

CCC PIPELINE CCTV SPECIFICATION

Version: 1.0

Date: October 2017

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Revision History

Version	Date	Name	Brief Description of Change
1.0	October 2017	Irmana Garcia-Sampedro Daniela Muruges	Update to BAU from CCTV

1. Introduction

This document covers:

- Technical Specification and requirements for carrying out CCTV inspections (for condition assessment and as-built CCTV surveys)
- Deliverables to CCC

1.1. Definitions

Asset Owner – Christchurch City Council (“**CCC**”)

Contractor – Party responsible for the CCTV operation (including all traffic management, site inspections, pipe cleaning, flow control, notification and CCTV documentation).

CCTV Data Management Provider – Christchurch city council approved providers to export CCTV data into infoNet

CCTV Sub Contractor – specialist CCTV company undertaking the CCTV survey on behalf of the Contractor.

CCTV Operator – the qualified and competent individual that operates the CCTV camera (working for the CCTV Sub Contractor)

Training Provider – CCTV operator and reviewer training provider agreed with Christchurch City Council.

2. CCC Technical Specifications

All pipeline CCTV inspections are to be carried out in accordance with all clauses in this document (CCC Pipeline CCTV Specification) and the New Zealand Pipe Inspection Manual 3rd Edition (NZPIM).

The order of precedence shall be:

- CCC Pipeline CCTV Specification
- NZPIM General Specification
- Other provisions in NZPIM

This document is the Particular Specification as per section 5 of the NZPIM.

Specific requirements for the CCTV inspection of lined/rehabilitated pipe can be found in the appended document [‘Guidelines for As-Built Inspections of Lined/Rehabilitated Pipe’](#) and ‘Specification for Pipe Lining’ prepared by SCIRT

3. Particular Specification – Condition Assessment CCTV

3.1. Purpose

The purpose of the CCTV work is to identify defects and classify the general structural condition of the pipelines inspected.

The scope involves:

- CCTV inspection using pan and tilt camera for any pipe greater than 100mm
- CCTV inspection of pipelines including verification of pipe diameter and pipe material on site.
- Condition coding and recording of inspection data.
- Locating and reporting major defects requiring immediate repair.
- Locating and marking the position of buried manholes.
- Reporting the position of manholes or pipeline networks that are incorrectly positioned on CCC plans.

The inspections to be carried out are located in:

- Public roads with different levels of traffic management (refer to CCC Road Level Classification)
- Private land
- Council reserves
- Both flat and hill areas

Issues that the CCTV Subcontractor and Contractor needs to be aware of and may encounter during survey include:

- Pump Stations: when pipelines downstream from pump stations are to be inspected, the Contractor shall contact the Shift Controller on duty at the City Water & Waste Control Room (ph: 941 5727) well in advance to make arrangements for the control of pump stations during the inspections
- Heavy Flows
- Pipes that contain debris
- Traffic
- Difficult Access
- Hot water discharges
- Aggressive industrial discharges
- Wastewater blowback or surcharge to properties

3.2. Health & Safety Hazards

The following health and safety hazards may be encountered during survey, this list is not exhaustive. Contractors should be aware of their obligations under the Health and Safety in Employment Act 1992.

- Access and egress: manholes are considered confined spaces
- Hazardous biological substances
- Environmental conditions (hot, cold)

- Contact and contamination with sewage or other harmful substances
- Dogs
- Traffic (vehicular and pedestrian)
- Electrical and power tools
- Exposure to sunshine, stings, bites and infectious environment
- Eye strain from CCTV viewing
- Flooding and overflow
- Gas, fumes and foul air
- Handling fuels and chemicals
- High pressure water cleaning
- Manual handling
- Exposure to hazardous noise levels
- Use of plant and machinery
- Slip, trip and fall hazards
- Handling of waste
- Working at height or above deep holes (e.g. manholes)
- Working at pipe inlets 450 mm diameter and larger
- Working downstream of a sewer discharge
- Working in confined spaces
- Working in low light conditions
- Negative pressures (suction) at suction hose inlets
- Dust, for example; within the CBD cordon; around liquefaction ejecta and demolition works

3.3. Cleaning and Root Removal

Prior to the CCTV inspections being undertaken pipes are to be:

- Initially light cleaned as per NZPIM Standard Specification. If after light cleaning, deposits or roots still remain in the pipe that prevent CCTV, the inspection is to be attempted from the other manhole. If the full length of the pipeline cannot be inspected then heavy cleaning is required to remove all foreign material and roots.
- For heavy cleaning, as defined in the NZPIM, a site risk management protocol or standard operating procedure is to be documented, and provided to the Contractor.
- A site specific risk assessment and method statement is required for any heavy cleaning where the following applies:
 - Adjacent to structures that lie within a 45 degree envelope, measured from the pipe invert to the ground surface
 - Through private property
 - On 'level 2' or 'city' category roads with evidence of tomo formation
 - Within brick barrels.

- Risk management is to include, but not be limited to:
 - Risk of damage to trench backfill or fragile pipes
 - Consideration of pipe material
 - Consideration of pipe depth
 - Risk due to depressions or asphalt patches indicating damaged pipes along the pipe alignment
 - The measures required to avoid 'Toilet Blowbacks' during cleaning

Certain properties are at higher risk of 'toilet blow-back' and are listed on the 'Toilet Blowback List'. The Toilet Blowback List is maintained by City Care Ltd and is provided by email on a weekly basis.

