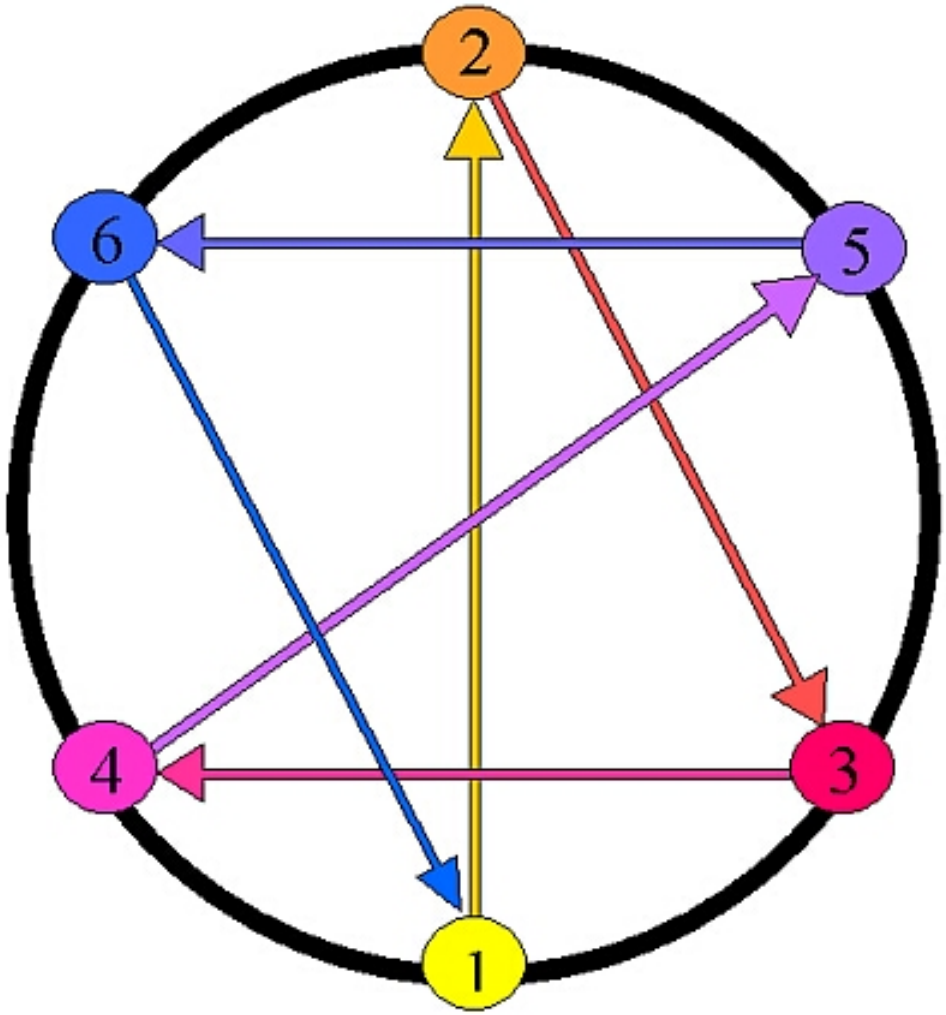
- Maxi-fit couplers are coated.

Maxi-fit Coupler on Pipe

- The Maxi-fit coupler can be slipped over pipe, without dismantling

Bolt Torque Pattern

- Couplers bolts are tightened and torqued in the pattern shown.



Protecto Caps

- Zinc anode Protecto caps are supplied with this type of coupler.

Support Coupler

- Support coupler by snugly placing treated block beneath it.

Bedding Material

- Use correct materials to support and cover the replacement pipe and coupler.

Robar Coupler

- Robar couplers will require dismantling.

Collar and Gasket

- The collar and gasket is slipped over existing pipe.

Centre Coupler

- Centre sleeve and remaining end gaskets over new pipe.

Torque Coupler Bolts

- The Robar couplers are torqued in the same pattern as the Maxi-fits.

Blocking Robar Coupler

- The Robar coupler is blocked for support.

Anodes for Robar Couplers

- The Robar couplers will require mechanically attached anodes.

Post Repair

Exit Excavation

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

Throttle valve

- Disinfect the throttle valve and hydrant port.

Flushing Pipe

- Slowly bleed the air from the water-main

Water Testing

- Perform water quality tests.

Inspect Pipe For Leaks

- Pressurize the water main and observe the repair for leeks.

