



INSPECTION SERVICES MANUAL
LINEAR INFRASTRUCTURE
(WATER, WASTEWATER AND TRANSPORTATION ASSETS)

ISSUED FOR USE

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Primary Contacts

Manager, Technical Services
Engineering & Construction, Public Works
Regional Municipality of Halton
1151 Bronte Road
Oakville, ON L6M 3L1

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ABBREVIATIONS

| | |
|--------|--|
| ANSI | American National Standards Institute |
| AWWA | American Water Works Association |
| CAD | Computer Aided Design |
| CD | Change Directive |
| CSA | Canadian Standards Association |
| DVD | Digital Video Disc |
| GPS | Global Positioning System |
| Halton | The Regional Municipality of Halton |
| MNR | Ministry of Natural Resources |
| MH | Maintenance Hole |
| MOE | Ministry of the Environment and Climate Change |
| MOL | Ministry of Labour |
| MTO | Ministry of Transportation – Ontario |
| NSF | National Sanitation Foundation |
| O&M | Operations and Maintenance |
| OHSA | Occupational Health and Safety Act |
| OPS | Ontario Provincial Standards |
| OPSS | Ontario Provincial Standard Specifications |
| OTM | Ontario Traffic Manual |
| PPE | Personal Protective Equipment |
| RFI | Request for Information |
| RFQ | Request for Quotation |
| WSIB | Workplace Safety & Insurance Board |

1 INTRODUCTION

The purpose of this Construction Services Manual for Linear Infrastructure (Water, Wastewater, and Transportation Assets) is to provide Halton staff and Consulting Engineering firms guidelines and tools to successfully carry out site inspection duties during the construction phase of a project. The requirements set forth within this manual are specific to Halton Region and are to be complied with unless dispensation has been obtained in writing from a Halton Region Public Works Department designate.

This manual provides procedures to be followed and covers aspects of water, wastewater and transportation capital works projects during the construction phase. The manual also includes a clear and concise understanding of a site inspector's role and responsibilities, suggested construction inspection tasks and record keeping best practices. This manual is supplemental to all requirements of the Contract Documents and Ministry of the Environment and Climate Change (MOE) regulations, guidelines and/or requirements, as well as other applicable regulatory requirements, standards or codes (e.g., including, but not limited to, Ontario Provincial Standards (OPS), American Water Works Association (AWWA), American National Standards Institute (ANSI), National Sanitation Foundation (NSF), etc.).

This manual shall not take precedence over the Contract Documents, which are to be constantly reviewed to ensure compliance with the contract requirements.

KNOW YOUR PROJECT! KNOW YOUR CONTRACTOR! KNOW YOUR COMMUNITY!

1.1 ACKNOWLEDGEMENTS

Halton thanks the following workshop participants for their active participation in the workshops and contributions to this manual. Without their effort and experience, this manual would not have been written.

| <u>Name</u> | <u>Title</u> |
|--------------------|--|
| Brijmohan Beniwal | Project Manager |
| Trish Holden | Manager, Development Support and Information Management |
| Tim Dennis | Director, Engineering & Construction Services |
| Bob Zawislak | Supervisor of Inspections, Public Works |
| Bob Wicklund | Project Manager II, Public Works |
| Scott Poole | Senior Construction Inspector, Public Works |
| Rick Ranalli | Project Manager II, Public Works |
| Martin Larkin | Project Manager II, Public Works |
| Seam Goh | Development Coordinator, Legislative & Planning Services |

2 PROJECT TEAM

2.1 SITE INSPECTOR

The primary role of a Site Inspector is to protect the interest of Halton Region while ensuring that the works (i.e., Construction Contract) are constructed properly and in accordance with the Contract Documents. However, the Site Inspector should not direct the construction means and methods, but should ensure that the contractor provides acceptable methods of good workmanship and quality of work according to the contract.

The Site Inspector works directly with the Contract Administrator, and any deviations from the contract should be clearly documented by the Site Inspector and brought to the Contract Administrator's attention, to be approved by the Contract Administrator prior to being implemented.

The following provides a brief outline of the roles and responsibilities of a Site Inspector:

General

- Maintain current and applicable Health and Safety training.

Pre-Construction

- Review all plans, specifications, and contract documents.
- Review and photograph/video pre-construction conditions.

Construction

- Record independent set of "As-Built" information (i.e., red-line mark-ups) on a continuous basis as the construction works progress. Additionally, cross-reference contractor supplied As-Built information for accuracy and completeness, and perform regular spot checks to field verify recorded information.
- Ensure workmanship complies with contract drawings and specifications.
- Continuous review of the Contractor's schedule and sequencing of the works.
- Monitor and report on adherence to *OHS*A regulations, OTM Book 7 for Traffic Control, provincial and federal health and safety regulations.
- Monitor the Contractor's operations for compliance with Halton Region's safety policies and safe passage for traveling public.
- Attend regular and ad hoc construction meetings with the Contractor.
- Ensure compliance with environmental requirements as described in the Contract Documents, including effectiveness of environmental protection measures.
- Provide quality control inspection of all Contractor activities.
- Provide periodic checks as required of Contractor's survey layout.
- Issuance of Documentation: Notice to Comply, Stop Work Orders, Site Instructions, Contemplated Contract Change Notices, Working Day Summary, Environmental Logs, Meeting Minutes, Progress Reports, Public Notices, Monthly Contractor Performance Reports with each PC submission, etc.
- Verify and record on site progress and deliverables to facilitate the issuance of payment certificates on a monthly basis up to final completion.
- Review all Requests for Information (RFIs) and quotes submitted by the Contractor.
- Respond to and address complaints and concerns from area residents and businesses.

- Verify all utility conflicts encountered and assist in coordination of a solution.
- Obtain all necessary final field survey information, measurements, etc., for the preparation of As-Built drawings.
- Maintain site records with a suitable and clear naming and filing convention, and acquire construction photographs at all key stages of the Construction Contract.
- Coordinate materials testing and communicate test results to Contract Administrator and Contractor.
- Notify the Contractor of any deficiencies in the construction of the work.

Testing and Commissioning

- Notification and coordination of appropriate Halton Region staff for testing and commissioning procedures.
- Observation of start-up and commissioning of the works.
- Execution of equipment sign-off sheets.
- Prepare watermain isolation plan

Post Construction

- Ensure contents of O&M Manuals comply with specification requirements; provide all Warranty and Guarantee certificates, contact person(s) and numbers for all suppliers and Contractors, etc.
- Maintain an up to date list of incomplete work and deficiencies and ensure they are corrected prior to issuance of contract completion (start of warranty period).
- Upon contract completion, provide a Contractor Performance Report (if applicable).
- Respond to inquiries during warranty and maintenance period.
- Prior to the end of the warranty and maintenance period, schedule and attend a final inspection of the work.
- Ensure all deficiencies identified during the final inspection have been rectified and that there are no outstanding operational issues.

