Work instruction:	Date Raised
Cured-in-place lining procedure (CIPP) (Re-line & Patch Repair)	18/06/2012

Work Description
Re-line drain line & patch repair
Instruction

Re-line

1. **Establish the work area.** Erect barriers around sufficient an area as to allow the complete process to be undertaken comfortably without any public access. Protect finishes with a polythene sheet and ply boards in the area designated for mixing resin components.

2. **Prior to the works, the system must be vented.** Lift the access chamber lids you are lining between, or if you are lining with only one point of access, open the lid or cut into the section of pipe and allow air to circulate for 10mins prior to commencement of works.

3. **Any lines upstream of the section about to be lined must be "plugged" before starting**. Check capacity of any plugged sections and the number of upstream users and if there is limited holding capacity, inform upstream users not to use drains for the required amount of time.

4. **Establish the condition of the section of pipe before lining by means of CCTV inspection**. Remove any debris/root ingress encountered by means of rodding, jetting or tree root cutters. Under normal circumstances this will have been undertaken prior to you attending site or an additional operative will be on site to complete the root cutting. If this is not the case, contact Head Office immediately and arrangements will be made right away.

5. **Establish the length of liner required to complete the section.** On sections of pipe with two access points a length of rope can be used or in cases of one access point, enter the CCTV camera to the required final position of the liner and mark on the reel with tape the length required.

6. **Measure and cut liner to sufficient length.** Take out the CCTV reel and measure off the length against the liner and cut with sufficient overlap for clamping and to enable a sample to be taken.

7. **Cut sufficient length of calibration hose.**

8. **a. Air System: Load calibration hose into Inversion Drum.** Attach one end of the hose to the cord connected to the internal spindle with cloth tape. Wind the hose onto the spindle until 200mm is left outside the cone. Fold the hose over the outside of the cone and attach it with the cloth tape. Once attached fit the spring clip over the hose and tighten to make an "air tight" connection.

   b. Water System: Load calibration hose into Drop Tube. Attach one end of the hose to the Drop Tube and tighten to make an "air tight" connection.

9. **Establish the required quantities of Resin – Accelerator & Catalyst.** See supplied manufacturer's instructions.

10. **Mixing resin components.** Pour required amount of Resin into the measured mixing container**.** Using a clean measuring jug, measure the required amount of accelerator and thoroughly mix into the Resin using an electric mixer(A mixing speed of no greater than 300rpm to be used). Using a clean measuring jug, measure the required amount of catalyst and mix into the accelerated resin.

11. **Combining resin system and carrier material.** Pour the mixed resin into the liner using a funnel. Attach the vacuum to a small incision made into the other end of the length of liner. The impregnation of the carrier material shall be under vacuum and that the lining when saturated is compressed to its nominal thickness. Push the resin along the length of material toward the applied vacuum by passing it through a set of rollers set at the nominal thickness. The carrier should be saturated to within 100mm of the vacuum point to avoid any resin being pulled into the pump.

12. **Excess resin.** Any excess resin will be collected in the original mixing container and left to cure. Place the other two measuring jugs used into the mixing container and dispose of all. Never attempt to dispose of containers with uncured resin inside.

13. **Insert liner into drain.** When inserting the liner from one end, connect the liner onto the drain rods and push the liner into position. In cases with access from two points, drag the liner into position using either drain rods or an already inserted rope.

14. **a. Air System: Insert Calibration Hose.** Insert the end of the calibration hose into the liner and slowly inflate with air until the calibration hose has passed completely through the length of the liner. Once the full length of the hose has been deployed, increase the pressure until the required level has been reached (see manufacturers' recommendations).

    b. Water System. Insert the end of the calibration hose into the liner and slowly enter water (Taking adequate health and safety precautions if using hot water) into the calibration hose until it has passed completely through the length of the liner. Once the full length of the hose has been deployed, increase the volume of water until the required level of pressure has been reached (see manufacturers' recommendations). It may be possible to pull out the calibration hose without cutting it and releasing the water. This is not compulsory.

15. **Cure Time.** Maintain required pressure for duration of supplied cure time. Constantly monitor the pressure gauge to ensure the correct level of pressure is maintained (0.5 Bar typical) until the CIPP has attained structural integrity. The excess resin and any off cuts should be monitored as additional indicators of the cure process.

16. **a. Air System: Remove calibration hose.** Deflate the calibration hose and remove it to reveal the cured liner. Remove the calibration hose along with the mixing and measuring containers from site.

    b. Water System: Remove calibration hose. Carefully make an insertion in the calibration hose and drain the water from within. Remove the calibration hose to reveal the cured liner. Remove the calibration hose along with the mixing and measuring containers from site.

17. **CCTV lined section and record.** After installation carry out a CCTV inspection to check that there are no visible defects, including irregularities in surface appearance, and that the drain is fully serviceable. The installer shall undertake a simple serviceability test by either flushing a toilet or running a tap to ensure free passage along the lined drain.