Email Anne.Holwell@citycare.co.nz if you need to be included in the distribution list.

The Contractor must check the list prior to cleaning any sewer line. Where a house is listed on the 'Toilet Blowback List' cleaning shall not proceed until the resident has been notified of the proposed cleaning activity. The affected resident shall be advised to take precautionary measures to protect the household from surcharge, including sealing toilet seats down.

The Contractor must take care during high pressure cleaning to minimise the build-up of debris and risk of causing a full or partial blockage. This includes minimising the pressure being used and conducting regular retrievals of the jetting nozzle.

If a 'blow-back' or surcharge occurs, the Contractor shall clean-up and update the 'Toilet Blowback List'. Clean-up is to include disinfecting the property using professional cleaners to the satisfaction of the owner or residents. This clean-up is to occur 'as soon as practical' and no later than 6 hours after notification of the event. Any blowbacks are to be advised to the Contractor and the CCC operations team (03 941 8999) within 48 hours of the blowback occurring.

If water from fire hydrants is required for cleaning operations, the Contractor shall only use CCC approved standpipes with built-in backflow prevention

3.4. Maximum Depth of Water Flow

- The depth of water is not to exceed 25% of the pipe diameter unless the water depth is caused by a dip medium or large in which case a comment is required against the dip defect. Where the contractor is unable to manage the flow to reduce the water below 25%, the Asset Owner is to be notified. The Asset Owner may approve alternative inspection methods such as 'boat surveys' where the flow conditions are difficult to manage.
- Following of the jetter head to obtain CCTV is NOT permissible unless technically valid comments for the reason are made in the comments section.
- Where there are pump stations upstream of the inspections, the Contractor shall submit a permit to work <https://ccc.govt.nz/consents-and-licences/construction-requirements/permit-to-work/> to make arrangements for the control of pump stations during the inspections.

3.5. Still Images

Still images of the defect listed in Table 1 are to be captured and linked to the relevant electronic log sheet. No more than 2 photos are to be taken per 1.0m of pipe length and no more than 1 photo per defect

Still images attached to defects must be in JPEG format

Table 1 – Condition Codes requiring still images

Condition Code	Still Image Required?		
	Severity Small	Severity Medium	Severity Large
CM	N	Y	Y
CL	N	Y	Y
CC	N	N	Y
DF	n/a	Y	Y
DP	N	N	N
IP	N	Y	Y
JD	N	N	Y
JF	N	N	Y
JO	N	N	Y
LF	N	N	Y
LP	N	N	Y
LX	N	N	Y
OP	N ¹	N ¹	Y
OT	N	N	N ²
PB	N	Y	Y
PF	N	Y	Y
PH	N	N	Y
PL	N	Y	Y
PX	n/a	n/a	Y
SD	N	N	Y
RI	N	N	Y
TM	n/a	n/a	Y

¹ Still images are required for any instance where another service authority's asset has compromised the pipe wall (ducts drilled through pipe wall).

² Still images are required where a temporary obstruction is unable to be removed by high pressure cleaning.

3.6. Additional Codes

- Lateral Problem, Large severity (LX,L – IP,L). Where large infiltration is observed from a lateral connection but no defect is visible the code LX,L shall be used with IP,L recorded in the comments column.
- For wastewater pipes, laterals with grease, silt or other forms of obstruction (excluding encrustation) shall be coded as Lateral OK (LO) with coding and comments relating to the service fault. This does not apply to stormwater pipes.

3.7. Major Defects Requiring Immediate Attention

Unless agreed otherwise and where there is no immediate risk to people or property, the Contractor must immediately notify the project engineer or asset owner if any of the following Condition Codes are identified:

- Pipe broken, large severity (PB, L)
- Pipe Collapsed (PX, L).
- Deformed Pipe, large severity (DF, L or PF, L).
- Tomo (TM, L).
- Any instance where another service authority's asset has compromised the pipe wall (ducts drilled through pipe wall etc)
- Obstruction Permanent, large (OP, L) and Obstruction Temporary, Large severity (OT, L) where the temporary obstruction is unable to be removed by high pressure cleaning.
- Pipe holed large (PH, L)

3.8. Manholes and Pipe Layout

The location or general layout of the drainage network may differ from that shown in Councils Geographic Information System (GIS). The Contractor is required to provide a sketch showing where manhole locations and pipe network layout differ from GIS in PDF format. A unique asset ID is to be temporarily assigned to the pipe and/or manhole and comments specifying the difference noted in the log sheet 'comments' section.

Updated asset information is to be sketched onto a map and supplied in hardcopy with any DVD files and/or electronic log sheet as part of a completed survey. The Contractor is to produce a plan showing the features that are missing or classified incorrectly and advise the CCC GIS team as follows:

Show the position of the missing details according to Section 12 of the CCC Infrastructure Design Standard (IDS).

Record material and diameter on the marked up plan.

Email informationservices@ccc.govt.nz at CCC with the details and cc

When buried manholes are located the Contractor is required to mark the position of the manhole on the ground surface and inform CCC. The manhole will be raised by CCC operations or a delegated authority <Wastewater – 03 941 8327; Stormwater – 03 941 8308>.

4. Particular Specification – As Built Survey Requirements for Newly Constructed Pipes and Repairs

4.1. Purpose

The purpose of the CCTV work is to provide an as-built condition record for repaired, renewed and new pipes.

