

# Field Services

## Manual





# Field Services Manual

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City of Toronto Field Services Manual:  
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Third Edition, 3<sup>rd</sup> Revision – September 2023



**City of Toronto****Engineering & Construction Services Division****Field Services Manual, 3<sup>rd</sup> Edition, 2<sup>nd</sup> Revision****Version Control Sheet**

Project Name: Field Services Manual	Version ID: 3 <sup>rd</sup> Edition, 3 <sup>rd</sup> Revision
Document Name: Field Services Manual	Date: September 2023
Prepared By: Edward Choi	Phone: 416-392-1843

**Version/Revision History**

<b>Version/Revision Number</b>	<b>Name of Contributor</b>	<b>Summary of Changes</b>	<b>Revision Date</b>
3 <sup>rd</sup> Revision	Edward Choi	Updated 'Engineering Surveys' section, Updated section relating to As-Built Drawing archival procedure, Updated Appendix A Forms to include new Daily Report, and Wellness Report in addition to various edits for grammar/clarity.	September 2023
2 <sup>nd</sup> Revision	Edward Choi	Removed remaining mentions of Third Party Utility Review and corrected formatting errors	June 2021
		Corrected references to align with the new chapters in the Capital Works Procedures Manual, Made minor modifications to Chapters 1 to 4 and Appendices	June 2021
1 <sup>st</sup> Revision	Field Services Manual Working Group	Inserted new Chapter 5: Development Engineering and Third Party & Utility Review, Made minor modifications to Chapters 1 to 4 and Appendices	April 2018

**Important Notice**

Engineering & Construction Services is committed to updating the Field Services Manual. The manual will be reposted online as new information is available. For the most up-to-date version of the manual please refer to the City of Toronto website.



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## Introduction

We've written the *Field Services Manual* for staff in the Engineering & Construction Services division to use and refer to when carrying out your responsibilities on linear infrastructure projects such as watermains, sewers and roads, vertical infrastructure projects such as bridges or expressways, or on plant and facilities related construction projects.

The purpose of this manual is to provide you a source of knowledge and the expectations of you as you carry out your duties during construction.

This manual will allow you to understand the responsibilities that accompany each role, how to prepare factual records of activities during construction, and how to be consistent in the review and monitoring of any construction related activity.

This manual should be utilized in conjunction with the *General Conditions of Contract*, *Capital Works Procedures Manual*, and the contract documents. It does not have precedence over the contract documents. Inspectors and contract administrators should fully review all contract documents, applicable specifications, special provisions, and drawings to ensure compliance with all contract requirements.

This manual with all the required forms is available in an online version only. Prior to using the manual, the online version should be checked for recent updates.

What this manual contains

**Chapter 1 – Project Team** – covers the responsibilities of inspectors, contract administrators, contractors, engineering surveys, assistant inspectors and inspection coordinators.

**Chapter 2 – Project Control** – covers the purpose of meetings, what should be discussed at pre-construction meetings, progress meetings, activities that could impact the schedule, how to document these issues, and conflict resolution procedures if there are differences of opinion.

**Chapter 3 – Communication** – covers the importance of communication between all parties, telephone conversations, purpose of contract administrator's site visits, how to handle

project issues that lead to contract modifications, public complaint process, monitoring health and safety on construction sites and spill requirements compliance.

**Chapter 4 – Field Construction Procedures** – covers filing system structure, the importance of facts and to record them on daily and weekly reports, deficient material or equipment, materials quality assurance tests, example of submittals by contractors, deficiency lists, as-built drawing requirements, tree protection, substantial performance, making right of all items on the deficiency list for final completion, contract payment, documentation to include for contract close-out, and final inspection as part of project close-out.

**Chapter 5 – Development Engineering / Engineering Transit Review** – covers the role of inspectors in Development Engineering and Engineering Transit Review as well as case managers. It also goes through the importance of meetings, changes in the work, public relations, and electronic filing.

**Appendix A – Forms** – contains a list of forms referred to in this manual and which should be used by the inspector and contract administrator.

**Appendix B – Inspection Tasks** – contains a listing of inspection tasks along with a description of each activity for that task.

**Appendix C – Materials Testing Protocol** – contains a guide on topics such as general administration and material management duties for inspectors and quality assurance of consultants, project engineers and managers, ready mixed concrete, hot mixed asphalt, granulars, imported earth and crack filling material.

**Appendix D – As-built Drawing Guidelines** – contains an explanation of the difference between record drawings and as-built drawings, the purpose and process of as-built drawings and what to submit at the completion of the project.

**Appendix E – As-built Features Requirements** – contains the as-built requirements such as field verification, survey pick-up and drawing mark-up for assets like storm sewers, sanitary or combined sewers, watermains, stormwater management facilities, transportation assets and other utilities.

**Appendix F – Weight Verification Protocol** – contains the protocol outlining the scope and procedures for weight verification to construction materials that are priced based on weight in City construction contracts.

**Appendix G – Health and Safety** – contains the roles and responsibilities of inspector and contract administration staff as well as other important aspects such as personal protection, rights of a worker, expectations, incidents, accidents, near misses, safety contraventions, violations, and the emergency response program.

**Appendix H – Sidewalk Deficiency Protocol** – contains the assessment schedule, and the type of defects expected.

**Appendix I – Bibliography** – contains a listing of field services manuals published by current city of Toronto divisions, and other neighbouring cities, directives issued, and styles guides used in the production of this manual.

**Glossary** – an alphabetical list of technical terms relating to construction field services provided by inspectors and contract administrators. Many of the words listed have been italicized and defined in the text.



## Definition of Roles

**Client, Client Division** - Unit or agency that represents funded programs that impact infrastructure within the City's right-of-way, such as Toronto Water, Transportation Services, Solid Waste, TTC, and BIA. In most cases, the Client is accountable to identify and update project limits, scope, budget, and delivery year through the life of projects.

Also referred to as the Asset Owner.

**Construction Supervisor** – On internally inspected projects, Construction Supervisors are responsible for supervising, motivating, training, and the day to day management of construction inspection staff. The Construction Supervisor provides daily functional direction to the Construction Inspection staff as well as dealing with site and contract issues.

For additional details, refer to Chapter 1.

**Consultant** – The Consultant is the person or entity engaged by the City and identified as such in the formal contract agreement. The Consultant can be the architect, engineer, or business entity licensed to practise in the province or territory of the place of the work. The term Consultant means the Consultant or the Consultant's authorized representative.

The Consultant may provide study, design, engineering services, and Contract Administration services for City projects, as stated in the agreement.

**Contract Administrator** – On internally managed projects, the Contract Administrator provides functional direction to the Inspector and is accountable for all matters related to the project, including managing the project's scope, budget, schedule, maintaining contract documentation, and reporting progress to their manager as well as all Clients or Stakeholders. The role involves overseeing the various project states from pre-construction to completion, reviewing Inspector's reports, contract changes and authorizing payments.

When an External Service Provider, typically a Consultant, is involved in the project, they take on the role of Contract Administrator. On these projects, the Consultant must work with the City's Project Lead throughout the project as defined in the agreement.

Details of roles and responsibilities are outlined in the Call Document and consulting services agreement for the project or program. Generally, the City Project Lead is responsible for decisions related to scope, schedule, budget and design impacts, and ensuring that the project is delivered on time and on budget while meeting the City's requirements. The External Service Provider makes recommendations to the City's Project Lead on a variety of items such as Contractor payments and Contract changes.

For both internally and externally managed projects, the Contract Administrator shall be familiar with all submissions, additional approvals, and other items specific to the Contract that are to be completed to the satisfaction of the City at various stages of the construction phase.

See also "Project Lead."

**Contractor** - The person or business that enters into a contract to furnish supplies or perform work at a certain price or rate and with a certain schedule. When in a binding agreement with the City, the Contractor is required to fulfill the obligations as outlined in the contract documents and specifications within a given schedule and price. All City contracts place the onus on the Contractor for complying with all applicable bylaws, statutes, and regulations and for carrying out the works in such a manner so as not to unnecessarily or unreasonably inconvenience the public. The Inspector (for internally managed projects) must assure that the quality of materials and workmanship is not compromised during the Contractor's due process. Any deviation from the contract design or specifications must be approved by the City prior to being implemented.

It is the Contractor's responsibility to direct their staff and subcontractors.

**Design Supervisor** – For linear internally designed projects, Design Supervisors are responsible for supervising the designers and draftspersons as they complete the design, as per the scope of work and schedule.

**Division Head** – Reports directly to the Deputy City Manager and is responsible for setting the overall strategic direction of their division by establishing its goals and objectives. Also responsible for establishing effective working relationships with other departments such as Corporate Services, Finance,

Economic Development Culture and Tourism, City Planning, as well as suppliers, union officials and the community to achieve mutual objectives. In regards to the processes described in this manual their role is to review and approve projects within their delegated signing authority. For ECS, this is the Chief Engineer and Executive Director. For Toronto Water and Transportation Services, this is the General Manager.

**External Service Provider** – A person or entity engaged by the City to provide services including but not limited to consulting, design, and contract administration.

See also "Consultant", "Contract Administrator."

**Fairness Consultant** – A third party retained to assess the procurement process and provide assurance that all components and/or proponents on a call were evaluated objectively and in accordance with approved and required procedures.

**Field Ambassador** - The Field Ambassador is the dedicated point of contact for the general public during program delivered construction projects, such as the Basement Flooding Protection Program. In a typical project, the Contract Administrator is the main point of contact for the general public, and the Inspector directs on-site communications. When a Field Ambassador is involved in a project, their role is to provide direct and timely response to issues from the public, reducing the amount of involvement between the public and the Contractor and construction delivery staff.

**General Contractor** – The person or business who contracts for and takes responsibility for completing a construction project. The General Contractor also hires, supervises, and pays all subcontractors and suppliers.

**Inspector** – The Inspector leads all inspection activities on site and works directly with the Contract Administrator. The Inspector also documents field activities completed by the Contractor. For further detail, refer to Chapter 1.

**Operations Lead** – On Major Infrastructure and Facilities projects, this is the Operations staff member who is the single point of contact for Operations. The Operations Lead is assigned to assist the Project Lead by assembling an Operations review team for Operability and Maintainability review of the new Capital Project.

**Program Manager** - When a collection of projects are being delivered under a Program Management structure by External Service Providers, the financial and strategic aspects of the program are overseen by a Program Manager. The Program Manager also works in conjunction with Project Leads, who manage the day-to-day activities of the individual projects.

**Project Lead** – The Project Lead is the project engineer, project manager, senior project engineer, or senior project manager who is accountable for ensuring the completion of the project from pre-design to the end of the warranty period.

While a contract is in the pre-design, design, and tender stages, responsibilities of the Project Lead include confirming the scope with the various internal Clients, liaising with internal and external Stakeholders, overseeing the completion of the design (overseeing the Consultant through completion of design, in some cases), obtaining all necessary approvals, as well as developing, reviewing and tendering the contract documents.

After an internally managed contract has been awarded, the role of Contract Administrator is taken on by the Project Lead. Responsibilities include overseeing the construction phase, managing the approval of change orders, managing the approval of monthly payment certificates and ensuring final acceptance of the work at the various stages of construction.

After an externally managed contract has been awarded, the Consultant is usually assigned the role of Contract Administrator and reports to the City Project Lead. The City Project Lead provides support and oversight on items such as payments and contract changes, upon receipt of recommendations from the Consultant Contract Administrator. The Project Lead works with the Consultant to ensure that the projects are designed and constructed within budget, schedule, as per City and applicable standards, and meet the expectations of the Clients.

On both internally and externally managed contracts, final authorization on payments is provided at manager level. Authorization of Changes in the Work are determined by signing authority, in accordance with the Financial Control By-law. The Project Lead liaises with internal and external Clients or Stakeholders and is the single point of contact for the Client Division.

See also "Contract Administrator."

**Stakeholders** – The units, groups, or individuals that may affect, be affected by, or perceive themselves to be affected by a decision, activity, or outcome of a project.

# Chapter 1: Project Team

## 1.1 Introduction

This chapter covers the responsibilities of inspectors, contract administrators, contractors, engineering surveys, assistant inspectors and inspection coordinators. For defined terms of each role, refer to the Capital Works Procedures Manual.

It is extremely important to have an appropriate balance between protecting the interest of the City and being fair to the contractor. Inspectors and contract administrators must be fair in their dealings with contractors, consultants, and others while maintaining a firm and reasonable approach to ensure that contract standards and specifications are met.

## 1.2 Inspectors

The importance of proper inspection on a construction project cannot be over emphasized and cannot occur without a properly trained inspector. The inspector provides the essential link between the City, the contractor, and the public.

The main duty of an inspector is to protect the interest of the City while assuring that the works are constructed properly and in accordance with the contract documents. All City contracts place the onus on the contractor for complying with all applicable bylaws, statutes, and regulations and so on and for carrying out the works in such a manner so as not to unnecessarily or unreasonably inconvenience the public. While it is the contractor's responsibility to comply with the aforementioned, it is the inspector's duty to ensure compliance with the contract documents and assure that the City receives the product specified in the contract documents.

### 1.2.1 Without External Service Provider

The City inspector leads all inspection activities on site and works directly with the contract administrator. The inspector also documents field activities by the contractor.

The contractor coordinates with the appropriate operating divisions, Toronto Police Services, TTC, Enbridge Gas, Bell, Rogers Cable, Transportation Services, Toronto Water and so on.

The inspector shall follow the Toronto Water protocol for shut-off valves.

The inspector also inspects work for conformance with the contract documents and prepares daily and weekly inspection reports. The contract administrator and the inspector should meet prior to project start up to discuss project specific requirements. Some of the additional activities that the inspector is responsible for are as follows:

#### *Documentation*

- Maintain project field documentation according to Chapter 4, Field Construction Procedures of this manual.
- Create water or sewer service cards or both (more details in Section 4.14).
- Compile information with regards to all field changes—red line information—in the contract document for as-built drawing preparation.
- Provide observations in writing along with photographs of any noncompliance issues for review and possible use by the contract administrator for the contractor performance evaluation.
- Track equipment on site and match the equipment to the appropriate OPSS 127 rate in case of future time & material work and mark the daily work report based on the form that lists the equipment provided by the contractor, which is given to the contract administrator at the pre-construction meeting.

#### *Coordination*

Coordinate construction activities such as testing, pre-engineering work, utility work and operation of City watermain valves by Toronto Water with contractor's field supervisors, operations staff, and testing companies contracted by the City.

#### *Payment*

Measure and document quantities of work completed for payment purposes. Verify work progress and assist in reviewing contractor's pay request where applicable.

#### *Scheduling*



Inform the contract administrator on the contractor's method of construction and progress.

#### *Materials and Testing*

Accept or reject materials delivered to site that do not meet specifications or that are delivered in a method that does not match protocol. If the rejection is overridden by the contract administrator or someone else, the inspector can take note of any out-of-protocol activities on their daily report.

Coordinate and observe materials testing, sampling, collecting tickets, weigh bills and so forth.

#### *Meetings*

Attend pre-construction and subsequent construction progress meetings to support the project manager with firsthand site knowledge that could be applicable to discussions/negotiations with the contractor and taking meeting notes as required.

#### *Change Management*

Assist the contract administrator with the change management process, submittal process, progress payments, information from the field, and so forth.

#### *Public Relations*

Respond to the public and direct them to the proper authority.

#### *Project Close-out*

Assist with warranty inspection prior to the end of the guarantee maintenance period.

Develop deficiency lists with contract administrator and the contractor and conduct post-construction inspections with assistance of the client groups and pre-end of warranty inspection.

### **1.2.2 With External Service Provider**

When an external service provider is involved in the project, it acts as the owner's representative and completes all of the tasks listed above that the inspector typically carries out and as stated in the Request for Proposal (RFP) and consulting

services agreement for the project or program. On these projects, the external service provider is the inspector. This role is sometimes referred to as the resident inspector, site inspector, site representative, field inspector, field representative or resident engineer.

### **1.2.3 Development Engineering Inspectors / Engineering Transit Review Inspectors**

The role is specific to the Engineering Review section and explained more in Chapter 5, *Development Engineering / Engineering Transit Review*.

## **1.3 City Project Lead**

On internally managed projects, the project lead provides functional project direction to the inspector and is accountable for all matters related to the project. This role includes managing the project's scope, budget, schedule, and reporting progress to the unit's manager as well as all project clients or stakeholders. With internally managed projects, the project lead is often also the contract administrator.

When an external service provider is involved on a project and is assigned the role of the contract administrator, the external service provider—typically a consultant—is managed by the City project lead. The City project lead provides support and oversight along with final authorization on items such as payments and contract changes, upon receipt of recommendations from the Consultant contract administrator. The City project lead also liaises with internal and external client or stakeholders.

The City project lead must review and be familiar with the RFP terms and conditions, RFP appendices, as well as the technical and financial proposal from the external service provider. This is done to ensure that the consulting assignment can be managed in accordance with the scope and the terms and conditions of the consulting agreement. The consulting agreement includes the RFP, any addenda, cost proposal, and the legal agreement.

The City project lead must ensure that the consultant involves experienced staff as identified in their original proposal. If a staff change is proposed by the consultant, the approval process identified in the *Capital Works Procedures Manual* must be followed.

## 1.4 Contract Administrators

The City's project lead must ensure that for internal and external contracts, contract administrators are in compliance with the various terms of the construction contract.

### 1.4.1 Without External Service Provider

The contract administrator is responsible for a number of tasks related to contract management of the project. They provide functional direction to the inspector and are accountable for all matters related to the project in accordance with the contract documents. They also provide project oversight, manage project within scope, budget, schedule, and report project progress to city management.

The following are some of the activities that the contract administrator is responsible for:

#### *Documentation*

- Maintain project documentation
- Review inspector's daily and weekly reports when authorization needed to generate progress payments and/or Estimate of Units
- Certify substantial performance and completion

#### *Meetings*

Chair meetings such as pre-construction, progress, schedule and so on and prepares meeting minutes.

Call for special meetings when necessary such as pre-paving, major water connection work, etc.

#### *Change Management*

Process contract changes per the change management protocols.

#### *Payment*

Review, authorize, and process contractor progress payments. Ensure appropriate permits such as road cut permits are obtained.

#### *Materials and Testing*

Review third party testing company reports and follow up on non-compliance with contract plans and specifications. Inspector is to be copied on all reports.

#### *Coordination*

Coordinate activities with other agencies, city divisions, and any public liaison committee. Manage third party activities in consultation with the inspector. Maintain project files, both electronic and hardcopy.

#### *Conflict Resolution*

Lead conflict resolution procedures and construction claims resolution process.

#### *Warranty*

Initiate and oversee completion of warranty work prior to the end of the guaranteed maintenance period. Coordinate and arrange meeting for end of project and warranty inspections.

### **1.4.2 With External Service Provider**

When an external service provider, typically a consultant, is involved in the project, it acts as the owner's contract administrator and shall complete all of the tasks listed above that the owner typically conducts. On these projects, the consultant must work with the City's project lead throughout the project as defined in the Request for Proposal (RFP). Details of roles and responsibilities are outlined in the RFP and consulting services agreement for the project or program. Generally, the City's project lead is responsible for decisions related to scope, schedule, budget and design impacts, and ensuring that the project is delivered on time and on budget while meeting the City's requirements. The external service provider reviews and makes recommendations to the City's project lead on a variety of items such as contractor payments, and contract modifications. Examples include change directives, change orders, and so on whereby the City provides the final approvals.

The contract administrator must be an active participant in all meetings and communications, including at a minimum, monthly site reviews.

#### *Other References:*

For information related to the role of the contract administrator, see the *Capital Works Procedures Manual*, Roles and Responsibilities.

For the definition of contract administrator, see *General Conditions of Contract*.

## 1.5 Contractor

The contractor, when in a binding agreement with the City, is required to fulfill the obligations as outlined in the contract documents and specifications within a given schedule and price. Any deviation from the contract design or specifications must be approved by the contract administrator and the City prior to being implemented.

It is the contractor's responsibility to direct their staff and sub-contractors. An inspector should not direct the means and methods of the delivery of the project, but should ensure that the contractor provides acceptable methods of good workmanship and quality of work according to the contract.

Other *References*:

For the definition of contractor, see *General Conditions of Contract*.

## 1.6 Engineering Surveys

The Engineering Surveys unit in the Engineering Support Services section provides layout and support to internally delivered Capital Works Program projects in coordination with managers of the Design & Construction, Transportation Infrastructure section. Engineering Surveys will:

- Attend construction meetings as required.
- Work with contract administrator and contractor to schedule survey requirements to effectively manage the survey and field layouts to avoid costly re-layouts.
- Perform and record the construction layout:
  - Establish and keep a record of horizontal and vertical stations along the alignment at an appropriate offset and frequency to enable the accurate construction of the proposed feature.

- Prepare grade sheets and all other field notes to record and convey the work done.
- Record and make notes and sketches of relevant information that will be of value in the subsequent as-built drawings.
- Complete specific requests from the Project Lead during the construction support phase with a minimum of 24 hours notice during regular working hours from Monday to Friday, which may include the following:
  - Provide assistance and input on issues that may arise, requiring revision to completed surveys, and provide remedial work.
  - Provide grade checks on forms and string lines prior to pouring concrete.
  - Provide assistance for the tie-in of underground infrastructure.
  - Assist in final quantity measurements when a dispute arises.
- Not be required to be on site during the construction support phase, unless by specific request from the Project Lead or to continue with construction layout.

## **1.7 Assistant Inspector**

The role of the assistant inspector is to provide assistance to the inspector with daily tasks on a project site. The inspector and the assistant inspector should meet prior to project start up to designate tasks; however, the tasks can be assigned throughout the duration of the project. Strong communication between the assistant inspector and the inspector should occur to ensure all tasks are being completed.

## **1.8 Inspection Coordinator**

The role of the inspection coordinator is to report to the construction supervisor and provide assistance to the inspector. The team should meet prior to project start up to define roles; however, the tasks can be designated throughout the duration of the project. Strong communication between the team should occur to ensure all tasks are being completed.

### 1.8.1 Major Responsibilities

The major responsibilities of the inspection coordinator can include:

- Assist with assigning, monitoring and covering off for construction inspection staff, for example the inspector and assistant inspector.
- Notify contractors when they are not following City policies and procedures and notify the contract administrator. Follow up as required.
- Assist project leads with investigation of complaints and deficiencies from residents or councillors and preparing reports.
- Provide measurement spot check on randomly selected items for each payment.
- Liaise with TTC forces when working on joint projects.
- Assist inspectors with measuring work items as needed.
- Carry out other duties as assigned by the construction supervisor, manager, or director.
- Provide coveroff for Construction Supervisor when needed.
- Assist the Construction Supervisor with the review of documentation completed by inspectors and help ensure accuracy of final measured quantities used for payment purposes.

#### *Meetings*

Meet with key team members such as the contract administrator, inspector, and design team as required to discuss specifications and drawings.

Attend pre-construction, progress meetings and other meetings as required.

#### *Documentation*

Assist in the review of plans, specifications, special specifications and drawings.

#### *Warranty*



Assist in the preparation of the 2-year warranty inspection list and updating the 2-year warranty deficiency list.

## 1.9 Construction Supervisor

The construction supervisor is responsible for the day-to-day management of construction inspection staff. The construction supervisor provides daily functional direction to the construction inspection staff. The construction supervisor also deals with site and contract issues. Duties can include but are not limited to:

- Review documentation prepared by inspectors, inspection coordinators and assistant inspectors and providing comments in writing for the project file to show due diligence.
- Ensure that the required documentation prepared by inspectors, inspection coordinators and assistant inspectors is prepared in compliance with the Field Services Manual and the most recent directives from the Engineering & Construction Services during the construction and upon completion of the contract.
- Ensure all inspector submittals are saved electronically.
- Ensure that all final calculations are checked for mathematical accuracy.
- Provide constructability review comments to the contract administrator prior to the tendering process.
- Visit inspector work sites to monitor performance at least once per week during the duration of construction to ensure inspector is performing duties as assigned (Note: Inspection coordinator can do this task on behalf of construction supervisor)
- Attend all preconstruction meetings or have the Inspection Coordinator attend in lieu of any absence.
- Attend all progress meetings in which the construction coordinator is not able to attend.

## 1.10 Case Manager

The role of the case manager is specific to the Engineering Review section and is discussed in Chapter 5, *Development Engineering / Engineering Transit Review*.

## **Chapter 2: Project Control**

### **2.1 Meetings**

Various types of meetings are necessary throughout the life of any project. Such meetings can include the following:

- pre-construction meetings
- progress meetings
- pre-concrete pour meetings
- pre-pave meetings

The schedules for meetings are dictated by the project complexity, contract progress, and the need to promptly address major issues. The meeting frequency is determined by the contract administrator and can be determined in conjunction with the inspector and the contractor. In the case where there is a consultant, the meeting frequency is pre-defined in the request for proposal (RFP). Items to be discussed in meetings can include the following:

- health and safety
- summary of contractual milestones
- schedule
- overview of work completed this period—provided by contractor
- a review of construction issue decisions and rationale
- recommended course of action
- protocol for construction changes
- tree protection
- new issues and others
- submittals

The contract administrator chairs the meetings and minutes must be recorded with copies distributed to all attendees, the project team and other key personnel. The inspector attends meetings to support the contract administrator by taking notes and providing firsthand site knowledge that could be applicable to the discussions / negotiations with the contractor. The inspection coordinator should also attend when time permits. A

copy of the meeting minutes should be circulated for comments to all attendees and changes or revisions noted. A copy of the final meeting minutes should always be included into the project files. Minutes are to be provided within 5 business days.

*Other References:*

For information related to the requirements for the pre-construction meetings and site meetings, see the *Capital Works Procedures Manual*, Chapter 1.

## **2.2 Pre-Construction Meetings**

A pre-construction meeting is required to outline and discuss administrative procedures and define responsibilities of the City, contractor(s), subcontractor(s), and consultant(s) in order to complete the project in an efficient and satisfactory manner and in accordance with the contract documents. A sample outline of a pre-construction meeting is referenced in Appendix A, *Forms*. The pre-construction meeting is typically held after the contract is awarded but before the commencement of any work on the contract.

Detailed discussions on method of construction, staging, schedule, and traffic control plan should take place. All relevant submittals are also part of the agenda for the pre-construction meeting. Submittals for mix designs are required prior to pre-pour or pre-pave meetings. The meeting should also include that the inspector is copied on all material testing results.

The contract administrator arranges the time and location, prepares a list of invitees, and sends out meeting notices to all involved parties. Project drawings, documents, design information, environmental data, templates, horizontal and vertical control, construction notices, or any other site specific information as appropriate for the project should be made available to the meeting participants. The contract administrator also advises the contractor on the frequency of contractor performance evaluations during the pre-construction meeting.

The contract administrator chairs the meeting and is responsible for generating and distributing the minutes. The agenda can be revised as appropriate for the contract. At the beginning of the meeting, an introduction of all attendees should be conducted. This includes the name, company, role, and responsibility. In addition, business cards should be distributed to all and an

emergency contact list prepared for distribution. An example contact names sheet is provided below. It is also important to identify key stakeholders during this meeting.

**Table 1: Contact Names Sheet**

Name	Company / Title or Role on contract	Work Number	Fax	Cell Phone	24-hour Emergency Phone	E-mail
-	-	-	-	-	-	-

*Other References:*

For additional information related to the requirements for the pre-construction meeting, see the *Capital Works Procedures Manual*, Chapter 1.

## 2.3 Progress Meetings

Progress meetings are typically held continuously throughout the duration of the project. The frequency of the progress meetings vary depending upon the complexity and length of the project. The contract administrator, inspector, and the contractor should determine the frequency of the progress meetings for each project. In the case where an external service provider is involved, the frequency of the meetings is specified in the RFP.

Progress meetings can address a number of topics and are typically held to encourage communication, resolve any issues, and plan activities before they occur. The following are some items that could be discussed:

- review of previous action items
- contract administration issues such as progress payments and contract changes
- construction schedule: overall schedule and contractor's weekly or biweekly plan
- safety issues
- staging of the work, construction constraints and site clean up
- coordination between construction, plant and district operating divisions in Transportation Services and Toronto Water, Toronto Parking Authority, external

service providers such as material testing companies and so on

- construction submittals, change order document status
- inspection and testing
- status of permits, for example, RoDARS, cut permits, MECP permits, and so on
- subcontractor status
- deficiency items
- third party or public complaints
- engineering surveys
- traffic and pedestrian access
- communication
- RFI's and field instructions
- RFQ's and change directives/orders
- claims
- utility conflicts/issues/coordination
- design/construction changes
- QAQC

Extended hours should be as per the contract documents

- Provide 48 hours notice of scheduling change during weekdays, and 72 hours notice for weekend and night work, with specific working hours. Standard working hours of 7 am to 7pm will be followed if notice is not provided.

Progress meetings are chaired by the contract administrator and are attended by the inspector and key contractor personnel. However, engineering surveys, Transportation Services, or plant operations staff and other key personnel may attend as requested. Meeting minutes with action items are to be prepared and distributed for each meeting.

A final progress meeting should be held to wrap up the project and close out any issues.

*Other References:*

For further information related to site meetings, see the Capital Works Procedures Manual, Chapter 1.

## **2.4 Joint Health and Safety Meetings**

Joint health and safety committees are a requirement of the Occupational Health and Safety Act and Regulations for Construction Projects (Ontario Regulation 213/91), where there are more than 20 workers regularly employed, designated substances are present on site, or there is an order by the Ministry of Labour to have a committee. It is the responsibility of the constructor on the project to designate a joint health and safety committee and to hold regular joint health and safety meetings.

Joint health and safety meetings can provide a forum for the following:

- identification of changes and hazards
- exchange of documentation
- demonstration of a safety-conscious work atmosphere
- expectations for safety on site
- provides an opportunity to resolve outstanding issues

Significant issues in the field that require immediate attention should not be left until the next joint health and safety meeting to be discussed.

When the City is not the constructor, the inspector may attend joint health and safety meetings as an observer only. The inspector may participate in coordination efforts such as contacting Toronto Water for valve operations. Attending these meetings will also help the inspector to determine the level of safety culture from the contractor. The constructor chairs the meeting and prepares meeting minutes; however, the contract administrator should ensure that they receive agendas and meeting minutes from these meetings.

For Toronto Water facilities projects where the City is the constructor, the plant designates a competent staff person from Toronto Water to be the health and safety supervisor for that construction project to fulfill the requirements of the Occupational Health and Safety Act. In the case where the contractor is the constructor, the contractor will have a competent person on site to act as supervisor to fulfill the requirements of the Occupational Health and Safety Act and may be requested to attend the plant joint health and safety meetings as required to ensure safety of the facility.

## 2.5 Schedule

In accordance with contract documents, the contractor develops a construction schedule for projects. Once an initial detailed schedule has been developed, it is submitted by the contractor, reviewed by the contract administrator, and modified by the contractor as necessary to ensure compliance with specifications. This forms the baseline project schedule. The progress schedule may change during the course of the project, but the baseline schedule does not unless an agreed new baseline schedule is approved. The contractor is required to update the progress schedule only and the baseline schedule is used for reference and to evaluate any potential claims.

The contract administrator, inspector, engineering surveys, and contractor use the schedule as a tool to:

- Evaluate impact of change requests with respect to schedule
- Aid in coordination of scheduled events and specified milestones
- Identify and coordinate plant operations with construction activities and with third parties, such as utilities, regulatory bodies and so on
- Communicate project status to stakeholders
- Identify potential delays, liquidated damages and so forth

The inspector is responsible for monitoring and noting any considerable changes to the scheduled activities and should notify the contract administrator of any deviations based upon the agreed method of communication.

Examples of activities that could impact schedule are detailed below. These examples should be looked for and noted in the daily reports:

- health and safety issues
- changes in workforce
- unforeseen conditions
- inclement weather conditions
- utility locates and mark-ups
- change of subcontractor(s)



- change in soil and groundwater conditions
- insufficient workforce, equipment or materials
- non-compliant or failed materials tests
- changes in the work, for example extra work or additional work
- equipment breakdown
- failure of contractor and subcontractor to show up on time
- lack of coordination from third parties, such as agencies, utilities, regulators, testing companies
- regulatory approvals or orders
- delivery of materials
- design issues
- public relations
- labour disputes, strikes, lockouts or other foreseen disruptions
- archaeological finds

The contract administrator and the inspector should collectively review the progress schedule with the contractor on a regular basis—at least monthly—and at a minimum, review the contractor's progress with key project milestones. The contract administrator and inspector should ensure that the schedule is included as an agenda item at each construction progress meeting.

#### *Other References:*

For the contractor's responsibilities and control of work related to scheduling, see the *General Conditions of Contract*.

## **2.6 Conflict Resolution**

During any project, differences of opinion regarding contract responsibilities, contract changes, budget, schedule, and contract interpretation can occur between the contractor and contract administrator or inspector or both.

### **2.6.1 Types of Conflicts:**

Many conflicts that do not involve change in scope, design changes, extra work and changes in schedule and can be

resolved between the inspector and the contractor, independently of the contract administrator. However, the contract administrator is to be notified of all issues resolved independently on site. These may include:

- compliance of the work in accordance with the contract documents
  - defective or incomplete work or materials
  - work location sequence (as per approved schedule)
  - not following applicable laws and regulations
- access to work or public access
- property damage
  - notification to contractor
  - direct public to City of Toronto claims process

Conflicts affecting design, cost, or scope, or that cannot be resolved quickly require immediate notification to the contract administrator. The inspector may be requested to assist the contract administrator. These conflicts can include any unresolved items as listed above or any of the following:

- scope, design changes
- cost
- schedule
- quantities
- quality—issues unresolved in the field
- health and safety issues as per the contract and Ministry of Labour requirements
- contract interpretation

## **2.6.2 Conflict Resolution Procedures**

- The initial level of conflict resolution is between the contractor and the inspector. The construction supervisor may offer guidance.
- The representatives should discuss any issues that arise during construction that they believe they are authorized to resolve.
- If the resolution requires a higher degree of authority, such as if it affects design, cost, schedule, or scope of

the work, or if the issue cannot be resolved quickly, the issue must be forwarded to the contract administrator for action.

It is important to document the issue and resolution in its entirety in the Inspector's Daily Report regardless of how simple the issue may appear, as this information could be useful in the future in the event of a claim or other dispute. This information must also be communicated to the contract administrator as soon as possible, preferably through an e-mail message.

If a conflict between the Owner and the Contractor fails to get resolved, resolution may be achieved through the adjudication process. For more information on adjudication, refer to Section 4.18.1 - Adjudication.

### **2.6.3 Resident / Private Property Owner Complaints & Claims**

When there is a private property damage issue the inspector must notify the contractor to address (correct) the problem. If the contractor does not believe it is at fault, the inspector should refer the dispute to the contract administrator. The inspector must document the issue and take any photographs as necessary. The contract administrator may suggest that the private property owner submit a claim in accordance with the City's claims process. All claims by the public against the City for injury or property damage should be referred to City Clerk's Office. For more information on how a member of the public can submit a claim, refer to the claims process on the City [website](#). Staff should not admit to any fault when contacted by the public about any claims.

ECS has developed a process for third party liability claims involving Contractors. The process is included in Appendix C of the Insurance & Risk Management Claims Manual, available from the Insurance & Risk Management unit.

It should be noted that the Tender document includes a provision that lays out the Contractor's responsibilities and obligations in responding to third party claims as well as City's responsibilities to ensure the claims are handled properly and in a timely manner.

Detailed information on claims procedures can be found on the [Insurance & Risk Management intranet](#).

*Other References:*

For specific requirements related to the contractor claims procedures, see *Capital Works Procedures Manual*, Chapter 6.

For requirements related to the claims, negotiations, the arbitration process, and mediation process, see *General Conditions of Contract*

## Chapter 3: Communication

### 3.1 Communications

A strong communication link between all parties is critical to the success of any project. Inspectors should be attentive, professional, and fair when dealing with contractors. Instructions should be clear, concise, and should be limited to issues within the scope of the contract documents. Instructions should only be given to authorized contractor personnel such as the supervisor. Instructions should never be given to the contractor's subcontractors. Important instructions should be given in writing, using the standard forms provided in Appendix A, *Forms*. Instructions for minor issues, such as those that do not impact schedule, budget, scope, or design, may be verbal after confirmation is obtained from the contract administrator. All verbal instructions must be recorded in the inspector's daily report.

Any misunderstandings or differences of opinion between the inspector and the contractor should be resolved promptly, fairly, and within the scope of the contract documents. Issues or disagreements that cannot be resolved at the field level should be escalated to the contract administrator.

All correspondence, transmittals of drawings, and information from the contractors and vendors should be submitted directly to the contract administrator. Hard copies of all documents are maintained in the project files.

The inspector must notify the Toronto Water division directly for coordination of valve and hydrant operation in writing. The contractor should not contact Toronto Water directly; rather he or she should be instructed to contact the inspector on the site for any valve opening/closing needs.

### 3.2 Telephone Conversations

A record of third party telephone conversations of significant issues must be documented in the *Inspector's Daily Report*. Significant issues can include those that address:

- cost
- schedule

- health and safety issues
- scope
- operation impact
- contract interpretation
- information
- contractual matters
- quality assurance results

Any issue that is related to a minor contract interpretation can be dealt with directly by the inspector. If the issue deals with matters beyond this, the contractor should be directed to the contract administrator or the inspector must contact the contract administrator for a resolution.

The inspector should log all conversations in the inspector's daily report. If other parties are relevant to the outcome of a telephone conversation, the contract administrator should distribute the information as appropriate.

### **3.3 Contract Administrator's Site Visits**

Contract administrator's site visits are typically limited and are based on the project's needs. For Major Infrastructure projects, this only happens if the contract administrator is not the resident engineer.

The purpose of site visits can include:

- prestart meeting with inspector
- minimum monthly progress meetings, which includes a full site review
- pre-pave meetings
- monitoring schedule and project progress
- conflict resolution
- meet with public and other project stakeholders
- technical review of and assistance with ongoing construction
- observation or evaluation of field performance tests
- assistance in problem resolution
- assistance in project start-up or project closeout

- participate in final inspection
- others as required

The contract administrator visiting the site should initially meet with the inspector to review procedures and goals of the visit. Before leaving the site, the contract administrator should debrief the inspector. The inspector will then log in the daily report the purpose of the site visit, any engineering issues or observations, requested actions, and any proposed solutions. For details on preparing reports, see section on daily and weekly reports in Chapter 4.

### 3.4 Issue Management and Contract Modifications

This section summarizes the different approaches to be taken to manage project issues that can lead to potential contract modifications. Such project issues typically occur by various means, as described below:

**Changes in the Work** include the deletion, extension, increase, decrease and additions to scope or alteration of lines, grades, dimensions, quantities, methods, drawings, changes in the character of the Work to be done or materials of the Work or part thereof, including changes in geotechnical, subsurface, surface or other conditions.

The process for issues identified and the appropriate action is provided in the *Capital Works Procedures Manual, Chapter 7*.

There are several forms provided as part of the contract modification process that allow for managing changes. These forms include:

- Field Instruction (FI)
- Change Directive (CD)
- Request for Quotation (RFQ) / Contemplated Change Notice (CCN)
- Change Order (CO)

#### 3.4.1 Field Instruction (FI)

The *Field Instruction* form (see Appendix A, *Forms*) is used to provide information or requests to the contractor or to authorize minor variations to the contract documents that do not impact

schedule, scope, cost, or design. Field instructions issued to the contractor can be prepared by the inspector. The contract administrator emails the inspector to issue the field instruction. Field instructions may also be called site instructions or supplementary instructions.

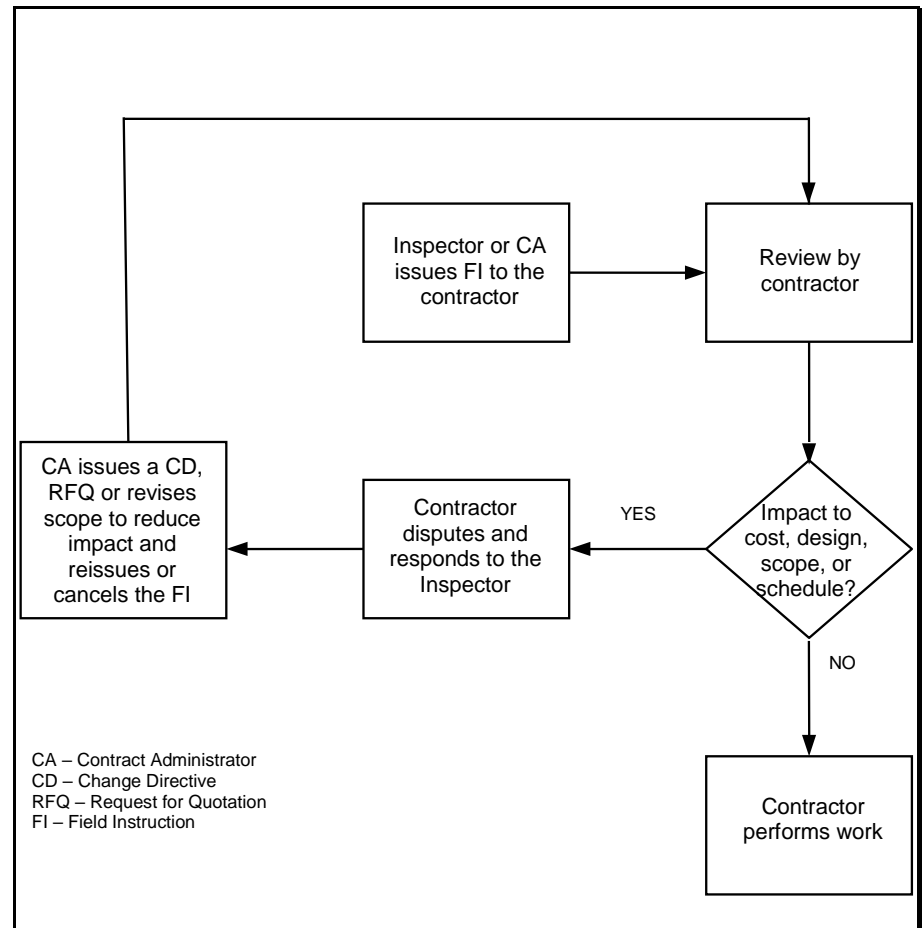
Field instructions may be issued with an email message provided the same information as required on the form is captured and that the email message is printed off and attached to the daily report for the day it was sent.

If the contractor disagrees with the field instruction information, the inspector and the contract administrator must evaluate other options for having the work performed. This can result in the issuance of a change directive or request for quotation, having others perform the work, or revising the scope and re-issuing as the next field instruction.

Field instructions and responses should be numbered and logged for tracking purposes.

The field instruction process is shown in the figure on the following page.



**Figure 1: Field Instruction Process**

### 3.4.2 Change Directive (CD)

Change directives are used to provide written authorization to contractors to proceed with performing changes to the original scope of the contract (Changes in Work). In general, change directives are issued when the Change in Work is related to an increase in the quantity of an existing unit price item, or the work must be completed before a change order can be issued: emergencies, on the critical path, or otherwise urgent in nature. Change directives are typically followed by change orders, which formally amend the contract.

A copy of the change directive and supporting documentation must be provided to the inspector. The inspector uses this information to inspect and document the Change in Work completed by the contractor.

Detailed information on issuing change directives is provided in the *Capital Works Procedures Manual, Chapter 7*.

For all Changes in Work performed on a time and material basis, lump sum basis, or unit price basis, the inspector must document manpower, materials, and equipment—including hours worked—on a daily basis in the *Changes in Work Completed* form (see Appendix A, *Forms*) in order to verify progress and facilitate contractor progress payments. The change directive number should always be referenced. For works that take place over multiple days, the final quantity should be summarized on a separate *Report of Changes in Work Completed* form for the contractor so that an invoice can be prepared.

### **3.4.3 Request for Quotation (RFQ)**

Request for Quotations (RFQs) are typically used to obtain detailed pricing and scheduling information on the scope of work when there is an anticipated Change in Work. The *Request for Quotation* form (see Appendix A, *Forms*) is prepared by the contract administrator and provided to the contractor. Detailed information regarding Requests for Quotation is provided in the *Capital Works Procedures Manual, Chapter 7*.

### **3.4.4 Change Order (CO)**

Change orders are used to amend the formal contract to reflect the Change in Work, and specify the terms of payment and extensions of time for the work. Change orders are also used to amend contracts to reflect decreases or credits for deleted work scope. Detailed information regarding change orders, and supporting documentation such as an RFQ, email correspondence, daily reports, etc., are provided in the *Capital Works Procedures Manual, Chapter 7*.

A copy of the change order and supporting documentation must be provided to the inspector. The inspector uses the information to inspect and document the Change in Work completed by the contractor.

For all Changes in Work performed on a time and material basis, negotiated lump sum, or negotiated unit price basis, the inspector must document manpower, materials, and equipment—including hours worked—on a daily basis in the *Report of Changes in Work Completed* form (see Appendix A, *Forms*) in order to verify progress and facilitate contractor progress payments. The change order number should always be referenced. For works that take place over multiple days, the

final quantity should be summarized on a separate *Report of Changes in Work Completed* form for the contractor so that an invoice can be prepared.

For works performed on a negotiated lump sum or negotiated unit price basis, the *Inspector's Daily Report* form is to be completed for verification of progress payments.

The measurement for change in work should also be reviewed for calculations, errors and omissions, and adequacy of supporting documentation.

*Other References:*

For specific requirements related to changes during construction, see the *Capital Works Procedures Manual*, Chapter 7.

### **3.5 Public Relations**

Inspectors are representatives of the City of Toronto. On a project, contractors may also be perceived by the public as representatives of the City—which they are not. As such, the public perception of the City is developed from the actions and attitudes of all people on a project. All on-site personnel should conduct themselves in a manner that earns the respect and confidence of the general public, as well as property owners, business owners, local citizens, tourists, and municipal officials. Courteous explanations and answers to questions raised by the public are essential in maintaining the good image of the City.

Projects involving the Toronto Transit Commission (TTC), large scale, or contentious projects have access to the Public Consultation Unit. In this scenario, the Public Consultations Unit would attend meetings as required, prepare and distribute notices, and address concerns raised by the public.

All media requests or questions should be directed to the contract administrator, who will forward the request to the established public relations lead.

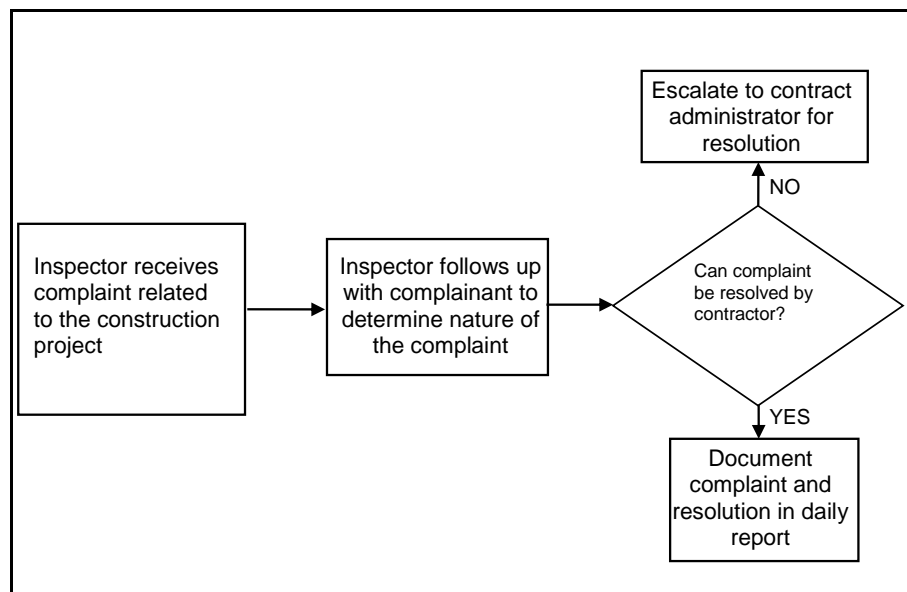
When a public complaint is made, the inspector should attempt to resolve the issue in the field with the contractor. There may be cases when the public is visibly upset and confrontational about a particular issue or the contractor may not be willing to resolve the issue. In these situations, the issue must be escalated to the contract administrator. All complaints made

must be documented by the inspector in the daily report and photographs taken as supporting documentation.

The contractor typically takes a pre-construction video or photographs of the area prior to start of work. This could also be utilized to resolve issues, should a conflict occur.

The figure below outlines a workflow for the complaint process.

**Figure 2: Complaint Process**



If a complaint relating to a construction project cannot be resolved by the contract administrator, the resident can be directed to the Program Manager, Customer Service and Issues Management for further response and resolution. If a resident has a complaint regarding damages to their property or bodily injury resulting from construction, the resident or business owner may submit a claim to the City in accordance with the City's claim process. For more information on how a member of the public can submit a claim, refer to the claims process on the City [website](#).

#### *Other References:*

For resident or property owner complaints or claims, see General Conditions of Contract.

### **3.6 Health and Safety**

All individuals on site are responsible for becoming familiar with and fully complying with applicable regulations and codes, their company health and safety policies and procedures, and the health and safety requirements of the constructor. For more information, see Appendix G, *Health and Safety*.

### **3.7 Spills Response**

All spills aside from regular collection of rainwater must be reported to the contract administrator immediately for follow up in accordance with the Toronto Water spills response plan and any other applicable legislation.

Spill requirements for the contractor are outlined in the contract documents. The inspector should monitor for compliance, should a spill occur.

## Chapter 4: Field Construction Procedures

### 4.1 Filing System

Maintaining a detailed and complete project file is a critical part of project management. The proper handling of documents by field and office staff determines the accuracy of the files and records. Without the collective cooperation of every member of the project team, document management and control cannot be effective.

Throughout the course of a project, different members of the project team will collect various items of documentation that are pertinent to their specific roles. At project close-out, all documents must be forwarded to the contract administrator for incorporation in the project files and to satisfy the requirements of the Request for Proposal. The contract administrator will review and submit the materials to the contract administration section for filing. External service providers shall manage their filing system in accordance with the Request for Proposal.

### 4.2 Examples of documents to be filed

The various items of documentation accumulated throughout the life of a project will eventually be maintained in a master project file, which will include the following:

**Contract administration file** – folders on tender books, low bidder, purchase requisitions, purchase orders, and purchase order amendments. This is maintained by the Contracts, Tenders, and Payments unit.

**Construction file** – folders on quality assurance, pre-construction and construction meeting minutes, final measurements, deficiency list, photographs, copies of contractor submittals such as mix designs, traffic control plans, utility stakeouts, and so on. This is maintained by the contract administrator / project lead until construction ends and then sent to the Contracts, Tenders, and Payments unit for storage until the warranty expires.

**Payment file** – folders on payment certificates, change directives, change orders and so on. This is maintained by the contract administrator / project lead until construction ends and

then sent to the Contracts, Tenders, and Payments unit for storage until the warranty expires.

**Inspector file** – folders on complete contract documents, contract price list, supporting documentation, field instructions log and so on.

**Daily reports and tickets file** – folders on inspector's daily reports, material tickets, and construction photographs and so on. This is maintained by the contract administrator / project lead until construction ends and then sent to the Contracts, Tenders, and Payments unit for storage until the warranty expires.

### 4.3 Role of Inspector in Filing

The inspector should also maintain a similar temporary file structure for all documentation in the field. Any documents in the inspector's possession are to be uploaded to ProjectWise and filed appropriately. The proper handling of documents by field staff determines the accuracy of the files and records. Without the collective cooperation of every member of the team, document management and control cannot be effective.

At project close-out (end of the warranty period), all physical documents must be forwarded to the contract administrator for incorporation in the project files once final payment is completed and the purchase order is closed.

### 4.4 Role of Project Managers on Externally-Managed Files

All documents should be forwarded monthly to the contract administrator for incorporation into the project file, as per the RFP requirements prior to payments being issued.

*Other References:*

For information related to filing, see *Capital Works Procedures Manual*, Chapter 9.

### 4.5 Daily and Weekly Reports

Each inspector must prepare a daily report for each workday as defined in the contract at the project site so that the events of that day may be recreated by those not on site, or who may

need information to deal with the claims from the contractor as well as claims or complaints from the public. This requirement also applies to the external contract administrator when they are assigned site activities. On linear infrastructure projects, the inspector must also complete a weekly inspection summary report based on the daily reports.

The Inspector's Daily Report can mean either:

- Inspector's Daily Report for Storm Sewer / Sanitary Sewer/ Watermain
- Inspector's Daily Report for Road / Sidewalk
- Inspector's Daily Report for Facilities / Vertical Works.

The weekly report and supporting daily reports must be submitted to the contract administrator through the construction supervisor. Each daily report must be supported by weigh tickets for all material delivered to site and calculator tape or on an Excel spreadsheet showing the total quantities for the respective tender items where applicable. Construction Inspection shall review and confirm the quantities based on inspector and field test reports. The *Inspector's Daily Report* and *Inspector's Weekly Report* forms are provided in Appendix A, *Forms*.

