

SAFE SYSTEM OF WORK

CIPP (Cured in place pipe) Relining Operations Ambient Cure & Hot Cure Installations

1. Scope

This SSOW applies to CIPP relining activities performed by Coastal Drainage Solutions Ltd, on any third-party site.

2. Responsibilities / Training Requirements

A minimum of two staff will be required to perform this task. The number of staff required will be dependent upon the length of the liner to be deployed, and its diameter and pipe location. A company Managing Director / Contract Manager will decide how many staff is required for each task. A company team leader must be on the site.

Several members of staff will have confined space training such that one person can enter the confined space, and a second person can act as the top man. One member of staff at the site must be a trained first aider.

CCTV Camera will be required to inspect the pipe before and after reline installation.

CSCS Trained operatives (subject to client Requirements & Policies)

NRASWA module / unit 2 as minimum standard of training

First Aid Trained

Manual Handling Trained

Abrasive Wheels Training

Open cuts / wounds must be reported to the team leader, and this may prevent access to the waterway unless the wound can be adequately covered.

3. Related documents

RA004 – CIPP Relining

As they apply to the work to be performed.

Water industry standards for relining activities
Operations Guide for Cured in Place Pipe Lining, OG4

4. Equipment / materials required

A confined space entry tripod with a safety winch and appropriate safety harnesses. 10-minute escape kit and a gas detector are also needed.
Barriers will be needed to prevent inadvertent access by the public.
Standard manhole covers lifters.
CCTV Unit.

PPE: hard hats, safety boots, eye protection, high visibility clothing and gloves. All PPE to be worn whenever on site
Chemically resistant gloves to be suitable for working with resins
Two parts to the resin, i.e. resin and accelerator
Mixing and spreading equipment for the resins, i.e. 110v hand mixer
Hardboard for working on the liner, i.e. spreading the resins
Inverter head and relining unit
Jubilee clips
Compressor
Water Boiler
Petrol/Diesel Generator
List is not exhaustive

5. Pre-requisites

These are procedures which may need to be undertaken prior to Coastal Drainage Solutions Ltd.'s work commencing. It may include:

- Highway requirements ie. Suitable cones, barriers, tapes, signage, and traffic control are all in place.
- Confined Space procedures
- Access requirements to private sites
- Specific on-site training
- Security procedures

- Any PTW which needs to be completed for the client.
- Access / egress requirements

Coastal Drainage Solutions Ltd may require the Client to ensure these are performed.

Coastal Drainage Solutions Ltd may undertake these tasks or they may require a sub-contractor to perform them. In all cases, the Team Leader will ensure the pre-requisites have been performed to the standard required of the Client, and Coastal Drainage Solutions Ltd, i.e. as laid out in SSOW1. This should be reflected on the On-site risk assessment. Any problems with pre-requisites should prevent the procedure from being commenced until the situation has been discussed with one of the Company Director, and the situation has been resolved. All such situations should be recorded on the On-Site Risk Assessment. Not all pre-requisites may be included in the safe system of work, ie, if there are specific local requirements, but if the team leader recognises that there is a pre-requisite before work can commence he should inform one of the Company Director and await guidance before commencing work. This should all be recorded in the On-Site Risk Assessment.

6. Method Statement

- Team Leader in receipt of Job Pack
- Tool Box Talk Delivered
- Complete on-Site Risk Assessment. Any requirement for a significant change to this or the related procedures must be discussed and agree with a Managing Director of the company.
- Assess the location to be surveyed.
- Wherever possible work from the downstream (empty) chamber in an upstream direction to the point of the problem. Follow instructions in SSOW1 to bung up the upstream point to prevent water flowing in the waterway during the surveying work.
- If not already performed, restrict pedestrian access to the chamber, inlet, or outlet, being worked on with suitably placed barriers before removing / opening covers.
- Lift the manhole cover.
- If it is required to carry out a man entry into the chamber it must be ventilated for 5 minutes prior to the man entry taking place.
- The dimensions of the manhole/chamber/point of access to be entered must be considered. Openings and shafts need to be adequate to afford safe access and need to be sufficiently large and free from obstruction to allow the passage of persons wearing the necessary PPE and equipment including rescue equipment, and to allow adequate access for rescue purposes. The opening should be of sufficient size to allow safe, unobstructed, and quick

entry and exit. It is recommended that openings and shafts must be 600mm in diameter or above. Openings and shafts which are smaller than this must not be entered and must be reported to the team leader to arrange for a site-specific risk assessment to be carried out

