FIELD SERVICES MANUAL

ENGINEERING

November 2025

Table of Contents

1.0 Introduction

This Field Services Manual is for project managers in the City's Engineering Department to use and refer to when carrying out responsibilities on infrastructure projects such as; watermains, sewers, roadways, trails, bridges, and facility related construction projects such as storm water management facilities.

The purpose of this manual is to provide a source of knowledge and expectations for the Consultant inspector and/or contract administrator, and the City's project manager as their duties are carried out during construction.

This manual will allow an understanding of 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, the Contract Administration Manual, and the contract documents. This manual does not have precedence over the contract documents. Inspectors, contract administrators, and the City's project managers should fully review all contract documents, applicable specifications, special provisions, and drawings to ensure compliance with all contract requirements.

Manual Outline:

- **Section 1 - Introduction**

- **Section 2 – Project Team:**
  - Covers the roles and responsibilities of City staff, primarily project managers; Consultant staff such as inspectors and contract administrators; and Contractors.

- **Section 3 – Project Control:**
  - Monitors project progress while ensuring project cost-effectiveness. Establishing key performance indicators (KPIs) helps in measuring success and addressing delays.
  - Project controls are processes for gathering and analyzing project data to keep costs and schedules on track. Includes the purpose of meetings, what should be discussed at pre-construction meetings, progress meetings, joint health and safety meetings, activities that could impact the construction schedule.
  - Documentation of issues, and conflict resolution procedures.

- **Section 4 – Communication and Change Management**
  - Establishes a robust communication protocol throughout the project life cycle. This section covers the importance of communication between all parties, telephone conversations, emails and formal documents.
  - Outlines purpose of contractor administrator and project manager site visits, documentation of meeting minutes.

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

❖ **Section 5 – Field Construction Procedures**

- Includes filing system structure.
- The importance of recording facts on daily and weekly reports.
- Materials quality assurance testing tasks and how to deal with deficient materials or equipment.
- Procedures and protocols for: contractor submittal review, deficiency lists, as-built drawing requirements, tree protection, contract payment, and substantial performance.
- Project closeout procedures including: rectification of all deficiencies for final completion and inspection.

❖ **Section 6 - Appendices**

- **Appendix A – Forms Inventory:**
  - Contains a list of forms referred to in this manual to be used by inspectors, contract administrators, and project managers.
- **Appendix B – Inspection Tasks**
  - Provides 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 from contract administrators and project managers.
  - Summary of testing protocols related to ready mixed concrete, hot mixed asphalt, granular aggregates, imported earth, and crack filing material.
- **Appendix D – As-Built Drawing Guidelines**
  - Provides an explanation of the differences 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 such as storm or sanitary sewers, or combined sewers, watermains, stormwater management facilities, transportation assets, and other utilities.
- **Appendix F – Utility Inspections**
  - Contains the activities the site inspector is responsible for when inspecting the work of utility companies

- **Appendix G– Weight Verification Protocol**
  - Contains the protocol outlining the scope and procedures for weight verification for construction materials that are priced based on weight in City construction contracts.
- **Appendix H – Health and Safety**
  - Includes the roles and responsibilities of inspectors, contractor administration staff, project managers.
  - Outline of personal protection, expectations, incidents, accidents, safety contraventions, violations, and the emergency response protocol.
- **Appendix I – Filing System for Design and Construction of Capital Project**
  - Reflects an approved design and construction folder filing structure for maintaining in an organized fashion all information/data on a project inclusive of background information, different phases of a project (pre-design, detailed design, construction, and post construction), financials, consultant procurement, project correspondence including reports and photos, tendering phase, contract specifications and drawings, and Committee/Council reports.
- **Appendix J - Watermain Testing Information Package Revision 3.0 (January 2023)**
  - This information package covers the cleaning, disinfection, hydrostatic testing, and sampling of watermains.

2.0 Project Team

Site Inspection in General

Continuous monitoring and real-time adjustments are essential to ensure the smooth progress of work. Site inspectors should proactively identify potential risks and mitigate issues before they escalate.

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

The main duty of an inspector is to protect the interest of the City while ensuring 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 laws, statutes, and regulations, and for performing 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.

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

2.1 External Service Provider (Consultant)

2.1.1 Site Inspector

When an external service provider is involved in a project, they act as the owner's representative and carry out all the duties/tasks as stated in the Request for Proposal (RFP) and consulting services agreement for the project. On these projects, the external service provider, for construction purposes, will consist of, at least, contract administrator and a site inspector. The site inspector is sometimes referred to as the resident inspector, field inspector, or resident engineer.

The City project manager, contract administrator and the site inspector should meet prior to construction start-up to discuss project specific requirements. Some of the activities that the site inspector is responsible for are as follows:

- **Inspecting** work for conformance with the contract documents and preparing daily and weekly inspection reports
- **Maintaining critical documentation** such as:
    - Maintaining project field documentation according to *Section 5 – Field Construction Procedures* of this manual
    - Creating water or sewer service cards or both

- Compiling information with regards to all field changes, as it relates to Change Orders (COs); and red line information on the contract drawings for as-built drawing preparation

- **Coordination**: coordinating construction activities such as testing, pre-engineering work, utility work and operation of City watermain valves by Markham Waterworks Operations with contractor's field supervisors, operations staff, and testing companies contracted by the City of Markham.
- **Payment:** measuring and documenting quantities of work completed for payment purposes. Verifying work progress and assisting in reviewing contractor's pay request where applicable.
- **Scheduling:** informing the contract administrator on the contractor's method of construction and progress.
- **Materials and Testing:** coordinating and observing materials testing, sampling, collecting tickets, weigh bills, etc...
- **Meetings:** attending pre-construction and subsequent progress meetings and, at times, assisting the contract administrator with taking meeting minutes.
- **Project Management:**
    - Assisting the contract administrator with change management process, submittal process, progress payments, information from the field, health and safety issues observed in the field, and any other information/data that is relevant.
    - Developing deficiency lists/log with the contract administrator and the contractor and conducting post-construction inspections with assistance of the client groups and pre-end of warranty inspection.
- **Public Relations:** responding to the public and directing them to the proper authority
- **Warranty:** conducting or assisting with warranty inspection prior to the end of the warranty maintenance period.

2.1.2 Contract Administrators

The City's project manager must ensure that the contract administrators have knowledge and are in compliance with the various terms of the construction contract.

The consultant's contract administrator must work with the City's project manager throughout the project as defined in the RFP. Details of roles and responsibilities are outlined in the RFP and in the consulting services agreement for the project.

Generally, the City's project manager 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 contract administrator shall lead the progress meetings with the contractor and the City project manager and after each meeting, meeting minutes shall be

submitted for the City's review and approval. The contract administrator performs the reviews and makes recommendations to the City's project manager on a variety of items such as contractor payments, contract modifications, change directives, and change orders; for the City to provide the final approvals. The contract administrator must be an active participant in all meetings and communications.

The City's project manager and contract administrator must ensure that the general contractor provides an authorized representative on the project at all times that is knowledgeable and has the authority for making decisions. Insufficient work directions and delays could result due to absence of the contractor's representative on site for decision making purposes.

The contract administrator is responsible for a number of tasks related to management of the project contract. He/she provides functional direction to the site inspector and is accountable for all matters related to the project in accordance with the contract documents.

The following provides a list of some of the **activities** that the **contract administrator** is responsible for:

- Provide project oversight; manage project within scope, budget, schedule, and report project progress to City management.
- Maintain all documentation such as;
  - All project documentation inclusive of emails
  - Review site inspector's daily and weekly reports
  - Ensure that documentation prepared by inspectors is in compliance with the most recent directives from the City's Engineering Department
  - Ensure all inspector submittals are saved electronically
  - Certify substantial performance and total completion
  - Oversee the commissioning process, close out procedures, deficiency rectification and warranty terms.
- Ensure inspector's health and safety is protected as required by OHSA and the City's policies
- Chair meetings such as pre-construction, progress, schedule, specific issues meetings, prepare and circulate meeting minutes.
- Change Management: Process contract changes per the change management protocols as identified in *Section 4 – Communications* of this manual and as per the Contract Administration Manual
- Payment Processing:
  - Review, recommend payment, and process contractor progress payments. In addition, ensure all appropriate permits have been obtained by the contractor; for example, road cut permits
  - Ensure that all final calculations are checked for accuracy and payment for items are completed in accordance with City requirements
- Materials and Testing:
  - Review third party testing reports and follow up with the contractor on non-compliance items with contract plans and specifications

- Developing and maintaining material testing logs to ensure rectification of items that were in non-compliance

- Coordination: Coordinate activities with other agencies, city divisions, and any other public liaison committee. Manage third party activities in consultation with the site inspector.
- 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

2.2 City Project Manager

The City's project manager manages the external service provider – 'the contract administrator'. The City project manager provides support and oversight along with final authorization on items such as payments and contract changes, upon receipt of recommendations from the contract administrator. The City project manager also liaises with internal and external clients (or stakeholders).

The City's project manager must review and be familiar with the RFP terms and conditions, as well as the technical and financial proposal from the consultant. This is to ensure that the consulting assignment can be managed in accordance with the scope and the terms and conditions of the consulting agreement.

The City project manager 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 Contract Administration manual is to be followed.

The City project manager must review and be familiar with the construction contract – specifications and drawings. This is to ensure that the construction contract is managed in accordance with the executed contractual agreement between the City and the contractor.

2.3 Contractor

The contractor is required to fulfill the obligations as outlined in the contract documents and specifications within a given schedule and price. The site inspector must ensure 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 contract administrator and the City's project manager prior to being implemented.

It is the contractor's responsibility to direct their staff and subcontractors. A site 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.

3.0 Project Control

3.1 Meetings

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

- Pre-construction meetings
- Progress meetings
- Project schedule and risk workshop meeting
- Pre-concrete pour meetings
- Pre-pave meetings
- Joint health and safety meetings or tailgate meetings or both – chaired by the contractor
- Public information meetings
- Councillor information meetings – chaired by City PM or City representative

The schedules for meetings are dictated by the project complexity. The meeting type and frequency is pre-defined in the RFP. Items to be discussed in meetings can include the following:

- Summary of contractual milestones
- Project Schedule and 2-week lookahead schedule
- Project Risks
- Overview of work completed within a certain period – provided by the contractor
- Recommended course of action(s)
- Protocol for construction changes – change management
- Project financial status
- Health and safety
- Tree protection
- New business/issues

The contract administrator defines and invites stakeholders, schedules the meeting, prepares meeting agenda and circulates for approval / modifications. The contract administrator chairs the meetings and records minutes with copies disturbed to all attendees, the project team, and other key personnel. The site inspector may assist, by taking meeting notes, with the full meeting minutes performed by the contract administrator. A copy of the meeting minutes should be circulated for review and comments to all attendees and changes or revisions noted. A copy of the final meeting minutes should always be included in the project files. The final meeting minutes becomes a part of the contract.

3.1.1 Pre-Construction Meetings

A pre-construction meeting is required to outline and discuss administrative procedures and define responsibilities of the City, consultants, contractors, and subcontractors 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 template, Form A23, is attached in Appendix A – Forms.

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 for pre-pour and pre-pave meetings. The pre-construction meeting is typically held after the contract is awarded but before the commencement of any work on the contract.

The contract administrator arranges the time and location, prepares a list of attendees, and sends out meeting notices to all involved parties. Project drawings, documents, design information, environmental data, templates, horizontal and vertical control, construction notices, City of Markham's health and safety requirements, 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 disturbing the minutes. The agenda can be revised as appropriate for the contract. At the start of the meeting, an introduction of all attendees should be conducted, which is to include the following:

- Name
- Company
- Role (position), and responsibility
- Business cards distributed to all
- Emergency contact list distributed to all
- Identification of key stakeholders for the project
- Setting up the communication protocol

Sample contact information sign-in sheet is provided below:

Contact Information Sheet						
Name	**Company**	**Position**	**Work Number**	**Cell Number**	**Emergency Number**	**Email**

3.1.2 Progress Meetings

Progress meetings are typically held continuously throughout the duration of the project. The frequency of the progress meetings may vary depending upon the complexity and length of the project. The frequency can also be specified in the RFP/RFT.

Progress meetings can address a number of topics and are typically held to discuss project progress, schedule, resolve issues, plan activities in advance, and encourage open and upfront communication to develop and maintain a cordial working relationship amongst all parties. The following provides a list of some items that could be discussed at progress meetings:

- Review of previous action items
- Contract administration issues such as progress payments and contract changes
- Construction schedule: the overall schedule and the contractor's weekly or biweekly plan
- Safety issues
- Coordination of issues between construction, operating departments in transportation and water, external service providers such as material testing companies, utilities, general public, etc.
- Construction submittals
- Change order document status
- Inspection and testing
- Status of permits; for example, road cut permits
- Subcontractor status
- Deficiency items
- Third party or public complaints
- Engineering surveys
- Vehicular traffic and pedestrian access

Progress meetings are chaired by the contract administrator and are attended by the City's project manger, the site inspector, and key contractor personnel. City operations staff and other key personnel and stakeholders may attend as requested. Meeting minutes with action items should be prepared and distributed for each meeting.

At the completion of the project, a final progress meeting should be held to wrap up the project and close out any issues.

3.1.3 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 documentation between parties
- Demonstration of a safety conscious work environment
- Identifications of expectations for safety on site
- Provides an opportunity to resolve outstanding issues

Significant health and safety issues in the field that require immediate attention should not be left until the next joint health and safety meeting to be discussed. In this regard, the Constructor is responsible to convene the health and safety committee to discuss the issue(s) as soon as possible.

With the City not as 'Constructor', the contractor is to designate a competent person on site to act as supervisor to fulfill the requirements of OHSA. The site inspector should attend the joint health and safety meetings as an observer only. The site inspector may participate in coordination efforts such as contacting the operations department for water valve operations. Attending these minutes will also help the inspector to determine the level of safety culture from the contractor. The contractor chairs the meeting and prepares meeting minutes; however, the site inspector and contract administrator should ensure that they receive agendas and meeting minutes from these meetings.

Where the City is known that it could take on the role of Constructor prior to the tendering of a project, perquisite and detailed discussions/meetings are to be convened with the capital delivery staff involved with the project inclusive of the City's Senior Health and Safety Specialist, Director of Engineering, Commissioner, City Legal, and CAO. Under no circumstances should the City's Project Manager be designated as the Constructor for the project. The Constructor role requires extensive knowledge and health and safety training which most probably would be the City's Senior Health and Safety Specialist personnel being fully aware and knowledgeable in fulfilling the requirements of OHSA.

Irrespective of the above, the City's capital delivery staff and its consultants must make every effort to avoid the City becoming constructor on a project.

Where the Contractor is the Constructor and health and safety issues/concerns are viewed on site, there are actions that can be taken either by the City's project manager, site inspector, or contract administrator. These actions have been outlined in Appendix H - Health and Safety, specifically section entitled, Safety Contraventions and Violations – refer to Appendix H.

3.2 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 schedule may change during the course of the project and the contractor is required to update the affected schedule activities as required for the project. The project schedule must be created with a City approved scheduling software such as Microsoft Project. The Microsoft

Project file for the schedule must be reviewed and approved by the contract administrator to ensure the correct parameters are used.

The City's project manager, contract administrator, site inspector, and contractor use the schedule as a tool to:

- Monitor the project progress vs. the scope of work to assure the project is executed on-budget and within the timeline.
- Undertake corrective actions when the project is behind the schedule (parallel tasks vs. Compressing the schedule).
- Evaluate the impact of change requests with respect to schedule.
- Aid in coordination of scheduled events and specified milestones.
- Identify and coordinate operations with construction activities and with third parties, such as utilities, regulatory bodies, etc.
- Communicate project status to stakeholders.
- Identify float time, potential delays, and potential application of liquidated damages.

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

A list of some activities that could impact schedule is detailed below. These examples provide the site inspector with activities that should be looked for and noted in the daily reports.

- Changes in the contractor's workforce
- Insufficient contractor's workforce, equipment or materials
- Equipment breakdown
- Failure of contractor and subcontractor to show up on time
- Delivery of materials
- Unforeseen conditions
- Inclement weather changes
- Utility locates and mark-ups
- Change of subcontractor(s)
- Change in soil and ground water conditions
- Non-compliant or failed materials tests
- Changes in the work; for example, modified or additional work
- Lack of coordination from third parties, such as agencies, utilities, regulators, testing companies
- Health and safety issues
- Regulatory approvals or orders
- Design issues
- Public relations
- Labour disputes, strikes, lockouts, or other unforeseen disruptions

- Archaeological finds
- Changes in construction method

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

3.3 Conflict Resolution Procedures

During any project, differences of opinion regarding contract responsibilities, contract language, budget, schedule, and contract interpretation can occur between the contractor and the contract administrator or site inspector or both. The initial level of conflict resolution is between the contractor and the contract administrator and site inspector. The representatives should discuss any issues that arise during construction that they believe they are authorized to resolve. Any issue undertaken at this level must be resolved in a timely manner and the City's project manager kept informed. If the resolution requires a higher level of authority, such as if it affects design, cost, schedule, or scope of work, or if the issue cannot be resolved quickly, this issue must be forwarded to the City's project manager for discussion/analysis and course of action(s).

It is critically important to document the issue and resolution in its entirety in the Inspector's Daily Report regardless of how simple the issue may appear. This information must also be communicated to the contract administrator and the City's project manager as soon as possible via email message followed with a formal correspondence. A sample of the Inspector's Daily Report, Form A1, is attached in Appendix A – Forms.

Some possible conflicts that could impact the work are:

Conflicts the contract administrator and site inspector could deal with independently;

- Compliance with the work in accordance with the contract documents. This may include
  - Defective or incomplete work or materials
  - Work sequence or rate of production
  - Access to work or public access
- Property damage
  - Notification to contractor
  - Notification to city's project manager
  - Direct public to the city's claim process; all claims to be submitted to claims@markham.ca with information as identified in Section 4 – Communications – 4.2.6 public relations

Conflicts where immediate notifications to the City's project manager is required;

- Conflicts can include any unresolved items as listed above
- Scope
- Design changes
- Cost

- Schedule
- Changes to quantities
- Quality issues unresolved in the field
- Health and safety issues
- Contract interpretation

When there is a private property damage issue, the inspector/contract administrator must inform the contractor to correct the problem. If the contractor does not believe they are at fault, the contract administrator should refer the dispute to the City's project manager. The inspector must document the issue and take any photographs as necessary. If the contract administrator and City project manager determine that the claim may be legitimate, the City's project manager may suggest to the private property owner to submit a claim. The City's Insurance and Risk Management should be notified of an impending claim and provide details of the potential claim.

4.0 Communication and Change Management

4.1 Communications

A strong communication protocol between all parties is critical to the success of any project. Contract Administrators and Site 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 be given to authorized contractor personnel such as the supervisor or site superintendent. Instructions should never be given to the contractor's subcontractors. Important instructions should be provided in writing, email or formal correspondence. Instructions for minor issues, such as those that do not impact schedule, budget, scope or design, may be verbal after confirmation is received from the contract administrator. All verbal instructions must be recorded in the inspector's daily report. The minutes of each progress meeting should be prepared by the contract administrator, and after the meeting should be circulated to the attendees for review and input. Upon agreement of the meeting minutes by all attendees, the final version will be provided to the City's PM for his/her record. All meeting minutes become a part of the contract and are binding.

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

All correspondence, transmittal of drawings, and information from the contractors and vendors should be submitted directly to the contract administrator. Hard copies of all documents are to be scanned, and PDF versions are to be maintained and provided to the City's Project Manager for filing.

The site inspector must notify Markham Waterworks Operations directly for the coordination of valve and hydrant operation. The contractor should not contact Markham Waterworks Operations directly; rather he/she should be instructed to contact the inspector on the site for any valve opening/closing needs.

For any other issues that need to be discussed and/or coordinated with other departments, the site inspector / contract administrator should coordinate with the City's Project Manager.