#### 4.5.1 Signing Reports

Daily and weekly reports will be signed off by the inspector, while the contract administrator is expected to sign off on the 4<sup>th</sup> weekly report for payment purposes. For linear infrastructure projects, only the first page of the daily reports, which shows total labour hours, equipment hours, material used and other totalized quantities, are to be shown to and signed by the contractor. If the contractor declines to sign, the inspector will record in the report and in their daily log book that the contractor has been shown or advised of the report's first page and why sign off was declined. The inspector shall complete daily reports for changes in work done under time and material and the inspector, contractor, and contract administrator shall sign-off the same.

**Note:** Inspectors daily reports – inspectors are required to sign and submit the *Inspector's Daily Report* form to the office for processing. On linear infrastructure projects, the contractor is also required to co-sign the front page of the *Inspector's Daily Report* form and to verify that the work recorded on the form



and only the work recorded on the form has indeed been performed by the contractor. The contractor is not to view or sign the page with the remarks.

Inspector's daily report additional remarks— inspectors can use the *Inspector's Daily Report Additional Remarks* form to record various payments or non-payment related activities occurred and observed by the inspectors on site and to provide comments, if necessary, to support and supplement the inspector's daily report. Inspectors are required to sign the Additional Remarks form as part of their submission to the office. The contractor does not co-sign the Additional Remarks form.

Daily report of changes in work completed (linear infrastructure projects) – both the inspector and the contractor have to sign the *Report of Changes in Work Completed* form to confirm that the changes in the work have been performed and the form can be used as a reference document for payment.

Inspectors' weekly reports – The weekly reports also have a signature block for contractors to sign and the response is the same as the daily report.

**Note:** For projects with an external service provider – if time and materials work is being performed, both the site representative or the owner's representative on site, and the contractor are to sign the *Daily Report – Facilities* form related to time and material work. Consultants may use third party software to generate report templates provided that they contain the same information as the City's report template.

#### **4.5.2 Content of Report**

The inspector should notify the contract administrator of any provisional work performed on site by noting it on the daily report. All work done as a result of a change in the work must be approved by the contract administrator prior to any work starting.

Daily reports should be accurate and thorough, addressing factual information only and avoiding opinion, conjecture, or speculation. All entries pertaining to a single contract must be maintained separately from all other projects. If there is more than one location within the contract then separate entries or daily reports or both may be done when work is done on each

individual location. The daily report should contain the following information:

- Report every workday, which can include Saturday, Sunday, Holidays, and/or night work if stated as mandatory in the contract. If no work is done on a workday, the date should be entered and the reason for not working should be recorded, for example, “No activities scheduled for this date due to (reason), no on-site inspection services provided”.
- Report when Report of Changes in Work Completed form has been used.
- Include references to on-site conversations and phone calls. For more information on communications and telephone conversations, see Chapter 3.
- Document site activities. References to specific scheduled activities should be made in accordance with the specific areas of responsibility. Problems or abnormal occurrences should be described clearly and photographed, including the reason for the specific event.

The following are examples of observations, tasks, and site activities that are typical report entries for linear projects. As such, not all tasks are applicable to facility or vertical projects:

- Document repairs to existing or contractor damaged utilities using the *Record of Damaged Utilities* Form (see Appendix A, Forms).
- Report the number of construction employees, by trade, on the daily report. Note contractors and individual subcontractors. This information should be obtained from the contractor; however, the number of employees on site should be corroborated by visual count.
- Report the work performed by the contractor and reference scheduled activities when possible.
- Record all individual items worked on by the contractor on a daily basis referring to survey chainages, where possible or measurement ties and street addresses as well as showing calculations for total quantities performed each day.
- Report on soil conditions and type of shoring used for all underground construction work.

- Report the type, model number, and number of each piece of heavy equipment on site. Note whether the equipment is owned or rented, and if the equipment is working, on standby, or not in use.
- Report quantities installed for each tender item, for example: cubic metres of concrete, linear metres of pipe noting each relevant contract item number when applicable as well as indicating starting and ending survey chainages wherever possible or measurement ties and street address with calculations.
- Report and photograph work on provisional items performed including the quantities, location, and time of the work, and the reason for the work.
- Report extra work with the change directive reference number if applicable.
- Document daily any situations and reasons where the Contract Administrator has approved deviation from the contract requirements.
- Payment on third party invoices, for example paid duty officer charges must be based on original invoices submitted by contractor. Photocopies of invoices should not be processed for payment.
- Contract administrator and inspector should review documentation supporting progress payment, including documentation on third party work.
- Refer to field tests as either pass or fail; if fail, identify course of action. Collect and attach to daily reports all field test results where the documents are provided by the material testing consultant.
- Potential out of scope work.
- Document and photograph areas that could not be constructed in accordance with specifications due to unforeseen circumstances.
- Document and photograph sensitive areas that may result in potential claims.
- Every time there is a change to the traffic control plan and work zone location has changed.
- All visitors to the site, the reason for their attendance, time on site and instructions, directions or comments provided.

- Complete all checkboxes noted in the daily report form or any other form required to be completed and submitted.

Report use of testing services received in all field test reports. If subcontracted, include name of company, the number of people, type, and number of tests, and time spent on testing and on the site.

- When a specific scheduled activity or measured event is completed, for example: a portion of a basic slab is cast, a length of pipeline is laid, a specific piece of equipment is set, and the date should be recorded.
- Note any questions on workmanship, to whom the question was raised, and the context in which the question was asked, for example, was it a complaint, a general comment, or a question regarding scheduling.
- Record the content, date, and parties involved of all substantive conversations held with the contractor.
- Record all materials or equipment delivered and obtain delivery tickets to be reviewed and attached to daily reports.
- Ensure that proper documentation is prepared and filed for the manufacturer's representative site visits in compliance with contract documents for equipment checkout and testing.
- Label last daily report made of significant field activities "project complete except for deficiencies". Afterwards, prepare daily reports on the day when deficiencies were addressed.

#### **4.5.3 Photography Requirements**

Photographs should be taken on a daily basis for any unusual activities observed or to demonstrate progress. This can include sub-excavations, buried material or equipment, or anything that could lead to a potential third party or contractor claim.

Photographs should be named accordingly and uploaded to the appropriate project folders on the City's server.

On the daily report, note the number of photographs taken each day with the approximate time and a note as to what is in the photos:

On a daily basis, photographs are to be taken of the following:

- Any changed conditions.
  - soil conditions are different than the information presented in the soil report;
  - utility locations are different than the information shown in the Locate Report
  - road closure/setups not in accordance with the Traffic Control Plan
- Any agreed upon extra work or situations where there is a possible claim or dispute.
- Any site safety issues or other issues pertaining to negative contractor performance appraisals.
- All traffic control devices, signing and traffic access if an accident occurs.
- When trenching begins and any changes to the type of shoring, tunnelling or sub-grade conditions.
- End of day site protection measures
- Damages to utilities
- Any damage to City infrastructure.

General photos of the work area are also taken and stored on ProjectWise without needing to be attached to the Daily Report, which include:

- General site set-up where crew(s) are working showing general progress.
- Any time traffic control that has changed from the previous day, unless the contractor has done so and forwarded the information to the inspector and the project manager or contract administrator
- Any location back of the sidewalk such as from lawns or driveways, and so on prior to work.
- Any obvious recent damage adjacent to the work location.

In addition, the inspector should take photographs of the following:

- All key phases and new operations.
- Equipment used on site.

- Typical and representation parts of all underground work such as buried bends, anodes compaction operations, and so forth.

#### **4.5.4 Regulatory Agency Visits**

The inspector will report all regulatory agency visits to the site during construction, irrespectively of whether the regulatory agency inspector has taken any action or not. The regulatory agency inspection and the details of the visits should be recorded in the inspector's daily report. The inspector should report the visits along with the details to the contract administrator who will then send a copy to the Program Manager, Health & Safety & Emergency Planning in the division.

*Other References:*

For information related to daily work records, see *General Conditions of Contract*.

### **4.6 Types of Inspections**

Daily inspections take place throughout the life of a project to ensure work is completed in accordance with contract specifications and to confirm rectification of deficiencies that can be rectified along the way. End-of-construction inspections and warranty inspections are specific types of inspections that address deficiencies at the end of the construction period and near the end of the warranty period, respectively.

#### **4.6.1 Daily Inspection**

Daily inspection encompasses the normal day to day work of the inspector to ensure contract compliance and could include compliance with any and all permits issued by the City of Toronto or other external organizations. These inspections include, utility inspection, development and third party inspection as well as contract inspection. Refer to the the task lists under Appendix B for a more comprehensive list of items requiring inspection.

#### **4.6.2 End-of-Construction Inspection**

End-of-construction inspections are required as part of project close-out to ensure that all requirements of the contract have been met. This inspection must occur prior to the Substantial Performance certificate being issued, and ideally while the

contractor is still on site with traffic control in place. The end-of-construction inspection should be set up by the contract administrator, who would know which client division representatives to invite (BIA, Beautiful City, Transportation, Toronto Water, etc.). The end-of-construction inspection is conducted so that the deficiencies from the deficiency list will be repaired or rectified before the contractor leaves the site, and before Completion is certified.

#### **4.6.3 Warranty Inspection**

The warranty period begins on the date of substantial performance, and is usually 24 months long. Warranty deficiencies must be identified and corrected by the end of the warranty period unless the deficiencies become some sort of hazard to pedestrians or vehicular traffic in which case they shall be rectified immediately.

Three to six months prior to the warranty expiring, the contract administrator will initiate and oversee a joint inspection that is between the contract administrator / inspector and the contractor with an invitation sent to the contractor, and representatives from internal and external client divisions, as appropriate. The warranty inspection should be initiated and set up by the contract administrator, who is aware of which client divisions to invite. Remember that some contractors shut down for the winter months and may not be available to attend between December and May. With major infrastructure projects, warranty inspections are carried out every six months with the third and final inspection taking place six (6) months prior to warranty expiring.

The contract administrator should send out a copy of the as-built drawings with the inspection request. Once the deficiency list is prepared by the inspector, the contract administrator should send it to the contractor a minimum of 60 days prior to the warranty expiry date, along with a copy to the construction supervisor.

When the contractor is ready to repair the deficiencies, it must contact the construction supervisor so that an inspector may be present on site to witness and sign off on the work. Upon rectification of the deficient items, the inspector confirms to the contract administrator that the deficient work has been rectified.

*Other References:*

For information related to warranty monitoring, see the *Capital Works Procedures Manual*, Chapter 8.

## 4.7 Equipment and Material Monitoring

The inspector should be active in the identification of deficient materials or equipment received on site. The inspector should inform the contractor of the deficiencies and record details and actions taken in the *Field Inspection of Materials and Equipment* form (see Appendix A, *Forms*) and on their daily report. For externally managed contracts, the requirements are in the RFP its Appendices. The inspector must also notify the contract administrator. In the event the contractor refuses to comply with the inspector's notification, the contract administrator issues a field instruction. The *Field Instruction* form (see Appendix A, *Forms*) should be filed and transmitted to all parties involved.

The inspector must follow up in the field to ensure that action has been taken on any deficient equipment or material received.

## 4.8 Materials Testing

Materials testing is an important component of any project in ensuring that all materials delivered and installed on a site meet project specifications. In general, the contractor is responsible for quality control, and the City is responsible for quality assurance.

Both the contract administrator and inspector should be familiar with the tests that are available, as well as the required sampling frequency. The contract documents typically make reference to municipal, provincial, or federal codes and standards. There may be exceptions where the contract is tailored, specifying the type and frequency of sampling and testing of construction materials for quality assurance. In cases where batch or lot size of the material supplied and placed does not coincide with those specified in contract documents, the contract administrator may revise the frequency of sampling and testing; however, the rationale for deviating from the contract documents must be documented.

### 4.8.1 Role of Contract Administrator

The contract administrator is responsible for arranging and reviewing laboratory tests. The contract administrator must verify that the minimum quality requirements for materials are



correct on the testing forms and that the appropriate commentary is provided for test results when exceptions are noted. The contract administrator must ensure that inspection staff are advised of these actions.

The material testing company should be invited to the pre-construction meeting by the contract administrator so that they may be informed about the general testing requirements, and other pertinent information as per the RFQ and other contract protocols. The mix designs submitted by the contractor shall be provided for compliance review to the material testing company by the contract administrator.

Contract administrators are required to verify that quality assurance of construction materials, performed by third party consultants, are in accordance with contract documents.

As per the contract "The Contractor shall be responsible for all quality control sampling and testing of all supplied material. The Contractor when requested shall provide the Contract Administrator with a copy of their quality control plan and the results of the tests performed.

The City's project lead is responsible for ensuring that the contract administrator for consultant-managed contracts adhere to the above requirements.

#### **4.8.2 Role of Inspector**

The inspector is responsible for arranging material quality field assurance tests, including having samples picked up for laboratory testing.

The material testing company is expected to immediately report all failed field tests to the inspector, who will then relay the information to the CA. When samples are taken into the Lab for testing, (Asphalt, Concrete and Granular samples), the Lab would sometimes send the Test Results to the CA directly, and not inform the Inspector in any way. Once the CA reviews the Test Results, the CA will then contact the Inspector and Contractor immediately.

Inspectors must be knowledgeable of the contractor's work activities and make the necessary arrangements for sampling and testing as per the terms of the material testing RFQ prior to the contractor conducting the work. The inspector should inquire with the contractor in order to make necessary arrangements for

material tests. Copies of approved mix designs shall be forwarded to the Inspector, prior to work starting.

When materials are delivered to site, the inspector or his or her designate must collect the ticket from each truck prior to discharge for weight based payment items (see Appendix F, *Weight Verification Protocol*).

For all other items delivered to site, material tickets must be collected and attached to the daily reports. If reports are electronic, material tickets are to be stored in an orderly fashion by the inspector and handed over to the contract administrator at the end of the project. If tickets are not produced, the contract administrator is to be notified. The missing tickets are to be documented in the daily reports as well discussed at the progress meetings. Handwritten material tickets are not acceptable. Inspectors have the authority to reject materials that are brought to site without the appropriate documentation. Deviations from this should be documented in the daily report for future reference as per specifications.

All coordination, field test results and sample pick-ups must be documented. For example, the request for sample collection including type of samples to be taken, quantity of samples, time required and so on, must be documented with a copy provided to the material testing company to be attached to the daily report. The material testing company must also submit a copy to the contract administrator with the final invoice.

#### **4.8.3 Field Testing Records**

A record of the field testing, sample preparation, and sample pick-up work should be recorded by the inspector in the daily report. Information kept in the City inspector's daily report should include:

- time on the project,
- name of technician
- tests or samples taken with locations indicated, and
- pass or fail noted and subsequent tests done

The testing technician should provide an immediate copy of the field activity report to the inspector before their departure, and immediately notify the inspector of any failed test results. This field activity report should summarize activities conducted and allow the inspector to verify that the correct information and

locations have been recorded. The inspector will then sign the field activity report and attach it to the daily report.

Any delays with regard to the field testing arrival on site and delays to the field testing representative after they arrived on site are to be documented by the inspector as under the terms of the RFQ payment for standby time may be required.

#### **4.8.4 Reporting of Failed Field Tests and Defective Work**

The material testing company must report to the inspector all failed field tests. The inspector should immediately follow up on all failed field test with the contractor and document and advise the contract administrator of issues and actions taken. Immediate action must be taken to rectify and re-test all failed field tests, all re-tests will be recorded in the field report as passing after remedial action taken with reference to the failed tests. The contract administrator is to follow-up with all failed laboratory test results.

All defective work has to be replaced or rectified immediately to the satisfaction of the contract administrator or inspector or both. No payment should be recommended until all defective work has been corrected and this is to be documented on the deficiency list. The project lead may however deduct funds and allow for partial payment depending upon the nature of the deficiency.

#### **4.8.5 Laboratory Test Results**

All laboratory test results for the contract submitted by the quality assurance laboratory should be carefully reviewed by the contract administrator. The contract administrator should follow-up on all defective work with the contractor and advise the inspector to update the deficiency list accordingly. Payment of the defective work should be withheld until the work is corrected, if possible.

All material testing results should be kept in a material testing quality assurance (QA) folder for easy retrieval by the contract administrator. The results should be tabulated and cross-referenced to the respective contract. The contract administrator is responsible for reviewing tests results of all laboratory testing, which are sent to them by the materials testing company.

The construction supervisor is to remind inspectors to ensure compliance with Materials Testing RFSQ, work plan,

Appendix C, *Materials Testing Protocol*, and discuss reasons for non-compliance on each contract.

In general, material testing is required for the following:

- gradation analysis on fill materials
- sulphates testing of recycled concrete material
- subgrade evaluation—bearing capacity/penetrometer test asphalt cores for Marshall density, gradation, compliance and so on
- field compaction and moisture tests on fill materials laboratory extraction and gradation test and Marshall test on hot mix asphalt
- asphalt cement and asphalt emulsions
- asphalt compaction testing for paving operations
- mold, cure, and break concrete cylinder specimens
- slump test for concrete
- air content for concrete
- concrete temperature for concrete
- sample testing of mortar, grout, crackfilling material
- other tests and samples requested by the contract administrator or as described on the contract document

#### *Other References*

For details on the outline the scope and procedures for the provision of weight verification to construction materials, see Appendix F, *Weight Verification Protocol*.

For details on material testing for the inspector and QA consultant, see Appendix C, *Materials Testing Protocol*.

For details related to deficiencies with concrete materials testing, see latest release of TS 1350, Amendment to *OPSS.MUNI 1350 (Sept 2017) Material Specification for Concrete – Materials and Production*.

For additional information on material inspection and materials testing, see the *General Conditions of Contract*.

## **4.9 Testing Required for Concrete and Asphalt Material**

Requirements for testing concrete and asphalt are contract specific. Therefore, it is imperative that the inspector is familiar with the RFP and specifications as they apply to the material testing of concrete and asphalt.

#### **4.9.1 Concrete Testing**

Prior to the concrete placement, the contract administrator and inspector will review at a meeting the specifications with the contractor placing emphasis on testing, mix designs, time limits finishing, curing, joint placement, consolidating(vibrating) ticket requirements and placement and any other project specific requirements.

The inspector will arrange for material testing as per the specifications and contract requirements and Appendix C. The technician will cast concrete cylinder samples for laboratory compressive strength tests. Three cylinders on the first load of the day typically and every 50 m<sup>3</sup> with no fewer than one test for each class of concrete placed on any one day.

The inspector will check the delivery time of the load – time when the concrete was batched to the time the concrete was unloaded – if it falls within the requirements as stipulated in TS 1350, or as stipulated in the contract documents.

The inspector and technician will check if the load is produced from concrete plant(s) that was specified in the contract, or the plants were agreed upon in the pre-construction meeting or in pre-concrete placement meeting. The inspector will check and document the thicknesses placed on the daily reports.

The contract administrator may arrange for core testing for verification of thickness of all road base, concrete sidewalk and curb as per the contract or perform a check comparing quantity delivered with quantity required for units of work paid by area.

The contract administrator is to pay attention to the updated TS 1350.11, which discusses price adjustment for compressive strength concrete.

#### **4.9.2 Asphalt Testing**

The contract administrator will discuss pre-paving issues such as specifications relating to paver and roller requirements and sequencing, review weather forecast, ticket weight verifications (when material paid by tonne) requirements and collection,

traffic control plan, including night time lighting, arrow boards, if required and so on at progress or pre-pave meeting prior to work commencing. The contract administrator will arrange for any necessary trial batches as per payment specifications.

The inspector will ensure availability of an asphalt thermometer or asphalt temperature gun for use when checking asphalt temperature. The inspector will ensure proof rolling and compaction testing are done on granular materials as required in Appendix C, *Materials Testing Protocol*. The inspector will also check and inspect all other preliminary work is completed so that paving may proceed as per Appendix B, *Inspection Tasks*.

For contracts where material is paid by weight, the inspector will arrange for check weight to be done according to Appendix C, *Materials Testing Protocol*. Arrange for continuous ticket collection as a second inspector may be required to assist with this requirement.

Review specifications at the pre-pave meeting and on the day of paving, safely check the temperature of asphalt mix at point of discharge – as a rule of thumb, at least 120 °C at point of discharge and air temperature of pavement for hot mix asphalt placing – for binder at least 2 °C, for surface at least 7 °C.

Ensure the material testing consultant performs compaction tests on hot mix asphalt mat using nuclear density gauge and all necessary on site testing, including temperature checks and sampling, as required under contract documents and Appendix C, *Material Testing Protocol*.

## 4.10 Test Reports

Hydrostatic leak tests and disinfection tests are two types of tests that can occur on a project. Prior to performing the tests, the contractor must prepare and submit a plan to the contract administrator for approval. Upon approval of the plan, the contractor and inspector make the necessary arrangements to prepare for testing. For example, the inspector will contact the Toronto Water division for valve coordination, such as valve opening/closing.

**Note:** Toronto Water will not accept a valve opening/closing request from the contractor; this request must come from the inspector with a minimum of 48 hours notice.

The *Hydrostatic Leak Test Record* and *Disinfection Test* forms (see Appendix A, *Forms*) are filled out by the contractor during testing. Information should be documented on the forms that indicate who conducted the tests, when the tests were completed, the location of the tests and so forth. The inspector is required to witness all tests and record the observations in the daily report.

#### 4.11 Construction Submittals

Contractor submittals are documents provided by contractors regarding detailed aspects of a project, and are used to verify that the project is being carried out in accordance with the contract documents. As part of most projects, contractors are required to provide submittals to the City at key stages in the work. The following is a non-exhaustive list of submittals by the contractor.

- Shop drawings
- Construction schedules
- Operation and maintenance manuals for equipment
- Equipment warranties
- Certificates of proper installation – mechanical fitness
- As-built drawings (to be submitted within 60 days of completion)
- Utility locates
- Ministry of Labour Notice of Project and Technical Standards and Safety Authority (TSSA)
- Quality control plans, material testing results and name of material suppliers
- Health and safety policies
- Survey layout information
- Electrical Safety Authority (ESA) certificates
- Trench shoring
- Mix designs
- Traffic control plans
- Sewer by-pass plans
- Spill response plans

- Watermain commissioning Plans (TS115)
- Shut-down and coordination schedule
- Excavation plan
- Drilling plan
- Dewatering and discharge plan
- Bypass plan
- Flood control plan
- Disinfection and sampling plan
- Odour control plan
- Utility relocates plan
- Restoration plan
- Pre-construction and post-construction inspection plan (CCTV, MSI)
- Materials and equipment delivery plan
- Waste disposal plan
- Environmental management plan (spills, sediment and erosion control, air pollution)
- Testing and commissioning plan
- Training plan for plant staff working with new equipment and processes

#### **4.11.1 Processing Construction Submittals – In-house Projects**

Any submittals provided by the contractor should be submitted to the contract administrator directly for review and as required. However, some submittals are required for the office such as traffic control plans, copies of utility stake outs and notice of project. The contract administrator must date and log all submittals and provide a copy of the approved submittal to the inspector.

All submittals must be submitted in the format prescribed in the contract documents. Submittals can include drawings and other information prepared by the contractor and vendors that provide detailed information about equipment or materials to be supplied under the contract. The information is reviewed by the contract administrator and returned to the contractor with appropriate comments. No changes to the contract are made during this



process – it is a review for current contract conformance and compliance.

For contracts which require schedule submittals accompanying the contractor's monthly payment application for Engineering & Construction Services – Design & Construction Section contracts, the schedule shall be submitted as required per the contract documentation or the specifications package or both.

For projects that require the preparation and submission of shop drawings by the contractor, the contract administrator must maintain a log of all shop drawings with the date received, reviewed and when it was approved. The contract administrator for consultant administered projects shall adequately safeguard approved copies of shop drawings and copies of the same are to be provided to the City at the completion of the contract. The contract administrator must forward all approved shop drawings to the inspector.

#### **4.11.2 Processing Construction Submittals – with External Service Providers**

On projects where an external service provider such as a consultant is contracted, the consultant may provide design, site inspection, and construction administration services. In such cases, the contractor is required to provide all submittals to the consultant directly. The consultant should provide copies of submittals reviewed by the consultant to the City contract administrator including the consultant's comments.

### **4.12 Deficiency Lists**

The inspector maintains a continuous list of deficient items for each contract and submits to the contract administrator. The contract administrator should review it as appropriate with the contractor at regularly scheduled progress meetings. For more information on progress meetings, see Section 2.3.

Deficiency lists summarize items of defective works and deficient items on a contract, which must be rectified before the contract is complete. Deficiency lists are maintained by the inspector, and are reviewed by the contract administrator and by the contractor regularly as the project progresses. The *Deficiency List* form can be found in Appendix A, *Forms*.

#### **4.12.1 When are deficiency lists required?**

- Must be prepared at the beginning of the contract and updated at least monthly or as deficiencies are identified.
- A deficiency list is required whenever there are deficient or defective items that need to be rectified to satisfy the contract requirements. Note: Site cleanup and tidiness deficiencies are to be included on the list.
- With approval from the contract administrator, the list is provided to the contractor for action.
- The deficiency list is finalized as part of substantial performance determination.

#### **4.12.2 When are deficiency lists reviewed?**

- The contract administrator should review the deficiency list as necessary with the contractor during regularly scheduled progress meetings. At a minimum, the deficiency list should be given to the contractor monthly at progress meetings and documented in minutes of meetings, at the end of a project phase, prior to substantial performance and prior to completion. The deficiency list is required to justify hold backs in progress payments
- Upon receipt of notification from the contractor for substantial performance, acceptance of part of the works, and final completion, the inspector, and the client group as required, along with the contractor, should perform a thorough examination of the work to ensure deficient work items are resolved or completed.
- Where deficiency list items require specialized review, the contract administrator arranges for design staff and specialty inspections, as necessary.
- Once work items have been completed, the inspector examines the completed work with the contractor.
- If the item is correctly completed, the inspector initials and dates the item on the deficiency list.
- The deficiency list is maintained in the project files.
- Any items disputed by the contractor are sent to the contract administrator, who reviews them with the inspector and, if necessary, the contractor.

### 4.12.3 Contents of deficiency list

The deficiency list should include the following items, as applicable:

1. List of deficient items, including defective works that need to be rectified, and the date which they were rectified.
2. References to related specifications, submittals, and drawings
3. Owner comments
4. Specialty inspection and testing reports
5. Value of deficiency work to be performed (final deficiency list). The value should be equivalent to the payment amount for the work performed by an external party, if the contractor decides not to rectify the deficiency as determined by the contract administrator based on the deficiency list.

*Other References:*

For information related to deficiencies and holdbacks, see the *Capital Works Procedures Manual*, Chapter 6.

## 4.13 As-built Drawings

The requirement for as-built drawings depends on the type of project. Unless otherwise specified in a consultant RFP and contract with the contractor, the following is to be done:

### 4.13.1 Linear Infrastructure Projects (Internal)

1. The Design Supervisor submits tender drawings at time of award to the Utility Mapping Unit
2. The Utility Mapping uploads tender drawings and any revised drawings to ImageSite
3. If applicable, the Design Supervisor submits “Issued for Construction” Drawings to the Utility Mapping Unit and will replace the tender drawings
4. If applicable, the Utility Mapping uploads “Issued for Construction” drawings and any revised drawings to ImageSite
5. The Inspector produces red-line drawings based on actual construction either by confirming the drawing, or indicating all variations on the drawings

6. The Construction Supervisor reviews the red-line drawings for general completion and timelines, and approved hard copies are sent to the project lead
7. The Project lead reviews for acceptance, and forwards to the Design Supervisor
8. The Design Supervisor is to scan red-line drawings and send to the Utility Mapping Unit for upload to ImageSite, and notify Toronto Water, Water Infrastructure Management
9. The Design Supervisor is to prepare as-built drawings and provide a PDF copy to Utility Mapping, and notifies Toronto Water, Water Infrastructure Management for underground assets
10. The Design Supervisor is to upload as-built drawings to ProjectWise
11. The Design Supervisor is to return hard copy of red-line drawings to Project Lead to be retained in archive box with other contract documentation

#### **4.13.2 Linear Infrastructure Projects (External)**

1. The Consultant's Contract Administrator submits tender drawings to City Project Lead
2. The City Project Lead submits tender drawings at time of award to Utility Mapping Unit
3. The Utility Mapping Unit uploads tender drawings and any revised drawings to ImageSite
4. If applicable, the City Project Lead submits "Issued for Construction" Drawings to Utility Mapping Unit and will replace the tender drawings
5. If applicable, Utility Mapping uploads "Issued for Construction" drawings and any revised drawings to ImageSite
6. The Contractor produces red-line markups and submits drawings to the Contract Administrator within 60 calendar days after Substantial Performance
7. The External Service Provider (contract administrator) submits as-built drawings to the City Project Lead within 30 working days of receiving final redline drawings from the contractor
8. The City Project Lead reviews and sends PDF drawings to [UtilityMapping@toronto.ca](mailto:UtilityMapping@toronto.ca) and CAD files to [ECSSupport@toronto.ca](mailto:ECSSupport@toronto.ca)
9. The Utility Mapping Unit uploads PDF files to ImageSite
10. The Engineering Systems Support Unit uploads the CAD drawings onto ProjectWise

### 4.13.3 Major Infrastructure Projects

1. Project Lead submits tender drawings at time of award to the Utility Mapping Unit
2. Contractor produces redlines on contract drawings
3. The External Inspector is responsible for inspection of the contractor's redline mark-ups
4. Redline drawings are submitted to City Project Lead before substantial performance is declared
5. The External Inspector consolidates changes and submits as-built drawings to the external contract administrator, who then submits them to the City Project Lead no later than 3 months after commissioning
6. The City Project Lead reviews and sends PDF drawings to [UtilityMapping@toronto.ca](mailto:UtilityMapping@toronto.ca) and CADD files to [ECSupport@toronto.ca](mailto:ECSupport@toronto.ca)
7. The Utility Mapping Unit uploads PDF files to ImageSite
8. The Engineering Systems Support Unit uploads the CADD drawings onto ProjectWise

### 4.13.4 Engineering Review Projects

For Development Engineering projects and Engineering Review Projects, refer to Chapter 5.

#### *Other Requirements:*

For information on as-built and record drawings, see Appendix D, *As-built Drawing Guidelines*. This document should be given to the contractor prior to project start-up and discussed in the pre-construction meeting.

For minimum requirements and responsibilities, see Appendix E, *As-built Features Requirements*.

## 4.14 Water and Sewer Service Cards

Water and sewer service cards show detailed information regarding water and sewer services to private properties, and include assets such as valves, hydrants, maintenance holes, and catchbasins to assist in locating the services. Water and sewer service cards may be used to assist in the preparation of the as-built drawings. Toronto Water will use the cards to update their asset inventory database and work management system. The sewer and water service cards can be found in Appendix A, *Forms*.

#### 4.14.1 Internal Projects

For internal projects, it is the inspector's responsibility to complete the sewer and water service cards, which are then submitted to the construction supervisor for review and forwarded to the contract administrator.

#### 4.14.2 External Projects

On externally managed projects, it is the consultant's responsibility to review and submit the card to Toronto Water directly, copying the project lead for filing.

#### 4.14.3 Submission Requirements

Water/sewer inspection service cards are to be submitted to [waterservicecards@toronto.ca](mailto:waterservicecards@toronto.ca) and each service card should be a separate PDF. Hard copies should be sent to the Manager – Watermain Asset Planning (18th floor MH). The preferred format is "55 John St.pdf" for the file names.

#### 4.14.4 Deadline for Remitting a Water/Sewer Service Card

It is extremely important that water service cards are completed in their entirety (City and Private portion) and submitted to Toronto Water within the following timelines:

- INDIVIDUAL WATER SERVICE INSTALLATIONS:  
**WITHIN 10 BUSINESS DAYS** of completing an installation
- IN-YEAR CAPITAL PROJECTS:  
**WITHIN 30 BUSINESS DAYS** of substantial completion (e.g. immediately following installation of all pipes and services for watermain projects)
- CARRY-OVER/MULTI-YEAR PROJECTS:  
**BY JANUARY 31** for all services replaced during the previous year (i.e. services installed in 2020 for a multi-year project should be submitted by January 31, 2021)

### 4.15 Engineering Surveys

For in house design projects, lines and grades are typically set by the engineering surveys unit. If there are any alterations to the design, engineering surveys will amend the layout to reflect the revisions. All engineering survey work is coordinated with the contract administrator.

## 4.16 Substantial Performance

The contractor's responsibilities for substantial performance are defined in the general conditions with reference to the *Construction Act*. Deficient and uncompleted work must be catalogued by the inspector, and the value of that work must be estimated by the contract administrator in order to determine substantial performance. In addition, operations and maintenance documentation and all warranty and guarantee information must be properly filled out for all equipment and material items and must be submitted to the contract administrator before substantial performance is granted.

At the time of substantial performance, the ongoing deficiency list prepared by the inspector is provided to the contractor and an inspection is conducted by the inspector. A new deficiency list is generated after substantial performance to document any deficiencies that may have occurred after substantial performance through to completion of the contract. Prior to end of warranty, a deficiency list is provided to the contractor to rectify the deficient items.

*Other References:*

[Construction Act, R.S.O. 1990, c. C.30](#)

For the requirements on the certificate of substantial performance, see the *General Conditions of Contract*.

For information related to substantial performance, see the *Capital Works Procedures Manual*, Chapter 6.

## 4.17 Completion

Completion is achieved when all items on the deficiency list have been rectified, all required submittals have been completed, and all other obligations of the contract have been satisfied. The contractor's responsibilities for completion are defined in the general conditions with reference to the *Construction Act*.

To achieve completion, the contractor must satisfy the contract requirements. As a final review, the inspector evaluates each item on the deficiency list and submits an updated list verifying the contractor's completion of the work, or listing items not satisfactorily corrected. The contractor must remedy any

deficient or incomplete work and notify the contract administrator that the work has been completed.

The inspector then examines the corrected work. When the inspector finds the work acceptable and the required submittals are complete, the contract administrator requests the contractor to make final application for payment. Final payment to the contractor is made after completion of all required work.

The following is a list of some examples of documentation that the inspector shall collect or prepare prior to final completion:

- watermains – as-built drawings and drawing indicating pavement and curb road cut locations and area, pressure tests, tracer wire continuity reports
- road, curb, and sidewalk as-built drawings
- electrical work – ESA as-built drawings
- final operations and maintenance manual
- measurements and calculations of all work items and sketches or marked-up plans to indicate where measurements were taken
- final review survey of work
- environmental compliance approval (ECA)
- quantity sheets
- water and sewer service cards
- deficiency lists

*Other References:*

For the requirements on the certificate of completion, see *General Conditions of Contract*.

## **4.18 Contract Payment**

For lump sum projects, the contractor must submit the proposed payment application or a breakdown of prices documentation for approval by the contract administrator prior to the first progress payment. Prior to each of the contractor's payment applications, the contractor must prepare an updated progress schedule showing current progress on all work activities. The progress schedule must show work activities, planned start and finish dates, original duration, current percent complete, and remaining duration.



Upon receipt of the contractor's schedule report, proper invoice, and other required payment application documentation, as defined by the Construction Act and contract documents, the contract administrator proceeds with formal review of the payment application in consultation with the inspector. Upon verification of completion of the work, the inspector submits a final weekly report to the contract administrator. The contract administrator reviews and provides final approval on the payment request. Payment application documents not recommended by the inspector are returned to the contractor for re-submittal. Deficient work should also be documented and a value assigned to the deficient work in order to adjust contract payment.

The Contract Administrator reviews and provides final approval on the payment request. The City has a maximum of 28 days to pay a Contractor's complete payment request. The Contract Administrator may require additional information from the Inspectors, and responses by the Inspectors to the Contract Administrators must be handled with urgency.

In the event of a disagreement over a Contractor's submitted payment request, the adjudication process may be triggered for the disputed quantities. The Inspector may be required to promptly provide additional assistance to the Contract Administrator including attending hearings, providing testimony as a witness, or other tasks during the dispute resolution process.

For all unit price contracts, progress payments shall be made based on the compilation of quantities on the daily inspection reports for the specific contract.

#### **4.18.1 Adjudication**

Adjudication is a process intended to achieve the rapid resolution of construction disputes on an interim, but binding, basis unless and until a court, arbitrator, or the parties by agreement in writing, say otherwise. It is intended to expeditiously resolve disputes, accelerating payment down the construction pyramid.

An adjudication decision is binding until there is a court/arbitral decision, or the parties agree in writing otherwise. It is "rough justice" insofar as issues are intended to be dealt with quickly. Decisions will be based primarily on the documentary record

and written submissions. The safety valve is that, if the parties are dissatisfied, the issues can still be litigated in court or submitted to arbitration.

A party can commence adjudication to obtain an adjudicator's decision on:

- disputes regarding invoices the City has not paid in full;
- payment claimed under the contract, including in respect of change orders or proposed change orders;
- the payment or non-payment of holdbacks; and
- "matters the parties agree can be adjudicated."

Adjudication is closely tied to the Prompt Payment process set out in the Construction Act. Adjudication can be initiated by either the Contract Administrator or the Contractor. For more information on the City's adjudication process, please refer to the Capital Works Procedures Manual.

*Other References:*

[Construction Act, R.S.O. 1990, c. C.30](#)

For specific requirements related to progress payments, see the *Capital Works Procedures Manual*, Chapter 6.

For the contractor's responsibilities and control of work related to measurement and payment, see the General Conditions of *Contract*.

## **4.19 Contract Close-Out**

The practice of contract close-out finalizes all project activities completed over the course of a project and occurs when the construction as well as the occupancy by the contractor ends. This includes gathering final items of documentation, ensuring deficiencies have been addressed and resolved, and submitting files to the contract administrator for inclusion in the master project file.

### **4.19.1 Closeout Documentation**

Collecting documentation for contract close-out begins near the end of construction and extends to the end of the warranty period. The contract administrator and inspector work together

to assemble the documentation required for the contract close-out process.

This documentation could include:

- certificate of substantial performance
- certificate of completion
- red-line/as-built drawings from contractors and consultants and red line drawings from the municipal construction inspector
- water or sewer service cards
- final measurement reports for final payment purposes
- all traffic control plans from the contractor (to be submitted and filed)
- completed deficiency list
- pre-end of warranty inspection report
- engineering surveys for as-builts
- warranty inspection reports and certification that they have been rectified

It is important that the inspector submits all documentation to the contract administrator at contract close-out for incorporation into the project file. Some of this documentation may have already been submitted to the contract administrator, but it should be submitted at close-out regardless, to ensure the project files are complete. All project information shall be stored in ProjectWise.

The contract administrator will review and submit the project files to the contract administration section for filing. External service providers shall manage their filing system in accordance with the Request for Proposal.

#### **4.19.2 Inspections**

Prior to the end of contract close-out, the end of construction inspection and warranty inspections are specific types of inspections that address deficiencies at the end of the construction period and near the end of the warranty period, respectively – will have taken place. The contract administrator assists with the inspections, and must ensure that all items on the current deficiency list, prepared by the inspector, are addressed and resolved prior to contract close-out and

approved by the contract administrator. The contract administrator, with input from the inspector, coordinates with the contractor the closing documentation for the project. For further details, see Section 4.6.

*Other References:*

For information related to final acceptance, see the *Capital Works Procedures Manual*, Chapter 6.

For the requirements on the certificate of substantial performance and contract completion, see the *General Conditions of Contract*.

## **4.20 Lighting Requirements for Working at Night**

Construction across the City is increasingly becoming more active at night to reduce traffic congestion and accelerate project schedules. The result of this is that ECS staff are being exposed to additional hazards and an increased unmitigated risk when working at night.

When inspecting construction sites, similar hazards exist, but the probability of occurrence increases when visibility is poor. These hazards may include:

- slips, trips, and falls over uneven ground, debris, open holes, raw materials, and equipment
- being struck by moving fleet and construction equipment on site
- being struck by oncoming traffic in the public right-of-way
- There are various controls to reduce risk when working at night such as: full body high-visibility and reflective apparel, the buddy system, night work specific pre-approved traffic control plan, on-site supervision, and most importantly – adequately lighting the work areas.

A minimum lighting level of 55 lux for general housekeeping, and access and egress. For paving operations where moving equipment is involved, higher lux level may be required. Spot or “task” lighting can be used to supplement the general lighting requirements when necessary, but does not replace the general duty to provide lighting in all areas.

The Contractor is required to submit a lighting plan and/or traffic control plan for night time work. The lighting requirements for night work are to be discussed during the pre-construction meeting.

## **Chapter 5: Development Engineering / Engineering Transit Review**

### **5.1 Introduction**

The Engineering Review section ensures that applications for land developments and third-party projects conform to City standards, policies, guidelines and procedures and that they can be serviced by existing infrastructure and where that is not possible, new or upgraded infrastructure is identified and provided. Other services include soil and groundwater quality assurance for lands being transferred to the City and City-wide utility mapping. The following sections describe the roles as they relate to engineering review inspections in more detail.

### **5.2 Case Manager**

The role of the case manager is specific to the Engineering Review section. The case manager provides detailed technical review of engineering proposals and recommends approval of the scope and cost of new infrastructure required to support Engineering Review developments and projects. The case manager administers the development/delivery agreements and works in conjunction with City Inspectors to ensure that infrastructure is constructed in compliance with accepted designs, City standards and by-laws. The case manager co-ordinates inspection related tasks with the ECS inspector and provides functional direction during construction.

#### **5.2.1 Development Engineering**

The activities undertaken by the case manager in Development Engineering are highlighted in the Development Engineering Manual.

#### **5.2.2 Engineering Transit Review**

Some of the activities undertaken by the case manager in Engineering Transit Review include:

- Review of engineering submissions in accordance with City requirements, design standards and specifications (as they relate to Toronto Water and Transportation)

Services standard design requirements), functional design, and engineering design principles.

- Review civil drawings for the City's right-of-way (roadways and boulevards), including surface drainage, road pavement design and boulevard pavement design. The review does not include pavement marking, vehicular movement, curb radii, and traffic signals. The review of such works is required to be undertaken by Transportation Services.
- Consult with Toronto Water as required regarding acceptance of design that is not in accordance with City standards as per the Memorandum of Understanding between Toronto Water and ECS
- Attend site meetings as required.
- Review for completeness the Ministry of the Environment, Conservation and Parks Environmental Compliance Approval (MECP ECA) application as submitted by the applicant. The Third Party & Utility Review manager shall sign-off the application on behalf of the municipality and forward the signed applications to City's Transfer of Review unit for review and submission to the MECP.
- Review for completeness the Drinking Water Permit Applications (DWWP) as submitted by the applicant. The Engineering Transit Review manager shall sign-off the application and forward to City's Transfer Review unit for review, acceptance, and permit issuance.
- Attend internal coordination meetings with other City Divisions such as Toronto Water as appropriate.
- Review important and non-standard issues with Toronto Water, Water Infrastructure Management (WIM) prior to and during project phases.
- Coordinate the commissioning and acceptance (handover) of any asset, improvement or infrastructure that is or will be owned and operated by or on behalf of Toronto Water, and is affected by the development and construction of the project.

### **5.3 Engineering Technical Coordinator and Engineering Technician Technologist**

The engineering technical coordinator and the engineering technician technologist assist in planning, co-ordinating and directing the review of third party utility projects and provide technical guidance to ensure the effective interpretation and application of City standards, specifications and policies for full stream utility applications.

## **5.4 Role of the Consulting Engineer**

The consulting engineer is a professional engineer or firm of engineers retained by the owner and skilled and experienced in municipal work and land development projects and registered with the Professional Engineers of Ontario, possessing a current certificate of authorization to practice professional engineering as required by the Professional Engineers Act. The consulting engineer is retained by the owner of a development to design all services and carry out all the necessary engineering and inspection requirements to be performed for a development including but not limited to the tasks as outlined in Section 3 of the Standard Subdivision Agreement.

On Third Party and Utility Review projects, the consulting engineer must work with the City's case manager and inspector throughout the project as defined in the respective agreement. Specific details of roles and responsibilities are outlined in the consulting services agreement for the project or program. For utility projects, the engineering technical coordinator / engineering technician technologist may be dealing directly with the representative from the respective utility and there may not be a consulting engineer involved.

## **5.5 City ECS Inspector**

The City ECS inspector will perform periodic inspections as required to monitor the quality and progress of the works. The City ECS inspector will monitor the progress of construction and ensure compliance with applicable development/delivery agreements. It is the responsibility of the developer/consulting engineer to administer the construction work and to provide full time construction inspection services at all times. The City ECS inspector will do the following.

### **5.5.1 Inspections**

- Prepare and file site visit [reports](#). (See Appendix A, Forms).



- Attend the pre-construction meeting called by the Consulting Engineer.
- Observe, spot check and record construction progress as per the inspection duration table. This may require extended working hours to inspect contractor's effort to complete a particular phase of construction.
- Inspect work as requested by the case manager that is not covered in the Inspection Duration Table such as spot checking of underground work that may result in extra time to ensure that issue is resolved, and work is done properly. Note that the consultant's inspector is to be on site while any work is ongoing; the City inspector is only to provide spot checks.
- Liaise with the developer's consulting engineer on matters pertaining to the construction process and progress of works within the public right-of-way and development lands.
- In conjunction with the developer's consulting engineer, inspect the construction of sanitary and storm sewers, watermain, and roadways within the subdivision phases as well as adjacent City roads and as set out in other development/delivery agreements to ensure conformance to the approved engineering drawings and permits issued, City standards, specifications and maintenance of a clean, mud-free condition on existing adjacent municipal roads. See Table 2 for inspection durations.
- Provide spot checking on key activities upon notification provided by the consultant such as witnessing the proof rolling of all road sub-grade prior to the placement of granular and/or base asphalt.
- The inspector will report any infractions, including taking photographs to illustrate issues related to the compliance of the approved drawings to the consultant and copy the case manager for any necessary corrective actions. Do not participate in the actual construction activities of the contractor.
- Communicate any possible construction problems to the Site Representative. If still not corrected, escalate to the case manager.
- Witness the watermain disinfection, pressure testing and laboratory sampling.

- Conduct joint inspections with the consulting engineer and case manager, as required, for the purposes of the City's acceptance for maintenance and final assumption of municipal services and road works.
- Conduct pre-construction inspection to capture existing conditions for third party and/or development assignments but not for utility assignments.
- Conduct further site inspection with the consulting engineer after the deficiencies have been rectified and provide input to the case manager.
- Advise the case manager of any outstanding deficiencies that have not been rectified and the reason.
- Attend all applicable site meetings with the case manager, as required.
- Ensures all required notification to all parties including Transportation Services is done.
- Reviews As-Built Drawings prior to submission
- Ensure compliance with the terms of all City issued permits
- Assists with coordination with other City Departments and Agencies such as Toronto Parking Authority as needed.

#### **5.5.2 Coordination**

- Upon request from the contractor and consulting engineer, after the case manager verifies the disinfection plan, coordinate with Toronto Water regarding the operation of water valves, disinfection of watermains and wet taps arranged by the contractor. Toronto Water requires 48 hours notice in order to arrange for Valve Shuts. A copy of the approved disinfection plan is to be forwarded to both Consultant and City Inspectors, before work starts.
- Coordinate and partake in the carrying out of the field activities related to the completion of the [Toronto Water Wellness Report](#).

#### **5.5.3 Communication with Case Managers**

- Update the case managers weekly and notify the change of activities on site and/or issues that need to be addressed immediately regarding the status and

progress of the subdivision / site plan development / construction work.

- Provide weekly summary and site visit reports.
- For utility inspections, ensure that the utility company follows the Full-Stream Line Change Process and completes the form (see Appendix A, Forms) as required for line change requests.
- Periodically inspect sedimentation control devices including, but not limited to catchbasins, siltation fences, rock check dams and temporary siltation ponds, to ensure proper maintenance and working condition.

## **5.6 Pre-construction/ Project Meetings**

The meeting should outline and discuss the method of construction, staging, schedule and traffic control. Any specific requirements regarding the restoration to be done should also be discussed. For utility projects only, the inspector shall fill in the appropriate form as required after the conclusion of the meeting (see Appendix A, Forms).

City inspectors should conduct a preliminary site visit and the case manager to attend meetings, as required. Both Inspectors and case managers should attend the pre-construction meeting. The Inspection Coordinator is to attend the pre-construction meeting when the Construction Supervisor is unavailable. Inspectors should attend all other site meetings. Minutes are provided from the consultant to both the case manager and the inspector. The case managers should coordinate the final inspection.

## **5.7 Changes in the Work for Engineering Review Applications**

Changes in work for Engineering Review applications include, but are not limited to: the deletion, extension, increase or decrease in scope of work; the alteration of line alignment, grades, dimensions; or any alteration of the approved construction methods, backfilling, or staging.

### **5.7.1 Development Engineering**

For development engineering projects, the owner's consulting engineer should notify the case manager of any deviation from the site plan such as a change in location for the sidewalk,

hydrants, catchbasins, telephone poles, and so on. This allows the case manager to be aware that construction is in progress in the event that a councillor or local resident has any concerns. There are times when the field changes require the case manager to involve other City divisions such as Toronto Water and Transportation Services in order to allow the field changes. These changes will also need to be shown on the as-built drawings when the planning applications require as-built drawings to be submitted as part of City's Subdivision Agreement, Municipal Infrastructure Agreement, and Consent Agreement.

### **5.7.2 Centralized Review Projects**

For Centralized Review projects, the proponent's consulting engineer needs to notify the City inspector and the case manager when there is a design change such as a realignment of the watermain, the addition of a manhole, or the removal of a fire hydrant. In addition, revised drawings are sent to Engineering Transit Review for review and approval whenever a change is made.

If the change is a field change such as a slight relocation of a fire hydrant or catchbasin, this change is considered a minor change and will be reflected in the as-built drawings submitted by the consulting engineer. It is the responsibility of the consulting engineer to inform the case manager and the inspector of any field changes as the inspector only does spot checking of work being done. Only the case manager can approve changes. If any issues arise, the inspector and the case manager will work with the respective City division such as Toronto Water to resolve these issues with the third party representative.

### **5.7.3 Utility Review Projects**

When the applicant utility company or their contractor requests any changes to the work described on the permit and associated drawings, the inspector shall immediately contact the Utility Review Supervisor.

The line change requested is forwarded to the Utility Supervisor who then assigns an engineering technical coordinator or an engineering technician technologist to review the submission. The line change is documented on a redline drawing and kept on file, which is later used to prepare the final set of drawings

and may be used by the Engineering Surveys Unit in the future. Further details regarding line changes are in Appendix A of this manual.

No changes shall be permitted without:

- Discussion between the inspector and Utility Review Supervisor to assess the impact of the requested line change. Where necessary, a site meeting should be held.
- For any changes to the staging of the work, written approval must also be obtained from the Transportation Services division work zone coordinator.

## **5.8 As-Built Drawings for Development Engineering**

### **5.8.1 Submission and Review of Draft As-Built Drawings**

Upon completion of construction of the municipal infrastructure and prior to issuing a letter of "Acceptance of Services", the Development Engineering Case Manager shall use Template 1 to prepare a letter to the developer's consultant to request the following be submitted:

- An electronic copy of draft as-built drawings, in PDF format, redlined to clearly indicate all field changes that were agreed to by the DE Case Manager and/or ECS Inspector;
- A electronic copy of the detailed design drawings previously accepted by the DE Manager, in and MicroStation format; and
- An electronic copy of the sewer design sheets, in PDF format, revised as necessary to reflect field changes, for review.
- An electronic copy of the maintenance and operation manual(s) for any facilities that were constructed (e.g. stormwater management ponds, non-linear facilities such as pumping stations, UV treatment facilities, etc.).