In addition to the inspection requirement and coding set out in the *New Zealand Pipe Inspection manual* the methodology outlined in this section must be applied when carrying out an As Built CCTV inspection (i.e. (Subdivisions, Capital Delivery, Maintenance)).

Refer to Appendix A for As Built CCTV process.

Note that pipelines that have undergone repairs to less than 10% of their length do not require an as-built CCTV. Refer Section 4.2

Prior to the as-built CCTV inspection all works within the manholes must be complete, manhole benching reinstated and interface sealed (where a new manhole was installed or benching in an existing manhole was removed / partially removed to facilitate the works).

All the requirements in section 3 are applicable for as-built CCTV at least specific requirements are listed under this section (i.e. Maximum depth of water flow)

4.2. Pipes repaired for less than 10% of the node to node pipe length

Where pipes are being repaired for less than 10% of the node to node pipe length, As-built CCTV is not required. However, the pre-repair CCTV record must be adjusted according to the NZPIM to reflect the repair work undertaken to the pipe (as an alternative to undertaking an as-built CCTV inspection). This needs to be completed by the City Care CCTV team as they hold all pre-repair CCTV records. The Contractor must email CCTVAsBuilts@citycare.co.nz a one-page [repair report](#),

The pre-repair CCTV record must be updated by the following process:

- Change the condition code where the repair has been made to a general comment (GC);
- Include the original condition code in the remark for the GC including a comment that it has been repaired;
- Attach the one-page repair summary to the GC in either JPEG format, and delete the original photo (if one existed)
- Re-export the data to InfoNet (in accordance with Section 3.12) Change the 'task status' to 'AsBuilt' to show that it is an as-built record.

The repair summary report must include a commentary on the repair method, images documenting the repair and must be signed by the site engineer.

For CCTV surveys where more than 10% of the pipe has been repaired, the as-built CCTV must be undertaken from node to node.

4.3. As Built CCTV Pipe Cleaning, Charging and Flow Control for Newly Constructed Pipes

All new pipelines should be cleaned with a high pressure cleaner no more than 24 hrs prior to inspection. Pipes must be free of all construction debris (e.g. offcuts, dirt gravel) before the survey is undertaken. Small quantities of debris infiltrating from laterals is not considered construction debris, provided coding to the NZPIM can take place.

Following cleaning, a charge of water must be sent through the pipe prior to CCTV inspection. This will allow the operator to identify dips based on standing water which may otherwise be missing following jetting.

Base flows must be plugged or diverted so that there is no flow coming from the upstream manhole. Flows from live laterals into the pipe being surveyed should result in a flow in the pipe no more than 10mm deep. If flow cannot be controlled due to infiltration from laterals, CCTV can be carried out provided:

- There is no risk to personnel, property or equipment.
- The CCTV as built inspection is marked as being out of specification by the operator in the comments section and a general comment is included as soon as base flow exceeds 10mm in depth.
- Upstream flow is controlled such that there is no base flow coming from the upstream manhole.
- The flow does not exceed half pipe flow minus 30mm and the camera lens is at all times clear of water flow (eg 45mm for a 150mm diameter pipe)
- The entire pipe can be seen and the flow is clear.
- It is not permissible under any circumstance to follow the jetter for as-built CCTV surveys.

4.4. As Built Defect Code Interpretation for Newly Constructed Pipes

The CCTV Operator must note any non-manufactured joints in the pipe line (e.g. non-standard joints such as solvent welded). Any non-manufactured joints are to be coded using GC and include the comments "non-manufactured joint".

Refer to Section 8 for pipe and node asset naming for as-built surveys.

A small dipped pipe (**DP S**) as defined for As Built survey is a dip in a pipe that is greater than 20mm of depth and less than 25% of the pipe diameter. Dips in pipes that are 20mm or less are not to be coded as a defect. The dip depth can be estimated using a variety of methods and different aids such as but not limited to: laser measurement, and transparent screen overlays on a photographic reference. If there is a disagreement around the depth of a dip, the comparison/measurement should be carried out using the cord/sagitta geometrical calculation (Puddle depth = radius - $\sqrt{(\text{radius}^2 - (\text{cord length}/2)^2)}$).

Table 2 includes dip percentages above which a dipped pipe should be coded. Photographs 1, 2 and 3 also provide a visual reference of pipes with approximately 20mm dips. The base flow level should be considered when determining the depth of a dip. That is, if there is a base flow of less than or equal to 10mm then this can be added to the 20mm dip allowance and the dip would not be coded as a defect.