4.1.1 Telephone Conversations

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

- Cost
- Schedule
- Scope
- Health and safety
- Operations impact
- Contract interpretation
- Requested information

- Quality assurance results – e.g.; materials testing

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

4.1.2 Contract Administrator's Site Visits

Contract administrator's site visits are typically limited and are based on the project's needs. The purpose of site visits can include:

- Minimum biweekly progress meetings
- 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
- Participate in contractor's performance evaluation
- Others as required

The contract administrator visiting the site should initially meet with the site inspector to review procedures and goals of the visit. Before leaving the site, the contract administrator should debrief the site inspector on any issues brought to the attention of the contract administrator. The site inspector should then log in the daily report the purpose of the site visit, any engineering issues or observations, requested actions, and proposed solutions. For details on preparing reports, see section on Daily and Weekly Reports under Section 5 of this manual.

4.2 Issue Management and Contract Modifications

This section will summarize the different approaches to be taken to manage project issues that can lead to potential contract modifications. Project issues can typically occur by various means as described below.

4.2.1 Changes in the Work

The deletion, extension, increase, decrease or alterations of lines, grades, dimensions, quantities, methods, drawings, changes in the character of the Work to be performed or materials of the Work or part thereof, including changes in geotechnical, subsurface, surface or other conditions.

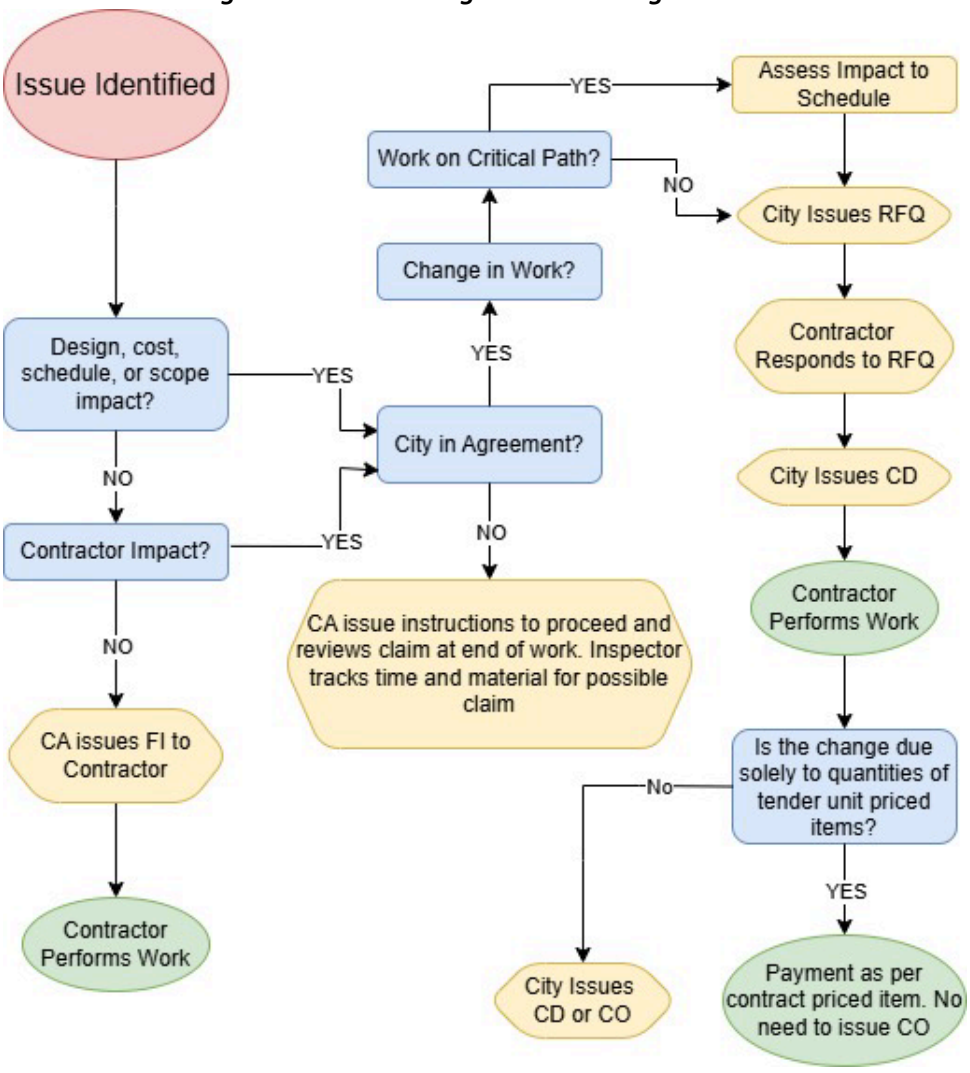
The process flow for issues identified and the appropriate process to be taken is shown below.

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)
- Change Order (CO)

Detailed descriptions and process flow diagrams are provided in this section. These diagrams/figures are for information purposes only.

Figure 1 - Issue Management & Change Process



4.2.2 Field Instruction (FI)

The Field Instruction form, Form A4, (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 either the site inspector or the contract administrator.

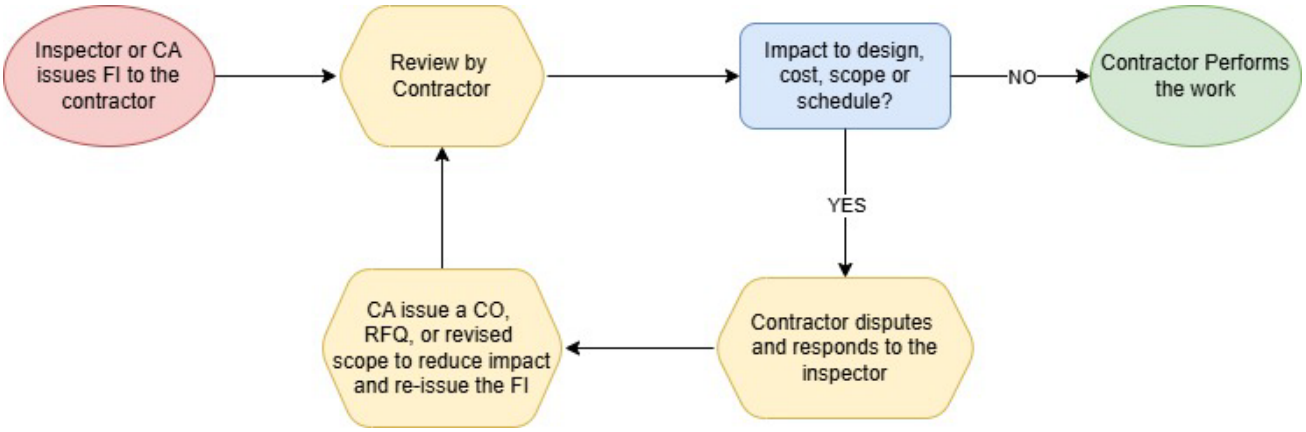
Field instructions may be issued with an email message provided the same information as required on the form is captured and that the email message is printed and attached to the daily reports for the day it was sent.

If the contractor disagrees with the field instruction information, the inspector and the contract administrator must discuss with the contractor as to the reasons followed by evaluating other options for having the work performed. This can include 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 Figure 2 below:

Figure 2 - Field Instruction (FI) Process



4.2.3 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. If the change in the work relates solely to

quantities of unit price work items in the tender call, payment for the work shall be made according to the tender price items. If the change in the work does not relate solely to quantities of unit price work items in the tender call, the contract administrator with concurrence with the City's project manager shall issue a change directive.

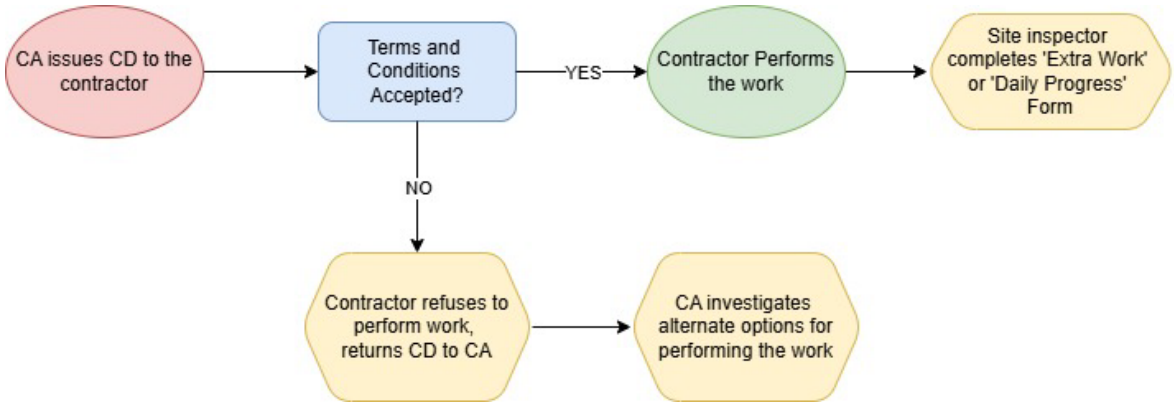
The contract administrator will finalize in written form and issue the change directive as soon as possible. Third part agreement should be sought prior to the change in work starting, if required and if possible.

For unit price contracts, a change directive (CD) should be issued for each item that quantities exceed the base quantity identified in the tender document. The CDs are issued to monitor and track the base unit priced items in the contract which are exceeded. Nearing completion of a contract, a reconciliation of the overruns and underruns of unit price work item quantities must be performed to determine if the base price of the contract has been exceeded. The base value of a contract excludes contingency allowance and provisional items. Subsequent to the reconciliation, a Change Order can be issued for the overall net value of the overrun work items.

For works performed on a Time and Material (T&M) basis, the inspector must document manpower, materials, and equipment, inclusive of hours worked, on a daily basis on the 'Changes in the Work' form, Form A3, in order to track and verify progress, and facilitate contractor progress payments. For extra works performed on a negotiated lump sum or negotiated unit price basis, a separate Daily Progress Report form can be completed for tracking and verification of progress and facilitate progress payments.

The change directive process is shown in Figure 3 below.

Figure 3 - Change Directive (CD) Process



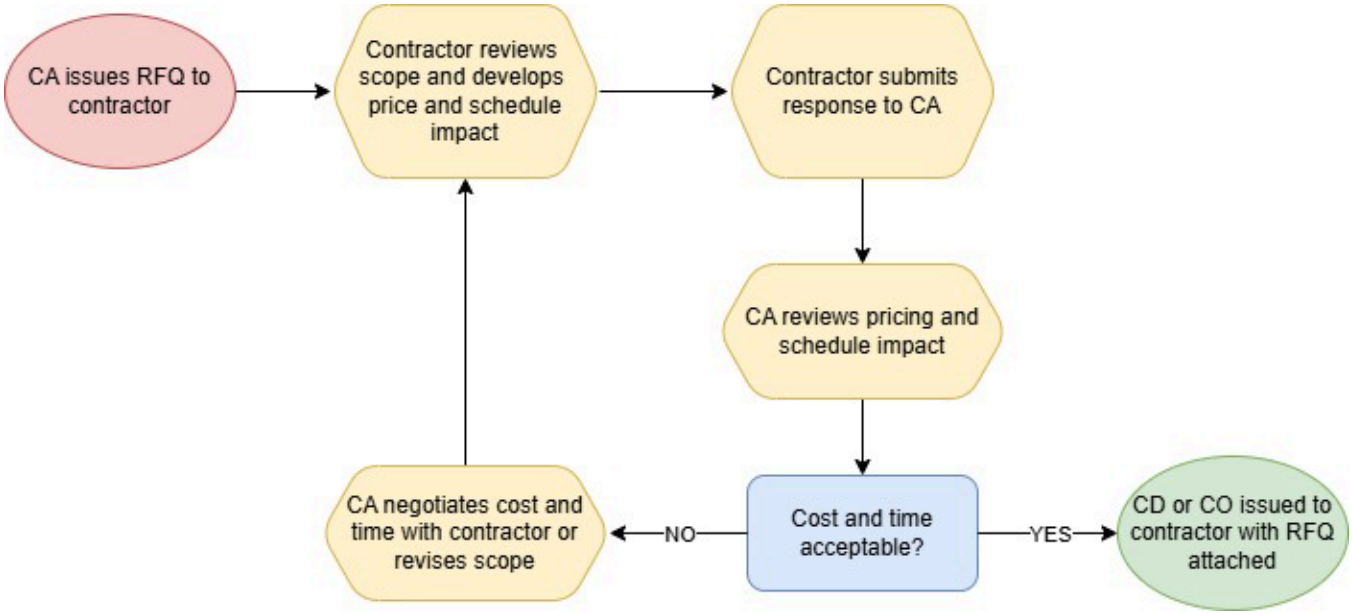
4.2.4 Request for Quotation (RFQ)

The RFQ, Form A5, in Appendix A, is prepared by the contract administrator and provided to the contractor. 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 contract administrator is to provide sufficiently detailed information/data on the changes for the contractor to fully understand the scope of work and to be able to submit a realistic price and time impact to perform the change in work. This can be sent attached to an email message. Turnaround times for RFQs are to be specified on each RFQ. A Change Directive or a Change Order must be issued prior to the change in work commencing.

The RFQ process is shown in Figure 4 below:

Figure 4 - Request for Quotation (RFQ) Process



4.2.5 Change Order (CO)

Change Orders are written amendments to the contract and are typically used for change in the work, and obtaining credit for deleted scope. All engineering or technical revisions to the contract documents involving changes to the design, contract cost, contract times, or other conditions of the contract, if the change does not relate solely to quantities of unit price work items in the tender call, must be documented and approved using the Change Order form, Form A10, in Appendix A.

Change Orders are prepared by the contract administrator in conjunction with the Contract Administration (CA) Manual. The CA Manual provides detailed information on the City's internal designated signing authorities that are required prior to issuing the Change Order.

Supporting documentation, such as an RFQ, should be used by the contract administrator to provide detailed scope and pricing information for the change in work to be performed. Other supporting documentation, such as a Change Directive, can also be used as information for the contract administrator to develop the change order. Any other relevant supporting information available such as photos, emails, sketches, etc., should also be appended to the change order.

The Change Order should clearly and concisely address the following:

- What was included in the original scope of work, and the new detailed scope of work to be performed as part of the change order
- Identify the change in work – answer the 5Ws – who, what, when, where, how, and why. The rationale identifying "why" should be documented separately and not attached to the documentation provided to the contractor.
- Define warranty terms and conditions.
- This is where a Briefing Note (BN) is very beneficial to fully explain all the 5Ws, particularly the "why" of the need for the change order. BNs are for internal use only and not forwarded to the contractor or the contract administrator
- Precise locations of the work with station-to-station limits and offsets. Detailed photographs, drawings, sketches, etc. may be attached
- When the work is scheduled to be performed including project milestones, if appropriate, working days or completion dates
- Time impact including all impact costs
- Time extension to the contract
- Reduction and deletion of existing tender item quantities as a result of the work on the change order
- Change Order summary sheet

A copy of the Change Order and supporting documentation (except for the BN) must be provided to the site inspector. The site inspector uses the information to inspect the change in work performed by the contractor.

For works performed on a Time and Material (T&M) basis, the site inspector must document labour, materials, and equipment – including hours work for each component – on a daily basis and identify

such data on a Report of Changes in the Work form, Form A3, in Appendix A. As this is extra work, the monitoring of change in work must be kept separate from the monitoring of the base contract work so as to verify the progress for the change in work and facilitate associated contractor progress payments. The site inspector must review and certify the contractors T&M timesheets and must be in agreement with the inspector's records.

For works performed on a negotiated lump sum or negotiated unit price basis, the Report on Changes in the Work form should also be used for monitoring progress and verification of progress payments. The measurement for change in work should also be reviewed for calculations, errors and omissions, and adequacy of supporting documentation.

For T&M work, the contract administrator must ensure that the contractor completes and submits the contractor payroll burden form, and other applicable mark-ups, which should then be attached to all T&M change orders as support documentation. The payroll burden value is to be determined in accordance with the contract documents. T&M tracking forms is included in Appendix A, Form A18.

Costs associated with all change orders will need to be monitored to ensure that the originally approved costs are not exceeded. If the total cost of a change order is expected to be exceeded, particularly on T&M work, a new change order must be prepared once the original estimate or quote is expected to be exceeded. The appropriate designated signing authority must be obtained based on the revised total cost of the change in work. *Under no circumstances should a change order be issued after all the work is completed.*

Contractors are required to submit monthly invoices for work performed under a change order for payment based on unit quantities or T&M. If the invoice contains errors, requires corrections or if the final amount of work performed is different from the invoice provided then an updated invoice must be submitted by the contractor. The invoice must include T&M timesheet record signed and certified by the site inspector. The contract administrator must discuss the adjustments and/or revisions to be made with the contractor prior to the submission of an updated invoice.

4.2.6 Public Relations

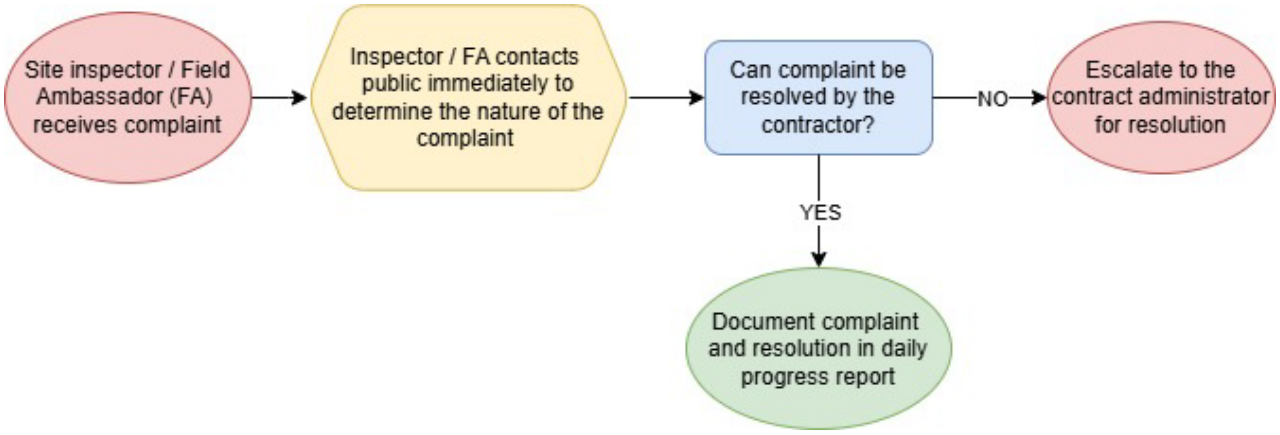
The consultant's site inspectors and contract administrators are representatives of the City of Markham. On a project, contractors may also be perceived by the public as representatives of the City – which they are not. As such, the public perception of the City is developed from the actions and the 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.

All media requests or questions should be directed to the contract administrator, who will then forward the request to the City's project Manager.

When a public complaint is made, the site inspector or field ambassador, if one is being utilized on the project, 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 site inspector in the daily progress 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. Figure 5 below outlines a workflow for the complaint process:

Figure 5 - Complaint Process



If a resident has a complaint regarding damages to their property or bodily injury resulting from construction, the resident or business owner can submit a claim to the City in accordance with the City's claim process.

A member of the public can submit a claim via an email to the following City address for claims:

➔ claims@markham.ca with the following pertinent information:

- Contact information – name, telephone number, address, email address
- Date and location of incident
- Details of incident
- Photographs of incident and damages
- Copy of invoice

4.2.7 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. It is the site inspector's role to monitor the contractor to ensure compliance to the contract.

4.2.8 Spills Response

All spills aside from regular collection of rainwater must be reported to the contract administrator immediately for follow up with the City to respond according to applicable legislations and procedures.

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

5.0 Field Construction Procedures

5.1 Filing System

A master project file is maintained by the capital delivery section in the Engineering Department of the City of Markham. A template of the project filing system tree is included in Appendix I for ease of reference. A digital copy of the folder tree maybe shared upon request.

5.1.1 Contract Administration File:

Folders on tender documents, bid analysis, low bidder, purchase requisitions, purchase orders, purchase order amendments, permits, RFIs, RFQ, schedules, etc.

The site inspector should maintain a similar temporary file structure for all documentation in the field. The site inspector may collect and manage a significant portion of the Construction File and must ensure that all documents are forwarded to the contract administrator. 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, all documents must be forwarded to the contract administrator. The contract administrator will review and submit the materials to the City's capital delivery section or the City's project manager for the particular project being undertaken for incorporation in the project files.