- Lower the gas detection equipment into the confined space, just below the cover level (test for a minimum of 5 minutes)
- If alarm sounds, then vent for further 15 minutes and re test as above. If alarm sounds again seek guidance from a Managing Director who will notify this to the client as a near miss incident. **DO NOT ENTER THE CONFINED SPACE**
- Erect the winch system or deploy the fall arrest system as appropriate
- Ensure safety harness and all PPE is donned correctly, ie. Hard hat, goggles, gloves, safety boots.
- Silt and Sludge levels must also be taken prior to entry. If the levels are higher than 0.5 metre the space must be cleared using a Jet/Vac unit before man entry can be made.
- Only one man is to enter the confined space, while remaining attached to the man winch always.
- Visually inspect ladder or step irons before putting weight on them. If in doubt ladder or rungs are not to be used
- Ensure that the atmosphere in the confined space is monitored constantly
- Top man to keep in regular communication with the person in the confined space
- Should the gas alarm activate, the person in the confined space will exit in accordance with the rescue plan using escape BA. The works will be suspended, and a Coastal Drainage Solutions Ltd Managing Director informed. A near miss accident report shall be raised.
- If the entrant gets into difficulty, then the top man will immediately retrieve the entrant from the confined space utilising the tripod and winch system which the entrant is attached to. An accident report shall be raised.
- If necessary, survey the drain/sewer/culvert in line with the industry code of practise. Confirm the length of the liner required.
- Measure a sufficient length of liner material and cut. Allow an additional 300mm at one end to vacuum and prevent spillage. Allow sufficient additional length to reach from the inversion tank to the drain invert. Seal both ends of the liner and by making a small hole in the wastage section, commence vacuum operation.
- If calibration hose is required, then cut a length of calibration hose that matches the distance from the inversion tank to the drain invert, this will act as a support for the liner and prevent resin spillages. If the liner to be installed is manhole to manhole, inverting the reline felt alone may be allowed.

MIXING AND APPLYING RESIN TO THE LINER

- This may not be necessary if the liner has been pre-prepared at the factory.
- Ensure there is sufficient ventilation and that all staff has been medically cleared to work with resins. If there is insufficient ventilation, then can ventilation be forced with fans?

- Put portable bunding/containment in place. All handling/mixing of chemicals is to be carried out within the banded area. Ensure the resins cannot enter any water course. Agitate the resins prior to dispensing from original cans.
- Establish the required quantities of the relevant resins for the length and diameter of sewer to be relined, ie is it a warm cure or ambient cure. Required quantity guidelines are detailed in Operations Guide for Cured in Place Pipe Lining, OG4
- Carefully pour sufficient resin into an appropriate mixing container. Using a clean measuring jug or catalyst dispenser, measure sufficient catalyst and mix into the accelerated resin container. (Care should be taken to prevent resin splashes or spillages.) If the product is lumpy, do not use as the product may be out of date.
- Unroll a sufficient length of calibration hose and prepare it prior to mixing any resins. Ensure that the length is sufficient to inflate the full liner being installed.
- Carefully agitate and mix the resin container until the correct colour is achieved. Ensure the products are completely mixed into the resin utilising 110v mixing equipment. Never mix by hand. Be aware of air entrapment.
- When mixing is complete pour the catalysed resin into the felt tube and commence spreading. (Care should be taken to prevent splashes and spillages whilst pouring the resin.) The vacuum will start to pull the resin plug through the felt tube to the leading edge.
- Wet out the liner tube by assisting the spread of the resin plug along the length of the felt, until a consistent colour change is achieved. (The vacuum must remain in operation at this stage.) If white spotting is noticeable, continue spreading until colour change. Set the calibration roller gap to suit the felt thickness for a 3mm liner felt this will be approx 8mm. If unsure review the reline design document. Once the liner has been completely impregnated with resin, all excess resin should be collected in an appropriate container.

LINER INSTALLATION

- Carefully feed the liner into the inversion tank via the outlet pipe. Attached the turn back portion of felt liner to the outlet pipe and secure with jubilee straps and tape. If needed (ie if the relining is not manhole to manhole) the protective sleeve of calibration hose already pre-measured, will be taped on at the turn back end of liner.
- The impregnated liner can now be inverted into the host pipe. The liner is lubricated with vegetable oil or washing up liquid and a small section inverted by hand, this is clamped to the installation device.
- Introduce air/water into the inversion tank. Water is obtained from a suitable stand pipe, or via a bowser. Air is introduced by a suitably maintained compressor. Note that all water or connectors may have positive pressure, and therefore must be securely attached and taped closed to prevent them inadvertently coming apart.
- Once enough air/water has entered the inversion tank, you will feel that the liner felt can be fed from the inversion pipe into the host pipe. Care should be taken to place the liner felt securely into the host pipe. This may require a

member of staff to enter the manhole space to manoeuvre the felt. Standard confined space entry procedures to be followed, but also ensure there is sufficient space for the member of staff whilst this is occurring, and consider if the ventilation here could cause short term exposure limits to be exceeded for styrene's, etc. If this is possible, then full face respirator with A2 filter must be worn by the member of staff entering the manhole, and they must be medically cleared for this work, and trained to wear the respirator. Whilst the liner felt is being installed maintain air/water levels to prevent air being trapped in the liner, as a guide air should be retained at approx. 0.5 bars whilst the liner felt is being installed. If installing with water, maintain an adequate head of water before releasing the felt through the host pipe. Tension of the liner felt must be retained always during installation.

