

CITY OF SASKATOON

Water and Sewer Section



Hydrant Replacement 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. Copies of an “Uncontrolled” procedure, work method check list and trainee manual for each trainee’s manual. An “Uncontrolled” document has the word Uncontrolled watermarked across the page.
- v. 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
- vi. Presentation and presentation equipment.
- vii. T.V. and V.C.R.
- viii. Mueller Co. Super Centurion 250 Hydrant Training video
- ix. Unidirectional flushing, AWWA video
- x. Being Prepared: Procedures For Fire Hydrant Maintenance video
- xi. Hydrant Handout: Century & B-50-B Model Hydrants.
- xii. Certificates of completion for each staff member.
- xiii. Examples of all equipment and materials.
- xiv. 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
	30min	Method and Techniques	7:45am	8:15am
	20min	Mueller Co. Super Centurion 250 Hydrant Training video	8:15am	8:45am
Session 2	25min	Method and Techniques	8:35am	9:05am
	15min	Break	9:00am	9:30am
Session 3	30min	Method and Techniques	9:15am	9:45am
	25min	Unidirectional flushing, AWWA video	9:45am	10:15am
	35min	Method and Techniques	10:10am	10:40am
	15min	Break	10:45am	11:15am
Session 4	90min	Review Equipment and Materials	11:00am	11:30am
	60min	Lunch	12:30pm	1:00pm
Session 5	30min	Being Prepared: Procedures For Fire Hydrant Maintenance video	1:30pm	2:00pm
	30min	Video Discussion	2:00pm	2:30pm
	30min	Review of Hand out on Century & B-50-B Model Hydrants.	2:30pm	3:00pm
	15min	Break	3:00pm	3:30pm
Session 6	75min	Review Procedure and Forms	3:15pm	3:45pm
		End of Day	4:30pm	5:00pm

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, and example is given below.


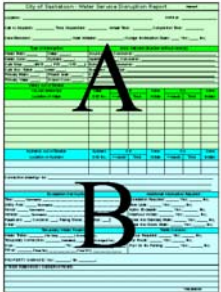
Introduction




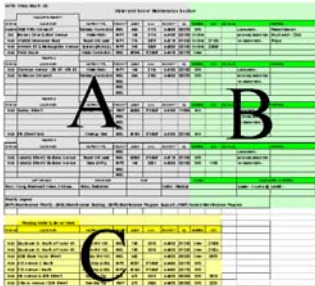
The objective of this course is to train staff on how to replace a hydrant in a timely, efficient manner while minimizing disruption in service to the customer and insuring the replacement meets current standards. Should substandard conditions of the peripheral infrastructure be identified, further renovations will be performed.



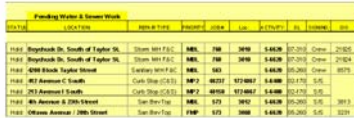

Session 2




Session 2 begins the slide presentation on the methods and techniques section of replacing a hydrant. The trainee's 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 before the break.




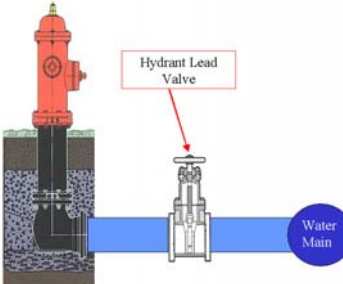
Methods and Techniques



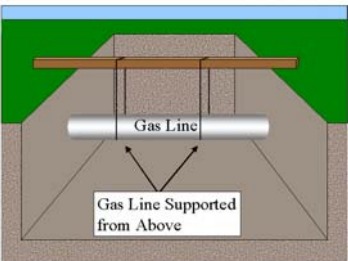

Slide 1	 <p>Hydrant Replacement Methods and Techniques</p>	To prepare for this section review each slide. Hand out the trainee manuals before starting the slide presentation.
Slide 2	<p>Water Service Disruption Reports</p> <ul style="list-style-type: none"> • Are prioritized and submitted to the Clearances and Locations Work Group. 	As the Water Service Disruption Reports appear, each request for repairs needs to be followed through first by prioritizing them, then submitting them to the Clearances and Locations Work Group.