5.2 Daily and Weekly Reports

Each site inspector must prepare a daily report for each workday at the project site so that events of the day may be recreated by those not on site, but also 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 contract administrator when they undertake site services. The site inspector must also complete a weekly inspection summary report based on the daily reports.

The weekly report and supporting daily reports must be submitted to the contract administrator. Each daily report must be supported by weigh tickets for all material delivered to the site and on an Excel spreadsheet showing the total quantities for the respective tender items where applicable. The contract administrator must review and confirm the quantities based on information received from the site inspector and field test reports. The inspector's Daily Work Report, Form A1, and Weekly Work Report, Form A2, are provided in Appendix A - Forms.

Daily and weekly work reports are to be signed-off by the site inspector and contractor. If the contractor declines to sign the daily work report, the site inspector will record in the report, and in their daily log book, that the contractor has been shown the report or advised of the contents of the report. If necessary, to resolve a quantity disagreement, a re-measurement of the applicable quantities in question should be performed with the contract administrator and the contractor. The site inspector shall complete daily work

reports for changes in the work completed under either on lump sum, unit price, or on time and material, and the site inspector and contractor shall sign-off the same.

Site inspectors should use an additional page attached to the daily work reports to record additional remarks pertaining to various payment and non-payment related activities that may have occurred and observed by the site inspectors on site and to provide comments, if necessary, to support and supplement the site inspector's daily work report. Site inspectors are required to sign the "additional remarks" page as part of their submission. The contractor does not view nor co-sign the "additional remarks" page.

Both the site inspector and the contractor are required to sign reports for changes in the work and the reports can be used as a reference document for payment. The site inspector should notify the contract administrator on any provisional work performed on site by noting it on a separate daily work report. All work done as a result of a change in the work must be approved by the contract administrator and the City's project manager prior to any work starting.

Daily work 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 daily work reports shall be made when work is done on each individual location. The **daily work report** should contain the following information:

- Report every workday and account for every calendar date. If no work is done on a given date, 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 provided."
- Report when Changes in the Work form has been used
- Include references to on-site conversations and telephone conversations; refer to Section 4 Communications
- 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 some examples of observations, tasks, and site activities that should be **typical report entries** – this not an exhaustive list of what could and should be recorded:

- Document repairs to existing or contractor damaged utilities using the Record of Damaged Services, Form A8 in Appendix A - Forms
- Report the number of construction employees, by trade, on the contract – both for the contractor and subcontractors.
- 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 meters of concrete, linear meters 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 change in the work (extra work) with the change directive reference number, if applicable.
- Report on use of paid duty officer including time, location, and duration.
- Refer to field tests and their results – pass or fail – and if fail, identify course of action. Collect and attach to daily reports copies of all field test results where the documents are provided by the material testing consultant. Ensure that the testing reports identify the name of the company, the number of people, type and number of tests, and time spent on testing and on site.
- Report on 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.
- Report on each time there is a significant change to the traffic control plan and work zone location has changed.
- Report on all visitors to the site, the reason for their attendance, time on site and instructions, directions or comments provided.
- 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

5.2.1 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 daily report, note the number of photographs taken each day with the appropriate time and a note as to what is in the photos. In general, photographs should be taken of the following conditions:

- Any site safety issues or other issues pertaining to negative contractor performance appraisals.

- Any changes to the type of shoring, tunnelling or sub-grade conditions
- Any time traffic control has changed from the previous day
- Prior to working at any location back of sidewalk such as from lawns or driveways
- Any obvious damage adjacent to the work location
- Underground work related to buried bends, anodes, compaction operations, etc.

5.3 Ministry of Labour Inspection Visits

The site inspector is to report all Ministry of Labour (MOL) visits to the site during construction, irrespective of whether the MOL inspector has taken any action or not. The MOL inspection and the details of the visits should be recorded in the site inspector's daily report. The site inspector should report the visits along with the details to the contract administrator who will then forward a copy to the City's Project Manager. In turn, the Project Manager is to provide a copy to the City's Health and Safety personnel.

5.4 Materials Testing

The contract administrator is responsible for developing an RFQ for materials testing for the project during construction. The final Terms of Reference is to be reviewed with the City's project manager prior to obtaining three (3) competitive quotes whose results are also to be reviewed with the City's project manager. The site inspector should have a copy of and be familiar with the Request for Quotation (RFQ) for the material testing requirements.

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

The site inspector is responsible for arranging material quality field assurance tests, including having samples picked up for laboratory testing. The contract administrator is responsible for review of all laboratory test results.

Site 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 program prior to the contractor conducting the work. The site inspector should inquire with the contractor in order to make the necessary arrangements for material tests.

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 material testing program and other contract protocols.

When materials are delivered to the site, the inspector or his or her designate must collect the ticket from each truck prior to discharge for weight-based payment items.

For all other items delivered to site, material tickets are to be collected and attached to the daily reports. 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 as discussed at the progress meetings.

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, etc., must be documented with a copy provided to the material testing company. The material testing company must also submit a copy to the contract administrator with the invoice.

A record of the field testing, sample preparation, and sample pick-up work should be recorded by the site inspector in the daily report. Information kept in the daily report should include time on the project, name of technician, and tests or samples taken with locations indicated. The testing technician should provide an immediate copy of the field activity report to the inspector before their departure. 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.

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. The contract administrator is to follow-up with all failed laboratory test results.

All defective work requires 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 log report.

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 place them on the deficiency list. Payment of the defective work should be withheld until the work is corrected.

All material testing results should be kept in a material testing quality assurance (QA) folder for easy retrieval by the contract administrator.

In general, material testing is required for the following:

- Gradation analysis on fill materials
- Sulphates testing of recycled concrete material
- Subgrade evaluation – bearing capacity, compaction testing, gradation
- Field compaction and moisture tests on in-situ and fill materials
- Asphalt compaction testing and Marshall test on hot mix asphalt
- Mold, cure, and break concrete cylinder specimens
- Slump test for cast-in place concrete
- Air content for cast-in-place concrete
- Concrete temperature for cast-in-place concrete
- Sample testing of mortar, grout, crack filling material
- Other test and samples requested by the contract administrator

5.4.1 Testing Required for Concrete and Asphalt Material

Contractor's Quality Control Plan:

The contractor's quality control plan must be submitted and reviewed, if required, as per the contract document. A copy of the reviewed and accepted plan by the contract administrator and the material testing consultant is to be provided to the inspector.

The inspector is to document instances of non-compliance with field tests and discuss instances of non-compliance with the contract administrator. Performances issues are to be reviewed with the contractor and should be documented on the contractor's performance evaluation form.

Concrete:

- All mix designs are to be submitted, a minimum of 5 working days, and reviewed by the material testing consultant ensuring that the process and the mix is consistent with the Ontario Provincial Standards Specifications (OPSS).
- Arrange for material testing as per the specifications and contract requirements. In general, the first three (3) loads per mix per day should be tested and cylinders cast, and until consistency is established, one for every slump test, and one for every strength test.
- Cast concrete cylinder samples for laboratory compressive strength test. Three (3) cylinders on the first load of the day, in general, and every 50$m^3$with no fewer than one test for each class of concrete placed on any one day.
- Check the delivery time of the load – time when the concrete was batched to the time the concrete was unloaded – not to exceed 1.5 hours (90 minutes).
- Check if the load is produced from concrete plant(s) that was specified in the contract, or the plants were agreed upon at the pre-construction meeting.

Asphalt:

- Review the contract requirements and discuss pre-paving issues such as traffic control plan, night time lighting, arrow boards, etc., at progress or pre-pave meeting prior to work commencing.
- Arrange for field testing and ensure availability of an infrared thermometer temperature gun and asphalt temperature gun for use when checking asphalt temperature.
- Ensure proof rolling and compaction testing are done on granular materials prior to the placement of asphalt.
- Ensure all other preliminary work is completed so that paving may proceed including casting adjustment, delivery of notifications, if required, and tack coat placement immediately prior and placement of line markings immediately after.
- Ensure the material testing consultant performs compaction tests on hot mix asphalt mat using nuclear density gauge as required under the specifications.

5.5 Watermain Testing Procedures – Disinfection and Hydrostatic Testing

Disinfection tests and hydrostatic leak tests are two (2) types of tests that can occur on a project. Prior to performing the tests, the contractor must prepare and submit a plan, a minimum of 48 hours, 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 Operations for valve coordination, such as valve opening/closing.

The Disinfection Test and the Hydrostatic Leak Test forms are completed by the contractor during testing. Information should be documented on the City approved forms that indicate who conducted the tests, when the tests were completed, location of the test, etc. In accordance with the City's requirements, Operations need to be present for all watermain tests and require 48 hours' advance notice. The Waterworks Operator and the inspector shall witness all cleaning, disinfection, hydrostatic testing and sample tests and the inspector is to record the observations in the daily report.

Refer to Appendix J - Watermain Testing Information Package Revision 3.0 (January 2023), City of Markham

5.6 Construction Submittals

Any submittals provided by the contractor should be submitted to the contract administrator for review and as required. The contract administrator must **date and log** all submittals and provide a copy of the approved submittal to the inspector. The site inspector should provide information to the contract administrator, as requested, to aid in the approval process.

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 monthly schedule submittals accompanying the contractor's monthly payment application, hard copies and pdf version of the schedule shall be submitted as required per the contract documentation.

Examples of submittals can include:

- Shop drawings
- Construction schedules
- Equipment warranties
- As-built drawings
- Utility locates
- Ministry of Labour reports
- Traffic control plans
- Operation and maintenance manuals for equipment

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 following information:

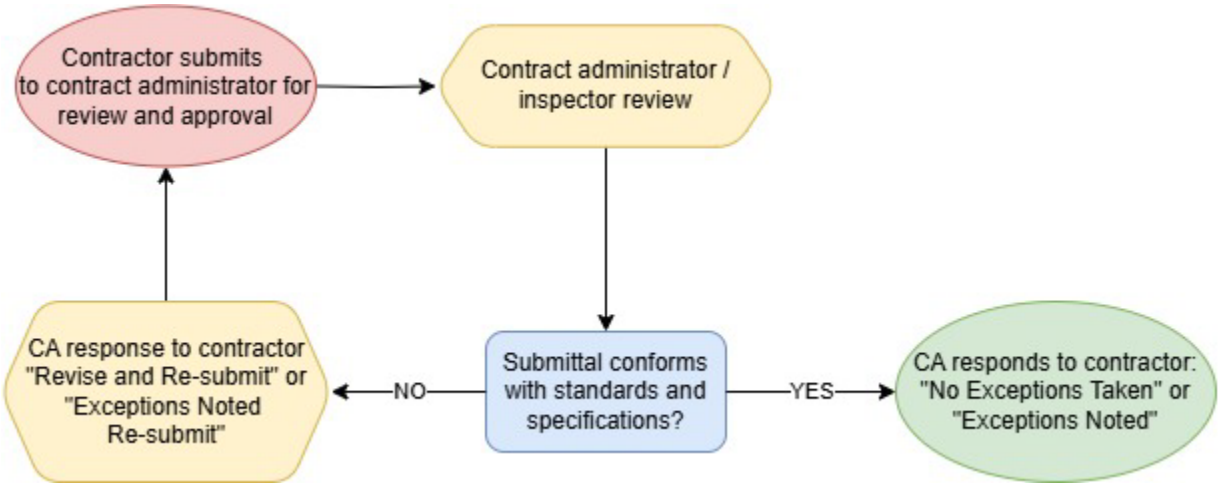
- Date received
- Date reviewed
- Date approved, and
- Date returned to the contractor

The contract administrator shall adequately safeguard approved copies of shop drawings and copies of the same are to be provide to the City at the completion of the contract.

The goals of the submittal review process are thorough reviews conforming to the intent of the design and **not** contract changes through the submittal process.

The processes for submittals are shown in the figure below.

Figure 6 - Submittal Review Process



5.7 Deficiency Lists

The site 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.

Upon receipt of notification from the contractor signifying substantial performance, acceptance and final completion, the inspector and the City's project manager, along with the contractor, should perform a thorough examination of the work to ensure deficient and incomplete work items are resolved or completed.

The contract administrator arranges for design staff and specialty inspections, as necessary. The Deficiency List form A6 can be found in Appendix A, Forms.

The deficiency list should consist of an accumulation of one or more items of the following:

- Work-to-date inspection report
- Checklist of deficient items, including defective works that need to be reworked
- Review of specifications, submittals, and drawings related information
- City comments, if any
- Specialty inspection and testing reports
- Value of deficient work to be performed
    - Value should be equivalent to the payment amount to an external party, if the contractor decides not to rectify the deficiency as determined by the contract administrator based on the deficiency list

The site inspector prepares an initial comprehensive copy of the overall deficiency list for review by the contract administrator. With approval from the contract administrator, the list is provided to the contractor for action. At a minimum, the deficiency list should be given to the contractor monthly at progress meetings, at the end of a project phase, prior to substantial performance, and prior to completion. Further, warranty deficiencies must be identified within the 2-year warranty period and corrected.

Upon notification by the contractor that specific work items have been completed, the site inspector examines the completed work with the contractor. If the item is correctly completed, the inspector initials and dates the item on the confirmation copy of the deficiency list. The official confirmation copy of 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, with the contractor and the City's project manager.

5.8 As-Built Drawings

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

The site inspector is responsible for red-lining as-built information on the contract drawings. This requirement is for all types of work and is required such that quantities and changes in the limits are recorded for final payment purposes and these changes can be identified on the redline plans. In cases whereby the contractor is required to produce redline mark-ups, the site inspector is also required to produce these drawings and compare and reconcile them such that there is agreement with all changes. If the inspector is unable to verify and agree to the contractor's as-built redline drawings, then this is to be reported to the contract administrator for action and listed as a deficiency.

The consultant's design or contract administration staff generates the as-built drawings according to the red-lined drawings. Based on full time site inspection, the as-built drawings should be signed by the consulting firm.

5.9 Data/Information on Water Services and Sewer Laterals

It is the site inspector's responsibility to complete all data/information with respect to all water services and sewer laterals either newly installed or found existing, which is then submitted to the contract administrator for review and filing. The contractor administrator will ensure that one copy is to be included in the project file, and one copy to be sent to the City's project manager for submittal to the City's Operations group for input into their Geo-Logic software for recording purposes.

The data/information complied is used to assist in the preparation of as-built drawings and for Operations to update their asset inventory database.

5.10 Engineering Construction Layout

All engineering construction survey work (construction layout) during construction is performed by the contractor and coordinated by the contract administrator.

5.11 Substantial Performance

The contractor's responsibilities for substantial performance are defined in the General Conditions of Contract with reference to the Construction Act. Work on any area, system, facility, or the like, must be to the point where it is able to be fully operational in the mode for which it was designed, unless specifications allow otherwise. The value of deficient and uncompleted work must be accounted for in determining if the contract is substantially performed. 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.

Substantial performance is granted by the issuance of a certificate of substantial performance by the contract administrator. As stated in the General Conditions of Contract, the warranty period begins on the date of substantial performance.

At the time of substantial performance, the on-going deficiency list prepared by the site inspector is provided to the contractor and an inspection is conducted by the site inspector, contractor, the City's project manager and other internal city departments, as required. 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. Every six (6) months during the 2-year warranty period, an inspection is performed to determine the status of the rectification of the deficiencies. The inspections are to be conducted by the same three (3) personnel identified above.

5.12 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 of Contract with reference to the Construction Act.

To achieve completion, the contractor must satisfy the contract requirements. As a final review, the site 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 site inspector then examines the corrected work. When the site 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 site inspector should collect or prepare prior to final completion:

- Watermains; as-built drawings and drawing indicating pavement and road cut locations and area, pressure tests, and trace wire continuity reports, if applicable
- Road, curb and sidewalk as-built drawings
- Electrical work - (Electrical Safety Association) ESA as-built drawings; refer to Engineering Department's Design Criteria Section N – Streetlighting and Electrical Standards, subsection N7 – Inspection Guidelines
- Final operations and maintenance manuals, if applicable
- 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), if applicable
- Quantity sheets
- Data/information on water services and sewer laterals
- Deficiency lists

5.13 Contract Payment

The contractor must submit the proposed payment application for approval by the contract administrator prior to the first progress payment. **The contractor must follow / use the City's template for 'Payment Certificate' Form A24 located in 'Appendix A – Forms Inventory'**. Prior to each of the contractor's payment applications, the contractor must prepare an updated progress schedule showing current progress on all work activities. Refer to Section 3 – Project Control – 3.2 Schedule. 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 and other required payment application documentation, as defined by the contract documents, the contract administrator proceeds with the 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 site 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.

For all unit price contracts, progress payments should be made based on the compilation of quantities on the daily inspection reports and reference to the weekly reports for the specific contract.

5.13.1 Subcontract Completion and Statutory Holdback Release

Under the provisions of the Construction Act, Part IV, Section 25, the contractor may notify the contract administrator (CA) that a subcontract has been completed satisfactorily and request the CA to certify the completion of the subcontract before the substantial performance of the entire contract.

Upon receipt of the request, the City's Project Manager / CA must verify the following:

- Subcontract work is 100% completed and has been performed satisfactorily in accordance with the contract specifications
- WSIB clearance has been received for the subcontractor
- Complete Form 7, Certificate of Completion of Subcontract including signatures by the payment certifier; normally, the CA providing site inspection services or the City Project Manager if no CA is involved
- Within 7 days of certification provide a copy of the Certificate to the contractor and subcontractor
- Complete Form 5, Declaration of Last Supply
- Perform a lien search to ensure that no liens have been placed on the contract pertaining to work by the subcontractor on the 61st day after certification of the completion of the subcontract
- Sections 31 and 33 of the Construction Act provides for the release of the statutory holdback to the subcontractor 60 days after the certification of the completion of the subcontract. Note that the Construction Act does not require the publication of the certificate. However, the contractor is required to submit the following prior to the release of the payment from the City:
- From the subcontractor: a release and waiver, and a statutory declaration that all work has been completed 100% and all in accordance with the contract specifications
- From the contractor: a release and waiver, and a statutory declaration that the subcontractor has completed all work in accordance with the contract specifications and no further work will be required from the subcontractor on this contract
- A copy of the contract between the contractor and the subcontractor including a statement from the contractor showing the amount of payment due to the subcontractor. Note that the value of the 10% statutory holdback on the contract amount between the contractor and the subcontractor cannot exceed the 10% holdback applied to the total value of the subcontract work identified by the contractor in the City contract. Should this be the case, the total amount of the subcontract work in the City contract will take precedent in the determination of the 10% holdback to be provided to the subcontractor.

If the general or subcontractor refuses to provide a copy of the Purchase Order between them then the City does not release holdback for the subcontractor's completed work. The Construction Act, Part IV, Clause 25, states: "Where a subcontract has been certified complete under Section 33, each payer upon the contract and subcontract **may**, without jeopardy, make payment reducing the holdbacks….". the key wording is "may" and the secondary wording is "without jeopardy". The payer, in this case, the City, is under no obligation to release the sub's holdback early due to the following:

a) the City has a contract only with the general contractor

b) the actual amount of the contract between the general and the sub is not known; and

c) releasing holdbacks to a sub based on the pricing provided by the general could jeopardize the financial stability of the contract. The risk lies in proper certification in accordance with Part V, Section 33 of the Act. The payer, that is the City, may still be liable to other lien claimants for early released holdback. In other words, too much monies may have been released thereby potentially impacting funds that could be released for other completed subcontractors.

The above process, in its entirety, also applies to the early release of statutory holdback on consulting assignments wherein a sub-consultant has completed its work component 100% and the prime consultant has provided a completed Form 7 with the City's Project Manager signing off as the payment certifier. All other steps are to be followed as per the above.

5.14 Contract Close-Out

The contract administrator along with the site inspector are responsible for day-to-day construction observations and documentation of required services for the contract close-out progress. The contract administrator assists with the inspections, as required, and with input from the site inspector, coordinates with the contractor the closing documentation of the project. This documentation can include:

- Certificate of substantial performance
- Certificate of completion
- As-built drawings
- Water services or sewer laterals data/information
- Completed deficiency list
- Pre-end of warranty inspection report
- Construction Layout surveys, if needed
- Warranty inspection reports and certification that they have been completed

The contract administrator must ensure that all items on the current deficiency list, prepared by the site inspector, are addressed and resolved prior to contract close-out.