2.2 CONTRACT ADMINISTRATOR

The Contract Administrator provides direction to the Site Inspector while maintaining a firm and reasonable approach with all stakeholders to ensure that contract standards and specifications are met. The following provides a brief outline of the roles and responsibilities of a Contract Administrator; however, a more comprehensive description can be referenced in the OPS General Conditions of Contract, Section GC 3.0 – Administration of the Contract:

- Act as liaison between Halton, Contractor, and applicable Regulatory Agencies (i.e., MOE, MOL, MTO, MNR, Conservation Halton, etc.)
- Manage inspection staff.
- Monitor and measure the Contractor's performance.
- Establish a non-adversarial relationship with the Contractor.
- Define mutual goals.
- Identify major obstacles.
- Review validity of potential changes in work.
- Assist with Contract dispute resolution.
- Monitor project schedule.

- Processing of submittals (i.e. shop drawings, RFIs, etc.).
- Review technical issues, resources, physical progress, and financial status.
- Certify Monthly Payment Certificates.
- Chair progress meetings.
- Facilitate contract closeout.
- Issuance of Documentation: Site Instructions, Change Orders, Certificate of Substantial Performance, Payment Certificate for Lien Holdback Release, Completion Certificate, Final Completion Certificate.
- Consultation and advisement of Halton Region during the warranty period.

2.3 PROJECT MANAGER

The Project Manager is responsible for ensuring that all areas defining scope of work are covered and agreed to by stakeholders and that the Contractor complies with the requirements of the Contract Documents; specifically, Contract Specifications and Drawings, Halton Region standards, and any additional conditions imposed by Halton Region. The Project Manager will ensure strong lines of communication and a full integration of the Project Team, will manage the requirements of the project, manage the inspection staff, and provide overall supervision, including acting as the escalation contact for administrative issues related to the project.

2.4 CONTRACTOR

When entering into an Agreement with Halton Region, the Contractor must duly fulfill their obligations as outlined in the contract documents and specifications within a given schedule and budget. The Contractor shall assume the role of Constructor, as defined in the *OHSA*, and shall have complete control of the work. The Site Inspector must ensure that the quality of materials and workmanship is not compromised during the Contractor's execution of the work. Additional information can be referenced in the OPS General Conditions of Contract, Section GC 7.0 – Contractor Responsibilities and Control of the Work.

2.5 OWNER

The Owner is generally defined as the party which has an interest in the project, who either undertakes the project independently or retains a third party to complete the project on the Owner's behalf. An interest in the project can include owning the land on which the project is undertaken, having the work undertaken (at the Owner's request), or benefitting from the improvements realized by the project. For the purposes of this document, the Owner is Halton Region.

2.6 SURVEY CREW

The designated Survey Crew Chief, Site Inspector and Project Managers should meet prior to construction commencement to review the extent of information to be collected by the project team's survey crews during construction, and to confirm this information complies with the project's As-Built requirements.

The first activity for a survey crew when arriving on site is to ensure that a Traffic Control Plan is established and adhered to at all times.

Some of the responsibilities of the project team survey crew are to:

- Provide the survey control point coordinates layout to the Contractor for the construction layout.
- Conduct field surveys for drainage, water and wastewater systems, road and highway systems, and buildings and structures to provide data for construction.
- Troubleshoot the Contractor's control point layouts on site.
- Assess and document quantities of installed materials on site for payment purposes at the Site Inspector's request.
- Collect data for As-Built drawings on site for records.
- Communicate effectively with the Site Inspector regarding project progress, issues, and concerns.

The Contract Documents should confirm the parties responsible for conducting the construction layout (e.g., Contractor, Halton), and for its accuracy in accordance with the stipulated requirements and tolerances on a project-specific basis. Survey requirements should additionally be confirmed with Halton's Project Manager before project commencement and performance of the construction layout.

Refer to Halton Region's Survey Practices and Standards for additional information.

2.7 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) TESTING

QA/QC testing is vital to any project. The Site Inspector is responsible to ensure that proper testing is performed and documented.

.1 Materials Testing

The Site Inspector and Contract Administrator should first meet with the third party materials testing agency to establish the testing criteria. The Site Inspector must coordinate all materials testing with third party testing agencies a minimum of 48 hours (or otherwise specified) prior to the Contractor conducting the work, if they are required. All test results taken by a third party material testing company must be documented and submitted. The Contractor must be notified of any non-compliant or failed test results immediately. The Contractor must rectify all defective work to the satisfaction of the Site Inspector and verify compliance through re-testing.

.2 Hydrostatic Tests, Disinfection, and CCTV Inspection

The Contractor must submit a commissioning plan to the Contract Administrator and Halton Region for review and approval by Halton Operations staff. The Contractor shall work in conjunction with the Site Inspector to create an Isolation Plan prior to any planned shutdown, hook-up or return to service. The review and approval process, including review period duration, should involve Halton Region Water & Wastewater System Services Division (i.e., "Operations") staff and be determined on a project-specific basis. All customers are to be notified a minimum 48 hours prior to a planned disruption.

The Site Inspector shall witness all cleaning, hydrostatic testing, disinfection, and sampling activities. The Site Inspector shall also arrange for Halton Region designated Operations staff to be attendance to witness the above activities, as required.

A pre-qualified company, specialized in regulated water systems, will carry out cleaning and disinfection activities. For further instruction, refer to current versions of Halton Region's Drinking Water Quality Management System (DWQMS) document number DS-W98 "Commissioning and Disinfection of Water Mains", Ontario Provincial Standard Specifications (OPSS), American Waterworks Association Standards, the Ontario Safe Drinking Water Act, 2002, and all other applicable legislative requirements as most recently amended, Halton Region Design Criteria, and CAN-CSA-B64.10.

CCTV inspections may be required by the Contract Documents to ensure compliance with Halton Region's requirements. CCTV inspections submitted should be reviewed by the Site Inspector and Contract Administrator in conjunction with Halton Region during the commissioning process, prior to awarding substantial performance.

2.8 ISSUES / DECISION MAKING MATRIX

Issues will arise on site during construction. It is important to establish and adhere to particular protocols, roles, and responsibilities, such that decisions can be made in an informed and effective manner. A suggested Issues / Decision Making Matrix is presented in **Figure 2.8.1** below, which can be used in its entirety or refined on a project specific basis.

