FOR THIRD PARTY CONSTRUCTION INSPECTION SERVICES
ON PRIVATE AND PUBLIC STORM AND SANITARY CONSTRUCTION
April 9, 2014
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Definitions

City and County of Denver - The municipality given authority by the State of Colorado which has the power to enforce its rules and regulations. Also known as CCD.

Third Party Inspector - In this document the third party inspector will be referred to as “Inspector”. This individual or company will document construction, ensure each aspect follows the correct specifications, and will sign the Certificate of Inspection letter during the close out of the project. This document is directed towards the Inspector. The project application signed by the owner states “I shall have a Construction Inspector on the job site at all times work is performed to assure compliance with the approved plans, standards, details, and specifications of the City. Construction observation shall either be performed by, or shall be supervised by, a Colorado registered Professional Engineer who shall certify that field inspections/observations were performed and that all work is installed and is in substantial compliance with the approved Construction Drawings and City specifications.”

Certificate of Inspection - The Certificate of Inspection (CI) letter will be submitted to CCD along with the as builds of the project prior to close out. The CI letter confirms that the project was constructed to CCD specifications. A sample letter may be found here.
1.0.0 Scope

This Wastewater Construction Inspection specifications document sets forth the provisions applicable to certify full time construction inspection of construction for projects located within the City and County of Denver (CCD) which warrant a Certificate of Inspection (CI) letter. This document is to outline the required duties of the Professional Engineer to certify full time inspection for Public and Private Projects to meet CCD specifications. This document is not to remove, take the place of, or supersede The Storm Drainage Design & Technical Criteria Manual, Public Works Wastewater Capital Project Management Standard Construction Specifications (PWWCPM SCS), or the Storm Drainage and Sanitary Sewer Construction Detail and Technical Specifications, but to supplement. All cost associated with performing duties outlined in this document shall be included in the approved cost estimate.

These specifications are for storm and sanitary work in CCD and these requirements shall be followed by every third party inspector. This document is designed as a checklist for signing the Certificate of Inspection letter and represents the minimum requirements. This document is to confirm the inspector understands he or she has the authority to reject and/or modify materials to meet CCD Specifications. Any rejections of materials shall be documented and the CCD Mainline Inspector assigned to the project shall be notified. All rejections must include a follow up inspection with a resolution.

Contractor is to follow all Federal, State, and Municipal laws. The inspector shall not replace any special or environmental inspectors, which may be required.

A preconstruction meeting will be held at the Wastewater building with the third party inspector, general contractor, utility contractor, engineer of record, and CCD. The preconstruction meeting will be canceled if there are parties absent. This meeting will discuss our criteria, construction schedule, and any possible issues. Please call 303.446.3722 to set this meeting up once plans have been approved.

CCD Specifications and Technical Criteria supersede approved construction documents. If approved construction documents calls for an item that contradicts that of CCD Specifications, Engineer of Record (EOR), and CCD Inspector shall be notified. Work shall discontinue until a resolution is reached.

If a circumstance arises and this document needs further clarification, contact Mainline Inspection at 303.446.3722.

1.1.0 Documentation

The Inspector shall compile daily reports detailing when the work was done, what was done, who did the work, where it was performed, and any other pertinent information (i.e. weather). These reports shall contain any details on deviations from CCD Standards and Specifications or any materials that were rejected. For any rejected materials, a corrective action should be discussed with the CCD Inspector and recorded in a daily report. Once the corrective action is taken, the daily report should note that the previous issue has been resolved.
Daily reports will be made available to CCD upon request and submitted weekly, or at the conclusion of the project with the CI letter.

2.0.0 Site Preparation and Earthwork

2.1.0 Clearing and Grubbing

The inspector does not need to be present for clearing and grubbing. See the abandonment section if abandonment work is included in the clearing and grubbing. A preconstruction meeting with the Mainline Inspection group should take place around this stage of a construction project. See Storm Drainage and Sanitary Sewer Construction Detail and Technical Specifications (CCD Specs) section 2.0.1.