It is important that all documentation is submitted to the contract administrator at contract close-out. Some of this documentation maybe I n duplicate, but it should be submitted regardless to ensure the project files are complete.

5.15 Warranty Inspection

The commencement and expiry dates of warranties must be monitored to ensure any known defects are corrected prior to the expiry of the warranty period. All works must be inspected a minimum of twice a year or as stated in the external provider's work scope and agreement. As each warranty inspection is performed a complete list of all defects and deficiencies are to be provided, by the contract administrator, to the City's project manager and his/her respective manager, and a copy to the contractor advising him to rectify the defects / deficiencies. A final list of deficiencies is to be provided at least 90 days prior to the expiry date of the warranty.

Three (3) months prior to the warranty expiring, a joint inspection between the site inspector, the contractor, and the City's project manager is to be done with an invitation sent to representatives from internal and external client divisions.

The contract administrator will then issue a Notice of Defects, if found appropriate, to the contractor a minimum of 60 days prior to the expiration of the 2-year warranty. The Notice of Defects requires approval from the City's manager of capital delivery in the Engineering Department. Upon rectification of the deficient items, the site inspector reviews to ensure acceptance.

6.0 APPENDICES

Appendix A – Forms Inventory

Form no.	Title	Version (month / year)
A1	Inspector's Daily Report	04 / 2025
A2	Inspector's Weekly Report	04 / 2025
A3	Report of Changes in the Work	04 / 2025
A4	Field Instruction Form	04 / 2025
A5	Request for Quotation Form	04 / 2025
A6	Deficiency List	04 / 2025
A7	New Watermain Disinfection Pressure Testing	01 / 2023
A8	Record of Damaged Services	04 / 2025
A9	Change Directive (CD)	04 / 2025
A10	Change Order (CO)	04 / 2025
A11	Change Directive – Change Order Summary	04 / 2025
A12	Site Office Safety Audit	04 / 2025
A13	Vendor Performance Evaluation	04 / 2025
A14	Warranty Defect Letter to Contractor	04 / 2025
A15	Contract Meeting Template	04 / 2025
A16	Utility Pre-Construction Meeting Agenda	04 / 2025
A17	Utility Inspection Report	04 / 2025
A18	Contractor's Payroll Burden Form	04 / 2025
A19	Project Risk Log	04 / 2025
A20	Certificate of Substantial Performance Template	04 / 2025
A21	Contact List	04 / 2025
A22	Submissions Log	04 / 2025
A23	Pre-Construction Meeting Agenda	09 / 2025
A24	Payment Certificate Template - Contractor	11 / 2025

****The Successful Bidder may request generic files (word/excel) of the above noted forms from the City****

City of Markham
Engineering Department
Form - A1

INSPECTOR'S DAILY REPORT

Report No: 001

CONTRACT #:
PROJECT NAME:

CONTRACTOR: _____ DATE: _____
SITE INSPECTOR: _____ WEATHER: _____
WORKING DAY: _____ WORKING HRS: _____

WORK ISSUES (INCL. SAFETY):

CONTRACT ITEMS COMPLETED TODAY				
ITEM #	DESCRIPTION	LOCATION/STATIONS	DAY'S TOTAL	TOTAL TO-DATE

LABOUR	NUM	HRS EACH	TOTAL HRS	LABOUR	NUM	HRS EACH	TOTAL HRS	LABOUR	NUM	HRS EACH	TOTAL HRS
Contractor:											
Subcontractor:											

EQUIPMENT (Make & Model)	# OF UNITS	EQUIP #	HOURS		TOTAL HRS		REMARKS
			WORKING	NON-WORKING	WORKING	NON-WORKING	
Contractor:							

City of Markham
Engineering Department
Form - A1

INSPECTOR'S DAILY REPORT

Report No: 001

EQUIPMENT (Make & Model)	**# OF UNITS**	**EQUIP #**	**HOURS**		**TOTAL HRS**		**REMARKS**
			WORKING	**NON-WORKING**	**WORKING**	**NON-WORKING**	
Subcontractor:							

MATERIAL DELIVERED TO JOB SITE

Description	Quantity	Pay or Non-pay Item	Description	Quantity	Pay or Non-pay Item

REMARKS

Note the following on a daily basis:

- **Soil conditions**
- **Traffic setup and any changes**
- **Number of photos taken and where and what they show**
- **Indicate any changes conditions, utility conflict or where they are found not to be shown on plan**
- **Field instructions or Change Directives issued**
- **Material testing done and results; attach copies to this report**
- **Reference documents attached to this report such as material tickets**
- **Note observations related to non-compliance with contract or specifications and deficiencies**
- **Note observations of significant tasks**

_____ _____

Contractor's Signature **Inspector's Signature**

NOTE: Quantities subject to final confirmation

City of Markham
Engineering Department
Form – A2

WEEKLY SUMMARY REPORT

Construction Phase
Report No. 001

Contract # & Project Name:	Week of:
Site Inspector:	Schedule: ____On _____Behind _____Ahead

Section A: [Provide Title of Section as per Bid Form of Contract]
[Below identify bid items with quantities as per Bid Form of Contract

Item No.	Description	Qty.	Unit	Mon.	Tue.	Wed.	Thurs.	Fri.	Sat.	Sun.	Week Total	Prev. Total	Total To-Date

Note:
The Item # and Description mirror the items in the Bid Form of the contract.

Signatures:

_____
Site Inspector

_____
Contractor

City of Markham
Engineering Department
Form – A3

CO#:001

REPORT OF CHANGES IN THE WORK

(Time and Material)

Date:	Contract No.:	Site Inspector:	Report No.:
Location:			
Contractor:		**Subcontractor:**	
Description of Work:			
[If work is performed over multiple days then one report should be used for each day in which work is performed]			

LABOUR

Number	Position	Hours	Total Hours	Number	Position	Hours	Total Hours
	Foreman						
	Labourer						
	Operator						
	Driver						

EQUIPMENT

OPSS 127#	Make/Model	Number	Hours/Days		Owned or Rented	Total Hours	
			Worked	Standby		W	S

MATERIALS SUPPLIED BY CONTRACTOR

Description	Quantity	Delivery Slip	Description	Quantity	Delivery Slip

REMARKS

_____ _____ _____

Contractor's Signature **Inspector's Signature** **City's Project Manager**

City of Markham
Engineering Department
Form – A4

FIELD INSTRUCTION

FI No. 001

Site Inspector:	**Date:**	**Contract No.**
Contractor:	Subcontractor:	
Contract Administrator:	Project Name:	
Drawing(s):	Other Documents:	
The following minor changes in the work have been ordered and authorized:		
DESCRIPTION OF INSTRUCTIONS:		
REASON FOR FIELD INSTRUCTION:		
REFERENCE DRAWING(S), SECTION(S) OR DETAIL(S):		
REFERENCE SPECIFICATION SECTION(S):		
The intent of this FI 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 FI is binding upon the City and the Contractor who will perform the work promptly. If the City or the Contractor believes an adjustment to the contract price or contract times is necessary, the party may make a claim in accordance with the General Conditions of Contract.		
Issued by Site Inspector: _____ Authorized Representative Date: _____	Contractor Receipt Acknowledgement: _____ Authorized Representative Title: _____ Date: _____	

City of Markham
Engineering Department
Form – A5

REQUEST FOR QUOTATION

RFQ#: 001

To Be Completed by Contract Administrator/Site Inspector:		
CA/SI:	**Date:**	**Contract No.:**
To:	**Project:**	
From:	**Specification Section:**	
Description: (To Be Completed by Initiator of Request)	**Date Quotation Required:**	
1. Scope of Work (include list of attachments, if any)		
2. Reason(s) for Modification: O **Owner** O **Unforeseen Conditions (site, weather, etc.)** O **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: **If Yes, provide reasons and anticipated schedule impact**	O **Yes** O **No**	
6. Attachment Identification (List):		
7. Quotation In Effect Until (Date):		
Authorized Signature: _____ **Contractor** **Date**		

City of Markham
Engineering Department
Form - A6

DEFICIENCY LIST

Project Name:		**Project #:**	
Consultant:		**Contractor:**	
Date:		**Revision #:**	

Deficiency Number	DESCRIPTION	Cost to Rectify [1]	Identification Date [2]	Rectification Date [3]	ACTION	Acceptance [4] (Y/N)
1	Include detailed description of deficiency, relate to appropriate specifications or drawings as necessary. Include attachments and photos as applicate					
2						
3						
4						
2						
5						
6						
7						
3						
8						
9						
10						
4						
11						
12						
13						
14						
15						
16						
17						
18						

Notes:

1. **Value to include what it would cost to engage another contractor to rectify the deficiency**
2. **Date when the deficiency was first identified**
3. **Date when the deficiency was fully rectified and accepted as meeting the contract specifications**
4. **Written formal acceptance by the owner or owner's consultant representative**

As the deficient items are completed and accepted they should not be deleted from the list. The completed items are to remain on the list to act both as status of work performed and as an accounting of funds being released as each deficiency is completed. Work on deficient items should be reviewed on a monthly basis if possible, and no longer than on a quarterly basis during the warranty period, as a minimum. This is to ensure that rectification work is progressing on a timely basis before the expiry of the 2-year warranty period such that course of action(s) can be taken by the City in the event that the contractor is not performing.

New Watermain Disinfection, Pressure Testing & Acceptance Form

Date: _____ City Contract No.:_____

Project: _____

Contractor: _____ Consulting Engineer:_____

Item	Work Description	Work Performed By	Comments		Witnessed by (initial)*
1.	Loading of Watermain	Contractor			
2.	Sample Request and Drawings	Consultant			
3.	Flushing and Swabbing	Contractor	# In	# Out	
4.	Turbidity (< 1 NTU)	Contractor/City			
5.	Hydrostatic Testing	Contractor			
6.	Disinfecting Watermain **(Initial chlorine concentration 50-100 mg/L)**	Contractor			
7.	24 hour Check **(Maximum decrease 40% of Initial Concentration, no more than 50 mg/L decrease)**	City Waterworks Staff			
8.	Pre-removal of Super Chlorinated Water check	City Waterworks Staff			
9.	Removal and Disposal of Super Chlorinated Water, as per AWWA C651-14 (residual 0.5 mg/L max.)	Contractor			
10.	Introduce Fresh Water	Contractor/City			
11.	First Sample- After 24 hours (Min-16 hours)	City Waterworks Staff			
12.	Second Sample- 24 hours after first sample (min 16 hours)	City Waterworks Staff			
13.	Sample Results	City Waterworks Staff			
14.	Final sample (After Connection)	City Waterworks Staff			

Please Note: This form to be accompanied by the Chlorine Residual / Turbidity results.

Consultant Engineer's Certification: **Firm:**_____

We hereby certify that the workforce carrying out the above mentioned work is licensed, by the MECP as an operator, and that watermain has been charged, pressure tested and disinfected in accordance with the City of Markham procedures as set out herein.

Engineers Stamp

_____

Print Name and Signature

City of Markham
Engineering Department
Form – A8

RECORD OF DAMAGED SERVICES / UTILITIES

LOCATION: Address and Station		
DATE and TIME:		
DAMAGED SERVICE / UTILITY: Type, size, material, depth, and condition		
WORK EFFORT: Machine used and amount of hand digging to locate and uncover		
PHOTO / SKETCH: Indicate direction of machine digging and various photo angles of site		
INCIDENTAL DAMAGE: From damaged service / utility		
INSPECTOR'S COMMENTS: Who is potentially liable?		
SIGNATURES:	_____ **Site Inspector**	_____ **Contractor**
	Date:	**Date:**

CHANGE DIRECTIVE

FRANK CLARIZIO
Director
Engineering Department

101 Town Centre Blvd.
Markham, ON
L3R 9W3

Tel: 905-477-7000 Ext. 7507
Email: fclarizio@markham.ca

Contractor:	**Change Directive No.:**
Project:	**Contract No.:**
Location:	**Date:**

Pursuant to General Conditions of Contract, GC 22 Change in the Work, you are to carry out the Work described below.

Payment for Change(s) may be on a Unit Priced basis or Lump Sum basis or Time and Material basis according to GC 23 Valuation and Certification of Changes in the Work, or as specified in the Change Order issued in respect of this Change Directive.

Description of Change(s)

[Start with a lead-in sentence that the Contractor is required to do and, if possible, identify the actual components of work to be performed in point form. Point form is not necessary, but it does make it concise and easy to follow]

Estimated Cost: $ (excl. HST)

The Contractor is required to follow all technical specifications for the completion of this work. Payment for this Change Directive will be performed through a Change Order and will be on a [identify method of payment] according to GC [identify applicable sub-clause to GC 23]

References: _____

RFQ No. & Date: _____

Contractor's Proposal: _____

Approval / Authorization:

Project Lead	**Manager**	**Senior Manager**	**Director**
_____	_____	_____	_____
Print Name	Print Name	Print Name	Print Name
_____	_____	_____	_____
Signature	Signature	Signature	Signature

Consultant / Contractor Administrator:

_____ _____
Print Name Signature

Contract Change Order (CCO)

Form - A10

Project:					
Contract No:				**Purchase Order #:**	
Title:	xxxx				
CCO No.:	No. 0x	**Rev. No.**	0	**Date Issued:**	
RFI No.:					
Contractor:				**Consultant:**	

INSTRUCTIONS TO CONTRACTOR:

The following is an amendment to the Contract stating the agreement between the City of Markham and the Contractor upon a change in the Work, extra work, additional work, obtaining credit for deleted scope, and the adjustments in Contract Price and Contract Time. The amount of this change includes all direct, indirect, delay, disruption, acceleration, impact and consequential costs. The Contractor accepts this Contract Change Order as total and final compensation, and waives any right to future claims for additional costs and/or damages related to this change. The work comprising in this Contract Change Order is to be performed and paid for in accordance with the provisions and standards of the Contract between the City of Markham and the Contractor.

DESCRIPTION OF CHANGE:

Item No.	Description	Unit	Quantity	Unit Price	Total Price
1					$0.00
2					
3				0.00	$0.00
				Total	**$0.00**

References:	City's / Consultant's RFQ or Change Directive and Date		
Additional Contract Time Allowed for Work in this Change Order:			
Current Completion Date: (Original Completion Time + Additional Contract Time in Earlier Co's; if any)			
New Completion Date: (Current Completion Time + Additional Contract Time in this CO)			
Allocation of Paymentl: (Contingency PO, Allowances, Provisional Items or Surplus Funds)			
Method of Payment: **(**Schedule of prices; Negotiated Unit Prices; Lump Sum Prices; Time and Material; or Combination)			
Approved by Senior Manager Infrastructure and Capital Projects:	SIGN PRINT NAME	**Date:**	
Approved by the Director of Engineering:	SIGN PRINT NAME	**Date:**	
Accepted by the Contractor:	SIGN PRINT NAME	**Date:**	

City of Markham
Engineering Department
Form - A11

Changre Order / Change Directive Summary

Project Name:	**Project #:**	**Purchase Order #:**
Consultant:	**Contractor:**	**Project Manager:**
Date:	**Revision #:**	

							Approval Authority		
Change Order #.	**Description**	**Date Change Directive was issued**	**Date work was completed**	**Date Change Order approved**	**Estimated Cost**	**Actual Cost**	**Director of Engineering**	**Commissioner of Development Services**	**CAO**
1							N/A	N/A	N/A
2						$ -	N/A	N/A	N/A
3					$ -	$ -	N/A	N/A	N/A
4					$ -	$ -	N/A	N/A	N/A
5					$ -	$ -	N/A	N/A	N/A
6					$ -	$ -	N/A	N/A	N/A
7					$ -	$ -	N/A	N/A	N/A
8					$ -	$ -	N/A	N/A	N/A
9					$ -	$ -	N/A	N/A	N/A
10					$ -	$ -	N/A	N/A	N/A
11					$ -	$ -	N/A	N/A	N/A
12					$ -	$ -	N/A	N/A	N/A
13					$ -	$ -	N/A	N/A	N/A
14					$ -	$ -	N/A	N/A	N/A
15					$ -	$ -	N/A	N/A	N/A
16					$ -	$ -	N/A	N/A	N/A
17					$ -	$ -	N/A	N/A	N/A
18					$ -	$ -	N/A	N/A	N/A
19					$ -	$ -	N/A	N/A	N/A
20					$ -	$ -	N/A	N/A	N/A
21					$ -	$ -	N/A	N/A	N/A
22					$ -	$ -	N/A	N/A	N/A
23					$ -	$ -	N/A	N/A	N/A
24					$ -	$ -	N/A	N/A	N/A
25					$ -	$ -	N/A	N/A	N/A
26					$ -	$ -	N/A	N/A	N/A
27					$ -	$ -	N/A	N/A	N/A
28					$ -	$ -	N/A	N/A	N/A
29					$ -	$ -	N/A	N/A	N/A
30					$ -	$ -	N/A	N/A	N/A
31					$ -	$ -	N/A	N/A	N/A
32					$ -	$ -	N/A	N/A	N/A
33					$ -	$ -	N/A	N/A	N/A
34					$ -	$ -	N/A	N/A	N/A
35					$ -	$ -	N/A	N/A	N/A
36					$ -	$ -	N/A	N/A	N/A
37					$ -	$ -	N/A	N/A	N/A
38					$ -	$ -	N/A	N/A	N/A
39					$ -	$ -	N/A	N/A	N/A
40					$ -	$ -	N/A	N/A	N/A
41					$ -	$ -	N/A	N/A	N/A
42					$ -	$ -	N/A	N/A	N/A
43					$ -	$ -	N/A	N/A	N/A
				Total Change Order:	**$ -**	**$ -**			
				Total Contingency Budget:	**$ -**				
				Contingency Remaining:	**$ -**				

City of Markham
Engineering Department
Form – A12

SITE OFFICE SAFETY AUDIT

Project:	**Date:**
Contractor:	**Site Office Location**
Consultant:	**Inspector:**

Equipment Item	Yes	No	N/A
First-aid kit properly equipped and maintained			
Eye-wash kit or station supplied and maintained			
Copy of current OHS Act and Regs.(The Green Book) supplied			
Adequate lighting			
Adequate heating and air-conditioning			
Supply of fresh drinking water			
Sanitary system supplied and maintained			
Fire extinguisher supplied and maintained			
Safe access / egress			
Copies of MSDS sheets provided			
Smoke alarm supplied and working			
Carbon monoxide detector supplied and working			
Safety bulletin board that meets requirements in OHS Act			
Burn kit			
Notes:			
Inspector's Signature: _____			
Contractor's Signature: _____			

City of Markham
Vendor Performance Evaluation Form

Evaluation Type *(select from drop menu)* **Interim**
Date January 25 ,2018

A. Vendor Information
Name ABC Inc.
Address 17 Main St. Markham ON.
Tel: 416-444-4444

Site Supervisor/Manager Mr. Smith

B. Project Information

Project Name Soil Remediation on Main St.

