

CITY OF SASKATOON

Water and Sewer Section



Water Main Repair Trainers Manual

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Preparation for Training

Resources for Training:

- i. A list of the staff requiring training.
- ii. Familiarization with training manual.
- iii. A meeting room.
- iv. Trainee manuals for staff.
- v. Copies of an “Uncontrolled” procedure, manual and Work Method Check List for each trainee. An “Uncontrolled” document has the word Uncontrolled watermarked across the page and no control number.
- vi. The videos: On The Job Trenching and Excavation, Responding to Water Main Breaks and Seeing is Believing, safely exposing buried utilities
- vii. Copies of Saskpower Emergency Personnel Electrical Safety booklet and the Saskpower Recommended Minimum Horizontal Clearances poster for each trainee.
- viii. Example copies of the following forms, for each trainee’s manual:
 - Water Service Disruption Report
 - Daily Work Report
 - Foreman’s job report
 - Worksite – Safety Check Sheet
 - Standard Distribution System Flushing and Sampling Form
 - Deep excavation notification form
 - Weekend Material Data Sheet
 - Confined Space Entry Inspection Form
 - Work Method checklist
 - Aggregate Tracking Ticket
- ix. Presentation and presentation equipment.
- x. A T.V. and V.C.R.
- xi. Certificates of completion for each staff member.
- xii. Examples of all equipment and materials.
- xiii. 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	30min	Method and Techniques slide show	7:45am	8:30am
	15min	Video: On The Job Trenching and Excavation	8:00am	8:45am
	30min	Method and Techniques slide show	8:30am	9:00 am
	15min	Break	9:00am	9:30am
Session 3	25min	Method and Techniques slide show	9:15am	9:45am
	20min	Video: Responding to Water Main Breaks	9:40am	10:10am
	45min	Method and Techniques slide show	10:00am	10:30am
	15min	Break	10:45am	11:15am
Session 4	60min	Review Equipment and Materials	11:00am	11:30am
	60min	Lunch	12:00pm	12:30pm
Session 5	30min	Video: Seeing is Believing, safely exposing buried utilities	1:00pm	1:30pm
	15min	Discussion on video	1:30pm	2:00pm
	30min	Review of Saskpower Emergency Personnel Electrical Safety booklet	1:45pm	2:15pm
	15min	Review of the Saskpower Recommended Minimum Horizontal Clearances.	2:15pm	2:45pm
	15min	Break	2:30pm	3:00pm
Session 6	75min	Review Procedure and Forms	2:45pm	3:15pm
		End of Day	4:30pm	4:30pm

Session 1

Session 1 is the introduction. Start by introducing yourself, your name your position how long you have been with the City of Saskatoon and anything else you deem applicable. After your introduction discuss what they will be trained on, an example is given below.

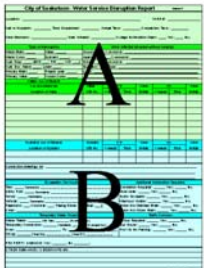
Introduction

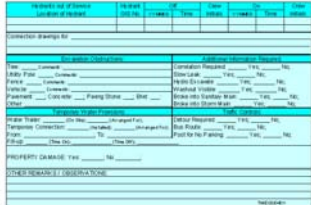
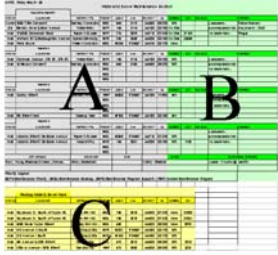
The objective of this course is to train staff on how to repair a water main in a timely and efficient manner while minimizing disruption in service to the customer and insuring the water main repair meets current standards.

Session 2

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

Methods and Techniques

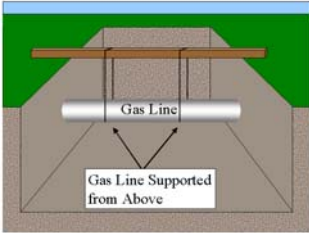
Slide 1		To prepare for this section review each slide. Hand out the trainee manuals before starting the slide presentation
Slide 2	Water Service Disruption Report • Are prioritized then submitted to Clearances and Locations Work Group. 	As the Water Service Disruption Reports appear, each request for repairs needs to be followed through.