RESOLUTION OF CONSTRUCTION ISSUES

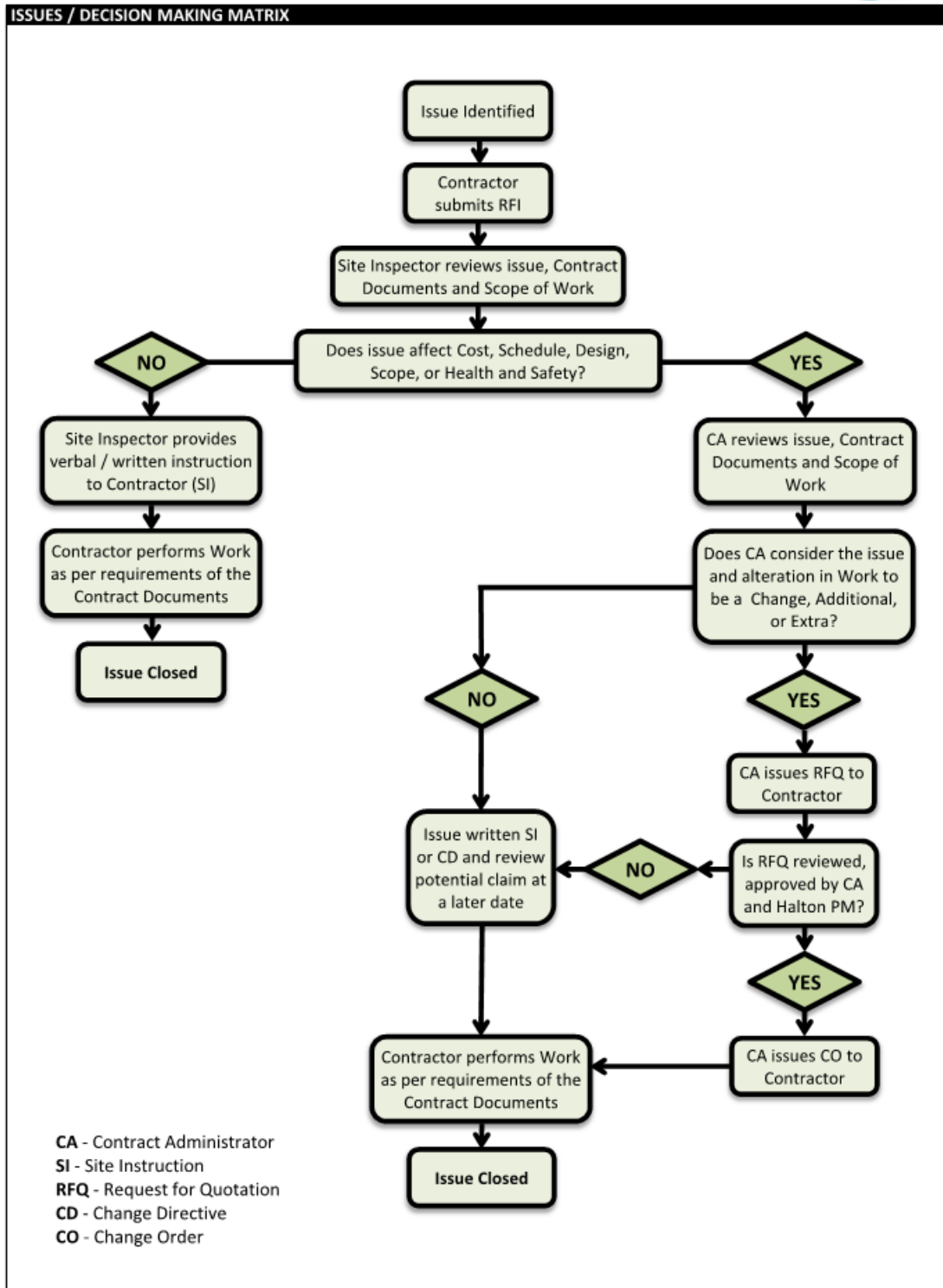


FIGURE 2.8.1 – ISSUES / DECISION MAKING MATRIX

3 PROJECT CONTROLS

3.1 SCOPE MANAGEMENT

The Site Inspector shall observe the technical conduct of the construction, as well as provide day to day communication with the Contractor, Contract Administrator and Halton Project Manager. The Site Inspector shall assume no responsibility for proper construction techniques and job site safety but primarily provide Halton Region a greater degree of confidence that the completed work will conform to the Contract Documents and that the integrity of the design concept as reflected in the Contract Documents has been implemented and preserved. The Site Inspector shall not be responsible for construction means, methods, techniques, sequences of procedures, or for safety precautions and programs in connection with the work performed by the Contractor and any subcontractors.

3.2 SCHEDULE MANAGEMENT

It is the Contractor's responsibility to schedule, sequence and perform the work in a manner which minimizes disruption to the public and existing Halton Region operations. The Contractor shall have complete control of the work and shall direct and supervise the work to ensure compliance with the contract. The Contractor shall provide a detailed schedule which will be reviewed by all parties for the purpose of establishing an agreed upon baseline schedule and identifying the critical path. If the schedule changes during the course of the project, it is the Contractor's responsibility to provide updates on a bi-weekly basis (if applicable).

The Site Inspector is responsible for monitoring and noting any changes to the scheduled activities and should notify the Contract Administrator of any deviations from the contract. The following provides a list of some activities that could impact schedule and should be duly noted in the Site Inspector's daily diaries:

- Unforeseen conditions.
- Abnormal inclement weather conditions.
- Utility locates and mark-ups.
- Change or lack of coordination of subcontractor(s).
- Change in soil and groundwater conditions.
- Insufficient workforce.
- Non-compliant or failed materials tests.
- Changes in the work (e.g., extra work or additional work).
- Equipment breakdown.
- Lack of coordination from third parties, such as agencies, utilities, etc.
- Health and safety issues.
- Permits and approvals or stop work orders.
- Delays in delivery of materials and equipment.
- Design issues.
- Public relations.
- Labour disputes, strikes, and lockouts.
- Archaeological finds.

In addition to discussing the schedule status at each progress meeting to review the contractor's progress with key project milestones, the Contract Administrator and the Site Inspector should collectively review the schedule with the Contractor on a regular basis.

3.3 COST MANAGEMENT

Tracking costs against budget and schedule is an important task primarily executed by the Contract Administrator. However, the Site Inspector's assistance is essential for early detection of potential issues, prompt corrective actions, and subsequent minimization of additional costs.

3.4 CHANGE MANAGEMENT

During any construction project, differences of opinion between the Site Inspector and Contractor regarding contract responsibilities, interpretation, changes, budget, and schedule is common within the industry. The Site Inspector should proactively attempt to identify risks up front and continually assess potential risks throughout the project. The initial level of change management or conflict resolution is between the Contractor and the Site Inspector. The representatives should discuss any issues that arise during construction that they believe they are authorized to resolve. Project issues that may occur are defined in the OPS General Conditions of Contract, Section GC 3.10 – Changes, and are generally described as follows:

- **Changes in Work:** The deletion, extension, increase, decrease, or alteration of lines, grades, dimensions, quantities, methods, drawings, substantial changes in geotechnical, subsurface, surface or other conditions, changes in the character of the Work to be done, or materials of the Work or part thereof, within the scope of the Contract.
- **Extra Work:** Work not provided for in the Contract as awarded but considered by the Contract Administrator to be essential to the satisfactory completion of the Contract within its intended scope, including unanticipated work required to comply with legislation and regulations that affect the Work.
- **Additional Work:** Work not provided for in the Contract and not considered by the Contract Administrator to be essential to the satisfactory completion of the contract within its intended scope.

