

# CCC PIPELINE CCTV SPECIFICATION

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**Revision History**

Version	Date	Name	Brief Description of Change
1.0	October 2017	Irmana Garcia-Sampedro Daniela Murugesh	Update to BAU from CCTV
2.0	December2020	Irmana Garcia-Sampedro	<ul style="list-style-type: none"> <li>• Edit H&amp;S references</li> <li>• New process to provide CCTV data and footage to council though the FME portal</li> <li>• Requirements to carry out pole camera inspections</li> <li>• Quality Assurance requirements</li> <li>• Other minor changes</li> </ul>
3.0	January 2021		<ul style="list-style-type: none"> <li>• Addition of people in definitions</li> <li>• General editing</li> </ul>

## 1. Introduction

This specification relates to the collection of CCTV data, assessment of CCTV data and provision of CCTV data to CCC. This data may be collected for two purposes. Firstly, on new pipes to confirm compliant construction (as built data), or on existing pipes to determine maintenance interventions and remaining asset life (condition assessment).

This document covers:

- Technical Specification and requirements for carrying out closed circuit television (CCTV) inspections (for condition assessment and as-built CCTV surveys)
- Deliverables to Christchurch City Council (CCC)

### 1.1. Definitions

**Asset Owner** – CCC

**CCC Authorised Drain Layer** - suitably experienced individual workers who have relevant experience and skills and are familiar with Council's requirements and specifications. Refer to <https://ccc.govt.nz/assets/Documents/Consents-and-Licences/construction-requirements/Authorised-Drainlayer-Register.pdf> for list of approved drainlayers.

**Contract Engineer** – Either the Principal or Engineers Representative

**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 (DMP)** – CCC approved providers to export CCTV data into InfoAsset.

**CCTV 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 Contractor)

**FME Portal** – Feature Manipulation Engine, Council web-based data submission and validation portal

**InfoAsset** – CCC Asset Management System

**Third Party Auditor** – Qualified and competent specialist CCTV operative

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

*Note: the same company could play the role of Contractor, CCTV Data Management Provider and CCTV Contractor.*

## **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
- Christchurch City Council Standard Specifications (CSS)

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 Stronger Christchurch Infrastructure Rebuild Team (SCIRT)

## **3. Particular Specification – Condition Assessment CCTV**

### **3.1. Purpose**

The purpose of the CCTV work is to identify defects, their location and their severity, and classify the general structural and operational condition of the pipelines inspected.

The scope involves:

- CCTV inspection using pan and tilt camera for any pipe greater than 100mm inside diameter (ID)
- 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
- Under water ways

Issues that the CCTV contractor and Contractor needs to be aware of and may encounter during survey include, but not limited to:

- Pump Stations: when pipelines downstream from pump stations are to be inspected, the Contractor shall submit a permit to work <https://ccc.govt.nz/consents-and-licences/construction-requirements/permit-to-work/> 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
- Unstable insitu pipe assets

### **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 at Work Act 2015.

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

- Working at night

### 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 by the Contractor prior to cleaning.
- All solid debris dislodged during cleaning activities must be removed and disposed of at an appropriate facility. A solid is described as any item or object that has deposited in the pipeline and is not being transported by standard wastewater flow. All solids must be captured such that they are not discharged further down gradient in the wastewater network.
- 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

*Please note that depressions above the wastewater line have previously been associated with ingress of backfill into the pipe line and this evidence should be considered when deciding on cleaning methodology prior to undertaking CCTV.*

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 authorisation is received from CCC..
- 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



Condition Code	Still Image Required?		
	Severity Small	Severity Medium	Severity Large
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 <sup>1</sup>	N <sup>1</sup>	Y
OT	N	N	N <sup>2</sup>
PB	N	Y	Y
PF	N	Y	Y
PH	N	N	Y
PL	N	Y	Y
PX	n/a	n/a	Y
SD	N	Y	Y
RI	N	N	Y
TM	n/a	n/a	Y

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

<sup>2</sup> 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

Contractor must immediately notify the contract engineer, where the contract engineer could either the Engineer Rep or the Principal, if any of the following codes are provisionally identified during the survey.