Slide 3	<p align="center">Water Service Disruption Reports</p> <ul style="list-style-type: none"> Section A of the Water Service Disruption Report. 	<p>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.</p>
Slide 4	<p align="center">Water Service Disruption Reports</p> <ul style="list-style-type: none"> Section B of the Water Service Disruption Report. 	<p>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.</p>
Slide 5	<p align="center">Clearances and Locations Work Group</p> <ul style="list-style-type: none"> Provides: drawings, utility locations, location numbers and forms. Coordinates the removal of obstructions if required. 	<p>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.</p>
Slide 6	<p align="center">Daily Work Sheet</p> <ul style="list-style-type: none"> The daily work sheet is created to provide other departments with the location of the Water & Sewer work being performed. 	<p>A daily work sheet is created to provide other departments with the location of the Water & Sewer work being performed that day.</p>

<p>Slide 7</p>	<p>Daily Work Sheet Section A</p> <ul style="list-style-type: none"> Section A shows the tasks for each Supervisor IV. 	<p>Section A shows the tasks for each Supervisor IV. In this view - status, location, repair type, priority, GIS #, job #, location #, activity #, and GL # are shown. The staff not at work are listed at the bottom of section A.</p>
<p>Slide 8</p>	<p>Daily Work Sheet Section B</p> <ul style="list-style-type: none"> Section B shows the rest of the row of tasks for each Supervisor IV. 	<p>Section B shows additional information on signing, GIS#, utility locations, staffing and comments.</p>
<p>Slide 9</p>	<p>Daily Work Sheet Section C</p> <ul style="list-style-type: none"> Section C shows work pending. 	<p>Section C shows pending work.</p>
<p>Slide 10</p>	<p>Pick up Materials</p> <ul style="list-style-type: none"> The Supervisor IV will pick up the required materials 	<p>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)</p>

Slide 11	<p>Marking Utilities</p> <ul style="list-style-type: none"> Representatives from utility companies can field locate their lines if required. <p>APWA Colour Codes</p> <ul style="list-style-type: none"> 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 	<p>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.</p>
Slide 12	<p>Choosing Equipment</p> <ul style="list-style-type: none"> Dimensions of the excavation will determine the type of shoring selected. 	<p>The Supervisor IV chooses what equipment to use.</p>
Slide 13	<p>Trailer Placement</p> <ul style="list-style-type: none"> Locate trailers clear of the excavation. 	<p>Upon arrival at the work site, determine a location for the trailers.</p>
Slide 14	<p>Emergency Water Supply Trailer</p> <ul style="list-style-type: none"> Water trailers and temporary hook ups are options to consider when there is a water outage. 	<p>Every effort will be made to notify the public affected by a water outage. Emergency water supply trailers and temporary hook ups are options to consider when there is a water outage. A generic notification letter may be posted on apartments (front and rear doors) where notifying all individuals affected is not possible.</p>




Slide 15	<p>Cutting Asphalt or Concrete</p> <ul style="list-style-type: none"> • Cut the asphalt or concrete before excavating.. 	<p>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.</p>
Slide 16	<p>Recycling Asphalt or Concrete</p> <ul style="list-style-type: none"> • The asphalt or concrete can be recycled. 	<p>Asphalt or concrete will be stripped, separated and hauled away to the designated reclamation site. Asphalt and concrete are to be recycled.</p>
Slide 17	<p>Excavation</p> <ul style="list-style-type: none"> • Excavate on the opposite side of the sewermain. 	<p>When excavating to repair a water main ensure that the majority of the excavation is on the opposite side of the sewer main, - if possible.</p>
Slide 18	<p>Hydrant Lead Valve</p> <ul style="list-style-type: none"> • In certain areas a hydrant lead valve must be installed. 	<p>If the hydrant being replaced is in an industrial, commercial or school area or on any water main equal to or greater than 300mm (12inches), it shall have a valve installed on its lead.</p>





Slide 19	<p>Spoil Pile</p> <ul style="list-style-type: none"> The trench will be sorted into salvageable material and non-salvageable material. 	<p>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 4inches) from the edge of the excavation.</p>
Slide 20	<p>Utility Depths</p> <ul style="list-style-type: none"> Establish utility depths using the feeling rod. 	<p>While locating a buried utility deeper than 1.2meters (4feet), shoring shall be placed in excavation prior to worker probing for the utility.</p>
Slide 21	<p>Supported Utility</p> <ul style="list-style-type: none"> Other Utilities must be supported 	<p>Support buried utilities as required during excavation.</p>
Slide 22	<p>General Excavation Safety</p> 	





Slide 23	<p>Gas Line Safety</p> <ul style="list-style-type: none"> • In the event of a natural gas line hit the machine shall be immediately turned off 	<p>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.</p>
Slide 24	<p>Power Line Safety</p> <ul style="list-style-type: none"> • Should a power line come to rest on the equipment, do not exit the equipment 	<p>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.</p>
Slide 25	<p>Excavation Safety</p> <ul style="list-style-type: none"> • Don't get between the excavator bucket and the truck being loaded. 	<p>Don't get between excavator bucket and the truck being loaded. Never stand under the bucket of the excavator/backhoe. Keep everyone in work area clear of the swing of the turntable and reach of the excavator/backhoe.</p>
Slide 26	<p>Trench Cave-in</p> <ul style="list-style-type: none"> • Protective structures must be used. 	<p>No worker will enter a trench greater than 1.2m (4feet) in depth, without the installation of a temporary protective structure.</p>