2.2.0 Grading

The inspector shall perform before and after grading inspections. The inspector is not required to observe all grading activities. The inspector shall confirm general grades are met prior to final paving or landscaping, along with verification that the overland drainage plan is followed, and offsite drainage has been addressed.

Inspector shall ensure that the third party Geotechnical engineer has inspected any fill brought onto site. The Inspector shall be included in all documentation of the fill, and to confirm approval or certification. If earthwork is to be placed in lifts, inspector shall ensure contractor is placing soil to the correct depth per the approved construction documents. Inspector shall confirm that correct densities are achieved during compaction. If the Inspector is the field geotechnical, conformance will be documented in the normal daily report. If the Inspector is not the field geotechnical technician, then the Inspector shall ensure proper testing is occurring. If a test fails, the Inspector shall ensure proper measures are taken to correct the issue and a successful test is achieved.

See CCD Specs section 26.0.
2.3.0 Bedding

Bedding material shall meet CCD Specifications for type and size of material for pipes and structures. Material not included in CCD Specifications shall not be used. The inspector shall bring all concerns to the attention of the CCD inspector. Native undisturbed soil shall be noted and inspected for all locations where bedding is not used (i.e. Cast in place manhole base section).

Bedding thickness shall be observed on a continuous basis to meet approved plans and CCD criteria. This may be changed to spot checking if the inspector is comfortable with the contractor’s means and methods.

See CCD Specs section 5.0.

2.4.0 Backfilling

Inspector shall observe methods and means. If the Inspector is comfortable that the contractor is performing the work correctly, full observation may be changed to spot checking. If full time inspection is changed to spot checking it will be for backfilling only. All other duties outlined in the documents must still be performed as specified.

The inspector is to ensure adequate testing, and to review test results. Any failed test results shall be documented and CCD shall be notified. Corrective action shall be taken to meet CCD Specifications.

See CCD Specs sections 5.0.3.1-5.0.3.4.
2.5.0 Rip Rap Placement

Inspector shall confirm that the rip rap conforms to plan specifications before placement. Buried rip rap installation shall be observed full time to verify correct amount and location. When mixing soil and rip rap contractor care shall be given to ensure foreign objects are not being entrained in the mixture.

See CCD Specs section 12.0.

2.6.0 Abandonment

Inspector shall ensure that the abandonment meets CCD criteria. The inspector shall verify that all utilities to be abandoned are indeed abandoned. If flow fill is the chosen method of abandonment, the inspector shall observe flow fill for consistency. Once flow fill has been placed, inspector shall ensure contractor practices good housekeeping and removes all excess material from adjacent surfaces, etc. Inspector shall inspect adjacent piping and ensure that the contractor has protected existing utilities and structures from the negative impact of flow fill installation. See CCD Specs section 3.0.5.

3.0.0 Structures

This section covers junctions and/or connections and other devices in a storm and sanitary utility network. These types of structures are generally fabricated out of concrete, with a small amount being plastic or metal.

See CCD Spec section 11.0.

3.1.0 Precast

A precast structure shall be defined as any object delivered to the site made of concrete that does not include pipe.
All precast concrete structures must be inspected upon delivery. The inspector shall confirm that all precast concrete shipped to the jobsite has been cured at least 5 days before shipping and at least 7 days before backfill is placed on the structure. All bells and spigots should be inspected and annotated on an inspection log, and on the structure. Photos are acceptable. This is the most common area for damage.

The inspector shall observe stacking or setting of precast structures to watch for any damage which may occur as a result of moving the structure, and to ensure adherence to manufacturer and/or CCD Specifications. The inspector shall confirm that the pipe entrances and exits of the structures meet the design intent and there is adequate concrete and reinforcement between, above, and below the penetrations. The bedding or undisturbed soil should be inspected to meet suitable subgrade specifications. Any modifications to precast structures will require CCD and manufacturer (or engineer of record) written approval.

3.2.0 Cast In Place

Cast-in-place structures shall include all outlet structures, micro pools, collars, and any other structures that include forms and/or an onsite concrete pour to construct.