Table 2 20mm Dip Depth Correlation

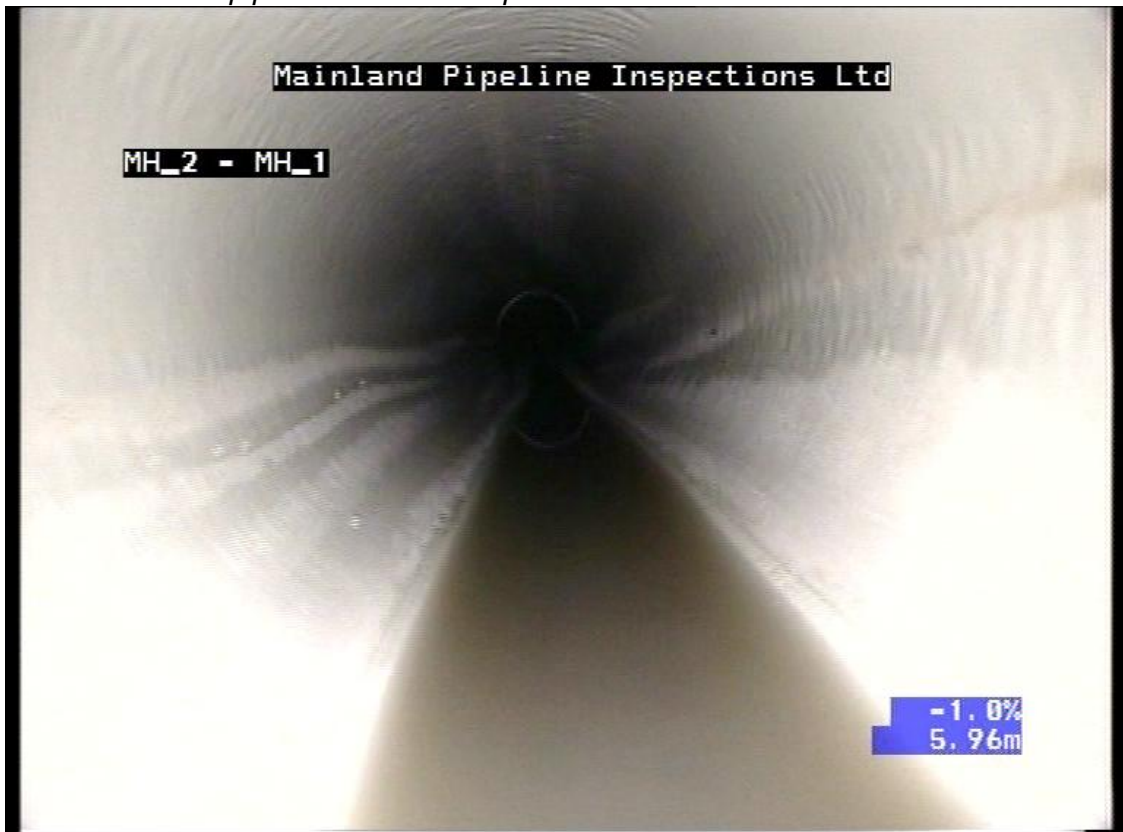
Internal Pipe Diameter (mm)	Diameter % indicating a small dip	Water depth greater than
150	13 – 25%	Photo 1
225	9 – 25%	Photo 2
300	7 – 25%	Photo 3
400	5 – 25%	No Photo

Photograph 1: 150mm pipe with a 20mm Dip

Photo 2: 225 mm pipe with a 20mm Dip



Photo 3: 300mm pipe with a 20 mm Dip



A Debris Greasy Small (DG S) in as-built surveys is defined as follows:

Debris Greasy Small refers to the presence of grease, fat, scale and any other materials adhered to the pipe wall (with the exception of encrustation deposits) that covers more than 25% of the circumference of the pipe and where the clear diameter is reduced by less than 10%.

Examples of how the above criterion is applied are shown on Photo 4 and Photo 5.

Photo 4: DG covers 10 to 15% of the circumference so not a DG,S

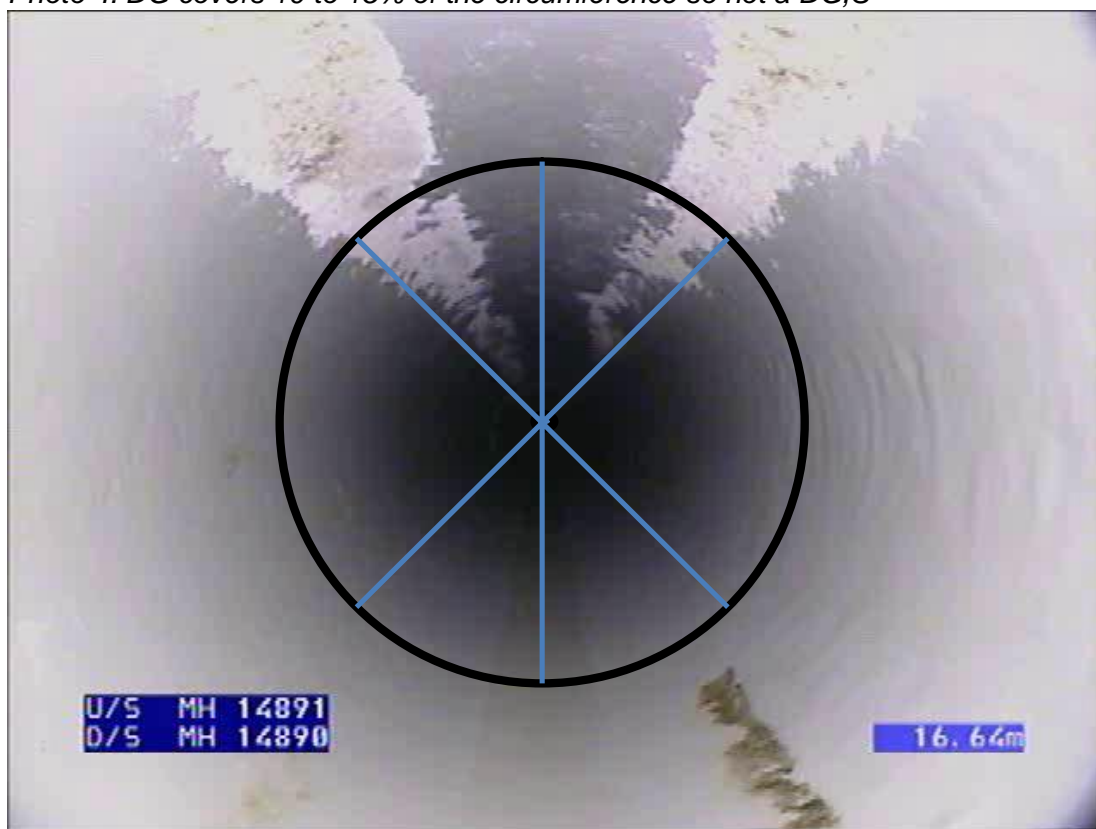


Photo 5: DG covers just over 25% of the circumference so is a DG,S



Debris Greasy Medium and Large definitions will remain unchanged from the current definition in the New Zealand Pipe Inspection Manual.