Slide 3	Water Service Disruption Report Section A of the Water Service Disruption Report. 	Section A of the Water Service Disruption Report. Contains the general data, the type of interruption, the units affected and all the valves out of service.
Slide 4	Water Service Disruption Report Section B of the Water Service Disruption Report. 	Section B of the Water Service Disruption Report contains hydrant, excavation, temporary water, traffic controls and any additional information.
Slide 5	Clearances and Locations Work Group - Provides: drawings, utility locations, location numbers and forms. - Coordinates the removal of obstructions if required. 	The Clearances and Locations Work Group is located on the 2nd floor of the John Deer Building. They supply drawings, utility locations, location numbers and forms.
Slide 6	Daily Work Sheet The daily work sheet is created to provide other departments with the location of the Water & Sewer work being performed. 	The daily work sheet is sent to, Public Works stores, the sign shop and any other departments that need to know work is being preformed.

Slide 7	Daily Work Sheet Section A Section A shows the tasks for each Supervisor IV. 	Section A shows the tasks for Supervisor IV, location, repair type, priority, GIS #, job #, location #, activity #, and GL #. The staff not at work are listed at the bottom of section A.
Slide 8	Daily Work Sheet Section B Section B shows additional information. 	Section B shows additional information on signing, GIS#, utility locations, staffing and comments.
Slide 9	Daily Work Sheet Section C Section C shows work pending. 	Section C shows pending work.
Slide 10	Pick up Materials The Supervisor IV will pick up the required materials 	The Supervisor IV will pick up all materials that can be transported with a ¾ ton truck from Public works stores. (For larger material a truck hoist or tandem truck will be used)

Slide 11	Choosing Equipment Choose the excavator/backhoe and shoring types based on size of excavation and soil condition. 	The Supervisor IV chooses what equipment to use.
Slide 12	Trailer Placement Locate trailers clear of the excavation. 	Upon arrival at the work site, determine a location for the trailers.
Slide 13	Marking Utilities - Representatives from utility companies can field locate their lines if required. 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	Representatives from utility companies can field locate their lines if required. All buried and overhead utilities shall be identified and marked prior to beginning an excavation. The Clearances and Locations Work Group representative or the Supervisor IV will mark the city owned utilities. Locations of the utilities will be a determining factor in performing the excavation.
Slide 14	Cutting Asphalt or Concrete Cut the asphalt or concrete before excavating. 	Every effort should be made to cut the asphalt or concrete with an earth saw (winter), quickie saw or asphalt saw (summer), prior to excavating.

Slide 15	Recycling Asphalt or Concrete • The asphalt or concrete can be recycled. 	Every effort should be made to cut the asphalt or concrete with an earth saw (winter), quickie saw or asphalt saw (summer), prior to excavating.
Slide 16	Emergency Water Supply Trailer • Water trailers and temporary hook ups are options to consider when there is a water outage. 	Every effort will be made to notify affected customers. A generic notification letter may be posted on apartments (front and rear doors) where notifying all individuals affected is not
Slide 17	Excavation • Excavate on the opposite side of the sewermain. 	Once the various conditions are evaluated, the dimensions of the excavation will determine the type of shoring selected.
Slide 18	Spoil Pile • The trench will be sorted into salvageable material and non-salvageable material. 	If stockpiling of salvageable material on site is not a viable option a dumpsite will be used.

Slide 19	Utility Depths Establish utility depths using the feeling rod. 	While locating a buried utility deeper than 1.2meters (4feet), shoring shall be placed in excavation prior to worker probing for the utility.
Slide 20	Supported Utility Other Utilities must be supported 	Support buried utilities as required during excavation.
Slide 21	Gas Line Safety In the event of a natural gas line hit the machine shall be immediately turned off 	In the event of a natural gas line hit the machine shall be immediately turned off, as the engine may ignite the gas, especially in calm conditions. In this picture the excavator/backhoe hit an underground propane line.
Slide 22	Power Line Safety Should a power line come to rest on the equipment, do not exit the equipment 	Should a power line come to rest on the equipment, do not exit the equipment. Exit only when told it is safe to do so.