Brief Description Determine any soil contamination

Original Award Price $50,000

Final Price at completion $65,000

Original Completion Date Monday, January 1, 2018

Actual Date of Completion Tuesday, January 2, 2018

Warranty Period (if applicable), effective from 21-Jan-18 to 31-Mar-19

C. City Staff
Project Manager Rob Smith

Department Engineering

D. Score

0.5 - 1.5	Unacceptable	Contractual requirements were not met and the quality of performance was far below expectations
1.5 - 2.5	Needs Improvement	Contractual requirements were met however there was a significant performance issue or multiple performance issues
2.5 - 3.5	Meets Expectations	Contractual requirements were met with no significant performance issues
3.5 - 4.0	Exceeds Expectations	Contractual requirements were exceeded and performance was over and above expectations
NA	Not Applicable	

Directions:
Complete all required fields in yellow. Ensure all sections are complete. File will not save unless all fields (in yellow) are completed.
Any questions or comments, please contact Alex Moore, Senior Manager of Purchasing and Accounts Payable (ext .4711)

E. Rating

A	B	C	D	E	F	G
		Weighting	**Overall Weighting**	**Scoring**	**Score**	**Comments**
A. Quality	**30.0**					
1.Quality of the final product		90.0	27.0	2.5	16.9	
2.Site Clean up		10.0	3.0	4.0	3.0	
		100.0	30.0		**19.88**	
B. Project Management	**30.0**					
1. Project Management		40.0	12.0	4.0	12.0	
2. Health and Safety		15.0	4.5	4.0	4.5	
3. Schedule Management		15.0	4.5	4.0	4.5	
4. Internal Communication		10.0	3.0	4.0	3.0	
5. External Communication/Public Relations		10.0	3.0	4.0	3.0	

A	B	C	D	E	F	G
		Weighting	Overall Weighting	Scoring	Score	Comments
6. Records Management		10.0	3.0	4.0	3.0	
		100.0	30.0		**30.00**	
C. Cost Control & Budget Management	**30.0**					
1. Project delivered within original Council approved budget - within Vendor control		70.0	21.0	1.5	7.9	
2. Fair pricing for change orders/ additional services and scope of work		20.0	6.0	0.5	0.8	
3.Residual Financial liabilities (liens, claims etc.,)		5.0	1.5	0.5	0.2	
4.Reasonable number of change orders		5.0	1.5	0.5	0.2	
		100.0	30.0		**9.00**	
D. Performance of Product During Warranty Period	**10.0**	100.0	10.0	1.0	2.5	
		100.0	10.0		**2.50**	
Overall Score	**100.0**				**61.38**	

F. Recommendation

Continue with Vendor? *(select from dropdown menu)* **Probation**

Comments

If Disqualification, recommended vendor not eligible to bid until (Date): _____ *DD/MM/YY*

To be completed by Procurement

Sign-offs	**Name**	**Signature**	**Date**	***Comments***
Prepared by Project Manager	Rob Smith		Monday, January 22, 2018	
Reviewed by Manager				
Approved by Director				
Legal Services				
Procurement Division				

Appendix Axxx [Note: the numbering of the Appendix will be done when the total number of appendices are identified and in what sequence]

Company/Contractor Address

Attention: [Name of Contractor's Project Manager]

Contract No. xxxxxx
[Contract Title / Description]

We are writing to advise that the warranty period for this contract will expire on [Date}. Based on our first interim [Note: as the warranty period progresses, the first interim could become second, third, or fourth – this is due to warranty inspections being done every 6 months] warranty inspection performed on [Date] – 6 months [depending on when the warranty inspections are performed, 6 months could change to 12 months or 18 months] after the Substantial Performance date of [Date}, we are providing a detailed list of defects and deficiencies in the Work attached to this letter.

Clause GC xxxxxxxx of the General Conditions of Contract requires the Contractor to correct promptly, at no additional cost to the Owner, defects and deficiencies in the Work which appear to and during the 24-month warranty period. Accordingly, we are requesting that your firm correct all defects and deficiencies within [30 working days from the date of this letter].

Please contact [Name], the City's Project Manager, at xxx-xxx-xxxx [phone number], to arrange for both a Road Occupancy Permit and an inspector to be on site while corrections are performed, at least 48 hours prior to the start of Work. Should you have any questions regarding this matter, please contact the undersigned directly at xxx-xxx-xxxx

Yours truly,

Xxxxxxx [name]

Project Manager

Cc: [ensure distribution to all pertinent contact]

City of Markham
Anthony Roman Centre
101 Town Centre Blvd.
Markham, ON Canada L3R 9W3
Tel. 905-477-7000
Fax: 905-479-7773
www.markham.ca

Form – A15

MINUTES OF MEETING

PROJECT: Project name

CONTRACT NO.: xxx-T-xx

DATE: Thursday May 25, 2024 **TIME:** 10:00 a.m.

PLACE: West Side of Milne Creek within Milne Dam Conservation Park

PRESENT:

Name	Agencies
xxxxxx	City of Markham (COM)
xxxx	City of Markham
Markus Hillar	Schollen & Company Inc. (SCC)
Brad Stephens	Toronto Region Conservation Authority (TRCA)
Suzanne Bevan	Toronto Region Conservation Authority
Christine Furtado	Toronto Region Conservation Authority
Jamie Milnes	Toronto Region Conservation Authority
Robert Donaldson	Melfer Construction Inc. (MEC)
Lucas Powlesland	Melfer Construction Inc.

	PROCEEDINGS:	**Action By:**
1.1	**Introduction** • [MM1] Introductions were made at the start of the meeting.	**Info**
1.2	**TRCA Approvals/Permits** • [MM1] Permit application to be divided into two portions and resubmitted to TRCA for expediting approval to facilitate works in less vegetated areas. • [MM1] Suggested divisions that were discussed are 1. Milne Creek Bridge and Milne Dam Bridge, and 2. the trail between Milne Creek Bridge and Milne Dam Bridge, and eastern project limit to and including Princess Bridge. • [MM1] MEC to provide stakeout of all critical structure points including footings, abutments, anchors, piles, etc. **Application 1: Milne Creek Bridge and Milne Dam Bridge** • [MM1] MEC to indicate extents of silt fence on site (i.e. utilizing caution tape), and identify which trees are marked for removal based on the Contract Drawings versus which additional trees need to be potentially removed to facilitate works and equipment access. MEC to provide survey of the aforementioned to SCC.	**Info** **Info** **MEC** **MEC**

	• [MM1] SCC to incorporate the survey information obtained from MEC and update drawings as required. Revised drawings to be submitted to TRCA for approval. **Application 2: Trail between Milne Creek Bridge and Milne Dam Bridge, and Eastern Project Limit to and Including Princess Bridge** • [MM1] SCC to break-out current Contract Drawings of this location and submit to TRCA for prompt approval.	**SCC** **SCC**
1.3	**Survey Monuments** • [MM1] COM provided surveyor information to MEC for obtaining HCMs. • [MM1] COM and MEC to finalize method of payment to MEC for obtaining a third party to provide HCMs. Post Meeting Note: COM indicated that payment to be made under the applicable Contract Item.	**Info** **Closed**

The foregoing represents the writer's understanding of the major items of discussion and the decisions reached and/or future actions required. If the above does not accurately represent the understanding of all parties attending, please notify the undersigned within 48 hours of receiving these minutes at PGorzynski@markham.ca.

Minutes prepared by,

xxxx
Contract Administrator
Engineering Department
City of Markham

cc: See distribution list

LEGEND FOR MINUTES	
MM X.Y **Unique Meeting Discussion Number where:** X = is the sequential meeting number Y= is the item number at the meeting [MMX] Will be inserted at each bullet point so readers can identify which meeting a given bullet point was added.	**Bold Text** – Represents new discussion and titles *Italic Text* – Represents revisions made as requested by an attendee Closed – The item is closed and will be removed from minutes Info – The item conveys information and will remain in minutes as long as it is relevant

City of Markham 101 Town
Centre Blvd.
Markham, ON Canada L3R 9W
Tel. 905-477-7000
www.markham.ca

Form – A16

UTILITY PRE-CONSTRUCTION MEETING

Date:	**Time:**	**Meeting Location:**	
Utility Permit #:			
Type of Utility Installation/Relocation:			
Site Location of Utility Work:			
Start Date:		**Planned Completion Date:**	
Utility Company:	**Contact Name:**	**Phone #:**	
Contractor:	**Contact Name:**	**Phone #:**	**24HR Emergency #:**
City/Consultant Inspector:		**Phone #:**	
Attendees: [name, company, phone]			
Notifications Distributed: [Councilors, Residents, BIAs]			
Traffic Restrictions / Working Hours:			
Pay-Duty Police: [if required, specify details]			
Staging of Work / Installation Method:			
Other Discussions: [where applicable, include: pedestrian access and safety; tree-protection; equipment storage; materials stockpiling; protection of open excavations, restoration, etc.]			
Additional Information: None _____ See Attached (# of pages): _____			

UTILITY CONSTRUCTION SITE INSPECTION

Report No.: ___

Date:	**Time Arrived:**	**Time Left:**
Utility Permit No.:	**Weather:**	
Location:		
Utility Company:	**Contractor:**	
City/Consultant Inspector:		

Inspection Tasks Checklist:

TASK	YES	NO	N/A
Permit on site			
Drawings on site			
Information sign in place			
Horizontal alignment as per permit			
Pedestrian / vehicle access maintained			
Traffic control in place			
Pay-duty police on-site			
Depth of cover as per permit			
• If NO, identify planned depth versus actual depth:			
Conformance with permit conditions			
Conformance with work restrictions			
Temporary restoration satisfactory			
Photographs taken			
Work Progress	_____% Complete		

Notes: (include explanation for any tasks checked NO or N/A above; and attach a sketch identifying the planned horizontal and vertical alignments versus actual in-situ measurements)

City of Markham
Engineering Department
Form – A18

Contractor's Payroll Burden Form

Contractor Name:

Calendar Year from May 1, 20xx to April 30, 20xx
[The dates shown are for the sewer and watermain industry as their collective agreements are from May 1st to April 30th. Other industries may have a different calendar year; you will need to be cognizant of the different dates that may be applicable to each industry]

a) Net Salaries Paid to All Employees:

• Total Salaries Paid		$_____
• Taxable Allowance / Benefit	minus	$_____
	Total A	$_____

b) Employee Benefits (All Employees)

• Vacation		$_____
• Sick Leave		$_____
• Statutory Holidays		$_____
• Training (Professional Development Time)		$_____
	Total B	$_____

Direct Labour Costs (B%)
B% = B / (A-B) x 100 %_____

c) Employee Non-Time Related Benefits (All Employees)

• Employment Insurance	$_____
• Group Life Insurance (Life, LTIP, etc.)	$_____
Specify: _____	
• Employer Health Tax	$_____
• Group Medical Plan (Dental, etc.)	$_____
• Workplace Safety and Insurance Board	$_____
• Contractor Pension Plan	$_____
• Canada Pension Plan	$_____
• Union Contributions	$_____
Total C	$_____

Indirect Labour Costs (C%)
C% = C / (A-B) x 100 %_____

Payroll Burden Rate
B% + C% %_____

I certify that this form is completed by or under the supervision of the undersigned

External Auditor Signature:	External Auditor Firm:	Date:
_____	_____	_____

Print Name: _____

Payroll Burden Rate for Work on a Time and Material Basis

General:

The Contractor's Payroll Burden Form ("form") is to be used to calculate the contractor's actual payroll burden rate. The form should preferably be submitted at the pre-construction meeting and absolutely prior to commencement of any work on a Time and Material basis.

The form is available from the Contract Administrator or the City's Project Manager and shall be completed, certified and signed by the Contractor's external auditor. The Payroll Burden Rate shall be calculated from the total expenditures of wages, salaries and benefits for all of the Contractor's employees paid during the previous 12-month period. All permitted expenses in relation to labour costs are included on the prescribed form.

If accepted, the submitted form shall be effective until the end of the calendar period identified on the form. The payroll burden rate shall apply to all Time and Material works carried out within the effective time period shown on the form. If the Contractor fails to submit a signed form prior to the commencement of any works on a time and material basis, or if the submitted form is not acceptable to the City, the City will not be obligated to make payment until such time that a form is submitted by the Contractor and accepted by the City.

During the contract period, the Contractor must submit an updated form prior to May 1st of a new calendar time period. If the Contractor fails to submitted an updated form or the submitted form is not acceptable to the City, the City is not obligated to make payment on any time and materials works until such time that an updated form is submitted by the Contractor and accepted by the City.

The Contractor's labour rates used in the work based on a Time and Material basis are subject to verification by the City.

All information in relation to the Contractor's Payroll Burden may be audited at the City's sole discretion. The Contractor's agrees to keep complete and accurate books, payrolls, accounts and employment records and make the records available for audit by the City upon request. The City reserves the right to recover any overpayment to the Contractor affected by the audit.

Definitions:

Total Salaries Paid:
Refers to the total annual salaries paid during the previous 12-month calendar year of employment with the Contractor including allowances, holiday pay (which includes vacation pat paid to the union), and other additional compensation.

Taxable Allowance and Benefit:
Refers to the income that the Contractor pays to or provides for an employee that is personal in nature such as, reimbursement of personal expenses, free use of property, goods or services owned by the Contractor or an allowance. Examples are; use of corporate vehicle, automobile allowance, room and board, bonuses, and interest free or low interest loans.

Actual Payroll Burden:
Refers to the payment of the following list of items. No other items shall be included in the calculation of the Contractor's Actual Payroll Burden.

a) Vacation: the Contractor's paid time off for vacation earned in each year calculated at salary cost (including overtime), in accordance with the Contractor's policy
b) Sick Leave: the Contractor's paid time off due sickness, accident, injury or specific personal and family issues such as bereavement leave, and jury duty. Such paid time off is in accordance with the Contractor's policy and calculated at salary cost.
c) Statutory Holidays: the Contractor's paid time off in accordance with Ontario law.
d) Training: the Contractor's paid time for employees to maintain and increase their level of skills pertaining to their position.
e) Employment Insurance: the Contractor's portion of employment insurance premiums incurred in accordance with the Employment Standards Act.
f) Group Life Insurance: reflects the premium paid by the Contractor to employee group life and short and long term disability insurance plans
g) Employer Health Tax: reflects the premium incurred by the Contractor for the year in accordance with the Employer Health Tax of Ontario
h) Group Medical Plan: reflects the premium paid by the Contractor for group health insurance plans providing coverage of health care costs not covered by basic government plan
i) Workplace Safety and Insurance Board: reflects the WSIB premium incurred by the Contractor for the year in accordance with the Workplace Safety and Insurance Act
j) Contractor's Pension Plan: reflects the Contractor's pension plan cost including the cost of funding the pension benefits earned by employees and cost of services of third parties incurred for the pension plan
k) Canada Pension Plan: reflects the Contractor's portion of Canada Pension Plan contribution incurred in accordance with the Canada Pension Plan Act
l) Union Contributions: reflects the premium paid by the Contractor to a union in accordance with active collective agreements

City of Markham
Engineering Department
Form - A19

PROJECT RISK LOG

	Ex 3	Ex 4	Ex 4		Ex 6a	Ex 6a	Ex 6b	Ex 6b	Ex 5						
ID	Risk Description	Probability	Impact	Score	Risk Response and Description	Secondary and/or Residual Risk	Trigger Event/Indicator (Complete if there is residual risk)	Contingency Plan (Complete if there is residual risk)	Contingency Reserve (Expected Time Value)	Contingency Reserve (Expected Monetary Value)	Owner	Open/ Closed	Date Entered	Date to Review	Updates
	What is this risk? All risks should be documented in the If/Then format			0	How will you respond to this risk, and what actions will you take to match that response? Re-evaluate the probability/impact scores after response plans have been implemented	Are there any risks that result from implementing a risk response strategy or minor risks left over after the risk response strategy is implemented?	Are there any indications that the risk is about to occur or has occurred?	If the risk becomes a reality, what will you do in response, as a backup, or alternative/ workaround? If you have residual risk, you should have a contingency plan		Probability (high end of scale) * Contingency Plan	Who monitors this risk?				
1	If the **funding resources and budget** are not approved in time, then there will be delay to the project schedule	1	-4	-4	Ensure that the funding sources are identifed and budget is approved at design phase.	Low residual risk (probability dropped from 4 to 1)	Cost estimates and detail design tasks are not on track.	Provide feedback that can be incorporated into a second design submission							
2	If the **budget is less than the costs of the tender bid submissions**, then approval for additional budget will be required before award of connstruction contract	1	-3	-3	Ensure that the services are properly designed and apply a factor of safety to the estimated cost. Clarify the scope of work and ensure adequate budget is allocated to the project. There is a number of non-standard items in this project, their costs needs to be identifed.	Very low residual risk (probability dropped from 3 to 1)	Cost estimates and unit prices are not compatible to recent constrcution projects.	Revise the tender documents in comaprision to recent projects and request additional budget approval if required before request for tenders.							
3	If the **project schedule** is not planned in details with consideration of all factors, then the completion dates may be extended with additional impacts to businesses and potential contractor's claim	1	-2	-2	Detailed project schedule to incorporate all factors (weather, events, unforeseen conditions, etc…)	Unforeseen conditions may still happen. Medium residual risk	Project is delayed during construction	Time and money (potential over-time or weekend work)							
4	If the design did not include detailed analysis of potential **constructability issues,** then contractor may claim for changes to scope of work during construction	2	-4	-8	Constructabilty to be part of the review in all design phases, involving construction admin staff	Medium residual risk (probability dropped from 4 to 2)	Construction administration staff to review final tender documents	Allow for contengencies budget							
5	If the **communication plan** is not implemented properly, then the project schedule and resources efforts may be affected due to miscommunication and complaints	1	-2	-2	The communication plan, to include details on the type/frequency of communcation with businesses/community/agencies during design and construction	Very low residual risk (probability dropped from 2 to 1)	Ability to meet with all stake holders	Incorporate a number of meetings/presentations to the construction schedule							
6	If the **permitting requirements** are not addressed in time, then the permit may not be issued in time to start construction.	1	-4	-4	Engage with permitting agencies early on/regularly regarding requirements, and ensure design meets stakeholder criteria.	Very low residual risk (probability dropped from 4 to 1)	Ability to meet application deadline	Meet with agencies and submit permit application at early stages of design							
7	If the **construction staging** is not fully planned, then there may be a financial impact on schedule and local businesses	1	-2	-2	Include construction management plan in the scope, communicate clearly to businesses and community, manage expectations and make concessions where possible, and negotiate requirements.	Very low residual risk (some stakeholders may still be unsatisfied)	Negative response from the stakeholders during construction	More consultation/ negotiations with stakeholders/community. Review staging plan as needed							
8	If there is not enough **busnisses consultation** and planning early on the project, then there may be opposition and potential busnisses disruption claims	2	-4	-8	Include a bussinness management plan in the scope, communicate project vision and requirements clearly, manage expectations, and negotiate conflicting requirements.	Busnissess may still not be satisfied and may affect apporvals	Negative response from the busnissess meetings	More consultation/ negotiation meetings with busnissess							
9	If there is changes or limited **key personnel resources** required for implementation, then there could be delays to the project.	1	-2	-2	Ensure there is good paperwork/ filing systems and strong communication to ensure smooth transition. Include adequate personal resources required for project delivery	Very low residual risk	Key personnel gives notice	Reassign project to another staff/ ensure handover							

PROJECT RISK LOG

ID	Risk Description	Probability	Impact	Score	Risk Response and Description	Secondary and/or Residual Risk	Trigger Event/Indicator (Complete if there is residual risk)	Contingency Plan (Complete if there is residual risk)	Contingency Reserve (Expected Time Value)	Contingency Reserve (Expected Monetary Value)	Owner	Open/ Closed	Date Entered	Date to Review	Updates
10	If coordination with the **utility companies** for the upgrades to their infrastructure is not initiated in the early stages of the design, then it may lead to delays to the overall schedule.	3	-4	**-12**	Communicate with utility companies on project milestones, cost sharing and requirements	High residual risk (probability reduced from 4 to 3)	Utility companies can not meet schedule	Negotiate with the utility companies if their infrastructure upgrades can be included as part of City's contract if needed. Address cost sharing issues early							
11	If **internal coordination with other departments** including details of the streetscape materials type, is not addressed in details as part of the design, then it may lead to high O & M costs	1	-4	**-4**	Regular communication with internal staff starting in the early stages of design. Document, circulate and follow up on requirements	High residual risk (probability reduced from 4 to 1	Changes in the requirements during late stage of design	Assess budget impact including O & M Cost							
12	If a qualified **consultant with a reasonable budget** cannot be retained, then there will be an impact on the overall schedule.	1	-2	**-2**	Provide a qualified consultants list and a clear evaluation criteria to Procurement. Evaluation of consultants' submissions in details	Very low residual risk	Lowest bid consultant does not meet technical expectations	Staff award report to consider unsolicited proposal from consultant with high technical score							
13	If proposed **municipal services upgrades** are not identified in the early stages of design then, it may lead to schedule and budget approval delays	1	-2	**-2**	Regular submissions to other departments for the review of proposed services upgrades and requirements	Very low residual risk	Staff are delayed in providing responses	Clearly identify schedule & budget impacts							
14	If site investigations for **existing underground utilities and soil conditions** is not addressed in details during the design, then it may lead to unforeseen conditions and contractor's claims during construction.	2	-4	**-8**	Include a detailed site investigation as part of the design budget. Meet and obtain as-built information from utility companies	High residual risk	Since this road was originally constructed long time ago. There is always a risk of unforeseen underground conditions	Allow for contengencies budget							
15	If **non standard infrastructures** are not available, then the project schedule will be impacted	2	-4	**-8**	Research, provide alternatives and plan for using non-standard products. Consult with other departments on operation and maintenance costs	High residual risk	Products are not readily available for future replacement as needed	Consult with other departments and provide alternatives							