Shoring Removal

- Excavator/backhoe operator removes shoring from excavation, placing it on a trailer.

Backfilling

Excavation Backfilling

- Remove unsuitable material

Backfilling Connections

- Cover services connection and mains with 150mm [6in.] of granular material and compact.

Non-shrink Backfill

- Non-shrink backfill shall be used where concrete or brick will be replaced.

Backfilling Other Utilities

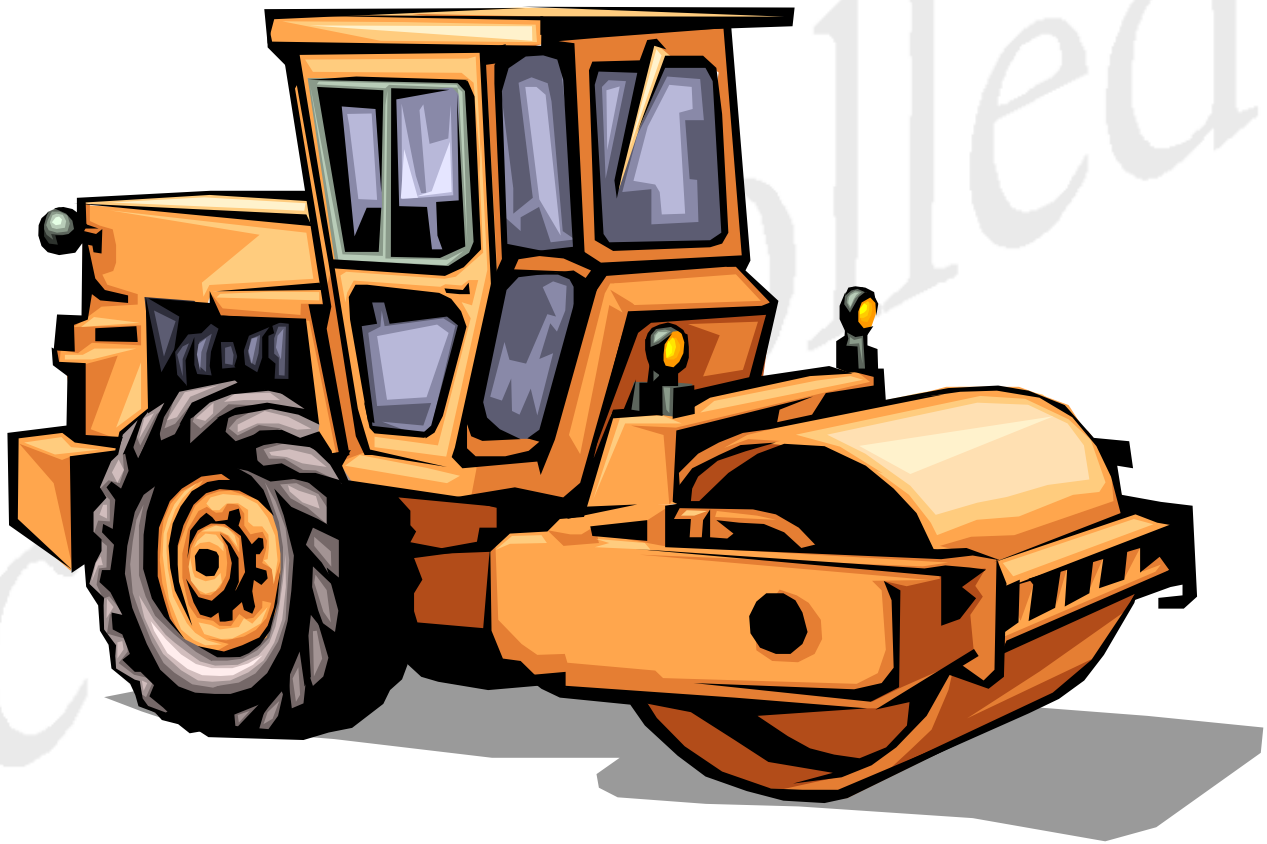
- Ensure utilities are supported according to the specifications of the owner of the utility.

Acceptable Backfill Material

- Acceptable quality of backfill material

Methods of Compaction

- Mechanical Methods of compaction are required.



Handheld Plate Tamper

- Backfill is 150mm [6inch.] lifts.

Hydraulic Tamper

- Hydraulic tamper [excavator attachment] cannot be used closer than 1m [3ft.] directly above pipe or service.