Minor ovality defects (**PF S**) are acceptable if the pipe passes the ovality test and can be removed from the logsheet by the following process:

- Contractor to provide ovality test result to the Data Management Provider.
- Change the PF S code to a general comment GC;
- Include the original condition code in the remarks;
- Attach the one-page ovality test in either JPEG format

Note that this only applies if the PF S defect is related to a minor ovality issue. If there are other PF S defects present (e.g. backfill pushing through the pipe wall and causing a deformation) then the defect needs to be logged as a PF S defect and go through the pipe defect consideration process.

The condition codes and associated severity set out in Table 3 are not considered by CCC to be pipe defects that require further action.

Table 3 Acceptable Condition Codes

PVC and PE Pipes		Concrete Pipes		PVC Pipes (Lateral Junction)	
Condition Code	Severity	Condition Code	Severity	Condition Code	Severity
SD	S	SD	S	JO	L ²
JD	S	JD	S		
JO	S	JO	S		
JO	M	CM	S		
DE	S	CL	S		
OT	S	CC	S		
PF	S (ovality)	PH	S		
+		JD	S		
*		JF	S		
		LP	S		
		LX	S ¹		
		DE	S		
		OT	S		

¹Only applies to concrete laterals connected to a concrete main. No LX accepted on PVC/PE laterals connected to a concrete main.

²Only acceptable if the pressure test is passed and the rubber ring is not exposed. Contractor to provide pressure test to the data management provider to be exported to InfoNet.

All other condition codes recorded in as-built surveys require a still image.

4.5. As Built CCTV Pipe Cleaning, Charging and Flow Control for Lined Pipes (Capital Delivery, Maintenance)

Prior to CCTV inspection all pipe lining and liner sealing works within the manhole must be complete and manhole benching reinstated (where removed / partially removed to facilitate liner installation). This includes the opening of all laterals, the installation of all LJR's and the completing of all lateral lining (if required).

All pipelines must be cleaned with a high pressure cleaner no more than 24 hrs. prior to inspection. Pipes must be free of all construction debris (e.g. offcuts, dirt gravel) before the survey is undertaken. Small quantities of debris infiltrating from laterals is not considered construction debris, provided coding to the NZPIM can take place.

Following cleaning, a charge of water must be sent through the pipe prior to CCTV inspection. This will allow the operator to identify dips based on standing water which may otherwise be missing following jetting.

Base flows must be plugged or diverted so that there is no flow coming from the upstream manhole. Flows from live laterals into the pipe being surveyed should result

in a flow in the pipe no more than 10mm deep. If flow cannot be controlled due to infiltration from laterals CCTV can be carried out, provided:

- There is no risk to personnel, property or equipment.
- The CCTV as-built inspection is marked as 'out of specification' by the operator in the comments section and a general comment is included as soon as base flow exceeds 10mm in depth.
- Upstream flow is controlled such that there is no base flow coming from the upstream manhole.
- Flow is only due to infiltration in laterals and does not include private or commercial discharges (e.g. washing machine, shower or trade waste discharges).
- The flow does not exceed half pipe flow minus 30mm and the camera lens is at all times clear of water flow. (e.g. 150mm Pipe = 45mm)
- The entire pipe can be seen and the flow is clear.

It is not permissible under any circumstance to follow the jetter for as-built CCTV surveys.

4.6. As Built Defect Code Interpretation for Lined Pipes

Refer to the below section and the current version of the document '*Guidelines for As-built CCTV Inspections of Lined/Rehabilitated Pipe*' for guidance on the inspection and coding of defects in newly lined pipe.

The operator must clearly inspect the seal of the liner at both the upstream and downstream manholes. If the camera is not able to rotate backwards to view the downstream manhole connection the camera should be re-launched from the downstream manhole.

The condition codes and associated severity set out in Table 4 are not considered by CCC to be pipe defects that require further action.

Table 4 Acceptable Condition Codes

Newly Lined Pipes	
Defect Code	Severity
DE	S
OT	S
PL	S*

*A Non-conformance report is required for lifting recorded under PL S

Care is required in regard to acceptable defect codes for post lining surveys. Latent defects (defects that existed in the host pipe prior to lining) may appear like defects in the liner. These, when identified, need to be compared with the pre-lining CCTV, to confirm if a lining defect or latent defect in the pipe is a lining defect or not. These should be referenced against the lining design notes.

Typical latent defects that may be appear as liner defects (typically coded as PF) include:

- Deformed pipe
- Displaced Joints
- Open Joints

- Holes in the pipe (PH, PB, TM & blank laterals)
- Dipped Pipes

4.7. As-Built defects(s) repair or acceptance for newly constructed and lined pipes

If a defect has been confirmed in an as-built inspection, the Contractor must repair it or seek acceptance to leave the defect in place by raising a Non-Conformance Report (NCR) using the appropriate template provided on Council's website: <https://ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/pipeline-cctv-inspections>.