If issues cannot be resolved at the Site Inspector and Contractor Site Supervisor level, an RFI will be requested from the Contractor for formal documentation. The matter must then be escalated up to the Contract Administrator and Halton Project Manager immediately. The following sections provide a series of different approaches that can assist with managing project issues which can potentially lead to a change in scope.

.2 Site Instruction

A Site Instruction is issued by the Contract Administrator or Site Inspector to the Contractor to provide or request information regarding minor variations to the contract that would typically not jeopardize schedule or initiate additional costs. If the Contractor disagrees with the contents of the Site Instruction and believes that it constitutes a change in scope, then the Site Inspector and Contract Administrator must evaluate other methods of successfully

completing the work. This can be achieved by the issuance of a Change Directive or Request for Quotation.

.3 Change Directive

A Change Directive (CD) is issued to the Contractor to make revisions/modifications to the contract to mitigate negative impacts to the project's schedule, cost, or both. The full intention of issuing a CD is to initiate a means of moving forward with the project. The Work is either performed on an agreed Lump Sum or Time and Material basis. If the latter, the Site Inspector must document labour, material and equipment on a daily basis to verify progress and future potential Change Orders.

.4 Request for Quotation

A Request for Quotation (RFQ) is typically issued by the Contract Administrator to obtain detailed pricing and scheduling when there is an anticipated change in work, extra work, or additional work. The Site Inspector may assist with this process by providing information on site conditions specific to the work.

.5 Change Order

A Change Order (CO) is a written amendment to the Contract which generally outlines a change in work, extra work, additional work, or a credit for deleting scope of work. Supporting documentation, such as an RFQ, will be used to provide the detailed pricing and scope of work required to properly execute a CO. The CO will be deemed to be full and final compensation with respect to the items within, and shall include all of the Contractor's direct and indirect costs. A final copy of the CO should be provided to the Site Inspector to verify that the work is being completed as per the terms and conditions identified.

4 COMMUNICATIONS

4.1 PROJECT CORRESPONDENCE

The successful delivery of construction projects starts with communication. The Site Inspector should be well versed in the Contract Documents and any other requirements of the work that the contractor is responsible to deliver.

Communications by the Site Inspector to the Contractor should be clear concise and deal only with requirements of the Contract. The Site Inspector is encouraged to be fair in dealing with the Contractor and should avoid being confrontational. Disputes should be addressed and resolved promptly with the assistance of the Contract Administrator as required.

Instructions by the Site Inspector should not be given to a Contractor's subcontractor. Instructions by the Site Inspector should only be given via the Contractor's designated Site Supervisor.

All person to person verbal conversations, telephone conversations, email and/or text message instructions provided by the Inspector to the Contractor should be documented in the inspector's daily diary report with a brief summary as to the context of the particular communication.

All formal written instructions (i.e., Site Instructions) to the Contractor by the Site Inspector shall be provided using the standard Halton Region Site Instruction Form.

All project correspondence from the Contractor (e.g., Letters, Transmittals complete with applicable shop drawings, information from suppliers, etc.) should be submitted to the Contract Administrator and not to the Site Inspector.

4.2 STAKEHOLDER COMMUNICATIONS

The Site Inspector's mindset and actions should always be undertaken with the understanding that they represent Halton Region. In collaboration with Halton's Project Manager, the Site Inspector should take a proactive approach to communicating with affected stakeholders/residents impacted by the construction project.

The Site Inspector should review the initial notices that were provided / distributed to local residents and businesses to advise them of the pending construction works. A courteous follow-up visit to these stakeholders should be performed to provide necessary contact information (i.e., phone numbers) to further explain the project scope and timelines for when they might be inconvenienced by the construction activities.

Furthermore, the Site Inspector should perform a pre-construction investigation, complete with photographs and video, for supporting documentation and future correspondence with affected stakeholders. As changes in the project arise, the Site Inspector should confirm an appropriate advisement process on a case by case basis and confirm delivery of the appropriate notifications to affected stakeholders.

When a stakeholder complaint is made which relates to the construction works, the Site Inspector, in conjunction with the Contractor's Superintendent, should attempt to meet with and resolve the issue with the complainant in the field as soon as possible.

Complaints that are not resolved immediately with the stakeholder are to be forwarded on to the Contract Administrator, with notification also provided to Halton's Project Manager.

All complaints and particular details of the complaint are to be documented in the Site Inspector's daily diary and tabled as an agenda item as part of subsequent Construction Progress Meetings, until resolution.

4.3 MEETINGS

The Site Inspector's input/contribution at various project meetings should provide the following:

.1 Pre-Construction Meetings

The Site Inspector is typically required to attend the Pre-Construction Meeting and provide:

- Site Inspector's contact information:
 - Mobile phone;
 - Email address; and,
 - After hours emergency contact.
- Advise attendees of critical items documented (i.e., photographed) during inspector's pre-construction investigations.

- Coordinate Contractor pre-construction investigations and documentation.
- Coordinate safety orientation with the Contractor.
- Review the Contract Documents and suggest high-level challenges that may be encountered by on the project .

.2 Progress Meetings

The Site Inspector shall attend Progress Meetings and provide updates regarding:

- Contractor's Progress of Work.
- Health and Safety (Reports of Safety Incidents).
- Environmental observations (e.g., silt control measures, report of any spills).
- Stakeholder/Public Complaints.
- An overview of all current and outstanding non-conformities observed during inspection.
- Site Instructions issued to Contractor (e.g., verbal, email, written).
- Stop Work Orders issued to the Contractor.
- Corrective Action items to be addressed by the Contractor.

.3 Health and Safety Meetings

Site Inspector attendance is highly recommended at all Health and Safety Meetings to provide the following:

- Attend the Contractor's Health and Safety Tail Gate Meetings.
- Remind the Contractor (i.e., "Constructor") that they are responsible for the overall safety of the site, and that all individuals engaged in the project are responsible to become familiar with and comply with the applicable regulations and codes including the Contractor's Health and Safety requirements.
- Report any infractions observed of the Contractor's Health and Safety procedures being practiced.
- Report observations including maintenance of proper signage, unsafe working conditions, and potential hazards as they relate to the contract requirements.

.4 Partnering Meetings

The Site Inspector should attend any Partnering Meetings and be prepared to provide his/her input as required. Partnering Meetings are typically held with key staff and senior management from Halton, the Engineer, the Contractor, and major subcontractors and suppliers.

Partnering Meetings are a tool used to transform the chosen group of partners into an effective team to undertake a project. These meetings should be focused on team building, fundamental project-related issues, concerns critical to the development and maintenance of the team, and the effective completion of the project.

Typical objectives of a Partnering Meeting include:

- Understanding working styles of the various team members.
- Developing, setting, and approval of team goals.
- Defining, understanding, and respecting the roles of everyone in the team.