- 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)

The principal must also be notified through email to [SewerReactiveMaintenance@ccc.govt.nz](mailto:SewerReactiveMaintenance@ccc.govt.nz) including in the email: pipe ID, pipe location, type of major defect(s), location of major defects(s) and photo(s).

### **3.8. Manholes and Pipe Layout Inaccuracies**

When the location or general layout of the drainage network differs from that shown in CCC's Geographic Information System (GIS), the next steps must be followed by the Contractor/Data Management Provider:

1. A unique asset ID is to be temporarily assigned to the pipe and/or manhole and comments specifying the difference noted in the CCTV data 'comments' section. The CCTV footage and data will be provided to CCC using the temporary ID.
2. Provide a sketch showing where manhole locations and pipe network layout differ from GIS in PDF format. Show the position of the missing details according to Section 12 of the CCC Infrastructure Design Standard (IDS). This sketch must be emailed to [informationservices@ccc.govt.nz](mailto:informationservices@ccc.govt.nz) and [AssetAssessment@ccc.govt.nz](mailto:AssetAssessment@ccc.govt.nz). The Contractor will receive the new asset ID assigned by CCC based on the information provided.
3. Rename the CCTV footage and data with the new asset ID and resubmit it to council.

When buried manholes are located the Contractor is required to mark the position of the manhole, with dazzle type spray paint, 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 – Pole camera inspections**

### **4.1. Purpose**

The purpose of the pole camera inspection is to efficiently support the CCTV assessment of pipes.

### **4.2. Scope**

Pole Camera services involve a camera incorporating a zoom and light mounted on an adjustable pole that can be inserted into an access point such as sump, manhole or open channel to allow video footage to be taken of the inside of a pipeline; without the need for any personnel to enter confined spaces.

CCC will provide the Contractor potential candidates to be inspected by polecam, in order to reduce inspection time and traffic management cost for the assessment of short and isolated pipes. A typical pole cam candidate might be; a small length of large diameter pipe, pipes between flush tanks and the wastewater system.

In the event a pole camera survey cannot be completed, it needs to be notified to CCC and a CCTV inspection will be programmed.

### **4.3. Cleaning Prior to Pole Cam Inspections**

Fieldwork crews shall have hand operated water blasters and/or rodding equipment available so that cobwebs can be cleared prior to commencement of the video recording – It is not expected that crews will spend longer than 15 minutes attempting to clear pipes

#### **4.4. Footage requirements**

The Pole Camera survey shall record the condition of the pipe using the camera zoom and focus capabilities to virtually “travel” down the pipe from the set up access point to the marker at the end of the asset. The speed of travel shall be appropriate for a clear viewing and the operator shall take the time to focus in on pipe defects.

A header screen shall be included at the start of the recording of each pole camera survey. The header screen shall display:

- Package number
- Network type (stormwater or waste water)
- Pipe Asset id
- Upstream and downstream ids
- Set up access id
- Date
- CCTV contractor company
- Pipe Diameter

The video shall provide clear view of the access point and visibility of the far end of the asset from the pole camera set up location. The camera light, focus and zoom shall be set so that features such as joints and defects are clearly in focus. Examples of unacceptable picture quality include:

- Camera out of focus
- Insufficient lighting
- Fog in the pipe
- Liquid in the pipe to more than half pipe depth - if pipe is affected by tides & survey not within 1.5 hours of low tide OR if likely to have been caused by a rainfall event within 2.5 hours of the survey.
- Condensation, grease, debris or spider webs on the lens
- Camera vibration
- Zoom/travel too rapid
- Defects overlooked i.e. no focus on a significant defect or defects

### **5. Particular Specification – As Built Survey Requirements for Newly Constructed Pipes and Repairs**

#### **5.1. 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 5.2

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)

### **5.2. 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). The Contractor must email [AssetAssessment@ccc.govt.nz](mailto:AssetAssessment@ccc.govt.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 InfoAsset (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.

### **5.3. 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 hours 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 (e.g. 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.
- The Contract Engineer is informed prior to taking footage.