- Occasionally the liner may become obstructed by pipe deformity or displaced joints in the host pipe, obstructions in the sewer pipe, changes in level of the sewer pipe, trapped air, etc. When this occurs, empty the inversion tank of excessive water; seal the inversion tank, and use the compressor to increase the air pressure in the liner. Note: stand away from the pressure release line when this work occurs. All connections to be properly linked and sealed with tape to ensure they do not fail. Tension should be felt on the liner once this has occurred. If there is no tension trying to pull the liner in, then repeat this step.
- When the end of the felt has reached the top of the inversion tank, either attach the calibration liner, or webbing straps to the felt, depending on whether it is a manhole to manhole reline or not. Hoses for hot water may need to be attached to the webbing if it is a hot cure process. Continue to feed the liner into the inversion tank, until fully installed.
- Once the liner felt has reached its destination, turn off the air/water supply. Insert the calibration hose into the open end of the liner felt. Once the calibration hose has been securely installed onto the inversion tank with jubilee clips and has been put into the open liner felt introduce air/water into the inversion tank and slowly release the calibration hose through the liner felt until the calibration hose has reached its destination. (The calibration hose must have expanded the complete length of installed liner felt.) Once the liner felt has been completely expanded to the full dimensions of the host pipe, secure the tank handle to prevent further movement.
- Whilst the liner is curing, regular checks are required to maintain the correct levels of air/water within the inversion tank, top up, as necessary. With a hot cure process, boilers and pumps will be used to recirculate water inside the liner at a temperature of 80°C. The return temperature of the water must be monitored throughout the cure. Take care of hot surfaces on the boiler and surrounding pipes. Please refer to the reline design for bespoke curing temperatures.
- As the cure is an exothermic process, bulk resin normally reacts prior to resin that has been distributed within a felt matrix. The cure is monitored by observing the bulk waste until it has cured and cooled. Dependant on temperature and environment issues it is likely that the liner will cure for at least 30 minutes after the bulk waste has cured, at this stage observe the liner checking for hardness and integrity at each end.

- When the cure has completed, release air/water from the inversion tank. If a calibration liner has been used, release the calibration liner (using remote cutting equipment if necessary); pull out the calibration hose (carefully so that it can be reused.) This may require water to be continually pumped out as it is removed. Sufficient staff should be present to allow this dependent on the length and diameter of the liner. Do not pull the calibration hose towards any hazards, ie traffic or open manhole covers. Inspect the liner to ensure it is rigid and tack free and should not be easily marked with your finger nail or blunt instrument.

POST RELINING WORKS

- There may be side sewers which need to be opened using the remote robotic cutting equipment. Use procedure SSOW6 to perform these operations.
- The end of the liner from the inversion tank into the sewer needs to be cut at the sewer entrance. The far end may also need to be cut if a manhole to manhole operation has been performed. These operations will be performed following SSOW8.
- The liner is checked using CCTV to ensure adequate quality prior to returning the sewer back to service. You are looking specifically at major obstructions and damage to the old pipe, and entrances to the sewer.
- Remove plug from the upstream section to restore flow. Two members of staff will perform this and SSOW7 will be followed if confined space entry is necessary.
- The manhole covers are then replaced, and the barriers removed.
- Upon completion of the works site is to be left tidy & secure. Team Leader to verify all equipment is removed and stowed correctly on vehicle.
- Remove Chapter 8 signing and guarding if necessary.
- Personal hygiene i.e. regular hand, and arm washing/cleaning will be carried out, soiled clothing and rags will be bagged and removed from site.
- Contact to be made with the client's representative to cancel permits and confirm that the sewer is back in service. If the project has been completed or the daily shift has ended, report to the client's site reception to book of site, ensuring that the client's approval to leave site has been granted.

Any necessary deviation from the SSOW can only occur if this has been agreed by one of the Company Directors, and the client, and this has been recorded on the On-Site Risk Assessment.

7. Emergency Procedures

Follow emergency procedures for confined space work in SSOW7.

Follow emergency procedures for contamination of ground water or other water courses in SSOW1.

If resins get into the eyes, then rinse them with water for 15min, and seek urgent medical attention.

If resins get onto the skin, wash with soap and water. If irritation develops, then seek medical attention.

If resins are swallowed see the individual COSHH assessments as the emergency procedures vary. Do not induce vomiting. Never give unconscious person water. Seek urgent medical attention.

If resins vapours / fumes are inhaled above occupational exposure limits (which should not occur in normal working conditions) remove the person to fresh air, assist breathing if necessary. Call for an ambulance.

If the resins are spilled, wear gloves and goggles and protective clothing. Respirators should not be required unless the spill is into a confined space. Ensure the spill is confined, ie the materials cannot enter any water course or ground soil.

8. Environmental Protection

- Ensure resin products do not enter a watercourse. If watercourses are contaminated, then the EA must be informed.
- Try to avoid perform this work at night in residential areas. This work is not to be performed if there are high water levels and the potential for flooding above any bungs or in waterways which staff must access.
- All waste to be double bagged and returned to base.

9. Records

- On-site risk assessments will be kept with the task specific paperwork for this task. A copy will be presented to the client if necessary, and the main copy will be held in the task file. Task files will be kept for at least 2 years from completion of task.
- CCTV footage will be stored electronically. A copy will be provided to the client if necessary.
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