The letter shall also instruct the developer's consultant that the drawings need to:

- incorporate the requirements for as-built drawings as outlined in Appendix 'A' of the current City's Design

Criteria for Sewers and Watermains. The following weblink should be indicated in the letter:

<https://www.toronto.ca/wp-content/uploads/2022/10/8f8d-ecs-specs-dcm-design-criteria-sewers-satermains-Sep2022.pdf>

- comply with the requirements for Location Certificates as set out in [By-Law 954-2009](#). The following weblink should be indicated in the letter:

<https://www.toronto.ca/legdocs/bylaws/2009/law0954.pdf>

Upon receipt of the draft As-Built drawings package, the Case Manager shall:

- forward the electronic detailed design drawings to the Supervisor, Engineering Surveys, Engineering Support Services, and request him/her to confirm that the electronic drawings comply with the requirements of the Ontario Co-ordinate System and the Location Certificate (pursuant to By-Law 954-2009);
- ensure that:
  - the drawings comply with the requirements for as-built drawings as outlined in Appendix 'A' of the current City's *Design Criteria for Sewers and Watermains*
  - any changes made to the previously accepted design are shown in accordance with direction previously given to the developer's consultant and reflect field and/or file notes, and daily reports submitted by the developer's consultant
  - the revision box indicates all revisions/changes made and the dates when those revisions/changes were made
  - that the maintenance and operations manual(s) comply with Toronto Water requirements for such manuals
- mark-up the changes on the drawings as necessary

#### **5.8.2 Return of Draft As-Built drawings to Consultant with Instructions to Submit Final As-Built.**

The Case Manager shall incorporate any comments from the Supervisor, Engineering Surveys, Engineering Support Services, with his/her own comments, and return one set of

marked-up drawings to the consultant along with a standard covering letter (Template 2), with the following instructions:

- Revise the as-built drawings to reflect the changes shown on the marked-up drawings. Revisions and changes shall be made permanent on the CAD drawings file and labeled as "As-Built Drawing". Do not strike through text or drawing information to indicate changes.
- Insert the words "As-Built" with the date when the as-built drawings were submitted in revision box and initial on all drawings.
- Ensure that the final as-built drawings make reference to the original sealed drawings. In lieu of a seal, the following note should be indicated in the box where the consultant would normally seal the drawings:  
"Original sealed by: [name of consultant]"  
"Dated: [insert date]"
- Ensure that the final as-built drawings make reference to the date that the original drawings were accepted by the Manager, Development Engineering using the following text:  
"Originally signed by: [name of Manager, Development Engineering]"  
"Dated: [insert date]"
- Submit a set of electronic files of the final as-built drawings in:
  - MicroStation (DON file format and integrated with the Ontario Co-ordinate System); and,
  - PDF format;
  - An electronic copy of the final sewer design sheets;
  - An electronic copy of the final approved maintenance and operation manual(s) for any facilities that were constructed; and,
  - An electronic copy of the redlined draft as-built set of drawings.

### **5.8.3 Circulation of Final As-Built Drawings**

Upon receipt of the final as-built drawings package from the developer's consultant, the Development Engineering Case

Manager shall forward the drawings and documents, with a covering memo, as follows:

- Electronic copies of the drawings, in PDF and Microstation format, to the Supervisor, Engineering Surveys, Engineering Support Services;
- An electronic copy of the drawings, design sheets, maintenance and operation manual(s) for all facilities to be maintained to Toronto Water (Manager, Approvals & Partnerships, Water Infrastructure Management);
- A copy of the electronic drawings to Transportation Services (Attention: Manager, Transportation Development Planning and Review); and,
- An electronic copy of the final As-built drawings, the final sewer design sheets, and the maintenance and operations manual(s) for any facilities that were constructed to the Development Engineering project folder.

## **5.9 As-Built Drawings for Engineering Transit Review**

For Third Party transit construction projects involving Metrolinx, TTC, Waterfront Toronto, etc., the Supervisor, Utility Mapping receives a copy of the as-built drawings from the case manager of the Transit Project in PDF format. The Utility Mapping Unit then uploads the as-built drawings onto ImageSite and notifies Toronto Water, Water Infrastructure Management and the Engineering Transit Review case manager that the as-built information has been uploaded into ImageSite. For more information, please follow the procedure below.

*Applications related to Transit Projects and processed by Third Party Review (Engineering Transit Review): Metrolinx, TTC*

*If Toronto Water Assets are involved, the Proponent has to provide PDF format as-built drawings to Toronto Water staff members as listed in Section 11 of the Toronto Water Wellness Report and one additional PDF copy to the Engineering Transit Review case manager*

*If transportation structures are involved, the Proponent has to provide a formal letter to the ECS Bridges, Structures and Expressways Group confirming the bridge/culvert/structure has been constructed in conformance with the contract drawings and specifications. Proponent has to provide as-built drawings in electronic PDF format directly to the Utility Mapping Unit, the ECS Bridges, Structures and Expressways Group, and one additional PDF copy to the Engineering Transit Review case manager.*



*Engineering Transit Review case manager reviews the drawings and sends a PDF copy to Utility Mapping at [UtilityMapping@toronto.ca](mailto:UtilityMapping@toronto.ca).*

*Utility Mapping uploads the as-built drawings to ImageSite*

*Utility Mapping notifies Toronto Water (Water Infrastructure Management) and Engineering Transit Review case manager that the as-built drawings have been uploaded to ImageSite*

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*Other References:*

[Design Criteria for Sewers and Watermains](#)

Directive No. TS-01-2011: As-Built Drawings for Development-Related Municipal Infrastructure

## 5.10 Electronic Project Filing

Inspectors should have access to the following for inspection related paperwork/documents:

**Inspection Documents:** including reports, records, photos, notes, and emails related to site inspections.

**Letter of Credit Reductions/Acceptance/Assumption:** including performance inspection and final inspection reports, deficiency lists, test results, wellness reports, CCTV inspection reports/videos.

**Meeting Records:** including minutes of preconstruction meetings and other site meetings minutes.

**Winter Maintenance:** including winter maintenance records, reports, notes.

Inspections related materials should be filed in a shared drive and should be filed separately for each project/address. The name of the folder is the municipal address of the site as provided by the case manager. While filing of all inspections related correspondence and records is the responsibility of the inspector, the case manager may file any relevant/inspection-related information in the Inspection files where applicable.

Information to be sent to the case manager for filing shall include the following:

- Field Change request and correspondence, from the Developer's Consultant.

- Watermain Disinfection Plan, accepted by the Contract Administrator (Developer's Consultant) and reviewed by the case manager for administrative acceptance.
- Pressure Testing of Watermain results, from Developer's Consultant.
- Disinfection of Watermain, from Developer's Consultant. Reviewed by the case manager for administrative acceptance.
- Peg Mandrel test results, from Developer's Consultant.
- Wellness Report information, (including Valve Operation Test, Fire flow Testing Results, tracer wire check, curb box check, CB and MH checks, CCTV Inspection and results). These are to be performed by the Developer's Consultant.
- Concrete Mix test results, verified by Developer's Consultant
- Asphalt Mix test results, verified by Developer's Consultant.
- Surface Work review/deficiency list, by City ECS Inspector, consultant, and case manager.
- Surface Work/Streetscape acceptance of onsite work, by City Client Inspector (not ECS inspector).

## 5.11 Inspection Duration

The City reserves the right to conduct and witness activities as deemed appropriate. The duration of select activities that may be inspected is outlined in Table 2 below as a guideline. Other requests for service may be determined by the case manager. More details can be found in Appendix B, *Inspection Tasks*, page B-103.

**Table 2: Inspection Durations**

Construction Task / Activity that Requires City Inspection	Duration of Inspection
1. Pre-Construction Meeting	Duration of meeting
2. Weekly construction meetings	Duration of meeting
3. Field Changes	As required.

Construction Task / Activity that Requires City Inspection	Duration of Inspection
4. Installation of sewers and/or watermains	Spot check for routine installation. Full Ttime when connecting to existing mains
5. Final Lot Grading	Duration of Inspection with Consultant
6. Installation of backflow preventer(s), Swabbing, Pressure Testing, Disinfection and Sampling of Watermain(s)	Full time
7. Wet Taps (or connections to existing watermains with certified operator. Refer to the Wet Tap Procedure dated June 1, 2017.	Full Time
8. Construction of above-ground works (roads, curbs, sidewalks, etc.)	Spot check
9. Connection of new roads to existing roads	Spot check
10. Acceptance / Assumption inspection	Duration of inspection with consultant
11. Emergencies (breaks, spills, damage to City infrastructure, etc.)	Duration of Emergency
12. Installation of hard boulevard works (sidewalks, tree pits, pavers, etc.) as part of streetscaping	Spot check
13. Piling and Shoring	Spot check
14. Installation of soft boulevard works (street tree planting, sodding, etc.)	Spot check
15. Installation of sewer and/or watermain on existing City road allowances	Spot check (Full time inspection upon request)

Construction Task / Activity that Requires City Inspection	Duration of Inspection
16. Preparation of formwork/work	Spot check

## 5.12 Delivery of Infrastructure Projects through Capital Program vs. Development/ Engineering Transit Review Applications

The following table outlines the key differences between inspections for Capital Projects and for Development Projects.

**Table 3: Inspection Responsibilities for Capital Projects vs. Development Projects**

Task	Capital Projects	Development/ Engineering Transit Review Projects
Work Commissioned / Paid for by	City	Developer/Third Party
Overall Project Management	Design and Construction Project Manager (D&C PM)	Developer/Third Party's Consultant
Approval of Engineering Design	D&C PM	Developer/Third Party's Consultant
Acceptance of Engineering Design	N/A	Engineering Review Manager / Case Manager
Primary Inspection Responsibility	City Inspections Staff	Developer/Third Party's Consultant
Secondary / part time inspection	N/A	City Inspections Staff

Task	Capital Projects	Development/ Engineering Transit Review Projects
Giving Direct Instructions to Contractors	City Inspections Staff	Developer/Third Party's Consultant
Certification that work was constructed per approved design	N/A	Developer/Third Party's Consultant
Leverage	As per Contract between the City and a Contractor / Payments to Contractor	As per Development/Delivery Agreement between the City and Financial Security posted by Developer

## Appendix A – Forms

**Table: Design and Construction Forms**

Form number	Title	Version (month/yr)
ECS-FSM-101	Inspector's Daily Report	06/23
ECS-FSM-102	Report of Changes in Work Completed	08/17
ECS-FSM-105	Inspector's Weekly Report	08/17
ECS-FSM-108	Field Instruction Report	08/17
ECS-FSM-109	Request for Quotation	08/17
ECS-FSM-110	Inspector's Daily Report Additional Remarks	08/17
ECS-FSM-111	Field Inspection of Materials and Equipment	08/17
ECS-FSM-112	Deficiency List	08/17
ECS-FSM-113	Underground Construction	08/17
ECS-FSM-115	Disinfection Test	09/20
ECS-FSM-116	Hydrostatic Leak Test Record	08/17
ECS-FSM-117a	Daily Observation Report – Major Infrastructure	08/17
ECS-FSM-117b	Daily Observation Report Checklist – Major Infrastructure Projects	08/17
ECS-FSM-118	Request for Quotation – Form A	08/17
ECS-FSM-122	Site Office Audit	08/17
ECS-FSM-123	Record of Damaged Services	08/17

Form number	Title	Version (month/yr)
ECS-FSM-124	Item Overrun and Underrun Justification Report	08/17
ECS-FSM-127	Contractor Infraction Report	08/17
ECS-FSM-200	Third Party & Development Construction Site Visit Report	08/17
ECS-FSM-201	Utility Pre-Construction Meeting Summary	08/17
ECS-FSM-202	Full Stream Line Change Process and Redline Submission Form	11/20
ECS-FSM-203	Toronto Water Wellness Report	12/22
ECS-FSM-204	Weight Verification Form	08/17
	Weight Scale Location Map	08/17
ECS-FSM-205	Water/Sewer Service Card Template	08/17
	Water/Sewer Service Card Reference Guide	08/17
ECS-GI-101 ECS-GI-102 ECS-GI-103 ECS-GI-104 ECS-GI-105 ECS-GI-106	Bioretention System Bioswale System Enhanced Grass Swale System Filter Strip System Green Gutter System Infiltration Trench System Permeable Pavement Stormwater Trenches with Trees	09/21

# INSPECTOR'S DAILY REPORT

Report No:		WDay No:		Inspector:		Date		Contract No.	
Location:						Project Engineer:			
Contractor:				Sub-Contractor:					
Weather (°C)	High		Low					Pay Duty Hours:	
Working Day? Yes	<input type="checkbox"/>	Is Stat Holiday:	<input type="checkbox"/>	Inspector's Time In:		Inspector's Time Out:			

## LABOUR

## EQUIPMENT

Number	Labour Duty	Hours	Total Hours	Qty	Model Spec	Hours	Total Hours

## WORK VISITED BY

## TEST TAKEN

Title	Visitor Name	Time In	Time Out	Test Type	Test Qty

## MATERIALS

Item Description	Qty	Pay Item	Non Pay
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

## CONTRACT ITEMS COMPLETED TODAY

1			
Project Location		Today's Total	Total to Date
2			
Project Location		Today's Total	Total to Date
3			
Project Location		Today's Total	Total to Date
4			
Project Location		Today's Total	Total to Date
5			
Project Location		Today's Total	Total to Date

Contractor's Signature

Inspector's Signature

Report Checked By Engineer/Supervisor



# INSPECTOR'S DAILY REPORT

Signs And Barricades Checked AM: ☐ PM: ☐

Contractor's Time In:	7:00:00 AM	To	
-----------------------	------------	----	--

Field Instructions Prepared? ☐ Change Directive Prepared? ☐ Extra Work Report Prepared? ☐

## REMARKS AND SUPPORTING DOCUMENTS REPORT

## Measurements and Calculations

Item	Description	Desc / Calculations	Quantity	Total

Inspector's Signature

Report Checked By Engineer/Supervisor



Engineering &amp; Construction Services

**REPORT OF  
CHANGES IN WORK COMPLETED**Change  
Order No:

Date:	Contract No:	Project Engineer:	Report No.
-------	--------------	-------------------	------------

Location:

Contractor: Sub-Contractor:

Description of Work :

Please Indicate how work is to be paid i.e. Lump sum agreed rate, time and material, as per schedule of prices, or contract items. Reference CD or CO and include with CO change order checklist. If work is done on a time and material basis then one report is needed for each day in which work was done.

**LABOUR**

Number	Duty	Hours	Total Hours	Number	Duty	Hours	Total Hours
	Foreperson						
	Labourer						
	Operator						
	Driver						

**EQUIPMENT**

OPSS 127 #	Make/Model	Hours / Days		Owned or Rented	Total Time
		Worked	Standby		

**MATERIALS SUPPLIED BY CONTRACTOR**

Description	Quantity	Delivery Slip	Description	Quantity	Delivery Slip

**REMARKS**


Note: This form is to be completed for any and all additional/extra work as verification by the Inspector that this work has been completed as per the CD or CO and is eligible for payment. Attach photos and material tickets when required.

Inspector's Name

Inspector's Signature

Contractor's Signature

CHANGES IN WORK  
AUTHORIZED BY:

MANAGER/PROJECT ENGINEER

Note: Quantities subject to final confirmation



Engineering and Construction Services

**Contract No.:**

**Description:**

**Project Engineer:**

Signature

**Telephone:**

**Cell Phone:**

**Inspector Name:**

Signature:

**Contractor Name:**

Signature:

## WEEKLY REPORT

**CONSTRUCTION SECTION**

**Week of:** \_\_\_\_\_

**To:** \_\_\_\_\_

**Report #** \_\_\_\_\_ **To** \_\_\_\_\_

**Schedule:** \_\_ On \_\_ Behind \_\_ Ahead of

Item #	Description	Qty.	Unit	Mon.	Tue.	Wed.	Thurs.	Fri.	Sat.	Sun.	Week Total	Prev. Total	Total to Date
1	Field office for the Engineer	1	lump sum										
2	Traffic control and Staging including traffic control persons, signs, flashers, delineators, barricades, etc.	1	Lump Sum										
3	Clean out existing catchbasins and sumps	4	each										
4	General excavation (Provisional)	80	m <sup>3</sup>										
5	Cold grind asphalt pavement up to 50mm deep (Provisional)	400	m <sup>2</sup>										
6	Cold grind asphalt pavement up to 100mm deep	1,750	m <sup>2</sup>										
7	Concrete/asphalt curbs, curbs & gutters, all types	390	m										
8	Concrete sidewalk, all thicknesses	480	m <sup>2</sup>										
9	Temporary Asphalt sidewalk, all thicknesses	60	m <sup>2</sup>										
10	Asphalt driveways, all thicknesses	370	m <sup>2</sup>										
11	Major crack repair in asphalt using HL8 - 300 mm wide, 75 mm deep	100	m										
12	Rout and seal joints and minor cracks	100	m										
13	Hot mix asphalt HL-3 MOD with PGAC 58-28	220	t										



Engineering &amp; Construction Services

**FIELD INSTRUCTION****Field Instruction  
No.: FI-**

Report No:

Inspector:

Date:

Contract No:

Contractor:

Subcontractor:

Contract Administrator:

Location:

Inspector:

Project No.:

Drawing(s):

Other Document(s):

The following minor changes in the work have been ordered and authorized:

**DESCRIPTION OF INSTRUCTIONS****REASON FOR FIELD INSTRUCTION:****REFERENCE DRAWING SHEETS AND SECTION(S) OR DETAIL(S)****REFERENCE SPECIFICATION SECTION(S) / PARAGRAPH(S)**

The intent of this Field Instruction is to authorize minor variations to the contract documents, not involving a change in contract price or contract times, and which are compatible with the design concept of the completed project.

This Field Instruction is binding upon OWNER and also on CONTRACTOR who will perform the work promptly. If OWNER or CONTRACTOR believes an adjustment to the contract price or contract times is necessary, the party may make a claim therefore in accordance with the General Conditions.

Issued by Inspector:

By: \_\_\_\_\_  
Authorized Representative

Date: \_\_\_\_\_

Contractor Receipt Acknowledgement:

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



Engineering & Construction Services

## REQUEST FOR QUOTATION

NO.: REQ-

Report No:

Inspector:

Date:

Contract No:

TO:

PROJECT:

FROM:

SPEC. SECTION :

DESCRIPTION::

DATE QUOTATION IS REQUIRED:

### To Be Completed By Initiator of Request:

#### 1. Scope of work (Include List of Attachments):

2. Reason(s) for Modification: ☐ Owner ☐ Unforeseen Conditions (site, weather, etc.) ☐ Other

#### 3. Approval of Request:

Contract Administrator: \_\_\_\_\_ Date: \_\_\_\_\_

### To Be Completed by Contractor:

4. Total Cost of Modification (Attach detailed Breakdown): \$ \_\_\_\_\_

5. Will a Modification to the Contract Time Be Requested: ☐ Yes ☐ No  
NOTE: If Yes, *Form A* Must be attached

6. Attachment Identification (List): \_\_\_\_\_

7. Quotation In Effect Until (Date): \_\_\_\_\_

Authorized Signature: \_\_\_\_\_  
Contractor Date



Engineering & Construction Services

# INSPECTOR'S DAILY REPORT ADDITIONAL REMARKS

Page: of

Report No:

Inspector:

Date:

Contract No:

## REMARKS

\_\_\_\_\_  
Inspector's Signature

REPORT CHECKED BY:

PROJECT ENGINEER/SUPERVISOR

**NOTE: Quantities subject to final confirmation**

Copy to: Consultant, Contract Administrator, Contractor, Office File

Form ECS-FSM-110 – 08/17  
INSPECTOR'S DAILY REPORT ADDITIONAL REMARKS



Engineering &amp; Construction Services

## FIELD INSPECTION OF MATERIALS AND EQUIPMENT

DATE:

ATTACHMENT TO DAILY LOG NO:

SHEET: OF

DAY:

PROJECT NAME:

CONTRACT NO.:

CONTRACTOR:

FURNISHED BY:

☐

CONTRACTOR

☐

OWNER

INSPECTED BY:

Specification

Plan

Sheet

of

Material or Equipment

Quantity

Manufacturer or Source

Jobber or Dealer

Address

Address

City

State

Zip Code

City

State

Zip Code

Proposed Use

Proposed Location

**Dimensions and other physical characteristics determined by measurement, weight, visual inspection, and routine field tests:**

Have required tests been run?

☐ Yes☐ No

Are copies of material/equipment compliance certificates attached?

☐ Yes☐ No☐ List:

Materials complies with specifications

☐ Yes☐ No

Specific location and explanation should be given if test results for inspections show non-compliance and the material is incorporated in the work.

Remarks:

Date Report Submitted:

Reviewed By:

Date:



Engineering &amp; Construction Services

**DEFICIENCY LIST**

Page 1 of 1

Inspector:

Date:

Contract No.

Contractor:

Contract Administrator:

Location:

Item	Location	Description	Cost	Accepted	
				By	Date
Total			\$		





Contract Number: \_\_\_\_\_

Project Location: \_\_\_\_\_

Drinking Water Tracking No. (For Development Engineering Use): \_\_\_\_\_


DISINFECTION PROPOSAL PLAN

Disinfection Criteria

Type of Installation:	<input type="checkbox"/> Watermain	<input type="checkbox"/> By-pass	<input type="checkbox"/> Service Hose
Pipe Diameter :	mm	Length:	m
Disinfection Method:	<input type="checkbox"/> Continuous Feed	<input type="checkbox"/> Slug	Pipe Material: PVC, DI, Other: _____
Contact Time:	<input type="checkbox"/> 24 hrs	<input type="checkbox"/> 3 hrs	Concentration: mg/L
Backflow Preventer to be used:	<input type="checkbox"/> RP	Disinfectant to be used:	
Discharge to:	<input type="checkbox"/> Storm	Location of source water:	
	<input type="checkbox"/> Sanitary		
	<input type="checkbox"/> Combined	Source provided by:	<input type="checkbox"/> Watermain Hydrant
			<input type="checkbox"/> By-pass

Disinfection Site Map:

Note: If this sketch area is not used with submission  
any attached sketch must include all pertinent information

N

Identify the following:  
Line valves (V-1, V-2, V-3, etc.):  
CL<sub>2</sub> Application (A)  
Flushing (F) example: F-1, F-2  
Sampling (S) example: S-1, S-2  
Backflow Preventer (BFP)

Contractor Company Name: \_\_\_\_\_

Date: \_\_\_\_\_

Contractor Representative Name

Print: \_\_\_\_\_ Signature: \_\_\_\_\_

Approved by Contract Administrator

Date: \_\_\_\_\_

Print: \_\_\_\_\_

Signature: \_\_\_\_\_

Contract Number: \_\_\_\_\_ Project Location: \_\_\_\_\_

Drinking Water Tracking No. (For Development Engineering Use): \_\_\_\_\_

DISINFECTION RECORD

Contract Administrator: \_\_\_\_\_ Contractor Company Name: \_\_\_\_\_

Drawing Attached: ☐ Yes ☐ No Disinfectant Used: \_\_\_\_\_

Disinfection of: ☐ Watermain ☐ By-pass ☐ Service Hose Backflow Preventer Used: ☐ RP

- Complete All Items On This Disinfection Checklist:
- ☐ Backflow prevention device tested by certified tester and test form submitted
- ☐ Pipe hydrostatic pressure tested prior to disinfection
- ☐ Flushing / Scouring velocity met
- ☐ Disinfection Process documented (Complete Table 1)
- ☐ Water quality documented during bacteriological sampling (Complete Table 2)
- ☐ Post-flushing water quality criteria met: Turbidity is less than 1 NTU, Total Chlorine Residual is between 0.50 mg/L and 2.5 mg/L
- ☐ Submitted all laboratory bacteriological sample chain of custody / submission forms with this form

Table 1: Disinfection Process

Location ID	START					END			Δ
	Date	Turbidity		Total Chlorine Residual		Total Chlorine Residual			Decrease in Chlorine Concentration
		NTU	Time of Testing	Initial (mg/L)	Time of Testing	After Contact Time (mg/L)	Date	Time of Testing	(Initial – After) (mg/L)

The following people acknowledge that the above information conforms to the limits set out in TS 7.30:

Certified Operator/ Water Quality Analyst: [Print] \_\_\_\_\_

[Signature] \_\_\_\_\_ [OWWCO Certificate No.] \_\_\_\_\_

Contract Administrator: [Print] \_\_\_\_\_ [Signature] \_\_\_\_\_

Contract Number: \_\_\_\_\_ Project Location: \_\_\_\_\_

Drinking Water Tracking No. (For Development Engineering Use): \_\_\_\_\_

SAMPLING AND TESTING

- A. Confirm 350 metre sampling point distancing met: ☐ Yes
- B. Confirm that second set of bacteriological sampling is a minimum 16 hours after the first set: ☐ Yes
- C. Licensed Laboratory performing analysis: \_\_\_\_\_

Table 2A: Post-flushing Water Quality, Sampling and Testing Record (First of Two Consecutive Sets of Samples)

Location ID and Bacteriological Sample Description	Date	Time of Sampling	*Turbidity (NTU)	*Total Chlorine Residual (mg/L)	Lab Chain of Custody / Sample Submission No.

\*Turbidity and Total Chlorine Residual MUST be field-tested at the same time(s) and at the same location(s) as any bacteriological sampling

Table 2B: Post-flushing Water Quality, Sampling and Testing Record (Second of Two Consecutive Sets of Samples)

Location ID and Bacteriological Sample Description	Date	Time of Sampling	*Turbidity (NTU)	*Total Chlorine Residual (mg/L)	Lab Chain of Custody / Sample Submission No.

\*Turbidity and Total Chlorine Residual MUST be field-tested at the same time(s) and at the same location(s) as any bacteriological sampling

The following people acknowledge that the above information conforms to the limits set out in TS 7.30:

Certified Operator / Water Quality Analyst: [Print] \_\_\_\_\_

[Signature] \_\_\_\_\_ [OWWCO Certificate NO.] \_\_\_\_\_

Contract Administrator: [Print] \_\_\_\_\_

[Signature] \_\_\_\_\_

Contract Number: \_\_\_\_\_ Project Location: \_\_\_\_\_  
Drinking Water Tracking No. (For Development Engineering Use): \_\_\_\_\_

**Exception to installation and disinfection of connections greater than one pipe length and up to a total length of 40 m :**

Checkboxes that confirm when exception used that watermain:

Crosses a transportation corridor, the extended closure of which could result in significant community impacts (e.g., traffic congestion, loss of emergency vehicle access, safety concerns) , ☐ Yes

or

Cannot be constructed to within one pipe length of the existing watermain due to the potential for destabilizing an existing thrust block. ☐ Yes

Checkboxes that confirm:

The new watermain and appurtenances forming the connection shall be sprayed or hand swabbed with a minimum 1% sodium hypochlorite solution, aboveground or in the excavation, immediately prior to installation. ☐ Yes

A Certified Operator is required to witness the installation of the connection to ensure that sanitary construction practices are followed, and proper disinfection is performed. ☐ Yes



Engineering & Construction Services

## HYDROSTATIC LEAK TEST RECORD (FOR BURIED WATER & WASTEWATER PRESSURE PIPING)

Date of Test:			
Test No.:		Retest:	Yes <input type="checkbox"/> No <input type="checkbox"/>
Project:		Project No.:	
Contractor:		Inspector:	(Print Name)
Pipeline Identification:			
Location of Test:			
Test From: (Station)	To: (Station)	Test Fluid:	
Test Specification:			
For _____ metres, pipe diameter of _____ makeup water = _____ litres ( length) (mm)			
First Test: <input type="checkbox"/> Subsequent Test: <input type="checkbox"/>			
<b>Allowable Leakage (L) Test Computation:</b>			
Refer to OPSS 441.07.24.03 which states the allowable leakage of 0.082 litres per millimetre of pipe diameter per kilometre of pipe for a 2-hour test period.			
<b>Remarks:</b>			
<b>Contractor Certification:</b>		<b>Inspector:</b>	
Signature		Signature	
Title		Title	



COMMUNICATION	
<b>Items/Concerns Discussed:</b>	
1.	
2.	
3.	
<b>Requested Revisions or Interpretations, Field Instructions, Change Directives, and Change Orders:</b>	
1.	
2.	
3.	
<b>Nonconforming Work Reported to Contractor today:</b>	
1.	
2.	
3.	
<b>Issues that may lead to Delays in project delivery:</b>	
1.	
2.	
3.	
<b>Visitors and Purpose of Visit:</b>	
1.	
2.	
<b>Attachments and Other Inspection/Observation Reports :</b>	
1.	
2.	
3.	

**REMARKS:**

Acknowledgement Signatures:

INSPECTOR: \_\_\_\_\_ **(Print Name)** Date: \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ **(Title)** \_\_\_\_\_ **(Print Name)** Date: \_\_\_\_\_

CITY PROJECT MANAGER: \_\_\_\_\_ **(Optional)** \_\_\_\_\_ **(Print Name)** Date: \_\_\_\_\_

Copies: ☐ CITY ☐ CONSULTANT ☐ FILE ☐ OTHER \_\_\_\_\_



## DAILY PHOTOGRAPHS (number to suit)

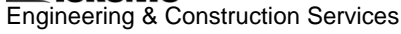
PHOTOGRAPHS	
<i>Insert photograph and description of works.</i>	
<b>Description:</b>	
<i>Insert photograph and description of works.</i>	
<b>Description:</b>	
<i>Insert photograph and description of works.</i>	
<b>Description:</b>	
<i>Insert photograph and description of works.</i>	
<b>Description:</b>	

## Daily Observation Report Checklist – Major Infrastructure Projects

The site inspector should maintain adequate data and records in a daily observation report related to the daily status and progress of the construction work. The report must include the following information in the table below as a minimum:

Items (see attached template):	Please Check:
Contract Name	<input type="checkbox"/>
Consultant Name	<input type="checkbox"/>
City Project Name	<input type="checkbox"/>
Project Number	<input type="checkbox"/>
Contractor Name	<input type="checkbox"/>
Completed By Name	<input type="checkbox"/>
Day and Date	<input type="checkbox"/>
Time In	<input type="checkbox"/>
Time Out	<input type="checkbox"/>
Report Number	<input type="checkbox"/>
Observations <ul style="list-style-type: none"> <li>- Health and Safety Issues</li> <li>- Tailgate Safety Meeting (Contractor)</li> <li>- Weather/Temperature</li> <li>- Contractor Site Supervisor Name</li> <li>- Work Area</li> <li>- Site Conditions</li> <li>- Number of Working Days to-date</li> <li>- Inclement Weather Challenges Noted?</li> <li>- Work Observed/Activity/Noted Concerns</li> <li>- Surveys or any site monitoring, such as for vibration being done</li> <li>- Changed conditions</li> <li>- Location of Work</li> <li>- Soil conditions</li> <li>- Testing or Commissioning</li> <li>- Progress of work and how it relates to the schedule</li> </ul>	<input type="checkbox"/>

Items (see attached template):	Please Check:
<p>List of Contractor Resources</p> <ul style="list-style-type: none"> <li>- List Resources or Append Daily Sign-in Sheet from Contractor or Facility</li> <li>- Personnel on-site including numbers</li> <li>- Activity/Purpose</li> <li>- Subcontractors and Equipment Manufacturer's on site</li> <li>- Material delivered to site</li> <li>- Equipment on site and use</li> </ul>	<input type="checkbox"/>
<p>Communication</p> <ul style="list-style-type: none"> <li>- Items/Concerns Discussed</li> <li>- Requested Revisions or Interpretations, field instructions, change directives or change orders issued or any other changed conditions</li> <li>- Nonconforming Work Reported to Contractor (on this date)</li> <li>- Issues that may lead to Delays in Project Delivery</li> <li>- Visitors and Purpose of Visit</li> <li>- Attachments and Other Inspections/Observation Reports</li> </ul>	<input type="checkbox"/>
<p>Acknowledgement Signatures</p> <ul style="list-style-type: none"> <li>- Inspector</li> <li>- Reviewed By</li> <li>- City Project Manager (Optional)</li> <li>- Copies to City, Consultant and Project File</li> </ul>	<input type="checkbox"/>
<p>Daily Photographs</p> <ul style="list-style-type: none"> <li>- Insert photograph</li> <li>- Include description of photograph, date, time and other details</li> </ul>	<input type="checkbox"/>



## Time Extension Backup Attachment

Report No:

Date:

**TO:**

**PROJECT:**

**FROM:**

**SPEC. SECTION :**

**DESCRIPTION:**

**DATE QUOTATION IS REQUIRED:**

The Owner or Owner's Representative will re-calculate the schedule with the proposed time impacts to all specific activities affected to determine what impact to the overall critical path as a means to evaluate any change to contract completion.

**Schedule Activities Affected:**

[illegible]

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Auditor (print full name): \_\_\_\_\_

Weather: \_\_\_\_\_

Location: \_\_\_\_\_

Contract # (where applicable): \_\_\_\_\_

Description of Work Performed: \_\_\_\_\_

## Personal Protective Equipment

Appropriate PPE being used:

☐ Yes

☐ No

## Site Office / Trailer

- |   |                              |                             |                               |
|---|------------------------------|-----------------------------|-------------------------------|
| 1. First-Aid kit properly equipped and maintained:  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 2. Eye-wash kit or station supplied and maintained: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 3. Copy of current OHS Act and Regs supplied:       | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 4. Adequate lighting:                               | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 5. Adequate heating and air-conditioning            | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 6. Supply of fresh drinking water:                  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 7. Sanitary system including toilet for sole use:   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 8. Fire extinguisher supplied and maintained        | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 9. Safe access / egress:                            | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 10. Copies of SDS sheets supplied:                  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 11. Smoke alarm supplied and working:               | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 12. Carbon monoxide detector supplied:              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 13. Other items included:                           | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| a) Notice of project                                | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| b) Copy of utility locates                          | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| c) Nearest hospital (map to nearest hospital)       | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| d) Form 1000  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| e) Street occupancy permit / utility cut permits    | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Both |
| f) Form #82 (M.O.L. 1,2,3,4 poster)                 | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| g) Construction Emergency Contact numbers           | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |
| 15. Electrical Safety Association Certificate       | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A  |

## Notes

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\_\_\_\_\_  
Inspector's Signature

\_\_\_\_\_  
Supervisor/Inspection Coordinator's Signature

## RECORD OF DAMAGED SERVICES REPORT

### Information to consider for your statement

If you witnessed the event:

- Give the facts as you witnessed them
- Refrain from speculation or other witness accounts and beliefs
- Describe in detail how the damage occurred
- Include any conversation with the Contractor or Authorities

Types of useful photos

Photo timelines

Photos with various view points

- ☐ Labelled  
☐ Location  
☐ Date and time stamped
- ☐ Leading to event  
☐ During event  
☐ Post event

- ☐ Distant photos (across the street)  
☐ Interim distance (3 to 5 metres)
- ☐ Close distance (1.5 to 3 metres)  
☐ Close up (1.5 metres or less)

Weather conditions leading up to the incident

- ☐ Clear  
☐ Sunny  
☐ Overcast
- ☐ Dusk  
☐ Dawn  
☐ Night
- ☐ Rain (light)  
☐ Rain (medium)  
☐ Rain (heavy)
- ☐ Snow (light)  
☐ Snow (medium)  
☐ Snow (heavy)
- ☐ Ice  
☐ Frozen  
☐ Other (please describe)

Temperature: \_\_\_\_\_

Were the locates clearly visible on the ground? ☐ Yes ☐ No

Type of marks? ☐ Paint ☐ Additional paint ☐ Flags ☐ Offset Flags ☐ Stakes

Depth of service? \_\_\_\_\_ Service Protected? ☐ Yes ☐ No Distance from the damaged service to the locate marks? \_\_\_\_\_

Service buried in? (e.g.: soft sand, conduit, hard clay, asphalt, concrete base ...)

How many people on site?

\_\_\_\_\_ Contractor + Subs  
 \_\_\_\_\_ Consultant

\_\_\_\_\_ City  
 \_\_\_\_\_ Public

\_\_\_\_\_ Other

List of equipment in the immediate vicinity of the incident

(e.g.: bobcat, mini hoe, excavator, rubber tire, shovel, hydrovac, concrete saw, drills ...)

Other comments:

N

## RECORD OF DAMAGED SERVICES REPORT

Date of Incident:	Project Number:	Inspector(s) Name:	Contractor and/or Sub Con Name:

Specific location of incident: (e.g.: 100 Queen Street East, corner of Queen and Bay)

Are locates valid? ☐ Yes ☐ No Does the City have a copy of locates? ☐ Yes ☐ No Are locates with the operator? ☐ Yes ☐ No

### Type and details of damaged service:

(e.g.: 1/2" gas, 6" main, street light, 600v service, Bell, fibre optic, depth, what was it buried in e.g.: asphalt, concrete base, sand, gravel, conduit...)

Size	Type	Size	Type	Size	Type	Size	Type
	<input type="checkbox"/> Gas Main		<input type="checkbox"/> Hydro		<input type="checkbox"/> Conduit		<input type="checkbox"/> Cable
	<input type="checkbox"/> Gas Service		<input type="checkbox"/> Hydro Pole		<input type="checkbox"/> Fibre Optic		<input type="checkbox"/> Other
	<input type="checkbox"/> Gas Valve		<input type="checkbox"/> Street Light Cable		<input type="checkbox"/> Bell Cable or Service Wire		

Owner of Service: \_\_\_\_\_ (e.g.: Enbridge, Bell, Rogers, Toronto Hydro...)

### Statement

The following statement is based on: <input type="checkbox"/> Inspector's witnessed account <input type="checkbox"/> Contractor's described account	Pictures attached: <input type="checkbox"/>
--	---

Statement:

Report completed by: _____ <div> <div>Print name</div> <div>Signature</div> <div>Date</div> </div>	Incident reported to: <input type="checkbox"/> Supervisor <input type="checkbox"/> H&S Manager <input type="checkbox"/> Engineer / CA
---	---

## Item Overrun and Underrun Justification Report

Contract #: \_\_\_\_\_

Contractor: \_\_\_\_\_

Project/Street Name: \_\_\_\_\_

Justification Report #: \_\_\_\_\_

Date: \_\_\_\_\_

Item No.	Description	Tender Quantity	Actual Quantity	Quantity Increase/Decrease	Reason for Quantity Change

Inspector:

Construction Supervisor:

City Project Manager:

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature





Engineering & Construction Services

## CONTRACTOR INFRACTION REPORT

<b>Contract No.:</b> <b>Tender Call No.:</b>		<b>Contractor:</b>	
<b>Contract Description:</b>		<b>Infraction No.:</b>	
		<b>Date Issued:</b>	
<b>Types of Infraction</b>			
1. Poor quality of work attributable to the Contractor		D	
Comments: _____			
2. Failure to comply with interim or final completion date(s)		D	
Comments: _____			
3. Failure to maintain public relations		D	
Comments: _____			
4. Failure to provide adequate organization, co-operation, personnel or equipment to perform the work		D	
Comments: _____			
5. Late submission of claim or notice of intent to claim		D	
Comments: _____			
6. Failure to comply with safety and or traffic control requirements		D	
Comments: _____			
7. Failure to comply with environment responsibilities and regulations		D	
Comments: _____			
8. Failure to comply with any other contractual conditions or specifications		D	
Comments: _____			
General Comments:			
Compiled by: _____		Supervisor: _____	
Reviewed by: _____		Project Lead: _____	
Approved by: _____		Manager: _____	
Date: _____		Date: _____	





## UTILITY PRE-CONSTRUCTION MEETING SUMMARY

Engineering & Construction Services

Date:	Time:	Meeting Location: <input type="checkbox"/> On-Site <input type="checkbox"/> Other ( <i>specify</i> ):	
RACS Permit #:	Stream: <input type="checkbox"/> Short <input type="checkbox"/> Full	District: <input type="checkbox"/> TEY <input type="checkbox"/> EY <input type="checkbox"/> NY <input type="checkbox"/> SC	
Site Location and Type of Installation:			
Start Date:		Anticipated Completion Date:	
Inspector:		Number:	
Utility Company:		Contact Name:	Number:
Contractor:		Contact Name:	Number: 24hr Emergency:
Attendees ( <i>name, company, number</i> ):			
Notifications Distributed: RODARS: <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A Residents: <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A BIA: <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A			
Traffic Restrictions / Working Hours:			
Pay-Duty Police Required: <input type="checkbox"/> No <input type="checkbox"/> Yes ( <i>specify details</i> ):			
Staging of Work / Installation Method / Restoration:			
Other Discussion ( <i>where applicable, discussion should include pedestrian access and safety, tree protection, equipment storage, materials stockpiling, protection of open excavations, etc.</i> ):			
Additional Information: <input type="checkbox"/> None <input type="checkbox"/> On Reverse <input type="checkbox"/> Attached (no. of pages): ____			

## Full-Stream Line Change Process

1. Contractor contacts utility company and City Inspector to attend the site.
2. Utility company determines whether it is best to request a line change or to daylight the potential conflict to see if there is truly a problem.
3. If a line change is required, utility company consults with the City Inspector in the field about the best course of action then prepares redlined drawing. Drawing should show the conflict that caused the change, basic offsets/clearances, and a note if the work location is moving from the boulevard to the roadway or vice versa.
4. Utility company emails the redlined drawing, along with the information indicated on the Redline Submission Form, to Third Party & Utility Review [UtilityLineChange@toronto.ca](mailto:UtilityLineChange@toronto.ca) copied to the Inspector.
  - The subject line of the email shall be: **Line Change - City Permit # - Street Name**
  - A picture of the redline may be taken in the field - as long as the quality is sufficient that all information is legible.
  - The information from the Redline Submission Form may be contained in the body of the email rather than attaching a separate form.
5. Utility company proactively pursues email sign-off from other companies whose infrastructure may be encroached upon by the change and forwards them to the Reviewer.
6. Reviewer begins review of line change without delay under the assumption that utility company is concurrently pursuing any required sign-offs.
7. Upon receipt of the required information, the Reviewer provides a response within 24 hours, copying the Inspector and Transportation Services.
8. If the change is acceptable, the reviewer stamps the PDF drawing electronically and emails it to the utility company, copying the Inspector, Transportation Services, and City Mapping.
9. If the work location is moving from the boulevard to the roadway or vice versa, work cannot proceed until a revised permit is issued by Transportation Services. If the work location remains on the same area of the right-of-way, then work may proceed immediately upon receipt of the acceptance email from the reviewer.

## **Full Stream Line Change – Red Line Submission Form**

### **Project Information:**

Utility Company Name:

Contractor Name:

Utility Company Project Name:

Utility Company Project Number:

City Permit Number:

City Inspector Name:

### **Line Change Information:**

Specify and highlight if work is moving from the boulevard to the roadway or vice versa:

Pages of permit drawing affected by line change:

Description and rationale for line change:

<b>Date:</b>	
<b>Project Name:</b>	
<b>Contract Number / Project ID:</b>	
<b>Project Description:</b>	
<b>Project Location:</b>	
<b>Environmental Compliance Approval Number: (If Applicable)</b>	
<b>City of Toronto Transfer of Review Tracking Number: (If Applicable)</b>	
<b>Construction Contractors:</b>	
<b>Developer Name: (If Applicable)</b>	
<b>Wellness Report Completed by:</b>	<b>Design Consultant (Print Name):</b>
	<b>Signature:</b>
<b>ECS Inspector:</b>	
<b>Wellness Report Review by:</b>	<b>City Case Manager / Project Manager (Print Name):</b>
	<b>Signature:</b>
<b>Concurred by:</b>	<b>Manager (Print Name):</b>
	<b>Signature:</b>

**INSTRUCTIONS:** Please perform activities as outlined below by asset type and check boxes on completion.

1. WATERMAIN			
Design Consultant <b>CHECK ITEMS</b>	ECS Inspector <b>CHECK ITEMS</b>		NOTES
<input type="checkbox"/>	<input type="checkbox"/>	<p>Direction to Open Valves - Certify the correct opening and closing direction of water isolation valves based on the following standard:</p> <p><u>For Etobicoke/York (former city of York, east of the Humber River), North York, Toronto/East York districts:</u></p> <p><b>Open Clockwise</b> Operating nut supplied at time of installation is painted <b>red</b>.</p> <p><u>For Etobicoke/York (former city of Etobicoke, west of the Humber River) and Scarborough districts:</u></p> <p><b>Open Counter Clockwise</b> Operating nut supplied at time of installation is painted <b>black</b>.</p>	
<input type="checkbox"/>		Approved Chlorination Plan/Disinfection Test provided by Design Consultant	
<input type="checkbox"/>	<input type="checkbox"/>	Perform Pressure Test in presence of the City Inspector	
<input type="checkbox"/>	<input type="checkbox"/>	All construction debris is removed from chamber/Valve box:	
<input type="checkbox"/>	<input type="checkbox"/>	After construction (pre-warranty period)	
<input type="checkbox"/>	<input type="checkbox"/>	End of warranty period	
<input type="checkbox"/>	<input type="checkbox"/>	Air Valves are installed and Drain Valves are installed and working properly	
2. FIRE HYDRANTS			
		<p><b>Fire Flow Testing and Marking of Fire Hydrants</b></p> <p>All hydrants are colour coded in accordance with NFPA 291 "Fire Flow Testing and Marking of Fire Hydrants." Accordingly, barrels are to be chrome yellow. The tops and hose nozzle caps should be painted with the following capacity indicating colour scheme to provide simplicity and consistency with colours used to signal safety, danger and intermediate condition.</p>	

<input type="checkbox"/>		The capacity colours are to be reflective paint by type, for rapid identification at night:	
<input type="checkbox"/>		• Class AA - rated capacity of 5680 litres/minute or greater – <b>light blue</b>	
<input type="checkbox"/>		• Class A - rated capacity of 3784–5680 litres/minute – <b>green</b>	
<input type="checkbox"/>		• Class B - rated capacity of 1900–3785 litres/minute – <b>orange</b>	
<input type="checkbox"/>		• Class C - rated capacity of less than 1900 litres/minute – <b>red</b>	
<input type="checkbox"/>	<input type="checkbox"/>	Flow Testing Report accepted by the City ECS Inspector / DE Case Manager	
<input type="checkbox"/>		Copy of results sent to local District Operations Contact (Refer to Part 12)	
<b>3. TRACER WIRES</b>			
<input type="checkbox"/>		All tracer wires have been installed on all non-metallic watermain along the full length of the pipe so as to provide a means of locating the main to ensure/test for electrical continuity of tracer wire	
<input type="checkbox"/>		Tracer wire on non-metallic systems have been connected to new or existing metallic watermain piping or associated fittings connected to the metallic watermain	
<input type="checkbox"/>	<input type="checkbox"/>	No tracer wires installed on all metallic watermain	
<b>4. WATER SERVICE CONNECTIONS</b>			
<input type="checkbox"/>	<input type="checkbox"/>	Curb boxes functional and set to grade	
<input type="checkbox"/>		Water Service Cards completed and submitted	



5. SANITARY, STORM AND COMBINED SEWERS			
<input type="checkbox"/>	<input type="checkbox"/>	Sewer Service Connection - Clean-out at street line, for all sewer service connections for residential lots, have been installed	
<input type="checkbox"/>		Sewer Service Cards completed and submitted	
<input type="checkbox"/>	<input type="checkbox"/>	Verify that there are no crossed sewer service connections by dye test	
<input type="checkbox"/>	<input type="checkbox"/>	Sanitary and Storm Sewer Cleaning – new sewer cleaned and CCTV inspected with appropriate Water Research Centre (WRC) coding of service and structural issues:	
<input type="checkbox"/>	<input type="checkbox"/>	After construction (pre-warranty period)	
<input type="checkbox"/>	<input type="checkbox"/>	End of warranty period	
<input type="checkbox"/>	<input type="checkbox"/>	Sewer Deformation Test(s) completed and results submitted:	
<input type="checkbox"/>	<input type="checkbox"/>	After construction (pre-warranty period)	
<input type="checkbox"/>	<input type="checkbox"/>	End of warranty period	
<input type="checkbox"/>	<input type="checkbox"/>	Sewer Air/Water Exfiltration Test(s) completed and results submitted:	
<input type="checkbox"/>	<input type="checkbox"/>	After construction (pre-warranty period)	
6. MAINTENANCE HOLE			
<input type="checkbox"/>	<input type="checkbox"/>	All construction debris has been removed from maintenance hole:	
<input type="checkbox"/>	<input type="checkbox"/>	After construction (pre-warranty period)	
<input type="checkbox"/>	<input type="checkbox"/>	End of warranty period	
7. CATCHBASINS			
<input type="checkbox"/>	<input type="checkbox"/>	All construction debris has been removed from catch basin and sediment and erosion control during construction in place:	
<input type="checkbox"/>	<input type="checkbox"/>	After construction (pre-warranty period)	
<input type="checkbox"/>	<input type="checkbox"/>	End of warranty period	

8. UNDERGROUND STORAGE TANKS / SUPERPIPES			
<input type="checkbox"/>		Inspection and Monitoring Reports have been completed and submitted, including an estimate of the quantity of any sediment removed	
<input type="checkbox"/>		Operation & Maintenance manual has been completed and submitted	
<input type="checkbox"/>	<input type="checkbox"/>	Underground storage tank cleaned as documented in Operation & Maintenance manual as well as at the beginning of the warranty period and within 12 months prior to assumption by City	
9. Manufacturer Treatment Devices (MTDs)			
<input type="checkbox"/>		Sediment Inspection Report has been completed and submitted, including an estimate of the quantity of any sediment removed	
<input type="checkbox"/>		MTD Summary Form and Operation & Maintenance manual has been completed and submitted	
<input type="checkbox"/>	<input type="checkbox"/>	MTD cleaned as documented in Operation & Maintenance manual as well as at the beginning of the warranty period and within 12 months prior to assumption by City	
10. WET OR DRY PONDS OR OTHER STORMWATER MANAGEMENT FACILITIES			
<input type="checkbox"/>		Inspection and Monitoring Report have been completed and submitted, including an estimate of the quantity of any sediment removed	
<input type="checkbox"/>		Operation & Maintenance manual, ECAs and all asset related documents have been completed and submitted. All documents must be received prior to assumption	
<input type="checkbox"/>	<input type="checkbox"/>	Cleaned of sediment, as documented in Operation & Maintenance manual, as well as within 12 months prior to assumption by City	
11. FINAL SUBMISSION DOCUMENTS (Submit to contacts specified in Part 12)			
<input type="checkbox"/>		As-Built Drawings	
<input type="checkbox"/>		Environmental Compliance Approvals (ECA) in PDF, with MECP letter for confirmation of the ownership changed to City of Toronto, [address of the City unit whose manager signed the ECA Form (under Section 7.2 Statement of Municipality)], if the applicant is not City of Toronto. Note: For works processed under the Consolidated Linear Infrastructure (CLI) ECA program, this shall not apply.	
<input type="checkbox"/>		Water and Sewer Service Cards (Items 4 & 5 above)	

<input type="checkbox"/>	Inspection & Maintenance Reports (Items 8, 9, 10 above)	
<input type="checkbox"/>	Performance Monitoring Reports (Item 5 above)	
<input type="checkbox"/>	Fire Flow Test Results (Item 2 above)	
<input type="checkbox"/>	Watermain Water Quality Results (Item 1 above)	
<input type="checkbox"/>	Operation & Maintenance Manual(s) (Items 8, 9, 10 above)	
<input type="checkbox"/>	Other relevant documentation: _____	

## 12. CONTACT INFORMATION

<input type="checkbox"/>	<b>One digital version in PDF using a data sharing portal (Secure File Transfer) to "Candice Au, Manager, Analytics Services, Water Infrastructure Management", Toronto Water (Candice.Au@toronto.ca) (Metro Hall 18<sup>th</sup> Floor, 55 John St. M5V 3C6)</b>			
<input type="checkbox"/>	<b>One paper copy and one PDF on USB to the applicable District Toronto Water Distribution &amp; Collection Manager(s):</b>			
	<b>Toronto, East York and Scarborough Districts, Manager, South/East Construction Services:</b>	Ed Francis <a href="mailto:Ed.Francis@toronto.ca">Ed.Francis@toronto.ca</a>	30 Northline Rd. M4B 3E2	
	<b>North York and Etobicoke / York Districts, Manager, North/West Construction Services:</b>	Joe Cirillo <a href="mailto:Joe.Cirillo@toronto.ca">Joe.Cirillo@toronto.ca</a>	150 Disco Rd. M9W 1M4	
<b>IMPORTANT:</b> For Stormwater Management Assets (e.g. Ponds, Oil & Grit Separators, Storage Tanks, Superpipes, etc.), provide one additional paper copy and PDF on USB:	<b>Manager, Program Maintenance (City-wide):</b>	Angelo Mintsinikas <a href="mailto:Angelo.Mintsinikas@toronto.ca">Angelo.Mintsinikas@toronto.ca</a>	60 Tiffield Rd. M1V 5N2	

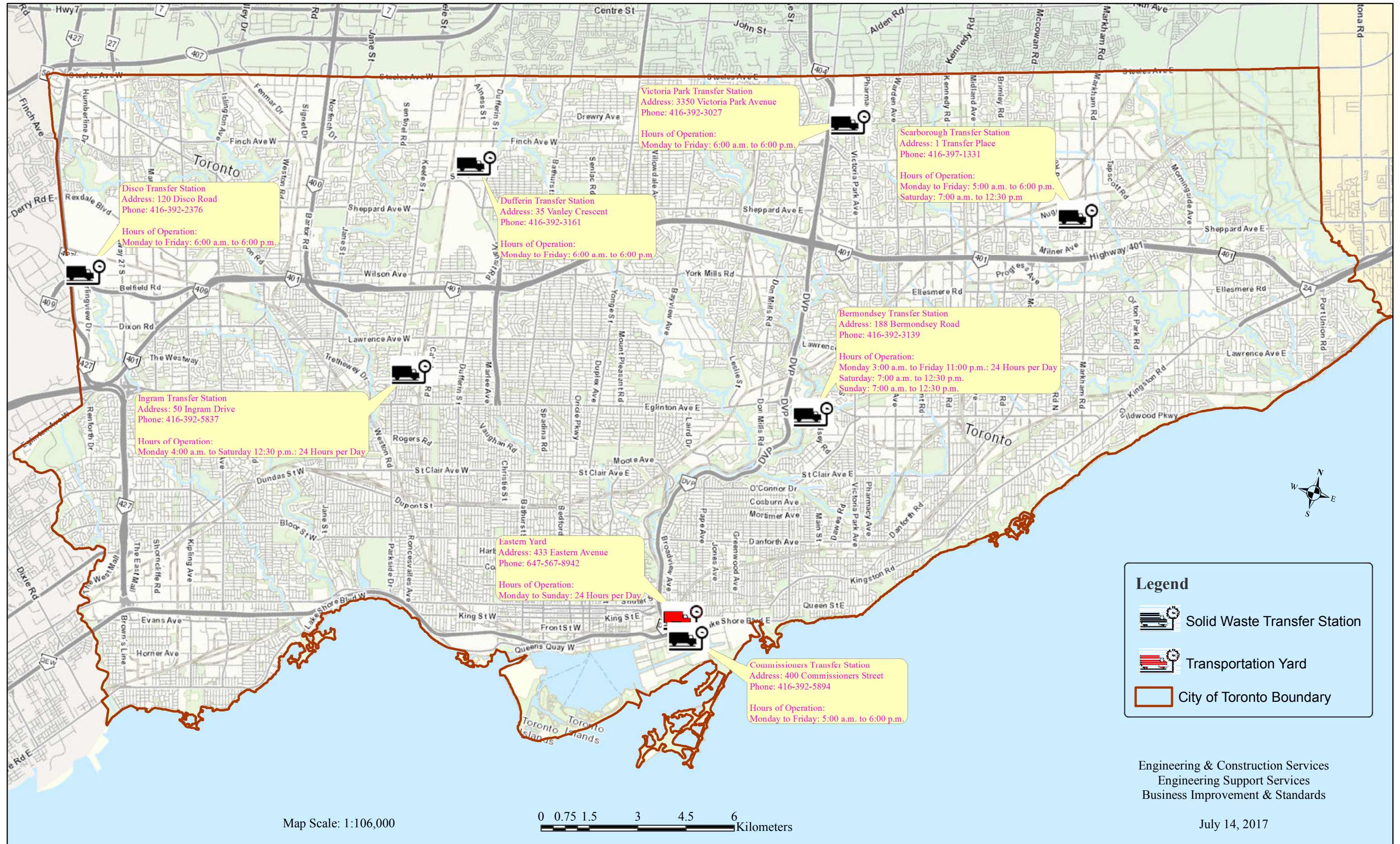
**Document Change Control Table**

Record changes to the Report and include Version Number, Date, Author(s), Brief Description of Change(s), i.e. why the change(s) were made.