#### 5.4. 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*

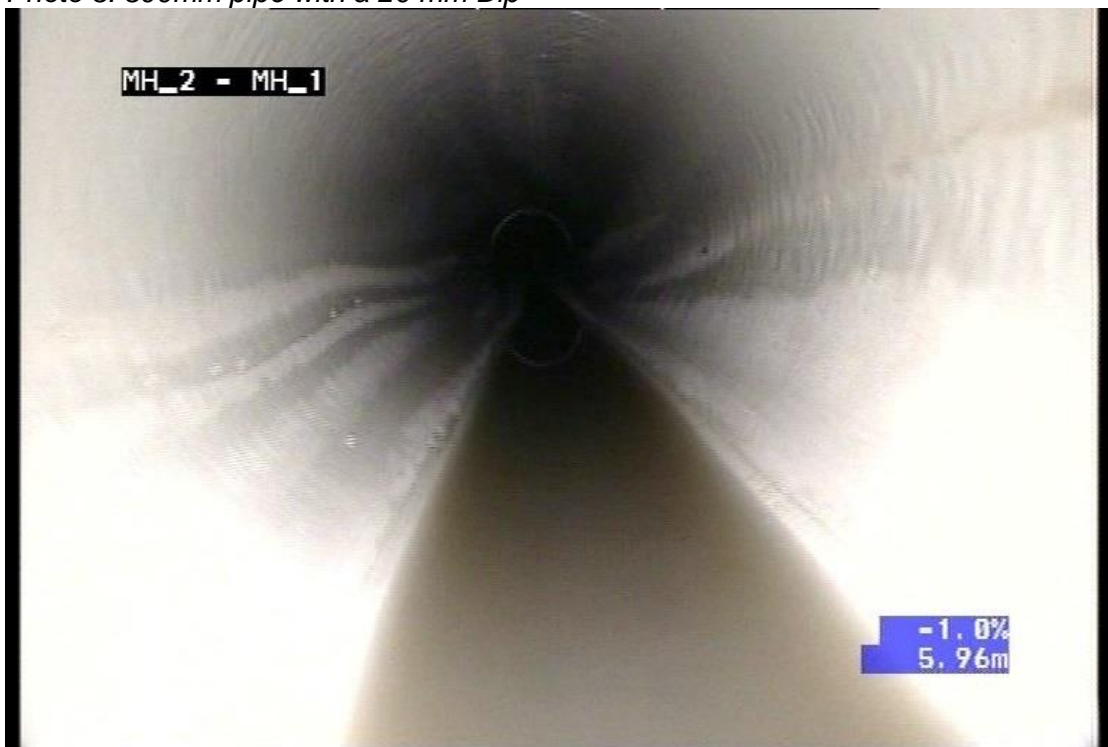
<b>Internal Pipe Diameter (mm)</b>	<b>Diameter % indicating a small dip</b>	<b>Water depth greater than</b>
150	13 – 25%	Photo 1
225	9 – 25%	Photo 2
300	7 – 25%	Photo 3
400	5 – 25%	No Photo