18. **Remove any upstream "bungs" and return line to service.** Remove any bungs put into position to facilitate the works and inform any upstream users that the task has been completed.

19. **Dispose of calibration hose and remnants of the liner.** Any remaining resin/ offcuts/ measuring jugs should be disposed of using a waste skip along with any surplus spoil.

20. **Replace lid or reconnect pipe clean up and remove barriers.** On completion of the works, replace any chamber lids and make good any final reinstatement. Clean down site and remove erected barriers.

Patch Repair

1. **Establish the work area.** Erect barriers around sufficient an area as to allow the complete process to be undertaken comfortably without any public access. Protect finishes with a polythene sheet and ply boards in the area designated for mixing resin components.

2. **Prior to the works, the system must be vented.** Lift the access chamber lids you are lining between, or if you are lining with only one point of access, open the lid or cut into the section of pipe and allow air to circulate for 10mins prior to commencement of works.

3. **Any lines upstream of the section about to be lined must be "plugged" before starting**. Check capacity of any plugged sections and the number of upstream users and if there is limited holding capacity, inform upstream users not to use drains for the required amount of time.

4. **Establish the condition of the section of pipe before lining by means of CCTV inspection**. Remove any debris/root ingress encountered by means of rodding, jetting or tree root cutters. Under normal circumstances this will have been undertaken prior to you attending site. If this is not the case, contact Head Office immediately and arrangements will be made right away. The date that the pipe was cleaned prior to the remedial works being undertaken is noted within the investigation job folder and will have been supplied with the schedule of works information.

5. **Establish the length and position of the patch liner required to complete the section.** On sections of pipe with two access points a length of rope can be used or in cases of one access point, enter the CCTV camera to the required final position of the liner and mark on the reel with tape the length required.

6. **Measure and cut liner to sufficient length.** Take out the CCTV reel and measure off the length against the liner. Cut/trim the liner if necessary.

7. **Mixing resin components.** Remove the clip from the resin bag by pulling outward on the two ends of the resin bag. Mix thoroughly by kneading the bag for 1 minute. Mixing is complete when all the resin is of uniform colour.

11. **Combining resin system and carrier material.** Cut off one corner of the bag and pour half of the contents onto the liner. Use the spreader provided to evenly spread the resin over the surface of the mat. Ensure all edges are coated. Fold along the first guideline and pour some resin on the untreated surface spreading evenly over the liner. Fold along the second guideline and apply more resin onto the untreated surface spreading evenly over the liner. Finally turn over the folded wetted liner and pour the remaining resin onto the surface again spreading evenly.

8. **Loading the resin coated carrier material onto the packer.** Place the packer on the liner ensuring that the liner is positioned centrally with the open end of the overlap facing away from the direction of entry into the pipe. Then roll the liner around the packer and secure it using wire ties positioned 25mm from each end of the liner.

9. **Insert liner into drain.** Insert the packer and patch assembly into the pipe and position it at the point of repair.

10. **Inflate the packer.** Inflate the packer to the minimum pressure required to fully fill the inside bore of the pipe.

11. **Cure Time.** Maintain required pressure for duration of supplied cure time. Constantly monitor the pressure gauge to ensure the correct level of pressure is maintained until the CIPP has attained structural integrity.

12. **Deflate and remove packer.** After curing is complete deflate the packer and remove from the

pipe. and

13. **CCTV lined section and record.** After installation carry out a CCTV inspection to check that there are no visible defects, including irregularities in surface appearance, and that the drain is fully serviceable. The installer shall undertake a simple serviceability test by either flushing a toilet or running a tap to ensure free passage along the lined drain.

14. **Remove any upstream "bungs" and return line to service.** Remove any bungs put into position to facilitate the works and inform any upstream users that the task has been completed.

15. **Dispose remnants of the liner.** Return any off cuts of the liner along with the used measuring/mixing containers to the depot and dispose of in the contaminated waste skip.

16. **Replace lid or reconnect pipe clean up and remove barriers.** On completion of the works, replace any chamber lids and make good any final reinstatement. Clean down site and remove erected barriers.

Following the completion of work you will need to complete the project documentation and return to the office;

a. Completed drain repair tick sheet
b. Completed customer satisfaction form (where possible)
c. Completed health & safety risk assessment
d. A completed liner installation sheet (for jobs involving re-lining)
e. Before, during and after photographs of the works taking place
f. After videos of all lines repaired (replaced and relined)

A revised site layout (if different from the one provided in the initial survey)

Responsibilities
Engineers
Key Objectives
To improve serviceability of drain line without having to dig up and replace **All in accordance with WRc – The Drain Repair Book – 4th Edition, best practice manual for the inspection and repair of domestic and light industrial drains**