Slide 23	Excavation Safety • Don't get between the excavator bucket and the truck being loaded. 	Don't get between excavator bucket and the truck your loading. Never stand under the bucket of the machine. Keep everyone in work area clear of the swing of the turntable and reach of the machine.
Slide 24	Trench Cave-in • Protective structures must be used. 	No worker will enter a trench greater than 1.2m (4feet) in depth, without the installation of a temporary protective structure.
Slide 25	Submersible Pump • Should an excess amount of water be observed in the trench, install a submersible pump. 	Should an excess amount of water be observed in the trench, install a submersible pump. The pump should be lowered down with a rope, not thrown down.
Slide 26	Shoring on Trailer • Inspect the shoring before use. 	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).

Slide 27	Unloading Shoring • Hook up shoring lifting chains appropriately 	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, to prevent shoring from swinging.
Slide 28	Shoring Installation • Use excavator/backhoe to install shoring. 	Position the excavator/backhoe far enough back so as to lift and lower shoring safely. Use tag lines whenever possible.
Slide 29	Hydraulic Expansion of Shoring • Expand shoring side panels to be tight against the excavation walls. 	Naturally frozen soil is not considered safe and therefore must be shored appropriately.

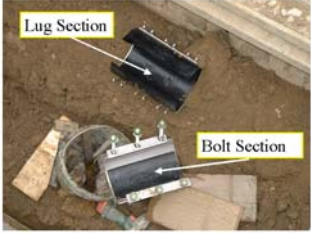
Stop and Show Video:

On The Job Trenching and Excavation. (AWWA)

Slide 30	Tool Disinfection • All tools must be disinfected prior to use on a water main. 	Disinfection is especially important if the tools have been previously used on a sewer repair. Ensure that the proper disinfectant applicator is used.
Slide 31	Tool Disinfection • Soak items with disinfectant solution (Min 5% Sodium Hypo-chlorite solution) 	Clean excess dirt with a rag and wire brush prior to soaking with disinfectant. Soak items for a minimum of 7 seconds in Disinfection solution. Scrub item with a clean rag then rinse clean with disinfectant solution. Let tools dry before use.
Slide 32	Enter Excavation • Bottom Labourer may enter excavation. 	After excavation is completed and shoring is in place, place ladder in hole, securing it inside the shoring. Bottom Labourer now proceeds to enter excavation. Bottom worker must wear all required personal protective equipment.
Slide 33	Three Points of Contact • Keep three point of contact with the ladder. 	Three points of contact must be kept on the ladder when in use.

Slide 34	Expose Pipe • Remove soil with tunnelling shovel. 	Expose pipe by removing soil with tunnelling shovel. Be careful of any near by utilities.
Slide 35	Break Identification • Pipe is washed and inspected. 	Pipe should be washed in order to inspect condition of pipe and to determine what method and materials will be used to perform repairs.
Slide 36	Split Pipe • A split pipe is longitudinal cracks in the pipe. 	For a split pipe determine if a repair clamp will cover corroded area. If corroded area is too severe, pipe replacement should be considered.
Slide 37	Hole Break in Pipe • Hole pipe breaks occur due to pipe corrosion. 	In most cases a repair clamp can be used to make the repair.

Slide 38	Shear Pipe Break • Shear breaks occur due to soil movement. 	Often a repair clamp can be used to make the repair.
Slide 39	 Repair Clamp Installation	This section will describe how to repair a water main with a repair clamp.
Slide 40	Pipe Cleaning • Clean each side of the break with rasp or scraper. 	After the soil has been removed from around the pipe, pipe must be cleaned on each side of the break with rasp or scraper.
Slide 41	Pipe Washing • Wash the pipe toughly before installing the repair clamp. 	Thoroughly wash pipe of debris to ensure a good seal between the repair clamp and pipe.

Slide 42	Repair Clamps • Back off all nuts to the end of each stud. 	Repair clamps come in 300mm (12 inch), 400mm (16inch) or 600mm (24 inch) lengths.
Slide 43	Preparing Repair Clamp • Pull the two-piece clamp apart. 	Pull the two-piece clamp apart. Apply a generous amount of pipe lubricant over the entire gasket surface. This will allow the gasket to slide smoothly over the pipe during installation.
Slide 44	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. 	The lug section of the clamp will be on the top of the pipe. The bolt section will be on the bottom of the pipe.
Slide 45	Connecting Repair Clamp • Grab the lifter bar on each side of the bolt section. • Gently spread and pull upwards until they snap into place. 	There should be no distortion or folds in the gaskets. The tapered ends are still free to move into position, (in the slack below the pipe).