*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*

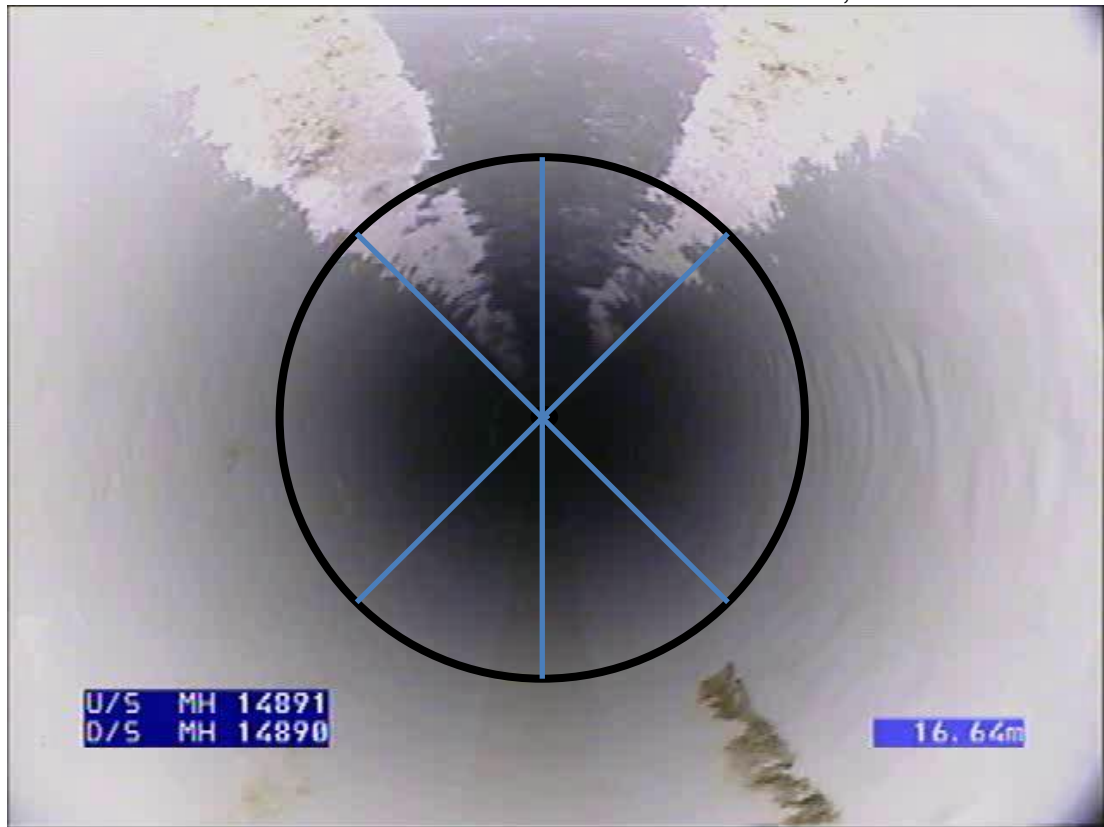
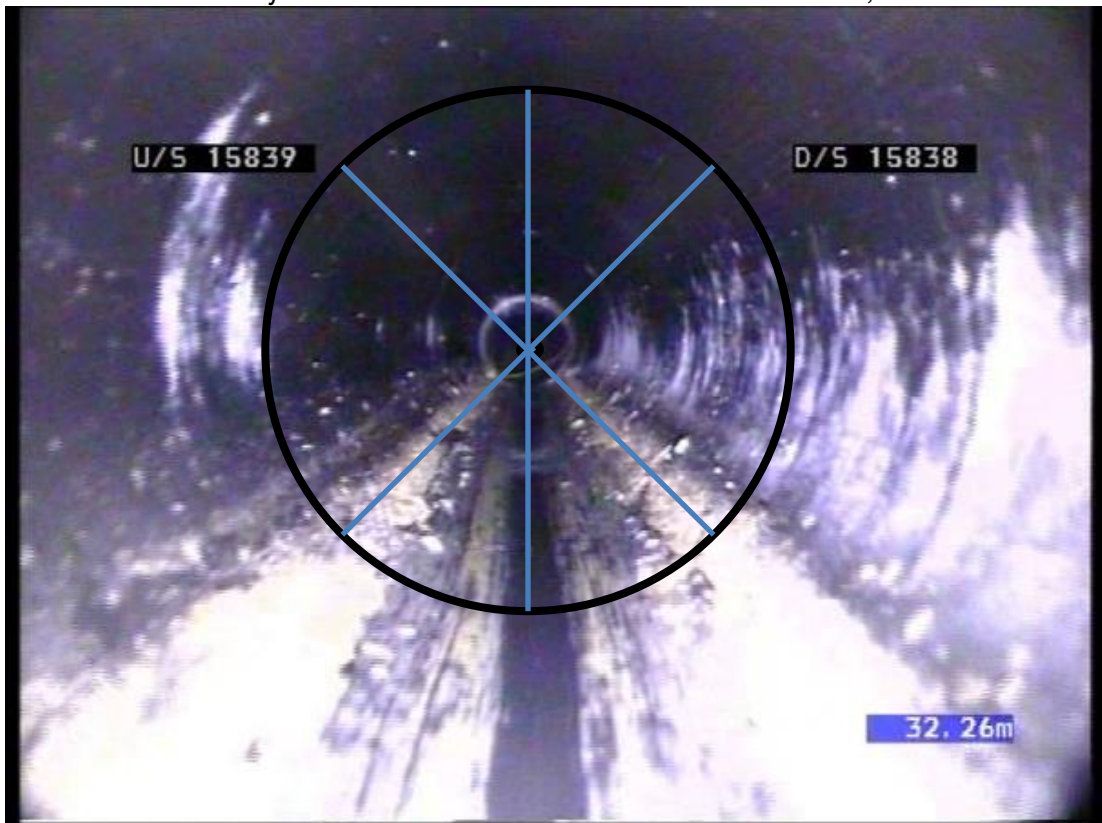




Photo 5: DG covers just over 25% of the circumference so is a DG,S



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 JPEG format.