If a repair is made to less than 10% of the pipe length or the defect is accepted by CCC, the Contractor is responsible for amending and reporting the updated data as outlined in the following sections.

4.7.1. Defect accepted by CCC

If the defect is reviewed and accepted to remain by CCC, the Contractor must instruct their Data Management Provider to update the as-built CCTV record as follows:

- Leave the condition code as is;
- Add the following phrase to the defect remark: "Defect Accepted By CCC";
- Insert a new GC code at the same distance with the remark "Evidence of defect acceptance". Attach a one page approval (copy of e-mail from CCC is sufficient) to the GC condition code in either a PNG or JPEG format, and
- Re-export the data to InfoNet.

4.7.2. Repair(s) less than 10% of pipe length

Where pipes are being repaired for less than 10% of the node to node pipe length to repair a defect found in an as-built inspection, the Contractor is not required to re-survey the pipe but must instruct their as-built CCTV provider to update the as-built CCTV record as follows:

- Change the condition code where the repair has been made to a general comment (GC);
- Include the original condition code in the remark field for the GC and add a comment that it has been repaired;
- Attach the one-page repair summary to the GC in JPEG format, and delete the original photo (if one existed);
- Re export the data to infoNet

4.7.3. Repair(s) greater than 10% of pipe length

If a repair(s) is required for more than 10% of the pipe length the entire asset (from node to node) must be completely re-CCTV'd following repair.

5. Deliverables

5.1. Deliverables – CCTV Subcontractor

- Ensure that manhole IDs match those given on the mark up construction drawings
- Ensure that information such as ‘setup’ and ‘direction of inspection’ are correct and don’t contradict each other.
- Make sure that abandoned inspections are labelled as such (IA instead of IE).
- When CCTV’ing collector sewers ensure that the log sheets clearly state what they are.
- Ensure that the video inspection starts in the centre of the manhole. This means that the video needs to start inside the manhole (not only the counter). If this is not possible due to access issues then please state this on the log sheet.
- Ensure that the first joint at the start manhole and the last joint at the finish manhole are panned and clearly visible on the video.
- Depending on the arrangements with your client, deliver all documentation to your client or directly to the CCTV data management provider for processing and reviewing.
- Prior to the as-built CCTV inspection, ensure that all works within the manholes are completed and manhole benching reinstate

The CCTV Sub Contractor is required to provide the video footage to the Contractor or Data Management Provider.

The CCTV footage shall be initially recorded utilizing a good quality digital video recorder and provided electronically or on a DVD.

Where a DVD is to be supplied it is to be labelled showing the following fields as a minimum:

- Unique Asset ID
- Date of CCTV inspection (ddmmyy)
- CCTV Sub Contractor and Contractor it is being done for.
- Asset type – sewer main, sewer lateral, stormwater main
- A unique video record number (survey ID/DVD Reference)
- Upstream and downstream manhole numbers
- The project, RMA or contract number

DVD must be labelled with the DVD Reference to match the cover.

5.1.1. Header Information Required

In addition to the mandatory fields specified in the General Specification of the NZPIM the following log sheet header information is to be included (descriptions of these items are included in Section 2 of the NZPIM):

- Name of CCTV contractor.
- Project/Contract Number.

- Upstream & Downstream Manhole Street No.
- Upstream & Downstream Manhole Street Name.
- Video Recorder Run-time Finish.
- DVD/Video reference number.
- Weather.
- Comments.
- Depth to the invert of the pipe measured down from manhole lid where there is more than one pipe between the same two nodes ('under / over' configurations such as collector sewers and main sewer lines).

5.2. Deliverables – Data Management Provider

Current Christchurch city council approved data management providers are

- City Care Ltd , contact John Garton john.garton@citycare.co.nz
- Hydrotech Ltd, contact John Grieve johng@hydrotech.co.nz

The Data Management Provider provide to CCC Electronic data of the inspection, in a format compatible with InfoNet (by either export or access to an online repository).

This is to include:

- CCTV Log
- Still images in the following format:
 - Electronic snapshots (only one Jpeg image per condition code) (linked to the relevant inspection).
- The Data Management Provider shall, on a weekly basis, update and provide a current catalogue. The catalogue is to record, as a minimum the following fields, for each asset surveyed:
 - CCTV Sub Contractor
 - The unique DVD 'Video Record Number' (Survey ID / Catalogue Number)
 - Asset Type (wastewater / stormwater)
 - Asset ID
 - Upstream node ID
 - Downstream node ID
 - Upstream node street address (include property street number)
 - Survey date
 - CCTV Operator
 - Client contract or request number
 - Comments, including; if the asset data does not match GIS or has been changed to reflect GIS; if the asset is a sewer lateral; if the survey is a 'reverse' survey; where the catalogue differs from the raw log sheet or video 'header' information to conform with GIS etc.
 - Video file present
 - Log sheet present
- The Data Management Provider shall provide CCTV inspection footage:
 - In a 'one video file for one pipe asset' format agreed with CCC. Where inspections are carried out from both ends of a pipeline section and each part terminates at a common feature or defect, the resulting two video files will require editing to create one video file for the pipe asset.
 - Ripped / converted to a standard NO LESS than MPEG-4 720x544 pixels, 3500kbps.
 - There shall be no audio embedded with the Video footage.