Slide 46	Run Down The Nuts • Uniformly run down the nuts on each side of the clamp. 	Ensure that the joints between sections are approximately equal when the clamp lies snug. Don't tighten bolts at this point, a specific torque will be applied later
Slide 47	Tighten the Nuts • Alternately tighten all nuts in uniform steps. 	Use the strong arm to tighten the bolts but make sure not to over tighten.
Slide 48	Torque Bolts • Torque up to 75 - 80 ft-lbs. • The clamp is now installed. 	Apply the manufactures recommended torque of 75-80 ft-lbs.
Slide 49	Torque Wrench • Shows torque in ft-lbs. 	The dial at the top of the torque wrench shows the torque in ft-lb.

Slide 50	Treated Block • Install treated blocks under pipe. 	Install treated blocks snugly underneath the repair clamp, use as many blocks as required.
Slide 51	Sacrificial Anode • The 36-lb. sacrificial anode must be installed on metallic pipe. 	Metallic pipe requires a 36 lb sacrificial anode to be installed.
Slide 52	Preparation for Anode Installation • File pipe to bare metal at the point of anode wire attachment. 	Prepare Pipe for Cadweld, by filing or grinding the pipe to bare metal.
Slide 53	Cadweld Charge • Prep Cadweld with charge. 	The Cadweld welding system is used to connect the anode wire to the pipe.

Slide 54	Anode Wire Sleeve • Insert stripped anode wire into sleeve 	Strip the anode wire then slip the bare copper wires into the sleeve.
Slide 55	Attach Wire to Pipe • Attach the anode's wire to pipe, with the Cadweld connector. 	Set the anodes wire on the pipe holding it in place with the Cadweld connector.
Slide 56	Lighting Cadweld • Prepare to light Cadweld. • A face shield and goggles must be worn when igniting the Cadweld. 	Use the Cadweld igniter to light the Cadweld.
Slide 57	Ignite Charge • Cadweld lit. 	The charge will explode and weld the wire to the pipe.

Slide 58	Check Weld • Check that weld is attached. 	Wait until the weld has cooled then gently tug on the wire to check if the wire is attached.
Slide 59	Protect Weld • Protect the weld from corrosion. 	Apply a tar patch or mastic equivalent over the weld to prevent corrosion.
Slide 60	Wet Anode • Soak anodes with water before backfilling. 	In order for the anode to work, the cardboard packaging must be wet. Depending on the ground conditions, it can take several months to a year before a dry anode will soak up enough groundwater to work efficiently. In order to allow the anodes to begin operating sooner, it is standard practice to soak the anodes with water before backfilling.

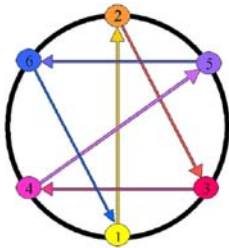
Session 3

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 61	 Pipe Replacement	This section will describe how to repair a water main by replacing a section of pipe.
Slide 62	Quickie Saw • Use a quickie saw to cut the pipe. • A face shield and goggles must be worn. 	Use a quickie saw, tile cutters or hydraulic cutters to cut pipe, this will eliminate further damage to the existing pipe. Material around pipe (where cut is to be performed) should be removed in such quantities as to accommodate cutting. A face shield and goggles must be worn when using the quickie saw, hydraulic cutters or the angle grinder.
Slide 63	Cutting Pipe • When cutting pipe, start at the bottom of pipe and work your way to the top. 	Cut the pipe from bottom to top, this will allow water to drain.
Slide 64	Cutting A/C Pipe • Tile cutters shall be used for A/C pipe. • Keep pipe wet while cutting to minimize airborne particles. 	Keep pipe wet while cutting to minimize airborne Particles. Appropriate respiration Tile cutters shall be used for A/C pipe. 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. It's recommended to go to the next joint when replacing A/C pipe to avoid cutting all together.