<sup>1</sup> Version Number	<sup>2</sup> Date of Issue	<sup>3</sup> Author(s)	<sup>4</sup> Brief Description of Change(s)
1.0	Dec 15, 2022	Toronto Water, Water Infrastructure Management	Refined wording, updated contacts, added double column check boxes
2.0	May 1, 2023	Toronto Water, Water Infrastructure Management	Revised wording of ECA item #11.



# Weight Scale Location Map







## WEIGHT VERIFICATION ORDER

Date: \_\_\_\_\_ Time of Issue: \_\_\_\_\_ Contract Number: \_\_\_\_\_

Main Contractor: \_\_\_\_\_

City Contract Administrator: \_\_\_\_\_

Location: \_\_\_\_\_

District (please circle): 1 (TO & EY) 2 (ET) 3 (NY) 4 (SC)

### Original Weigh Ticket From Supplier

Sub-Contractor: \_\_\_\_\_ Product: \_\_\_\_\_

Ticket Time: \_\_\_\_\_ Ticket Number: \_\_\_\_\_

Truck Number: \_\_\_\_\_ Plate Number: \_\_\_\_\_

Gross Weight (Kg): \_\_\_\_\_ Tare Weight (Kg): \_\_\_\_\_

Net Weight (Kg): \_\_\_\_\_

Maximum Allowed Variance (1.0% of Net Weight (Kg)) : \_\_\_\_\_

Temperature of Hot Mix Asphalt Before Departure for Weight Verification (if applicable): \_\_\_\_\_

Time of Departure From Site: \_\_\_\_\_

Weigh Facility (circle one, see back) 1 2 3 4 5 6 7 Other: \_\_\_\_\_

### Verification of Gross Weight at City Facility

Ticket Time: \_\_\_\_\_ Gross Weight (Kg): \_\_\_\_\_

Temperature of Hot Mix Asphalt After Returning from Weight Verification (if applicable): \_\_\_\_\_

Verification of Tare Weight required: Yes No (go to "Net Weight")

Time of Departure From Site: \_\_\_\_\_

### Verification of Tare Weight at City Facility

Ticket Time: \_\_\_\_\_ Tare Weight (Kg): \_\_\_\_\_

Net Weight (Kg): \_\_\_\_\_ Variance (Kg): \_\_\_\_\_

Pay Adjustment Required (Variance > Maximum Allowed Variance): Yes No

Other Ticket Numbers Affected: \_\_\_\_\_

Inspector: \_\_\_\_\_ Signature: \_\_\_\_\_

Contractor's Foreman: \_\_\_\_\_ Signature: \_\_\_\_\_

Truck Driver: \_\_\_\_\_ Signature: \_\_\_\_\_

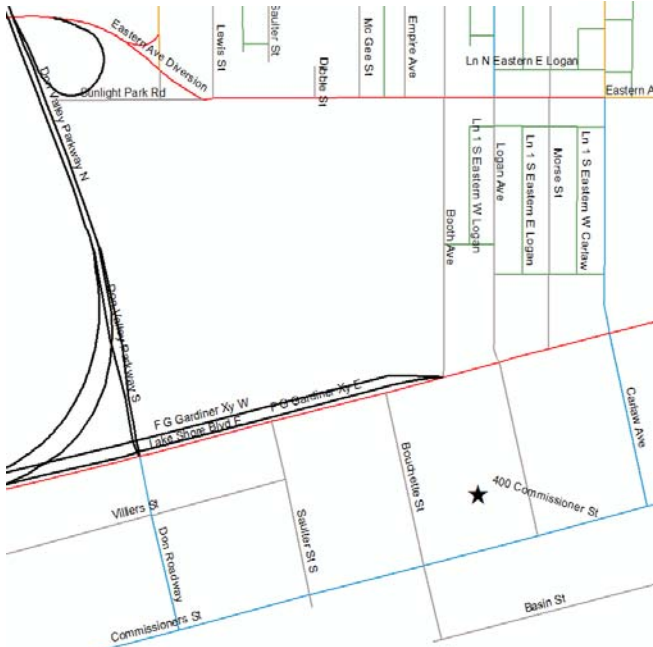
### 1. Commissioners Transfer Station

Address: 400 Commissioners Street

Phone: 416-392-5894

#### Hours of Operation:

Monday to Friday: 5:00 a.m. to 6:00 p.m.



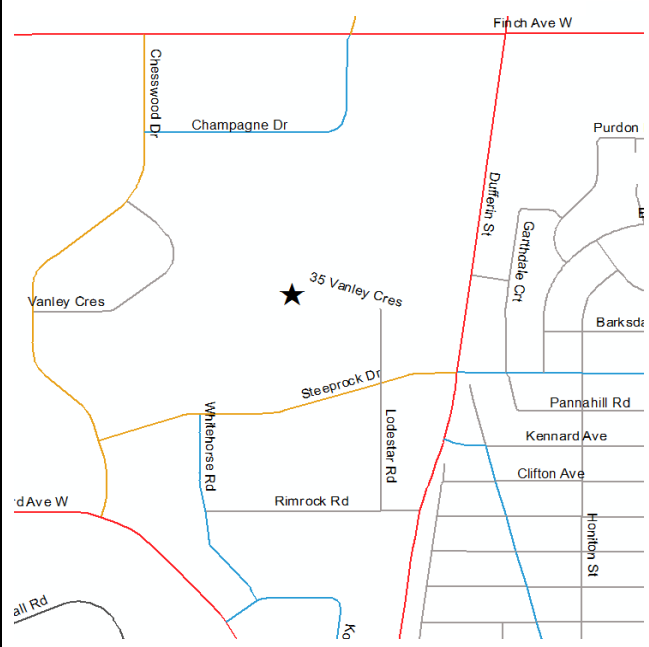
### 2. Dufferin Transfer Station

Address: 35 Vanley Crescent

Phone: 416-392-3161

#### Hours of Operation:

Monday to Friday: 6:00 a.m. to 6:00 p.m.



### 3. Bermondsey Transfer Station

Address: 188 Bermondsey Road

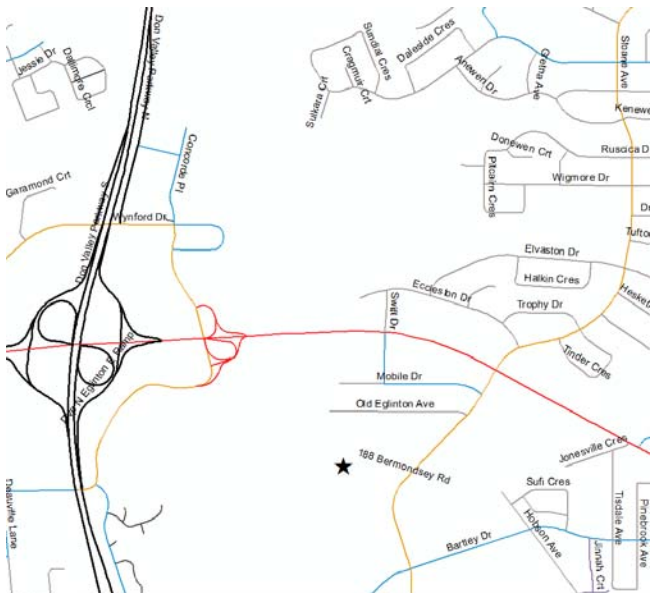
Phone: 416-392-3139

#### Hours of Operation:

24 Hours per Day from Monday 3:00 a.m. to Friday 11:00 p.m.

Saturday: 7:00 a.m. to 12:30 p.m.

Sunday: 7:00 a.m. to 12:30 p.m.



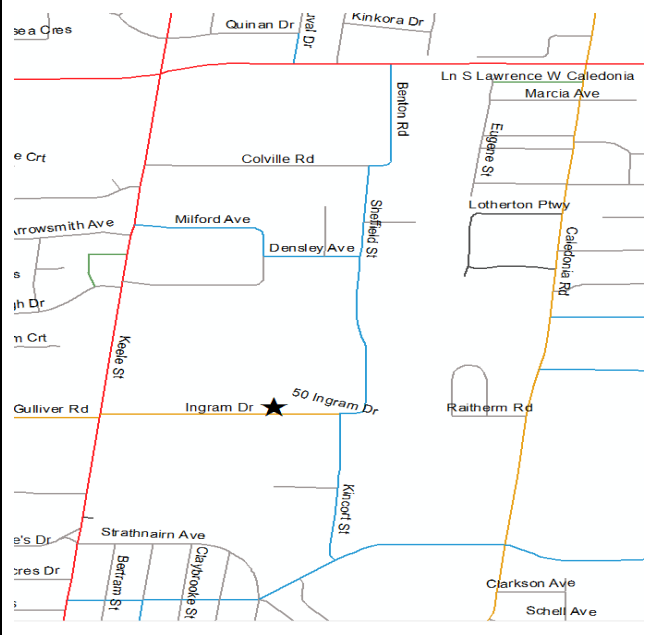
### 4. Ingram Transfer Station

Address: 50 Ingram Drive

Phone: 416-392-5837

#### Hours of Operation:

24 Hours per Day from Monday 4:00 a.m. to Saturday 12:30 p.m.



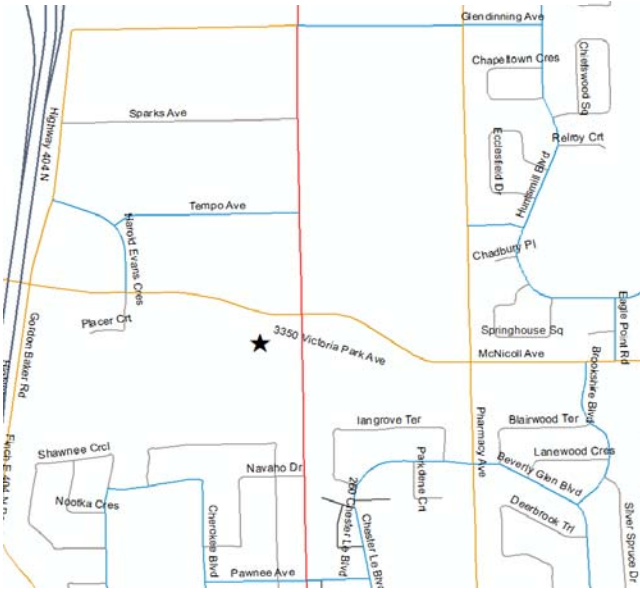
### 5. Victoria Park Transfer Station

Address: 3350 Victoria Park Avenue

Phone: 416-392-3027

#### Hours of Operation:

Monday to Friday: 6:00 a.m. to 6:00 p.m.



### 6. Scarborough Transfer Station

Address: 1 Transfer Place

Phone: 416-397-1331

#### Hours of Operation:

Monday to Friday: 5:00 a.m. to 6:00 p.m.

Saturday: 7:00 a.m. to 12:30 p.m.



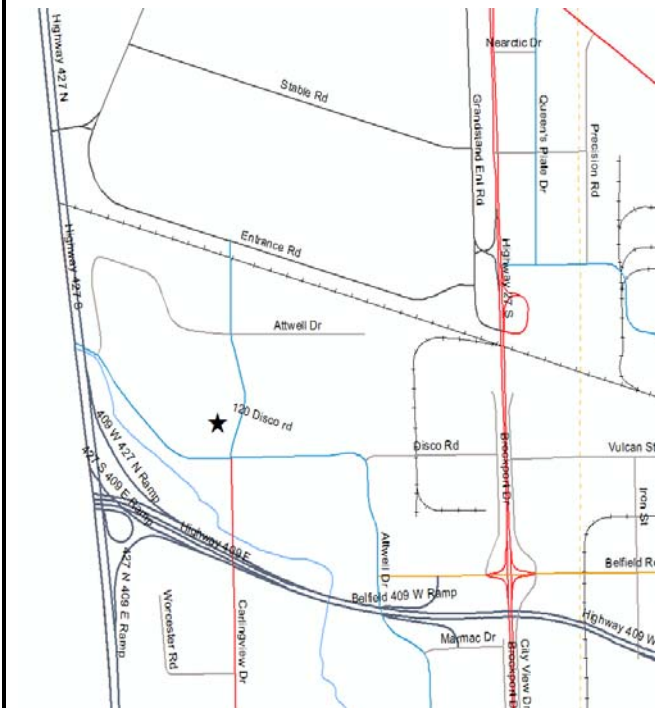
### 7. Disco Transfer Station

Address: 120 Disco Road

Phone: 416-392-2376

#### Hours of Operation:

Monday to Friday: 6:00 a.m. to 6:00 p.m.



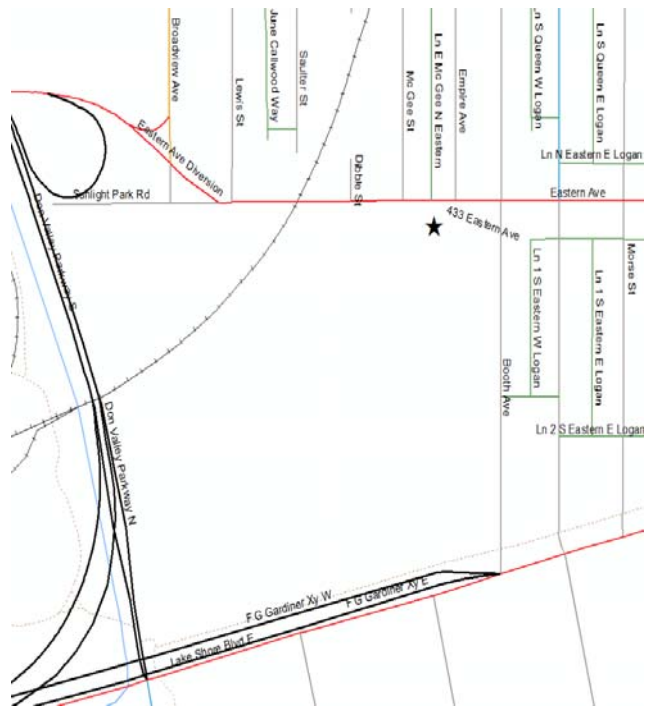
### 8. Eastern Avenue Yard

Address: 433 Eastern Avenue

Phone: 647-567-8942

#### Hours of Operation:

Monday to Sunday: 24 Hours per Day





The installation checkbox to be checked **only** if it is replacement or new installation. Otherwise check the inspection box

A filter **MUST** be distributed if the service is lead (on the City and/or private side)

Material **AND** size to be recorded **ONLY** if replaced.

Material **AND** size of old or existing water service **MUST** be filled for **both** inspection **s** and installations.

City of Toronto						<input checked="" type="checkbox"/> Installation <input type="checkbox"/> Inspection/Repair	
Street Name: <i>John St.</i>				Street No.: <i>5555</i>		CSR No.: <i>123456</i>	
<input type="checkbox"/> street which service ties to W/M or sewer Nearest Cross Street Name: <i>Wellington St.</i>				Install/Inspect Date: <i>11/23/2007</i>		W/O No.: <i>654321</i>	
<input checked="" type="checkbox"/> street which service ties to W/M or sewer <b>WATER CARD</b> <input type="checkbox"/> Fire <input type="checkbox"/> Domestic <input checked="" type="checkbox"/> Combined				Contractor: <i>JJ W/S Inc</i>		Contract No.: <i>2007-1234</i>	
<b>NSF-053 Filter Distributed (Lead Only)</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Recorded by: <i>John Doe (Company)</i>		Type: <input type="checkbox"/> Residential <input checked="" type="checkbox"/> ICI <input type="checkbox"/> Mixed use	
<b>New W/S</b> <input type="checkbox"/> Tracer Wire <input checked="" type="checkbox"/> Anode on W/S <input type="checkbox"/> Anode on W/M							
City Domestic	Mat	<i>DI</i>	City Fire	Mat	<i>DI</i>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <b>This box is Reserved For Sewer cards</b> </div>	
	Dia [mm]	<i>100</i>		Dia [mm]	<i>200</i>		
Private Domestic	Mat		Private Fire	Mat			
	Dia [mm]			Dia [mm]			
<b>Old or Existing W/S</b> <input type="checkbox"/> Disconnected <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Did not exist							
City Domestic	Mat	<i>Copper</i>	City Fire	Mat	<i>DI</i>		
	Dia [mm]	<i>50</i>		Dia [mm]	<i>150</i>		
Private Domestic	Mat	<i>Copper</i>	Private Fire	Mat	<i>DI</i>		
	Dia [mm]	<i>50</i>		Dia [mm]	<i>150</i>		
<b>W/M</b>				<b>W/S Depth [m]</b>			
Mat	<i>CI</i>		@ main	<i>1.8</i>			
Dia [mm]	<i>150</i>		@ cstop	<i>1.6</i>			

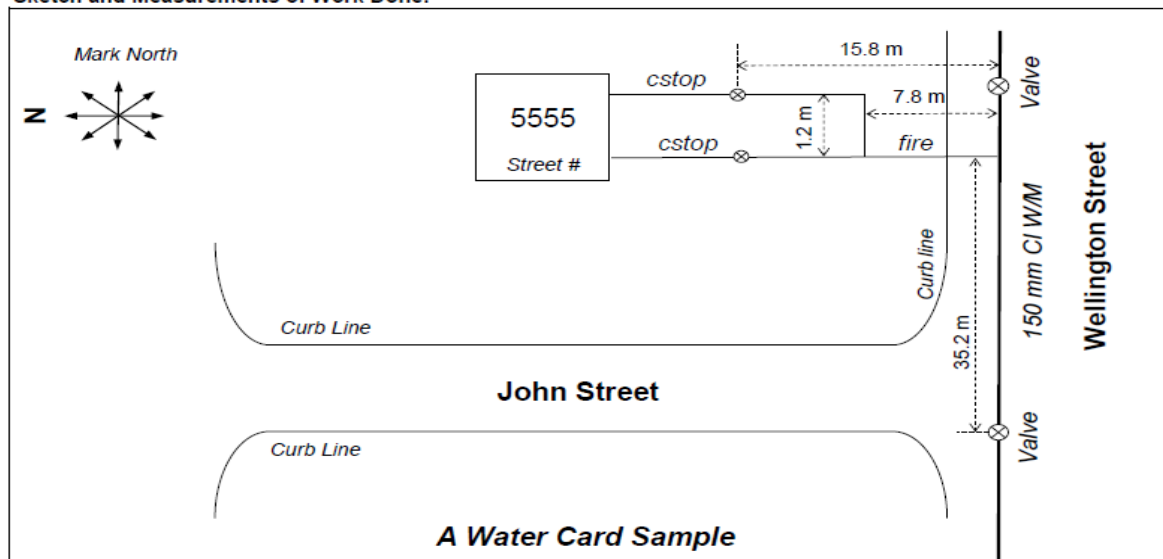
Full name and company of individual for follow up.

Material **AND** size to be recorded **ONLY** if replaced.

**This section not required if INSPECTION only.**

Material **AND** size of old or existing fire service - **MUST** be completed.

#### Sketch and Measurements of Work Done:




#### Quick Reference Guide for Water Service Cards

- Shaded areas must be fully filled.
- Shaded areas must be filled for installation only.

**Exceptions:**  
Info for domestic is not required for replacement of fire service **IF** the domestic is separate.

The installation checkbox **MUST** be checked.

Location, date, and cross street info to be fully filled.

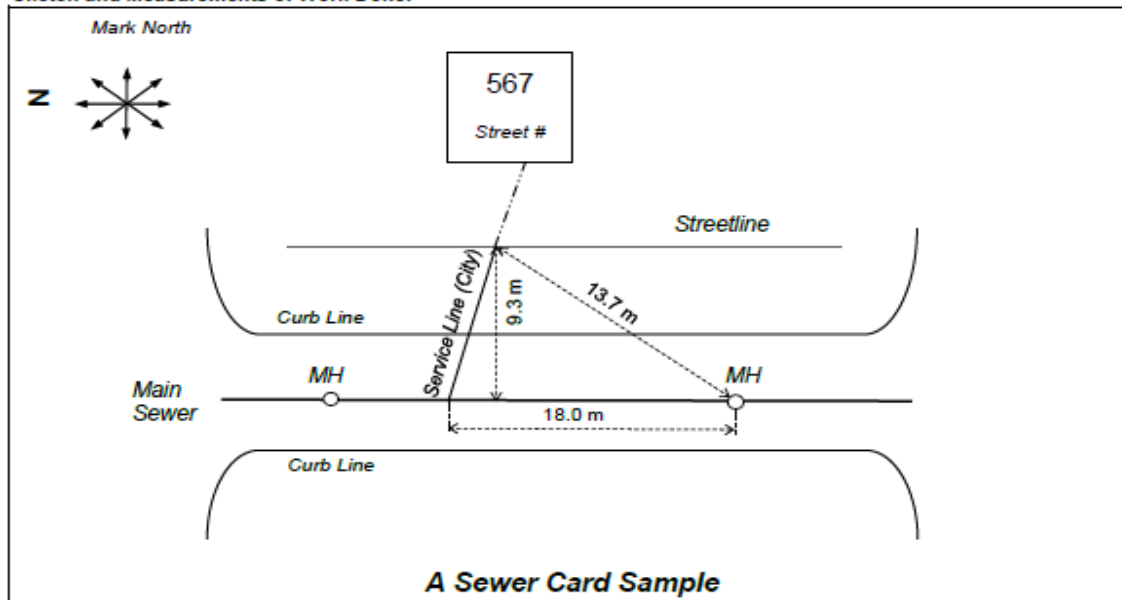
 <b>City of Toronto</b> <b>Water/Sewer Service Card</b>		<input checked="" type="checkbox"/> <b>Installation</b> <input type="checkbox"/> <b>Inspection/Repair</b>	CSR No.: 123456 W/O No.: 987654 Contractor: Service Inc. Contract No.: 65443 Recorded by: TW Service Type: <input checked="" type="checkbox"/> Residential <input type="checkbox"/> ICI <input type="checkbox"/> Mixed use
Street Name: John St. <input type="checkbox"/> street which service ties to W/M or sewer	Street No.: 567 Install/Inspect Date: 11/20/2007 Nearest Cross Street Name: <input type="checkbox"/> street which service ties to W/M or sewer		
<p style="text-align: center; color: blue; font-size: 1.2em;">This box is reserved For Water service cards</p>		<b>SEWER CARD</b> Sewer Service Purpose <input checked="" type="checkbox"/> Sanitary <input type="checkbox"/> Combined <input type="checkbox"/> Storm Sewer Service <input checked="" type="checkbox"/> New <input type="checkbox"/> Inspection Mat: PVC Dia [mm]: 100 Sewer Service Depth [m] @ Sewer: 2.4 @ Streetline: 1.9 Sewer Mat: Concrete Dia [mm]: 900 Old Sewer Service Disconnected <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Did not exist	

Full name and company of individual for follow up.


Material, size, depth of sewer service to be recorded.

Material, size of the associated sewer main to be recorded.

Sketch and Measurements of Work Done:



## Quick Reference Guide for Sewer Service Cards

 Shaded areas must be fully filled.

<div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> <b>City of Toronto</b>  <b>Water/Sewer Service Card</b> </div> <div style="display: inline-block; vertical-align: middle; margin-left: 20px;"> <input type="checkbox"/> <b>Installation</b>  <input type="checkbox"/> <b>Inspection/Repair</b> </div>		CSR No.:	
		W/O No.:	
Street Name:		Street No.:	
<input type="checkbox"/> street which service ties to W/M or sewer		Install/Inspect Date:	
Nearest Cross Street Name:		Contractor:	
<input type="checkbox"/> street which service ties to W/M or sewer		Contract No.:	
		Recorded by:	
		Type: <input type="checkbox"/> Residential <input type="checkbox"/> ICI <input type="checkbox"/> Mixed use	
<b>WATER CARD</b> <input type="checkbox"/> Fire <input type="checkbox"/> Domestic <input type="checkbox"/> Combined		<b>SEWER CARD</b>	
<b>NSF-053 Filter Distributed (Lead Only)</b> <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>New W/S</b> <input type="checkbox"/> Tracer Wire <input type="checkbox"/> Anode on W/S <input type="checkbox"/> Anode on W/M		<b>Sewer Service Purpose</b> <input type="checkbox"/> Sanitary <input type="checkbox"/> Combined <input type="checkbox"/> Storm	
City Domestic	Mat		
	Dia [mm]		
City Fire	Mat		
	Dia [mm]		
Private Domestic	Mat		
	Dia [mm]		
Private Fire	Mat		
	Dia [mm]		
<b>Old or Existing W/S</b> Disconnected <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Did not exist		<b>Sewer Service Depth [m]</b>	
City Domestic	Mat		@ Sewer
	Dia [mm]		@ Streetline
City Fire	Mat		
	Dia [mm]		
Private Domestic	Mat		
	Dia [mm]		
Private Fire	Mat		
	Dia [mm]		
<b>W/M</b>		<b>W/S Depth [m]</b>	
Mat		@ main	
Dia [mm]		@ cstop	
		<b>Old Sewer Service Disconnected</b> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Did not exist	

**Sketch and Measurements of Work Done:**

Mark North

Street #

Curb Line

Curb Line

Note: MARK street # and existing water/sewer assets such as water main, valves, hydrants, maintenance holes and catchbasins. TAKE a minimum number of measurements from existing water/sewer assets to exactly locate the alterations. Forward a copy of this completed form to: Manager, Watermain Asset Planning, Metro Hall 18th Floor.

Water/Sewer Service Card template version # 05. Please discard all previous templates (digital and hard copy) and use the most current version.

## GENERAL INFORMATION:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

## VISUAL INDICATORS:

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Inlet</b>	<b>Inlet structural integrity:</b> Damage to inlet or sediment pad structure is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the width	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pretreatment sediment accumulation:</b> Device is ≥50% full of sediment/trash/debris or inflow of water to the GI is impaired	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Inlet erosion:</b> Gullies or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Side slope erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding area:</b> Maximum surface ponding area differs from design by >25%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pavement Surface Condition / Tree Opening (if applicable):</b> Differential settlement, cracking or other grade abnormalities at tree opening or over covered soil trenches.	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
Filter Bed	<b>Standing water:</b> Standing water ponded on filter bed surface >24 hours after the end of a storm event	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Filter bed erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Mulch depth:</b> Average depth is less than 5cm or greater than 15cm or bare soil areas are visible	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is ≥5cm in depth	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Surface ponding depth:</b> Maximum differs from design or as-built drawing by >10%	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Filter bed surface sinking:</b> Local surface depressions are ≥10cm in depth or animal burrows are visible	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Check dams</b> (if applicable): Structures are missing or buried in sediment	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Planting Area</b>	<b>Tree condition</b> (if applicable): Tree is not thriving, displaying signs of damage, stress, pests or disease.	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Outlet</b>	<b>Monitoring well condition:</b> Structural damage or sediment clog is visible and impairing its function or cap is missing	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Underdrain obstruction:</b> Structural damage, sediment clog or vegetation roots are visible and reducing conveyance capacity of the pipe by $\geq 33\%$	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

**FIELD INSPECTION DATA FORM: STORMWATER TRENCHES WITH TREE(S)**

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Outlet</b> (Continued)	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Trench drain obstruction (if applicable):</b> Structural damage, sediment clog or vegetation are visible and reducing conveyance capacity of the drain by $\geq 33\%$	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Simplified Notation:</b>			
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification			
<b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected			
<b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required			

<b>Photographs:</b>
<b>Notes and Sketches:</b>



## SOIL CHARACTERIZATION TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Sampling date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior sampling):</b>
<b>Sampled by:</b>	<b>Sampling duration (minutes):</b>

Sample ID/ Sample #	Sampling Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)	Sample ID/ Sample #	Sample Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)

Notes and Sketches:

\*Reference ASTM D6951/D6951M Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Subsurface water storage reservoir depth (mm):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, estimated from contributing drainage area and rainfall depth for natural storm events, measured by magnetic flow meter for simulated storm events)</b>				
B	Maximum post-storm filter bed surface water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm filter bed surface water level				
D	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface water level reaches 50mm				
E	Minimum post-storm filter bed surface water level (mm, zero or static reading or level just prior to onset of next rain storm):				
F	Date/time (mm/dd/yyyy hh:mm:ss) of minimum post-storm filter bed surface water level (zero or static reading or level just prior to onset of next rain storm):				
G	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface is fully drained (zero or static water level reading):				
H	<b>Filter bed surface ponding event duration (h, (G-C)*24)</b>				
I	<b>Filter bed surface infiltration rate estimate (mm/h, (F-D)*24)</b>				
J	Maximum post-storm subsurface storage reservoir water level (mm, at end of rainfall or delivery of water to the GI)				

**FIELD INSPECTION DATA FORM: STORMWATER TRENCHES WITH TREE(S)**

Parameter		Test #1	Test #2	Test #3	Average
K	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm subsurface storage reservoir water level				
L	Subsurface storage reservoir starting water level (mm, half full water level):				
M	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir starting water level (half full)				
N	Subsurface storage reservoir ending water level (mm, one quarter full water level)				
O	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir ending water level (one quarter full)				
P	Date/time (mm/dd/yyyy hh:mm:ss) when subsurface storage reservoir is fully drained (zero or static water level reading)				
Q	<b>Subsurface water storage reservoir drainage period duration (h, (P-K)*24)</b>				
R	<b>Subsurface water storage reservoir drainage rate (mm/h, (L-N)/(M-O)*24)</b>				
<b>Acceptance Criteria:</b>					
<ul style="list-style-type: none"> <li>• Water flows into GI as intended</li> <li>• Filter bed surface infiltration rate <math>\geq 25</math> mm/h and <math>\leq 203</math> mm/h, or consult manufacturer or vendor for an acceptable range specific to the product</li> <li>• Surface water storage reservoir (i.e., surface ponding) fully drains within 24 hours of the end of the storm</li> <li>• Underdrain peak flow rate is within +/- 15% of design specification</li> <li>• Active subsurface water storage reservoir volume drains within 48 to 72 hours of the end of the storm for newly constructed GIs, and within 48 to 96 hours for in-service GIs</li> </ul>					

## GENERAL INFORMATION:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

## VISUAL INDICATORS:

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Inlet</b>	<b>Inlet structural integrity:</b> Damage to inlet or sediment pad structure is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the width	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pretreatment sediment accumulation:</b> Device is ≥50% full of sediment/trash/debris or inflow of water to the GI is impaired	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Inlet erosion:</b> Gullies or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Side slope erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding area:</b> Maximum surface ponding area differs from design by >25%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Filter Bed</b>	<b>Standing water:</b> Standing water ponded on filter bed surface >24 hours after the end of a storm event	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed erosion:</b> Gullies, ruts or bare soil areas $\geq 30$ cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Mulch depth:</b> Average depth is less than 5cm or greater than 15cm or bare soil areas are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is $\geq 5$ cm in depth	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding depth:</b> Maximum differs from design or as-built drawing by $>10\%$	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed surface sinking:</b> Local surface depressions are $\geq 10$ cm in depth or animal burrows are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Check dams</b> (if applicable): Structures are missing or buried in sediment	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Planting Area</b>	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Outlet</b>	<b>Monitoring well condition:</b> Structural damage or sediment clog is visible and impairing its function or cap is missing	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Underdrain obstruction:</b> Structural damage, sediment clog or vegetation roots are visible and reducing conveyance capacity of the pipe by $\geq 33\%$	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

**FIELD INSPECTION DATA FORM: BIORETENTION SYSTEM**

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Outlet</b> <i>(Continued)</i>	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Simplified Notation:</b>			
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification <b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected <b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required			

**Photographs:**

**Notes and Sketches:**



## SOIL CHARACTERIZATION TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Sampling date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior sampling):</b>
<b>Sampled by:</b>	<b>Sampling duration (minutes):</b>

Sample ID/ Sample #	Sampling Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)	Sample ID/ Sample #	Sample Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)

Notes and Sketches:

\*Reference ASTM D6951/D6951M Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Subsurface water storage reservoir depth (mm):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, estimated from contributing drainage area and rainfall depth for natural storm events, measured by magnetic flow meter for simulated storm events)</b>				
B	Maximum post-storm filter bed surface water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm filter bed surface water level				
D	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface water level reaches 50mm				
E	Minimum post-storm filter bed surface water level (mm, zero or static reading or level just prior to onset of next rain storm):				
F	Date/time (mm/dd/yyyy hh:mm:ss) of minimum post-storm filter bed surface water level (zero or static reading or level just prior to onset of next rain storm):				
G	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface is fully drained (zero or static water level reading):				
H	<b>Filter bed surface ponding event duration (h, (G-C)*24)</b>				
I	<b>Filter bed surface infiltration rate estimate (mm/h, (F-D)*24)</b>				
J	Maximum post-storm subsurface storage reservoir water level (mm, at end of rainfall or delivery of water to the GI)				

**FIELD INSPECTION DATA FORM: BIORETENTION SYSTEM**

Parameter		Test #1	Test #2	Test #3	Average
K	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm subsurface storage reservoir water level				
L	Subsurface storage reservoir starting water level (mm, half full water level):				
M	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir starting water level (half full)				
N	Subsurface storage reservoir ending water level (mm, one quarter full water level)				
O	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir ending water level (one quarter full)				
P	Date/time (mm/dd/yyyy hh:mm:ss) when subsurface storage reservoir is fully drained (zero or static water level reading)				
Q	<b>Subsurface water storage reservoir drainage period duration (h, (P-K)*24)</b>				
R	<b>Subsurface water storage reservoir drainage rate (mm/h, (L-N)/(M-O)*24)</b>				
<b>Acceptance Criteria:</b>					
<ul style="list-style-type: none"> <li>• Water flows into GI as intended</li> <li>• Filter bed surface infiltration rate <math>\geq 25</math> mm/h and <math>\leq 203</math> mm/h, or consult manufacturer or vendor for an acceptable range specific to the product</li> <li>• Surface water storage reservoir (i.e., surface ponding) fully drains within 24 hours of the end of the storm</li> <li>• Underdrain peak flow rate is within +/- 15% of design specification</li> <li>• Active subsurface water storage reservoir volume drains within 48 to 72 hours of the end of the storm for newly constructed GIs, and within 48 to 96 hours for in-service GIs</li> </ul>					

**GENERAL INFORMATION:**

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

**VISUAL INDICATORS:**

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Inlet</b>	<b>Inlet structural integrity:</b> Damage to inlet or displacement of rip-rap erosion protection is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the width	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pretreatment sediment accumulation:</b> Device is ≥50% full of sediment/trash/debris or inflow of water to the GI is impaired	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Inlet erosion:</b> Gullies or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Side slope erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding area:</b> Maximum surface ponding area differs from design by >25%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Filter Bed</b>	<b>Standing water:</b> Standing water ponded on filter bed surface >24 hours after the end of a storm event	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Mulch depth:</b> Average depth is less than 5cm or greater than 15cm or bare soil areas are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is ≥5cm in depth	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding depth:</b> Maximum differs from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed surface sinking:</b> Local surface depressions are ≥10cm in depth or animal burrows are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Check dams</b> (if applicable): Structures are missing or buried in sediment	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Planting Area</b>	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Outlet</b>	<b>Outlet structural integrity:</b> Damage to outlet structure is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Outlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking outflow over one third (33%) of the width	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP	
<b>Outlet</b> (Continued)	<b>Monitoring well condition:</b> Structural damage or sediment clog is visible and impairing its function or cap is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Underdrain obstruction:</b> Structural damage, sediment clog or vegetation roots are visible and reducing conveyance capacity of the pipe by $\geq 33\%$	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Simplified Notation:</b>				
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification <b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected <b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required				

**Photographs:**

**Notes and Sketches:**



## SOIL CHARACTERIZATION TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Sampling date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior sampling):</b>
<b>Sampled by:</b>	<b>Sampling duration (minutes):</b>

Sample ID/ Sample #	Sampling Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)	Sample ID/ Sample #	Sample Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)

Notes and Sketches:

\*Reference ASTM D6951/D6951M Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Subsurface water storage reservoir depth (mm):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, estimated from contributing drainage area and rainfall depth for natural storm events, measured by magnetic flow meter for simulated storm events)</b>				
B	Maximum post-storm filter bed surface water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm filter bed surface water level				
D	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface water level reaches 50mm				
E	Minimum post-storm filter bed surface water level (mm, zero or static reading or level just prior to onset of next rain storm):				
F	Date/time (mm/dd/yyyy hh:mm:ss) of minimum post-storm filter bed surface water level (zero or static reading or level just prior to onset of next rain storm):				
G	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface is fully drained (zero or static water level reading):				
H	<b>Filter bed surface ponding event duration (h, (G-C)*24)</b>				
I	<b>Filter bed surface infiltration rate estimate (mm/h, (F-D)*24)</b>				
J	Maximum post-storm subsurface storage reservoir water level (mm, at end of rainfall or delivery of water to the GI)				

**FIELD INSPECTION DATA FORM: BIOSWALE SYSTEM**

Parameter		Test #1	Test #2	Test #3	Average
K	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm subsurface storage reservoir water level				
L	Subsurface storage reservoir starting water level (mm, half full water level):				
M	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir starting water level (half full)				
N	Subsurface storage reservoir ending water level (mm, one quarter full water level)				
O	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir ending water level (one quarter full)				
P	Date/time (mm/dd/yyyy hh:mm:ss) when subsurface storage reservoir is fully drained (zero or static water level reading)				
Q	<b>Subsurface water storage reservoir drainage period duration (h, (P-K)*24)</b>				
R	<b>Subsurface water storage reservoir drainage rate (mm/h, (L-N)/(M-O)*24)</b>				
<b>Acceptance Criteria:</b>					
<ul style="list-style-type: none"> <li>• Water flows into GI as intended</li> <li>• Filter bed surface infiltration rate <math>\geq 25</math> mm/h and <math>\leq 203</math> mm/h, or consult manufacturer or vendor for an acceptable range specific to the product</li> <li>• Surface water storage reservoir (i.e., surface ponding) fully drains within 24 hours of the end of the storm</li> <li>• Underdrain peak flow rate is within +/- 15% of design specification</li> <li>• Active subsurface water storage reservoir volume drains within 48 to 72 hours of the end of the storm for newly constructed GIs, and within 48 to 96 hours for in-service GIs</li> </ul>					

**GENERAL INFORMATION:**

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

**VISUAL INDICATORS:**

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Inlet</b>	<b>Inlet structural integrity:</b> Damage to inlet or displacement of rip-rap erosion protection is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the width	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pretreatment sediment accumulation:</b> Device is ≥50% full of sediment/trash/debris or inflow of water to the GI is impaired	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Inlet erosion:</b> Gullies or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Side slope erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding area:</b> Maximum surface ponding area differs from design by >25%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Filter Bed</b>	<b>Standing water:</b> Standing water ponded on filter bed surface >24 hours after the end of a storm event	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed erosion:</b> Gullies, ruts or bare soil areas $\geq 30$ cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Mulch depth:</b> Average depth is less than 5cm or greater than 15cm or bare soil areas are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is $\geq 5$ cm in depth	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Surface ponding depth:</b> Maximum differs from design or as-built drawing by $>10\%$	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed surface sinking:</b> Local surface depressions are $\geq 10$ cm in depth or animal burrows are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP	
<b>Filter Bed</b> (Continued)	<b>Check dams</b> (if applicable): Structures are missing or buried in sediment	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Planting Area</b>	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Outlet</b>	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Simplified Notation:</b>				
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification				
<b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected				
<b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required				

**Photographs:**

**Notes and Sketches:**



## SOIL CHARACTERIZATION TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Sampling date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior sampling):</b>
<b>Sampled by:</b>	<b>Sampling duration (minutes):</b>

Sample ID/ Sample #	Sampling Location	Sample Collected? (Yes/No)	Topsoil Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)	Sample ID/ Sample #	Sample Location	Sample Collected? (Yes/No)	Topsoil Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)

Notes and Sketches:

\*Reference ASTM D6951/D6951M Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Check dam invert height <i>if applicable</i> (cm, between check dam invert and the soil or sediment surface on the upstream side):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, estimated from contributing drainage area and rainfall depth for natural storm events, measured by magnetic flow meter for simulated storm events)</b>				
B	Maximum post-storm filter bed surface water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm filter bed surface water level				
D	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface water level reaches 50mm				
E	Minimum post-storm filter bed surface water level (mm, zero or static reading or level just prior to onset of next rain storm):				
F	Date/time (mm/dd/yyyy hh:mm:ss) of minimum post-storm filter bed surface water level (zero or static reading or level just prior to onset of next rain storm):				
G	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface is fully drained (zero or static water level reading):				
H	<b>Filter bed surface ponding event duration (h, (G-C)*24)</b>				
I	<b>Filter bed surface infiltration rate estimate (mm/h, (F-D)*24)</b>				
<b>Acceptance Criteria:</b>					
<ul style="list-style-type: none"> <li>Water flows into GI as intended</li> <li>Filter bed surface infiltration rate <math>\geq 15</math> mm/h and <math>\leq 203</math> mm/h, or consult manufacturer or vendor for an acceptable range specific to the product</li> <li>Surface water storage reservoir (i.e., surface ponding behind check dams) fully drains within 24 hours of the end of the storm</li> </ul>					

## GENERAL INFORMATION:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

## VISUAL INDICATORS:

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Inlet</b>	<b>Inlet structural integrity:</b> Damage to inlet or sediment pad structure is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the width	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pretreatment sediment accumulation:</b> Device is ≥50% full of sediment/trash/debris or inflow of water to the GI is impaired	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Inlet erosion:</b> Gullies or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Side slope erosion:</b> Gullies, ruts or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Filter Bed</b>	<b>Standing water:</b> Standing water ponded on filter bed surface >24 hours after the end of a storm event	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Filter Bed</b> (Continued)	<b>Filter bed erosion:</b> Gullies, ruts or bare soil areas $\geq 30$ cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Mulch depth:</b> Average depth is less than 5cm or greater than 15cm or bare soil areas are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is $\geq 5$ cm in depth	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed surface sinking:</b> Local surface depressions are $\geq 10$ cm in depth or animal burrows are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Planting Area</b>	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:  <b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Action:  Timeframe:
Outlet	<b>Outlet structural integrity:</b> Damage to outlet structure is impairing function of the GI	Comment/Measurements:  <b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Action:  Timeframe:
	<b>Outlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking outflow over one third (33%) of the width	Comment/Measurements:  <b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Action:  Timeframe:
	<b>Underdrain obstruction:</b> Structural damage, sediment clog or vegetation roots are visible and reducing conveyance capacity of the pipe by ≥ 33%	Comment/Measurements:  <b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Action:  Timeframe:
	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:  <b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Action:  Timeframe:
<b>Simplified Notation:</b> <b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification <b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected <b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required			

## SOIL CHARACTERIZATION TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Sampling date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior sampling):</b>
<b>Sampled by:</b>	<b>Sampling duration (minutes):</b>

Sample ID/ Sample #	Sampling Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)	Sample ID/ Sample #	Sample Location	Sample Collected? (Yes/No)	Filter Media Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)

Notes and Sketches:

\*Reference ASTM D6951/D6951M Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Subsurface water storage reservoir depth (mm):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, estimated from contributing drainage area and rainfall depth for natural storm events, measured by magnetic flow meter for simulated storm events)</b>				
B	Maximum post-storm filter bed surface water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm filter bed surface water level				
D	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface water level reaches 50mm				
E	Minimum post-storm filter bed surface water level (mm, zero or static reading or level just prior to onset of next rain storm):				
F	Date/time (mm/dd/yyyy hh:mm:ss) of minimum post-storm filter bed surface water level (zero or static reading or level just prior to onset of next rain storm):				
G	Date/time (mm/dd/yyyy hh:mm:ss) when filter bed surface is fully drained (zero or static water level reading):				
H	<b>Filter bed surface ponding event duration (h, (G-C)*24)</b>				
I	<b>Filter bed surface infiltration rate estimate (mm/h, (F-D)*24)</b>				
<b>Acceptance Criteria:</b>					
<ul style="list-style-type: none"> <li>Water flows into GI as intended</li> <li>Filter bed surface infiltration rate <math>\geq 15</math> mm/h and <math>\leq 203</math> mm/h, or consult manufacturer or vendor for an acceptable range specific to the product</li> <li>Surface water storage reservoir (i.e., surface ponding behind check dams) fully drains within 24 hours of the end of the storm</li> <li>Underdrain peak flow rate is within +/- 15% of design specification</li> </ul>					



**Photographs:**

**Notes and Sketches:**

## GENERAL INFORMATION:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

## VISUAL INDICATORS:

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
Contributing Drainage Area	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
Inlet	<b>Inlet structural integrity:</b> Damage to inlet or flow spreader structure is impairing function of the GI	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:
	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the width	Comment/Measurements:	Action:
		Pass <input type="checkbox"/> Fail <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet erosion:</b> Gullies or bare soil areas $\geq 30$ cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by $>10\%$	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Filter Bed</b>	<b>Standing water:</b> Standing water ponded on filter bed surface $>24$ hours after the end of a storm event	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed erosion:</b> Gullies, ruts or bare soil areas $\geq 30$ cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Mulch depth:</b> Average depth is less than 5cm or greater than 15cm or bare soil areas are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is $\geq 5$ cm in depth	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP	
<b>Filter Bed</b> (Continued)	<b>Filter bed surface sinking:</b> Local surface depressions are ≥10cm in depth or animal burrows are visible	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Planting Area</b>	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Outlet</b>	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Simplified Notation:</b>				
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification <b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected <b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required				

**FIELD INSPECTION DATA FORM: FILTER STRIP SYSTEM**

**Photographs:**

**Notes and Sketches:**

## SOIL CHARACTERIZATION TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Sampling date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior sampling):</b>
<b>Sampled by:</b>	<b>Sampling duration (minutes):</b>

Sample ID/ Sample #	Sampling Location	Sample Collected? (Yes/No)	Topsoil Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)	Sample ID/ Sample #	Sample Location	Sample Collected? (Yes/No)	Topsoil Depth (cm)	Maximum Penetrometer Reading* (PSI, kg/cm <sup>2</sup> or kPa)

Notes and Sketches:

\*Reference ASTM D6951/D6951M Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Application

## GENERAL INFORMATION:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

## VISUAL INDICATORS:

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Pavement Surface</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Standing water:</b> Standing water ponded on pavement surface is present	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Pavement Surface</b> (Continued)	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pavement surface condition:</b> Damage, missing or displaced pavers, ruts or local sinking present, paver joint fill is missing or low, weed growth between pavers is extensive and impairing aesthetic value	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pavement surface sediment accumulation:</b> Joints between pavers or grid cells are completely filled with fine sediment, any portion is covered with sediment	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Planting Area</b>	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation condition:</b> Grass is not thriving or over-grown and impairing the aesthetic value of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Outlet</b>	<b>Monitoring well condition:</b> Structural damage or sediment clog is visible and impairing its function or cap is missing	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:



**FIELD INSPECTION DATA FORM: PERMEABLE PAVEMENT SYSTEM**

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP	
<b>Outlet</b> (Continued)	<b>Underdrain obstruction:</b> Structural damage, sediment clog or vegetation roots are visible and reducing conveyance capacity of the pipe by $\geq 33\%$	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Control Structure</b> (If Applicable)	<b>Control structure condition:</b> Structure is inaccessible or ladder rungs are missing, damage or evidence of leaking is visible	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Simplified Notation:</b>				
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification				
<b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected				
<b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required				

**Photographs:**

**Notes and Sketches:**

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Subsurface water storage reservoir depth (mm):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, measured or estimated from contributing drainage area and rainfall depth for natural storm events, measured by flow meter for simulated storm events)</b>				
B	Maximum post-storm sub-surface storage reservoir water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm sub-surface storage reservoir water level				
D	Sub-surface storage reservoir starting water level (mm, half full water level)				
E	Date/time (mm/dd/yyyy hh:mm:ss) of sub-surface storage reservoir starting water level (half full)				
F	Sub-surface storage reservoir ending water level (mm, one quarter full water level)				
G	Date/time (mm/dd/yyyy hh:mm:ss) of sub-surface storage reservoir ending water level (one quarter full)				
H	Date/time (mm/dd/yyyy hh:mm:ss) when sub-surface storage reservoir is fully drained (zero or static water level reading)				
I	<b>Sub-surface water storage reservoir drainage period duration (h, (H-C)*24)</b>				
J	<b>Sub-surface water storage reservoir drainage rate (mm/h, (D-F)/(G-E)*24)</b>				

**FIELD INSPECTION DATA FORM: PERMEABLE PAVEMENT SYSTEM****Acceptance Criteria:**

- Water flows into GI as intended
- Underdrain peak flow rate is within +/- 15% of design specification
- Active sub-surface water storage reservoir volume drains within 48 to 72 hours of the end of the storm for newly constructed GIs, and within 48 to 96 hours for in-service GIs

**Additional Notes:**

**GENERAL INFORMATION:**

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Address:</b>	<b>Location:</b>
<b>GI Construction Date:</b>	<b>GI Warranty Date:</b>

**VISUAL INDICATORS:**

<b>Inspection date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Weather (24 hours prior to inspection):</b>
<b>Inspected by:</b>	<b>Inspection duration (minutes):</b>

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Contributing Drainage Area</b>	<b>Contributing drainage area condition:</b> Area differs by >10% from design or as-built drawing; Excessive trash, debris, sediment or other pollutant load is present or impairing function of the GI; Land cover has changed	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Inlet</b>	<b>Inlet structural integrity:</b> Damage to inlet or structure is impairing function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP
<b>Inlet</b> (Continued)	<b>Inlet obstruction:</b> Sediment/trash/debris/vegetation ≥5cm deep or blocking inflow over one third (33%) of the inlet width or area	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Pretreatment sediment accumulation:</b> Device is ≥50% full of sediment/trash/debris or inflow of water to the GI is impaired	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Inlet erosion:</b> Gullies or bare soil areas ≥30cm in length are visible	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Perimeter</b>	<b>GI dimensions:</b> Differ from design or as-built drawing by >10%	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Filter Bed</b>	<b>Trash:</b> Trash is visible and impairing aesthetics or function of the GI	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
	<b>Filter bed sediment accumulation:</b> Mean or local accumulation of sediment is ≥5cm in depth	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:
<b>Planting Area</b> (if applicable)	<b>Vegetation cover:</b> Less than 80% of planting area is covered by living vegetation	Comment/Measurements:	Action:
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:

**FIELD INSPECTION DATA FORM: INFILTRATION TRENCH SYSTEM**

COMPONENT	INDICATOR	CONDITION	FOLLOW-UP	
<b>Planting Area (if applicable)</b> <i>(Continued)</i>	<b>Vegetation condition:</b> Vegetation is over-grown or over-crowded and is impairing aesthetics or obstructing sight lines needed for safety	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Vegetation composition:</b> More than 50% of the vegetation is undesirable (e.g. weeds, invasive) or not the species specified in the planting details	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Outlet</b>	<b>Monitoring well condition:</b> Structural damage or sediment clog is visible and impairing its function or cap is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Underdrain obstruction:</b> Structural damage, sediment clog or vegetation roots are visible and reducing conveyance capacity of the pipe by $\geq 33\%$	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
	<b>Overflow outlet obstruction:</b> Structural damage, sediment/trash/debris is obstructing outflow, structure is full of water or grate is missing	Comment/Measurements:	Action:	
		<b>Pass</b> <input type="checkbox"/> <b>Fail</b> <input type="checkbox"/>	Timeframe:	
<b>Simplified Notation:</b>				
<b>Inspection Type:</b> C = Construction; W = Warranty; RO = Routine Operation; MV = Maintenance Verification; PV = Performance Verification <b>Comments:</b> N/A = Not Applicable; N/I = Not Inspected <b>Actions:</b> 0 = No Action Required; 1 = Routine Maintenance Required; 2 = Structural Repair Required; 3 = Further Investigation Required				

**Photographs:**

**Notes and Sketches:**

## NATURAL OR SIMULATED STORM EVENT TESTING:

<b>GI Identifier:</b>	<b>Inspection Type (Check one):</b> Construction <input type="checkbox"/> Warranty <input type="checkbox"/> Routine Operation <input type="checkbox"/> Maintenance Verification <input type="checkbox"/> Performance Verification <input type="checkbox"/>
<b>Testing date and time:</b> MM/DD/YYYY HH:MM:SS	<b>Subsurface water storage reservoir depth (mm):</b>
<b>Tested by:</b>	<b>Test duration (hours):</b>

Parameter		Test #1	Test #2	Test #3	Average
A	<b>Volume of water directed to the GI (L or m<sup>3</sup>, estimated from contributing drainage area and rainfall depth for natural storm events, measured by flow meter for simulated storm events)</b>				
B	Maximum post-storm subsurface storage reservoir water level (mm, at end of rainfall or delivery of water to the GI)				
C	Date/time (mm/dd/yyyy hh:mm:ss) of maximum post-storm subsurface storage reservoir water level				
D	Subsurface storage reservoir starting water level (mm, half full water level):				
E	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir starting water level (half full)				
F	Subsurface storage reservoir ending water level (mm, one quarter full water level)				
G	Date/time (mm/dd/yyyy hh:mm:ss) of subsurface storage reservoir ending water level (one quarter full)				
H	Date/time (mm/dd/yyyy hh:mm:ss) when subsurface storage reservoir is fully drained (zero or static water level reading)				
I	<b>Subsurface water storage reservoir drainage period duration (h, (H-C)*24)</b>				
J	<b>Subsurface water storage reservoir drainage rate (mm/h, (D-F)/(G-E)*24)</b>				



**FIELD INSPECTION DATA FORM: INFILTRATION TRENCH SYSTEM****Acceptance Criteria:**

- Water flows into GI as intended
- Underdrain peak flow rate is within +/- 15% of design specification
- Active subsurface water storage reservoir volume drains within 48 to 72 hours of the end of the storm for newly constructed GIs, and within 48 to 96 hours for in-service GIs

**Additional Notes:**

## Appendix B – Inspection Tasks

The inspection tasks listed under each activity are to be used as a basis for inspection. The contract administrator and inspector should work together at the start of a contract to determine critical inspection levels for construction activities and the need of adding tasks to this list.