Stop and Watch Video:

Muller Co. Super Centurion 250 Hydrant Training





Slide 27	 <p>Preparing for Repair</p>	
Slide 28	<p>Shoring on Trailer</p> <ul style="list-style-type: none"> • Inspect the shoring before use. 	<p>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).</p>
Slide 29	<p>Unloading Shoring</p> <ul style="list-style-type: none"> • Hook up shoring lifting chains appropriately 	<p>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.</p>




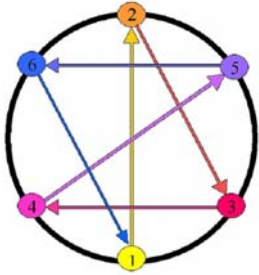
Slide 30	<p>Shoring Installation</p> <ul style="list-style-type: none"> • Use excavator/backhoe to install shoring. 	<p>Position the excavator/backhoe far enough back so the shoring can be lifted and lowered safely. Use tag lines whenever possible. Naturally frozen soil is not considered safe and therefore must be shored.</p>
Slide 31	<p>Hydraulic Expansion of Shoring</p> <ul style="list-style-type: none"> • Expand shoring side panels to be tight against the excavation walls. 	<p>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.</p>
Slide 32	<p>Tool Disinfection</p> <ul style="list-style-type: none"> • All tools must be disinfected prior to use on a water main. 	<p>All tools must be disinfected prior to use on a water main, especially if they have been previously used on a sewer repair. Ensure that the proper disinfectant applicator is used.</p>
Slide 33	<p>Tool Disinfection</p> <ul style="list-style-type: none"> • Soak items with disinfectant solution (Min 5% Sodium Hypo-chlorite solution). 	<p>Clean excess dirt with a rag and wire brush 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 use.</p>



Slide 34	<p>Enter Excavation</p> <ul style="list-style-type: none"> Bottom Labourer may enter excavation. 	<p>After shoring is in place, install and secure the ladder in the excavation. Labourers must wear all the required personal protective equipment.</p>
Slide 35	<p>Three Points of Contact</p> <ul style="list-style-type: none"> Keep three point of contact with the ladder. 	<p>Three points of contact must be kept on the ladder when in use.</p>
Slide 36	<p>Submersible Pump</p> <ul style="list-style-type: none"> Should an excess amount of water be observed in the trench, install a submersible pump. 	<p>Should an excess amount of water be observed in the trench, install a submersible pump. The pump should be lowered into the excavation with a rope, not thrown down.</p>
Slide 37	<p>Lead Replacement</p> <ul style="list-style-type: none"> Extend lead replacement past the face of curb. 	<p>Extend the hydrant lead replacement past the existing face of curb. If the pipe joint is close, extend lead replacement to the joint</p>

Slide 38	<p>Secure Hydrant</p> <ul style="list-style-type: none"> Existing hydrant secured. 	<p>Secure existing hydrant with sling and truck hoist, or Excavator/Backhoe.</p>
Slide 39	<p>Cut Pipe</p> <ul style="list-style-type: none"> Cut pipe using the quickie saw. 	<p>When cutting pipe start at the bottom of pipe and work your way to the top, allowing water to drain. Goggles and a face shield must be worn when using the quickie saw.</p>
Slide 40	<p>Cutting A/C Pipe</p> <ul style="list-style-type: none"> Tile cutters shall be used for A/C pipe. Keep pipe wet while cutting to minimize airborne particles. 	<p>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 pipe pieces under 5kgs must be double bagged and labelled for transport to the landfill. A dangerous goods carrier must transport A/C pipe 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.</p>

Slide 41	<p>Hydraulic Pipe Cutters</p> <ul style="list-style-type: none"> Hydraulic cutters can be used on CI pipe. 	Hydraulic cutters can be used on cast iron pipe.
Slide 42	<p>Remove Hydrant</p> <ul style="list-style-type: none"> Remove hydrant. 	Exit excavation and remove existing hydrant using truck hoist or Excavator/Backhoe.
Slide 43	<p>Expose Drain Pipe</p> <ul style="list-style-type: none"> Expose drain pipe if applicable. 	Look for and expose drainage pipe if applicable. The hydrant drainpipe is a connection to the sewer main, for the hydrant barrel to drain into. If a drainage pipe is found then it must be blocked off.
Slide 44	<p>Block Drainage Pipe</p> <ul style="list-style-type: none"> Block off drain pipe. 	To block off the drainage pipe, the pipe must be stuffed with rags then filled with concrete.