- Stored on a secure hard drive. The hard drive shall be 'backed up' off site and tested on a regular basis.
- Compatible with InfoNet
- With "live access" to quality controlled video footage for condition assessment inspections.
- Refer to Section 8 for specific requirements around the naming of pipe and node assets

5.3. Deliverables – Contractor

The Contractor is to provide the Data Management Provider and CCTV subcontractor the following information

- CCC project/contract number
 - Subdivisions: RMA number
 - Capital Projects: CPMS number
 - Condition Assessment CCTV: PO or WO Number

In Addition, for Asbuilt CCTV Inspections the contractor must provide;

The CWW stamped constructions drawings including any post construction modification, The contractor must ensure that every node given on the drawing is named.

The contractor must complete the [CCTV summary sheet](https://ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/pipeline-cctv-inspections/), <https://ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/pipeline-cctv-inspections/> using the council template and provide the template to the Data Management provider once the Data Manager Provider export the data to CCC InfoNet, The contractor must update the summary sheet to match the information on the CCTV data management provider's logsheets

The CCTV Summary sheet includes

- Project location: e.g. name of subdivision, subdivision stage, RMA number (where applicable) or contract number
- Indication of whether more footage is to come for the particular subdivision / subdivision stage / project
- Name of drainage company that carried out the work, and their nominated CCC Authorised Drainlayer
- A table that lists the lengths CCTV'd.
- The table should include: pipe type (wastewater / stormwater), street name, asset ID, manhole IDs, pipe diameter, pipe length, comments (this information needs to match the information on the CCTV data management provider's reviewed log sheets).
- Details of any repairs or rework carried out on the pipes prior to submitting to CCC

Submit the following information to CCC:

- Construction drawing / as-built drawing clearly showing pipe locations, asset IDs, pipe dimensions.
- A summary sheet using the Council template (refer to bullet point above). Submit 1 summary sheet per subdivision stage and per network (i.e. 1 summary sheet for all wastewater pipelines in a subdivision stage and 1 CCTV package for all stormwater pipelines in a subdivision stage)

Note that the actual CCTV footage does not need to be submitted to Council as Council can access it through the CCTV data management providers' systems.

Note: where a defect was found in a pipeline during the CCTV inspection and the defect was corrected/repared and the line CCTV'd again then submit the most recent log sheet and footage only, but include the repair information on the summary sheet.

6. Quality Assurance

6.1. CCTV Sub Contractor Quality Assurance

The CCTV Sub Contractor is to audit the quality of the CCTV footage prior to submitting to the Data Management Provider. This includes ensuring that the CCTV to be provided matches the most current version of the mark-up drawings, or GIS system. Only CCTV operators deemed 'competent' by a CCC approved training provider are to be used.

6.2. Data Manager Provider Quality Assurance

The Data manager provider to ensure the CCTV subcontractor is providing footage as per section 5.1

The Data manager Provider is to notify the contractor if the CCTV footage does not complaint with NZPIM or this specification

The Lead Data Manager will nominate an experienced and approved auditor to undertake on-going auditing of the works, either 20% of assets or one asset (whichever is the greater) is to be audited, utilising the audit procedure outlined on pages 2-19 to 2-20 of NZPIM.

6.3. CCC Quality Assurance

CCC will undertake on-going auditing of 5% of all CCTV inspections. If the accuracy level for a work package sample is less than 90%, then another 5% will be audited. If the subsequent audit shows an accuracy level of less than 90% for the work package sample then the Contractor will be required to repeat the CCTV work package. The extent of the re-work will depend on the nature of errors identified in the audit.

For condition assessment purposes if a work package fails the larger 10% audit and the failure is not due to over-scoring of defects, pipes with a mean structural score of greater or equal to six will not be re-coded by the Data management provider, as this score indicates a pipe with a high degree of damage requiring renewal. If the audit

does highlight over-scoring of defects, all pipes in the work package will need to be re-coded by the Data management Provider.

For as built purposes if a work package fails the larger audit the entire package will need to be re-coded by the Data Management Provider.

7. Data Management - CCTV Electronic Data

7.1. Data Management Plan

The Data Management Plan is to be produced by the Data Manager Provider to document the CCTV storage system and data management/transfer method and processes. It is to be agreed and documented collaboratively with the CCC. This applies to both pipe condition assessment and as-built CCTV surveys.

The Data Management Plan is to specify:

- Data storage obligations (what video, log sheets, electronic data, project plans to be kept, how and for what duration)
- The method and timeframe for communicating each form of stored data between CCC and Contractor (video, log sheets, other electronic information)
- The process to verify that the summary catalogue is correct and matches GIS
- The process to verify that the stored data is a complete and accurate record
- The data architecture (folder structure and location etc)
- Organisational, team and individual responsibilities
- A disaster recovery and system monitoring method statement
- What software is to be used and how it interfaces with existing software
- What other deliverables are required
- The level of resilience of any data storage array
- The induction and support process for new technicians

7.2. Disaster recovery

The data must be 'backed up' incrementally daily, with weekly full backups as a minimum. The backup/media is to be stored offsite. Ownership and accountability for the backups and their location is to be specified in the Data Management Plan. The process for system recovery is to be documented and with an individual allocated responsibility. The position description and a 'Curriculum Vitae' of the nominated person is to be provided to the Christchurch City Council for approval. A test restoration of data and recovery process is to be carried out upon commissioning and monthly thereafter, prior to a recovery event occurring. Backups must be structured to allow for recovery of accidentally deleted data. The recovery process for accidental deletion shall be tested on a biannual basis.