Note that this only applies if the PF S defect is related to a minor PVC pipe ovality issue. If there are other defects present contributing to pipe deformation (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*

<b>PVC and PE Pipes</b>		<b>Concrete Pipes</b>		<b>PVC Pipes (Lateral Junction)</b>	
<b>Condition Code</b>	<b>Severity</b>	<b>Condition Code</b>	<b>Severity</b>	<b>Condition Code</b>	<b>Severity</b>
SD	S	SD	S	JO	L <sup>2</sup>
JD	S	JD	S		
JO	S	JO	S		
JO	M	CM	S		
DE	S	CL	S		
OT	S	CC	S		
PF	S (ovality) <sup>3</sup>	PH	S		
		JD	S		
		JF	S		
		LP	S		
		LX	S <sup>1</sup>		
		DE	S		
		OT	S		

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

<sup>2</sup>Only 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 InfoAsset.

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

<sup>3</sup>Only acceptable if passes ovality test and no other defects (such as backfill pushing through pipe wall) are present.

### **5.5. 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 Lateral joint repairs (LJRs) and the completing of all lateral lining (if required).

All pipelines must be cleaned with a high pressure cleaner no more than 24 hours 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.

### 5.6. 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*

<b>Newly Lined Pipes</b>	
<b>Defect Code</b>	<b>Severity</b>
DE	S
OT	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

### **5.7. 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.

#### **5.7.1. Defect accepted by CCC**

If the defect is reviewed and accepted to remain by CCC, the Contractor must instruct their CCTV 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 InfoAsset.

#### **5.7.2. 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 Data Management 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 InfoAsset

### 5.7.3. 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.

## 6. Deliverables

### 6.1. Deliverables – CCTV contractor

- Ensure that manhole IDs match those given on the mark-up of stamped construction drawings (for asbuilt CCTV) or CCC GIS (for condition assessment CCTV)
- 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 start depth field must be provided in the header CSV file
- 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 reinstated.

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

The CCTV footage shall be initially recorded utilizing a good quality digital video recorder and provided labelled showing the following fields as a minimum:

- Unique Asset ID
- Date of CCTV inspection (ddmmyy)
- CCTV 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

#### 6.1.1. Footage 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.
- 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).

## 6.2. Deliverables – Data Management Provider

A CCTV contractor can become a CCTV Data Management Provider by submitting CCTV data and footage through the council FME portal. Follow this link to request access to CCC FME portal.

<https://www.ccc.govt.nz/consents-and-licences/construction-requirements/infrastructure-design-standards/as-built-data-portal/request-portal-access/>

Once the login is created, the CCTV Data Management Provider can access to the "CCTV validate" and "CCTV Submit" FME repositories following this link

<https://fme.ccc.govt.nz/fmeserver/>

The following files are required to run the CCTV validate repository

- CCTVHeader. A CSV file containing key information about the CCTV survey. Please note only one file per submission is required. This CCTV Header file must contain as many rows as CCTV surveys are part of the submission.
- CCTVDetail. A CSV file containing survey defects information and reference to still images (if images are required). Please note only one file per submission is required. This CCTVDetail file must contain all the defect codes from the CCTV surveys submitted.
- CCTVDocument. A CSV file defining the relation between the still image file and the still image defect code the image refer to. The number of rows in this file must be equal to the number of still images provided.
- Still images files provided in JPEG format. The image name must match the name provided in the CCTV Documents file and in the CCTV Detail file.

For a definition of the fields required in the CCTVHeader, CCTVDetail and CCTVDocument files, refer to "templates" section in the following link

<https://www.ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/pipeline-cctv-inspections/>

In addition to the documents provided to pass the CCTV data validation through the "CCTV validation" repository The CCTV Data Management Provider must add to the zip file the CCTV inspection footage and upload it through the "CCTV Submit" repository

Footage file requirements include:

- '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.
  - 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

Further instructions to navigate in the FME portal can be found in the following process

<https://au.promapp.com/ccc/Process/Minimode/Permalink/IWTHkfJoghXBHm4sYBI3>

Note that all CCTV contactors have the opportunity to become CCTV Data Management Providers but they need to pass our quality assurance requirements as per section 7.3 of this specification.