- Collaborating to resolve issues, solve problems, and develop innovative solutions for the project.

.5 Risk Workshops

Risk Workshops are typically used to identify, describe, and both qualitatively and quantitatively assess potential construction risks for the Contract. Participants will be requested to provide risk mitigation recommendations and contingency plans for risk events. The Site Inspector may be requested to attend the Risk Workshop and be prepared to provide his/her input as required.

.6 Testing and Commissioning Meetings

It is recommended that the Site Inspector attend all Testing and Commissioning meetings and also provide notice (i.e., “Notice of Water Supply Interruption”) to the stakeholders/property owners.

A commissioning plan should be presented by the Contractor during the Testing and Commissioning meetings, for discussion and review by the Site Inspector, Contract Administrator, and Halton Region. The review period duration required by Halton Region should also be confirmed at the time of the meeting.

The commissioning plan should make clear whether the intent is to commission watermain using physical cleaning or CCTV. In the event that the watermain has not been kept clean, in the opinion of the Site Inspector, Contract Administrator, and Halton Region, physical cleaning and CCTV inspection may be required.

4.4 CONTRACTOR PERFORMANCE REPORT

The Contractor Performance Report is to be completed on a monthly basis and submitted with each payment certificate. The final report is to be submitted by the Site Inspector to the Contract Administrator along with: daily inspection diaries, the complete set of red-line mark-ups for the As-Built drawings, a detailed record of all water and wastewater service locate sheets, and all photos taken during construction of the works. These records will be audited and reviewed by Halton Region on a regular basis throughout the project.

The Contractor’s Performance Report is intended to evaluate the Contractor’s project performance from the Site Inspector’s perspective, to include as a minimum the following general categories, evaluated using the noted parameters:

- Job Organization - (Good, Average, Below Average, Poor)
- Quality of Work - (Good, Average, Below Average, Poor)
- Public Relations - (Good, Average, Below Average, Poor)
- Safety Practices - (Good, Average, Below Average, Poor)
- Clean Up - (Good, Average, Below Average, Poor)
- Completion - (Early, On Time, Late)

The Contractor Performance Report is to also include Site Inspector comments for Contractor works and attitudes, related to but not limited to, intangible construction activities. (e.g., maintenance and tidiness / cleanliness of the site, dust control measures, response times provided to verbal and/or site instructions, etc.).

The standard Halton Region Contractor Performance Report form shall be utilized and executed with signatures provided by the Site Inspector, Contract Administrator, and Contractor for the particular construction contract. Upon request, a copy of the Contractor Performance Report is to be made available to the Contractor for record purposes.

5 HEALTH AND SAFETY

Health and Safety is a vital part of our day-to-day business. We all play a part with becoming familiar with applicable regulations and company health and safety policies. It is the Site Inspector's role to monitor the Contractor's activities and document compliance issues with Halton Region's Health and Safety policies or the *Occupational Health and Safety Act (OHSA)*. The Contractor is also required to post the project-specific health and safety plan on-site and provide a copy to the Site Inspector and Contract Administrator for their records.

5.1 WHO IS "CONSTRUCTOR"

The Contractor unequivocally acknowledges that they are the "Constructor" as defined in the *OHSA* and shall have complete control of the Work and is responsible for the overall health and safety on site.

5.2 HEALTH AND SAFETY PLANS

Prior to commencing Work, the Contractor shall provide a copy of their current Health and Safety policies and project-specific health and safety plans, including their subcontractors'. The Contract Administrator, with assistance from the Site Inspector, will review the Health and Safety plan as it relates to the safety of on-site inspection staff.

.1 Notice of Project

The Contractor will be responsible to provide the proper notification to all regulatory bodies required for construction activities. The Contractor is responsible to post a copy of the Ministry of Labour Notice of Project at the work site and provide a copy to the Contract Administrator and Site Inspector for their records.

.2 Registration of Constructors and Employers Engaged in Construction

The Contractor will be responsible to ensure that each subcontractor employed on the project completes and provides an approved MOE Form 1000 registration form prior to commencing work on site. The Contractor is responsible to keep copies of these forms at the work site and provide a copy to the Contract Administrator and Site Inspector for their records.

.3 Emergency Contact List

The Contractor shall submit, and post on site, the emergency contact numbers for police, fire, and ambulance for the project area, in addition to the names and after-hours numbers for key site personnel and a map to the nearest hospital. Contact numbers for applicable agencies regulatory (e.g., Conservation Halton, etc.) should also be included. The Site Inspector should have an emergency contact list available at all times for reliable access to contact information in the event of an emergency.

.4 Evacuation Procedure

Prior to commencing Work, the Contractor shall provide an Emergency Response Plan which provides immediate response to serious site occurrences such as explosion, fire, or migration of toxic or hazardous material from site. Emergency evacuation procedures are required to direct anyone on site of what to do and where to go in the event of an emergency. The emergency evacuation procedures must also be posted in a noticeable area. The Site Inspector should be fully familiar with the Evacuation Procedure and the role they will be expected to perform in the event of an evacuation.

.5 Spills Response

Prior to commencing construction, the Contractor shall submit a Spills Response Plan to the Contract Administrator and Site Inspector. The Plan shall outline procedures for the reporting, In the event of improper or accidental spillage into the natural environment, the Contractor shall immediately contact all relevant parties and comply with the Environmental Protection Act.

The Site Inspector should also continuously monitor the construction site for potential environmental spill hazards particularly at the end of each day and prior to every weekend.

5.3 PERSONAL PROTECTIVE EQUIPMENT

All personnel on site are responsible to wear Canadian Standards Association (CSA) approved Personal Protective Equipment (PPE) safety apparel; at a minimum, construction safety boots, reflective vest, hard hat, and protective eyewear. The Contractor is responsible to ensure that the proper PPE is being used for particular tasks.

While on site, the Site Inspector is responsible to comply with the more stringent PPE requirements of Halton or the Contractor's Health and Safety requirements.

5.4 CONFINED SPACE ENTRY

As defined under the *OHSA*, "confined space" means a fully or partially enclosed space,

- (a) that is not both designed and constructed for continuous human occupancy, and
- (b) in which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it.

Only trained personnel shall enter a confined space and must follow the guidelines set out in the *OHSA* and Halton Region Health and Safety policies. If the Contractor is entering a confined space, they must provide a written confined space entry program, energy disconnect-lockout system, entry-permit system, and an emergency rescue plan.

5.5 UNSAFE CONDITIONS

Safety is everyone's responsibility! The Site Inspector, Contract Administrator, and Halton Region have the right to document any health and safety concerns regarding the Contractor's means and methods of construction and may issue warnings and/or Stop Work Orders for any Contractor violations of the *OHSA*. The Site Inspector may also issue a Site Instruction to the Contractor directing them to correct the hazard immediately at their own expense.