7.3. Location of Storage

The storage array is to be located in an environmentally controlled cabinet, free of dust. Regular cleaning shall be completed and an appropriate temperature monitored and maintained. The storage location, cleaning schedule and temperature monitoring shall be agreed and documented in the Data Management Plan.

7.4. Failure notification and system monitoring

The method for failure notification and system monitoring is to be detailed in the Data Management Plan.

System wide pro-active monitoring and predictive failure analysis shall be completed to minimise failure due to component wear. The hard drive's reporting capability shall be supported to enable pre-failure error statistic logging. A monitoring regime of these statistics shall be documented and implemented. The replacement criterion is to be defined for components prior to failure.

In the event of a hard drive in the array failing, the ability to rebuild the array in a timely manner requires one or more of the following:

- A spare drive being available onsite.
- A 'hot spare' being provisioned, such that in the event of a hard drive failure, the system will automatically utilize the 'hot spare' and rebuild the array.
- A well-documented and tested supply chain involvement

8. Pipe and File naming Convention

This section specifies how to name pipe, node assets (typically MHs) and footage on CCTV surveys (condition assessment or as-built) of existing assets, newly constructed, lined or repaired assets

The CCTV Sub-Contractor and Data Management Provider needs to be issued Final construction drawings marked up with any nodes added during the construction phase by the Contractor's Site Engineer before they undertake as-built CCTV. The contractor must ensure that every node given on the construction is named

8.1. Node Asset Naming

8.1.1. As-built CCTV Surveys

8.1.1.1. Mains

The CCTV subcontractor and Data management provider must record node IDs (at either end of the pipe asset) exactly as they appear on the construction drawings, regardless of whether the pipe is new, has been lined or has been repaired. This is to ensure a naming cross-over with other as-built data collection. e.g. If MH-4321 is given on the construction drawings, this should be recorded as MH-4321

If WWMH-1234(NEW) is given on the construction drawing, this should be recorded as WWMH-1234(NEW)

8.1.1.2. Laterals

The nodes will specify the start and end point of the inspection:

For existing Lateral, the nodes to be used are:

- Main
- Boundary

- IP(Inspection Point)
- GT (Gully Trap)

For New Constructed Lateral, the nodes to be used are

- Lot ID/Property Address
- Main or Junction node ID if provided

8.1.2. Condition Assessment CCTV

8.1.2.1. Mains

CCTV subcontractor and Data Manager Provider must record node IDs as per GIS

8.1.2.2. Laterals

The nodes will specified start and end point of the inspection, Main, Boundary, IP(Inspection Point) or Gully Trap (GT))

8.2. Pipe Asset Survey Naming

The pipeline asset survey ID shall be created with the format:

AABBBBBBBBBBBB

Code	Description	No. of Characters
AA	Network Type(SW/WW)	2
BBBBBBB	Asbuilt CCTV (Main and laterals) YearMonthDayTime (yyyymmddtttt) Time using 24hr clock	12 (Mains) 14(Laterals)
	For condition assessment CCTV or As-built CCTV in mains, laterals, lined pipes, repairsà GIS ID	9

Examples:

- As built CCTV new constructed Main: WW201706231015
- As built CCTV new constructed Lateral: WWLA201706231015
- Condition Assessment or AsBuilt CCTV Existing Main: WWpipe35869
- Condition Assessment or AsBuilt CCTV Existing Lateral:WWLA-586005

The Data management provider must include in the export to CCC InfoNet, the project/contract number provided by the contractor. See section Deliverables (Contractor)

This will be used in InfoNet to generate the InfoNet UID e.g.

WW201706231015_ RMA/2016/2128

8.3. Footage file naming convention

- Video footage must be provided using the following file naming convention:

AAAAAA_BBCCCCCC_DDDDDD_EEEE_FF_GGGGG

Code	Description	No. of Characters	Example
AAAAAA	Project Number	Up to 12	PO4500416005(Condition Assessment CCTV) RMA/2016/2128 (Asbuilt Subdivisions) CPMS232 (Condition Assessment or Asbuilt Capital projects)
BB	Network Type	2	SW WW
CCCCCCC	For Asbuilt CCTV YearMonthDayTime (yyyymmddttt) Time using 24hr clock For Condition AssessmentCCTV, lined pipes, repairsà GIS ID	Up to 12	pipe12548 201701291424
DDDDDD	Date of Inspection	6	150413 (ddmmyy)
EEEE	Cleaning Stage	4	PRCL (precleaning) POCL (postcleaning)
FF	Abandoned inspection direction (only applies if inspection is abandoned from both directions.)	2	US DS
GGGGG	Survey using method other than standard CCTV Tractor unit (this method must be approved by the principal before inspection).	UP to 7	Boat Polecam Pushcam

A few examples include:

- § CPMS231_SWpipe78564_210717_POCL (Capital project inspection for a stormwater asset)
- § RMA/2016/2128_WW201701291424_210717_POCL (Subdivision Asbuilt CCTV of a WW asset)

- § PO4500416005_SWpipe78564_210717_POCL_US (Condition assessment CCTV from the us node of a stormwater asset that was abandoned.
- § PO4500416005_SWpipe78564_210717_PRCL_PUSHCAM (Condition Assessment CCTV of a stormwater asset that wasn't cleaned and was inspected using a pushcam.

Appendix A