Slide 45	<p>Add Bedding</p> <ul style="list-style-type: none">• Have Excavator/Backhoe add crushed rocks for bedding and drain pit. 	<p>The excavator/backhoe will add crushed rock for bedding and drain pit. Lower the concrete hydrant block into the excavation.</p>
Slide 46	<p>Level Base</p> <ul style="list-style-type: none">• Level base for new hydrant. 	<p>The crushed rock must be levelled before continuing with the hydrant installation.</p>
Slide 47	<p>Level Concrete Block</p> <ul style="list-style-type: none">• Place and level concrete block. 	<p>Place and level concrete block where you want the new hydrant to be placed. The existing concrete block can be re-used if undamaged.</p>
Slide 48	<p>Measurement for Pipe</p> <ul style="list-style-type: none">• Measurement from old pipe. 	<p>Measure from the old pipe to a point approximately 75mm (3 inches) past the face of the concrete block.</p>





Slide 49	<p>New Pipe</p> <ul style="list-style-type: none">• Cut and file edge of new pipe. 	<p>Cut new PVC pipe to the length measured above and file one end for hydrant installation. When using a grinder, a face shield and goggles must be worn.</p>
Slide 50	<p>Clean Pipe</p> <ul style="list-style-type: none">• Clean remaining pipe to facilitate coupler. 	<p>Clean remaining pipe to facilitate coupler.</p>
Slide 51	<p>Install Coupler</p> <ul style="list-style-type: none">• Sliding coupler over one end of pipe. 	<p>Slide coupler over one end of the pipe and butt new pipe to existing pipe.</p>
Slide 52	<p>Bolt Torque Pattern</p> <ul style="list-style-type: none">• Bolt torque pattern. 	<p>Couplers are assembled using bolts tightened and torqued in the bolt torque pattern.</p>





Slide 53	<p>Protecto Caps</p> <ul style="list-style-type: none"> • Maxi-fit couplers use Protecto caps. 	<p>Affix Protecto caps to the ends of the bolts on the coupler. The Protecto caps will eliminate the need for an anode on the coupler.</p>
Slide 54	<p>Support Coupler</p> <ul style="list-style-type: none"> • Support coupler with treated blocks 	<p>Support new coupler with blocks and check to see whether it is aligned with existing pipe.</p>



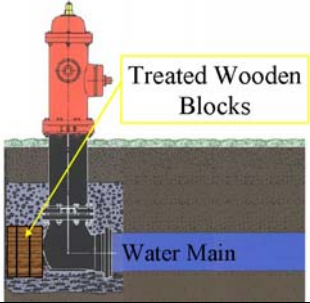

Session 3





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 55	 <p>Hydrant Installation</p>	
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Slide 56	<p>Check Hydrant Rubber</p> <ul style="list-style-type: none">• Check the hydrant rubber. 	<p>Make sure the rubber in the hydrant is clean and warm especially in the winter, also ensure the end of the new pipe is clean.</p>
Slide 57	<p>Grease with Lubricant</p> <ul style="list-style-type: none">• Grease pipe and hydrant with lubricant. 	<p>Grease both the hydrant boot and the pipe end liberally with pipe lubricant.</p>
Slide 58	<p>Hydrant Lifting Apparatus</p> <ul style="list-style-type: none">• Connect the new hydrant to the hydrant lifting apparatus. 	<p>Connect the new hydrant to the hydrant lifting apparatus.</p>
Slide 59	<p>Lower Hydrant</p> <ul style="list-style-type: none">• Lowering hydrant. 	<p>Lower hydrant with truck hoist or Excavator/Backhoe on to the concrete block.</p>





Slide 60	<p>Aligning Hydrant</p> <ul style="list-style-type: none"> Aligning Hydrant with the new pipe. 	Line the hydrant up with the end of the new pipe.
Slide 61	<p>Check Hydrant</p> <ul style="list-style-type: none"> Check level and position 	Check hydrant level and position. Ensures that the hydrant is at planned grade level.
Slide 62	<p>Hydrant Breakaway Flange</p> <ul style="list-style-type: none"> Set the height of the hydrant breakaway flange. 	The hydrant breakaway flange must be set at an elevation of 50mm (2inches) above finished grade.
Slide 63	<p>Open Hydrant</p> <ul style="list-style-type: none"> Open hydrant port & attach hose. 	Open new hydrant port on side draining away from excavation and attach hose.