### **6.3. Deliverables – Contractor**

The Contractor is to provide the CCTV Data Management Provider and CCTV contractor 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 City Water and Waste (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 CCTV Data Management Provider once the Data Management Provider export the data to CCC InfoAsset, 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.

## **7. Quality Assurance**

### **7.1. CCTV Contractor Quality Assurance**

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

### **7.2. CCTV Data Management Provider Quality Assurance**

The DMP is to ensure the CCTV contractor is providing footage as per section 5.1.

The DMP is to notify the contractor if the CCTV footage does not complaint with NZPIM or this specification.

The DMP is responsible for the quality of the condition coding and will nominate an experienced and qualified auditor to undertake on-going internal auditing of the works, either 20% of assets or one asset (whichever is the greater) is to be audited.

### **7.3. CCC Quality Assurance**

CCC or third party auditor will undertake for each DMP a monthly audits of 5% of all CCTV inspection videos from each camera operator. The audit methodology will be based on audit procedures outlined in section A4.4.4 Part B - *Audit on Camera Operations Practices* of the NZPIM 4th Edition. If L1 or L2 faults are found, a new



inspection must be undertaken to replace the faulty inspection and all video inspections completed by the same camera operator within the work package will be audited, . If L1 or L2 faults are found in the subsequent audit, the contractor will be required to repeat all inspections completed by the same camera operator within the work package.

CCC or third part auditor will also undertake monthly audits of 5% of CCTV data uploaded from each reviewer. The audit methodology will be based on audit procedures outlined in section A4.4.4 part A – *Audit on Reporting Accuracy* of the NZPIM 4th Edition. If the coding accuracy is less than 95%, then another 5% will be audited if the subsequent audit shows an accuracy level of less 95% for the work package sample then the contractor will be required to re code the entire work package.

When a contractor requests access to CCC's FME portal to become a Data Management Provider. A sample of ten CCTV inspections need to be submitted and CCC or third party auditor will undertake a 100% audit of the sample. If the accuracy level is less than 95% CCC will not approve the CCTV contractor as Data Management Provider.

CCC will be entitled to terminate the access of a DMP to the FME portal at any time. This will generally be but not limited to a result of repeated or regular audits failures.

Note that the footage quality is DMP's responsibility and an audit failure will be counted against the DMP submitting the footage through the FME portal so that the DMP could refuse to submit data to CCC on behalf of the CCTV contractor if the footage is not meeting CCC requirements.

## **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 Contractor and CCTV Data Management Provider needs to be issued Final mark-up of stamped construction drawings including 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 drawings are named.

### **8.1. Node Asset Naming**

#### **8.1.1. As-built CCTV Surveys**

##### **8.1.1.1. Mains**

The CCTV contractor and Data management provider must record node IDs (at either end of the pipe asset) exactly as they appear on the mark-up of stamped 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 mark-up of stamped 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 an existing Lateral, the nodes to be used are:

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

For a 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 contractor and Data Management Provider must record node IDs as per GIS

8.1.2.2. Laterals

The nodes will specify 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, repairs→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 InfoAsset, the project/contract number provided by the contractor. See section Deliverables (Contractor)

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

WW201706231015\_ RMA20162128

### 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) RMA20162128 (Asbuilt Subdivisions) CPMS0232 (Condition Assessment or Asbuilt Capital projects)
BB	Network Type	2	SW WW
CCCCCC	For Asbuilt CCTV YearMonthDayTime (yyyymmddttt) Time using 24hr clock For Condition AssessmentCCTV, lined pipes, repairs→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	UP to 7	Boat Polecam Pushcam

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<b>Code</b>	<b>Description</b>	<b>No. of Characters</b>	<b>Example</b>
	principal before inspection).		

A few examples include:

- CPMS0231\_SWpipe78564\_210717\_POCL (Capital project inspection for a stormwater asset)
- RMA20162128\_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**