FORM 9
CERTIFICATE OF SUBSTANTIAL PERFORMANCE OF THE CONTRACT UNDER SECTION 32 OF THE ACT

Construction Act

_____ ,
(County/District/Regional Municipality/Town/City in which premises are situated)

_____ ,
(street address and city, town, etc., or, if there is no street address, the location of the premises)

This is to certify that the contract for the following improvement:

_____
(short description of the improvement)

to the above premises was substantially performed on _____ .
(date substantially performed)

Date certificate signed: _____

_____ _____
(payment certifier where there is one) (owner and contractor, where there is no payment certifier)

Name of owner: _____

Address for service: _____

Name of contractor: _____

Address for service: _____

Name of payment certifier (where applicable): _____

Address: _____

(Use A or B, whichever is appropriate)

☐ A. Identification of premises for preservation of liens:

_____
(if a lien attaches to the premises, a legal description of the premises,
including all property identifier numbers and addresses for the premises)

☐ B. Office to which claim for lien must be given to preserve lien:

_____
(if the lien does not attach to the premises, a concise description of the premises, including addresses,
and the name and address of the person or body to whom the claim for lien must be given)

City of Markham
Engineering Department
Form - A21

CONTACT LIST

Company	Position	Telephone	Mobile	Email
ABC CONTRACTOR				
Rob Smith	Project Manager	123-456-7890	123-456-7890	Rsmith@email.com

PROJECT SUBMISSIONS LOG

Form - A22

Spec No.	Description	Date		Comments	Submission Comments
		Submitted	Reviewed		
01000-X	Form 1000's				
01000-1	List of Subcontractors and Suppliers				
01400-1	Quality Control Plan				
01500	Temporary Facilities				
01560-1	Environmental Policy				
01600-1	Site Specific Safety Program				
02140	Dewatering				
02025-1	Baseline Schedule				
02025-2	Revised Baseline Schedule				
02025-3	Revised Baseline Schedule				
02270	Erosion Control				
02274-1	Precast L wall				
02274-2	Pre-cast L Wall with Reinforcing				
02276-1	Concrete segmental retaining wall				
02283-1	Noise Wall System - Panel Details				
02283-2					
02311-1	Site Grading - Borrow source 1 (Dixie/Steeles)				
02311-1R1	Site Grading - Borrow source 1 (Dixie/Steeles)				
02311-2	Site Grading - Borrow source 2 (Countryside Drive in Brampton)				
02311-2R1	Site Grading - Borrow source 2 (Countryside Drive in Brampton)				
02340-1	Geosynthetic Soil Stabilization - Material Substitution to TBX2500				
02368-1	Temporary Shoring				
02370-1	Temporary Tie Back Anchors				
02383-1	Piling				
02393-1	Steel bin wall				
02620-1	Subdrainage				
02630-1	Culverts				
02631-1	Maintenance Holes, Catch Basins and Ditch Inlets				
02701-1	Granular Materials - RCM "A"				
02701-2	Granular Materials - RCM "B"				
02701-3	GRANULAR B TYPE II				
02724-1	Track Subballast				
02725-1	Track Ballast				
02741-1	Hot Mix Asphalt				
02761	Pavement Markings				

PROJECT SUBMISSIONS LOG

Form - A22

Spec No.	Description	Date		Comments	Submission Comments
		Submitted	Reviewed		
02770-1	Concrete Headwalls				
02825-1	Fencing				
02831-1	MSE Walls				
02906-1	Planting of Trees and Shrubs				
02911-1	Topsoil, Seed and Cover				
02950-1	Railway Track Construction				
03100-1	Concrete formwork and falsework				
03201-1	Concrete Reinforcement				
03203-1	Concrete Accessories				
03290-1	Joints in Concrete				
03312-1	Precast Culvert				
03314-1	Concrete Ties - Cert. of Compliance, Coponent drawing, Plant cert.				
03314-2	Concrete Ties - Component Drawings				
03314-3	Concrete Ties - Component Drawings and Concrete Mix Design				
03314-4	Concrete Ties - GO LOGO				
07111-1	Damp Proofing				
16170-1	Plowcon - manholes and pipe				
16170-2	Plowcon - pipe				
16170-3	Plowcon - structures				

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PRE-CONSTRUCTION MEETING

Form – A23 (Rev 09/2025)

PROJECT:	xxx		
CONTRACT NO.:	xxx		
DATE:	xxx	**TIME:**	
PLACE:			
PRESENT:			

Agenda	**Action By**:
1. Introductions	
2. Contract Status and Notices.	
• Status of contract execution	
• Bonds and insurance	
• WSIB forms	
• Ministry of Labour Notice of Project • External agencies/utilities with involvement in project: ▪ York Region (Watermain, Storm Sewer, Sanitary Sewer and Road Occupancy Permit) ▪ TRCA, MNR, MOE • Issued for Construction Drawings provided to Contractor on --- date	
3. Contacts and Communication • The Contractor Administrator will compile a Contact List for Distribution.	
4. Safety • xxxx to submit Health/Safety plan and Material Safety Data Sheets (MSDS).	
5. Coordination	

Agenda	Action By:
• Contractor to notify CA in advance of any subcontractor attending site.	
6. Testing and Inspection • QC plan • QA testing and inspection payment terms. • City of Markham - QA testing inspection firm. **Mandatory Requirement**: • The Contractor must coordinate with the Contract Administrator (CA) and the City of Markham to ensure the presence of a Water Works Operator to witness all water connection activities. A minimum of 48 hours' notice must be provided to schedule the Operator's attendance. Under no circumstances shall the Contractor proceed with any water connection without the Water Works Operator present. • This requirement is in addition to all other obligations outlined in the New Watermain Information Package located in Appendix J of the City of Markham Field Services Manual.	
7. Submittals • Contractor to submit a schedule for shop drawing submissions. Shop drawings to be submitted in digital PDF format. • All shop drawings submittal shall be reviewed or approved and returned to the Contractor within review periods per contract. • Shop drawings to be submitted to the Contractor Administrator.	
8. Quality Control • Material sampling will apply but is not limited to offsite borrow, granular materials, concrete, asphalt, steel reinforcing, piling. • Contractor will be required to monitor benchmarks and control points.	
9. Field Inspection • Pre-Condition surveys/inspection of all buildings, structures and utilities to be completed contractor. • Pre/post site photo to be obtained by Contractor and City of Markham.	
10. Schedule • Contractor is required to submit a detailed baseline schedule indicating their work deadlines in accordance with the original Contract and drawings. • Contractor is to advise regarding their commencement date as soon as possible.	
11. Work Changes	

Agenda	Action By:
• All notice of proposed change documents, site instruction, and change order will be issued by the Contract Administrator. • Extra work authorization is required from City of Markham to perform extra work.	
12. Progress Payments • Contractor is required to submit monthly invoices within the first 5 business days after months end to City of Markham for review and certification of rates.	
13. Meetings • Construction meetings will be regularly scheduled at monthly intervals. Additional or special meetings can be scheduled as necessity dictates. • Health and safety meetings will be scheduled as required.	
14. Contract Close Out • The procedure for contract close out shall be in accordance with the Contractor Documents. • As-built drawings and mark-ups to be assigned per contract terms	
15. Other Business • Contractor is provided with three (3) full sized sets of "Issued for Construction" Drawings, and AutoCAD drawings. • Contractor is advised of any permits i.e. TRCA permit forthcoming. • Discuss Permit to Take Water • Discuss Laydown area for staging and storage • Property Issue • Tree cutting permit	

The foregoing represents my understanding of the major items of discussion and the decisions reached and/or future actions required. If the above does not accurately represent the understanding of all parties attending, please notify the undersigned within 48 hours of receiving these minutes.

Minutes prepared by,

xx
Engineering Department
City of Markham

PROGRESS PAYMENT INVOICE

Payment Certification Number:	PC #1
Contract Number:	030-T-25
Project:	New Project
Payment Period:	From: Jan 01, 2025 to Jan 31, 2025
Date Run:	19-Nov-2025

Project Manager:	Name	Approval Date:	March 21, 2024
Location:		Contract Status:	Construction
Vendor Name:	ABC Contractor	Order to Commence Date:	March 21, 2024
Address:	123 Main St, City, ON L2L 3G3	Project Completion Date:	December 31, 2025
		Purchase Order Number(s):	123-456-789
		Award Price (Excluding HST):	$ 121,402.00
		P.O. Adjustment Amount:	$ 2,010.00
		Total P.O. Amount:	$ 123,412.00
		13% HST:	$ 16,043.56
		Award Price (Including 13% HST):	$ 139,455.56

SUMMARY SHEET

	Previous Amount	Total This Period	To Date Amount	Amount Remaining	Total Contract Amount
SECTION "A" – GENERAL	$ 6,040.00	$ 3,020.00	$ 9,060.00	$ 1,090.00	$ 10,150.00
SECTION "B" – ROAD WORKS	$ 5,030.00	$ 5,010.00	$ 10,040.00	$ 65,580.00	$ 75,620.00
SECTION "C" – SIGNALS	$ 3.60	$ 2.30	$ 5.90	$ 1,708.10	$ 1,714.00
SECTION "D" – TEMP SIGNALS	$ 4.60	$ 2.30	$ 6.90	$ 51.10	$ 58.00
SECTION "E" – ALLOWANCES	$ 3,000.00	$ 1,500.00	$ 4,500.00	$ 20,500.00	$ 25,000.00
SECTION "F" – PROVISIONALS	$ 46.00	$ 23.00	$ 69.00	$ 8,791.00	$ 8,860.00
CHANGE ORDER	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ 10.00	$ 2,010.00
SUBTOTALS	**$ 15,124.20**	**$ 10,557.60**	**$ 25,681.80**	**$ 97,730.20**	**$ 123,412.00**

Gross Amount Due to Date	**$ 25,681.80**
Less Statutory Holdback 10%	$ 2,568.18
Release of Statutory Holdback 10%	
Amount Due to Date	$ 23,113.62
Less Previous Paid Requests	$ 13,611.78
Amount Due this Certificate	**$ 9,501.84**
13% HST	$ 1,235.24
AMOUNT DUE THIS CERTIFICATE INCL. HST	**$ 10,737.08**

GENERAL INVOICING INSTRUCTION

1. Payment certificate breakdown must match RFP Bid document and Bid form
2. Ensure specification references are accurate
3. Submit excel file with pdf invoice
4. include wsib and statutory clearance with each claim
5. File naming as follows: PO####_Contractor_Inv#_YYMMDD
6. Any extra work is not allowed to commence without written approval from the City prior to the work taking place. Approval in the form of change order or change directive
7. any extra work completed without prior authorization will not be paid
8. include sub contractor invoices and backup documentation
9. any charges for provisional items and/or allowance must be approved by the City prior to the work taking place
10. Any new or replacement subcontractors must be approved by the City prior to working on the project

INVOICING PROCEDURE

1. Contractor to submit a draft invoice to the City for review, comment and approval on the quantities prior to formal submission to accounts payable
2. Contractor to submit the draft invoice on or before the 25th of every month. Contractor to project work to be completed until end of month
3. Once received, reviewed and approved, the City PM will authroize formal submission to accounts payable at Apadmin@markham.ca
4. The date on the invoice must be the same date it is sent to accounts payable after all reviews and revisions are complete
5. Payment should be received within 28 days from the invoice date (sent to Accounts payable), allow a few days for mail delivery of cheques.
6. The City is currently only making payments via cheques, EFT is not allowed

PROGRESS PAYMENT INVOICE

Payment Certification Number:	PC #1
Contract Number:	030-T-25
Project:	New Project
Payment Period:	From: Jan 01, 2025 to Jan 31, 2025
Date Run:	19-Nov-2025

ITEM No.	Detail or Spec Ref	ITEM DESCRIPTION	Approved Budget / Bid Quantity and Price				Quantity			Percentage %			Payment ($)			Change Order / Change Directive			
			Est. Qty.	Unit	Unit Bid Price	Total Bid Price (Excl. of Hst)	Previous	Current	To Date	Previous	Current	To Date	Previous	Current	To Date	CO/CD No.	Approved CO / CD Quantity	Approved CO / CD Amount	Over-run Check
SECTION "A" – GENERAL																			
A1	SP1	Mobilization Demobilization and installation of three Project Sign Boards supplied by the City	1	LS	$ 10,000.00	$ 10,000.00	0.6	0.3	0.9	60%	30%	90%	$ 6,000.00	$ 3,000.00	$ 9,000.00			$ -	OK
A2	SP2	Locate and Stakeout Existing Utilities and Services	1	LS	$ 10.00	$ 10.00							$ -	$ -	$ -			$ -	OK
A3	SP3	Construction Layout of Line and Grade	1	LS	$ 10.00	$ 10.00							$ -	$ -	$ -			$ -	OK
A4	SP4	Traffic Protection and Control inlcuding preparation submission and implementation of traffic control measures and signage and construction fencing.	1	LS	$ 10.00	$ 10.00							$ -	$ -	$ -			$ -	OK
A5	SP5	Supply and Maintain Portable Variable Message Signs	4	month	$ 10.00	$ 40.00	2	1	3	50%	25%	75%	$ 20.00	$ 10.00	$ 30.00			$ -	OK
A6	SP6	Contract Documentation Provision of performance bond labour and materials bond Insurance and Maintenance Guarantee	1	LS	$ 10.00	$ 10.00							$ -	$ -	$ -	CO #2	1.00	$ 10.00	OK
A7	SP7	Supply and Maintain Field Office	6	month	$ 10.00	$ 60.00	2	1	3	33%	17%	50%	$ 20.00	$ 10.00	$ 30.00			$ -	OK
A8	SP8	Site Records (Photographs / Pre and Post CCTV)	1	LS	$ 10.00	$ 10.00							$ -	$ -	$ -			$ -	OK
A9			1			$ -							$ -	$ -	$ -			$ -	OK
A10			1			$ -							$ -	$ -	$ -			$ -	OK
A11			1			$ -							$ -	$ -	$ -			$ -	OK
A12			1			$ -							$ -	$ -	$ -			$ -	OK
A13			1			$ -							$ -	$ -	$ -			$ -	OK
A14			1			$ -							$ -	$ -	$ -			$ -	OK
A15			1			$ -							$ -	$ -	$ -			$ -	OK
A16			1			$ -							$ -	$ -	$ -			$ -	OK
A17			1			$ -							$ -	$ -	$ -			$ -	OK
A18			1			$ -							$ -	$ -	$ -			$ -	OK
A19			1			$ -							$ -	$ -	$ -			$ -	OK
A20			1			$ -							$ -	$ -	$ -			$ -	OK
A21			1			$ -							$ -	$ -	$ -			$ -	OK
A22			1			$ -							$ -	$ -	$ -			$ -	OK
A23			1			$ -							$ -	$ -	$ -			$ -	OK
A24			1			$ -							$ -	$ -	$ -			$ -	OK
A25			1			$ -							$ -	$ -	$ -			$ -	OK
A26			1			$ -							$ -	$ -	$ -			$ -	OK
A27			1			$ -							$ -	$ -	$ -			$ -	OK
A28			1			$ -							$ -	$ -	$ -			$ -	OK
A29			1			$ -							$ -	$ -	$ -			$ -	OK
A30			1			$ -							$ -	$ -	$ -			$ -	OK
A31			1			$ -							$ -	$ -	$ -			$ -	OK
A32			1			$ -							$ -	$ -	$ -			$ -	OK
A33			1			$ -							$ -	$ -	$ -			$ -	OK
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A35			1			$ -							$ -	$ -	$ -			$ -	OK
A37			1			$ -							$ -	$ -	$ -			$ -	OK
A38			1			$ -							$ -	$ -	$ -			$ -	OK
A39			1			$ -							$ -	$ -	$ -			$ -	OK
A40			1			$ -							$ -	$ -	$ -			$ -	OK
A41			1			$ -							$ -	$ -	$ -			$ -	OK
A42			1			$ -							$ -	$ -	$ -			$ -	OK
A43			1			$ -							$ -	$ -	$ -			$ -	OK
		Subtotal (Excl of HST)				**$ 10,150.00**							**$ 6,040.00**	**$ 3,020.00**	**$ 9,060.00**			**$ 10.00**	

MARKHAM

PROGRESS PAYMENT INVOICE

Payment Certification Number:	PC #1
Contract Number:	030-T-25
Project:	New Project
Payment Period:	From: Jan 01, 2025 to Jan 31, 2025
Date Run:	19-Nov-2025

			Approved Budget / Bid Quantity and Price				Quantity			Percentage %			Payment ($)			Change Order / Change Directive			
ITEM No.	Detail or Spec Ref	ITEM DESCRIPTION	Est. Qty.	Unit	Unit Bid Price	Total Bid Price (Excl. of Hst)	Previous	Current	To Date	Previous	Current	To Date	Previous	Current	To Date	CO/CD No.	Approved CO / CD Quantity	Approved CO / CD Amount	Over-run Check
SECTION "B" – ROAD WORKS																			
B1.1	SP10	Clearing and grubbing	1	LS	$ 10.00	$ 10.00	0.6	0.3	0.9	60%	30%	90%	$ 6.00	$ 3.00	$ 9.00			$ -	OK
B1.2	SP11	Tree Removal (greater than 150 mm dia.)	9	ea	$ 10.00	$ 90.00							$ -	$ -	$ -			$ -	OK
B1.3	SP12 MP12	Barrier for Tree Protection	250	m	$ 10.00	$ 2,500.00							$ -	$ -	$ -			$ -	OK
B1.4	SP13 MP5	Catchbasin Siltation Control Buffer	9	ea	$ 10.00	$ 90.00							$ -	$ -	$ -			$ -	OK
B1.5	SP14	Fibre Roll Flow Check Dam (min. 450 mm dia.) as per OPSD 219.191	1	ea	$ 10.00	$ 10.00	1		1	100%		100%	$ 10.00	$ -	$ 10.00			$ -	OK
B2.1	SP15	Earth Excavation and Grading including disposal offsite	2200	m³	$ 10.00	$ 22,000.00	500	500	1000	23%	23%	45%	$ 5,000.00	$ 5,000.00	$ 10,000.00	CO #1	200.00	$ 2,000.00	OK
B2.2	SP16	Excavate for Utility Verification (Provisional)	6	ea	$ 10.00	$ 60.00	2	1	3	33%	17%	50%	$ 20.00	$ 10.00	$ 30.00			$ -	OK
B3.1	SP17	Remove and Dispose Single Catch Basins	2	ea	$ 10.00	$ 20.00							$ -	$ -	$ -			$ -	OK
B3.2	SP17	Remove and Dispose Existing Double Catch Basins	2	ea	$ 10.00	$ 20.00							$ -	$ -	$ -			$ -	OK
B3.3	SP17	Removal of Sidewalks	502	m²	$ 10.00	$ 5,020.00							$ -	$ -	$ -			$ -	OK
B3.4	SP17	Removal of Curb and gutter and barrier curb (all types)	580	m	$ 10.00	$ 5,800.00							$ -	$ -	$ -			$ -	OK
B3.5	SP17	Removal of Asphalt Pavement Full Depth	2700	m²	$ 10.00	$ 27,000.00							$ -	$ -	$ -			$ -	OK
B3.6	SP17	Asphalt Milling 40 mm Depth	1300	m²	$ 10.00	$ 13,000.00							$ -	$ -	$ -			$ -	OK
B3.7						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B4.1						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B4.2						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B5.1						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B5.2						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B5.3						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B5.4						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B5.5						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B5.6						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B6.1						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B7.1						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B7.2						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
B8.1						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
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					Subtotal (Excl of HST)	$ 75,620.00							$ 5,030.00	$ 5,010.00	$ 10,040.00			$ 2,000.00	

