STORMWATER CONVEYANCE PIPE INSPECTION CHECKLIST

PROJECT INFORMATION:	
Project Name:	
Project Address:	
Plan/Permit #:	
Date	

PIPE INSPECTION REQUIREMENTS

Pipe inspections are a requirement for the work completed on the stormwater conveyance system both on public and private property. Prior to any inspection, the infrastructure must be clear of sediment and debris and verified by a City Representative.

The Pipe Inspection Submittal requires varying inspections depending on the type and size of infrastructure installed. The following submittal documents are required for stormwater infrastructure development as specified below:

Inspections will be evaluated for repair using NASSCO PACP and guidelines outlined in AASHTO Guide Specifications for Highway Construction Appendix X5 Table X 5.2.3-1.

SUBMITTAL DOCUMENTATION:

- The *CCTV Inspection* is required prior to the final lift of asphalt of all stormwater pipes under 72" in diameter.
- The *Mandrel Test Report* for deflection testing is a **requirement for flexible pipes**. Full length laser profiling may be used in place of mandrel testing with prior approval and it is consistent with the remaining requirements of table 4.0 below.
- The *Repair Plan* shall be considered for all pipes that have NASSCO PACP **structural or O&M (operational and maintenance) defects with a score of 2 or greater.** A Repair Plan is required for all pipes with **a structural or O&M score of 3 or greater**.
- The *Engineer sealed Bridge Inspection Report in compliance with the National Bridge Inspection Standards (NBIS)* a is required for all **stormwater conveyance infrastructure 72" or greater in any dimension**. The Bridge Inspector shall be prequalified by NCDOT to perform municipal bridge inspections.

Table 1.0 Submittal Documentation

YES	NOT APPLICABLE	SUBMITTAL DOCUMENTATION
☒		Inspection Checklist
☐	☐	CCTV Inspection Database Files
☐	☐	CCTV Report PDF
☐	☐	Mandrel Test Report
☐	☐	Repair Plan
☐	☐	Engineer Sealed Bridge Inspection Report in compliance with NBIS

REQUIREMENTS FOR SUBMITTAL DOCUMENTATION:

The following table includes the requirements for the above submittal documental reports and must be completed to acknowledge compliance.

Table 2.0 CCTV Inspection Requirements

YES	NOT APPLICABLE	CCTV INSPECTION REQUIREMENTS
☐	☐	Stormwater infrastructure less than 72" in diameter, rise, or span has completed CCTV Inspection.
☐	☐	Stormwater infrastructure must be cleaned prior to inspection. Sufficient time must be allotted between inspection and cleaning to allow for clear inspection of the pipe joints and barrel.
☐	☐	Inspection is completed using NASSCO PACP 7 certified software and inspection protocol.
☐	☐	PACP exportable database including all media files.
☐	☐	CCTV Operator must have a current NASSCO PACP Certification.
☐	☐	The inspection is completed with stormwater asset identification numbers provided on the City's Stormwater Development Map (TBA).
☐	☐	All inspection header information must be fully and accurately entered on all CCTV reports. These fields include: a. Date and Time b. City c. Street Name d. Pipe Asset Identification Number (Pipe Segment Reference) e. Upstream Node Number f. Downstream Node Number g. Direction of CCTV Inspection in relation to Flow h. Pipe Shape i. Pipe Height/Diameter j. If applicable, Pipe Width k. Pipe Use l. Pipe Material m. Total Length n. Length Surveyed o. CCTV Operator Name p. CCTV Operator PACP Certificate Number q. Customer r. Weather s. Pre-Cleaning t. Date Cleaned u. Inspection Status v. Location Code w. Year Constructed x. If applicable, Year Renewed y. If applicable, Lining Method z. If applicable, Coating Method aa. If applicable, the CCTV Reviewer Name and PACP Certificate Number
☐	☐	Inspection speed does not exceed 30 feet per minute.
☐	☐	A minimum of TWO photographs of each defect and observation are taken, one with perspective view and one with a close-up view.
☐	☐	A full 360-degree pan of the upstream and downstream manholes/structures during each pipe asset inspection is completed.
☐	☐	A full 360-degree pan of all joints is completed.

Table 2.0 CCTV Inspection Requirements (CONTINUED)

YES	NOT APPLICABLE	CCTV INSPECTION REQUIREMENTS (CONTINUED)
☐	☐	The following information is maintained in real time and is displayed on the video monitor. • Date • Time • Distance Counter • Indicator of Camera Head Position • Pipe Asset Identification Number
☐	☐	If laser profiling is chosen in lieu of mandrel testing, video reports are included in CCTV Video Report submittal for flexible pipes.

Table 3.0 – Mandrel Testing Requirements (For Flexible Pipe Only)

YES	NOT APPLICABLE	MANDREL TESTING REQUIREMENTS
☐	☐	The deflection test to be completed no sooner than 30 days after installation and backfill of flexible pipes installed.
☐	☐	The use of a 9-vane mandrel sized for 7.5% deflection is used to complete the test.
☐	☐	The storm drain is clear and free of debris prior to conducting deflection testing.
☐	☐	The mandrel is pulled by hand through pipe sections.
☐	☐	Flexible pipes that do not pass the deflection test must be included in the repair plan for replacement.