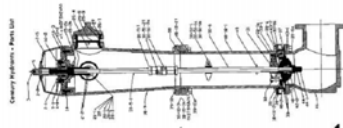

Slide 64	<p>Connect Pipe and Hydrant</p> <ul style="list-style-type: none">• Connecting pipe and hydrant. 	<p>Drive crowbar into the ground in such a way as to achieve a lever to force hydrant onto new pipe. Blocks and wedges can also be used to force hydrant onto the pipe.</p>
Slide 65	<p>Install Blocks</p> <ul style="list-style-type: none">• Install treated wooden thrust block behind the hydrant. 	<p>Using a shovel, prepare a bed for treated wooden support blocks and install in a direct line behind newly installed hydrant.</p>
Slide 66	<p>Treated Wooden Blocks</p> <ul style="list-style-type: none">• Prevent the hydrant from pushing back new pipe when under pressure. 	<p>Use treated wooden blocks to prevent the hydrant from pushing off the new pipe when under pressure.</p>
Slide 67	<p>Attaching a Sacrificial Anode</p> 	

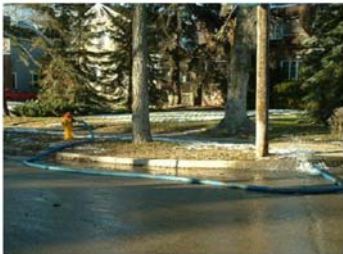

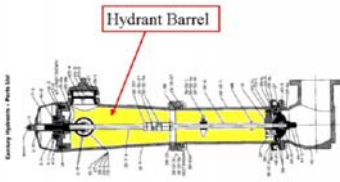

Slide 68	<p>Anodes</p> <ul style="list-style-type: none">• The 36-lb. sacrificial anode must be installed on metallic pipe 	Metallic pipe requires a 36 lb sacrificial anode to be installed. Robar couplers require a 24lb anode. The anodes will be installed by means of Cadweld
Slide 69	<p>Preparation for Anode Installation</p> <ul style="list-style-type: none">• 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 at the point of anode wire attachment.
Slide 70	<p>Cadweld Charge</p> <ul style="list-style-type: none">• Prep Cadweld with charge. 	Prep Cadweld with charge.
Slide 71	<p>Sleeve on Anode Wire</p> <ul style="list-style-type: none">• Insert stripped anode wire into sleeve. 	Sleeve is inserted into the stripped anode wire




Slide 72	<p>Attach Wire to Pipe</p> <ul style="list-style-type: none">• Attach the anode's wire to pipe, with the Cadweld connector. 	Attach 36-lb. Sacrificial anode's wire to pipe, with the Cadweld connector.
Slide 73	<p>Lighting Cadweld</p> <ul style="list-style-type: none">• Prepare to light Cadweld.• A face shield and goggles must be worn when igniting the Cadweld. 	The Cadweld charge is lit with an igniter. A face shield and goggles must be worn when igniting the Cadweld.
Slide 74	<p>Ignite Charge</p> <ul style="list-style-type: none">• Cadweld lit. 	The charge will explode and weld the wire to the pipe.
Slide 75	<p>Check Weld</p> <ul style="list-style-type: none">• Check that weld is attached. 	Wait until the weld has cooled then gently tug on the wire to check if it is attached.

Slide 76	<p>Protect Weld</p> <ul style="list-style-type: none"> • Protect the weld from corrosion. 	<p>Apply a tar patch or mastic equivalent over weld. Sacrificial anode is now installed</p>
Slide 77	<p>Wet Anode</p> <ul style="list-style-type: none"> • Soak anodes with water before backfilling. 	<p>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.</p>
Slide 78	<p>Post-Repair</p> 	
Slide 79	<p>Exit Excavation</p> <ul style="list-style-type: none"> • Remove all hand tools from excavation. • Exit and remove ladder. 	<p>Remove all hand tools from excavation, exit, and remove ladder. Never throw tools out of excavation. Clean tools prior to storing.</p>

Slide 80	<p>Throttle Valve</p> <ul style="list-style-type: none"> • Attach throttle valve and hose. 	<p>Attach throttle valve to hydrant along with a hose.</p>
Slide 81	<p>Throttle valve</p> <ul style="list-style-type: none"> • Disinfect throttle valve. 	<p>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.</p>
Slide 82	<p>Open Hydrant</p> <ul style="list-style-type: none"> • Opening hydrant. 	<p>To open hydrant turn the operating nut clockwise until hydrant is completely open. Depending on the make of hydrant, anywhere from 13 to 30 turns may be required to open a hydrant completely.</p>
Slide 83	<p>Hydrant Flushing</p> <ul style="list-style-type: none"> • Open valve and and hydrant. 	<p>Open the valve furthest from hydrant you are using. Air will be expelled from the water line while it fills with water. Open the valve slowly, opening it too fast will create water hammer, which can damage to the water main.</p>