5.6 INCIDENT REPORTING

All incidents, including near-miss incidents, must be immediately reported by the Contractor to the Site Inspector, who must then notify the Contract Administrator, who will in turn notify Halton's Project Manager. Depending on the severity of the incident, a comprehensive investigation may need to be conducted by the Ministry of Labour. The procedures for investigating workplace incidents may include:

- Interviewing injured employees and witnesses.
- Examining the workplace for factors associated with the incident.
- Determining the cause of the incident.
- Taking corrective action to prevent the incident from reoccurring.
- Recording the findings and actions taken.

All incidents must be investigated and reported in accordance with legislative requirements. As per *OHSA* requirements, for injuries involving contractor or sub-contractor staff, the Ministry of Labour and the Contractor's joint health and safety committee representative must be notified in order to follow up and investigate as required. For injuries involving Halton Region staff, the Ministry of Labour the Halton Region's joint health and safety committee representative must be notified.

The Constructor must give a copy of all Workplace Safety and Insurance Board (WSIB) Employers' Report of Injury/Disease Form 7 or Ministry of Labour accident reports to the Contract Administrator and the Contract Administrator will forward a copy to Halton Region.

The Site Inspector is also responsible to review and compile a copy of all resulting Incident Reports and to generally confirm that the recommended corrective action(s) are being properly addressed during construction.

6 FIELD CONSTRUCTION PROCEDURES

6.1 CONTRACT DOCUMENTS

The Contract Documents are prepared by the Design Engineer(s) of Record using specific design criteria and standards unique to the project. These Contract Documents should be considered to be complete and accurate (unless otherwise stated) as far as the available information and assumptions made of the existing conditions are accurate, but minor changes are expected to occur as the construction work progresses.

The Site Inspector should be very familiar with the Contract Documents, including the drawings, standard specifications, and special provisions. The Site Inspector is encouraged to perform regular reviews of the Contract Documents prior to and throughout the construction period. The Site Inspector shall ensure that one set of full size Issued for Construction plans stamped by the Design Engineer(s) are current, include the latest plan revisions, and are retained in the field office at all times.

6.2 SHOP DRAWINGS

Prior to submission of shop drawings, the Contract Documents typically require the Contractor to stamp each shop drawing acknowledging that the material, equipment or procedures have been provided in compliance with the Contract Documents. It is

recommended that the Site Inspector review each shop drawing to confirm that this stamp has been provided. If this has not been provided, it is suggested the Site Inspector confirm this requirement with the Contract Administrator.

Any shop drawing submittals provided by the Contractor should be forwarded to the Contract Administrator directly for review and approval. The Contract Administrator is typically responsible for logging and reviewing all submittals, and providing a copy of the approved submittal to the Site Inspector for record purposes. The Site Inspector may be requested to provide information to the Contract Administrator to aid in the review process.

Shop drawing submittals typically include drawings, materials specification sheets, and manufacturer's recommended procedures. The information is then reviewed by the Contract Administrator and Design Engineer(s), and returned to the Contractor with appropriate comments to confirm the shop drawings have been prepared in compliance with the Contract Documents. However, the goal of the submittal review process does not involve a thorough review confirming the intent of the design. Furthermore, no changes to the Contract are made during this process – these reviews only involve contract conformance and compliance.

6.3 RECORDS FILING SYSTEM

All project correspondence, records, drawings and documents is to be maintained by the Contract Administrator in a central filing system. The documents managed by the Contract Administrator are to include, but are not limited to, Contract Documents, meeting agendas and minutes, payment certificates, change orders, requests for information, requests for quotation and shop drawings. The filing system should be maintained up to date with a systematic, intuitive file structure that is searchable. Access to this filing system is typically provided to any party involved with the supervision and administration of the construction project upon request. The Contractor is not typically provided access to the records filing system unless the Contract Documents include this requirement.

Diligent handling of project records determines the accuracy of the files and records. The Site Inspector shall be responsible for collecting and managing all field documents including, but not limited to, daily records, weekly and monthly inspection reports, construction photographs, material tickets (properly correlated to location and tender item), and deficiency lists. The Site Inspector should endeavor to provide these documents to the Contract Administrator on a regular basis for record keeping purposes or upon request.

6.4 DAILY WORK RECORDS

Daily Work Records (i.e., “daily records”) prepared by the Site Inspector should be accurate and thorough, addressing factual information only. Items involving opinion, conjecture or speculation should be avoided or captured under a separate section for informational purposes only. Daily records should be prepared in a standard report (i.e., Daily Inspection Report) format.

Daily records shall be provided for a single construction project and maintained separately from all other construction projects. If no work is performed on a given date, the date should be entered and the reason for not working should be recorded. Each daily report

should also be supported with weight tickets and quantity calculations for respective tender items, where applicable.

At a minimum, the following general daily record headings are suggested to be captured, with specific items observed during inspection categorized into these headings:

- General (Date, Weather, Temperature, Time on Site)
- Health and Safety
- Environmental
- Progress of Work
- Schedule Update
- Resources on Site (Crews, Equipment, and Major Material Deliveries)
- Protection of Property / Permits and Approvals
- Specification Items
- Discussion Items
- Visitors and Correspondence
- Photographs and Sketches

Photographs shall be taken at intermittent periods throughout the work day with particular emphasis on capturing progress of work, unusual activities observed, and non-conformities. Deficiencies should be documented on an on-going basis, noted in the daily records, and tracked until resolution. Photographs should be saved to the filing system with a file naming structure that includes the date the photograph was taken. It is also suggested that each photograph should electronically be date stamped for record purposes.

6.5 WEEKLY AND MONTHLY REPORTS

It is suggested that weekly and monthly inspection summary reports, prepared by the Site Inspector and submitted to the Contract Administrator and Halton Project Manager for record, be completed and include:

- High-level overview on the progress of work and schedule.
- Major health and safety and environmental incidents, concerns and resolutions.
- Outstanding major non-conformities or deficiencies awaiting resolution.
- Incidences of new major non-conformities or deficiencies recorded during the reporting period.
- Before and after photographs for showing the progress of work, incidents, and non-conformities as captured throughout the reporting period.

6.6 INSPECTION TASKS AND FORMS

.1 General Inspection Requirements

The Contract Administrator and Site Inspector should work together at the start of a Contract to discuss and confirm the inspection requirements for all construction activities. The General Inspection Tasks checklist provides guidance to the Site Inspector for typical duties during the Pre-Construction, Construction, and Post-Construction phases.

.2 Daily Work Records

The checklist of daily records is recommended to be reviewed and confirmed at the outset of each project. It is suggested that the Site Inspector's daily records include fields for all the requirements set forth in this inspection task checklist. The Contract Administrator may request a sample daily record prior to construction to verify all necessary daily record information has been captured on the report.

While daily records should be saved in the filing system for the project, the Site Inspector is also encouraged to provide the Contract Administrator with completed daily inspection reports for review and comment periodically throughout the construction duration. A typical minimum frequency of once every two weeks is suggested. Sample Daily, Weekly, and Monthly Inspection Forms are provided in **Appendix A**.