Table 4.0 – Repair Plan Requirements

YES	NOT APPLICABLE	REPAIR PLAN REQUIREMENTS
☐	☐	CCTV Inspection database with media files
☐	☐	CCTV Reports in PDF format
☐	☐	Completed Repair Plan Table
☐	☐	Supporting repair plan documents
☐	☐	Engineer review acknowledgement

Table 5.0 – NBIS Compliant Inspection Requirements

YES	NOT APPLICABLE	NBIS COMPLIANT INSPECTION REQUIREMENTS
☐	☐	Engineer Sealed NBIS Compliant Inspection Report

The pipe inspection data as required above must be submitted electronically through a secure file sharing platform, that can be submitted to and received by asbuiltsubmittal@raleighnc.gov. The file sharing platform should be available for a minimum of 30 days.

For purposes of assuring compliance with the inspection requirements, the City reserves the right to inspect stormwater conveyance infrastructure during and after construction.

PROFESSIONAL CERTIFICATION

Professional certification must be completed by an engineer licensed in North Carolina unless otherwise stated in the permit conditions.

I, _____ as a duly registered _____ in the State of North Carolina attest that on _____, 20_____ all stormwater conveyance systems are constructed and installed in conformance with the ordinances, rules, regulations, drainage design standards of the City of Raleigh, and the approved construction plans. All information provided is correct to the best of my knowledge. It is a violation of UDO 9.2.5(F) to falsify this certification. A civil penalty for falsifying this certification shall be assessed by the City of Raleigh in the amount of $3000.00.

Professional Seal:

Applicant Signature: _____

Date: _____

STORMWATER CONVEYANCE DEFLECTION TESTING

Mandrel Test Report

The mandrel test is required for all flexible pipes installed within the Right-of-Way and pipes on private property that convey public runoff. The purpose of the mandrel test is to ensure proper installation of the plastic pipe, and that each segment does not exceed a 7.5% deflection.

MANDREL TESTING REQUIREMENTS:

- Test must be completed at least 30 days after pipe installation and final backfill.
- The pipe must be clear of sediment and debris.
- The test requires the uses of a 9-vane mandrel that is sized for the pipe being tested. No more that a seven and a half percent reduction in mandrel size from the inner pipe diameter is permitted for the test.
- The mandrel must be pulled by hand.
- The test must be conducted between the upstream and downstream structure directly connected to the pipe being tested, with the mandrel completely passing through each section of pipe.

Laser profiling may be completed in lieu of mandrel testing. Laser profiling video reports must be submitted with the CCTV Inspection package.

Result Documentation

The mandrel must pass completely through each plastic pipe section to be documented as “Pass” in the table below. Sections deformed more than 7.5% have failed the test and must be documented. A repair plan must be submitted with the sections of pipe that have failed and include the proposed corrective action that will be completed. Please use the attached excel table to complete the result documentation for the mandrel testing.

If you have any questions, please contact: **asbuiltsubmittal@raleighnc.gov**

City of Raleigh
Raleigh Stormwater

Mandrel Test Report

Stormwater Conveyance Permit

Date of Test: _____
Weather: _____

Plan/Permit Number:	Contractor:
Test Conducted By:	**Site Engineer:**

Structure No.	Pipe Facility ID	Pipe Diameter (in)	Pipe Length (ft)	Date Pipe Backfilled:	Type of Mandrel	Size of Mandrel	Pass or Fail	Comments

STORMWATER PIPE INSPECTION - REPAIR PLAN

1. Project Details

Project Plan Number	

Evaluation for repair will use NASSCO PACP and guidelines outlined in AASHTO Guide Specifications for Highway Construction Appendix X5 Table X 5.2.3-1.

REPAIR PLAN SUBMITTAL REQUIREMENTS

- Repair plan is required to document all defects with a PACP structural or O&M defects of 2 or greater.
    - Repairs should be considered for all defects listed.
- Repairs are **required** for PACP structural defect code 3 or greater.
- A proposed corrective action must be submitted prior to repairing the asset and must be approved by the City of Raleigh.

The repairs shall be completed as submitted in the repair plan. Each pipe with a completed repair must be fully re-inspected and a new Pipe Inspection Submittal Package must be resubmitted.

Contact Information:

Engineer's Details	Name:
	Email:
	Phone:

2. Pipe Details

Please fill out the following table pipes identified with PACP scores of 2 and greater.

A proposed corrective action must be documented for each pipe segment repair. Defects that pose no structural or O&M concern may not require repair but should be documented. Repairs may include Cured-in-Place-Pipe (CIPP) lining, replacement, or other repair technologies with supporting explanation from Engineer of Record. Additional proposals may be attached to the Repair Plan Submittal to provide supporting documentation for other repair methodologies.

3. Engineer Review Acknowledgement

The attached repair plan has been reviewed and is consistent with the approved project plan.

X _____

Stormwater Pipe Inspection – Repair Plan Table

Asset ID	Diameter (in)	Material	PACP Defect Code	PACP Defect Description	Distance From Upstream Node (ft)	Proposed Corrective Action	Comments	For City Use Only: Approved, Rejected, Declined, Approved with Conditions