PROGRESS PAYMENT INVOICE

Payment Certification Number:	PC #1
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ITEM No.	Detail or Spec Ref	ITEM DESCRIPTION	Approved Budget / Bid Quantity and Price: Est. Qty.	Unit	Unit Bid Price	Total Bid Price (Excl. of Hst)	Quantity: Previous	Current	To Date	Percentage %: Previous	Current	To Date	Payment ($): Previous	Current	To Date	Change Order / Change Directive: CO/CD No.	Approved CO / CD Quantity	Approved CO / CD Amount	Over-run Check
SECTION "C" – SIGNALS																			
C1	SSP01	Removal & Salvage Illumination and Traffic Signal Infrastructure - Standard Roadway Illumination	1	LS	$ 1.00	$ 1.00	0.6	0.3	0.9	60%	30%	90%	$ 0.60	$ 0.30	$ 0.90			$ -	OK
C2	SPE001	Rigid Duct 1 - 50 mm dia. Duct	250	m	$ 1.00	$ 250.00							$ -	$ -	$ -			$ -	OK
C3	SPE001 OPSS 450	HDPE 100 mm Diameter Coilable High Density Polyethylene Conduit by Directional Bore	13	m	$ 1.00	$ 13.00							$ -	$ -	$ -			$ -	OK
C4	SPE068A OPSS 604	Cabling - Buried Luminaire Wire #4 AWG Low-Voltage Cable in Duct Grounding Hardware	1050	m	$ 1.00	$ 1,050.00							$ -	$ -	$ -			$ -	OK
C5.1	SPE070	Ground Electrode - Ground Rod	2	ea	$ 1.00	$ 2.00	1	1	2	50%	50%	100%	$ 1.00	$ 1.00	$ 2.00			$ -	OK
C5.2	SPE069A	#12 AWG Green Insulated Ground Wire in Pole	35	m	$ 1.00	$ 35.00							$ -	$ -	$ -			$ -	OK
C5.3	SPE069A	#6 AWG Green Insulated Ground Wire in Duct	350	m	$ 1.00	$ 350.00	2	1	3	1%	0%	1%	$ 2.00	$ 1.00	$ 3.00			$ -	OK
C6.1	SSP02 MST-	Lighting Poles (City of Markham Standard MST-1 & MST-2) 10.7m	2	ea	$ 1.00	$ 2.00							$ -	$ -	$ -			$ -	OK
C6.2	SSP02	Lighting Poles (City of Markham Standard MST-1 & MST-2) 12.2m	2	ea	$ 1.00	$ 2.00							$ -	$ -	$ -			$ -	OK
C7	SPE057	2.4m Elliptical Mast Arm	6	ea	$ 1.00	$ 6.00							$ -	$ -	$ -			$ -	OK
C8.1	SSP03	Roadway Luminaires a) Supply and Install LRL NXT-60M-600mA-2ES-	3	ea	$ 1.00	$ 3.00							$ -	$ -	$ -			$ -	OK
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					Subtotal (Excl of HST)	**$ 1,714.00**							**$ 3.60**	**$ 2.30**	**$ 5.90**			**$ -**	

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SECTION “D” – TEMP SIGNALS																			
D1	SPE001	Supply and Install 75 mm Diameter Rigid PVC Conduit by Open Cut	20	m	$ 1.00	$ 20.00	0.6	0.3	0.9	3%	2%	5%	$ 0.60	$ 0.30	$ 0.90			$ -	OK
D2	SPE007	Supply & Install Rigid PVC Conduit for Mounting on Wood Poles	1	ea	$ 1.00	$ 1.00							$ -	$ -	$ -			$ -	OK
D3	SPE030	Supply & Install Wood Traffic Signal Poles	4	ea	$ 1.00	$ 4.00							$ -	$ -	$ -			$ -	OK
D4	SPE040	Supply and Install Yellow/Grey Backed Highway Type LED (all 30cm) Traffic Signal	8	ea	$ 1.00	$ 8.00							$ -	$ -	$ -			$ -	OK
D5	SPE045	Supply & Install Traffic Signal Head Suspension Clamp (Top & Bottom)	8	each set	$ 1.00	$ 8.00	2	1	3	25%	13%	38%	$ 2.00	$ 1.00	$ 3.00			$ -	OK
D6	SSP7	Reuse Salvaged Existing LED Pedestrian Signal Head & Mount on Portable Pedestrian Stands	6	ea	$ 1.00	$ 6.00							$ -	$ -	$ -	CO #2	1.00	$ 1.00	OK
D7	SPE051	Supply and Install Pedestrian Pushbutton	6	ea	$ 1.00	$ 6.00	2	1	3	33%	17%	50%	$ 2.00	$ 1.00	$ 3.00			$ -	OK
D8	D8	Supply and Install Traffic Signal Controller Complete With Accessory	1	ea	$ 1.00	$ 1.00							$ -	$ -	$ -			$ -	OK
D9	SPE057	Supply & Install Aluminum Luminaire Mast Arm (2.4m)	4	ea	$ 1.00	$ 4.00							$ -	$ -	$ -			$ -	OK
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					Subtotal (Excl of HST)	**$ 58.00**							**$ 4.60**	**$ 2.30**	**$ 6.90**			**$ 1.00**	

PROGRESS PAYMENT INVOICE	
Payment Certification Number:	PC #1
Contract Number:	030-T-25
Project:	New Project
Payment Period:	From: Jan 01, 2025 to Jan 31, 2025
Date Run:	19-Nov-2025

			Approved Budget / Bid Quantity and Price				Quantity			Percentage %			Payment ($)			Change Order / Change Directive			
ITEM No.	Detail or Spec Ref	ITEM DESCRIPTION	Est. Qty.	Unit	Unit Bid Price	Total Bid Price (Excl. of Hst)	Previous	Current	To Date	Previous	Current	To Date	Previous	Current	To Date	CO/CD No.	Approved CO / CD Quantity	Approved CO / CD Amount	Over-run Check
SECTION "E" – ALLOWANCES																			
E1	SPE074A	Connection to Power by Hydro Utility	1	LS	$ 5,000.00	$ 5,000.00	0.6	0.3	0.9	60%	30%	90%	$ 3,000.00	$ 1,500.00	$ 4,500.00			$ -	OK
E2	SP9	Paid Duty Police	1	LS	$ 10,000.00	$ 10,000.00							$ -	$ -	$ -			$ -	OK
E3	SP9A	Geotechnical Investigation/Material Testing (Asphalt Granulars etc.)	1	LS	$ 10,000.00	$ 10,000.00							$ -	$ -	$ -			$ -	OK
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						$ -				#DIV/0!	#DIV/0!	#DIV/0!	$ -	$ -	$ -			$ -	OK
					Subtotal (Excl of HST)	**$ 25,000.00**							**$ 3,000.00**	**$ 1,500.00**	**$ 4,500.00**			**$ -**	

PROGRESS PAYMENT INVOICE

Payment Certification Number:	PC #1
Contract Number:	030-T-25
Project:	New Project
Payment Period:	From: Jan 01, 2025 to Jan 31, 2025
Date Run:	19-Nov-2025

ITEM No.	Detail or Spec Ref	ITEM DESCRIPTION	Approved Budget / Bid Quantity and Price: Est. Qty.	Unit	Unit Bid Price	Total Bid Price (Excl. of Hst)	Quantity: Previous	Current	To Date	Percentage %: Previous	Current	To Date	Payment ($): Previous	Current	To Date	Change Order / Change Directive: CO/CD No.	Approved CO / CD Quantity	Approved CO / CD Amount	Over-run Check
SECTION "F" – PROVISIONALS																			
F1	NA	Supply and Place 19mm Crusher Run Limestone for Spot Dig-Outs	60	Tonne	$ 10.00	$ 600.00	0.6	0.3	0.9	1%	1%	2%	$ 6.00	$ 3.00	$ 9.00			$ -	OK
F2.1	F2	Restore Irrigation System a) Spinker Head	20	each	$ 10.00	$ 200.00							$ -	$ -	$ -			$ -	OK
F2.2	F2	Restore Irrigation System b) Water Line	200	m	$ 10.00	$ 2,000.00							$ -	$ -	$ -			$ -	OK
F3	NA	Street Light/Utility Pole Support	4	each	$ 500.00	$ 2,000.00							$ -	$ -	$ -			$ -	OK
F4	NA	Remove and Replace Concrete Curb and Gutter OPSD 600.040	50	m	$ 10.00	$ 500.00	2	1	3	4%	2%	6%	$ 20.00	$ 10.00	$ 30.00			$ -	OK
F5	NA	Supply Place and Compact 50mm dia Crusher Run Limestone	50	Tonne	$ 10.00	$ 500.00							$ -	$ -	$ -			$ -	OK
F6	NA	Supply Place and Remove Steel Plate Over Trench	20	m²	$ 10.00	$ 200.00	2	1	3	10%	5%	15%	$ 20.00	$ 10.00	$ 30.00			$ -	OK
F7	NA	Supply and Intall Construction Fence	150	m	$ 10.00	$ 1,500.00							$ -	$ -	$ -			$ -	OK
F8.1	NA	Extra labour due to man-made obstruction delays not shown on plans or	20	hr	$ 10.00	$ 200.00							$ -	$ -	$ -			$ -	OK
F8.2	NA	Extra labour due to man-made obstruction delays not shown on plans or	20	hr	$ 10.00	$ 200.00							$ -	$ -	$ -			$ -	OK
F8.3	NA	Extra labour due to man-made obstruction delays not shown on plans or	24	hr	$ 10.00	$ 240.00							$ -	$ -	$ -			$ -	OK
F8.4	NA	Extra labour due to man-made obstruction delays not shown on plans or	24	hr	$ 10.00	$ 240.00							$ -	$ -	$ -			$ -	OK
F8.5	NA	Extra labour due to man-made obstruction delays not shown on plans or	24	hr	$ 10.00	$ 240.00							$ -	$ -	$ -			$ -	OK
F8.6	NA	Extra labour due to man-made obstruction delays not shown on plans or	24	hr	$ 10.00	$ 240.00							$ -	$ -	$ -			$ -	OK
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					Subtotal (Excl of HST)	$ 8,860.00							$ 46.00	$ 23.00	$ 69.00			$ -	

	PROGRESS PAYMENT INVOICE	
MARKHAM	Payment Certification Number:	PC #1
	Contract Number:	030-T-25
	Project:	New Project
	Payment Period:	From: Jan 01, 2025 to Jan 31, 2025
	Date Run:	#########

				Approved Budget / Bid Quantity and Price				Quantity			Percentage %			Payment ($)			Notes
CHANGE ORDER	Reference CHANGE DIRECTIVE #	Spec. Ref	CHANGE DESCRIPTION	Est. Qty.	Unit	Unit Price	Total CO/ CD Price (Excl. of Hst)	Previous	Current	To Date	Previous	Current	To Date	Previous	Current	To Date	
CHANGE ORDER																	
CO #1	CD# 1	Sp 15	Earth Excavation and Grading including disposal offsite	200	m³	10	$ 2,000.00	100	100	200	50%	50%	100%	$ 1,000.00	$ 1,000.00	$ 2,000.00	
CO #2	CD# 4	Sp 16	Contract Documentation Provision of performance bond labour and materials bond Insurance and Maintenance Guarantee	1	LS	$ 10.00	$ 10.00							$ -	$ -	$ -	
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						Subtotal (Excl of HST)	$ 2,010.00							$ 1,000.00	$ 1,000.00	$ 2,000.00	

Appendix B – Inspection Tasks

The inspection tasks listed under each work component / activity are to be used as a general guide for inspection. The tasks listed represent an overview; they are not exhaustive and are not limited to only those tasks identified. *The contract administrator and site inspector should work together at the start of a contract to determine critical inspection levels for construction activities and the potential need of adding tasks to this list.*

Any inspection activity identified as a milestone requires a contract administrator or site inspector on site to inspect the operation(s) of these critical milestones. The site 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 inspection task activity****

B.1 Roadway – Inspection Tasks

General Tasks

a) Ensure permits are on site or in site office for examination by others: such as, Ministry Of Labour (MOL) notice of project, noise exemptions, TRCA approvals, railway board orders, certificates of approval, cut permits, traffic control plan, etc.
b) Ensure that contractor has a road occupancy permit prior to commencing work on the right-of-way **(M)**
c) Attend progress meetings
d) Contact material testing consultants for services required such as plant pick-up, concrete cylinder, asphalt, granular material **(M)**
e) Interpret test results of material testing by consultants and advise contract administrator and contractor of any not meeting specifications for further action **(M)**
f) Ensure traffic control is as specified as per the contract requirements **(M)**
g) Document day-to-day activities on a contract by the various templates found in this manual. Record contractor, sub-contractor, and supplier forces (including personnel classification), equipment owned and rented, and material delivered on site **(M)**
h) Location of utilities encountered that vary from plan location
i) Soil conditions such as type and whether ground water is present
j) Recording of traffic accidents or slip and falls occurring in the work zone for potential claims
k) Claims by the contractor or complaints received from the contractor or from the public
l) Tracking of extra work on the appropriate form
m) Recording of substantial performance achievement and ensuring process is completed by contract administrator **(M)**
n) Prepare deficiency list for contractor; review deficiencies at all progress meetings and submit a monthly list

o) Ensure that tickets for weighted materials are periodically verified for auditing purposes by approved weigh scale facilities and ensure payment adjustment factors as per protocol in this Manual
p) Preparation of weekly reports that are used for the preparation of the month-end quantities for progress certification by contract administrator

Ditching Tasks, if applicable

a) If drainage ditch is applicable, check that ditch grading tolerances and all slopes conform to design requirements **(M)**
b) Check that appropriate measures are taken to prevent erosion of ditches as per contract **(M)**

Grade and Compaction Tasks

a) Verification of horizontal and vertical roadway grading are within the specified tolerances. If grade checks continually fail, notify the contract administrator **(M)**
b) Ensure that the area is evenly graded and compacted. Sample and test material to ensure correct moisture content and proctor density for accurate testing results **(M)**
c) Check that subbase and base materials comply as specified in the contract documents
d) Ensure that all visible soft or loose areas are repaired **(M)**
e) If compaction fails, the contractor will not be permitted to pour concrete or place asphalt until granular material is re-compacted and re-tests pass **(M)**

Curb and Gutter Tasks

a) Check proper type of curb is constructed **(M)**
b) Check for proper positioning of drainage structures, frames and grates at the curb line **(M)**
c) Inspect concrete placement, consolidation, finishing, curing operations, and saw cuts at catch basins. Consolidation of formed concrete to be performed using pencil vibrator
d) Check for proper treatments of curb at entrances and handicap ramp locations

Sidewalk Tasks

a) Check for proper alignment, grade, granular base preparation, and additional thickness at commercial and industrial driveways **(M)**
b) Check for proper positioning of construction joints and expansion points, including location and depth
c) Check for curb ramps and tactile walking surface indicators as per contract drawings

Geotextile Tasks

a) Check installation area for removal of sharp objects that may puncture the geotextile and ensure that the subgrade is roiled smooth **(M)**
b) Check that drop height for material placed onto geotextile is less than one metre to ensure geotextile is not damaged

Asphalt Paving Tasks

a) Ensure that the mix design has been approved **(M)**
b) Ensure that grade of surface to be paved has been properly prepared **(M)**
c) Ensure that tack coat is applied to all required areas
d) Ensure that compaction is carried out as specified in the contract **(M)**
e) Ensure that all tickets are collected at the time of delivery if paid by weight **(M)**
f) Make arrangements for weight check with City facility
g) Check paving is carried out full width with ramping as specified in the contract
h) Check that air temperature at the surface of the road is above the minimum specified **(M)**
i) Check that the temperature of the hot mix delivered to the site is as specified **(M)**
j) Prior to placement of subsequent asphalt lift, ensure that the temperature of the previous asphalt layer is acceptable
k) Check that the line marking subcontractor and routing and sealing contractor has been scheduled

Pavement Marking Tasks

a) Check that the locations of the temporary markings are applied as per the approved staging drawings
b) Notify the appropriate City staff for permanent markings are as requested or required
c) Check that zone painting is completed on any temporary driving surface prior to opening to vehicular traffic

Environmental Compliance Tasks

a) Ensure that contractor has submitted an erosion and sediment control plan and monitor contractor's compliance with this plan **(M)**
b) Check that contractor ensures that workers are trained in the hazards of asbestos, use of respirators, cleaning and disposal of protective clothing and the requirements of the asbestos removal operations as per Ontario Reg 278/05
c) Check that excess materials from the work are handled as specified in the contract **(M)**
d) Ensure that dumping tickets are collected
e) Record contaminated material taken away from the site and verify that the hauler is Ministry of Environment & Climate Change (MOECC) certified **(M)**

Vehicular Traffic Control

a) Ensure contractor complies with the traffic management plan submitted **(M)**
b) Ensure that layout of signs is in accordance with contract and are placed according to Book 7 – Temporary Conditions and are approved by Transportation
c) Check daily that local traffic access to residential, commercial or institutional areas is not modified or redirected unless otherwise specified in the contract **(M)**
d) Ensure that sidewalks and driveways are ramped to provide access for pedestrians and vehicles and pedestrian use sidewalk signs

e) Check for removal of temporary traffic signs when no longer required
f) 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 **(M)**
g) In addition to the aforementioned, the contract administrator to ensure that the Contractor Incident Report, and the Contractor Incident Follow-Up Checklist forms are completed and forwarded to the City's project manager **(M)**
h) Co-ordinate with right-of-way management unit for the inspection of the traffic control devices
i) Ensure that all temporary concrete barriers are installed and connected properly
j) Confirm removal or relocation of concrete barriers is carried out as specified
k) Check requirements for paid duty police officer(s) and ensure that contractor adheres to requirements

Sedimentation Control

a) Check installation of sediment barriers, flow checks, sediment traps, turbidity curtains, and cofferdams are installed as per contract
b) Check accumulated sediment is cleaned out periodically
c) Ensure compliance with time constraints on the maximum period between removal of original vegetative surface and placement of final specified surface cover
d) Ensure work specified in the watercourses or water bodies is in compliance with what is specified in the contract or authorized through environmental permits or approvals **(M)**
e) Check compliance with time constraints specified in the contract relative to work in and adjacent to watercourses **(M)**

B.2 Sanitary / Storm Sewers – Inspection Tasks

General Tasks

a) Ensure contractor has documented the existing site conditions and adjacent properties by taking pre-construction photos in preparation of potential subsequent claims according to the contract documents. And contractors have submitted a copy to the contract administrator. **(M)**
b) Check pipe class and condition of pipe including maintenance holes, saddles, etc.
c) Documents day-to-day activities on a contract via:
    - Field book
    - Daily inspector's report
    - Daily quantity sheets
    - Weekly inspector's report
    - Daily summary of weighted materials sheet
    - Daily summary of work completed on cost-plus basis
d) Ensure Occupational Health and Safety Act (OHSA) compliance

e) Note ground conditions during excavation, such as, excessive trench collapse, presence of water, soft spots, ground condition at bottom of trench, etc. **(M)**
f) Record and report all ground movements, failures, seepage zones, and changes in soil conditions to the contract administrator
g) Stations of lateral services recorded
h) Check that lateral is connected to the proper sewer main – storm to storm; and sanitary to sanitary
i) Check for proper connections to existing service pipes; and proper size of pipe is used for all house connections **(M)**
j) Type of shoring used
k) Check pipe is installed to proper alignment and grade **(M)**
l) Record chainages and length of pipes installed including any and all service connections
m) Location of utilities encountered that vary from plan location
n) Material testing performed and copies of test results provided by material testing consultant; document action(s) taken on failed results **(M)**
o) Check specified compaction is obtained under pipes entering or existing maintenance holes and concrete is placed and vibrated where cradling is required **(M)**
p) Ensure that steps, ladders, and platforms are properly aligned and secured to allow for safe and easy access
q) If bypass pumps are required, check that they are as per approved submitted plans, and if inclement weather is forecast check their proper functioning
r) Record all rock excavations **(M)**
s) Check utilities have been properly supported during trench excavation
t) Deficiency inspection to be completed as the work progresses and maintained on a running basis to be provided to the contract administrator and the contractor at least weekly and at progress meetings