The inspector shall inspect the bedding or undisturbed soil, prior to pour, to determine if the subgrade meets suitable specifications. The inspector shall inspect all rebar or reinforcing substrates prior to the concrete pour. The inspector shall watch the concrete pour to ensure that the concrete gets consolidated, and to verify that samples and testing are occurring during the pour. Inspector shall ensure unnecessary and unauthorized water is not added to the concrete. Water may be added to the mix before testing; however, after testing no further water may be added. Inspector shall verify that current weather conditions allow for said work per CCD criteria. The inspector shall be cognizant of concrete time left on the truck, as a double check for the tester. Inspector has the authority to reject or send back any concrete that does not meet CCD criteria.

Photo 4: Rebar for a Cast in Place manhole base on an existing pipe section.
3.3.0 Special
Special structures shall be considered items not covered in other sections of this document, and will include underground water quality devices and underground detention vaults. Special structures will include all metal or plastic devices, such as proprietary inlets or cleanouts.

Inspection of metal and plastic shall ensure that the object meets CCD and manufacturer specifications. The inspector shall inspect the bedding or undisturbed soil to determine if the subgrade meets suitable specifications. All material (rebar/reinforcing, piping) shall be inspected and documented to meet CCD requirements. All means and methods shall be observed to comply with CCD and appropriate specifications. The inspector shall perform all duties outlined in the Cast-In-Place section if special structures require on site concrete pours.

4.0.0 Pipe
This section will cover all inspections for construction of material used to convey fluids (sanitary and storm water).

4.1.0 Precast Concrete Pipe
All precast concrete pipe must be inspected upon delivery. The third party inspector shall confirm that all precast concrete shipped to the jobsite has been cured at least 5 days before shipping and at least 7 days before backfill on the pipe. All bells and spigots should be inspected and annotated in an inspection log, and on the structure. Photos are acceptable. This is the most common area for damage.

All cracks in the pipe shall be measured to ensure they meet manufacturer and CCD Specifications. All concrete pipes shall be used as designed; any deviations shall require CCD and/or manufacturer written approval. If a pipe must be rejected a red “X” shall be placed over the date, or in an obvious visible place, so that the “X” can be easily identified via casual observation.

See CCD Specs sections 10.1-10.3.
4.2.0 **Flexible Pipe**

Flexible Pipe includes PVC, CCD approved HDPE materials, or equivalent materials that have been approved in writing by CCD. It shall include the use of such materials in inlet or cleanout type applications.

The inspector shall inspect and verify that the bedding meets CCD requirements for placement below any approved flexible pipe. The inspector shall perform an inspection before installation and an inspection after installation before backfill. The inspector shall confirm that these parts are set to final grade. Inspector shall perform a final inspection to ensure no damage has occurred to these pipes.

See CCD Specs sections 10.4-10.8.
4.3.0  Pipe Installation

The inspector shall perform an inspection on all pipe material, manhole sections, and all flared end sections to make sure they comply with CCD criteria for transportation to the jobsite. See pipe material section for more information on post transportation inspection. Inspection shall include all joints and seals to meet CCD and manufacturer specifications. Inspector shall observe methods and means. Once comfortable that the contractor is performing the work correctly, full observation may be changed to periodic field checks with testing per CCD Specifications to ensure quality control. All joints should be observed and measured if questionable to ensure gaps are within CCD and manufacturer specifications. Bedding shall be observed to meet CCD requirements and/or approved construction documents. This will also include any geosynthetic or fabric material, as called out in CCD Specifications and the approved construction documents.

Cut off walls shall be inspected and documented on the inspection log. Rebar shall be visually inspected for correct size, location, and being tied off. The inspector shall ensure that the cut off walls are in the locations according to the approved construction documents. All cut off walls shall conform to CCD criteria.

The inspector shall be present during all utility crossings.

See CCD Specs section 4.0.7.

4.4.0  Boring and Tunneling

The inspector shall evaluate means and methods of operations, and ensure work is conforming to approved plans and CCD Specifications. This section includes pipe encasement. Pipe used shall be inspected to meet CCD and manufacturer specifications.