Vibratory Roller

- Vibratory roller is best suitable for larger excavations and should be used in 150mm [6 inch.] lifts.

Bucket Tamping

- Bucket tamping should be avoided.

Finished Backfill

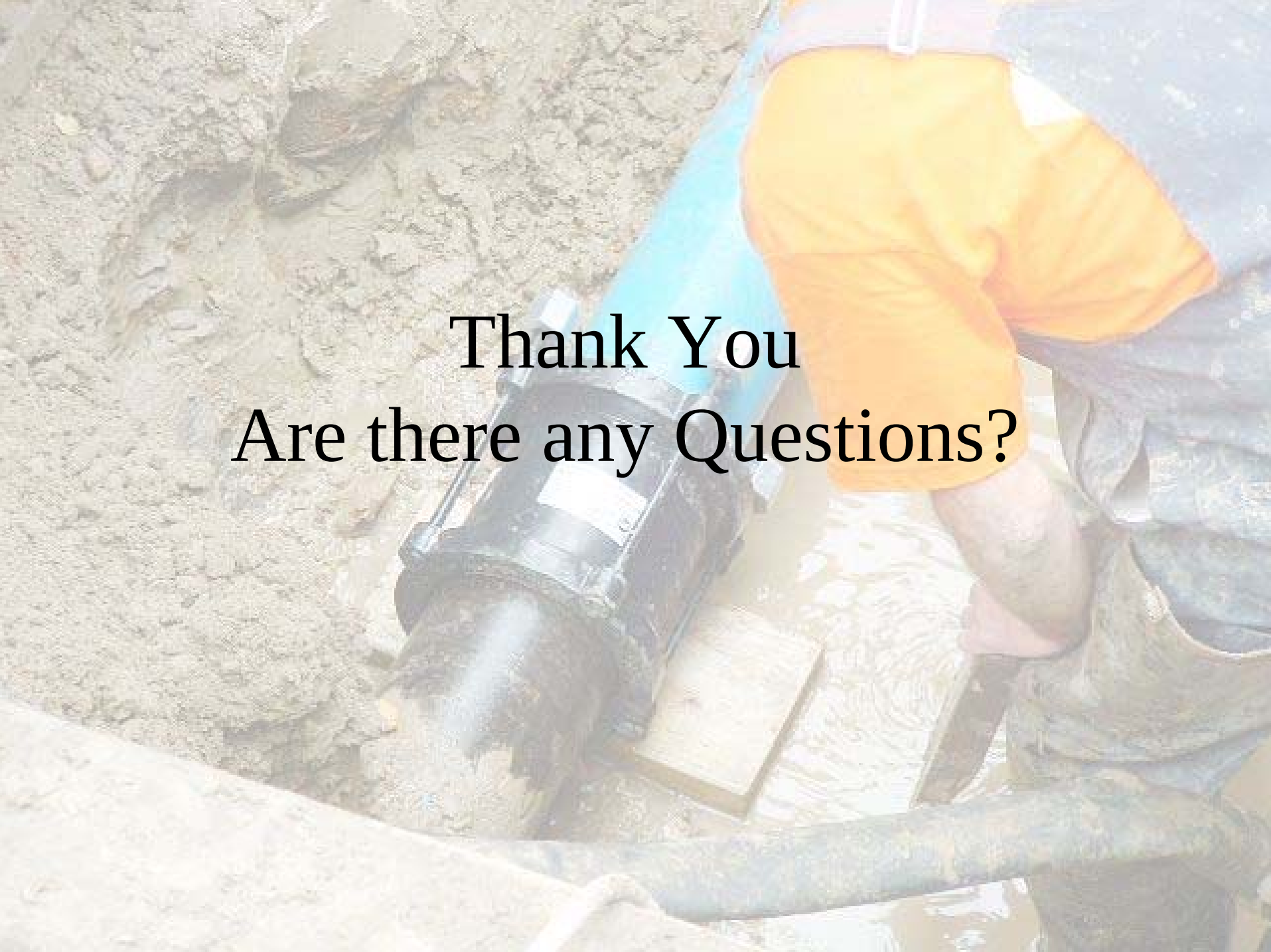
- Leave adequate room for asphalt or concrete as per the Roadway Section's instruction.

Road Signs

- Remove unnecessary road signs.

Site Restoration

- Others will perform the site restoration.


Thank You
Are there any Questions?