Any inspection activity identified as a milestone requires a contract administrator or inspector on site to inspect the operation(s) at predetermined critical milestones. The inspector and contract administrator must pay particular attention by observing milestone tasks and reporting any problems with these tasks as soon as possible in writing regardless of the level of inspection specified. Milestones are indicated with an "M" beside the activity task number.

Any references to material testing and sampling should be done in accordance with Appendix C, *Materials Testing Protocol*, unless otherwise stated in the contract documents.

**Table: Inspection tasks**

Category	Task	Name
green infrastructure	GI 1	All GI feature types
green infrastructure	GI 2	Trenches and vegetated GI features
green infrastructure	GI 3	Permeable paving
highway guide rail	HR 1	Guide Rail
highway guide rail	HR 2	Crash/Cushion Attenuating Terminal Barrier
landscaping	L 1	Topsoil
landscaping	L 2	Sodding
landscaping	L 3	Seeding and Mulching
resurfacing	RF 1	Hot Mix Paving Operations

**Table: Inspection tasks (continued)**

Category	Task	Name
resurfacing	RF 2	In-Place Full Depth Reclamation of Bituminous Pavement and Underlying Granular (Pulverizing)
resurfacing	RF 3	Concrete Base and Pavement
resurfacing	RF 4	Concrete Pavement – Full Depth Repair
road	R 1	General Inspection
road	R 2	Ditching
road	R 3	Grade and Compaction
road	R 4	Granular Base and Granular Sub-base
road	R 5	Road Cut Permit Inspections
road	R 6	Curb and Gutter
road	R 7	Concrete Sidewalk
road	R 8	Geotextile
road	R 9	Tack Coat
road	R 10	Hot Mix Paving Operations
road	R 11	Pavement Marking
road	R 12	General Environmental Compliance
road	R 13	Control of Dust from the Work
road	R 14	User of Waste Products/Materials in the Work

Table: Inspection tasks (continued)

Category	Task	Name
road	R 15	Management and Disposal of Excess Materials
road	R 16	General Traffic Control Overview and Local Traffic Access Patterns
road	R 17	Temporary Concrete Barrier (Relocation)
road	R 18	Temporary Erosion and Sedimentation Control
road	R 19	Work in Adjacent to and Over Water bodies
sanitary sewers	SAS 1	General Inspection
sanitary sewers	SAS 2	Sanitary Maintenance Holes
sanitary sewers	SAS 3	Sanitary Sewer Installation
sanitary sewers	SAS 4	Jack and Bore
sanitary sewers	SAS 5	Sanitary House Laterals
sanitary sewers	SAS 6	Gravity Sewer Testing
storm sewers	STS 1	General Inspection
storm sewers	STS 2	Storm Maintenance Holes, Catchbasins and Ditch Inlets
storm sewers	STS 3	Storm Sewer Installation
storm sewers	STS 4	Subdrains
storm sewers	STS 5	Storm House Laterals and Catchbasin Leads
structural	S 1	Structure Excavation

**Table: Inspection tasks (continued)**

Category	Task	Name
structural	S 2	Piling
structural	S 3	Structure Backfilling
structural	S 4	Falsework
structural	S 5	Formwork
structural	S 6	Installation of Bearings
structural	S 7	Concrete and Structural Steel Beam Erection
structural	S 8	Reinforcing Steel Placement
structural	S 9	Concrete Placement, Consolidation, Finishing and Cutting
structural	S 10	Installation of Expansion Joints
structural	S 11	Barrier Walls
structural	S 12	Railing for Barrier / Parapet Wall
structural	S 13	High Performance Concrete (This task list is in addition to S 9)
structural	S 14	Bridge Deck Waterproofing
structural	S 15	Cofferdams, Sheet Piling, Tie Backs and Roadway Protection
structural	S 16	Dewatering
structural	S 17	Caisson Foundations

**Table: Inspection tasks (continued)**

Category	Task	Name
structural	S 18	Tremie Concrete
structural	S 19	Structure Rehabilitation– Removal of Waterproofing System From Deck Surfaces
structural	S 20	Structure Rehabilitation– Concrete Removal and Surface Preparation
structural	S 21	Structure Rehabilitation– Concrete Overlay
structural	S 22	Structure Rehabilitation–Full Deck Removal
structural	S 23	Structure Rehabilitation– Concrete Patches
structural	S 24	Structure Rehabilitation– Silica Fume Concrete Overlay
structural	S 25	Structure Rehabilitation– Concrete Refacing
structural	S 26	Structural Steel Coating
traffic	T 1	Underground Ducts and Bases
traffic	T 2	Electrical Chambers
traffic	T 3	Pole Foundations and Pole Erection

**Table: Inspection tasks (continued)**

Category	Task	Name
watermains	WM 1	General Inspection
watermains	WM 2	Watermain Installation
watermains	WM 3	Water Valves Installation
watermains	WM 4	Hydrant Installation
watermains	WM 5	Water Service Installations
watermains	WM 6	Installation of Temporary Services
watermains	WM 7	Hydrostatic Testing
watermains	WM 8	Chlorination / Disinfection Testing
watermains	WM 9	Connections to Existing Watermains
watermains	WM 10	Water Permit
trenchless sewer rehabilitation	TRH 1	Full Length Cured-In-Place Pipe (CIPP)
trenchless replacement	TRP 1	Horizontal Directional Drilling (HDD)
utilities	UT 1	Utility Construction
third party and development	TPD 1	General Inspection
TTC	TTC 1	Track Allowance

## Green Infrastructure – Task GI 1

## Construction of all GI feature types

## Check related task list “Storm Sewers – Task STS 1”

Task #	✓	Activity
GI 1.1		Ensure that the nearby drainage areas do not contain excessive trash, debris, sediment and that no other pollutant source is present.
<b>GI 1.2 M</b>		<b>Check that the excavation limits of the feature are verified and recorded.</b>
<b>GI 1.3 M</b>		<b>Check all delivered materials to verify that they are being supplied from the approved list.</b>
<b>GI 1.4 M</b>		<b>Check proper procedures are used for perforated pipe installation, when an underdrain is specified in the contract documents</b>
<b>GI 1.5 M</b>		<b>Ensure that a monitoring well is installed according to the contract documents</b>
<b>GI 1.6 M</b>		<b>Check that appropriate placing sequence is used during backfilling. Note if the drawings call for geotextiles and ensure that they have been installed properly.</b>
GI 1.7		Ensure that the GI feature does not contain trash, debris, sediment and that no other pollutant load is present.
GI 1.8		Record differential settlement, cracking, or other grade abnormalities.
GI 1.9		Record any structural damage to the monitoring well, if sediment clogging is visible, or if the cap is missing.
GI 1.10		Record any structural damage to a visible underdrain, or if sediment clogging is visible.
GI 1.11		Ensure that any overflow or outflow structures are unobstructed by sediment/trash/debris.
GI 1.12		Record any missing grates from overflow or outflow structures.



## Green Infrastructure – Task GI 2

**Construction of Stormwater Trenches with Trees, Infiltration Trenches, Bioretention or Bioswale Systems, or Green Gutters. Each described below as ‘the GI feature’**

**Check related task list “Landscaping - Task L 3”**

Task #	✓	Activity
<b>GI 2.1 M</b>		<b>Ensure that growing medium conforms to the contract documents and is sampled as required before installation.</b>
<b>GI 2.2 M</b>		<b>Ensure that the finish grade of the GI feature is below the contributing drainage area and the elevation of the inlet(s)</b>
GI 2.3		Check the dimensions of the inlets are as specified in the contract documents.
GI 2.4		Record any damage to inlets, trench drains, or sediment pad structures connected to the GI feature.
GI 2.5		Record any sediment/trash/debris/vegetation $\geq$ 5cm deep within the inlets, trench drains, or sediment pad structures or blocking inflow over one third (33%) of the width of the inlets.
GI 2.6		Record any sediment $\geq$ 5cm deep within the GI feature.
GI 2.7		Record any visible standing water in the GI feature, if > 24 hrs since last storm.
GI 2.8		Record any gullies or bare soil areas $\geq$ 30cm in length in the GI feature.

**Green Infrastructure – Task GI 3****Construction of Permeable Pavement**

Task #	✓	Activity
GI 3.1		Record if any portion of the permeable pavement area is covered with sediment.
GI 3.2		Record if standing water is present on any portion of the permeable pavement.
GI 3.3		Record any damaged, missing, or displaced pavers, ruts, or local sinking observed.
GI 3.4		Record if paver joint fill is missing or low.
GI 3.5		Record if the joints between pavers or grid cells are completely filled with fine sediment.

## Highway guide rail – Task HR 1

## Guide Rail

Task #	✓	Activity
<b>HR 1.1 M</b>		<b>Check all delivered material to verify that it is being supplied as per the requirements of the contract.</b>
HR 1.2		Ensure that the proper guide rail treatment is used as per the contract.
HR 1.3		Check that preservative treated wood posts conform to the contract requirements.
HR 1.4		Check guide rail is erected to the specified length and height.
HR 1.5		Check guide posts are the specified length.
HR 1.6		Check that loose material in the bottom of the post hole is tamped or removed prior to placing posts.
HR 1.7		Check that all posts are vertical and that the backfill is properly tamped.
HR 1.8		Check stretching, stapling and splicing is completed.
HR 1.9		Check that posts are cut off correctly, chamfered and tops treated and mounting height is correct based on edge of pavement grades.
<b>HR 1.10 M</b>		<b>Check that anchor blocks are constructed properly with regards to forming and placement of concrete.</b>
HR 1.11		Check that steel beam guide rail in the vicinity of concrete surfaces is bolted to these surfaces.
HR 1.12		Confirm placement of reflectorized strips.
HR 1.13		Check that the steel beam guide rail elements are overlapped in the directions of adjacent traffic.
HR 1.14		Check that valid utility locates and approved traffic control plans are received.

## Highway guide rail – Task HR 2

## Crash/Cushion Attenuating Terminal Barrier

Task #	✓	Activity
HR 2.1 M		<b>Check all the delivered material to verify that it is being supplied as per the requirements of the contract.</b>
HR 2.2		Check that all preservative treated wood is identified with certification marks authorized by the Canadian Wood Preservation Association.
HR 2.3		Inspect the preservative treated wood to ensure the splits and checks are within specified limits.
HR 2.4		Check that guide rail is erected at the proper locations.
HR 2.5		Check that guide posts are the specified height.
HR 2.6		Check that steel posts are properly installed with regards to depth, alignment and spacing.
HR 2.7		Check that loose material in the bottom of the post hole is tamped or removed prior to placing the posts.
HR 2.8		Check that all posts are vertical and that the backfill is properly tamped.
HR 2.9		Check that channels are installed at proper locations, elevations and are terminated as specified in the contract.
HR 2.10		Check that spacer channel is installed properly and all connection details for posts 1 through 6 are adhered to.
HR 2.11		Check that anchor cable is installed at the correct height.
HR 2.12		Check that guide rail is properly attached as required.
HR 2.13		Check that all bolts, washers and nuts are placed and affixed to all plates, angles, posts and steel rail as required.

**Landscaping – Task L 1**

**Topsoil**

Task #	✓	Activity
<b>L 1.1 M</b>		<b>Ensure that imported topsoil conforms to the contract documents and is sampled as required.</b>
L 1.2		Check that topsoil is not used for filling depressions or wasted.
<b>L 1.3 M</b>		<b>Check that topsoil is spread uniformly to the depth specified.</b>
L 1.4		Accurately record quantities.

**Landscaping – Task L 2****Sodding**

Task #	✓	Activity
<b>L 2.1 M</b>		<b>Check that scarification and preparation of topsoil has been carried out and rolled where required.</b>
L 2.2		Check application rate and type of fertilizer.
L 2.3		Check sod before placement to ensure condition is as specified.
L 2.4		Check placement of sod on sloped ensuring that the staking pattern is correct.
L 2.5		Ensure the sod edges are countersunk to match adjacent surface.
L 2.6		Ensure grade control plan for subdivisions is adhered to prior to sod placement.
L 2.7		Ensure that watering is carried out per contract requirements.

### Landscaping – Task L 3

#### Seeding and Mulching

Task #	✓	Activity
L 3.1 M		<b>Check all delivered material to verify that it is being supplied per requirements of the contract.</b>
L 3.2		Check that material supplied by the contractor bears a label indicating that specified information.
L 3.3 M		<b>Check specified preparation of soil prior to seeding and mulching.</b>
L 3.4		Ensure seeding and mulching operation is completed at temperatures or time of year allowed by specification or shown in the contract documents.
L 3.5		Check for growth of plant material or erosion of seeded areas or both.

## Resurfacing – Task RF 1

## Hot Mix Paving Operations

Task #	✓	Activity
<i>Pre-paving</i>		
RF 1.1 M		<b>Ensure compliance with all pre-pave meeting requirements and that arrangement have been made for continuous ticket collection if paid by weight.</b>
RF 1.2		Ensure that the mix design has been approved.
RF 1.3 M		<b>Ensure that the material delivered is as per specified material.</b>
RF 1.4 M		<b>Obtain random testing locations on all lifts of asphalt and arrange for testing as per Appendix C.</b>
RF 1.5 M		<b>Ensure that grade of surface to be paved has been properly prepared.</b>
RF 1.6		Ensure that butt joints have been properly constructed.
RF 1.7 M		<b>Ensure tack coat is applied to all required areas.</b>
RF 1.8		Ensure adherence to City procedures with respect to towing and removal of vehicles.
RF 1.9 M		<b>Ensure traffic control is in place as per traffic control plan and contract documents.</b>
RF 1.10 M		<b>Ensure that compaction is carried out as specified in the contract.</b>
<i>Placing</i>		
RF 1.11 M		<b>Visually inspect mix placed for dragging, segregation and other visual defects prior to paving with another lift or stage changes or both.</b>
RF 1.12		Check paving is carried out full width to essentially the same station, with ramping as specified in the contract prior to shutdown each day, including edge ramping.
RF 1.13 M		<b>Check that proper sequence of paving operation, that is intersections, tapers, ramps, bridge decks and all staging plans.</b>
RF 1.14		Ensure hand tamping around catch basins.
RF 1.15 M		<b>Check placement of hot mixes including alignment and distribution.</b>
RF 1.16 M		<b>Check that air temperature at the surface of the road is above the minimum specified.</b>
RF 1.17 M		<b>Check that temperature of mix delivered to the site is as specified.</b>



### Resurfacing – Task RF 1

#### Hot Mix Paving Operations (continued)

Task #	✓	Activity
RF 1.18		Ensure specified distance between pavers is maintained when paving in echelon and proper rolling patterns are used.
<b>RF 1.19 M</b>		<b>Check that all required samples are taken and tested.</b>
RF 1.20		Check equipment does not impact or damage areas beyond the road structure, such as curbs, adjustment chamber.
RF 1.21		Check for proper reinstatement of sample locations if required.
RF 1.22		Ensure that access ramps are in as required—one-half metre with paper if required.
<b>RF 1.23 M</b>		<b>Prior to placement of subsequent lifts, ensure that the temperature of the previous mat is acceptable and compacted.</b>

**Resurfacing – Task RF 2****In-place Full Depth Reclamation of Bituminous and Underlying Granular (Pulverizing)**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
RF 2.1		Check that the in-place materials are processed to the depths, widths and gradation as specified in the contract.
RF 2.2		Check that the composition of the blended material is visually uniform and is as specified in the contract.
RF 2.3		Check that oversized or harmful material has been removed as specified in the contract.
<b>RF 2.4 M</b>		<b>Check that operational constraints are carried out as specified in the contract.</b>
<b>RF 2.5 M</b>		<b>Ensure that surface grading and compaction is as specified in the contract.</b>

## Resurfacing – Task RF 3

## Concrete Base and Pavement

Task #	✓	Activity
<b>RF 3.1 M</b>		<b>Check that all the delivered material is supplied from the approved list and properly stored.</b>
<b>RF 3.2 M</b>		<b>Check for proper alignment, grade and base preparation.</b>
RF 3.3		Check material supplied by the contractor is sampled as required as per the field services manual and the contract requirements.
RF 3.4		Check the concrete placement, consolidation, finishing and curing operations are in accordance with task S 9.
RF 3.5		Check that the spacer wires are cut on the load transfer devices prior to placing concrete.
RF 3.6		Check that the dowel bars and tie bars are placed and remain in the specified location. Check load transfer devices are placed on the proper skew, staked in place and are visibly marked for joint cutting. Load transfer devices should be checked following paving operations to ensure they have not moved.
RF 3.7		When fixed form pavers are used, check that hand held vibrators are used properly to supplement consolidation.
<b>RF 3.8 M</b>		<b>Check specified finishing and texturing procedures are adhered to.</b>
RF 3.9		Check timing of form removal is as specified and any honeycombed areas are properly repaired.
<b>RF 3.10 M</b>		<b>Check that the joints are correct type and cut or formed at the proper location.</b>
RF 3.11		Check that the initial saw cut is made to the full depth of the joint. Ensure this initial saw cut is done within the constraints specified in the contract, without damaging the concrete surface.
RF 3.12		Inspect hardened concrete surface for cracks outside of the joints.
<b>RF 3.13 M</b>		<b>Check that traffic is not permitted on the concrete pavement until the designed compressive strength is achieved.</b>
RF 3.14		Check that quality assurance cores are obtained and delivered to the designated laboratory if required.
RF 3.15		Check profile traces and ensure high points are ground down and depressions are filled in.

## Resurfacing – Task RF 4

## Concrete Pavement – Full Depth Repair

Task #	✓	Activity
<b>RF 4.1 M</b>		<b>Check that removal limits shown in the contract drawings or permits are appropriate to existing field conditions prior to work commencing and document locations of repair.</b>
RF 4.2		Check that the saw cuts are full depth.
RF 4.3		Check that the concrete removal does not damage the sub-base or adjacent concrete surfaces.
RF 4.4		Check that the dowels, tie bars and load transfer devices are placed as specified in the contract.
<b>RF 4.5 M</b>		<b>Check concrete placement, consolidation, finishing and curing procedures are in accordance with task S 9 unless specified otherwise elsewhere in the contract.</b>
RF 4.6		Check that the dowel bars and tie bars are completely surrounded by epoxy when placed in drilled holes in concrete.

## Road – Task R 1

## General Inspection

Task #	✓	Activity
R 1.1		<p>Ensure permits on-site or in field office for examination by others:</p> <ul style="list-style-type: none"> <li>• Ministry of Labour notice of project</li> <li>• noise exemptions</li> <li>• TRCA approvals</li> <li>• railway board orders</li> <li>• oil pipelines</li> <li>• certificates of approval</li> <li>• Transportation Services cut permits including all documents required by the contract such as Traffic Control Plans and utility stake outs</li> </ul>
R 1.2		<p>Attend progress meetings and prepare list of concerns that are not resolved on a day-to-day basis, also:</p> <ul style="list-style-type: none"> <li>• Health and safety issues including traffic control plan, utility locates, type of shoring, notice of project</li> <li>• environmental issues</li> <li>• quality assurance</li> <li>• productivity or lack thereof</li> <li>• potential extra work orders or claims</li> <li>• potential contract item overruns and under runs</li> <li>• schedule and progress of work</li> <li>• complaints from the public</li> <li>• sub grade conditions and type</li> <li>• any material ticket collection problems</li> </ul>
R 1.3		Contract administrator ensures that RoDARS restriction notice is prepared for all stages of the contract, send a copy to dispatch centre
R 1.4 M		<b>Contact material testing consultants for services required such as plant pickup, concrete cylinder, asphalt, and granular material pickup.</b>
R 1.5		Interpret test results of material testing consultants and advise contract administrator and contractor of any not meeting specifications for further action. Note in daily report that contractor was notified.
R 1.6		Ensure that the materials testing consultant completes temperature, air, slump tests and casts concrete cylinder specimens for testing as per American Concrete Institute (ACI) certification.

## Road – Task R 1

## General Inspection (continued)

Task #	✓	Activity
R 1.7		Ensure excavating methods and equipment is not damaging existing utilities, and if so, advise accordingly.
R 1.8		Ensure traffic control is as specified as per the contract requirements. Any deficiencies should be reported and noted. Ensure excavations are properly secured, for example, fencing.
R 1.9		On a daily basis ensure that all material storage is done as per the contract requirements.
R 1.10		Document day-to-day activities on contract by: <ul style="list-style-type: none"> <li>• personal diary</li> <li>• vehicle maintenance log (if operating departmental vehicle)</li> <li>• field book</li> <li>• daily inspector's report</li> <li>• daily quantity sheets</li> <li>• weekly quantity sheets</li> <li>• daily summary of weighed materials sheet</li> <li>• daily summary of work completed on a cost-plus basis sheet</li> </ul>

## Road – Task R 1

## General Inspection (continued)

Task #	✓	Activity
R 1.11 M		<p><b>Document the following activities on a day-to-day basis:</b></p> <ul style="list-style-type: none"> <li>• contractor, sub-contractor and supplier forces (including breakdown of classification), equipment (detail as per OPS 127) and material delivered on site.</li> <li>• traffic control, that is what lanes are closed and for what distance, staging, presence of paid duty officer(s)</li> <li>• weather conditions</li> <li>• general progress of work and quantities for each item completed</li> <li>• claims by contractor or complaints received by contractor or from the public</li> <li>• verbal instructions given to contractor should in writing preferable through a field instruction</li> <li>• any events that could adversely affect productivity</li> <li>• any changes to plans or adherence to specifications</li> <li>• spills that occur and any follow up notification</li> <li>• claims or potential claims such as traffic accidents or slip and falls occurring in the work zone</li> <li>• sub-excavation quantities</li> <li>• dealings with adjacent property owners and public</li> <li>• concerns relayed by contract administrator and status</li> <li>• environmental controls are in-place and working, that is hay bales, silt fence and so forth</li> <li>• material testing completed, field results and reasons why a required test was not done</li> <li>• trench widths, shoring type used and sub grade conditions, such as soil type and whether ground water is present.</li> <li>• location of utilities encountered that vary from plan location.</li> <li>• non-contract compliance issues and follow up action taken such as discussion with contractor and contract administrator</li> <li>• all labour and equipment in the daily report forms are to be tracked, including sizes model numbers and owned and leased equipment</li> <li>• visitors to site, reasons for the visit and any discussions.</li> <li>• any other items to be recorded as required in the standard daily report and other report forms</li> <li>• working days, extension of time days</li> <li>• extra work to be tracked and reconciled on a daily basis using OPS 127 equipment rates and obtaining receipts of all material and rented equipment on site</li> <li>• consultant testing services on-site</li> </ul>

## Road – Task R 1

## General Inspection (continued)

Task #	✓	Activity
R 1.12		Check temporary restoration to ensure compliance with contract documents and record area with a sketch.
R 1.13		Inspector prepares weekly reports that are used for the preparation of the month-end quantities for progress certification by contract administrator. All calculations by municipal construction inspectors and assistant inspectors should be double-checked before submission by the inspection unit.
R 1.14		Tracking contract completion for milestones including substantial completion—97 percent of dollar value work completed and opened for intended use—is done by the contract administrator.
R 1.15		Co-ordinate sign replacement, signals, street furniture, transit shelters, crosswalk locations and pavement markings with Transportation Services. Ensure advisory signs in place and removed when construction completed.
R 1.16		Front-line person enforcing terms and conditions of internal contracts and third party to developer design-build contracts.
R 1.17		Training function of assistant inspectors (co-op students) in contract administration and aspects of inspection.
R 1.18		Ensure tickets for weighed materials are periodically verified for auditing purposes by approved scale facilities and ensure payment adjustment factors for different aggregate combinations are used as per the Field Services Manual.
R 1.19		Checks grades of excavated work, formwork and as-built work using simple levels, straight edge and if necessary, mobilizes construction survey crew for additional help. This includes checking key elevations at high points and low points as well as any other problem areas.
R 1.20		Co-ordinates minor bridge and structural repairs with appropriate person from structures section to ensure adherence to specifications. Informs inspector or supervisor of any damage to existing structures and for inspection at road/bridge interface.
R 1.21		Prepare deficiency list for contractor and ensure all items are cleaned up prior to demobilization. Review deficiencies at all progress meetings to prepare and submit a monthly list.
R 1.22		Track material testing consultant services on-site and document visits monthly for processing of invoices by contract administrator.



**Road – Task R 2**

**Ditching**

Task #	✓	Activity
<b>R 2.1 M</b>		<b>Check that ditch grading tolerances are correctly applied and all slopes conform to acceptance envelope as per the grade check requirements. (R 2). Check for positive flow.</b>
R 2.2		Check that suitable material excavated from ditches is utilized in fill areas.
R 2.3		Check that unsuitable material is managed as specified in the contract.
<b>R 2.4 M</b>		<b>Check that appropriate measures are taken to prevent erosion of ditches.</b>
R 2.5		Check for adequate drainage from fields tiles.

## Road – Task R 3

## Grade and Compaction

Task #	✓	Activity
		<i>Horizontal and Vertical Grading Tolerances</i>
R 3.1 M		<p>A monitoring checking frequency of 100 percent is required to be recorded to verify that the grade and cross sections are within the specified tolerances. The monitoring frequency may be reduced with the approval of the contract administrator.</p> <p>If grade checks continually fail, notify the contract administrator.</p>
		<i>Compaction</i>
R 3.2 M		<p><b>Before testing:</b></p> <ol style="list-style-type: none"> <li>1 Ensure that the area is evenly graded and compacted, that is no area was missed by compaction equipment. Sample and test material to ensure correct moisture content and proctor density for accurate testing results.</li> <li>2 Ensure that all visible soft or loose areas are repaired.</li> <li>3 Refer to Appendix C, <i>Materials Testing Protocol</i> and related City specifications for testing requirements.</li> </ol> <p><b>After testing:</b></p> <ol style="list-style-type: none"> <li>1 If compaction fails, the contractor will not be permitted to pour concrete or place asphalt until granulars are re-compacted and re-tests pass.</li> <li>2 If compaction results continually fail, notify the contract administrator.</li> </ol>

**Road – Task R 4**

**Granular Base and Granular Sub-base**

Task #	✓	Activity
R 4.1		Check that quality assurance samples are obtained for testing as specified in the contract documents. Conduct visual inspection of material for contamination, including clay balls, clay coated particles or foreign material. Where contamination is observed or suspected, take appropriate action.
R 4.2		Check that subbase and base materials comply as specified in the contract documents.
R 4.3		Check contractor's compaction density readings to see that all the work falls within the specified tolerances.
R 4.4		Verify and record horizontal and vertical grading tolerances prior to the placement of the next type of material or pavement.

**Road – Task R 5****Road Cut Permit Inspections**

Task #	✓	Activity
<b>R 5.1 M</b>		<b>Ensure that the contractor has a road occupancy permit prior to commencing work on the right-of-way.</b>
R 5.2		Ensure the permit has the correct address and clearly defines any special conditions.
R 5.3		Ensure the permit holder, contact name, and telephone number is accurate and clearly identified.

**Road – Task R 6****Curb and Gutter**

Task #	✓	Activity
<b>R 6.1 M</b>		<b>Check proper type of curb is constructed. Check for ledge and key for rigid pavement..</b>
<b>R 6.2 M</b>		<b>Check for proper alignment, grade and granular base preparation.</b>
R 6.3		Check for proper positioning of construction joints.
<b>R 6.4 M</b>		<b>Check for proper positioning of drainage structures, frames and grates.</b>
R 6.5		Inspect the concrete placement, consolidation, finishing and curing operations and saw cuts at catchbasins. All formed concrete is to be consolidated using a pencil vibrator.
R 6.6		Check that all required material samples are taken.
R 6.7		If extrusion method is being used, ensure proper percentage of air is being maintained behind slip form machine. Test for compressive strength, air entrainment, temperature and slump.
R 6.8		Check for proper treatments at entrances and handicap ramp locations.

## Road – Task R 7

## Concrete Sidewalk

Task #	✓	Activity
R 7.1 M		Check for proper alignment, grade, granular base preparation and extra thickness at commercial and industrial driveways.
R 7.2 M		Check proper positioning of construction joints and expansion joints, including location and depth.
R 7.3		Check that all required material samples are taken.
R 7.4 M		Check that the concrete placement, consolidation finishing and curing operations are conducted according to City standards and specifications.
R 7.5 M		Check full depth expansion joints—contractor stamp tooled edges and construction joints: <ul style="list-style-type: none"><li>• proper direction and spacing for installation of tactile walking surface indicator plates</li><li>• proper cross fall</li><li>• grade to match driveways</li></ul>
R 7.6 M		Ensure that entrances and pedestrian access ramp locations are constructed according to the latest contract drawings.

**Road – Task R 8**

**Geotextile**

Task #	✓	Activity
<b>R 8.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
R 8.2		Check that material supplied by the contractor is sampled as required and forwarded for testing.
<b>R 8.3 M</b>		<b>Check installation area for removal of sharp objects that may puncture the geotextile and ensure that subgrade is rolled smooth.</b>
R 8.4		Check that during installation the proper overlap has been maintained.
R 8.5		Check that the geotextile is not exposed to sunlight for more than three days.
R 8.6		Check that drop height for material placed onto geotextile is less than one metre to ensure geotextile is not damaged.
R 8.7		Check that all materials contaminated or damaged during installation are either replaced or repaired so that the geotextile will perform as intended.

## Road – Task R 9

## Tack Coat

Task #	✓	Activity
<b>R 9.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list and arrange sampling and testing.</b>
R 9.2		Check that existing pavement is dry and clean before applying tack coat.
R 9.3		Check that proper rate of application and coverage is used.
<b>R 9.4 M</b>		<b>Check that tack coat has cured to the desired level before placing hot mix pavement tack.</b>
<b>R 9.5 M</b>		<b>Check that traffic is not allowed on the tack coated area before paving.</b>
R 9.6		Ensure that the contractor does not overspray beyond the pavement area.



## Road – Task R 10

## Hot Mix Paving Operations

Task #	✓	Activity
<i>Pre-paving</i>		
<b>R 10.1 M</b>		<b>Check proper equipment is on site as per contract documents.</b>
R 10.2		Inspector to walk site immediately prior to paving to ensure area to be paved is fully prepared, including matching joints cut, castings set to proper alignment and areas graded to ensure there is room for proper thickness of asphalt to be placed.
<b>R 10.3 M</b>		<b>Ensure that the mix design has been approved.</b>
<b>R 10.4 M</b>		<b>Approval of trial batches or mix verification if requested by the contract administrator.</b>
<b>R 10.5 M</b>		<b>Ensure the delivery of specified materials and plant sample is taken.</b>
R 10.6		Obtain random testing locations on all lifts of asphalt.
<b>R 10.7 M</b>		<b>Ensure that grade of surface to be paved has been properly prepared.</b>
R 10.8		Ensure that match joints have been properly constructed.
R 10.9		Ensure tack coat is applied to all required areas.
R 10.10		Ensure adherence to City procedures with respect to towing and removal of vehicles.
R 10.11		Send notice requiring vehicles out of pathways for flexible pavement.
<b>R 10.12 M</b>		<b>Ensure that compaction is carried out as specified in the contract.</b>
R 10.13		Contract administrator to arrange, attend and document pre-pave meeting.
<i>Paving</i>		
<b>R 10.14 M</b>		<b>Ticket collection in paving operation. Inspector shall ensure that all tickets are collected at the time of delivery if paid by weight.</b>
R 10.15		Visually inspect mix placed for dragging, segregation and other visual defects prior to covering with another lift or stage changes.
R 10.16		Check paving is carried out full width to essentially the same station, with ramping as specified in the contract.
R 10.17		Check for proper sequence of paving operations, for instance intersections, tapers, ramps, bridge decks and all staging plans.

## Road – Task R 10

## Hot Mix Paving Operations (continued)

Task #	✓	Activity
R 10.18 M		<b>Check placement of hot mix including alignment and distribution.</b>
R 10.19 M		<b>Check that air temperature at the surface of the road is above the minimum specified.</b>
R 10.20 M		<b>Check that the temperature of mix delivered to the site is as specified.</b>
R 10.21		Check that vehicles are equipped with insulated tarpaulins.
R 10.22		Ensure specified distance between pavers is maintained when paving in echelon.
R 10.23 M		<b>Check that all required samples are taken.</b>
R 10.24		Check equipment does not impact or damage areas beyond the road structure.
R 10.25		Check for proper reinstatement of sample locations if required.
R 10.26		Send notice requiring vehicles out of pathways for flexible pavement.
R 10.27		Ensure that access ramps are in as required.
R 10.28		Prior to placement of subsequent lift, ensure that the temperature of the previous mat is acceptable.
R 10.29 M		<b>Ensure compliance with all pre-pave meeting requirements and arrange for testing of materials and compaction for day of paving.</b>
R 10.30 M		<b>Ensure that compaction is carried out as specified in the contract.</b>
R 10.31		Check and ensure areas to be paved has been cleaned of all dirt, grime, loose broken and foreign material.
R 10.32		Ensure that areas to be paved have been checked prior to paving to ensure all required work such as joint filling, cut repairs, and casting adjustment, and so on, has been done.
R 10.33		Check that line marking sub-contractor and routing and sealing contractor has been scheduled.
R 10.34		Make arrangements of weight check with City facility.

**Road – Task R 11****Pavement Marking**

Task #	✓	Activity
		<i>Temporary</i>
R 11.1		Check that the locations of the temporary markings are applied as per the approved staging drawings or as required by the construction operation and approved traffic control plans.
R 11.2		Check surface is dry and free of any loose or foreign material.
R 11.3		Temporary Tape  1 Check for correct spacing and application.  2 Check specified tamping has been carried out.
		<i>Permanent Pavement Markings</i>
R 11.4		Notify the appropriate City staff for permanent markings.
R 11.5		Check that air temperature, pavement temperature and surface condition requirements are met.
R 11.6		Check that the locations of the permanent and temporary markings applied are as specified in the contract documents.
R 11.7		Check that the surface is dry and free of loose and/or foreign material.
R 11.8		Check that zone painting is completed on any temporary driving surface prior to opening to traffic.
R 11.9		Check that zone painting has a well-defined edge, free from waviness, uniformly dimensioned and shaded with no splatter or overspray.
R 11.10		Check that glass beads are applied uniformly prior to the paint drying.
R 11.11		Check that the pavement markings are applied.

## Road – Task R 12

## General Environmental Compliance

Task #	✓	Activity
<b>R 12.1 M</b>		<b>Ensure that contractor has submitted an erosion and sediment control plan and monitor contractor's compliance with this approved plan.</b>
R 12.2		Check compliance with design and construction commitments.
R 12.3		Check that work does not cause environmental impacts that were not predicted in environmental assessment documentation.
R 12.4		Check compliance with technical environmental requirements and prohibitions of federal and provincial legislation, particularly with respect to environmental impacts.
<b>R 12.5 M</b>		<b>Ensure that environmental permits or approvals are current and on site prior to commencement of work.</b>
<b>R 12.6 M</b>		<b>Check all excavations for evidence of contaminated material and archaeological finds and immediately report all instances to the contract administrator.</b>

**Road – Task R 13**

**Control of Dust from the Work**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>R 13.1 M</b>		<b>Ensure that dust from construction operations such as grading, concrete cutting/grinding, abrasive blast cleaning of concrete and steel, hauling operations and road sweeping does not cause a nuisance to pedestrian and vehicular traffic, adjacent residential, commercial and institutional properties.</b>

**Road – Task R 14****Use of Waste Products / Materials in the Work**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>R 14.1 M</b>		<b>Check that waste and product dust suppressants meet the material and construction requirements of the contract.</b>
<b>R 14.2 M</b>		<b>Check that any use/placement of reclaimed/excess concrete, asphalt pavement and so on such as aggregate, embankment material, fill, slope flattening material is in compliance with the material and construction requirements of the contract.</b>
<b>R 14.3 M</b>		<b>Ensure submission of sulphate testing of recycled concrete material.</b>

**Road – Task R 15**

**Management and Disposal of Excess Materials**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>R 15.1 M</b>		<b>Check that excess materials from the work are handled, stored and disposed of as specified in the contract.</b>
<b>R 15.2 M</b>		<b>Check that standard forms regarding the disposal of excess material is submitted prior to disposal of excess material off site.</b>
<b>R 15.3 M</b>		<b>Ensure that dumping tickets are collected.</b>
<b>R 15.4</b>		Inspector must notify the contract administrator if material is suspected of being contaminated.
<b>R 15.5 M</b>		<b>Record contaminated material taken away from site and verify that the hauler is MOECC certified.</b>

## Road – Task R 16

## General Traffic Control Overview and Local Traffic Access Patterns

Task #	✓	Activity
<b>R 16.1 M</b>		<b>Ensure that the contractor complies with the approved traffic management plan submitted by the contractor.</b>
R 16.2		Record contractor's contact person(s) responsible for traffic control.
R 16.3		Ensure that layout of signs is in accordance with the contract and traffic control plans, or as modified by the City.
R 16.4		Ensure that contractor's initial sign placements—by station, offset and height above pavement— are placed according to Book 7 – Temporary Conditions and approved by the Transportation Services work zone coordinator, and that all revisions are clearly documented.
<b>R 16.5 M</b>		<b>Check daily that local traffic access to residential, commercial or institutional areas is not modified or redirected unless otherwise specified in the contract and that prior and approved notification has been delivered.</b>
R 16.6		Ensure that sidewalks and driveways are ramped to provide access for pedestrians and vehicles and pedestrian use other sidewalk signs.
R 16.7		Ensure work areas are properly fenced and delineated to provide for safe traffic flow.
R 16.8		Check that any modification or redirection of local traffic access to residential, commercial or institutional areas complies with the time constraints specified in the contract.
R 16.9		Advise daily that all signs and traffic control devices are properly maintained, and in good working order, for example, flashers, and so on.
R 16.10		Check for the removal of temporary signs when they are no longer required.
R 16.11		Check that the contractor records each stage change or sign change.
<b>R 16.12 M</b>		<b>If an accident occurs, document all traffic control devices, signing, time of inspection and any other pertinent information including measurements, photos and police accident reports in the daily report.</b>
R 16.13		Check that all lane closure protocol is adhered to as per the requirements of the contract documents.
R 16.14		Co-ordinate with right-of-way management unit for the inspection of the traffic control devices.



**Road – Task R 17**

**Traffic Control – Temporary Concrete Barrier (Relocation)**

Task #	✓	Activity
R 17.1		Check defects in barriers are verified before and after installation.
R 17.2		Ensure all units are connected properly.
R 17.3		Confirm placement, treatments and offsets are as shown on the contract drawings.
R 17.4		Ensure barriers are checked for misalignment or damage throughout the project. Ensure barriers are replaced or repaired as required.
R 17.5		Confirm removal or relocation is carried out as specified.
R 17.6		Check requirements for paid duty police officer(s) and ensure contractor adheres to requirements.

**Road – Task R 18****Temporary Erosion and Sedimentation Control**

Task #	✓	Activity
R 18.1		Check sediment barriers, flow checks, sediment traps, turbidity curtains and cofferdams are installed and maintained where and when they are specified in the contract and in the contractor's erosion and sedimentation control plan.
R 18.2		Check accumulated sediment is cleaned out from temporary erosion and sedimentation control measures as required. Check temporary erosion and sedimentation control measures for effective working condition before forecasted major rainfall events and after the storm event.
R 18.3		Check temporary erosion and sedimentation control measures are removed as specified and in a manner that prevents sediment escape.
R 18.4		Ensure compliance with time constraints on the maximum period between removal of original vegetative surface cover and placement of final specified surface cover. Check dates for seed and cover are not exceeded.
R 18.5		Ensure contractor installs any additional erosion and sedimentation control measures necessary because of procedures selected by the contractor or site conditions or both.

## Road – Task R 19

## Work in, Adjacent to, and Over Waterbodies

Task #	✓	Activity
R 19.1 M		<b>Ensure sedimentation and other harmful material is not permitted to enter into the watercourse or other water bodies.</b>
R 19.2		Entry of equipment and construction materials into watercourses and water bodies and undertaking of any work is limited to that specified in the contract and environmental documentation, as may be authorized through environmental permits or approvals.
R 19.3 M		<b>Ensure work specified in the watercourses or water bodies and on the banks is in compliance with what is specified in the contract and environmental documentation, and as may be authorized through environmental permits or approvals.</b>
R 19.4		Check temporary water passage systems, temporary water body crossings, cofferdams and turbidity curtains are installed, maintained and removed in compliance with the requirements of the contract.
R 19.5		Ensure disturbance or damage to watercourses or water body beds, banks and bank vegetation is limited to that specified in the contract and environment documentation, and as may be authorized through environmental permits or approvals.
R 19.6 M		<b>Check compliance with the time constraints specified in the contract relative to work in and adjacent to watercourses. The inspector to ensure that all other approvals have been obtained.</b>

## Sanitary Sewers – Task SAS 1

## General Inspection

Task #	✓	Activity
<b>SAS 1.1 M</b>		<b>Document existing site conditions and adjacent properties by taking pre-construction photos in preparation of subsequent claims. Ensure contractors have documented and submitted a copy to the contract administrator.</b>
SAS 1.2		Ensure contractor has a “competent” supervisor on-site at all times directing work of his own forces and sub-contractors.
SAS 1.3		Pipe class checked and condition of pipe inspected, for example, maintenance holes, saddles, and so on. All connections core drilled or pre-manufactured.
SAS 1.4		Document day-to-day activities on contract by: <ul style="list-style-type: none"> <li>• personal diary</li> <li>• vehicle maintenance log—if operating departmental vehicle</li> <li>• field book</li> <li>• daily inspector’s report</li> <li>• daily quantity sheets</li> <li>• weekly quantity sheets</li> <li>• daily summary of weighed materials sheet</li> <li>• daily summary of work completed on a cost-plus basis sheet</li> </ul>
SAS 1.5		Document the following activities on a day-to-day basis: <ul style="list-style-type: none"> <li>• contractor, sub-contractor and supplier forces including breakdown of classification, equipment detail as per OPS 127 and material delivered on site</li> <li>• traffic control, that is what lanes are closed and for what distance, staging</li> <li>• weather conditions</li> <li>• general progress of work</li> <li>• claims by contractor or complaints received by contractor</li> <li>• verbal instructions given to contractor</li> <li>• any events that could adversely affect productivity</li> <li>• any changes to plans or adherence to specifications</li> <li>• spills that occur and any follow-up notification</li> <li>• claims that occur and any follow-up notification</li> <li>• claims or potential claims such as traffic accidents or slip and falls occurring in the work zone</li> <li>• sub-excavation quantities</li> <li>• change directives, change orders or field instructions</li> <li>• soil conditions</li> </ul>

## Sanitary Sewers – Task SAS 1

## General Inspection (continued)

Task #	✓	Activity
SAS 1.5 continued		<ul style="list-style-type: none"> <li>trench widths</li> <li>type of trench shoring used</li> </ul>
SAS 1.6		<ul style="list-style-type: none"> <li>ensure OHSA compliance</li> <li>ground conditions during excavation noted, that is areas of excessive trench collapse, presence of water and monitor dewatering methods – well points / MECP Permit to Take Water, and so on.</li> <li>stations of water services and sanitary services recorded</li> <li>condition and type of shoring used noted</li> <li>method of compaction noted</li> <li>grade sheets mathematically checked</li> <li>laser and/or batter boards checked to ensure they have been set at the proper elevation</li> <li>bedding to spring line checked</li> <li>dealings with adjacent property owners and public</li> <li>concerns relayed by contract administrator and status</li> <li>material testing completed, field results and reasons why a required test was not done</li> <li>trench widths, shoring type used and sub grade conditions, such as soil type and whether ground water is present</li> <li>location of utilities encountered that vary from plan location</li> <li>non-contract compliance issues and follow up action taken such as discussion with contractor and contract administrator</li> <li>all labour and equipment in the daily report forms are to be tracked. Including sizes model numbers and owned and leased equipment</li> <li>visitors to site, reasons for the visit and any discussions</li> <li>record any other items as required in the standard daily report and other report forms</li> </ul>
SAS 1.7		Track material testing consultant services on-site and document visits daily for processing of invoices by contract administrator.
<b>SAS 1.8 M</b>		<b>Prepare deficiency list for contractor and ensure all items are cleaned up prior to demobilization.</b>
SAS 1.9		On a daily basis ensure that all material storage is done as per the contract requirements.

## Sanitary Sewers – Task SAS 2

## Sanitary Maintenance Holes

Task #	✓	Activity
<b>SAS 2.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
<b>SAS 2.2 M</b>		<b>Check type, size, alignment, offsets and grades of maintenance holes.</b>
SAS 2.3		If reclaimed concrete material is being used, ensure it does not contain any reclaimed asphalt pavement material.
SAS 2.4		Reclaimed concrete material is not to be used in conjunction with aluminium or galvanized piping or fixtures as it may cause corrosion.
SAS 2.5		Check that backfill materials are specified in the contract and are compacted in lifts around structures to the required densities.
SAS 2.6		Check that pre-cast maintenance hole sections are properly installed and gaskets are in place.
SAS 2.7		Check that poured-in-place maintenance holes conform to the contract standards.
SAS 2.8		Check correct placement of reinforcing steel where required.
<b>SAS 2.9 M</b>		<b>Check specified compaction is obtained under pipes entering or exiting maintenance holes and concrete is placed and vibrated where cradling is required.</b>
SAS 2.10		Check that maintenance holes are cleaned out. Check that honeycombed areas and lifting holes are patched, and the grates and pipe are grouted upon completion.
SAS 2.11		Check all proposed structures to make sure drop pipes have been properly constructed and anchored to structures.
SAS 2.12		Ensure that the proper adjustment rings are used to establish the final grade elevations.
SAS 2.13		Ensure that the pipe connections at the maintenance hole are properly constructed and watertight.
SAS 2.14		Ensure that benching is in place where specified.
SAS 2.15		Ensure that steps, ladders, and platforms are correctly spaced, properly aligned and secured to allow for safe and easy access.

## Sanitary Sewers – Task SAS 3

## Sanitary Sewer Installation

Task #	✓	Activity
<b>SAS 3.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list that was submitted by the contractor at the commencement of the contract.</b>
SAS 3.2		Check the trench alignment, grade and width are as specified.
<b>SAS 3.3 M</b>		<b>Check that the pipe is installed to proper alignment and grade.</b>
SAS 3.4		If reclaimed concrete material is being used, ensure it does not contain any reclaimed asphalt pavement material.
SAS 3.5		Reclaimed concrete material is not to be used in conjunction with aluminium or galvanized piping or fixtures as it may cause corrosion.
<b>SAS 3.6 M</b>		<b>Check that the specified bedding, cover and backfill materials are used, and compacted as per standard specifications.</b>
SAS 3.7		Ensure excavations are free of water at all times and proper pumping procedures are followed.
<b>SAS 3.8 M</b>		<b>Check all pipes to ensure use of the correct class and size.</b>
SAS 3.9		Inspect pipe and gaskets for defects and reject those that are damaged or defective.
SAS 3.10		During progress of work, check that all pipes and connections are kept clean and free of foreign debris.
SAS 3.11		Where applicable, check that joints are lapped in directions of flow.
<b>SAS 3.12 M</b>		<b>Record all rock excavations.</b>
SAS 3.13		Check that all utilities have been properly supported during construction and prior to backfilling. Ensure that utility sizes and elevations are recorded. Advise utilities in the event of damage.
<b>SAS 3.14 M</b>		<b>Plastic sewer pipes will be tested for deflection as per OPSS 410.</b>
SAS 3.15		Check if bypass pumps are working, if inclement weather is forecasted. Check that bypass is as per approved submitted plans and MECP permits.

**Sanitary Sewers – Task SAS 4****Jack and Bore**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
SAS 4.1		Check that sufficient indicators are set up and maintained to detect and monitor any movements and gases within and outside the tunnel.
SAS 4.2		Check that installation techniques employed meet the specification.
<b>SAS 4.3 M</b>		<b>Check that the alignment and grade are maintained.</b>
<b>SAS 4.4 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list and is in good condition.</b>
SAS 4.5		Maintain detailed records and report all ground movements, failures, seepage zones and changes in soil conditions to the contract administrator.



**Sanitary Sewers – Task SAS 5****Sanitary House Laterals**

Task #	✓	Activity
<b>SAS 5.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
<b>SAS 5.2 M</b>		<b>Check all connections at sewer mains for pipe and tee alignment, saddle stability and compaction.</b>
SAS 5.3		If reclaimed concrete material is being used, ensure it does not contain any reclaimed asphalt pavement material.
SAS 5.4		Reclaimed concrete material is not to be used in conjunction with aluminium or galvanized piping or fixtures as it may cause corrosion.
<b>SAS 5.5 M</b>		<b>Check that the granular bedding has been installed and compacted to the spring line of pipe. Check that granular cover and backfill are placed and compacted to specifications.</b>
<b>SAS 5.6 M</b>		<b>Check for proper connections to existing service pipes.</b>
SAS 5.7		Check that positive flow is maintained from the connection at streetline to the new sewer.
SAS 5.8		Check that the proper size and class of the pipe is used for all house connections.
SAS 5.9		Record chainages, size, class, and lengths of pipes installed.
SAS 5.10		Record swing ties—three minimum—to established features at property line.
<b>SAS 5.11 M</b>		<b>Complete sewer service cards.</b>
SAS 5.12		Record elevation and location at property line.
SAS 5.13		Check that lateral is connected to the proper sewer main, which is sanitary to sanitary.
SAS 5.14		Ensure that all permits are in place for the service laterals to vacant lots.