Slide 84	<p>Water Testing</p> <ul style="list-style-type: none"> • Test water for turbidity, chlorine and bacteria. 	<p>When the air has been flushed from the system begin testing the water. 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.</p>
Slide 85	<p>Close Hydrant</p> <ul style="list-style-type: none"> • Close the hydrant slowly. 	<p>Close the hydrant at a rate no faster than 1 revolution every 3 seconds. Closing a hydrant too quickly can create water hammer sufficient to rupture the water main.</p>
Slide 86	<p>Compression Hydrants</p> <ul style="list-style-type: none"> • Compression hydrants do not require excessive force to close. 	<p>Compression hydrants do not require excessive force to close. Closing them too tightly will deform and damage the disk rubber (valve) at the bottom of the hydrant, resulting in leakage and eventual replacement.</p>
Slide 87	<p>Ensuring Hydrant Closure</p> <ul style="list-style-type: none"> • Ensure hydrant is closed. 	<p>Ensure hydrant is closed by listening for the sound of pressurized water with a hydrophone or by placing your ear against the hydrant. If there is any sound tighten the hydrant slightly and recheck for sound. Be sure the sound is that of pressurized water and not the sound of water draining from the hydrant, which is normal.</p>





Slide 88	<p>If Hydrant will not Close</p> <ul style="list-style-type: none"> • If hydrant is not closing down properly, re-flush. 	<p>If you are confident the hydrant is not closing down properly, flush the hydrant - as there may be something wedged underneath the disk rubber allowing the water to flow by.</p>
Slide 89	<p>When Hydrant is Closed</p> <ul style="list-style-type: none"> • When the water flow has stopped. 	<p>When the water flow has stopped, loosen off the operating nut slightly to remove the stress from the operating parts. You should be able to move the operating nut by hand, if it is a compression hydrant. This will ensure the hydrant operates easily when required.</p>
Slide 90	<p>Hydrant Barrel</p> <ul style="list-style-type: none"> • Check for proper drainage from the barrel. 	<p>After closing the hydrant, check for proper drainage from the barrel. Drainage should be sufficient to create suction when a hand is held over a port.</p>
Slide 91	<p>Port Caps</p> <ul style="list-style-type: none"> • Replace the port cap. 	<p>Replace the Port caps but leave them loose enough to allow air to pass by so the hydrant may continue to drain.</p>

Slide 92	<p>Closing Caps</p> <ul style="list-style-type: none"> Once the hydrant has drained completely, tighten the port caps with a hydrant wrench. 	<p>Once the hydrant has drained completely, tighten the port caps with a hydrant wrench (never a pipe wrench), and then back them off slightly so they will not be excessively tight but tight enough that they cannot be removed by hand.</p>
Slide 93	<p>Checking for Leaks</p> <ul style="list-style-type: none"> Check repair for leaks. 	<p>The water main is now under pressure. Check the new repair for leaks. Listen to the hydrant for sounds that could indicate a break in the main.</p>
Slide 94	<p>Shoring Removal</p> <ul style="list-style-type: none"> Excavator/Backhoe operator removes shoring from excavation, placing it on a trailer. 	<p>Discuss what the Labourer is standing on, and what he should be standing on.</p>





Stop and watch video:

Unidirectional Flushing AWWA

Slide 95	 <p>Backfilling</p>	
Slide 96	<p>Add Crushed Rock</p> <ul style="list-style-type: none"> • Install crushed rock. 	<p>Install crushed-rock, this is used as a sump when the hydrant barrel drains.</p>
Slide 97	<p>Excavation Backfilling</p> <ul style="list-style-type: none"> • Remove unsuitable material below pipe. 	<p>If soil conditions at base of excavation are saturated and/or unstable, remove unsuitable material below pipe and place and compact with crushed rock and/or granular material for bedding.</p>
Slide 98	<p>Hydrant alignment</p> <ul style="list-style-type: none"> • Check alignment. 	<p>Backfill around the hydrant, check regularly to ensure hydrant barrel is properly aligned.</p>

Slide 99	<p>Backfilling</p> <ul style="list-style-type: none"> • Use clean backfill material. 	<p>If applicable cover connection and main services with 150mm (6inches) of granular material and compact. Use spoil-material if suitable. If not bring in clean backfill material.</p>
Slide 100	<p>Non-shrink Backfill</p> <ul style="list-style-type: none"> • Non-shrink backfill shall be used where concrete or brick will be replaced. 	<p>Leave non-shrink backfill a minimum of 300mm(12inch) below grade.</p>
Slide 101	<p>Backfilling Other Utilities</p> <ul style="list-style-type: none"> • Ensure utilities are supported according to the specifications of the owner of the utility. 	<p>A representative from the utility may be required to inspect and approve the bedding.</p>
Slide 102	<p>Acceptable Backfill Material</p> <ul style="list-style-type: none"> • Acceptable quality of backfill material 	<p>Backfill material should be free from loam [fertile material] sod, boulders, foreign material and frozen lumps.</p>