Slide 65	Hydraulic Pipe Cutters Hydraulic cutters can be used on CI pipe. 	Hydraulic cutters can be used on cast iron pipe.
Slide 66	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. 	For small pipe a crowbar may be used to dislodge it, with larger pipe a chain and excavator/backhoe can be used, either way be careful not to damage ends of the existing pipe. After removal check the existing pipe for corrosion or cracks that will require additional pipe to be cut out.
Slide 67	Lifting Pipe From Excavation Safely remove pipe from excavation. 	At this point a chain should be wrapped around failed pipe in such a manner so pipe can be safely removed from excavation. The top Labourer can pull out smaller pipe with a rope.
Slide 68	Measuring Pipe Take overall measurement of the space between existing pipes. 	Take a measurement of the section of cut out pipe, be sure to subtract 12mm (1/2 inch) from overall measurement to allow for easier installation of new pipe. Relay measurement to top labourer.

Slide 69	Cutting Pipe • Cut the new pipe. 	The replacement pipe should be 12mm (1/2 inch) smaller than the section for failed pipe. The replacement pipe must be PVC, unless otherwise stated.
Slide 70	Couplers and Clamps • Approved couplers may be used. • Repair clamps are not to be used as couplers! 	The Robar coupler is the blue-green coupler in the top left. The Maxi-fit coupler is the black coupler in the bottom left. The transition coupler is black odd shaped coupler in the top right. Two repair clamps are in the bottom right.
Slide 71	Transition Coupler • Reducing or transition couplers. 	Transition couplers are used to make a non-restrained connection between two pipes of the same nominal size but with different outside diameters.
Slide 72	Maxi-fit Coupler • Maxi-fit couplers are coated. 	Maxi-fit couplers are coated, eliminating the need for further protection such as on site wrapping.

Slide 73	Maxi-fit Coupler on Pipe The Maxi-fit coupler can be slipped over pipe, without dismantling 	The Maxi-fit couplers can be slipped over either the existing pipe or on the replacement pipe. The coupler is then centred over existing and new pipe
Slide 74	Bolt Torque Pattern Couplers bolts are tightened and torqued in the pattern shown. 	After tightening the bolts are then torqued in the same pattern with 40 - 50 ft-lbs.
Slide 75	Protecto Caps Zinc anode Protecto caps are supplied with this type of coupler. 	Zinc anode Protecto caps are supplied with this type of coupler. Protecto caps eliminate the need for a mechanically attached anode on the coupler. Protecto caps are screwed on at the end of each bolt.
Slide 76	Support Coupler Support coupler by snugly placing treated block beneath it. 	If connecting to metallic pipe a 36lb sacrificial anode must be attached to the pipe, (Use the same procedure as given in this manual).

Slide 77	Bedding Material • Use correct materials to support and cover the replacement pipe and coupler. 	Replacement pipe must be properly supported by working bedding material (Crushed rock and/or base gravel) underneath the pipe. The pipe should be covered with the same material.
Slide 78	Robar Coupler • Robar couplers will require dismantling. 	Robar couplers will require dismantling. There are 3 main parts to a Robar coupler, the top section called the collar, the black rubbers called the gaskets, and middle section called the sleeve.
Slide 79	Collar and Gasket • The collar and gasket is slipped over existing pipe. 	Robar couplers will require dismantling. There are 3 main parts to a Robar coupler, the top section called the collar, the black rubbers called the gaskets, and middle section called the sleeve.
Slide 80	Centre Coupler • Centre sleeve and remaining end gaskets over new pipe. 	Centre the sleeve and remaining gaskets over new pipe. Insert the bolts. Couplers are slipped back and centred over the existing pipe and replacement pipe.

Slide 81	Torque Coupler Bolts • The Robar couplers are torqued in the same pattern as the Maxi-fits. 	Couplers are assembled using bolts, tightened in the torque pattern. Robar bolts are then torqued to 70-80 ft-lbs.
Slide 82	Blocking Robar Coupler • The Robar coupler is blocked for support. 	Robar couplers are blocked in the same way as Maxi-fit couplers.
Slide 83	Anodes for Robar Couplers • The Robar couplers will require mechanically attached anodes. 	Robar couplers require a 24lb anode and metallic pipe requires a 36lb anode. Attached anodes as described in the anode installation section of this manual.