**Sanitary Sewers – Task SAS 6****Gravity Sewer Testing**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>SAS 6.1 M</b>		<b>Ensure that the contractor CCTV's all sanitary sewers as per the requirements of the contract or development agreements or both.</b>
SAS 6.2		Ensure that the contractor pressure tests all sanitary sewers, force main connections, if applicable, and house laterals as per the requirements of the contract and development agreements or both. This is especially true where MOECC separation guidelines cannot be met. Not applicable to rehabilitation projects.
<b>SAS 6.3 M</b>		<b>Ensure that deflection testing takes place on plastic sewer pipes as per OPSS 410.</b>

**Storm Sewers – Task STS 1****General Inspection**

Task #	✓	Activity
STS 1.1		Follow-up with the contractor to ensure that they document the existing site conditions and adjacent properties by taking pre-construction photos in preparation of subsequent claims according to the contract documents.
STS 1.2		Ensure contractor has a supervisor on-site at all times directing work of his own forces and sub-contractors.
STS 1.3		Pipe class checked and condition of pipe inspected, for example, manholes, saddles and so on. All connections core drilled or pre-manufactured.
STS 1.4		Document day-to-day activities on contract by: <ul style="list-style-type: none"><li>• personal diary</li><li>• vehicle maintenance log—if operating departmental vehicle</li><li>• field book</li><li>• daily inspector's report</li><li>• daily quantity sheets</li><li>• weekly quantity sheets</li><li>• daily summary of weighed materials sheet</li><li>• daily summary of work completed on a cost-plus basis sheet</li></ul>
STS 1.5		Document the following activities on a day-to-day basis: <ul style="list-style-type: none"><li>• contractor, sub-contractor and supplier forces including breakdown of classification, equipment detail as per OPS 127 and material delivered on site</li><li>• traffic control, that is what lanes are closed and for what distance, staging</li><li>• weather conditions</li><li>• general progress of work</li><li>• claims by contractor or complaints received by contractor</li><li>• written instructions given to contractor</li><li>• any events that could adversely affect productivity</li><li>• any changes to plans or adherence to specifications</li><li>• spills that occur and any follow-up notification</li><li>• claims that occur and any follow-up notification</li><li>• claims or potential claims such as traffic accidents or slip and falls occurring in the work zone</li><li>• sub-excavation quantities according to the contract documents</li></ul>

## Storm Sewers – Task STS 1

## General Inspection (continued)

Task #	✓	Activity
STS 1.6 continued		<ul style="list-style-type: none"> <li>• ground conditions during excavation noted, that is areas of excessive trench collapse, presence of water and monitor dewatering methods – well points and MECP Permit to Take Water, and so on</li> <li>• stations of water services and sanitary services recorded</li> <li>• type and condition of shoring used noted</li> <li>• method and type of compaction noted</li> <li>• lasers and/or batter boards checked to ensure they have been set at the proper elevation</li> <li>• bedding to spring line checked</li> <li>• dealings with adjacent property owners and public</li> <li>• concerns relayed by contract administrator and status</li> <li>• material testing completed, field results and reasons why a required test was not done</li> <li>• trench widths, shoring type used and sub grade conditions, such as soil type and whether ground water is present</li> <li>• location of utilities encountered that vary from plan location</li> <li>• non-contract compliance issues and follow up action taken such as discussion with contractor and contract administrator</li> <li>• all labour and equipment in the daily report forms are to be tracked. Including sizes model numbers and owned and leased equipment</li> <li>• visitors to site, reasons for the visit and any discussions</li> </ul>
<b>STS 1.7 M</b>		<b>Track material testing consultant services on-site and document visits daily for processing of invoices by contract administrator.</b>
<b>STS 1.8 M</b>		<b>Prepare deficiency list for contractor and ensure all items are cleaned up prior to demobilization. This list should be prepared on a running basis and provided to the contract administrator and contractor at progress meetings or at least monthly.</b>
STS 1.9		On a daily basis ensure that all material storage is done as per the contract requirements.

## Storm Sewers – Task STS 2

## Storm Maintenance Holes, Catchbasins and Ditch Inlets

Task #	✓	Activity
<b>STS 2.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
<b>STS 2.2 M</b>		<b>Check type, size, alignment, offsets and grades of maintenance holes, catchbasins and ditch inlets.</b>
STS 2.3		Check that backfill materials are specified in the contract and are compacted in lifts around structures to the required densities (R 2).
SAS 2.4		Recycled material concrete is not to be used in conjunction with aluminium or galvanized piping or fixtures as it may cause corrosion.
STS 2.5		Check that pre-cast maintenance hole sections are properly installed.
STS 2.6		Check that poured in place maintenance holes, catchbasins and ditch inlets conform to the contract standards.
STS 2.7		Check correct placement of reinforcing steel where required.
<b>STS 2.8 M</b>		<b>Check specified compaction is obtained under pipes entering or exiting maintenance holes, catchbasins, and ditch inlets and concrete is placed and vibrated where cradling is required.</b>
STS 2.9		Check that maintenance holes, catchbasins and ditch inlets are cleaned out. Check that honeycombed areas and lifting holes are parged, and the grates and pipe are grouted upon completion.
STS 2.10		Check all proposed structures to make sure drop pipes have been properly constructed and anchored to structures.
STS 2.11		When installing catchbasins to combined sewers, make sure odour traps are properly installed.
STS 2.12		Ensure that the proper adjustment rings are used to establish the final grade elevations.
STS 2.13		Ensure that the pipe connections at the maintenance hole are properly constructed and water tight.
STS 2.14		Ensure that benching is in place where specified.
STS 2.15		Ensure that steps, ladders, and platforms are correctly spaced and properly aligned and secured to allow for proper access as per contract specification.

## Storm Sewers – Task STS 3

## Storm Sewer Installation

Task #	✓	Activity
<b>STS 3.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list that was submitted by the contractor at the commencement of the contract.</b>
STS 3.2		Check the alignment, grade and width are as specified.
<b>STS 3.3 M</b>		<b>Check that the pipe is installed to proper alignment and grade.</b>
SAS 3.4		Recycled material concrete is not to be used in conjunction with aluminium or galvanized piping or fixtures as it may cause corrosion
<b>STS 3.5 M</b>		<b>Check that the specified bedding, cover and backfill materials are used, and compacted as per standards.</b>
STS 3.6		Ensure excavations are free of water at all times and proper pumping procedures are followed.
STS 3.7		Check all pipes to ensure use of the correct material, class, and size.
STS 3.8		Inspect pipe for defects and reject those that are damaged or defective.
STS 3.9		During progress of work, check that all pipes and connections are kept clean and free of foreign debris.
STS 3.10		Check that all gaskets and joints are tight as per manufacturer's recommendations.
STS 3.11		Where applicable, check that joints are lapped in direction of flow.
STS 3.12		Check that proper equipment is used for compaction until the specified depth of cover over the pipes is achieved.
STS 3.13		Ensure that all pipe inverts are recorded at maintenance holes.
<b>STS 3.14 M</b>		<b>Record all rock excavations.</b>
STS 3.15		Check that all utilities have been properly supported during construction and prior to backfilling. Ensure that utility sizes and elevations are recorded. Advise utilities and contract administrator in the event of damage.

### Storm Sewers – Task STS 4

#### Subdrains

Task #	✓	Activity
STS 4.1		Check for specified size of pipe, including filter material. Check that all delivered material is stored properly and verify that it is being supplied from the approved list.
<b>STS 4.2 M</b>		<b>Check that pipe is installed to proper alignment and grade.</b>
STS 4.3		Check that granular materials comply with the specifications and are compacted as per compaction requirements.
STS 4.4		Check that proper connections to maintenance holes, catchbasins, and ditch inlets are grouted and have sufficient grade.
STS 4.5		Check that outlet and collector pipes are not crushed during backfilling operations.

### Storm Sewers – Task STS 5

#### Storm House Laterals and Catchbasin Leads

Task #	✓	Activity
STS 5.1		Check all the delivered material to verify that it is being supplied from the approved list.
STS 5.2		Reclaimed concrete material bedding or backfill not to be used in conjunction with galvanized materials or aluminum piping as it may cause corrosion.
<b>STS 5.3 M</b>		<b>Check that all connection angles at sewer mains are as specified.</b>
<b>STS 5.4 M</b>		<b>Check that the granular bedding has been installed and compacted to the spring line of pipe. Check that granular cover and backfill are placed and compacted to specifications.</b>
STS 5.5		Check for proper connections to existing service pipes.
<b>STS 5.6 M</b>		<b>Check that the proper type, class, and size of the pipe is used for all house connections.</b>
STS 5.7		Record chainages and lengths of pipes installed.
STS 5.8		Complete sewer service cards according to Toronto Water requirements.
STS 5.9		Check that lateral is connected to the proper sewer main, which is storm to storm.



### Structural – Task S 1

#### Structure Excavation

Task #	✓	Activity
<b>S 1.1 M</b>		<b>Check that all footing excavations conform to size, shape, line, elevation, and grade as specified in the contract.</b>
S 1.2		Check that the excavation is rendered stable and safe during footing excavation and construction.
S 1.3		Check that loosened material, soft material, boulders and other deleterious material at the foundation base are removed and replaced with suitable compacted material or mass concrete.
S 1.4		Record the depth, length, width, type of material used, and how it was placed, when a working slab is used by the contractor.
S 1.5		Check that any adjacent utility or structure is not affected or undermined by the footing excavation. Record location of utilities.
S 1.6		Check that the founding soil is protected and preserved.
S 1.7		Ensure that excavated materials are handled as per the requirements of the contract.

## Structural – Task S 2

## Piling

Task #	✓	Activity <sup>1</sup>
<b>S 2.1 M</b>		<b>Record and verify the pile type, length of pipe, splices, driving shoes and length of cut off.</b>
S 2.2		Check that all the delivered material is supplied from the approved list, and handled and stored so as to prevent damage to the piles.
S 2.3		Ensure Contractor lays out perimeter of footings prior to piling operations.
S 2.4		Check that pile driving equipment conforms to specified requirements, for example: size of hammer, horsepower, model, make and so on.
S 2.5		Check that the end treatments are correctly applied, that is shoes, collars, rock points and so on.
<b>S 2.6 M</b>		<b>Check that pile installation sequence is as per submission, and that layout and orientation of piles conforms to contract requirements.</b>
S 2.7		Check that vertical and batter alignment of pile meets specified requirements.
S 2.8		Check that welding of splicing conforms to specified requirements.
S 2.9		Check that pile set and refusal criteria are satisfied including any re-tapping and dynamic testing.
S 2.10		Maintain pile driving records.
S 2.11		Check that the concrete placement, consolidation, finishing and curing operations are in accordance with task S 9.

S 2.12		<p>Conduct a monitoring program for vibration and movements of the structures until construction is complete. The monitoring program should include inclinometers, multi-points extensometers, pile target survey, precision survey, surface settlement survey, vibration etc.</p> <p>The monitoring reports are to be forwarded weekly to the Contract Administrator and advise them immediately when the results approach the review level as proposed, or any damage to the structure witnessed on site or through data recorded by the monitoring program.</p> <p>When the monitoring results exceed the alert level as specified by the piling &amp; shoring design engineer, a letter/report from the bridge specialized engineering firm is to be prepared. The document is to evaluate the impact on the bridge(s) confirming if adverse impacts on the bridges were experienced due to the vibrations. The document must be sealed, signed, and dated by two Professional Engineers licensed in Ontario.</p>
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<sup>1</sup> Tasks below are typically performed by the engineering consultant

**Structural – Task S 3****Structure Backfilling**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>S 3.1 M</b>		<b>Check that the area to be backfilled conforms to the contract documents.</b>
<b>S 3.2 M</b>		<b>Check that the structure excavation limits are verified and recorded prior to commencement of backfilling operations.</b>
<b>S 3.3 M</b>		<b>Check that the concrete has reached the required percentage of the design strength prior to backfilling.</b>
S 3.4		Check subdrains are placed as specified in the contract.
S 3.5		Check proper procedures are used for weep holes and perforated pipe installation.
<b>S 3.6 M</b>		<b>Ensure use of proper material and backfill is placed as specified in contract.</b>
S 3.7		Check that appropriate compaction procedures and sequence is used, and that appropriate compaction equipment is used in restricted areas.
S 3.8		Check that appropriate compaction testing is being conducted.
S 3.9		Check that appropriate placing sequence is used. Note if the drawings call for geotextiles and ensure that they have been installed properly.

**Structural – Task S 4****Falsework**

Task #	✓	Activity
<b>S 4.1 M</b>		<b>Check that stamped, approved falsework drawings are on site. Check installation of falsework against stamped working drawings prior to pour. Specifically ensure member sizes and spacing, mudsill locations and associate member sizes, longitudinal and transverse bracing, max extensions on screw heads of towers, type and location of hangers and location of screed rails.</b>
S 4.2		Ensure that all required revisions are approved.
S 4.3		Ensure that falsework is erected on a stable base.
S 4.4		Ensure that required certifications are obtained prior to concrete placement.
S 4.5		Monitor falsework several times during concrete placement operation for deflection and settlement, that is tell tails.
<b>S 4.6 M</b>		<b>Check that the required concrete strength has been reached prior to removing falsework.</b>
S 4.7		Ensure that the falsework is not removed prior to the grouting of the post tension ducts.

**Structural – Task S 5****Formwork**

Task #	✓	Activity
<b>S 5.1 M</b>		<b>Check all material, including hardware, for condition, quality, adjustment and fit.</b>
S 5.2		Check dimensions of forms are as specified in the contract.
S 5.3		Check form release oil is applied to the forms before the installation of reinforcing steel.
S 5.4		Ensure proper cover to reinforcing steel is maintained during form installation.
S 5.5		Check forms and anchoring—several times—for alignment and possible deformation, during concrete placement.
S 5.6		Ensure that the mould is clean and free of all debris.
S 5.7		Ensure that any void box tie downs are installed as specified in the contract documents.

**Structural – Task S 6****Installation of Bearings**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>S 6.1 M</b>		<b>Check that all the delivered material is being supplied from the approved list and properly stored.</b>
S 6.2		Check and record from elastomeric bearings, the size, name of manufacturer, part number and date of manufacture and also check that the bearing is not on the list of defective bearings.
S 6.3		When specified, randomly select and then ship the sample bearing(s) for testing as specified.
S 6.4		Check that surface tolerance and bedding requirements of bearing seats conform to specification.
S 6.5		Check that each bearing is installed at the correct location, elevation, and is properly aligned as specified.
S 6.6		Check removal of any shipping device or restraints from bearings as specified in the contract or shop drawings or both.
<b>S 6.7 M</b>		<b>Upon completion of the structure, visually inspect the bearings to ensure they have full and uniform bearing at top and bottom, and that bearing components are not out of position.</b>
S 6.8		Check the timing and procedure for jacking and re-alignment of bearings.
<b>S 6.9 M</b>		<b>Check for defects following jacking.</b>

**Structural – Task S 7****Concrete and Structural Steel Beam Erection**

Task #	✓	Activity
<b>S 7.1 M</b>		<b>Check that the stamped approved erection drawings are on site.</b>
S 7.2		Check that beams have not been damaged and are set to the specified alignment, are properly oriented, and are seated properly.
<b>S 7.3 M</b>		<b>Ensure that the contractor complies with the approved drawings and procedures.</b>
S 7.4		Ensure that lifting equipment has adequate capacity and is located on a stable foundation.
S 7.5		Ensure that lateral bracing is in place prior to lifting beams.



**Structural – Task S 8****Reinforcing Steel Placement**

Task #	✓	Activity
S 8.1		Examine reinforcing steel schedule and drawings.
S 8.2		Check for proper site storage and handling.
<b>S 8.3 M</b>		<b>Check all the delivered material is being supplied from the approved list.</b>
S 8.4		Check correct grade, bar mark, size, length, and bending dimensions and provision of mill certificates.
S 8.5		Check condition of all types of reinforcing steel and ensure damaged bars are repaired with approved materials or replaced as specified in the contract.
S 8.6		Check coated tie wire is used on epoxy coated steel and stainless steel ties are used on stainless steel.
S 8.7		Check splicing, spacing, positioning, layering, cover, welding, supports and tying of bars is carried out as specified in the contract.
S 8.8		A sample of the stainless steel rebar must be obtained and forwarded for testing, as per the contract documents.
S 8.9		Check that the steel is in the proper place for cover as per the drawings, prior to concrete placement. Verify adequate cover before placement of concrete.
S 8.10		Ensure that embedded hardware such as anchor bolts are installed, recognizing that they are often not shown on reinforcing drawings.
S 8.11		Ensure that the location of construction joints and control joints are placed correctly.

**Structural – Task S 9****Concrete Placement, Consolidation, Finishing and Curing**

Task #	✓	Activity
<i>Placement</i>		
<b>S 9.1 M</b>		<b>Ensure that the concrete mix design and supporting documentation has been obtained and reviewed.</b>
<b>S 9.2 M</b>		<b>Check to ensure all materials are from approved lists and meet the requirements of the contract.</b>
S 9.3		Review details of “pre-placement” meeting regularly for compliance.
S 9.4		Check that the thermal coupler wire or copper tubing is installed correctly.
S 9.5		Check transporting systems such as concrete pumps, belts, runways, and so on. Also ensure that the contractor has a back up plan if required.
S 9.6		Ensure that submissions for cold and hot weather concrete placement have been obtained and reviewed.
S 9.7		Ensure that the contractor has provided the equipment identified in the submission including back-up units.
<b>S 9.8 M</b>		<b>Ensure concrete delivery tickets are checked for correct class and concrete batching time.</b>
S 9.9		Ensure concrete is placed in specified time, that is from time on ticket.
S 9.10		Check correct placement operations, if applicable correct placing sequence is as specified in the contract.
<b>S 9.11 M</b>		<b>Check that all required quality assurance testing and sampling is carried out.</b>
S 9.12		Ensure that contractor has received permission to proceed with the pour.
S 9.13		Check how concrete is being placed. If by chutes, ensure that the drop height is acceptable.
<b>S 9.14 M</b>		<b>Ensure deck finisher dry run is conducted and check clearances.</b>
<i>Consolidation</i>		
S 9.15		Check vibration equipment is in good operating condition and meets specification requirements.
<b>S 9.16 M</b>		<b>Check adequate consolidation and proper use of vibrating.</b>

**Structural – Task S 9****Concrete Placement, Consolidation, Finishing and Curing (continued)**

Task #	✓	Activity
<i>Finishing</i>		
S 9.17		Check deck finishing equipment is as specified in the contract.
S 9.18		Check that finishing of plastic concrete is as specified in the contract.
S 9.19		Check tolerances of finishing concrete are as specified in the contract.
<i>Curing</i>		
<b>S 9.20 M</b>		<b>Check that specified curing is carried out. Ensure that burlap is soaked overnight.</b>
S 9.21		Check that hot and cold weather protection requirements are carried out as specified in the contract, including monitoring concrete temperatures where applicable.

## Structural – Task S 10

## Installation of Expansion Joints

Task #	✓	Activity
S 10.1		Check no damage occurs during handling.
S 10.2		Check all delivered material to verify that it is being supplied from the approved list.
<b>S 10.3 M</b>		<b>Check material supplied by the contractor is sampled as required.</b>
S 10.4		Check for proper storage.
S 10.5		Check field splices in steel components are located and welded as per shop drawings and are performed by a certified welder and ensure that the weld is field painted.
S 10.6		Ensure that the dimensions of the block-out to receive the joint assembly are in accordance with the contract drawings and standard drawings.
S 10.7		Check that the block-out to receive the joint is abrasive blast cleaned, without damaging the epoxy coated steel.
S 10.8		Check that all debris in the block-out has been removed and the area coated with a cement paste prior to placing concrete.
<b>S 10.9 M</b>		<b>Check that the proper gap or “j” dimension of the unit has been established prior to placing concrete, and check that the constant gap is achieved throughout the total length.</b>
<b>S 10.10 M</b>		<b>Ensure proper cover from expansion joint steel.</b>
S 10.11		Check that the concrete placement, consolidation, finishing and curing operations are in accordance with task S 9.
S 10.12		Check that clamping angles or channels are removed as specified in the contract.
S 10.13		Check that holes left from removal of clamping angles or channels are cleaned and grouted with approved epoxy.
S 10.14		Check for concrete blockages in the expansion joint openings.
S 10.15		Check that seal is properly installed with no damage, wrinkles or splices.
S 10.16		Check that sliding plates on sidewalk, curbs, and median have been installed properly with regards to the direction of traffic.
S 10.17		Check that formwork including Styrofoam has been removed below expansion joint assembly between deck and ballast wall before the seal is installed.

### Structural – Task S 10

#### Installation of Expansion Joints (continued)

Task #	✓	Activity
S 10.18		Check for cracks in the concrete adjacent to the expansion joint.
S 10.19		Ensure that vent holes are not plugged.
<b>S 10.20 M</b>		<b>Sound the steel armour for voids. If voids are detected, ensure proper procedures are taken to fill the voids.</b>
S 10.21		Ensure that all required testing has been carried out.
S 10.22		Ensure end dam concrete has obtained the minimum strength if voids are to be filled.
S 10.23		Check ballast wall and deck for deterioration and bring to the attention of the project manager and contractor.

**Structural – Task S 11****Barrier Walls**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
S 11.1		Check method of construction is as specified in the contract.
S 11.2		<p>Conventional wooden or steel form method.</p> <ol style="list-style-type: none"> <li>1 Check for correct alignment, grade and granular base preparation.</li> <li>2 Check for correct joint detail and spacing.</li> <li>3 Check cover on reinforcing steel.</li> <li>4 Check that the concrete placement, consolidation and finishing operations are in accordance with task S 9.</li> <li>5 Check that specified curing requirements are carried out.</li> <li>6 Check for surface tolerances and cracking.</li> <li>7 Check that railing mounts or anchorages are correctly installed, for example: location, elevation, flushness, and anchor bolt protrusion is adequate for tube rails.</li> <li>8 Check that the inside faces of formwork is clean, oiled, and in good order, to produce a smooth cast face.</li> <li>9 Check that the barrier wall forms are adequately restrained to prevent uplift and spreading.</li> <li>10 Ensure anchorages for handrail are installed in correct locations.</li> </ol>
S 11.3		<p>Extruded method (Not allowed on bridge decks).</p> <ol style="list-style-type: none"> <li>1 Check for correct alignment, grade and granular base preparation.</li> <li>2 Check location of reinforcing steel.</li> <li>3 Check that the concrete placement, consolidation and finishing operations are in accordance with task S 9.</li> <li>4 Check specified percentage of air is being maintained behind extruder.</li> <li>5 Check that specified curing requirements are met.</li> <li>6 Check for surface tolerances and cracking.</li> </ol>

### Structural – Task S 12

#### Railing for Barrier or Parapet Wall

Task #	✓	Activity
S 12.1		Ensure that all rail and post material delivered to the site is that specified in the contract.
S 12.2		Ensure that material is stored properly.
S 12.3		Check material for damage or defects.
<b>S 12.4 M</b>		<b>Ensure that anchorages have been properly located.</b>
S 12.5		Ensure all end caps are installed properly.
S 12.6		Check the gap on rail mating surfaces to ensure the joint will slide.
S 12.7		Ensure that slide joints are located as detailed in the contract.
S 12.8		Ensure that rail posts are perpendicular and rails are properly aligned.

## Structural – Task S 13

## High Performance Concrete

(This task list is in addition to S 9)

Task #	✓	Activity
<b>S 13.1 M</b>		<b>Ensure mix design is approved by the contract administrator.</b>
S 13.2		Ensure that the number of thermocouples conform to the special provisions.
<i>Placement of Curing</i>		
S 13.3		Check the thermocouples for temperature and temperature difference control are installed.
S 13.4		Check the concrete temperature, slump and air content are as per contract.
S 13.5		Check that the concrete does not segregate during placement and consolidation.
S 13.6		Check the moulds used for making test cylinders conform to requirements.
S 13.7		Check structure decks, approach slabs, curbs and sidewalks, to ensure that fog mist is applied continuously from the time of spreading until concrete is covered with burlap.
S 13.8		Review contractor's temperature records daily. Calculate the thermal gradient by dividing the temperature difference between the centre of concrete and the surface of concrete by the distance between the centre and its nearest surface. If the thermal gradient is greater than 1.5° C/cm, alert the contract administrator.
S 13.9		Check protection is applied when temperature and/or temperature difference exceeds the limit.
<i>Quality Assurance</i>		
S 13.10		Ensure that testing is carried out as per contract requirements.
S 13.11		Carry out crack inspection and review proposal for repairs.
<b>S 13.12 M</b>		<b>Check permission to waterproof is not issued until cracks are treated and the deck is cured for three (3) days.</b>



## Structural – Task S 14

## Bridge Deck Waterproofing

Task #	✓	Activity
<b>S 14.1 M</b>		<b>Check that the deck meets requirements for surface tolerance and surface finish. Contractor to verify acceptability of deck surface with waterproofing subcontractor.</b>
<b>S 14.2 M</b>		<b>Check that the air and concrete surface temperature are within specification requirements.</b>
<b>S 14.3 M</b>		<b>Verify that the deck surface, face of the curbs and barriers walls have been completely treated by abrasive blast cleaning to expose sound, laitance-free concrete and provide permission to proceed.</b>
S 14.4		Check that no traffic, other than the construction equipment directly associated with the waterproofing operation, is allowed on the abrasive blast cleaned deck.
<b>S 14.5 M</b>		<b>Check that all delivered materials are approved.</b>
S 14.6		Check that tack coat is cured completely and free of any surface moisture and dirt before waterproofing membrane is applied.
S 14.7		Check specified temperature of waterproofing membrane at time of placing.
S 14.8		Check correct placement of membrane reinforcement.
S 14.9		Check correct placing of protection boards.
S 14.10		Check the deck drainage tubes are open.
S 14.11		Check tack coating of protection boards just prior to paving.
S 14.12		Ensure that the contractor takes adequate protective measures to mask concrete and prevent over-spray of tack coat materials onto adjacent concrete surfaces such as the curb face, barrier wall, abutments, columns, and so forth.
S 14.13		Measure and record waterproofing thickness.
S 14.14		Ensure that required samples are taken for testing.
S 14.15		Ensure that the direction of lap is oriented with the direction of the paving operation.

**Structural – Task S 15****Cofferdams, Sheet Piling, Tie-backs and Roadway Protection**

Task #	✓	Activity
<b>S 15.1 M</b>		<b>Ensure that stamped approved drawings are available on site.</b>
S 15.2		Check length and condition of all material delivered to the site.
S 15.3		Check that the contractor's scheme is as specified on the working drawings.
S 15.4		Check that the scheme is as specified in the contract for length.
S 15.5		Check that anchor testing is as specified in the specifications.
S 15.6		Check that the contractor monitors the completed scheme for movement.

**Structural – Task S 16****Dewatering**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
S 16.1		Check operation of dewatering system.
S 16.2		Check that the contractor is monitoring the system as specified in the contract.
S 16.3		Check that dewatering is not removed until the backfilling is brought up to grade.
S 16.4		Check that dewatering is not causing erosion of soil at the outlet and other environmental concerns, for example muddy water discharge. Check that the contractor has the standby equipment such as pumps, hoses, and so forth, on site as required in the environmental submission.
<b>S 16.5 M</b>		<b>Check environmental special provisions are adhered to.</b>
<b>S 16.6 M</b>		<b>Check that discharge is being managed as per contract requirements.</b>
S 16.7		Check that groundwater drawdown levels are as designed on the drawings.
S 16.8		Check that the contractor's dewatering scheme is not causing loss of materials under adjacent founding elements or backfill.
S 16.9		Monitor pump inlet to ensure pump is not submerged in mud.

**Structural – Task S 17****Caisson Foundations**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
S 17.1		Check type, length, and condition of caisson liners.
S 17.2		Check that installation equipment is as specified in the contract.
S 17.3		Check that penetration and cut off are in accordance with design data.
<b>S 17.4 M</b>		<b>Check that caissons are cleaned out prior to placing reinforcing steel and concrete.</b>
S 17.5		Ensure that reinforcing cages are placed correctly.
S 17.6		Check that the concrete placement, consolidation, finishing, and curing operations are performed in accordance with task S 9.
S 17.7		Check that vertical and batter alignment of caisson are as specified in the contract.

### Structural – Task S 18

#### Tremie Concrete

Task #	✓	Activity
S 18.1		Check placement operation is as specified.
S 18.2		Check the concrete placement, consolidation, finishing and curing operations are in accordance with contract.
S 18.3		Check elevation at which the placement is terminated.
S 18.4		Check that dewatering is not carried out prior to when it is specified in the contract.
<b>S 18.5 M</b>		<b>Check proper removals, cleaning and soundness of top surface prior to placing additional concrete.</b>
S 18.6		Ensure that formed enclosure meets water tightness specified in the contractor's submission, when placement is required next to a watercourse.

**Structural – Task S 19****Structure Rehabilitation – Removal of Waterproofing System from Deck Surface****Note: For deck to be subsequently rehabilitated by patch or waterproofing and paving.**

Task #	✓	Activity
S 19.1		Check that all old waterproofing membrane is completely removed from the concrete surface without any damage to the existing surface of the deck.
S 19.2		Identify all repairs and remedial works have been carried out prior to waterproofing.
S 19.3		Check that all repairs and remedial work to the concrete deck has been completed.

**Structural – Task S 20****Structure Rehabilitation – Concrete Removal and Surface Preparation**

Task #	✓	Activity
S 20.1		Establish concrete removal areas on deck surface, sidewalk, curb face, barrier, and walls by visual and other specified means hammer sound chain drag and mark out removal areas. Check that areas identified in the original deck condition survey are considered. When repair areas differ from the intended quantity notify the contract administrator.
<b>S 20.2 M</b>		<b>Check that concrete removal is being done correctly and as specified in the contract, that is hammer size, locations of removals, staging of removal, and strength of adjacent patches.</b>
<b>S 20.3 M</b>		<b>Check surface preparation is as specified in the contract.</b>
S 20.4		Check that the correct depth of scarification is achieved and weight of equipment does not exceed limit specified.
S 20.5		Ensure that exposed rebar has been sand blasted and treated with the specified chemicals to stop corrosion if required according to contract documents.
S 20.6		Saw cut perimeter of repair areas.
S 20.7		Ensure all remaining concrete is sound.
S 20.8		Ensure that concrete removals are not in conflict with post-tensioned tendons, utility ducts, and structural voids.

## Structural – Task S 21

## Structure Rehabilitation – Concrete Overlay

Task #	✓	Activity
<i>Submission</i>		
<b>S 21.1 M</b>		<b>Obtain contractor's submission and verify that the concrete mix design meets the requirements of the special provision for air void system in the hardened concrete and minimum specified seven day compressive strength.</b>
S 21.2		Obtain documentation certifying that the super plasticizer meets the following: <ul style="list-style-type: none"> <li>• conforms to ASTM C 494 standard specification for chemical admixtures for concrete and Committee C 17 on fibre reinforced cement products requirements</li> <li>• no chlorides were added during the manufacturer of the super plasticizer</li> <li>• it is compatible with the cementing materials and all other admixtures used in the concrete</li> </ul>
S 21.3		Check that all supporting test data is not more than 12 months old from the data the concrete mix design was submitted.
<i>Trial Run</i>		
S 21.4		Check that the screed rails have been installed outside the area to be waterproofed.
S 21.5		Check that the contractor's trial run has been completed before each placing operation to ensure that the minimum thickness of the overlay can be achieved.
S 21.6		Check that the contractor has verified that the screed rails and finishing machine have been set to ensure that the thickness of the overlay meets the requirements of the contract documents before proceeding with the placement of the overlay.
<i>Placement</i>		
S 21.7		Check that all full depth patches have been repaired prior to placing the overlay, unless otherwise specified in the contract documents.
S 21.8		Check that concrete for all partial depth removal areas in the deck are placed at the same time as the overlay.
S 21.9		Check that overlay is not placed adjacent to any new concrete less than 48 hours old. If the ambient air temperature falls below 10°C within the first 48 hours after placement of concrete, the 48 hour time requirement is extended to 96 hours.



## Structural – Task S 21

## Structure Rehabilitation – Concrete Overlay (continued)

Task #	✓	Activity
<b>S 21.10 M</b>		<b>Check the temperature of the air and existing concrete surface to receive the overlay, to ensure it meets contract requirements prior to and during concrete operations.</b>
S 21.11		Check equipment and runways for the concrete transporting equipment to ensure they are not supported by reinforcing steel.
S 21.12		Check that only the finishing machine and buggies used to place concrete are allowed on the abrasive blast cleaned portions of the deck. No other vehicles or equipment, including concrete ready mix trucks shall be permitted.
S 21.13		Check that heavy vehicles such as concrete ready mix trucks or dump trucks are not permitted on the deck where concrete removal has taken place.
S 21.14		Check that removal of all dust and loose material is carried by oil-free compressed air.
S 21.15		Check that the prepared surface is maintained in a wet condition for six hours prior to placing concrete.
S 21.16		Check that excess water is removed by oil-free compressed air immediately prior to application of bonding grout.
S 21.17		Check that areas of reinforcing steel and prepared concrete surface are protected from oil leaks and dropping grout or concrete from placing equipment.
S 21.18		Check that all vertical and horizontal surfaces against which the overlay will be placed receive a thorough, even coating of bonding grout, with no excess left in place.
S 21.19		Check that the application of bonding grout is such that the brushed material does not become dry before it is covered with overlay concrete. Ensure that bonding grout, which is not used within 30 minutes after mixing, is discarded.
S 21.20		Check that concrete placement, consolidation, finishing and curing procedures are in accordance with the contract documents.
S 21.21		Check that the overlay is cured with burlap and water regardless of ambient temperature. Check that the burlap is maintained in a continuously wet condition throughout the curing period by means of a soaker hose. The soaker hoses shall be placed on the burlap prior to placing the moisture barrier.
S 21.22		Check that the burlap is prevented from freezing during cold weather.

**Structural – Task S 21****Structure Rehabilitation – Concrete Overlay (continued)**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
S 21.23		Check that the construction joints are placed as specified in the contract documents.
S 21.24		Check that the tensile bond strength testing if carried out as per the contract requirements.
S 21.25		Check that the core holes have been filled according to the contract requirements.
		<i>Quality Assurance</i>
S 21.26		Obtain and review tensile bond strength test results.
S 21.27		Check overlay for any areas of debonding, honeycombed areas or cracks.
S 21.28		Obtain and verify contractor's crack inspection report and review Contractor's crack treatment proposal is applicable.
S 21.29		Check that permission to waterproof is not issued until cracks are treated, if applicable, and the deck is air cured for three days.

**Structural – Task S 22****Structure Rehabilitation – Full Deck Removal**

Task #	✓	Activity
<b>S 22.1 M</b>		<b>Check that concrete removal is being carried out as per contract documents and contractor's stamped approved working drawings.</b>
S 22.2		Check any required cutting and bending of existing reinforcing steel as specified in the contract.
S 22.3		Check the contractor exercises care when working around components, which are to be left in place to ensure they are not damaged or loosened and the hammers don't come in contact in a manner that will cause debonding in the adjacent concrete areas not being repaired.
<b>S 22.4 M</b>		<b>Inspect existing structural steel components for damage resulting from the removal operation. Inspect other main load carrying elements like precast girders or concrete and timber beams.</b>
S 22.5		Record all details and dimensions in areas that are in conflict with the existing structure drawings.
S 22.6		Ensure that removals are not in conflict with buried utility ducts in the deck or sidewalk.

**Structural – Task S 23****Structure Rehabilitation – Concrete Patches**

Task #	✓	Activity
<b>S 23.1 M</b>		<b>Ensure that the concrete mix design is submitted and reviewed.</b>
S 23.2		For form and pump placement method, obtain and review the contractor's proposal at least one week prior to commencement of the work. Ensure that proposal includes methodology and equipment to be used for this construction contract and that it is signed and sealed by a professional engineer.
S 23.3		For form and pump placement method, check that the pump is a positive displacement type pump and that it is capable of delivering adequate volumes of concrete to maintain a continuous placement.
		<i>Placement</i>
<b>S 23.4 M</b>		<b>Check the temperature of the air and existing concrete surface to receive the overlay, to ensure it meets contract requirements prior to and during concrete operation.</b>
S 23.5		Check equipment and runaways for the concrete transporting equipment to ensure they are not supported by reinforcing steel.
S 23.6		Check removal of all dust and loose material is carried out by oil-free compressed air.
S 23.7		Check that the prepared surface is maintained in a wet condition for one hour prior to placing concrete.
S 23.8		Check excess water is removed by oil-free compressed air immediately prior to application of bonding grout.
S 23.9		Check concrete placement, consolidation, finishing and curing procedures are in accordance with task S 9 unless specified otherwise elsewhere in the contract.
S 23.10		Check that thermocouple wires have been installed in the concrete for cold weather protection as specified in the special provision.
S 23.11		Review contractor's temperature records daily for cold weather protection, if applicable.
S 23.12		Check that prior to season shut down, all patches are completed in all areas of concrete removal.
S 23.13		Check that no construction vehicles, equipment or traffic, with the exception of saw cutting equipment be permitted on the finished surface of the patches until the curing period has elapsed and the specified compressive strength has been attained.

**Structural – Task S 23****Structure Rehabilitation – Concrete Patches (continued)**

Task #	✓	Activity
S 23.14		Define the lots and determine core locations for air void system and tensile bond strength test.
S 23.15		Check that the tensile bond strength testing is carried out as per the contract requirement.
S 23.16		Check that the core holes have been filled according to the contract requirements.
		<i>Quality Assurance</i>
S 23.17		Obtain and review tensile bond strength test results.
S 23.18		Check patches for any areas of debonding, honeycombed areas or cracks.
S 23.19		Obtain and verify contractor's crack inspection report, review Contractor's crack treatment proposal if applicable.
S 23.20		Check permission to waterproof is not issued until the cracks are treated, if applicable, and the patches in the deck are cured for three (3) days.

**Structural – Task S 24****Structure Rehabilitation – Silica Fume Concrete Overlay**

This task list is in addition to S 9 and S 21, and should be used in conjunction with S 9 and S 21.

Task #	✓	Activity
<i>Submission</i>		
S 24.1		Verify that the concrete mix and materials meet the requirements of the special provision for rapid chloride permeability at 28 days.
<i>Placement</i>		
S 24.2		Perform pre-pour dry run to verify grades or screed elevations, concrete cover and operation of mist fogger.
S 24.3		Check that the concrete placement, consolidation, finishing and curing operations are in accordance with tasks S 9 and S 21.
S 24.4		Constantly monitor and record temperatures.
S 24.5		Check that fog mist is applied continuously from the time of screeding until concrete is covered with burlap.
S 24.6		Ensure wet curing for seven days in accordance with contract specifications.
S 24.7		Define the lots and determine core locations for air void system, tensile bond strength and rapid chloride permeability test.
<i>Quality Assurance</i>		
<b>S 24.8 M</b>		<b>Check that the quality assurance operations are carried out.</b>

## Structural – Task S 25

## Structure Rehabilitation – Concrete Refacing

Task #	✓	Activity
<i>Welded Steel Wire Fabric (if applicable)</i>		
S 25.1		Check that the welded steel wire fabric is welded galvanized steel and conforms to ASTM A185-01 standard specification for steel welded wire reinforcement, plain, for concrete.
S 25.2		Check that the anchors for the attachment of the wire fabric to the concrete surface are galvanized in conformance with ASTM A123 / A123M-08 standard specification for zinc (hot-dip galvanized) coatings on iron and steel products.
S 25.3		Check that the wire fabric is installed after the concrete surface and exposed reinforcing steel in the repair area have been abrasive blast cleaned—ensure proper cover over wire mesh.
S 25.4		Check that the wire fabric is installed in accordance with the special provision in the locations shown on contract drawings using spacers and anchors. Ensure proper cover is maintained.
S 25.5		Check that the wire fabric is kept clean of any contamination.
S 25.6		Ensure forms are installed correctly and have adequate support prevent deformation.
<i>Placement</i>		
S 25.7		Check that submissions, concrete placement, finishing, curing, and quality assurance procedures are carried out as specified in the contract.
<i>Curing</i>		
<b>S 25.8 M</b>		<b>Check that burlap and water is applied immediately to the top of all exposed concrete surfaces, within two to four metres from the finishing operation.</b>
S 25.9		Check that burlap is kept continuously wet by means of soaker hose placed along the top of the component being refaced. Check that the soaker is placed immediately after the concrete has set without causing fines to wash out.
S 25.10		Check that the forms are removed within 16 to 24 hours of concrete placement and that the concrete is cured as specified in the special provision.

## Structural – Task S 26

## Structural Steel Coating

Task #	✓	Activity
<b>S 26.1 M</b>		<b>Check all the delivered material, for example, abrasives and coatings, to verify that it is being supplied as per the requirements and specifications.</b>
S 26.2		Check material supplied by the contractor is sampled as required.
S 26.3		Check all requirements and manufacturers product data sheets are met.
S 26.4		Check individual coating products used in the coating system come from the same manufacturer and are compatible.
S 26.5		Check approvals for access, such as scaffolding and stain towers. Review shop drawings signed by a professional engineer.
S 26.6		Check environmental operations including enclosure systems, negative pressure, management and disposal of spent blast medium and removed coating material are as specified in contract or contractor's approved proposal or both.
<b>S 26.7 M</b>		<b>Check that surface preparation is carried out as specified in the contract and meet the specified The Society for Protective Coatings (SSPC) standard.</b>
S 26.8		Obtain sample of spent blast medium if specified in the contract. Delivery to contract administrator for laboratory testing.
<b>S 26.9 M</b>		<b>Check that coating of structural steel follows cleaning within the time as specified in the contract.</b>
S 26.10		Check air temperature and dew point restrictions.
S 26.11		Check that the coat application is carried out as specified in the contract.
<b>S 26.12 M</b>		<b>Ensure that all applicable tests are performed, for example steel profile, paint thickness, temperature, dew point, and so forth.</b>
S 26.13		Check that all blast abrasive, dust and other debris are removed from the steel surface and each coating surface prior to the application of the subsequent coat.
S 26.14		Ensure that the clean steel profile and paint thickness are recorded in diaries.
S 26.15		Check condition of galvanized components during installation. Ensure repairs as specified in the contract.
<b>S 26.16 M</b>		<b>Ensure that the consultant or sub-consultant inspecting the structural steel coating holds the appropriate certifications.</b>
S 26.17		Flag any damage to the structural steel that was revealed after coating was removed.



## Traffic – Task T 1

## Underground Ducts and Bases

Task #	✓	Activity
<b>T 1.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
T 1.2		Check that excavation for the duct or duct banks conforms to the specified dimensions.
T 1.3		Check that wobble joints are installed as specified in the contract.
T 1.4		Check that the correct size and number of ducts are being installed.
<b>T 1.5 M</b>		<b>Check that backfill materials are as specified in the contract and is compacted as required.</b>
T 1.6		Where Electrical Non-Metallic Tubing (EMT) is used, check that it has been installed in accordance with the contract documents.
T 1.7		Check that marker tape and cable bricks have been installed as specified in the contract.
T 1.8		Check that all unused ducts have fish wire installed, and are plugged.
<b>T 1.9 M</b>		<b>Check that ducts for underpass luminaries consist of non-metallic liquid tight conduit and connectors.</b>

## Traffic – Task T 2

## Electrical Chambers

Task #	✓	Activity
<b>T 2.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
T 2.2		Check type, alignment, offsets and grade of maintenance holes and hand holes.
T 2.3		Check that the correct number of sleeves and openings are installed. Ensure correct positioning and installation of ladder rungs, pulling irons, duct sleeves, drainage pipe and frames and covers.
T 2.4		Check that drainage installation has been completed as specified in the contract.
<b>T 2.5 M</b>		<b>Check that backfill materials are as specified in the contract and are compacted as required.</b>
T 2.6		Check that rigid and flexible ducts entering maintenance holes are installed with standard end bells places flush with the face of the inside wall of the unit.
<b>T 2.7 M</b>		<b>Check that frames and covers of electrical chambers are connected to the system ground or are intrinsically safe as per contract requirements.</b>

## Traffic – Task T 3

## Electrical Chambers

Task #	✓	Activity
<b>T 3.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list of shop drawings.</b>
T 3.2		Check that the contractor augers that holes to the specified dimensions for footings.
T 3.3		At locations requiring excavation for bases, check excavation limits and ensure proper backfilling and compaction procedures.
T 3.4		Visually check all poles for dents, cracks, scratches and any other obvious imperfections.
T 3.5		Check that the contractor properly stores, erects and supports the poles in accordance with the manufacturer's recommendations.
T 3.6		Check that pole orientation is as specified in the contract.
T 3.7		Check that the orientation and elevation of the frangible base is as specified in the contract.
<b>T 3.8 M</b>		<b>Check that pole foundations and poles are installed to the correct elevation, station and offset, as specified in the contract.</b>
T 3.9		Check that the local grading around the pole foundations is completed as specified in the contract.

**Watermains – Task WM 1****General Inspection**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
WM 1.1		Check that valid utility locates and mark-ups and approved traffic control plans are received.
WM 1.2		Check that hydrant “Out-of-Service” bags are used when a hydrant is temporarily out of service.
WM 1.3		Job inspected prior to saw cutting—ideally—to ensure no survey error or apparent conflicts with design.
WM 1.4		Check condition of road surface outside trench.
WM 1.5		Material, pipe class checked, and condition of pipe inspected.
WM 1.6		Valves, fittings, saddles, and so on are checked.
WM 1.7		Construction proceeding as per standard drawings and specifications.
WM 1.8		Ground conditions during excavation noted, that is areas of excessive trench collapse, presence of water to be monitored and possibly dewatered, undermining of asphalt and so on.
WM 1.9		Cover to top of pipe checked during construction.
WM 1.10		Stations of water services and sanitary services recorded.
WM 1.11		Trench width recorded.
WM 1.12		Type of shoring used noted.
WM 1.13		Ensure that traffic control plan is in place and adhered to.
WM 1.14		Pictures taken of key tasks, unusual circumstances, extra work, typical anode and bend, tee, connection placements, changed conditions new operations, shoring, traffic control, and so forth.
WM 1.15		Deficiency inspection to be completed immediately as the work progresses and maintained on a running basis to be provided to the contract administrator and the contractor at least monthly and upon completion of construction.
WM 1.16		On a daily basis ensure that all material storage is done as per the contract requirements.

## Watermains – Task WM 2

## Watermain Installation

Task #	✓	Activity
<b>WM 2.1 M</b>		<b>Check all the delivered material to verify that it is being supplied from the approved list.</b>
WM 2.2		Ensure that pipe, fittings and other appurtenances are free of defects and are handled and stored as per requirements of contract.
WM 2.3		Review location requirements for placement of nozzles with contractor for hydrostatic testing, leakage testing and disinfection.
<b>WM 2.4 M</b>		<b>Check that the alignment and grade are properly set.</b>
WM 2.5		Ensure that all pipe fittings and other appurtenances are kept clean and free of debris, and pipes are provided with caps.
WM 2.6		Check that excavations are free of water at all times.
WM 2.7		Record soil conditions if varies from geotechnical report.
<b>WM 2.8 M</b>		<b>Check that trench designed depths and widths are adhered to.</b>
WM 2.9		Check that specified bedding is used and placed as per contract documents.
WM 2.10		Check that watermain and/or where insulation is used for shallow/buried bridge is placed to depth as specified in the contract.
WM 2.11		Check all pipes to ensure correct type, class and size.
WM 2.12		Ensure that a watertight nightcap is provided at the end of each day and during any lengthy work stoppages.
WM 2.13		Check that all pipe ends are lubricated with material recommended by the pipe manufacturer prior to installation.
WM 2.14		Check that fabricated bends are used when changes in line or grade are required.
WM 2.15		Check that any connections, caps and bends are provided with thrust blocks or restraining rings as per the requirements of the contract.
WM 2.16		Check that trench backfill materials are as specified in the contract and required compaction is obtained.
WM 2.17		Check that backfill is brought up evenly on both sides of the pipe at the same time.
WM 2.18		Check that oversize particles are removed.

## Watermains – Task WM 2

## Watermain Installation (continued)

Task #	✓	Activity
WM 2.19		Check that appropriate equipment is used for compaction until the specified depth in the contract documents of cover over the pipe is achieved.
<b>WM 2.20 M</b>		<b>Check that hydrostatic and disinfection testing is completed and results are satisfactory before watermain is put back into service.</b>
WM 2.21		Ensure that top of pipe elevations are obtained and recorded.
<b>WM 2.22 M</b>		<b>Check that locations of bends, ties, connections and so on are recorded.</b>
WM 2.23		Ensure that the length of restrained pipe, on each side of the point of force, is as per contract.
WM 2.24		If applicable, check that the pipe installation sequence is as per the approved shop drawings.
WM 2.25		Ensure that the bituminous lined diaper and grout are installed on all joints of concrete watermain pipe as per contract.
WM 2.26		Ensure that anodes are installed on metallic pipe and appurtenances per the requirements of the contract and record size and location.
WM 2.27		Ensure that test stations are installed on all metallic watermain installations per contract.
<b>WM 2.28 M</b>		<b>Ensure that tracing wire is properly installed and tested for conductivity, continuity and traceability for non-metallic pipe.</b>
WM 2.29		Document the work done in a manner similar to sanitary and storm sewer construction

### Watermains – Task WM 3

#### Water Valves Installation

Task #	✓	Activity
WM 3.1		Check that all valves are supplied as specified from the approved list.
WM 3.2		Check that the bedding for valves is in accordance with pipe bedding specifications, unless otherwise specified.
WM 3.3		Ensure that damages to the factory applied protective coatings are corrected accordingly.
WM 3.4		Ensure that concrete supports are provided for valves when required.
<b>WM 3.5 M</b>		<p><b>Ensure that the direction of operation on all valves is clockwise, as specified (right hand opening) for transmission mains.</b></p> <p><b>For distribution watermains direction to open valves is :</b></p> <p><b>Open Clockwise</b> In districts Etobicoke/York (former City of York, east of the Humber River), North York, Toronto/East York all valves supplied to these areas of the City will open by operating in a clockwise direction and the operating nut supplied will be painted in red.</p> <p><b>Open Counter Clockwise</b> In districts Etobicoke/York (former City of Etobicoke, west of the Humber River), and Scarborough all valves supplied to these areas of the City will open by operating in a counter clockwise direction and the operating nut supplied will be painted in black.</p>
WM 3.6		Ensure that specified large valves have a hand wheel as well as the operating nut.
WM 3.7		Ensure that all valve boxes are installed plumb with well compacted backfill.
WM 3.8		Ensure that valve chambers are the type and size specified in the contract.
WM 3.9		Ensure that valve chambers with concrete floors have sumps as per the contract.
WM 3.10		Ensure that frames and covers for the valve chambers conform to the contract documents.
WM 3.11		Ensure that valve chamber frames and covers are centered over the valve nut with the cover adjusted to match grade. For large valve chambers with one or more valves, ensure that a sleeve is provided in the roof of the chamber immediately over the operating nut. Ensure that the valve box is installed over the centre of the sleeve.

**Watermains – Task WM 3****Water Valves Installation (continued)**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
WM 3.12		Ensure that lifting hooks and lifting holes are provided, used and parged on pre-cast valve chamber sections.
WM 3.13		Ensure that pre-cast valve chamber sections are sealed as per the contract.
WM 3.14		Ensure that valve restraints are in place before pressure testing is conducted.
WM 3.15		Valve tied down before pressure testing. Make sure tracer wire is brought up to chamber.



**Watermains – Task WM 4****Hydrant Installation**

Task #	✓	Activity
<b>WM 4.1 M</b>		<b>Check all hydrants to verify that they are supplied from the approved list.</b>
WM 4.2		Check that the bedding for the hydrants is in accordance with the contract documents.
<b>WM 4.3 M</b>		<b>Check that hydrants are placed to the depth and location specified in the contract.</b>
WM 4.4		Check that hydrants are plumb. Ensure that the larger outlet nozzle is facing the roadway.
<b>WM 4.5 M</b>		<b>Check that the breakaway flange and coupling are at the proper elevation above the finished grade and that extensions are installed properly.</b>
WM 4.6		Check that the restraining rings and the concrete thrust block are installed at the boot of the hydrant.
WM 4.7		Check that the restraining rings and concrete block is installed under the isolating valve and that the valve box over the valve is plumb and does not rest on the valve, but on the concrete block.
WM 4.8		Check that the operating nut on the hydrant opens counter clockwise.
<b>WM 4.9 M</b>		<b>Check that the upper barrel of the hydrant has a factory coat of yellow paint for City hydrants, and red for private hydrants.</b>
WM 4.10		Check that anodes for cathodic protection and tracing wire are installed as per the contract.