Slide 103	<p>Methods of Compaction</p> <ul style="list-style-type: none"> • Mechanical Methods of compaction are required. 	Choose the method of compaction based on suitability.
Slide 104	<p>Hydraulic Tamper</p> <ul style="list-style-type: none"> • Hydraulic tamper [excavator attachment] cannot be used closer than 1m [3ft.] directly above pipe or service. 	Use with 150mm (6 inch) lifts.
Slide 105	<p>Walk Behind Tamper</p> <ul style="list-style-type: none"> • Walk behind vibratory compactor. 	Walk behind vibratory compactor can be used around mains, connections and manhole barrels etc. Backfill shall be placed in 150mm (6inches) lifts.
Slide 106	<p>Handheld Plate Tamper</p> <ul style="list-style-type: none"> • Backfill is 150mm [6inch.] lifts. 	The handheld plate tamper is use for compacting around the pipe zone.


Slide 107	<p>Vibratory Roller</p> <ul style="list-style-type: none"> Vibratory roller is best suitable for larger excavations and should be used in 150mm [6 inch.] lifts. 	<p>The vibrator roller is commonly used for large excavations.</p>
Slide 108	<p>Bucket Tamping</p> <ul style="list-style-type: none"> Bucket tamping should be avoided. 	<p>Bucket tamping is not an approved method of compaction</p>
Slide 109	<p>Finished Backfill</p> <ul style="list-style-type: none"> Leave adequate room for asphalt or concrete as per the Roadway Section's instruction. 	<p>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.</p>
Slide 110	<p>Road Signs</p> <ul style="list-style-type: none"> Remove unnecessary road signs. 	<p>Before leaving the site all unnecessary traffic control devices will be removed, as per traffic control manual.</p>





Slide 111	<p>Site Restoration</p> <ul style="list-style-type: none"> • Others will perform the site restoration. 	Others will perform site restoration.
Slide 112	 <p>Are there any Questions?</p>	





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 hall 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	 <p>Hydrant Replacement Resources Required</p>	<p>To prepare get out the box of equipment and materials.</p> <p>Pass around each piece of equipment while the trainer is discussing it.</p>
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Slide 2	 <p>People</p>	The number or staff required may vary depending on the size of the job.
Slide 3	<p>1 – Supervisor IV</p> 	There is one Supervisor IV for each water main repair.
Slide 4	<p>2 - Labourers</p> 	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	<p>1 - Backhoe operator</p> 	One backhoe/excavator operator will be required for each water main repair.





Slide 6	<p>2 - Tandem axle truck operators</p> 	Two tandem axle truck operators will be required.
Slide 7	<p>1 - Loader operator (as required)</p> 	Occasionally a loader operator is required.
Slide 8	 <p>Equipment</p>	<p>Get the box of example tools ready to pass around.</p> <p>Pass each tool out when you come to that slide.</p>
Slide 9	<p>Feeling Rod</p> 	The feeling rod is used for finding buried utilities.





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





Slide 14	<p>Rasp / File</p> 	<p>The rasp is used to file the pipe where the anode wire will be welded on.</p>
Slide 15	<p>Drill with 1-1/16" Deep Socket</p> 	<p>The drill is used to tighten the bolts on the repair clamp or the couplers.</p>
Slide 16	<p>Strong Arm</p> 	<p>The strong arm is used for tightening the repair clamp or coupler bolts.</p>
Slide 17	<p>Torque Wrench</p> 	<p>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.</p>

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

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




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




Slide 30	<p>Truck</p> 	<p>The trucks are used to haul material and tow trailers.</p>
Slide 31	<p>Front-End Loader</p> 	<p>The front-end loader is used to load trucks with backfilling materials.</p>
Slide 32	<p>Hydrant Key</p> 	<p>The hydrant key is used to open and close hydrants.</p>
Slide 33	<p>Throttle Valve</p> 	<p>The hydrant throttle valve is used to regulate flow from the hydrant.</p>



Slide 34	Hydrant Hose 	The hydrant hose can be used for hydrant flushing or pumping out the excavation.
Slide 35	Hydrant Diffuser 	The hydrant diffuser is used to lessen the discharge from the hydrant.
Slide 36	Hydraulic Tamper 	Hydraulic tamper is an attachment for the excavator. It is used to compact the soil.
Slide 37	Vibrator Roller Packer 	Vibratory roller packer is a compactor used in large excavations.