Stop and Show Video:

Responding to Water Main Breaks By AWWA

Slide 84	 Post Repair	
Slide 85	Exit Excavation • Remove all hand tools from excavation. • Exit and remove ladder. 	Remove all hand tools from excavation, exit, and remove ladder. Never throw tools out of excavation. Clean tools prior to storing.
Slide 86	Throttle valve • Disinfect the throttle valve and hydrant port. 	Disinfect throttle valve and hydrant port with disinfectant solution. Attach throttle valve and hose onto hydrant. Ensure throttle valve is open and run hose to the storm manhole or catch basin; alternately a diffuser can be used.
Slide 87	Flushing Pipe • Slowly bleed the air from the water-main 	Open the valve upstream of the repair to flush the main past the repair. Air will be expelled from the water main while it fills with water. Open the valve slowly. Opening it too fast can create water hammer, which can further damage the water main.

Slide 88	Water Testing • Perform water quality tests. 	When there is no air left in the system, turn the hydrant off, slowly. The water main is now under pressure. Check the new repair for leaks. Listen to the hydrant for sounds that could indicate another break in the main.
Slide 89	Inspect Pipe For Leaks • Pressurize the water main and observe the repair for leaks. 	Take a water sample from the hydrant with the water sample jar. Test for turbidity and chlorine. Deliver water sample to the water treatment plant. Follow the procedures in the water quality SOP.
Slide 90	Shoring Removal • Excavator/backhoe operator removes shoring from excavation, placing it on a trailer. 	Ensure all shoring equipment and its trailer has been serviced and is ready for the next job. Keep shoring clean. Keep shoring & trailer clean. End plates should be stored in proper place on trailer and be easily accessible.
Slide 91	 Backfilling	

Slide 92	Excavation Backfilling Remove unsuitable material 	If soil conditions at base of excavation are saturated and/or unstable, remove unsuitable material below pipe and replace with crushed rock and/or granular material.
Slide 93	Backfilling Connections Cover services connection and mains with 150mm [6in.] of granular material and compact. 	Cover services connection and mains with 150mm [6in.] of granular material and compact. Use spoil material if suitable. If not bring in clean backfill material.
Slide 94	Non-shrink Backfill Non-shrink backfill shall be used where concrete or brick will be replaced. 	Leave non-shrink backfill a minimum of 300mm(12inch) below grade.
Slide 95	Backfilling Other Utilities Ensure utilities are supported 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 96	Acceptable Backfill Material • Acceptable quality of backfill material 	Backfill material should be free from loam [fertile material] sod, boulders, foreign material and frozen lumps.
Slide 97	Methods of Compaction • Mechanical Methods of compaction are required. 	Choose the method of compaction based on suitability.
Slide 98	Handheld Plate Tamper • Backfill is 150mm [6inch.] lifts. 	The handheld plate tamper is use for compacting around the pipe zone.
Slide 99	Hydraulic Tamper • Hydraulic tamper [excavator attachment] cannot be used closer than 1m [3ft.] directly above pipe or service. 	Use with 150mm (6 inch) lifts.

Slide 100	Vibratory Roller • Vibratory roller is best suitable for larger excavations and should be used in 150mm [6 inch.] lifts. 	The vibrator roller is commonly used for large excavations.
Slide 101	Bucket Tamping • Bucket tamping should be avoided. 	Bucket tamping is not an approved method of compaction
Slide 102	Finished Backfill • Leave adequate room for asphalt or concrete as per the Roadway Section's instruction. 	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 103	Road Signs • Remove unnecessary road signs. 	Before leaving the site any unnecessary traffic control devices will be removed, as per traffic control manual.

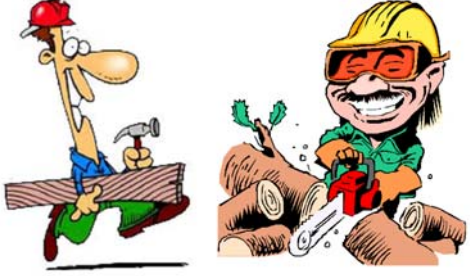
Slide 104	Site Restoration • Others will perform the site restoration. 	Others will perform site restoration.
Slide 105	 Thank You Are there any Questions?	