**Watermains – Task WM 5****Water Service Installation**

Task #	✓	Activity
<b>WM 5.1 M</b>		<b>Check all delivered material to verify that it is being supplied as specified from the approved list.</b>
<b>WM 5.2 M</b>		<b>Check all pipes for correct type, size and class.</b>
WM 5.3		Check that specified bedding is used and places as per contract.
WM 5.4		Check that the depth of cover on all services is per the contract.
WM 5.5		Ensure that saddles are sized to provide even support around the full circumference of the pipe. Ensure that the recommended torque is applied.
WM 5.6		Check that all service connections are installed as per contract requirements.
WM 5.7		Check that a horizontal gooseneck is provided on specified services and is placed on the tightening side of the corporation stop.
WM 5.8		Check that the appropriate cutting tool and tapping machine are utilized. Check coupons for cutter performance.
WM 5.9		Check that curb stops are provided on all specified services at or near the property line and set to the correct elevation.
WM 5.10		Check that curb boxes and rods are installed plumb over the curb stops.
WM 5.11		Ensure that curb stop is properly supported.
WM 5.12		Ensure proper staggering between multiple services.
WM 5.13		Ensure that tracing wire is installed when required.
WM 5.14		Record swing ties to establish features at property line and complete water service card.
WM 5.15		Ensure water service card is completed.
WM 5.16		Ensure water service is disinfected if diameter is 100 millimetres or greater and results recorded in the inspectors daily report.
WM 5.17		Ensure that wet tap is cleaned with disinfectant to minimize contamination.

**Watermains – Task WM 6**

**Installation of By-pass Services**

Task #	✓	Activity
WM 6.1		Arrange a meeting with the contractor and City forces to coordinate the installation of by-pass services.
WM 6.2		Ensure that the backflow preventer and all by-pass hoses are installed and protected according to the contract.
WM 6.3		Provide daily monitoring of the temporary service installations and notify contractor of damages or leaks.

**Watermains – Task WM 7****Hydrostatic Testing**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>WM 7.1 M</b>		<b>Maintain presence on site for the duration of the test.</b>
<b>WM 7.2 M</b>		<b>The watermain section to be tested shall be isolated by the contractor with the proper backflow prevention device which is to remain in place at all times.</b>
WM 7.3		Ensure adequate cover is provided over the watermain prior to testing.
WM 7.4		The watermain shall be filled by the contractor and flushed to remove any debris.
WM 7.5		Once the watermain has been properly flushed, check that the contractor increases the pressure to the testing level and air is expelled through hydrants and high points.
WM 7.6		Record the segment length and ensure that the testing pressure is maintained for the time, and within the specified pressure loss.
WM 7.7		Ensure that a leakage test is conducted during the first hour of the hydrostatic test, and that the volume of make-up water is within the tolerances specified in the contract.

### Watermains – Task WM 8

#### Chlorination and Disinfection Testing

Task #	✓	Activity
WM 8.1		Once the watermain has been successfully tested for leakage, co-ordinate chlorination/disinfection test with the contractor.
WM 8.2		Ensure that the chlorination/disinfection plan has been prepared and submitted by the contractor and approved by the contract administrator. Inspector to receive a copy.
<b>WM 8.3 M</b>		<b>Ensure that no compressed air testing is permitted.</b>
<b>WM 8.4 M</b>		<b>Ensure only Toronto Water operates the live system and not the contractor.</b>
<b>WM 8.5 M</b>		<b>Ensure that disinfection tests are successfully performed by the contractor.</b>
WM 8.6		Ensure that the contractor provides proper access to nozzles for disinfection.
<b>WM 8.7 M</b>		<b>Record disinfection test information in daily report.</b>

**Watermains – Task WM 9****Connections to Existing Watermains**

Task #	✓	Activity
<b>WM 9.1 M</b>		<b>Ensure that the contractor does not operate in-service valves and hydrants.</b>
WM 9.2		Ensure that the contractor undertakes the proper swabbing to disinfect short filler lengths of pipe when making connections.

**Watermains – Task WM 10**

**Water Permit**

Task #	✓	Activity
WM 10.1		Ensure that the contractor has a hydrant permit to take water for capital works projects such as for by-passes.

## Trenchless Rehabilitation – Task TRH 1

## Full Length Cured-in-Place Pipe (CIPP)

Task #	✓	Activity
TRH 1.1		Check all delivered material is supplied as specified.
TRH 1.2		Ensure pre-cleaning, post-cleaning, and post-lining CCTV inspection are conducted as specified.
<b>TRH 1.3 M</b>		<b>Check liner material such as felt type, size and thickness are as specified.</b>
TRH 1.4		Check resin and catalyst are as specified.
TRH 1.5		Check liner is free of debris such as cuts and tears.
TRH 1.6		Confirm specialized application equipment and processes are implemented as required.
TRH 1.7		Ensure wet out forms are completed by contractor.
TRH 1.8		Ensure inversion forms are completed by contractor.
TRH 1.9		Ensure installation is conducted as specified in contract documents.
TRH 1.10		Ensure curing forms are completed by contractor.
TRH 1.11		Ensure cooling down steps is observed.
TRH 1.12		Check lateral reinstatements are conducted.
TRH 1.13		Ensure lateral statement forms are completed by contractor.
<b>TRH 1.14 M</b>		<b>Ensure liner testing for physical and chemical properties is conducted.</b>
TRH 1.15		Check damaged areas and defects are repaired.
TRH 1.16		Check liner sealing and finishing to face of maintenance holes is as specified.
TRH 1.17		Confirm active infiltration is stopped before lining begins.
<b>TRH 1.18 M</b>		<b>Ensure post inspection of any defects in the liner if required.</b>
TRH 1.19		Check liner is free of defects such as cuts and tears before installation.
TRH 1.20		Monitor by pass, as specified.
TRH 1.21		Ensure public is notified in advance.



**Trenchless Replacement – Task TRP 1****Horizontal Directional Drilling (HDD)**

<b>Task #</b>	<b>✓</b>	<b>Activity</b>
<b>TRP 1.1 M</b>		<b>Check all delivered material is supplied.</b>
<b>TRP 1.2 M</b>		<b>Check pipe material, size and class.</b>
TRP 1.3		Confirm rig classification and capabilities.
<b>TRP 1.4 M</b>		<b>Check all plans, sub-surface investigation and utility surveys, geotechnical reports and design calculations.</b>
TRP 1.5		Ensure butt fusion and testing of pipe segments is conducted.
TRP 1.6		Ensure bore tracking equipment, walkover tracking systems, and non-walkover tracking systems are utilized.
TRP 1.7		Check drilling fluids and additives, delivery, recovery, containment systems, and storage.
<b>TRP 1.8 M</b>		<b>Check alignment and grade.</b>
TRP 1.9		Confirm preparatory work for drilling pilot holes, reaming pilot holes, pulling to cleaning pipe ends, and handling and disposal of drilling mud and cuttings.
TRP 1.10		Check post inspection of pipe for any defects.
<b>TRP 1.11 M</b>		<b>Ensure testing and acceptance.</b>
<b>TRP 1.12 M</b>		<b>Ensure all applicable forms and as-constructed drawings are provided by contractor to the City.</b>



## Utilities – Task UT 1

## Utility Construction

Task #	✓	Activity
UT 1.1		Check that a project information sign is placed at each end of the project. The sign should be visible to passing vehicular and pedestrian traffic, including the name of the utility company, the name of the contractor —where applicable—and a contact number.
UT 1.2		Ensure that pedestrian and vehicular access is being maintained in an efficient manner, unless restrictions have been approved by the Transportation Services division or the affected resident(s) or both.
UT 1.3		Check site for general cleanliness and housekeeping.
UT 1.4		Check that a copy of the permit is on-site. The expiry date on the permit should be checked to ensure that it is still valid and that the work is being carried out in the location noted on the permit.
UT 1.5		Check that a copy of the drawing is on-site, where applicable.
UT 1.6		Ensure that utility infrastructure is being installed in the correct alignment. The alignment should be as indicated on the drawing or sketch on the permit.
UT 1.7		Check that traffic control is in place and that traffic control plan is available on site.
UT 1.8		Check that pay-duty police are on-site, where applicable.
UT 1.9		Check that any adjacent utility or structure is not affected or undermined by the excavation.
UT 1.10		Ensure that utility infrastructure is being installed at the correct depth. The depth should be as indicated on the drawing or sketch on the permit. The inspector should measure the depth and note that depth of cover is as per the permit on the <i>Utility Construction Site Visit Report</i> (see Appendix A, <i>Forms</i> ).
UT 1.11		Ensure that the work is being carried out in conformance with the conditions and work restrictions listed on the front or back of the permit.
UT 1.12		Check that any restoration being performed by the utility company meets City's standards.
UT 1.13		Ensure that any photographs that are taken are noted on the <i>Utility Construction Site Visit Report</i> .
<b>UT 1.14 M</b>		<b>Complete the <i>Utility Construction Site Visit Report</i> and ensure that all major conditions noted on the permit are addressed on the report and inspections conducted according to the development and third party / utility inspection duration table.</b>

## Third Party and Development – Task TPD 1

## General Inspection

Task #	✓	Activity
Guidelines		<p>Inspector to ensure all permit and any other requirements under agreement are followed and that all standards and specifications are adhered to by the proponent or permit holder and they ensure compliance by their contractors. The inspector is to assist with coordination issues, interpretation of permit and specification requirement but to refer any questions regarding discrepancies in these documents to the case manager for final resolution.</p> <p>All new operations are to be reviewed and discussed prior to the work commencing with the proponent or their consultant. In addition, these operations are to be observed at an early stage and with comments on any concerns regarding non-compliance to permits provided in writing and in a timely fashion to mitigate deficiencies and rework. The case manager is to be copied on unresolved issues of non-compliance and must approve all field changes.</p> <p>The inspector is to be proactive, and not accept responsibility of the proponent, consultant or contractor. They are to minimize direct discussions with the contractor. Document performance problems and relay this information to case manager.</p> <p>Use inspection task lists in the <i>Field Services Manual</i> (see Appendix B, <i>Inspection Tasks</i>), especially milestone tasks, as a guideline when performing inspections.</p>
TPD 1.1		<p><i>Pre-construction and progress meetings</i></p> <p>It is the responsibility of the proponent to notify the City's inspector to attend the meeting for issues that are related to the City's infrastructure. The inspector is responsible for informing the case manager about any site issues that will be discussed at the site meeting which may require the case manager's direct attendance. If the permit mentions that the specifications and the <i>Field Services Manual</i> are to be followed, the inspector is to follow-up to ensure the proponent and their consultant has a copy. Ensure that any submittal requirements and other important issues are reviewed at meetings.</p>

## Third Party and Development – Task TPD 1

## General Inspection (continued)

Task #	✓	Activity
TPD 1.2		<p><i>Field changes</i></p> <p>Field changes due to any conflict on site are to be proposed by the proponent's consultant, and not the contractor. Contractors should be directed to contact the proponent and their consultants, and not the City's site inspector and the case manager. However, the inspector is to investigate and report to the case manager on the validity of the proposed change.</p>
TPD 1.3		<p><i>Installation of sewers and watermains</i></p> <p>Spot check for routine installation. Check that proponent or their consultant or both, are providing inspection, survey layout, material testing and documentation in accordance with the terms of the permit, specifications and any agreements.</p> <p>Sewers; inspection is required of the bedding of pressure pipes and sewers with water tight joints to ensure compliance with MOECC Procedure F-6-1 <i>Procedures to Govern the Separation of Sewers and Watermains</i>. Inspection also required to ensure backfilling is completed according to the specifications and agreement.</p> <p>Refer to and spot check other milestone inspection tasks in the <i>Field Services Manual</i> (see Appendix B, <i>Inspection Tasks</i>) pertaining to watermains and sewers.</p>
TPD 1.4		<p><i>Connection of new mains to existing mains</i></p> <p>Near the end of the operation or before backfilling, ensure full-time attendance by the consultant and as-built information is recorded and submitted. Discuss connection work prior to the work being done with all parties involved. Ensure a photograph is taken and submitted of all connections.</p>
TPD 1.5		<p><i>Disinfection of watermain</i></p> <p>Ensure proper documentation is completed and submitted, attendance by proponent or their consultant prior to work commencing, and that they are on site to ensure compliance with the disinfection procedure and chain of custody for sampling. Assist and provide guidance to proponent to help ensure that the procedure is followed correctly.</p> <p>Coordinate valve turn-on and turn-off. Report any unresolved problems to case manager.</p>

## Third Party and Development – Task TPD 1

## General Inspection (continued)

Task #	✓	Activity
TPD 1.5 continued		<p>Note: Toronto Water has requested Third Party &amp; Utility Review to be responsible to review and accept the disinfection test forms prior to submission to Toronto Water.</p> <p>a) The disinfection of watermain systems shall conform to the City's standard specification TS 7.30, and is available at:  <a href="http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=ebd73d3085131410VgnVCM10000071d60f89RCRD&amp;vgnextchannel=9deeabbf06721410VgnVCM10000071d60f89RCRD">http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=ebd73d3085131410VgnVCM10000071d60f89RCRD&amp;vgnextchannel=9deeabbf06721410VgnVCM10000071d60f89RCRD</a>  The watermain <i>Disinfection Test Form</i> is available at the same abovementioned link, and is associated with the City's standard specification TS 7.30.</p> <p>b) Prior to performing watermain disinfection, the proponent's is responsible to complete the <i>Disinfection Criteria</i> section of the <i>Disinfection Test Form</i>, including the <i>Disinfection Site Map (Disinfection Proposal)</i>.</p> <p>c) The proponent's consultant shall state in the <i>Disinfection Proposal</i> that the disinfection criteria and tests conform to the City's standard specification TS 7.30.</p> <p>d) The <i>Disinfection Proposal</i> shall be signed and dated by the proponent's contractor, and the proponent's consultant as <i>Contract Administrator</i>.</p> <p>e) The proponent shall submit completed <i>Disinfection Criteria</i> section of the <i>Disinfection Test Form</i>, in electronic (PDF) format, to the City's case manager of the project, for City's review and acceptance.</p> <p>f) The proponent shall not proceed with watermain disinfection until he/she receives City's acceptance from the City's case manager.</p> <p>g) Prior to proceeding with watermain disinfection, the proponent is responsible to provide appropriate time notice to the City's Site Inspector of the scheduled disinfection to allow the City's Site Inspector to distribute the <i>Disinfection</i>.</p>
TPD 1.6		Spot check construction of above-ground works such as roads, curbs, sidewalks, hard boulevard works, tree pits, pavers, and

		<p>any other streetscape features and construction of soft boulevard works such as street tree planting, sodding, and so forth for compliance with specifications, permits and agreements.</p> <p>Spot check formwork and other preparation work to ensure survey layout used. Check high, low points and cross fall for compliance with specifications and approved plans.</p> <p>Review testing requirements and areas of past problems or concerns with proponent and consultant prior to work commencing. Follow up with spot checks after observing and confirming compliance as early as possible in the operation.</p> <p>Ensure that proponent or their consultant has checked the pedestrian crossings ramps slopes to prior to pouring of concrete to ensure that they meet the City's standards and ensuring that sidewalk identification stamps and raised tactile plates are placed at ramps at all pedestrian crossings to meet the new Ontario Regulation 191/11 <i>Integrated Accessibility Standards</i>.</p> <p>Refer to Appendix B, <i>Inspection Tasks</i> of the <i>Field Services Manual</i> and spot check on any other milestone tasks with regards to road, curb and sidewalk construction, and so forth.</p>
TPD 1.7		<p><i>Connection of new roads to existing roads</i></p> <p>Spot check during construction and review with proponent prior to final paving so that any deficiencies may be corrected prior to completion of the final paving.</p>
TPD 1.8		<p><i>Acceptance and assumption inspections</i></p> <p>Duration of inspection with proponent, permit holder, consultant, case manager, Transportation Services and Toronto Water representatives as required.</p>
TPD 1.9		<p>Emergencies—breaks, spills, damage to City infrastructure, and so forth.</p> <p>Ensure consultant is notified and has a representative on site to document and photograph emergencies. Operating divisions and utility companies are to be notified along with notifying the case manager.</p> <p>Once they are on site, they are to stay until relieved by representatives from the affected operating division with permission from their supervisor.</p>
TPD 1.10		<p>Ensure that any photographs taken, verbal discussions held and e-mail messages sent are noted on the <i>Utility Construction Site Visit Report</i>.</p>

## TTC Projects – Task TTC 1

## Track Allowance

Task #	✓	Activity
TTC 1.1		Ensure notifications have been distributed and perimeter information signs have been placed as required
TTC 1.2		Review specifications and all contract documents and confirm that survey layout has been completed
<b>TTC 1.3 M</b>		<b>Inspector, contract administrator along with representatives from TTC are to walk site before and immediately after closure is in place to review limits of work and mark out with contractor and TTC representatives as required, such as civil, electrical items and other items. Mark out limits where changes to thickness and elevations of concrete is required due to use of wooden ties for special work. Document results.</b>
<b>TTC 1.4 M</b>		<b>Ensure traffic control is as per contract and approved traffic control plans and document in daily reports and photograph all the closure points and approaches to show signage placed. Ensure pedestrian barricades have been set up around perimeter as per contract documents.</b>
TTC 1.5		Ensure contractor has signed off with TTC that overhead power lines have been de-energized and limits known prior to work commencing. Copies of sign off form to be placed in site office.
<b>TTC 1.6 M</b>		<b>Ensure and document that all utility stake outs are complete, up to date and written copies provided prior to excavation commencing.</b>
<b>TTC 1.7 M</b>		<b>Check and document depth of excavation and type of material encountered.</b>
<b>TTC 1.8 M</b>		<b>Ensure and document that contractor is undertaking vibration monitoring during TTC track removal as per contract documents.</b>
TTC 1.9		Check formwork is installed as per plans and specifications prior to concrete being placed especially the formwork for the margins.
<b>TTC 1.10 M</b>		<b>Ensure all conduits and drains pipes are installed prior to placement of each lift of concrete being placed and document locations and quantities for as-constructed drawings.</b>
TTC 1.11		Refer to task manual for work items involving excavation and placement of granular and concrete.
TTC 1.12		Ensure that the vibrating screed with correct profile and hand vibrators are used when placing concrete.



### TTC Projects – Task TTC 1

#### Track Allowance (continued)

Task #	✓	Activity
TTC 1.13		Check template used for rail groove in concrete TTC track allowance meets specifications.
TTC 1.14		Check and ensure finished profile of surface concrete between rails meets specifications.
TTC 1.15		Ensure joints are placed in concrete and that bond breaker and curing compound is placed as per specifications.
TTC 1.16 M		<b>Compare the actual concrete used with the theoretical concrete required, document and adjust payment as per contract and specifications.</b>
TTC 1.17 M		<b>Observe, document and ensure compliance with contract documents all material testing performed on site.</b>
TTC 1.18 M		<b>Check to ensure that approved concrete mix design is used including fibre reinforced concrete.</b>

## Appendix C – Materials Testing Protocol

**Note: Contract Administrator must have a current copy of the Material Testing Request for Quotation, obtainable from ProjectWise.**

### General Administration and Material Management Duties for Inspector, QA consultants and Project Lead/Contract Administrator

On-site Visual Inspection and Other Actions by Inspector	Field QA Test and Other Actions	Laboratory QA Test and Other Actions
1) Inspector's Administration and Material Inspection Duties on Site:	1) QA Consultant's Testing and Reporting Duties on Site, (or as mentioned in QA Consultant's Contract Documents):	1) QA Consultant's Administration, Testing and Reporting Duties, (or as mentioned in QA Consultant's Contract Documents):
1.1) Visually inspect the quality of materials delivered to site and check the quality of work in preparing the materials	1.1) Report attendance to Inspector upon arrival on site	1.1) QA consultant review contractor's Form A or Form B concrete mix designs for all concrete types specified in contract with City Project Lead/Contract Administrator
1.2) Order field testing from QA consultant according to the minimum material testing frequencies or as required	1.2) Perform field tests and prepare samples as directed by Inspector	1.2) QA consultant review contractor's hot mix asphalt mix designs for all hot mix asphalt types specified in contract with City Project Lead/Contract Administrator
1.3) Collect concrete, hot mix asphalt, aggregates and other materials delivery tickets from truck drivers and record where the materials are placed	1.3) Based on the field test results, advise Inspector if the concrete, hot mix asphalt, aggregates and other materials meet contract specification or not	1.3) QA consultant review contractor's aggregate (crushed limestone and recycled concrete) QC data with Project Lead/Contract Administrator to check if the QC data meet with specification
1.4) Document field observations, visual inspection findings and record field test results in Inspector's Daily Field Report or other field records	1.4) Submit preliminary field test results on site in writing to Inspector immediately after testing	1.4) City's QA consultant and City Project Engineer/Manager request changes to concrete and HM asphalt mix designs and aggregate production to meet contract requirement from material suppliers if necessary
1.5) Inform the general contractor if the materials delivered to site have failed to meet contract specification and request the general contractor and material suppliers to rectify the problems	1.5) Submit final field test results to Project Lead/Contract Administrator in writing within 7 working days of each field test	1.5) Submit all laboratory test results in writing to Project Lead/Contract Administrator within 7 working days of each laboratory test
1.6) Recommend rejecting the material, including the entire truck load of the material, with no payment to the rejected		1.6) When applicable, QA consultant compile all field and laboratory test results of all the materials tested in the contract, arrange them

On-site Visual Inspection and Other Actions by Inspector	Field QA Test and Other Actions	Laboratory QA Test and Other Actions
material to the general contractor if field test results show the materials have failed to meet specification		according to construction locations (station numbers) and prepare a QA report summarizing the quality of all materials used, the in-situ densities and core thicknesses achieved in the contract
1.7) Recommend payment adjustment to Project Lead/Contract Administrator if deficiencies on volume, weight and thickness occurred		
1.8) If the failed materials have been placed before remedial actions can take effect, identify and document where the failed materials were placed		
1.9) Instruct the general contractor to remove the areas where defective materials were placed		
1.10) Record observation and report in writing to Project Lead/Contract Administrator on whether corrective actions to defective materials had taken place or not		
1.11) Project Lead/Contract Administrator and Inspector follow up the defective material issues with general contractor and material suppliers		
1.12) Based on the field and laboratory test results, Inspector and Project Lead/Contract Administrator instruct the general contractor to perform corrective actions. Apply price adjustment to defective materials/works according to contract specification where warranted		
2) Monitor the work performed by QA consultants:		
2.1) Record attendance of QA consultants (time arrived and time left the site)		

<b>On-site Visual Inspection and Other Actions by Inspector</b>	<b>Field QA Test and Other Actions</b>	<b>Laboratory QA Test and Other Actions</b>
2.2) Document what work (sampling, testing and inspection) QA consultants have performed on site		
2.3) Make sure QA consultants submit their preliminary field test reports to Inspector after finishing testing		
2.4) Check if QA consultants are complying with industry standards and specifications in testing and sampling materials		
2.5) Reject test results or samples that had failed to meet standards and specifications and order retest and re-sampling if necessary		
2.6) Check if QA consultants are certified by CCIL / CSA or other equivalent testing regulating bodies and are knowledgeable in testing and sampling construction materials		
2.7) Check if QA technicians are careful in testing, preparing samples and storing samples on site		
2.8) Inspector and Project Lead/Contract Administrator follow up performance deficiencies with QA consultant's project lead if necessary		

### Ready Mixed Concrete

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Document if concrete truck drivers are adding water, superplasticizer or air entrainment agent to the load on site without prior authorization from the general contractor and Project Lead/Contract Administrator	Typically the first load of the day and every second load until consistency is attained. Random checking thereafter	1) Perform air entrainment tests	Refer to TS 1350 Table B: Frequency of Field Sampling and Testing of Concrete or Table C: Small quantity lots frequency of field sampling and testing of concrete	1) Trial batching at concrete supply plant, conduct air and slump tests on site, perform 7-day and other strength compressive strength tests according to the mix types 30 working days prior to placing concrete	One trial batch per concrete mix design per contract, or as required
2) Visually check the plasticity of fresh concrete at point of discharge	Typically the first load of the day and every second load until consistency is attained. Random checking thereafter	2) Perform slump tests	Refer to TS 1350 Table B: Frequency of Field Sampling and Testing of Concrete or Table C: Small quantity lots frequency of field sampling and testing of concrete	2) Perform 24-hour, 7-day and 28-day compressive strength tests, or other strength tests for normal and early strength concrete as specified in contract	All samples taken
3) Order on-site slump tests, air tests and concrete cylinder sampling from City's QA consultant in accordance with the minimum testing frequencies or as required	Refer to QA minimum testing frequencies	3) Cast concrete cylinder samples for laboratory compressive strength tests	Refer to TS 1350 Table B: Frequency of Field Sampling and Testing of Concrete or Table C: Small quantity lots frequency of field sampling and testing of concrete	3) Determine the unit weight of concrete sample	One test per mix design per contract

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
4) Collect concrete delivery tickets, review and document details of tickets	See below	4) Record in all test reports the air temperature of the site during testing	Every test	4) Review concrete mix design prepared by others to verify compliance with City specifications and provide comments. Confirm if concrete meets contract specifications and mix design properties.	As directed by City Project Manager.
4.1) Check the delivery time of the load (time when the concrete was batched to the time the concrete was unloaded) if it falls to meet the TS 1350	Typically the first load of the day and every second load until consistency is attained. Random checking thereafter	5) Record temperature of plastic concrete at point of discharge	Every air and slump test and every time concrete cylinders are casted	5) Field air entrainment, slump and temperature tests on fresh concrete as per CSA A23.2-4C, CSA A23.2-5C and CSA A23.2-17C. Confirm concrete performance properties.	TS 1350 Table B & C, based on quantity.
4.2) Check if the load is produced from concrete plant(s) that was specified in the contract, or the plants were agreed upon in the pre-construction meeting or in any pre-concrete placement meeting	Typically the first load of the day and every second load until consistency is attained. Random checking thereafter	6) Determine thickness of concrete road bases, sidewalks or other structures by coring if the slab/structure is paid by area or length in contract	Every 60 m lineal length of structure	6) Casting of concrete cylinder for compressive tests. Confirm concrete performance properties.	TS 1350 Table B & C, based on quantity.

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
4.3) Verify and document the actual volume of each pour and compare with the theoretical volume if the work is paid by volume	Random check all areas where concrete is placed	7) Conduct concrete in-situ properties and quality assurance check by coring samples on site	As directed by Inspector and/or Project Engineer / Manager	7) Compressive strength test of 150mm x 300mm or 150mm x 200mm cylinder. Confirm concrete performance properties.	TS 1350 Table B & C, based on quantity.
4.4) Check and Verify the thickness of concrete structure if the concrete is paid by area or length in contract	Random check all areas where concrete is placed			8) Compressive strength test for High-Strength Concrete as per CSA A23.1. Confirm concrete performance properties.	TS 1350 Table B & C, based on quantity.
5) Check the conditions of the granular base or subgrade before concrete is discharged	See below			9) Mortar test as per ASTM C780. Confirm concrete performance properties.	As directed by City Project Manager.
5.1) Granular Base / Subgrade - Check and document the state of compaction of the granular base (if any) and subgrade - Recommend the general contractor to recompact granular base / subgrade where necessary - Request QA consultant to perform compaction test if necessary - Check and document the moisture condition of the granular base (if any) and subgrade - Recommend wetting the granular base / subgrade to the general contractor if subgrade plastic sheeting is not specified to be used in contract	Random check all location where fresh concrete is discharged to			10) Shrinkage test, 7th day and 28th day as per ASTM C157M. Verify concrete performance requirements.	As directed by City Project Manager.

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
6) Check and document the concrete protection and curing measures applied to fresh concrete on site	Random check all concrete structures			11) On site concrete hammer test for onsite strength test. Verify concrete performance requirements.	As directed by City Project Manager.
6.1) Check if the protections to wet concrete against adverse weather conditions such as wind, precipitation and extreme temperatures are adequate or not	Random check all structures where concrete is placed			12) Air void system test in hardened concrete as per ASTM C457. Verify concrete performance requirements.	As directed by City Project Manager.
6.2) Check if curing compounds or other curing materials / measures are applied to fresh concrete on site	Random check all structures where concrete is placed			13) Chloride ion penetrability test as per ASTM C1202. Verify chloride penetration resistance of concrete.	2 tests per pour per structural element.
7) Check and document if vibration is adequately applied to fill voids and hard-to-reach areas	Random check all structures where concrete is placed				
7.1) Ensure the proper size and type of vibrators are used	Random check all structures where concrete is placed				
7.2) Avoid under or over vibration	Random check all structures where concrete is placed				
8) Check and document deficiencies found during finishing of fresh concrete	See below				
8.1) Check if excessive handwork is applied to fresh concrete	Random check all areas where				



On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
	concrete is placed				
8.2) Check if water is added in finishing the concrete	Random check all areas where concrete is placed				
8.3) Check if areas with stone segregation are found on concrete surface	Random check all areas where concrete is placed				
8.4) Check if hot weather concrete protection is adequate or not	Random check all areas where concrete is placed				
8.5) Check cold weather concrete protection is adequate or not	Random check all areas where concrete is placed				
8.6) Check if barricades are put in place to protect wet concrete from pedestrians and/or vehicular traffic	Random check all areas where concrete is placed				
8.7) Check if depressions and bumps are found on concrete surface	Random check all areas where concrete is placed				
8.8) Check if sidewalks or other structures are constructed with the proper gradients	Random check all areas where concrete is placed				
8.9) Check if spalling is found on concrete surfaces and at expansion joint cuts	Random check all areas where concrete is placed				
8.10) Check if honey combs are developing on finished concrete surface	Random check all areas where concrete is placed				
8.11) Check if cracks are developing on finished concrete surface	Random check all areas where concrete is placed				
9) Monitor the work performed by Field QA testing technicians	All site visits				
9.1) Check and document if cylinders are stored in an acceptable curing box or not	All samples taken until consistency is attained. Random				

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
	checking thereafter.				
9.2) Check and document if the curing box is placed at a secured location or not	All samples taken until consistency is attained. Random checking thereafter.				
9.3) Check if concrete cylinders are delivered to testing laboratory in accordance with the time limits or not (within a maximum of 76 hours for 35 MPa or less concrete, or within 28 hours for 35 MPa or higher concrete)	All samples taken until consistency is attained. Random checking thereafter.				

**Hot/Warm Mixed Asphalt**

<b>On-site Visual Inspection, Other Actions by Inspector, and Rationale</b>	<b>Frequency of Visual Inspection</b>	<b>Field QA Test and Other Actions</b>	<b>Minimum Field Testing Frequency</b>	<b>Laboratory QA Test and Other Actions</b>	<b>Minimum Laboratory Testing Frequency</b>
1) Check temperature of asphalt mix at point of discharge (at least 131-137°C for PG 58-28 at point of discharge) and air temperature of pavement for hot/warm mix asphalt placing (for binder at least 2°C and for surface at least 7°C)	Typically the first load of the day and every second load until consistency is attained. Random checking thereafter.	1) Perform compaction tests on hot/warm mix asphalt mat using nuclear density gauge	Conduct randomly at a minimum frequency of every 100 m per lane or 150 m <sup>2</sup> per area	1) Trial batching at hot/warm mix asphalt plant and conduct full Superpave mix compliance asphalt test (Extraction and gradation, AC content and properties tests) on trial batch 7 working days before asphalt placement	One trial batch per hot/warm mix asphalt mix design
1.1) Check substrate temperature to ensure that it is not frozen and that it is sufficiently warm.	Daily during cold weather months.				
2) Collect hot/warm mix asphalt delivery tickets, review and document details of tickets	All deliveries to site	2) Prepare plate samples of hot/warm mix asphalt on site for Superpave extraction and gradation tests and properties tests for each type of mix (reject samples prepared by shovels)	See below:	2) Extraction and gradation testing and Fast Track Reporting (for large quantity paving jobs like arterial road paving):	First production load from the asphalt plant on each paving day.

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
3) Verify the weight of the loads delivered to site	As per City of Toronto Weight Verification Protocol	2.1) Large quantity paving job (for example, arterial road paving)	First production load from the asphalt plant on each paving day, every 250 Mg (tonne) thereafter	2.1) Conduct hot/warm mix asphalt extraction and gradation (EandG) tests on the first production load sample from asphalt plant, report (fax or phone) the EandG results to Project Lead/Contract Administrator and asphalt plant as soon as the test results are ready. Advise changes to production if necessary	Every 250 Mg (tonne)
4) Check and document the conditions of the hot/warm mixed asphalt mat	See below	2.2) Small quantity paving jobs	Typically the first load of the day, every 250 Mg (tonne). Minimum 1 sample in the morning and 1 sample in the afternoon	3) EandG Testing and Regular Reporting (7-working-day reporting):	
4.1) Check if there are areas with stone segregation on the mat and at longitudinal joints	Random check all locations where hot/warm mix asphalt is placed	3) Visually check the nominal size of the aggregates used in the mix if they are complying with specification or not	All test samples taken on site	3.1) Conduct hot/warm mix asphalt extraction and gradation (EandG) tests on the samples taken from site	All samples from site

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
4.2) Check if all the stones in the mat are adequately coated with asphalt or not	Random check all locations where hot/warm mix asphalt is placed	4) Visually check the if type of aggregates used in the mix are complying with specification or not	All test samples taken on site	4) Conduct hot/warm mix asphalt full Superpave mix compliance asphalt tests (Extraction and Gradation, AC content and properties tests)	Every 500 Mg (tonne) after the first load
4.3) Check if there are areas with flushing / bleeding on the mat, especially on hot days	Random check all locations where hot/warm mix asphalt is placed	5) Determine asphalt mat thickness by coring if the asphalt is paid by area or length in contract	Every 60 m length per traveling lane	5) Conduct AC recovered penetration test when RAP (Reclaimed Asphalt Pavement) is used in the mix	One test of each day of paving
4.4) Check and verify the thickness of asphalt mat if the asphalt is paid by area or length in contract	Every 50 m length of asphalt mat	6) Conduct hot/warm mix asphalt in-situ properties and quality assurance check by coring samples on site	As directed by Inspector and/or Project Engineer / Manager	6) Conduct specification conformance tests on Performance Graded Asphalt Cement (PGAC) if required	One test for each mix design
4.5) Check if depressions and bumps are found on the surface of the mat	Random check all locations where hot /warm mix asphalt is placed	7) Record in test report the air temperature of the site during testing	Every test		
4.6) Check if roll marks and scratches are found on the surface of the mat	Random check all locations where hot/warm mix asphalt is placed	8) Record in test report the temperature of hot/warm mix asphalt during sampling	Every test		
4.7) Check if oil spills are found on the surface of the mat	Random check all locations where hot/warm mix asphalt is placed				

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
4.8) Check if opened and uneven construction joints are found on the surface of the mat	Random check all locations where hot/warm mix asphalt is placed				
4.9) Check if contractor opens the mat to traffic when the mat is still warm	Random check all locations where hot/warm mix asphalt is placed				
5) Check if contractor applies tack coat to old pavement, vertical face of curbs, cold pavement joints and structures as specified in contract and specification. Also check the rate of application and over-spraying	Random check all locations where hot/warm mix asphalt is placed				
6) Monitor the work performed by Field QA testing technicians	All site visits				

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
				<p>7) Visit asphalt plant, retrieve asphalt cement samples from feeding tank, prior to commencement of contract work.</p> <p>To collect sample to verify high/low temperature verification and check if excessive amount of used engine oil is present.</p> <p>Report laboratory test results, via email, to the Project Manager within three (3) days after sampling.</p>	2-litres split between 2-one litre containers for each PGAC grade per contract.
				<p>8) Perform PGAC verification as per AASHTO R29 or ASTM D7643.</p> <p>Verify high/low temperature verification.</p> <p>Report laboratory test results, via email, to the Project Manager within three (3) days after sampling.</p>	One for each PGAC grade per contract.

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
				<p>9) Determination of the ash content of asphalt cement as per LS 227.</p> <p>Strong correlation between ash content and excessive use of used engine oil.</p> <p>Report laboratory test results, via email, to the Project Manager within three (3) days after sampling.</p>	One for each PGAC grade per contract.



On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
				<p>10) Determination of asphalt cement's resistance to ductile failure using double edge notched tension test (DENT) as per LS 299.</p> <p>Measures asphalt cement's elasticity, i.e. ability to stretch and resist cracking. Checks for excessive use of used engine oil.</p> <p>Report laboratory test results, via email, to the Project Manager within three (3) days after sampling.</p>	All grades except PGAC 58-28. One per contract.

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
				<p>11) Determination of performance grade of physically aged asphalt cement using extended bending beam rheometer (BBR) method as per LS 308.</p> <p>Found best to be able to predict pavement cracking at cold temperatures. Checks for excessive use of used engine oil.</p> <p>Report laboratory test results, via email, to the Project Manager within three (3) days after sampling.</p>	All grades except PGAC 58-28. One per contract.

On-site Visual Inspection, Other Actions by Inspector, and Rationale	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
				<p>12) Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR) as per AASHTO-T350.</p> <p>Determine the high temperature rutting properties and elastic response of the binder. Checks for excessive use of used engine oil.</p> <p>Report laboratory test results, via email, to the Project Manager within three (3) days after sampling.</p>	All grades except PGAC 58-28. One per contract.

**Superpave and Marshall Mix Compliance**

<b>Laboratory QA Test and Other Actions</b>	<b>Minimum Laboratory Testing Frequency</b>
1) Review asphalt job mix formula prepared by others to verify compliance with City specifications and provide comments. Confirm if job mix formula meets Superpave Traffic Category and mix design properties.	One per Superpave or Marshall asphalt type.
2) Full Marshall compliance check (stability, flow and air voids) with 3 briquettes as per LS 263, LS 265, LS 266, LS 282, LS 292. Confirm if material properties meet Marshall specifications.	Every 500 tonnes after the first load.
3) Superpave mix design verification of raw materials as per LS 316. Raw material check before start of production.	Perform only if experiencing problem with aggregate. As needed basis.
4) Extraction and gradation compliance check of Marshall or Superpave asphalt sample (washed and unwashed). Includes cost of testing and reporting by telephone and email for unwashed sample within five (5) hours and for washed sample within six (6) hours of sampling. Check gradation % passing and asphalt cement %. Quick turnaround testing - same day.	Large quantity paving jobs; test the first production load from plant and one sample every 250 Mg. Small quantity paving jobs; typically first load of the day, every 250 Mg. Minimum one sample in morning and one sample in afternoon.
5) Extraction, gradation and mix properties on Superpave asphalt as per LS 262, LS 264, LS 266, LS 282, LS 313. Check air voids, voids in mineral aggregate (VMA), gradation % passing, asphalt cement %. Detailed report - 4-day turnaround.	Large quantity paving jobs; test the first production load from plant and one sample every 250 Mg. Small quantity paving jobs; typically first load of the day, every 250 Mg. Minimum one sample in morning and one sample in afternoon.
6) Tack coat testing. Tack coat to meet requirements for SS-1 in Table 1 of OPSS 1103.	One per contract.
7) Field compaction asphalt tests using a nuclear gauge densometer as per ASTM D2950M. Check minimum pavement compaction based on maximum relative density.	Conduct randomly every 100 m per lane or 150 m <sup>2</sup> per area. Conduct randomly at joints - recommended.
8) Resistance of compacted asphalt mixtures to moisture-induced damage (tensile strength ratio) as per AASHTO T283. Detect susceptibility to moisture damage of asphalt mixes.	One per contract.
9) Resistance to stripping of asphalt cement in bituminous mixture by Marshall immersion (quick visual strip test) as per LS 283. Check for moisture-induced stripping potential of asphalt cement in mixes.	One per contract.

**Recovered Asphalt Testing: ECS Business Improvement & Standards Unit (BIS) Study**

<b>Laboratory QA Test and Other Actions</b>	<b>Minimum Laboratory Testing Frequency</b>
1) PGAC extracted and recovered from the loose HMA samples taken during construction of the pavement or from samples saw cut from the finished pavement. Recovery of asphalt from	Locations and frequency to be determined by BIS unit. One test per contract. See TS 1101, Table 1, see Note 1, 2 and 3. Include items #3, 4, 5 and 6.

Rotavapor method in LS 284 and LS 200 as specified in TS 1101, Table 1, see Note 1, 2 and 3. Check if asphalt was overheated (burnt) during storage and excessive use of RAP.

### Granulars (Crushed Limestone and Recycled Concrete)

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) For RCM material, review contractor supplied test data to confirm material being delivered is under control.	Every load until consistency is attained. Random checking thereafter	1) Conduct compaction (including moisture content) tests using nuclear density gauge	All trench backfill, granular bases and subbases	1) Visit granular material supplier quarry/plant, retrieve granular samples. Confirm if aggregates meet contract specifications and gradation properties.	See Granular Sampling Frequency and Sample Size tables below.
2) Visually check for deleterious materials (1% max) and document findings. Determine if RAP is present if not allowed (Granular A RCM, for instance)	Every load until consistency is attained. Random checking thereafter	1.1) Sewer and Watermain trenches	Refer to TS 501.08 Construction Specification for Compaction	2) Review granular aggregate test data and results report prepared by others to verify compliance with City specifications and provide comments. Confirm if granular aggregates meet contract specifications and gradation properties.	As directed by Project Manager.
3) Visually check the percent crushed of aggregate delivered and document findings. If testing recycled concrete, include sulphate testing of sampled aggregate.	Every 250 Mg (tonne) per type of material	1.2) Granular bases for roads, curbs, sidewalks and other structures	Refer to TS 501.08 Construction Specification for Compaction	3) Sieve analysis on granular fill, bedding material, base courses and aggregates as per ASTM-C136, LS 601 and LS 602.	See Granular Sampling Frequency and Sample Size tables below.

4) Order QA gradation tests from QA consultants	Recommend minimum of 1 test completed per source of RCM per project or as per OPSS.MUNI 1010.07.03.01, whichever is greater.	2) Take samples from stockpiles on site for gradation tests	Refer to TS 1010 Material Specification for Aggregates – Base, Subbase, Select upgrade, and Backfill Material	4) Percentage volume of asphalt coated particles as per LS 621 and percent crushed particles analysis as per LS 607. Checking % of asphalt coated particles in supplied reclaimed asphalt pavement (RAP).	See Granular Sampling Frequency and Sample Size tables below.
5) Order physical property test of aggregates from QA consultants if necessary	All deliveries to site	3) Take samples from stockpiles on site for Proctor density tests	One sample per type of material per contract	5) Laboratory soil and aggregates density tests (standard) as per ASTM D698 and LS 706. Confirm laboratory compaction characteristics of soil and granular materials using standard effort.	See Granular Sampling Frequency and Sample Size tables below.
6) Collect aggregate delivery tickets, review and document details of tickets	As per City of Toronto Weight Verification Protocol	4) Determine granular base thickness by coring or digging test pits	Every 50 m length of base	6) Laboratory soil and aggregates density tests (modified) as per ASTM D1557 and LS 707. Confirm laboratory compaction characteristics of soil and granular materials using modified effort.	See Granular Sampling Frequency and Sample Size tables below.
7) Verify the weight of the loads delivered to site if the materials are paid by weight				7) Field compaction soil and aggregates tests using nuclear gauge as per ASTM D2922. Confirm field compaction requirements of earth and granular materials.	See Granular Sampling Frequency and Sample Size tables below.
8) Monitor the work performed by Field QA testing technicians	All site visits			8) Micro-deval abrasion coarse and fine aggregate loss as per	See Granular Sampling Frequency and

				LS 618 and LS 619. Detect changes in the properties of aggregate produced from an aggregate source.	Sample Size tables below.
				9) Petrographic analysis for coarse and fine aggregates as per LS 609 and LS 616. Confirm the quality of fine and coarse aggregates.	As directed by City Project Manager
				10) Determination of insoluble residue of carbonate aggregates as per LS 613. Confirm pavement frictional properties, carbonate aggregates that may polish excessively and become slippery.	As directed by City Project Manager
				11) Soundness of aggregates as per LS 606, and freezing and thawing of aggregates as per LS 614. Determine the resistance to disintegration of aggregates subject to weathering conditions.	As directed by City Project Manager
				12) Sulphate concentration test on reclaimed concrete material (RCM). Pricing to include field sampling, pick up, testing and reporting. Confirm the presence of gypsum e.g. drywall.	The sampling and testing frequency from the stockpile would commence with the first testing to be performed based on one test for every 1000 tonnes of production. Ten

					(10) samples/tests, based on one for every 1000 tonnes, are required to establish that material is considered to be under control meeting all specification requirements. The subsequence testing and sampling can be performed less frequently at one test for every 5000 tonnes.
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### Granular Sampling Frequency

Material	Frequency for Type 1 control chart (t)	Frequency for Type 2 control chart (2)
Granular A, M and S	2,500	5,000
Granular B and SSM	5,000	10,000
Granular O	2,000	4,000
50 mm Crushed Aggregate	5,000	10,000

### Granular Sample Size

Material	Minimum mass of individual field samples (kg)
Granular A, M and S	25
Granular B and SSM	50
Granular O	25
50 mm Crushed Aggregate	50

Note: Each sample container shall hold no more than 25 kg of material.



**Imported Earth or Growing Medium**

<b>On-site Visual Inspection and Other Actions by Inspector</b>	<b>Frequency of Visual Inspection</b>	<b>Field QA Test and Other Actions</b>	<b>Minimum Field Testing Frequency</b>	<b>Laboratory QA Test and Other Actions</b>	<b>Minimum Laboratory Testing Frequency</b>
1) Visually Check for deleterious materials and document findings	Every load until consistency is attained. Random checking thereafter.	1) Conduct compaction (including moisture content) tests using nuclear equipment	All trench backfill, and subgrade	1) Bulk chemical analysis of soil samples - Inorganics. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
2) Verify the weight of the loads delivered to site if the materials are paid by weight	As per City of Toronto Weight Verification Protocol	2) Sewer and Watermain trenches	One test per 0.3 m lift for each increment or fraction of 150 lineal meters of backfill	2) Bulk chemical analysis of soil samples - PHCs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
2.1) Collect earth delivery tickets, review and document details of tickets	All deliveries to site	3) Road or sidewalk subgrade	One test per lift for each increment or fraction of 500 square meters on each traveling lane	3) Bulk chemical analysis of soil samples - VOCs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
3) Monitor the work performed by Field QA testing technicians	All site visits	4) Take samples from stockpiles on site for soil classification and engineering properties tests	Every 250 Mg (tonne) per type of material, or as required	4) Bulk chemical analysis of soil samples - PAHs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				5) Bulk chemical analysis of soil samples - BTEX. Confirm site soil condition standard for	As directed by City Project Manager

				excess soil management.	
				6) Bulk chemical analysis of soil samples - PCBs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				7) Bulk chemical analysis of soil samples - OC Pesticides. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				8) O. Reg 347. analysis of soil samples - Inorganics. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				9) O. Reg 347. analysis of soil samples - VOCs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				10) O. Reg 347. analysis of soil samples - PAHs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				11) O. Reg 347. analysis of soil samples - BTEX.	As directed by City Project Manager

				Confirm site soil condition standard for excess soil management.	
				12) O. Reg 347. analysis of soil samples - PCBs. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				13) MECP guidelines for Soil, Groundwater and Sediment for Use Under Part XV.1 of the Environmental Protection Act, 2011 as per Tables 1, 2, and 3 Site Condition Standards. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager
				14) Geo-environmental water quality sampling, laboratory testing and reporting per Toronto Sewer By-law (Sanitary and Combined Sewers Discharge and Storm Water Discharge). Pricing to include sampling, pick up, testing and reporting. Confirm site soil condition standard for excess soil management.	As directed by City Project Manager

### Crack Filling Material

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Check the temperature of crack filling material on site	Every 4 hours of operation	1) Take samples on site for AC penetration tests	At commencement of contract, every 20,000 m to 25,000 m	1) Conduct AC penetration test	All samples taken
2) Monitor the work performed by Field QA testing technicians	All site visits	2) Inspect and verify all gauges on the melting pot	Every day when operation begins		

### Unshrinkable Fill

On-site Visual Inspection and Other Actions by Inspector	Frequency of Visual Inspection	Field QA Test and Other Actions	Minimum Field Testing Frequency	Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Ensure that vibrator is used as per specifications	At the start of every operation where unshrinkable fill is used	Test according to CSA A23.2	One set of two test cylinders, per supplier, per day.	As per CSA A23.2	Once per day when unshrinkable fill is used
2) Visually check to ensure that unshrinkable fill is not placed in direct contact gas mains or plastic pipe	At every crossing		One set of two test cylinders, per supplier, per day.	As per CSA A23.2	Once per contract or whenever supplier or mix design changes

### Pile Dynamic Analysis and Soil Bearing Capacity (Major Infrastructure)

Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Witness pile dynamic analysis test as conducted by the contractor as per ASTM D4945. Qualification of individual P.Eng or CET. Confirm that the bearing capacity of the driven pile casing meets the requirements of the structural design.	As directed by City Project Manager.
2) Review and interpret pile dynamic analysis test data and results (report) submitted by the Contractor. Qualification of individual P.Eng. Ensure that the interpretation of the bearing capacity derived from the dynamic load test is accurate and that the results meet the requirements of the structural design.	As directed by City Project Manager.

3) Witness Pile Static Axial Compression Load test as conducted by the Contractor as per ASTM D1143 and Pile Static Lateral Load test as conducted by the Contractor as per ASTM D3996. Qualification of individual P.Eng. Confirm that the bearing capacity of the driven pile casing meets the requirements of the structural design.	As directed by City Project Manager.
4) Review and interpret Pile Static Load test data and results (report) submitted by the Contractor. Qualification of individual P.Eng. Ensure that the interpretation of the bearing capacity derived from the dynamic load test is accurate and that the results meet the requirements of the structural design.	As directed by City Project Manager.
5) Soil bearing capacity check as per ASTM D1194 - Plate load test. Pricing to include sampling, testing and reporting. Check soil bearing capacity to support the load applied to the ground.	As directed by City Project Manager.

### Waterproofing Membrane Testing (Bridges, Structures, and Expressways)

Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Cone penetration test at 25° C. Pricing to include sampling, pick up, testing and reporting. Verify membrane quality for acceptance determination and payment adjustment factors.	As directed by City Project Manager.
2) Flow test at 60 °C. Pricing to include sampling, pick up, testing and reporting. Verify membrane quality for acceptance determination and payment adjustment factors.	As directed by City Project Manager.
3) Low temperature flexibility test at -25 °C. Pricing to include sampling, pick up, testing and reporting. Verify membrane quality for acceptance determination and payment adjustment factors.	As directed by City Project Manager.
4) Toughness test. Pricing to include sampling, pick up, testing and reporting. Verify membrane quality for acceptance determination and payment adjustment factors.	As directed by City Project Manager.
5) Toughness/peak load. Pricing to include sampling, pick up, testing and reporting. Verify membrane quality for acceptance determination and payment adjustment factors.	As directed by City Project Manager.
6) Pull Test for Metallic Dowels as per MTO Pull Test Guide. Price per lot of 10 dowels. Verify performance requirements for the installation of metallic dowels in concrete.	A total of 10 dowels in each lot for testing will be selected by the Project Manager. If 2 or more failed additional pull testing on 20 dowels in the lot shall be conducted.
7) Field pick up of concrete cylinders cast by others. Pricing to include sampling, pick up, testing and reporting. Samples for compressive strength testing.	As directed by City Project Manager.

### Core Sampling and Testing

Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Core drilling 100 mm diameter for in-situ testing of the depth of concrete thickness. Perform pavement assessment.	As directed by City Project Manager
2) Core drilling 100 mm diameter for in-situ testing of full depth concrete road base thickness. Perform pavement assessment.	As directed by City Project Manager
3) Core drilling 50 mm diameter for in-situ testing of full depth, asphalt pavement thickness. Perform pavement assessment.	As directed by City Project Manager
4) Determination of pavement compaction from asphalt cores as per LS-262 and LS-265. Check for compaction requirements - bulk relative density and percent air voids.	As directed by City Project Manager
5) Asbestos content determination from asphalt cores as per EPA/R600/R-93/116. Pricing to include testing and reporting. Check for asbestos containing materials (ACM).	As directed by City Project Manager

### Brick Gutter Testing

Laboratory QA Test and Other Actions	Minimum Laboratory Testing Frequency
1) Brick gutter test as per ASTM C902, CSA A82-06 (R2011). Pricing to include sampling, pick up, testing and reporting. Check compressive strength and saturation coefficient of brick gutter.	As required, 5 bricks per sample.

## Appendix D – As-built Drawing Guidelines

The purpose of this section is to provide some background material if you are preparing record or as-built drawings. This section is intended for use on City capital improvement projects or on private developer related projects.

### Purpose

A requirement for a full-stream application under the Municipal Consent Requirements (MCR) is for the applicant to provide as-constructed drawings or as-built drawings. As well, under the *Safe Drinking Water Act (SDWA)* 2000 Part V as-built drawings of constructed facilities must be made available upon demand, if requested by the Ministry of the Environment and Climate Change. The material in this appendix outlines the requirements for preparing record drawings or as-built drawings, which may need to be submitted by the contractor in accordance with the contract documents, or by the Contract Administrator if an external service provider is used. The as-built drawings can then be used by city staff, other government agencies, developers and engineers for planning, design, and maintenance purposes.