.3 Health and Safety

The Health and Safety checklist provided is intended to provide examples of general use and may not apply to every circumstance. All health and safety requirements shall follow all local regulatory requirements and is subject to change. The Contractor shall be solely responsible for ensuring that all applicable standards and regulations are fulfilled.

.4 Discipline-Specific Inspection Task Checklists

The inspection tasks listed under each discipline are to be used as a basis for inspection, and to ensure the intent of the design is achieved during construction. The checklists are not intended to be mandatory inspection requirements for all projects, but rather a comprehensive list of construction inspection tasks for various disciplines that the Site Inspector is suggested to review and confirm during the course of their duties.

The application of these discipline-specific checklists is not intended to be a higher precedence than the Contract Documents, but rather a supporting guideline for inspection best practices. Additional inspection tasks may be required to ensure compliance with the Contract Documents, and are at the discretion of the Design Engineer(s), Contract Administrator, or Site Inspector.

The discipline-specific inspection task checklists provided in **Appendix B** are noted below:

- Watermains
- Wastewater Mains
- Stormwater Management
- Transportation – Roads
- Transportation – Structures
- Structural
- Environmental
- Tunnelling and Trenchless
- Traffic Management

Similarly, the application of these discipline-specific checklists is intended to support the use of Halton Region Standard Forms. It is suggested that pertinent forms be identified on a project-specific basis and reviewed prior to construction commencement. Completion of

applicable Standard Halton Region Forms throughout construction is required. Halton Region Standard Forms are provided in **Appendix C**.

7 CONTRACT CLOSEOUT

7.1 AS-BUILT DRAWINGS

The As-Built information is to be recorded on a continuous basis as the construction works progress. The As-Built drawings must be maintained during the course of the construction works by the Site Inspector, updated daily, and cross-referenced with information obtained by the Contractor.

A complete set of As-Built drawings must also be provided by the Contractor prior to applying for Substantial Performance. The Site Inspector to confirm that the As-Built drawings provided by the Contractor provides for the required level of detailed information. Where a GPS survey coordinate system was utilized as part of the construction of the works, a separate digital file (i.e., CADD or equivalent, as per Design Supervisor's request) shall be obtained from the Contractor that identifies the precise coordinates for all of the critical locations and features as noted below.

This As-Built information must be recorded in the dedicated survey field book(s) and/or on applicable documentation forms specific to the construction project. Information obtained during the construction phase must be underlined with red pencil and indexed in the front of the construction field book in red. Field information shall be cross referenced as part of the Contract Closeout Documentation submittals and/or as part of the Operation and Maintenance Manuals for the new works.

.1 Watermain Works

As-Built Records to include the following:

- Tie in all valves, bends, tees, crosses and reducers to each other and to the plan stations and construction centerline (i.e., survey baseline). Swing ties to well established permanent features (i.e., buildings) is acceptable, but not preferred.
- Where a watermain alignment deflects away from the proposed alignment, note the new location from the centerline (i.e., survey baseline) and show the change in the diary and on the As-Built plans.
- Use GPS survey points or swing ties to locate watermain valve chambers, water valve boxes, etc.
- Measure and record the curb stop and box from the projection of the left outside wall or right outside wall of the building all along the street line.
- A Halton Region standard 'Water Service Locate Sheet' should be filled out for each connection along each street to identify all new service connection at the municipal right-of-way/property line.
- Site Inspector to provide marked-up cross references to the particular shop drawings provided for the watermain works to allow for this information to be cross referenced to the Operation and Maintenance Manuals for the new works.

.2 Wastewater Works

As-Built Records to include the following:

- Tie in the locations of all Maintenance Holes (MH) with offset measurements from the construction centerline (i.e., baseline) and the plan station chainage, measured to the closest decimeter.
- Wastewater laterals (i.e., service connections) should be tied in at right angles to the baseline control between the MHs; measure along street line to a projection of the nearest outside building wall, complete with invert elevations of the stub end of the lateral/service connection at the municipal right-of-way/property line.
- A Halton Region standard 'Sanitary Lateral Locate Sheet' should be filled out for each connection along each street to identify all new laterals at the municipal right-of-way/property line.
- Invert elevations and size (i.e., diameter) of every sewer at each MH, measured to the closest millimeter.
- Top of MH lid elevation.
- Distance between MHs, measured to the closest millimeter, from center of lid to center of lid.
- The above noted wastewater information as gathered by 'Data Collector' should be reduced and recorded on the Halton Region Standard Detail Record sheets with proper reference provided to the data file and the field book used for applicable Bench Marks / elevations.
- Information obtained during the construction phase must be underlined with red pencil and indexed in the front of the construction field book in red. Field book information to be cross referenced to the Contract Closeout Documentation submittals and/or as part of the Operation and Maintenance Manuals for the new works.

Note: If entry into a Maintenance Hole (MH) is required, at a minimum, the Safety Procedures set out in the Halton Region Confined Space Entry Procedures must be followed.

.3 Transportation Works

As-Built Records to include the following:

- A certain level of As-Built record information (e.g., elevations as per various levels/depths of road base and sub-base), should be obtained and recorded while the road construction works are in progress.
- Centreline profile top of pavement.
- Ditch elevations (from final road cross sections).
- Locations and invert elevations of sanitary and storm sewers, laterals/stubs, catch basins, etc.
- Invert elevations from:
 - Cross culverts;
 - Entrance culverts;
 - Catch basins; and,
 - Ditch inlets and outfall.
- Locations of all above ground utilities.
- Hydro poles, and new conduits installed.
- Bell poles, pedestals and markers.

- Hydrants.
- Water valves.
- Gas valves.
- Traffic light poles, hand wells, pedestals, traffic signal conduits, traffic loops, etc.
- Locations of new or relocated vegetation, landscaping, etc.
- Locations as per start and finish of guide rails.
- Locations as per start and finish of curb and gutters.
- Tie in the ends of box culverts and record size dimensions.
- Tie in locations of asphalt/gravel bicycle pathways.
- Tie in new fencing installed, to include start and ends, gates and field entrances, denote fence type, etc.

7.2 OPERATION AND MAINTENANCE MANUALS

The Site Inspector should review the Construction Contract Documents to become aware as to what level of documentation/technical data information is to be submitted by the Contractor at the Project Closeout. For example, some water and wastewater projects may only require the submission of technical data sheets for the new watermain valves and equipment installed and not require for an extensive O&M Manual to be provided.

The Site Inspector and Contract Administrator should review submission requirements to ensure that all documentation submitted by the Contractor has been provided in compliance with the format and the submission requirements stipulated in the Contract Documents.

7.3 TEST REPORTS

The Site Inspector should be present and witness the field inspection of and the testing undertaken by the manufacturer's representative to verify the installation of the equipment and materials incorporated into the constructed works by the Contractor.

The Site Inspector should obtain copies of all of the applicable test reports and equipment installation sign-off sheets by the manufacturer's representative to include these sign-off sheets as part of the project close-out documentation submittal package to the Contract Administrator.