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	 Water Main Repair Resources Required	To prepare get out the box of equipment and materials. If time permits lay them out on the table in the order they will be discussed in.
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Slide 2	 People	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 distribution valve replacement.
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 distribution valve 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	 Equipment	Get the box of example equipment (if included) ready to pass around. Pass each tool out when you come to that slide.
Slide 9	Feeling Rod 	The feeling rod is used for finding buried utilities.

Slide 10	Tunnelling Shovel 	The tunnelling shovel is used for digging around the pipe.
Slide 11	Shovel 	The shovel is used for digging.
Slide 12	Broom 	The broom is used for site clean up.
Slide 13	Scraper 	The scraper is used for cleaning off the pipe.

Slide 14	Rasp / File 	The rasp is used to file the pipe where the anode wire will be welded on.
Slide 15	Drill with 1-1/16" Deep Socket 	The drill is used to tighten the bolts on the repair clamp or the couplers.
Slide 16	Strong Arm 	The strong arm is used for tightening the repair clamp or coupler bolts.
Slide 17	Torque Wrench 	The torque wrench is used to tighten the bolt with a specified amount of torque. It has a dial that measures the torque in ft-lbs.

Slide 18	Cadwelder 	The Cadweld is used to weld the anode wire to the metallic pipe.
Slide 19	Sledgehammer 	The sledgehammer can be used for knocking the support block into place.
Slide 20	Pickaxe 	The pickaxe is used to break up hard soil.
Slide 21	Valve Key 	The valve key is used to open and close the valves.

Slide 22	Disinfectant Sprayer 	The disinfectant sprayer is used to spray disinfectant solution on contaminated tools and equipment.
Slide 23	Quickie Saw 	Quickie saw is used to cut pipes.
Slide 24	Tile Cutter 	Tile cutter is used to cut asbestos cement pipes.
Slide 25	Hydraulic Cutter 	Hydraulic cutter is used to cut cast iron pipes.

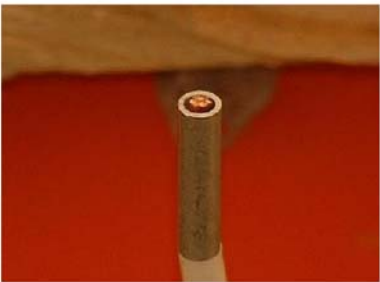
Slide 26	Emergency Water Supply Trailer 	The emergency water trailer is used to supply water.
Slide 27	Crew Trailer 	The crew trailers are used for storage and as a mobile office.
Slide 28	Excavator/Backhoe 	The excavator/backhoe is used to excavate, but it can also be used to lift heavy equipment like shoring.
Slide 29	Shoring & Trailer 	Shoring is used in excavation to protect workers from the excavation collapsing.

Slide 30	Truck 	The trucks are used to haul material and tow trailers.
Slide 31	Front-End Loader 	The front-end loader is used to load trucks with backfilling materials.
Slide 32	Hydrant Key 	The hydrant key is used to open and close hydrants.
Slide 33	Hydrant Hose 	The hydrant can be used in hydrant flushing and pumping out the excavation. It is important in winter to direct the water to either the storm or sanitary sewer.

Slide 34	Hydrant Diffuser 	The hydrant diffuser is used to lessen the discharge from the hydrant.
Slide 35	Hydraulic Tamper 	Hydraulic tamper [excavator attachment] cannot be used closer than 1m (3feet) directly above pipe or service. Use with 150mm (6inches) lifts.
Slide 36	Vibrator Roller Packer 	Vibratory roller packer must be used for larger excavations. Backfill shall be placed in 150mm (6 inches) lifts.
Slide 37	Handheld Plate Tamper 	Handheld plate tampers are to be used for compacting in the pipe zone, around manholes etc. Backfill shall be placed in 150mm (6 inches) lifts.

Slide 38	Vibratory Compactor 	Vibratory compactors are compactors used for small areas.
Slide 39	Chlorine Tester 	The chlorine tester is used to test how much chlorine is in the water after the main has been disinfected and flushed.
Slide 40	Turbidity Meter 	Turbidity is a measure of particles in the water sample. The more particles in the water, the higher the turbidity.
Slide 41	Asphalt Saw 	Cut the asphalt with an earth saw or asphalt saw (summer) prior to excavating. This will ensure an excavation that is straight on all sides and is easier to patch. Wear face shield and goggles when using asphalt saw.