Slide 38	Handheld Plate Tamper 	Handheld plate tampers are compactors used to compact small areas.
Slide 39	Vibratory Compactor 	Vibratory compactors are compactors used for small areas.
Slide 40	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 41	Turbidity Meter 	<p>Turbidity is a measurement of particles in the water sample.</p> <p>The more particles in the water, the higher the turbidity.</p>

Slide 42	<p>Asphalt Saw</p> 	Cut the asphalt with an earth saw or asphalt saw prior to excavating.
Slide 43	<p>Materials</p> 	Get the box of example materials ready to pass around.
Slide 44	<p>Maxi-fit Coupler</p> 	The Maxi-fit coupler is used to connect replacement pipe to the existing pipe.
Slide 45	<p>Robar Coupler</p> 	The Robar coupler is used to connect replacement pipe to the existing pipe.

Slide 46	<p>New Hydrant</p> 	New hydrants at the Public Works stores before installation.
Slide 47	<p>PVC Pipes</p> 	PVC pipe is currently the standard type of water main pipe used at the City of Saskatoon.
Slide 48	<p>Pipe lubricant</p> 	Pipe lubricant is used on the coupler and repair clamp gaskets.
Slide 49	<p>36-lb Anode</p> 	The anode is used for cathodic protection.

Slide 50	<p>Anode's Wire Sleeve</p> 	<p>A sleeve is slid over the anode's wire prior to Cadwelding.</p>
Slide 51	<p>Denso Tape Patch</p> 	<p>Denso tape is used to cover and protect the anode's weld from corrosion.</p>
Slide 52	<p>Denso Paste</p> 	<p>Denso paste is used to protect metal from corrosion.</p>
Slide 53	<p>Water Sample Jar</p> 	<p>The sample jar is used to take water samples to the water treatment plant for testing.</p>

Slide 54	<p>Cadweld Charge</p> 	<p>The Cadweld charge is part of the Cadweld system.</p>
Slide 55	<p>Treated Wooden Block</p> 	<p>The treated wooden blocks are used to support pipes, clamps and couplers.</p>
Slide 56	<p>Clean Rags</p> 	<p>Clean rags are used to clean the pipe.</p>
Slide 57		

Session 5

Session 5 will include a work exercise and discussion. Watch the video Being Prepared: Procedures for Fire Hydrant Maintenance AWWA and review the questions. Typical constraints and control mechanisms shown below are good discussion topics. Ask the trainees what they think the typical constraints are and discuss answers.

Questions for Discussion on the Video: Being Prepared: Procedures for Fire Hydrant Maintenance AWWA

What are the two main types of hydrants?

Dry Barrel and Wet Barrel

What are two types of dry barrel hydrants?

Compression and Gate

What Personal Protective Equipment must be worn on a job site?

Hardhat, Steel toed footwear, pants, and short-sleeved shirt

What are the three main components of a hydrant?

Upper barrel, shoe (or boot) and lower barrel

Why are the hydrant hoods different colours?

The hydrant hood colours indicate the size of the water main feeding that particular hydrant.

What are the different hydrant hood colours?

Water Main Colour Coding Chart

<i>Water Main Size</i>	<i>Hydrant Hood Colour</i>
<i>100mm (4")</i>	<i>White</i>
<i>150mm (6")</i>	<i>Red</i>
<i>200mm (8")</i>	<i>Yellow</i>
<i>250mm (10")</i>	<i>Black</i>
<i>300mm (14")</i>	<i>Blue</i>
<i>350mm (16")</i>	<i>Orange</i>
<i>400mm (16")</i>	<i>Green</i>
<i>450mm (18")</i>	<i>Silver</i>

How are broken hydrants marked?

Broken hydrants are marked by an "Out of Service" cap on top of the operating nut

Who is notified if a broken hydrant is found?

The Operations Assistant III in charge of hydrants.

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

Control Mechanisms

Superintendent will discuss with the Supervisor IV any latest techniques or materials that may be introduced into this activity from other agencies.

Hydrant Handout

Hand out the Century & B-50-B Model Hydrants information Package. Review each section and discuss.

Session 6

Session 6 will review the procedure and all the required forms. Start by handing out the procedure and review it. Hand out all the required forms, then review each. A general overview of the procedure and each form is given below.

Procedure Introduction

The procedure is a document that focuses: the roles and responsibilities of the required persons, for a specific task and the critical steps of the task.

Procedures are used primarily during training for a task, and then mainly as a reference document. Procedures should be auditable by either inspection during the process or by review of an audit trail upon completion of the process. Procedures are not intended to be used while the task is being performed.

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 Clearances and Locations Work Group.

Worksite – Safety Check Sheet

This report lists all the safety requirements that must be met. It is handed out with the Foreman's job report.

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 5meters (16ft). The form is sent to Sask-labour and Charlie Cairns from Corporate Services - Employee Services.

Weekend Material Data Sheet

This form is filled out on the weekend when supplies are taken from central or engineering stores. The form is given to stores.

Confined Space Entry Inspection Form

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

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.