7.4 DEFICIENCY LISTS

Nearing the completion of the constructed works, prior to the Contractor's request for Substantial Performance status, the Site Inspector will be responsible to prepare a final Deficiency List for outstanding incidental works to be completed by the Contractor in order to achieve project completion status.

The Deficiency List is to be maintained and updated by the Site Inspector to the end date of the Warranty Period and beyond as required, until all deficiency items/works have been successfully completed by the Contractor. The Site Inspector shall complete the Halton Region – Deficiency Audit Form to prepare the project deficiency list.

A few items to keep in mind when preparing the Deficiency Audit:

- Settlement of the trench areas.

- Condition of roads and curbs, in particular poor drainage and ponding issues following a rain event.
- Landscaping problems (e.g., dead sod and/or seeded areas, ground settlement in grassed areas).
- Condition of MHs and Water Valve Chambers (e.g., infiltration, ladder rungs, etc.).
- Operation of all valves and curb boxes.
- Recording of any buried curb boxes.
- Untidy condition of the construction areas, construction debris not properly removed from site.

Please refer to Halton Region standard deficiency checklists for further items of interest.

7.5 SUBSTANTIAL PERFORMANCE

The Construction Contract will be deemed to achieve Substantial Performance status at the time when the constructed works have been successfully tested and commissioned, are ready for the intended purpose, and are placed into service.

For the specific definition of Substantial Performance the Inspector shall make reference to the definition provided in the OPS General Conditions of Contract, Section GC 1.05 – Substantial Performance.

The Site Inspector, at the Substantial Performance stage of the construction contract, shall be responsible to ensure that the Contractor has complied with all facets of the testing and commissioning, inspection of and start up requirements for applicable equipment, and that all applicable test reports have been received by the Contract Administrator.

The Site Inspector will also be responsible to have prepared a Deficiency List for incidental works to be completed by the Contractor in order to achieve project completion status. The Deficiency List is to be maintained and updated by the Inspector until all deficiency works have been completed.

7.6 COMPLETION

The Construction Contract will be deemed to achieve Completion status at the time when all identified deficiencies have been successfully rectified and all of the required services and submittal requirements by the Contractor have been provided.

For the specific definition of Completion the Site Inspector shall make reference to the definition provided in the OPS General Conditions of Contract, Section GC 1.06 – Completion.

7.7 WARRANTY PERIOD AND CERTIFICATES

The Warranty Period, as amended by Halton Region's Supplementary General Conditions, begins upon Completion of the Construction Contract.

The Site Inspector should obtain copies of all of the applicable Warranty Period Certificates provided by the manufacturer's representative to include these as part of the project close-out documentation submittal package to the Contract Administrator.

7.8 FINAL INSPECTION

The Contract Administrator will arrange for a Final Inspection approximately one (1) to two (2) months prior to the end of the Warranty Period. The Site Inspector, in concert with the Region of Halton Water & Wastewater System Services staff, will conduct a 'Final Assumption Inspection' (i.e., walk through) of the entire project to verify that previously remediated deficiency items remain satisfactory and/or identify any new deficiency items that became apparent during the Warranty Period.

7.9 FINAL COMPLETION

The Construction Contract will be deemed to achieve Final Completion status at the end of the Warranty Period stipulated in the Construction Contract Documents, with the provision that all of the identified deficiencies have been successfully completed by the Contractor.

The Site Inspector will be required to complete the Halton Region 'Inspection Services Report'. The Inspection Services Report is to be executed with applicable signatures by the Site Inspector, Contract Administrator, Project Manager, and the Region's CAD Technician once all of the project documentation has been received and confirmed to be in full compliance with Halton Region requirements.

APPENDIX A

SAMPLE DAILY, WEEKLY, AND MONTHLY INSPECTION FORMS

APPENDIX B

SITE INSPECTION TASK CHECKLISTS

APPENDIX C

HALTON REGION STANDARD INSPECTION FORMS

Note: Please visit PW SharePoint Site for current / up-to-date version of the forms

LIST OF HALTON REGION STANDARD INSPECTION FORMS

| Form No | Name of Form |
|---------|---|
| 1 | APPROVED MANUFACTURERS PRODUCTS LIST FOR WASTEWATER SYSTEMS (PDF) http://dm.halton.local/publicworks/cpdt/DESIGN/Approved%20Manufacturers%20Products%20List%20for%20Wastewater%20Systems.pdf |
| 2 | APPROVED PRODUCT CHECK LIST-WASTEWATER http://dm.halton.local/publicworks/cpdt/design_page.aspx?RootFolder=%2fpublicworks%2fcpd%2fDESIGN%2fApproved%20Product%20Check%20List%20for%20Wastewater&FolderCTID=0x012000B618F1BCCD02EC4C95E62479D4EB926C&View=%7bD4918FFD%2d8D86%2d4F5F%2d8183%2d0AD6310D4303%7d |
| 3 | APPROVED MANUFACTURERS PRODUCTS LIST FOR WATER SYSTEMS (PDF) http://dm.halton.local/publicworks/cpdt/DESIGN/Approved%20Manufacturers%20Products%20List%20for%20Water%20Systems.pdf |
| 4 | APPROVED PRODUCT CHECK LIST-WATER http://dm.halton.local/publicworks/cpdt/design_page.aspx?RootFolder=%2fpublicworks%2fcpd%2fDESIGN%2fApproved%20Product%20Check%20List%20for%20Water&FolderCTID=0x012000B618F1BCCD02EC4C95E62479D4EB926C&View=%7bD4918FFD%2d8D86%2d4F5F%2d8183%2d0AD6310D4303%7d |
| 5 | CAPITAL PROJECT COMPLETION FORM |
| 6 | CAPITAL PROJECT DEFICIENCY AUDIT |
| 7 | CONTRACTOR'S PERFORMANCE REPORT |
| 8 | DAILY QUANTITY SHEET |
| 9 | SANITARY LATERAL LOCATE SHEET |
| 10 | SUMMARY OF ITEMS-DAILY QUANTITY |
| 11 | SUBMISSION SHEET - ALL MUNICIPALITIES - CONSTRUCTION SAMPLE SHEET (PDF) |
| 12 | CPP JOINT RECORDING LOG FORM |
| 13 | DEFICIENCY CHECKLIST CHAMBER |
| 14 | DEFICIENCY CHECKLIST CURB BOX |
| 15 | DEFICIENCY CHECKLIST HYDRANT |
| 16 | ISOLATION PLAN |

| Form No | Name of Form |
|---------|---|
| 17 | PRESSURE TEST |
| 18 | WATER LOCATE SHEET |
| 19 | WATERMAIN DISINFECTION, PRESSURE TESTING & ACCEPTANCE |
| 20 | DEVELOPMENT COMPLETION FORM |
| 21 | AIR TESTING REPORT |

Note: Please visit PW SharePoint Site for current / up-to-date version of the forms