See CCD Spec section 7.1 and 7.2.
5.0.0 Connections

5.1.0 Core Drilling
The cutting into manholes, inlets, pipes, or structures for connections shall only be completed when a core driller is utilized. Any deviation from core drilling must be discussed with CCD and obtain prior written approval. Jack hammers shall never be used. If a connection occurs near a joint, relocation may be necessary and the CCD Inspector shall be notified.

Photo 7: Large diameter concrete pipe boring pit.

Photo 8: Core drill was used to create this cut out.
5.2.0 **Concrete to Concrete**
Concrete to concrete connections require a collar and must follow CCD Specifications. The inspector shall do a pre-concrete pour inspection of the rebar and visually inspect the size and shape of the new collar to ensure it meets CCD Details and Specifications.

5.3.0 **Boots and Gaskets**
The inspector shall ensure the straps are in place and accessible. This connection shall be a watertight seal. A pressure test may be required if the connection does not pass a visual inspection. Inspection shall include confirmation that gaskets or boots meets CCD specifications and manufacturer specifications.

6.0.0 **Detention and Water Quality**

6.1.0 **Ponds**
This section shall include all detention, retention, forebays, and water quality ponds built at grade for the purpose of holding storm water. Trickle channels, forebays, and any rip rap shall be considered an element of the pond. Inspection of the pond will include the subgrade, pre pour, and final pour. Pre pour inspection is to include the subgrade, form work, and rebar. The inspector shall refer back to the Cast-In-Place structures and follow the requirements for concrete pours that are a part of the pond.

Outlet structures are a critical component of the ponds. Most structures are cast-in-place, for which the cast-in-place section will provide guidance. Once a structure is completed, the inspector shall confirm that all elements are installed per the approved construction documents. Inspector to verify outlet controls include trash racks and orifice plates. The inspector shall verify outlet controls are built per approved construction documents. If pumps are required see the pump section in the underground section.

6.2.0 **Porous Landscape Detention, Rain Gardens, Sand Filter Basins, ETC.**
The inspector shall inspect any and all underdrain piping and bedding. The inspector shall visually inspect special media before placement in Porous Landscape Detention (PLD) or rain garden. The inspector will inspect placement of media to ensure adequate minimum depths are achieved. This can be done as a full time inspection or a final spot check, if the inspector has the means to measure the media after placement.

Inspection will also include observation of installation of liners and batten bars. This inspection shall be to ensure the methods and means used to install liner do not damage or puncture liner. Prior to installation inspector shall confirm that liner meets approved plans and specifications.
Inspector shall inspect overflows for functionality and flow path. Vegetation shall be inspected to confirm that the placement meets approved plans. Inspector shall insure that items not approved are not placed in these features (for example wood mulch).

6.3.0 Roof Top Detention

The inspector shall perform a post construction inspection. The Inspection shall include checking overflows, liners, and adjacent equipment. Inspection shall include measurement of drains and overflows for conformance to approved plans and CCD Specifications.

6.4.0 Underground Detention

6.4.1 Structures

See Special Structures section for inspection items.

6.4.2 Outlet Controls

See the Ponds section under Detention and Water Quality for inspection items; to include plates, and trash racks.

Photo 9: large diameter HDPE detention vault installation.

6.4.3 Pumps

The inspector shall perform a post construction inspection of the pumps. This inspection shall include safety or accessibility of the pumps for maintenance, conformance to plans, float locations, and rails free from damage and they are operational. The inspector shall confirm the pumps meet CCD and approved plan specifications. A test run shall be preformed while in the presence of the inspector to ensure the pumps work correctly.
6.5.0 Porous Pavers

The inspector shall document correct bedding material and depth before placement of pavers. The inspector shall ensure all necessary density tests were preformed on the bedding and/or subgrade. The inspector shall document in the inspection log that the pavers meet the approved construction document's specifications.

Photo 11: Ted Christianson testing the permeability of porous pavement.