### ***Distinction between Record and As-built Drawings***

The Professional Engineers of Ontario (PEO) document "Use of the Professional Engineer's Seal" has a section titled "As-built and Record Drawings" and reads as follows:

Professional engineers should use the following distinction between as-built and record drawings. Drawings referred to as "as-built" are prepared by a third party, or by the engineer using information furnished by the contractor or other field staff. Record drawings are those prepared by the reviewing engineer after verifying in detail the actual conditions of the completed project. For some projects, this verification may require frequent or continuous presence on site. The distinction between as-built and record drawings determines whether drawings representing the final state of the projects should be sealed.

Because professional engineers are responsible for the content of drawings bearing their seals, as-built drawings should not be sealed, since the engineer is not responsible for the content of these documents.

Some of the information provided on as-built drawings might be changes authorized by the engineer during construction. Other information might reflect changes initiated by other parties due to site conditions or other causes. Changes by the engineer will already have been documented by change orders, sealed sketches, or sealed reports, so there is no need to seal the as-builts. Where changes are by others, although the engineer will have a responsibility to advise the client whether the change was a result of a safety concern or a contravention of codes or standards, the engineer should not be forced to seal the documents, since to do so might imply that the changes were part of the engineer's design. If as-builts are produced by making changes to the original construction drawings, the seal should not be applied, or should be removed if already in place, and the drawings marked "as-built drawing". In place of a seal, there should be a note referencing the original sealed drawings.

Sealed drawings with record information might imply to some parties that the engineer is providing some type of warranty or certification of the construction. This is never the case, since the contractor is always responsible for construction.

For any as-constructed drawing submitted to the City, the requirement will be as-built drawings, not record drawings.

### *Definitions*

**As-built drawing** – is documentation created by or based solely on information provided by a third party that reflects the installed, constructed or commissioned conditions of a device, machine, equipment, apparatus, structure, system or other outcome of an engineering project. Since the engineer has not verified that the information is complete or accurate, as-built drawings must not be sealed.

**Record drawing** – is a document created to accurately reflect as-constructed, as-built or as-fabricated conditions and that has been sealed by a professional engineer after verifying that the document is accurate. They are usually retained to meet business or regulatory requirements.



**Sealed** – means a document is signed, dated and bears an impression of the professional engineer's stamp. The seal implies that the professional engineer attests to the completeness and accuracy of the document.

**Construction drawings** – Construction drawings are generated from the tender drawings, modified to incorporate any changes from addenda that were issued during the tender process. Construction drawings are issued after the tender has closed and are the ones used at the construction stage. They will consist of one paper print of the approved design drawing with changes or corrections made as required by the City or the consultants/designers.

## Required Information

The following are examples of changes made to a project that are required to be included on the as-built drawings:

- Field changes noted by the developer's engineer of work or engineer of record in the case of development related projects.
- Comments or remarks of field information that may have been provided by the design consultant in the case of capital improvement projects.
- Field information provided on the contractors construction drawings, assembled by the contractor hired to perform the work.
- Project change order drawings or change order details indicating changes made to the contract drawings in the case of capital improvement projects.
- Field information provided on the inspectors construction drawings, assembled by the city inspector assigned to the project.
- Survey notes provided by the survey crew, assembled by the City's engineering survey unit only when the City has performed the layout.
- Locations where material was marginal, and was accepted, but at a lower rate, or with a modification to warranty

## As-built Drawing Requirements

For content requirements for water distribution systems, storm or sanitary sewer systems and stormwater management facilities, see the *Design Criteria for Sewers and Watermains manual, Appendix A, As-built Drawings*.

## Appendix E – As-built Features Requirements

This section is to be read in conjunction with the as-built drawing sections in Chapters 4 & 5 of the Field Services Manual

In the case of rehabilitating existing sewers, maintenance holes, appurtenances, and structures, capture the dimensions after rehabilitation.

### Storm Drainage

Storm drainage features are intended to move rainwater and groundwater. As-built drawings will indicate all necessary information about the storm drainage system to evaluate whether the constructed features will be able to function as intended by the design. Information will be field verified or surveyed or both as outlined in the following table. The following table indicates what features are required and by whom should provide the information.

**Table: Storm drainage features**

Storm drainage features	Field verify (inspector)	Survey (engineering surveys unit or consultants surveyors)	Indicate on as-built drawing (drawing preparer or engineer)
pipe	size, material, class of pipe, bedding type, drop pipe size	inverts, drop pipe inverts, location of end of stub or bulkhead	Redraw pipe on drawing if pipe has moved more than 300 mm horizontally or 150 mm or more vertically.  Recalculate slope on record length and surveyed inverts.  Indicate new information on plans such as slope, length, and diameter and so on.
catchbasins, maintenance holes, outfalls, inlet structures	size, type, cover type, safety platforms, flow regulator, overflow, weir, grate type	rim elevation location of feature, overflow weir invert inlet /outlet inverts	Redraw structure on drawings if it moved 300 mm or more. Indicate new information on plans such as size, type and so on.

culverts	size, material, shape, seepage collars	location of ends of culverts and inverts	Redraw culvert on drawings if has moved more than 300 mm.  Recalculate slope based on recorded length and surveyed inverts.  Indicate new information on plans such as slope, length, and diameter and so on.
subdrains	pipe locations, material, and size		Redraw subdrains on drawings if it moved 300 mm or more.
laterals	size, material, class, bedding		Indicate locations on plan.
other drainage features			Redraw feature on drawings if it moved 300 mm or more.

## Stormwater Management

Stormwater management features are intended to capture and control the rate and quality of the rainwater runoff. As-built drawings will indicate all necessary information about the stormwater management system to evaluate whether the constructed features will be able to function as intended by the design.

Information will be field verified or surveyed or both as outlined in the following table. The following table indicates what features are required and by whom should provide the information.

**Table: Stormwater management features**

Stormwater management features	Field Verify (inspector)	Survey (engineering surveys unit or consultants surveyors)	Indicate on as-built drawing (drawing preparer or engineer)
storage tanks	material, type, size, control systems such as orifice size and weir dimensions	control structure location, control elevations such as orifice inverts, weir elevations bottom elevations and access locations	Redraw structure on drawing if moved more than 300 mm horizontally or 150 mm or more vertically.  Indicate new information on plans such as size, type and so on.
ponds	size, shape	control structure location, control elevations such as orifice inverts and weir elevations  overflow elevation  topographic survey including bottom elevations  final volumes	Redraw pond on drawing if moved more than 3.0 m or more.  Recalculate volume  Indicate new information on plans such as size, type, volume and so on.  Permanent pool elevation, Pond max. water elevation, flow monitor MH and sampling MH locations
wetlands		boundary of created or modified wetlands	Redraw wetland on drawings if moved more than 3.0 m or more.  Recalculate volume based on water surface shape and depth.  Indicate new information on plans such as size, type, volume and so on.

Grease interceptor oil/grit separation	size, material, vault, dimensions	horizontal location of four corners of vault where applicable	Indicate vault dimensions and size, inverts.
Infiltration systems, French drains	material, size, pipe such as size, type and diameter	inlet invert outlet invert	Redraw feature on drawings if it moved 300 mm or more.

## Water Distribution Systems

Water system features are intended to move or hold potable water. As-built drawings will indicate all necessary information about the water system to evaluate whether the constructed features will be able to function as intended by the design. Information will be field verified or surveyed or both as outlined in the following table. The following table indicates what features are required and by whom should provide the information.

**Table: Water distribution systems features**

Water distribution features	Field verify (inspector)	Survey (engineering surveys unit or consultants surveyors)	Indicate on as-built drawing (drawing preparer or engineer)
pipe and fittings	manufacture—material, size, class, bedding, joint type, fittings measure distance between fittings—centre of tees, crosses, bends crossing invert—location and invert of any utility crossings depth of pipes during installation at every fitting and appurtenances, vertical bends location where insulation used	top of pipe, location of valve, horizontal location of bends, tees and crosses	Redraw pipe on drawing if pipe has moved more than 300 mm horizontally or 150 mm or more vertically. Recalculate slope on record length and surveyed inverts. Indicate new information on plans such as slope, length, and diameter and so on.
valves in chamber such as gate valve, air valve, and butterfly valve			Redraw structure on drawings if it moved 300 mm or more. Indicate new information on plans such as size, type and so on.

hydrants	manufacturer hydrant bury depth	horizontal location of hydrant– centre of valve of stem top of hydrant elevation	Redraw hydrant on drawings if it moved 300 mm or more. Indicate new information on plans.
water service lines	material, size, type (fire / domestic), location	curb stop valve location	Redraw service line on drawings if it moved 300 mm or more. Indicate new information on plans, for example existing size, type, and so on.
mainline flow meters chambers	type, size, vault or box and size	horizontal location of centre of box, horizontal location of four corners of vault, location of lid, rim elevation	Redraw vault or box on drawings if it moved 300 mm or more. Indicate new information on plans, for example, size, type, and so on.
pressure reducing valve chamber	size, vault size, vault drain data	horizontal location of four corners of vault, location of lid, rim elevation	Redraw vault on drawings if it moved 300 mm or more. Indicate new information on plans, for example, size, type, and so on.
backflow devices at street line— exterior to building	device brand type, size, service line size, location of drain	horizontal location of four corners of vault or centre of box	Redraw vault or box on drawings if it moved 300 mm or more. Indicate new information on plans, for example, size, type, and so on.
backflow devices— interior to building	device brand, type, size, service line size, general location within building		



## Sanitary or Combined Sewer

Sanitary or combined sewer system features are intended to transport sanitary waste into a collection system. As-built drawings will indicate all necessary information about the water system to evaluate whether the constructed features will be able to function as intended by the design. Information will be field verified or surveyed or both as outlined in the following table. The following table indicates what features are required and by whom should provide the information.

**Table: Sanitary or combined sewer features**

<b>Sanitary combined sewer features</b>	<b>Field verify (inspector)</b>	<b>Survey (engineering surveys unit or consultants surveyors)</b>	<b>Indicate on as-built drawing (drawing preparer or engineer)</b>
maintenance holes	maintenance hole diameter, type, manufacturer, safety platform, flow restrictors, overflow	horizontal location of centre of manhole, horizontal location of centre of lid, rim elevations and all invert elevations, overflow weir invert	Note all changes and correct elevations.
pipe—gravity sewer main	size, material, class of pipe, bedding type, drop pipe size	length—horizontal length of pipe from centre of manhole to centre of manhole. Inverts, drop pipe inverts, locations of end of stub/bulkhead inverts, drop pipe inverts, location of end of stub or bulkhead	Redraw pipe on drawing if pipe has moved more than 300 mm horizontally or 150 mm or more vertically.  Recalculate slope on record length and surveyed inverts. Indicate new information on plans such as slope, length, and diameter and so on.

pipe and fittings– force main	manufacturer– material, size, class, bedding, joint type, fittings measure distance between fittings–centre of tees, crosses, bends crossing invert– location and invert of any utility crossings depth of pipes during installations at every fitting and appurtenance	horizontal location of main:	Redraw pipe on drawings if it moved 300 mm or more. Indicate new information on plans, for example, slope, length, size, and so on.
laterals	material, size, locations, backflow valve		Indicate location on plans.
cleanouts	size, material, location	rim elevations, centre of box, horizontal location of centre of box	Redraw structure on drawings if it moved 300 mm or more indicate new information on plans.
grease interceptor or oil grit separators	Pipe materials, size, vault dimensions and size	horizontal location of four corners of the vault and inverts	Show vault dimensions and size. Show pipe elevations.

## Transportation

Transportation system features are intended to transport vehicle and pedestrian traffic. As-built drawings will indicate all necessary information about the transportation system to evaluate whether the constructed features will be able to function as intended by the design. Information will be field verified or surveyed or both as outlined in the following table. The following table indicates what features are required and by whom should provide the information.

Included but not limited to all surface features impacted by the construction.

**Table: Transportation features**

Transportation features	Field verify (inspector)	Survey (engineering surveys or consultants surveyors)	Indicate on as-built drawing (drawing preparer or engineer)  Redraw on record drawing any and all transportation features listed if moved 300 mm or more.
pavement	material, depth, width, type – rigid or flexible	elevations	Note all changes and correct locations indicated locations on plans
curb and gutter	location of face curb		
driveways	location, width, type – commercial or domestic		
signage	location, size, type of sign		
sidewalk	location, type – light or heavy, material, width	elevations	
street lighting	height, wattage, material		
monument	location, materials		
conduit	location, depth, materials, size, owner		
handwell	location, conduit entrance, type – street lighting, traffic		

## Other Utilities

As-built drawings will indicate all necessary information about other utilities to evaluate whether the constructed features will be able to function as intended by the design. Information will be field verified or surveyed or both as outlined in the following table. The following table indicates what features are required and by whom should provide the information.

**Table: Other utilities features**

Other utilities features	Field verify (inspector)	Survey (engineering surveys unit or consultants surveyor)	Indicate on as-built drawing (drawing preparer or engineer)
other utilities	identify location and depth of all existing utilities encountered and new utilities constructed		Show utilities encountered and their depth.

## **Appendix F – Weight Verification Protocol**

Weight verification protocol is for construction materials which are priced based on unit weight.

The purpose of this protocol is to outline the scope and procedures for the provision of weight verification to construction materials that are priced based on unit weight in City construction contracts.

### **Scope**

Contractor's delivery trucks carrying construction materials including, but not limited to, aggregates, asphaltic concrete and soils that are paid by weight as identified in the form of tender in the City's construction contracts are subject to weight verification at the discretion of the contract administrator or the site inspector.

It is the responsibility of the site inspector to verify randomly the weight of the materials delivered to construction sites. The site inspector will issue a Weight Verification Order to truck drivers and contractor's field representative when they decide to verify the weight of the materials delivered to site.

For weigh scale services, Solid Waste requires a chargeable account. The account and arrangement should be performed by the Engineer and/or Contract Administrator.

The City will not compensate contractors for any cost associated with the weight verification process.

### **Application**

This protocol applies to all City's transportation, structures, sewer, and watermain construction contracts. The provisions included in this procedure shall form part of the contract between the City and the contractor.

## Material Delivery and Weight Verification Procedures

Prior to unloading materials that are priced based on unit weight, truck drivers shall submit the weigh tickets in-person to the site inspector. Material weigh tickets that are not accepted in-person by the site inspector prior to unloading will not be paid.


The City reserves the right to verify the weight of materials supplied in connection with the City's construction contracts.

When directed by the site inspector, the truck carrying construction materials that are priced based on unit weight shall proceed immediately to a City solid waste management services transfer station specified by the site inspector, and the truck will be weighed at the facility.

The site inspector should minimize trucks waiting time at a transfer station and reduce trucks traveling time to and from a transfer station by:

- Contact the general supervisor, transfer operations at (416-392-3132) for west end sites and (416-392-3017) for east end sites one day in advance to get information about the best time to direct trucks for weight verification.
- Choosing a transfer station closest to the site, if possible.
- Avoiding weight verification in extreme weather conditions.
- Directing trucks to another transfer station to avoid roadways affected by traffic congestions and serious traffic accidents.

The site inspector will issue a Dump Authorization Slip (see sample on the next page) to the truck driver, who will show it to the transfer station staff upon arrival at the facility. The site inspector shall measure the temperature of hot mix asphalt at the site in a safe manner before and after the weight verification and record it in the Weight Verification Order.

 <b>Dump Authorization Slip</b>	
Authorization Slip No.	<b>17924</b>
Authorization Number: 123-580-949	Start Date:
Create Date: Fri, April 24, 2015	End Date:
<b>Bill Acct/Name: EM-10046 Engineering Services</b>	
Hauler Acct/Name 1: VP-99999 Various Haulers	<u>Restrictions</u>
Hauler Acct/Name 2:	Allowed Loads: 0
Hauler Acct/Name 3:	Max. Daily Loads: 0
	Max. Wt. Allowed: 0
Material Code/Desc 1: Not Specified	<u>Allowed Origins</u>
Material Code/Desc 2:	Not Specified
Material Code/Desc 3:	
Comments Load Weighing Service	
Effective April 1, 2015 all load weighing service transactions will be required to use a Dump Authorization Slip for Non-Registered vehicles and will be charged a fee of \$10.61 (flat fee for weighing a vehicle).	

**Figure: Sample Dump Authorization Slip**

If workload permits, site inspector should follow the truck in their vehicle to the transfer station. Otherwise, the site inspector should contact the transfer station staff to inform them about the incoming truck.

A weight scale receipt will be issued to the truck driver by the transfer station staff showing the verified gross weight of the truck and its content. The weigh scale receipt will also include information on the date of the operation, time of weighing, name of the facility performing the weighing, vehicle's license plate number, name of inbound weigh scale operator and comments from the transfer station, if applicable. The truck driver should retain one copy of the weigh scale receipt for record and submit the other copy to the site inspector for verification purpose.

Should the weight verification show that the weight of the load is less than what is shown on the contractor's weigh ticket by more than one percent, the site inspector shall direct the empty truck to return to the same facility on the same day to verify its tare weight.

The weighing facility will issue a new weigh scale receipt to the truck driver showing the verified tare weight of the truck. Both the truck driver and the site inspector should retain one copy of the receipt for record and verification purposes.

The transfer station will not charge the truck driver or the contractor for the weight verification operations.

## Quality Assurance

For each contract, a minimum of one truckload for each type of construction material paid by weight shall be weight verified at a City weighing facility. If more than one load of the same material is expected to be delivered on the same day, the weight of the first load delivered to the site should be verified, if possible. See Appendix C for weight verification frequency.

Should the weight verification show that the verified net weight of the material is less than what is shown on the contractor's weigh ticket by one percent or less, Site inspector may instruct the contractor to perform weight verification on other trucks.

Should the weight verification show that the verified net weight of material is less than what is shown on the contractor's weigh ticket by more than one percent, the site inspector shall notify the contractor of the weight discrepancy immediately and instruct the contractor to take steps to correct the problem without delay. At the same time, the site inspector shall immediately direct the next available truck(s) to a city weighing facility to verify the weight of the load(s) until the contractor has rectified the problem and the weight discrepancy is within the allowable limits.

Contractors must ensure that all weight verified materials delivered to work sites meet all contract specifications. Any weight verified material that has failed to meet contract specifications, for example: the asphalt temperature is below specification, shall not be used in the contract and shall be disposed of off site at contractor's expense. In extenuating circumstances where ambient temperature is below the specified minimum temperature, but the Contract Administrator has requested that work is to proceed, the Inspector will note in Daily Report and send an email, indicating that Contract Administrator has requested work to proceed, even though temperature placement is not as specified.

## Price Adjustment

Should the weight verification show that the verified net weight of the material is less than what is shown on the contractor's weigh ticket by more than one percent, the payment for the affected load shall be made based on the weight measured by the City's weighing facility. The Contract Administrator will then make adjustments to payment, as required.



The Contract Administrator will also adjust the method of measurement for all following loads that are not weight verified but have been delivered to the site before a new weight verification process can prove the contractor had rectified the weight inconsistency. The net weight of the following loads will be adjusted using an adjustment factor "A" as determined by the following formula:

$$A = 1.0 - (B - C)/B; \text{ where } A \leq 1.0; (B - C)/B > 1.0 \%$$

where

1.0 % = weight tolerance allowed

A = adjustment factor

B = net weight shown on delivery ticket

C = net weight determined at the City transfer station

$$\text{adjusted net weight} = A \times \text{delivery ticket net weight}$$

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#### Example 1:

Net weight shown on delivery ticket = 20,000 kg (B)

Net weight determined at City transfer station = 19,920 kg (C)

$$(B-C)/B = (20,000 - 19,920)/20,000 = 0.004 = 0.4 \%$$

0.4 % < 1.0 %, **adjustment factor shall not be applied.**

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#### Example 2:

Net weight shown on delivery ticket = 20,000 kg (B)

Net weight determined at the City transfer station = 19,000 kg (C)

$$(B-C)/B = (20,000 - 19,000)/20,000 = 0.05 = 5.0\%$$

5.0 % > 1.0 %, **adjustment factor shall be applied.**

$$A = 1.0 - (20,000 - 19,000)/20,000 = 1.0 - 0.05 = 0.95$$

$$\text{adjusted net weight} = 0.95 \times \text{delivery ticket net weight}$$


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All following loads that are not weight verified will be paid at the adjusted net weight until a new weight verification process has proven otherwise.

## Measurement of Payment

Not applicable.

## Basis of Payment

The City will not pay the contractor any costs associated with the weight verification process.

## Appendix G – Health and Safety

The City is committed to providing and maintaining safe and healthy working conditions for all members of the Toronto Public Service. It has committed to a continuous safety improvement program with a goal of Targeting ZERO Together – achieving a zero injuries workplace.

Making health and safety (H&S) a top priority while Targeting ZERO Together, the Engineering & Construction Services (ECS) division has developed a comprehensive H&S program committed to improving the wellbeing of all staff, regardless of the type of work carried out or where the work is completed.

The ECS Health & Safety and Emergency Planning webpage provides division-specific strategies, policies, procedures, best practices, guidelines, forms and various tools to help support employees in performing their duties safely and effectively.

### Purpose

The purpose of the H&S section in this manual is to provide a quick summary and guideline to employees working in the field, on construction sites, facilities or areas of similar nature.

All employees are responsible for familiarizing themselves and fully complying with the OHSA and applicable regulations (namely the Construction Projects regulation 213/91), other legal requirements including but not limited to the TSSA and the HTA, industry guidelines and best practices, the City's and ECS's H&S policies, procedures, guidelines, best practices, contract specific H&S requirements, as well as the site specific requirements of the Constructor.

For additional and more in depth information, ECS comprehensive H&S Program is available on the intranet at <http://insideto.toronto.ca/ecs/index.htm>.

## Definitions

The following terms marked \* are defined in the OHSA *Occupational Health and Safety Act* and other terms listed are important to know:

**Certificate of Recognition (COR™)** means a comprehensive health and safety audit tool with an accredited certification program in Ontario that is granted by the Infrastructure Health and Safety Association (IHSA). IHSA is the designated body for certifying contractors in Ontario's construction industry who demonstrate their standards of health and safety management systems through a structured audit process. **COR™** provides validation that a contractor has demonstrated an understanding of health and safety and has made a commitment to continuous monitoring and application of its program when delivering construction activities.

**Competent Person\*** means a person who:

- a) Is qualified because of knowledge, training and experience to organize the work and its performance
- b) Is familiar with this Act and the regulations that apply to the work
- c) Has knowledge of any potential or actual danger to health or safety in the workplace

**Construction\*** includes the erection, alteration, repair, dismantling, demolition, structural maintenance, painting, land clearing, earth moving, grading, excavating, trenching, digging, boring, drilling, blasting, or concreting, the installation of any machinery or plant, and any work or undertaking in connection with a project but does not include any work or undertaking underground in a mine.

**Constructor\*** means a person who undertakes a project for an owner and includes an owner who undertakes all or part of a project by himself or by more than one employer.

**Employer\*** means a person who employs one or more workers or contracts for the services of one or more workers and includes a contractor or subcontractor who performs work or supplies services and a contractor or subcontractor who undertakes with an owner, constructor, contractor or subcontractor to perform work or supply services

**Immediately Dangerous Situation:** if the noncompliance / uncontrolled hazard were to continue there would be imminent danger to workers and / or the public which warrants a Stop Work ceasing all activity and eliminating the hazard to lower the risk of imminent danger to zero.

**Joint Health and Safety Committee (JHSC)** refers to ECS's 'Outside' JHSC where staff may report hazards to after immediate Supervisor for resolution. JHSC's are a requirement under the OHSA.

**Locate** as defined in the ORGCA Best Practices Guide are as follows:

- a) Locate (verb): The process of an underground plant owner or their agent providing information to an excavator which enables them to determine the location of a facility.
- b) Locate (noun): The provision of location information by an facility owner (or their agent) in the form of ground surface markings and/or facility location documentation, such as drawings, mapping, numeric descriptions or other written documentation.
- c) Locate Form: Accompanying documentation for a locate which is completed by the party providing the locate. A locate form may or may not contain the specific facility location details and/or drawings, but should in all cases contain administrative aspects of the locate such as when, when, why completed, and who completed it.
- d) Locate Request: A communication between an excavator and the owner or their agent (usually the notification service) in which a request for locating underground facilities is processed.
- e) Locate Ticket: A locate request document created by the notification service or an owner marked with a unique identification number.
- f) Locator: A person whose job is to locate underground infrastructure.

**Major Incident** can refer to the following scenarios:

- a) Critical injuries. Reportable to the MOL.
- b) Critical incidents. Reportable to the MOL per the Construction Reg. of the OHSA.
- c) Serious Worker injuries resulting in Lost Time.
- d) Gas Service / Gas Main / Vital Main damage. Reportable

to utility owner / TSSA.

- e) Underground and / or Overhead hydro Service / hydro main / vital main damage or even contact. Reportable to the MOL per Construction Reg. and/or ESA and utility owner.
- f) Any injury to a member of the public during construction and / or anytime thereafter as a result of the work.
- g) Any at fault traffic incident resulting in injury to a member of the public or workers while in support of the work
- h) Any act of at fault Workplace Violence against a member of the public or a City of Toronto staff
- i) Reportable spills to the MOE

**Project\*** means a construction project, whether public or private, including:

- a) the construction of a building, bridge, structure, industrial establishment, mining plant, shaft, tunnel, caisson, trench, excavation, highway, railway, street, runway, parking lot, cofferdam, conduit, sewer, water main, service connection, telegraph, telephone or electrical cable, pipe line, duct or well, or any combination thereof
- b) the moving of a building or structure, and
- c) any work or undertaking, or any lands or appurtenances used in connection with construction.

**OHSA** means the Ontario Occupational Health and Safety Act.

**Project Management Team:** various contract stakeholders including but not limited to City of Toronto Project Managers, Engineers, Construction Inspectors, Contract Administrators (internal or external) directly assigned to the contract as well as, as appropriate, middle and upper management and internal ECS H&S resource.

**Owner\*** means a trustee, receiver, mortgagee in possession, tenant, lessee, or occupier of any lands or premises used or to be used as a workplace, and a person who acts for or on behalf of an owner as an agent or delegate.

**Regulatory Agency** means a legislated agency responsible to develop, administer and enforce legislation within its legislative branch and/or authority. Common agencies are but not limited to:

- Ministry of Labour, MOL (since renamed MLTSD – Ministry of

Labour, Training and Skills Development but for the purposes of this document: MOL)

- Ministry of the Environment, Conservation and Parks, MECP
- Ministry of Transportation, MOT
- Technical Standards and Safety Authority, TSSA
- National Energy Board, NEB

## Roles and Responsibilities

ECS staff visiting construction sites shall:

- Use or wear the equipment, protective devices or clothing that the City / ECS requires to be used or worn
- Apply all Training received
- Follow directions from Management / Supervision (unless it is unsafe to do so) and abide by *(copy and paste para 2 under section 'Purpose' here)*
- Report to and frequently communicate with your immediate Supervisor / Manager
- Report to and frequently communicate with the contract's Project Management Team
- Follow the Constructor's site specific H&S requirements
- Report immediately any known or observed H&S violation, contravention, act, or nonconformance to the Constructor's Crew Leader immediately and escalate as required (i.e. if noncompliance continues after verbal report at 1<sup>st</sup> level Supervision, continue up the hierarchy and include written reports and photos).
- Stop work when Immediately Dangerous Situations are observed and escalate the issue immediately including written reports and photos.
- When applicable, cooperate in a professional manner with external authorities with regards to access, information, documentation and full disclosure as requested. Ensure that all Regulatory Agency visits and all major incidents are reported immediately to the Project Management Team and the ECS Health & Safety & Emergency Planning Consultant
- Report all personal injuries, incidents, and near misses to your immediate Supervisor / Manager for investigation and documenting in the City's Quatro Safety system
- Ensure the site trailer / site office has been audited for compliance on the TS122 – Site Office Audit Form *(if this is still what it's called)* if City staff are using it as a work area at all.

- Ensure the CPE section A is performed and accurate with supporting documentation
- Ensure the Record of Damaged Utilities Form (TS123) is fully and accurately completed as required
- Ensure mandatory MOL documents are on site including but not limited to the City's Form1000 and the Constructor's NoP at minimum.

## **Certificate of Recognition**

As part of the City of Toronto's ongoing commitment to health and safety, the City of Toronto has endorsed and adopted the Certificate of Recognition (COR™) program (or an OHS Certificate Equivalent) as part of our construction contract management and construction tendering process. As of January 2019, it is expected that all tendered contracts have COR™ criteria. On projects under \$10 million, it is intended that this will be selectively applied to consultants, based upon complexity and risk factors as determined by the City.

## **General Safety Rules**

### ***Safety in the Site Trailer or Office***

- Ensure the TS122 is complete if City staff are using the site Trailer / Office at any time
- Practice good ergonomics.
- Ensure there's no slips, trips, fall hazards including ice

### ***Safety in the Field***

- Protect yourself by ensuring you are not at risk of personal injury / illness
- "If you see something, say something" City staff, as site visitors on a Constructor's site, are not responsible for the site's H&S, the Constructor is, however, there is a duty to report noncompliance when observed. Depending on the risk of the noncompliance observed, escalate accordingly, and always start with 1<sup>st</sup> level site Supervision (Crew Leader / Foreman / Foreperson, Site Superintendent, etc.)
- Report all site and personal incidents, illnesses, accidents, near misses, and hazards observed to your immediate Supervisor
- Report to the ECS 'Outside' JHSC in the event a hazard

remains unresolved after reporting to your immediate Supervisor / Manager

- Notify Constructor when on site.
- Be aware of the potential hazards on the site by always practicing situational awareness for your own protection.
- Participate in and apply the required H&S training as described in ECS's H&S Training Program
- Become familiar with emergency and rescue procedures and ensure you're included in the site's Emergency Plan if you were to suffer personal injury / illness.
- In addition to observing you are protected against all site hazards, pay special attention to the traffic control plan. Remain aware of the environment and surroundings at all times, for instance, do not take pictures, write notes, or use cell phone until you are away from hazardous areas such as Vehicular Traffic and moving equipment. .
- Ensure H&S is a standing agenda item on the bi-weekly progress meetings and meaningful discussions take place including but not limited to lessons learned from recent incidents, injuries, accidents, and / or near misses

### ***Personal Protective Equipment (PPE)***

#### ***Mandatory PPE***

- Wear CSA approved footwear (Ω TYPE 1 Boot).
- Wear City branded CSA approved hardhat (TYPE 2 CLASS E).
- Wear City branded CSA approved high-visibility vest and / or other hi-vis clothing such as sweater and jacket. If working at night, wear retro-reflective silver stripes encircling each arm and leg.

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**Note:** Hoodies, loose clothing, long hair, and loose jewelry should be taken off or tucked or tied in tight to the body to avoid entanglements.

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#### ***Conditional PPE—as required for specific hazards***

- CSA approved Safety glasses, goggles, visors, face shields and so on
- CSA approved Hearing protection
- CSA approved Respirator
- Face Mask / Covering (3-ply cloth or disposable medical)
- Tyvek Suit



- Gloves
- CSA approved Fall Protection Harness and Lanyard
- Personal flotation devices
- Insect Repellent
- Any other PPE as determined through risk assessments

### ***Rights of a Worker\****

#### *Right to Know*

- Workers have the right to know the potential hazards at their workplace as well as the potential hazards associated with their job or specific tasks.
- Workers have the right to protect themselves from these hazards.
- Workers have the right to additional training or instructions to enable them to understand the hazards they may deal with.

#### *Right to Participate*

- Workers have the right to participate in prevention such as hazard recognition and control measures, notifying supervisors and Joint Health and Safety (JHSC) members.
- Workers may participate in training.
- Worker may participate on a JHSC committee or serve as a JHSC representative.

#### *Right to Refuse*

- Employees refusing work shall contact the immediate supervisor.
- The supervisor shall follow the City's work refusal procedure.

#### *Right to Stop Work*

A JHSC Certified worker has this additional right which can be used under specific circumstances—refer to functions of the JHSC document.

#### *Protection from reprisal*

Workers are protected by legislation from reprisal if they have acted in compliance with the OHSA or regulations or sought

enforcement of the OHSA or regulations.

### ***City's Expectations of Contractors***

For the purpose of this procedure, "contractor" includes contractors, sub-contractors and constructors.

- Ensure compliance with all applicable H&S legislations, regulations, industry best practices and guidelines
- Ensure compliance with the contract
- In a timely fashion, provide the City all of the necessary H&S documentation required and requested
- Notify the City of all injuries, incidents, accidents, and near misses on site and provide complete written investigations of each.
- Ensure that any unsafe act or condition observed within their respective site, are corrected in a timely fashion and controls implemented to prevent recurrence.
- Report to the City any unsafe acts and conditions observed onsite.
- Be responsible for the health, safety and environmental conditions of all persons present and activities conducted on their work site. In other words, understand and comply with their role as the Constructor\*
- When applicable, cooperate in a professional manner with external authorities and City authorized personnel with regards to access, information, documentation and full disclosure as requested.
- Ensure that all Regulatory Agency visits are reported immediately to the City with any accompanying documentation.
- Ensure that all Regulatory Agency orders and notifications are complied with, within the inspector's set schedule.
- Cooperate with the City and other subcontractors or trades on site in protecting the H&S of everyone in the workplace.
- Ensure H&S is a standing agenda item on the bi-weekly progress meetings and meaningful discussions take place including but not limited to lessons learned from recent incidents, injuries, accidents, and / or near misses

### ***City's Expectations of Consultants***

For the purpose of this procedure, "consultant" includes engineers, architects, and other specialized persons not

performing construction activities but contract administration (CA).

- Ensure compliance with all applicable H&S legislations, regulations, industry best practices and guidelines
- In a timely fashion, provide the City with all of the necessary health and safety documentation required and requested.
- Notify the City via a complete written investigation of all incidents, injuries, accidents and near misses
- When applicable, cooperate in a professional manner with external authorities or City authorized personnel with regards to access, information, documentation and full disclosure as requested.
- Ensure the site trailer / site office has been audited for compliance on the TS122 – Site Office Audit Form (*if this is still what it's called*) if City staff are using it as a work area at all.
- Ensure the CPE section A is performed and accurate with supporting documentation
- Ensure the Record of Damaged Utilities Form (TS123 *if this is still what it's called*)) is fully and accurately completed as required
- Advise the City when contractor safety performance is negative or when a contractor's safety behaviour/record can negatively impact the City.

### ***Reporting Incidents, Illnesses, Accidents, and Near Misses***

#### *Events with City Employees*

- All incidents, illnesses, accidents and near misses must be reported immediately to the supervisor.
- The supervisor must immediately report all incidents, accidents and near misses to the ECS Health & Safety & Emergency Planning Consultant.
- Follow ECS specific Incident Notification Protocol and the Corporate Critical Injury Investigation and Reporting Policy at <https://www.toronto.ca/city-government/accountability-operations-customer-service/city-administration/corporate-policies/people-equity-policies/critical-injury-investigation-reporting/>.

#### *Events with Contractors*

- All incidents, illnesses, accidents and near misses must be reported immediately to the City's project management team to ensure review during bi-weekly progress meetings, proper immediate corrective action and prevent recurrence action plan is in place,
- The City's Project Management Team must immediately report all major incidents to the ECS Health & Safety & Emergency Planning Consultant.
- Follow ECS specific Incident Notification Protocol and the Corporate Critical Injury Investigation and Reporting Policy at <https://www.toronto.ca/city-government/accountability-operations-customer-service/city-administration/corporate-policies/people-equity-policies/critical-injury-investigation-reporting/>.
- The project manager shall obtain all copies of the contractor's investigation and provide major incidents to the H&S and Emergency Planning Consultant for review.

### ***H&S Contraventions, NonCompliances, and Violations***

When known contraventions of the *Occupational Health and Safety Act and Regulations* and other requirements (including other legal requirements) are witnessed, the actions taken by City site visitors (including but not limited to the construction inspectors, surveyors, engineers, other members of the project management team and contract administrators) will depend on the risk and whether or not the observation is an immediate dangerous situation. The actions are illustrated in the following two scenarios:

**Scenario 1:** there is immediate danger to life or health. In this scenario, the city staff may stop the activity or the worker in question.

- If possible and safe to do so, take a picture
- Verbally discuss the observation with the contractor's supervisor immediately
- Follow up with an email summarizing the observation, the subsequent conversation and the action/non action (positive and/negative) taken by the contractor (cc: Project Manager and ECS Health & Safety & Emergency Planning Consultant)
- The city staff inspector/contract administrator always has the option and the right to call the Regulatory Agency directly

(As a measure of good faith and striving to continuously improve working relationships with contractors, it is advisable to attempt an internal resolution with the contractor before calling a Regulatory Agency, however you should not hesitate to bringing in the Regulatory Agency in immediately dangerous situations circumstances, repeat offences or where the contractor refuses to engage in safety)

**Scenario 2:** there is a known contravention but it does *not* constitute an immediately dangerous situation

**(DO NOT DIRECT THE CONTRACTOR OR THEIR EMPLOYEE TO COMPLY)**

- Contact immediate supervisor and/or project manager if you require further direction, or
- Verbally discuss the observation with the contractor's supervisor immediately
- Follow up with an email summarizing the observation, the subsequent conversation and the action/non action (positive and/negative) taken by the contractor (cc: Project Manager and ECS Health & Safety & Emergency Planning Consultant
- The City staff always has the option and the right to call the Regulatory Agency directly

(As a measure of good faith and striving to continuously improve working relationships with contractors, it is advisable to attempt an internal resolution with the contractor before calling a Regulatory Agency, however you should not hesitate to bringing in the Regulatory Agency in dangerous circumstances, repeat offences or where the contractor refuses to engage in safety)

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**Note:** The City or its representatives may not direct the contractor in H&S related matters, unless contract language explicitly states otherwise.

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### ***Emergency Response Plan***

- Ensure that current emergency contact numbers are posted and available
- Ensure there is instructions to the nearest hospital
- Familiarize yourself with the Contractor's emergency response plan including:
  - Evacuation point (muster) location(s)
  - Fire extinguisher locations
  - Eye wash station locations
  - First aid kit locations
  - First aiders available on site at all times
  - Spill kit locations
- Follow the Contractors' Emergency response plan when on their site and ensure you form part of that plan in the event city staff suffer personal injury/illness

## **Training**

For details of training requirements, see the ECS H&S Training Program on the [intranet](#).

## **References**

- [OHSA – Occupational Health & Safety Act and all applicable regulations](#)
- [Regulation 213/91 – Construction Projects](#)
- Ontario Regional Common Ground Alliance Best Practices Guide for Excavation [https://orcga.com/wp-content/uploads/2018/11/CCGA-Best-practices\\_version3\\_October2018.pdf](https://orcga.com/wp-content/uploads/2018/11/CCGA-Best-practices_version3_October2018.pdf)
- Infrastructure Health & Safety Association – Construction Health & Safety manual
- [City's Occupational health and safety intranet site](#)
- [People & Equity Policies](#)
- [ECS H&S Intranet Site](#)

## Appendix H – Sidewalk Deficiency Protocol

### Assessment Schedule

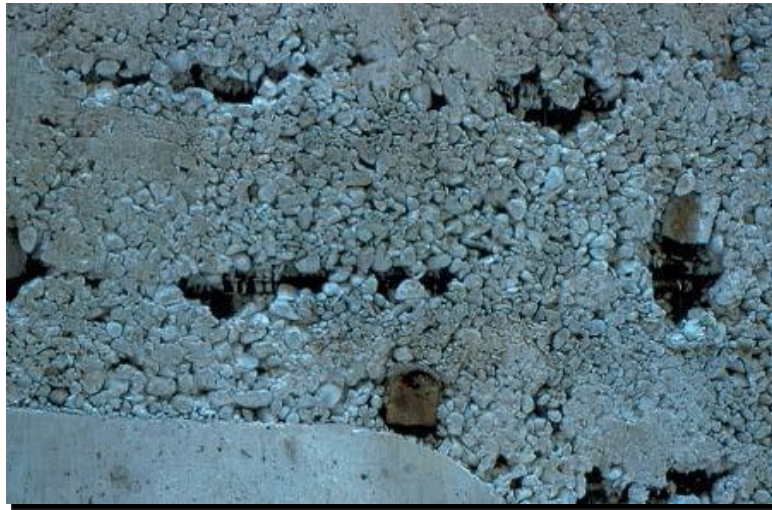
All types of cracks, spalling or other deficiencies shall be assessed at the following periods:

- Within 28 days after the placement of the concrete. This will allow the contractor to rectify the situation immediately and minimize any possible disruption to the public if the contractor is required to relocate his forces;
- Immediately after receiving low compressive strength results. This allows the referee testing to take place as close to the strength timeline as possible;
- At the time of substantial completion so that all deficiencies other than hairline cracks can be rectified; and
- At the time of warranty inspection. This will be the final deficiency report that will be provided to the contractor, so care has to be taken to identify all defects.
- Suspended sidewalks should be treated as structural concrete. They are to be assessed as structural elements, similar to a deck. Test as per TS 1350, Table B, decks

### Types of Defects Expected

The types of defects that require the removal and replacement of all concrete are listed below:

- The concrete is honeycombed. Honeycombing is defined as voids left in concrete owing to failure of the mortar to fill effectively the spaces among coarse aggregate particles. Honeycombing results in a greatly increased susceptibility to freeze thaw damage and reduced life expectancy.



### **Honeycombed concrete**

- The concrete contains embedded debris. Embedded debris is defined as any material that is not part of the planned concrete mix design. Typical debris are pieces of wood from formwork or grade stakes left in place, rocks and garbage. The debris will cause voids in the concrete and may result in popouts and reduced life expectancy.
- The concrete has been damaged by freezing. Concrete that has experienced low temperatures prior to properly curing will result in a black appearance. If the black appearance fades after a week or so, then the assumption is that the damage was minor and the concrete has continued curing and may be acceptable if there are no other defects. If the black appearance is still evident after a month, then the assumption is that the damage caused by the freezing has ceased the curing process and therefore, the concrete is rejectable, regardless of the compressive strength achieved.



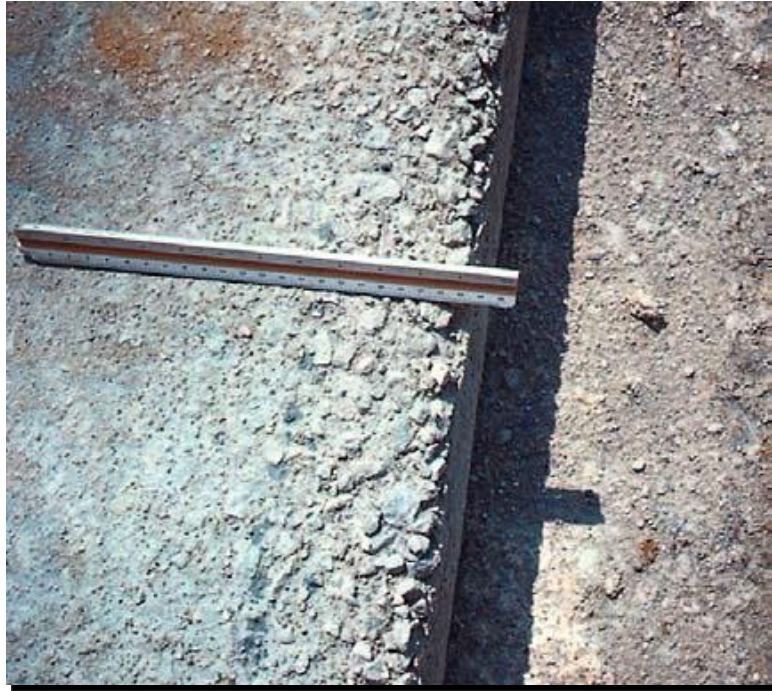


### **Concrete damaged by freezing**

- The concrete temperature at the time of placement exceeded the maximum allowable temperature set out in the contract specifications. Hot weather conditions may produce a rapid rate of evaporation of moisture from the surface of the concrete and accelerated setting time. The high rate of evaporation alters the water/cement ratio of the concrete and will result in lower potential strength. The high rate of evaporation also induces early plastic shrinkage causing more cracking. The higher temperatures also accelerate the slump loss and may cause loss of entrained air.
- The concrete surface has been damaged by rain. Severity of rain damage can vary depending on the amount of exposure or intensity and how long the concrete cured prior to the exposure. Rain damage results in displacement of fines at the surface and causes improper elongation of the air voids. Rain damage causes the surface of the concrete to spall and results in an unacceptable finish to the concrete. It also increases the susceptibility of the concrete to freeze thaw damage.



**Concrete damaged by rain**



**Concrete damaged by rain**

- The concrete contains footprints or other undesirable impressions.



**Concrete containing undesirable impressions**

- The concrete has been subjected to traffic before it has achieved 75 percent of the specified 28 day compressive strength.
- The concrete has cracked or separated. Cracks in this section refer to unplanned separations in the concrete that are 2 mm or greater in width, separations that have shifted along the vertical alignment and are no longer flush, or both.



**Concrete that has cracked**

Hairline cracks are defined as fractures in which the fragments remain in alignment and do not separate because the line of break is so fine. Single hairline cracks that do not separate the concrete panel into a section less than 0.5 m wide do not require any further remedial action as the possible repairs available to use will typically result in a worse situation than leaving the hairline crack alone.



**Hairline crack**

Multiple hairline cracks or hairline cracks that are closer than 0.5 m to the edges of the concrete panel shall be sealed to prevent any further damage. The sealant shall be Sikadur 52 epoxy injection grout as supplied by Sika Canada Inc. or an approved equal.



**Concrete with multiple hairline cracks**





**Concrete with a crack requiring sealing**

Single cracks that are less than 2 mm in width and do not show signs of shifting either at the time of inspection or the possibility of shifting at a future time can be sealed to prevent any further damage. The sealant shall be Sikadur 52 epoxy injection grout as supplied by Sika Canada Inc. or an approved equal.

Multiple cracks or cracks that are closer than 0.5 m to the edges of the concrete panel require the removal and replacement of the affected concrete between expansion joints—3 bays.

Multiple cracks generally spider out and result in small pieces that can pop out or separate at future dates and reduce the life expectancy of the concrete.

- The concrete surface has spalled as defined in the *General Conditions of Contract* that the contract administrator will be the sole judge to the determination. Spalling is typically caused by rain or overworking the concrete surface during finishing. Concretes with higher supplementary cementing materials may be more susceptible to the effects of overworking the concrete finish (that is to say the way concrete was finished 15 years ago may not be acceptable on the new concrete mixes with higher supplementary cementing materials).



**Concrete that has spalled**

- Expansion and isolation joints are not vertical.
- The concrete sections have heaved or sunk, from their original position.

## Appendix I – Bibliography

### Style Guides

***City of Toronto – Corporate Writing and Style Guide (2009)***

By Strategic Communications, City Manager's Office.  
Published by City of Toronto, 55 John Street, Toronto,  
Ontario, M5V 3C6.

### Directives

***Frequency of Contractor Performance Evaluations***

By Engineering & Construction Services, City of Toronto,  
5100 Yonge Street, Toronto, Ontario, M2N 5V7, 2014.

***Change Order Protocol***

By Engineering & Construction Services, City of Toronto,  
5100 Yonge Street, Toronto, Ontario, M2N 5V7, 2015.

***Invoice and Unbudgeted Expenditure Documentation***

By Engineering & Construction Services, City of Toronto,  
5100 Yonge Street, Toronto, Ontario, M2N 5V7, 2015.

***Construction Material Testing and Quality Assurance***

By Engineering & Construction Services, City of Toronto,  
5100 Yonge Street, Toronto, Ontario, M2N 5V7, 2015.

***Compliance with Contract Terms and Conditions***

By Engineering & Construction Services, City of Toronto,  
5100 Yonge Street, Toronto, Ontario, M2N 5V7, 2014.

***Sign-off of Daily Inspection Reports***

By Engineering & Construction Services, City of Toronto,  
5100 Yonge Street, Toronto, Ontario, M2N 5V7, 2014.

## Glossary

**As-built drawing** – is documentation created by or based solely on information provided by a third party that reflects the installed, constructed or commissioned conditions of a device, machine, equipment, apparatus, structure, system or other outcome of an engineering project. Since the engineer has not verified that the information is complete or accurate, as-built drawings must not be sealed.

**ASTM** – American Society for Testing Materials

**Book 7** – MTO's Ontario traffic manual *Book 7 Temporary Conditions* has been developed to show how to apply traffic control devices in temporary construction, maintenance, and utility work zones, to help ensure worker safety, motorist safety, and motorist mobility. It has been prepared to assist works in the field by illustrating the appropriate signing and the channelization required for the most common types of roadway work operations.

**CADD** – Computer Aided Design and Drafting

**Canadian Standards Association (CSA)** – is a non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems and personnel in Canada.

**CCTV** – Closed Circuit Television

**Change Directive (CD)** – The change directive is used to order the contractor to make revisions to the contract, which are on the critical path or will impact time or cost or both. The change directive is utilized to keep the project moving forward and a subsequent change order with cost and schedule impacts is issued once the work has commenced. For further details, refer to the General Conditions of contract.

**City** – The City of Toronto—the corporation—and will be referred to as the City for the purposes of this document.

**Change Order (CO)** – Change orders are written amendments to the contract and are typically used for contingencies, change in the work, extra work, additional work, and obtaining credit for deleted scope. For further details, refer to the General Conditions of contract.



**Construction drawings** – Construction drawings are created from the tender drawings, modified to incorporate any changes from addenda that were issued during the tender process. Construction drawings are issued after the tender has closed and are the ones used at the construction stage. They will consist of one paper print of the approved design drawing with changes or corrections made as required.

**Consultant** – Consulting engineering firm retained by, or on behalf of the City. This referenced may also include municipal staff depending on the context.

**Contract Administrator** – The individual or firm responsible for overseeing the construction of the works and representing the City's interest.

**CWPP** – Capital Works Projects Procurement and Administration Procedures Manual, December 2007 edition.

**Engineer** – The licensed individual or firm responsible for the design of the works or their designate. Also may be referred to as the design engineer.

**ESA** – Electrical Safety Authority

**Field Instruction (FI)** – Instructions that provide information or requests to the contractor or to authorize minor variations to the contract documents that do not impact schedule, scope, cost, or design.

**GC** – General Conditions of Contract

**MECP** – Ministry of the Environment, Conservation and Parks for the province of Ontario. Formerly known as the Ministry of Environment and Climate Change (MOECC).

**MTO** – Ministry of Transportation for the province of Ontario.

**Municipal Class EA** – Municipal Class Environmental Assessments undertaken by municipalities which can vary in their environmental impact, such that the projects are classified in the Class EA in terms of schedules.

**OHSA** – Occupational Health and Safety Act for the province of Ontario.

**OPSS** – Ontario Provincial Standard Specifications

**Quality Control (QC)** – means a system or a series of activities performed by the contractor to ensure that materials supplied meet the specified requirements.

**Quality Assurance (QA)** – means a system of activities carried out by the owner to ensure that the materials received meet the specified requirements.

**Record drawings** – is a document created to accurately reflect as-constructed, as-built or as-fabricated conditions and that has been sealed by a professional engineer after verifying that the document is accurate. They are usually retained to meet business or regulatory requirements.

**Red Line Drawings** – refers to mark ups on a drawing, made in the field showing how something was actually constructed. Their purpose is to indicate where there were deviations or additions from the design drawing. The red lined drawings are used to produce as-built drawings.

**Request for Quotation (RFQ)** – RFQs are typically used to obtain detailed pricing and scheduling information on the scope of work when there is an anticipated change in work, extra work, or additional work. RFQs are prepared by the contract administrator and provided to the contractor.

**RoDARS** – Road Disruption Activity Reporting System is a report which notifies all emergency services such as police, fire, ambulance and so on, must also be submitted enabling these services to adequately plan alternate routes in the event of an emergency. The RODARS form is also sent to the city dispatch, traffic services and the TTC for their information.

**Sealed** – means a document is signed, dated and bears an impression of the professional engineer's stamp. The seal implies that the professional engineer attests to the completeness and accuracy of the document.

**Shop Drawings** – A drawing or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator. Shop drawings are typically required for prefabricated components, and are an example of a construction submittal as prescribed in the contract documents.

**TRCA** – Toronto and Region Conservation Authority

**TSSA** – Technical Standards and Safety Authority

**TTC** – Toronto Transit Commission

**Total Float** – is the amount of time the scheduled activity can be delayed or extended, without delaying the project's finish date.

**Water/Sewer Card** – a form filled in by the inspector or assistant inspector showing the location and physical details of the water service or sewer service installed by the contractor.

**WSIB** – Workplace Safety & Insurance Board

# **City of Toronto**

Engineering and Construction Services  
North York Civic Center  
5100 Yonge Street, 4th Floor  
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M2N 5V7

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