Slide 42	 Materials	To prepare for the next section get the box of example materials ready to pass around.
Slide 43	Robar Coupler 	The Robar coupler is used to connect replacement pipe to the existing pipe.
Slide 44	Maxi-fit Coupler 	The Maxi-fit coupler is also used to connect replacement pipe to the existing pipe.
Slide 45	Repair Clamp 	The crew trailers are used for storage and as a mobile office.

Slide 46	PVC Pipes 	PVC pipe is currently the standard type of water main pipe used at the city of Saskatoon.
Slide 47	36-lb Anode 	The anode is used for cathodic protection.
Slide 48	Anode's Wire Sleeve 	A sleeve is slide over the anode's wire prior to Cadwelding.
Slide 49	Denso Tape Patch 	Denso tape is used to cover and protect the anode's weld from corrosion.

Slide 50	Denso Paste 	Denso paste is used to protect metal from corrosion.
Slide 51	Water Sample Jar 	The sample jar is used to take water samples to the water treatment for testing.
Slide 52	Cadweld Charge 	The Cadweld charge is part of the Cadweld system.
Slide 53	Treated Wooden Block 	The treated wooden blocks are used to support pipes, clamps and couplers.

Slide 54	Clean Rags 	Clean rags are used to clean the pipe.
Slide 55	Pipe lubricant 	Pipe lubricant is used on the coupler and repair clamp gaskets.
Slide 55		

Session 5

Session 5 will include a work exercise and discussion. To begin this section play the video SEEING IS BELIEVING Safely Exposing Buried Utilities. After the video discuss in a group the topics given below.

Video Discussion.

What types of utilities can you find underground?

Gas, Power, Water, Sewer, The Phone, Cable Fibre Optics

Has anyone ever hit an underground utility? If so when and how?

Does anyone know where the air monitors are and how to use them?

The Operations Assistant IV on the 2 floor of the John Deere building keeps the air monitors.

If a hazardous material is found who should be called?

Fire and Protective Services

The tolerance zone is the area on either side of the utility that must be exposed by hand. Who knows what the tolerance zone is?

The occupational health and safety regulations state the tolerance is 600mm on either side of the utility.

If damage to any underground utility has occurred who should it be reported to?

The Labourers first notifies the Supervisor IV, who notifies the Supervisor VI, who notifies the Superintendent of Occupational Health and Safety and the Superintendent of Operations, who notifies Saskatchewan Labour and the General Manager of Infrastructure services.

What should you do if you find an unmarked utility while excavating?

Work should stop immediately! The Supervisor IV and the Clearances and Locations Work Group should be notified. Work should not continue until the utility is identified.

Saskpower Manuals

Hand out the Saskpower manual 'Emergency Personnel, Electrical Safety' and have the trainees read it and then discuss as a group.

Reinforce that the staff should call 911 if a live power line is hit.

Hand out the Saskpower Recommended Minimum Horizontal Clearances Poster, and review with the trainees.

Typical Constraints

Customer requirements; schools, day care facilities, restaurants etc. will result in planned maintenance repairs being scheduled or notification of water outage required in advance.

Underground utility locations; emergency repairs may be held up due to down time waiting for underground utility location

Session 6

Session 6 will review the procedure and all the required forms. Start by handing out all the forms, then review each. A general overview of the procedure 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.

Water Service Disruption Report

This form is used to initiate maintenance. It has replaced the sewer and water maintenance memo. It is given to the 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. It is given to the Supervisor IV with the worksite safety check sheet, by the locations department.

Worksite – Safety Check Sheet

This report lists all the safety requirements that must be met. It is handed out with the Forman's job report and must be filled out for each job (It is a reminder of our commitment to safety).

Standard Distribution System Flushing and Sampling Form

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

Deep excavation notification form

This form is filled out for excavations deeper than 5 meters. The form is sent to Saskatchewan labour and the Superintendent of Occupational Health and Safety from Corporate Services - Employee Services.

Weekend Material Data Sheet

This form is filled out on the weekend when supplies are taken from Public Works stores. The form is to be sent to stores.

Confined Space Entry Inspection Form

This form is filled out when staff enters a confined space, such as manholes and valve chambers. The form should be given to the Supervisor IV who will forward it to the appropriate location.

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.

Uncontrolled