B.3 Watermain – Inspection Tasks

General Tasks

a) Check utility locates and traffic control plans have been received
b) Check hydrant "out-of-service" bags are used on hydrants that are temporarily out of service, if applicable
c) Note ground conditions during excavation, such as, excessive trench collapse, presence of water, soft spots, ground condition at bottom of trench, etc. **(M)**
d) Record stations of water and sanitary services
e) Deficiency inspection to be completed as the work progresses and maintained on a running basis to be provided to the contract administrator and the contractor at least weekly and at progress meetings
f) Check pipe class and condition of pipe including valves, fittings, saddles, etc.
g) Check that alignment and grade are properly set
h) Review location requirements for placement of nozzles with contractor for hydrostatic testing, leakage testing, and disinfection **(M)**
i) Check that thrust blocks or restraining rings are provided to any connections, caps, and bends as per requirements of the contract **(M)**

j) Check that appropriate compaction and test results have been completed
k) Check that hydrostatic and disinfection testing is completed and results satisfactory before watermain is placed into service **(M).** Refer to Appendix J – Watermain Testing Procedures
l) Ensure that tracing wire is properly installed and tested for conductivity, continuity and traceability for non-metallic pipe **(M)**
m) Ensure that the direction of operation on all valves is as specified: clockwise open; counter-clockwise closed **(M)**
n) Ensure that valve chamber frames and covers are centered over the valve nut with the cover adjusted to match grade
o) Ensure that pre-cast valve chamber sections are sealed as per contract
p) Ensure that valve chambers with concrete floors have either sumps or connection to storm, as per contract
q) Ensure valve restraints are in place before pressure testing is conducted

Hydrant Installation

a) Check bedding for the hydrants is in accordance with the contract documents
b) Check hydrants are placed to the depth and location specified in the contract **(M)**
c) Check that hydrants are plumb and that the larger outlet nozzles is facing the roadway
d) Check that operating nut on the hydrant opens counter clockwise
e) Check that restraining rings and concrete thrust block are installed at the boot of the hydrant
f) Check that breakaway flange and coupling are at the proper elevation above finished grade and that extensions are installed properly **(M)**

Water Service Installation

a) Check all pipes for correct type, size and class **(M)**
b) Check depth of cover on services is as per contract
c) Ensure that saddles are sized to provide even support around the full circumference of the pipe. Ensure recommended torque is applied
d) Check that horizontal gooseneck is provided on specified services and placed on the tightening side of the corporation stop
e) Check curb stops are provided on all specified services at or near property line
f) Ensure that water service is disinfected if diameter is 100 mm or greater and results recorded in the inspector's daily report
g) Ensure that wet tap is cleaned with disinfectant to minimize contamination

Hydrostatic Testing

a) Watermain section to be tested shall be isolated by the contractor with the proper backflow prevention devices **(M)**
b) Follow and complete the hydrostatic testing as outlined on the City's form – New Watermain Disinfection, Pressure Testing, Acceptance Form, January 2023 – see Appendix A7 and Appendix J

c) Watermain to be filled by the contractor and flushed to remove any debris
d) Once watermain has been flushed, check that contractor increases the pressure to the testing level and air is expelled through hydrants and high points
e) Record the segment length and ensure testing pressure is maintained for the time, and within the specified pressure loss
f) Ensure that leakage test is conducted during the first hour of the hydrostatic test, and that the volume of the make-up water is within the tolerances specified in the contract

Chlorination and Disinfection Testing

a) Once watermain has been successfully tested for leakage, coordinate the chlorination/disinfection test with contractor
b) Follow and complete the chlorination and disinfection plan as outlined in the City's form - New Watermain Disinfection, Pressure Testing, Acceptance Form, January 2023 – see Appendix A7 and Appendix J
c) Ensure that Markham's Operations operates the live system and not the contractor **(M)**
d) Ensure that contractor provides proper access to nozzles for disinfection
e) Record disinfection test information in daily report **(M)**
f) Ensure contractor undertakes swabbing to disinfect short filler lengths of pipe re connections

B.4 Utility Construction – Inspection Tasks

General Tasks

a) Check that a project information sign is placed at each end of the project. The sign should include name of utility company, name of contractor, and a contract number
b) Ensure that pedestrian and vehicular access is being maintained
c) Check copy of permit is on-site and that expiry date is still valid; and work is being carried out in the location noted on permit
d) Check copy of drawing is on-site
e) Ensure that utility infrastructure is installed in the correct alignment and depth as per drawing or sketch on permit
f) Check that traffic control is in place
g) Check that pay-duty police are on-site, where applicable
h) Check that any restoration being performed by utility company meets City's standards
i) Ensure that photographs are taken
j) Complete Utility Construction Site Visit Report **(M)**

B.5 Landscaping – Inspection Tasks

General Tasks

a) Check that topsoil is spread uniformly to depth specified **(M)**
b) Check that topsoil is not used for filling depressions; record quantities
c) Check placement of sod on sloped ensuring staking pattern is correct
d) Ensure that sod edges are countersunk to match adjacent surface
e) Check application rate and type of fertilizer; ensure watering is carried out per contract requirements
f) When seeding, check specified preparation of soil prior to seeding and mulching **(M)**
g) Ensure that seeding and mulching operations are completed at temperatures or time of year allowed by specifications or identified in contract
h) Check for growth of plant or erosion of seeded areas or both

B.6 Guide Rail – Inspection Tasks

General Tasks

a) Check that the steel beam guide rail elements are overlapped in direction of adjacent vehicular traffic
b) Check that preservative treated wood posts conform to the contract requirements
c) Check that posts are cut off correctly, chamfered and tops treated and mounted height is correct based on edge of pavement grades
d) Confirm placement of reflectorized strips
e) Check that channels are installed at proper locations, elevations and are terminated as specified in contract
f) Check that all bolts, washers and nuts are placed and affixed to all plates, angles, posts and steel rail as required

B.7 Electrical – Inspection Tasks

Underground Ducts and Bases

a) Check that correct number and size of ducts are installed
b) Check that ducts for underpass luminaries consist of non-metallic liquid tight conduit and connectors **(M)**
c) Where Electrical Non-Metallic Tubing (EMT) is used, check it has been installed in accordance with specifications
d) Check marker tape and cable bricks have been installed as specified
e) Check that unused ducts have fish wire installed and are plugged

Electrical Chambers

a) Check type, alignment, offsets and grade of maintenance holes and hand holes
b) Check correct number of sleeves and openings are installed

c) Ensure correct positioning and installation of ladder rungs, pulling irons, duct sleeves, drainage pipe and frames and covers
d) Check that frames and covers of electrical chambers are connected to the system ground or are intrinsically safe as per contract requirements **(M)**
e) Check that rigid and flexible ducts entering maintenance holes have ends placed flush with face of the inside wall of the unit
f) Check that contractor augers holes to specified dimensions for footings
g) Check that pole orientation is as specified in contract
h) Check that pole foundations and poles are installed to correct elevation, station and offset, as specified in contract
i) Check grading around pole foundations is completed as specified

B.8 Structural (Bridge)- Inspection Tasks

Dewatering

a) Check operation of dewatering system
b) Check contractor is monitoring system as specified in the contract
c) Check dewatering is not removed until the backfilling is brought up to grade
d) Check for muddy water discharge at the outlet
e) Check that environmental special provisions are being adhered to **(M)**
f) Check that discharge is being managed as per contract **(M)**
g) Check that groundwater drawdown levels are as designed on the drawings
h) Check that contractor's dewatering scheme is not causing loss of materials under adjacent founding elements or backfill

Bridge Excavation

a) Check that all footing and subbase excavations conform to size, shape, line, elevation, and grade as specified in the contract **(M)**
b) Check that loosened material, soft material, boulders and other deleterious material at the foundation base are removed and replaced with suitable material
c) Record the depth, length, width, type of material used, and how it was placed
d) Check that any adjacent utility or structure is not affected or undermined by the footing and subbase excavation
e) Record location of utilities

Caisson Foundations

a) Check type, length, and condition of caisson liners
b) Check that penetration and cut off are in accordance with design data
c) Check that caissons are cleaned out prior to placing reinforcing steel and concrete **(M)**
d) Check that vertical and batter alignment of caisson are as specified in the contract

e) Check that concrete placement, consolidation, and curing operations are performed in accordance with the tasks identified below regarding the aforementioned operations

Bridge Backfilling

a) Check that the structure excavation limits are verified and recorded prior to commencement of backfilling operations **(M)**
b) Check that concrete has reached required percentage of design strength prior to backfilling **(M)**
c) Ensure that backfilling is performed in sequential equal lifts on both sides of the structure
d) Check that appropriate compaction procedures and sequence is used, and that appropriate compaction equipment is used in restricted areas
e) Ensure that appropriate compaction testing is being conducted

Falsework

a) Check that stamped, approved falsework drawings are on site and check installation of falsework against stamped working drawings prior to concrete pour **(M)**
b) Ensure member sizes and spacing, longitudinal and transverse bracing, type and location of hangers are all as per stamped installation drawings **(M)**
c) Check that required concrete strength has been reached prior to removing falsework **(M)**
d) Monitor falsework several times during concrete placement operation for deflection and settlement

Installation of Bridge Bearings

a) Check and record for elastomeric bearings, the size, name of manufacturer, part number and date of manufacturer; and also check that bearing is not on the list of defective bearings
b) When specified, randomly select and then ship the sample bearing(s) for testing as specified
c) Check that surface tolerance and bedding requirements of bearing seats conform to specifications
d) Check that each bearing is installed at the correct location, elevation, and is properly aligned as specified
e) Check the timing and procedure for jacking and re-alignment of bearings
f) On completion of the structure, visually inspect the bearings to ensure they have full and uniform bearing at and bottom, and that bearing components are not out of position **(M)**
g) Check for defects following jacking **(M)**

Concrete and Structural Steel Beam Erection

a) Check that stamped approved erection drawings are on site **(M)**
b) Check that beams have not been damaged and are set to the specified alignment and seated properly
c) Ensure that the lifting equipment has adequate capacity and is located on a stable foundation
d) Ensure that lateral bracing is in place prior to lifting beams
e) Ensure that contractor complies with approved drawings and procedures **(M)**

Reinforcing Steel Placement

a) Examine reinforcing steel schedule and drawings

b) Check for correct grade, bar mark, size, length, and bending dimensions and provision of mill certificates
c) Check condition of all types of reinforcing steel and ensure damaged bars are repaired with approved materials or replaced as specified in the contract
d) Check coated tie wire is used on epoxy costed steel; and stainless steel ties are used on stainless steel
e) Check that splicing, spacing, cover, welding, supports and tying of bars is carried out as specified in the contract
f) 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 **(M)**

Concrete Placement, Consolidation, Finishing and Curing

a) Ensure that the concrete mix design and supporting documentation has been obtained and reviewed **(M)**
b) Check those transporting systems such as concrete pumps, belts, runways, etc. are ready to be initiated for concrete pour. Also ensure that contractor has a back-up if required if a component of the transport system malfunctions **(M)**
c) Ensure that submissions for cold and hot weather concrete placement have been obtained and reviewed
d) Ensure that concrete delivery tickets are checked for correct class and concrete batching times **(M)**
e) Ensure that concrete is placed within specified time from time on ticket
f) Check that all required quality assurance testing and sampling is carried out **(M)**
g) For consolidation, check vibration equipment is in good operating condition and meets specification requirements
h) Check adequate consolidation and proper use of vibrating
i) Check deck finishing equipment is as specified in the contract
j) Check tolerances of finishing concrete are as specified in the contract
k) Check that specified curing is carried out **(M)**
l) Monitor concrete temperatures where applicable, and check that weather protection requirements are carried out as specified in the contract

Installation of Expansion Joints

a) Check material for damages or defects
b) Check field splices in steel components are located and welded as per shop drawings; and are performed by certified welder and ensure that the weld is field painted
c) Ensure that the dimensions of the block-out to receive the joint assembly are in accordance with the contract drawings
d) Check that the block-out to receive the joint is abrasive blast cleaned, without damaging the epoxy coated steel
e) Check that all debris in the block-out has been removed and the area coated with a cement paste prior to placing concrete
f) Check that the proper gap of the unit has been established prior to placing concrete, and check that the gap is constant throughout the total length
g) Ensure proper cover from expansion joint steel **(M)**

h) Check that holes left from removal of clamping angles or channels are cleaned and grouted with approved epoxy
i) Check for concrete blockages in the expansion joint openings
j) Check that seal is properly installed with no damage, wrinkles or splices
k) Check that sliding plates on sidewalk, curbs, and median have been installed properly with regards to the direction of traffic
l) Check that formwork including Styrofoam has been removed below expansion joint assembly between deck and ballast wall before seal is installed
m) Check for cracks in the concrete adjacent to the expansion joint
n) Ensure that all required testing has been carried out

Railing for Parapet Wall

a) Check material for damage and defects
b) Ensure that anchorages have been properly located **(M)**
c) Ensure that all end caps are installed properly
d) Check the gap on the rail mating surfaces to ensure the joint will slide
e) Ensure that slide joints are located as detailed in the contract
f) Ensure that rail posts are perpendicular, and rails are properly aligned

Bridge Deck Waterproofing

a) Check that deck meets requirements for surface tolerance and surface finish. Contractor to verify acceptability of deck surface with waterproofing subcontractor **(M)**
b) Check that air and concrete surface temperatures are within specification requirements **(M)**
c) Verify that the deck surface and face of curbs have been completely treated by abrasive blast cleaning to expose sound, laitance-free concrete and provide permission to proceed **(M)**
d) Check that all delivered materials are approved **(M)**
e) Check that tack coat is cured completely and free of any surface moisture and dirt before waterproofing membrane is applied
f) Check specified temperature of waterproofing at time of placing
g) Check the deck drainage tubes are opened
h) Ensure that contractor takes adequate protective measures and prevent over-spray of tack coat materials onto adjacent concrete surfaces such as curb face, barrier and parapet wall, abutments, columns, etc.
i) Measure and record waterproofing thickness
j) Ensure that required samples are taken for testing

B.9 Pipe Culvert – Inspection Tasks

Dewatering

a) Check operation of dewatering system
b) Check contractor is monitoring system as specified in the contract
c) Check dewatering is not removed until the backfilling is brought up to grade
d) Check for muddy water discharge at the outlet
e) Check that environmental special provisions are being adhered to **(M)**
f) Check that discharge is being managed as per contract **(M)**
g) Check that groundwater drawdown levels are as designed on the drawings
h) Check that contractor's dewatering scheme is not causing loss of materials under adjacent founding elements or backfill

Culvert Excavation

a) Check that all subbase excavations conform to size, shape, line, elevation, and grade as specified in the contract **(M)**
b) Check that loosened material, soft material, boulders and other deleterious material at the foundation base are removed and replaced with suitable material
c) Ensure that depth of excavation is as per design drawings or at least having a depth of one-half the diameter of the culvert with a minimum depth of 300mm **(M)**
d) Record the depth, length, width, type of material used, and how it was placed
e) Check that any adjacent utility or structure is not affected or undermined by the subbase excavation
f) Record location of utilities

Culvert Installation

a) Ensure size and type of culvert is as per design drawings **(M)**
b) Ensure that culvert is installed as per design or in accordance with OPSS 421
c) Ensure culvert is placed on a proper slope enabling self-cleaning ability; minimum slope of 0.5% to maximum 3% **(M)**

Culvert Backfilling

a) Check that the structure excavation limits are verified and recorded prior to commencement of backfilling operations **(M)**
b) Ensure that backfilling is performed in sequential equal lifts on both sides of the structure and no greater than 300mm lifts
c) Ensure that gravel is placed beneath the culvert pipe for load distribution **(M)**
d) Ensure that gravel is as per design specifications or pea gravel is used for best drainage with a minimum of 100mm depth of gravel

e) For culverts backfilled with granular material, ensure cohesive soil plug is placed around culvert at both the inlet and outlet **(M)**
f) Check that backfill is free from large materials
g) Check that appropriate compaction procedures and sequence is used, and that appropriate compaction equipment is used in restricted areas
h) Ensure that appropriate compaction testing is being conducted

Appendix C – Materials Testing Protocol

General Administration and Material Management Duties for Contract Administrator, Site Inspector, and Testing Consultant

This section outlines the field duties of the site inspector/contract administrator, field testing technician, and laboratory testing. For each personnel this section identifies their respective duties/responsibilities for the performance of material testing for various types of materials including frequency of inspection and testing as listed herein.

Inspector's Administrative Duties on Site

- Visually inspect the quality of materials delivered to the site and check the quality of work in the preparation of the materials
- Order field testing from testing consultant according to the minimum material testing frequencies or as required
- Collect concrete, Hot-Mix (HM) asphalt, aggregates and other material delivery tickets and record where the materials are placed
- Document field observations, visual inspection findings and record field test results in Inspector's Daily Field Report or field records
- Inform the general contractor if the materials delivered to site have failed to meet contract specifications and request the contractor and material suppliers to rectify the problem
- Recommend rejecting the material including the entire truck load of the material, with no payment for the rejected material to the contractor, if field test results show the materials have failed to meet specifications
- Recommend payments adjustment to Contract Administrator if deficiencies on volume, weight and thickness occurred
- If the failed materials have been placed before remedial actions can take effect, identify and document where the failed materials were placed
- Instruct the contractor to remove the areas where defective materials were placed
- Record observation and report to the Contract Administrator on whether corrective actions to the defective materials have taken place or not
- Contract Administrator, City Project Manager follow up on the defective materials issues with contractor and material suppliers
- Based on the field and laboratory test results, the Contract Administrator and City Project Manager to instruct the contractor to perform corrective actions. Apply price adjustment to defective materials/works according to contract specifications where warranted
- Record attendance of Testing consultant on site – time arrived, and time left
- Check if Testing consultants are certified by CCR / CSA or other equivalent testing regulatory bodies and are knowledgeable in testing and sampling construction materials
- Document what work Testing consultant performed on site – sampling, testing, and inspection
- Ensure that Testing consultant submits preliminary field test results to inspector after completion of testing

- Check if Testing technicians are careful in the testing, preparing samples and storing samples on site
- Reject test results or samples that have failed to meet testing standards and specifications and order retest and resampling, if necessary
- Contract Administrator and City's Project Manager follow up performance deficiencies with Testing consultant's project lead, if necessary

Testing Consultant's Duties on Site – Field Testing

- Report attendance to inspector upon arrival on site
- Perform field tests and prepare samples as directed by inspector
- Based on field test results, advise inspector if the concrete, HM asphalt, aggregates, and other materials meet contract specifications or not
- Submit preliminary field test results on site, in writing, to inspector immediately after testing
- Submit final field test results to Contract Administrator, in writing, with 7 working days of each field test

Testing Consultant's Administrative Duties – Laboratory Testing

- Review contractor's concrete mix designs for all concrete types specified in the contract with Contract Administrator and City's Project Manager
- Review contractor's HM asphalt design for all HM asphalt types specified in the contract with Contract Administrator and City's Project Manager
- Review contractor's aggregate – crushed limestone and/or recycled concrete – to ensure that QC data meets with contract specifications with Contract Administrator and City's Project Manager
- Submit all laboratory test results, in writing, to the Contract Administrator within 7 working days of each laboratory test
- Compile all field and laboratory test results of all the materials tested on the project, arrange them according to construction locations (station numbers and landmarks, if possible); and prepare a QA report summarizing the quality of all materials used, the in-situ densities, and core thicknesses achieved on the contract

Ready Mixed Concrete

Inspector's Duties on Site

- Document if concrete truck drivers are adding water, superplasticizer or air entrenchment agent to the load on site without prior authorization from the contractor and Contract Administrator
    - Typically performed on the first load of the day and randomly thereafter unless issues are found
- Visually check the plasticity of fresh concrete at point of discharge
    - Typically performed on the first load of the day and randomly thereafter unless issues are found
- Order on site slump tests, air tests, and concrete cylinder sampling from Testing consultant in accordance with the minimum testing frequencies or as required
- Collect concrete delivery tickets, review and document details of tickets

- Check the delivery time of the load (time when the concrete was batched to the time the concrete was unloaded); time should not exceed 90 minutes.
- Check if the load is produced from concrete plants that was specified in the contract, or the plants were agreed upon in the pre-construction meeting
- Verify and document the actual volume of each pour and compare with the theoretical volume if the work is paid by volume
- Check and verify thickness of concrete structure if the concrete is paid by area or length in contract

- Check the conditions of the granular base or subgrade before concrete is discharged
  - Check and document the state of compaction of the granular base and subgrade
  - Recommend the contractor to recompact the granular base / subgrade where necessary
  - Request Testing consultant to perform compaction test if necessary
  - Check and document the moisture condition of the granular base / subgrade
- Check and document the concrete protection and curing measures applied to fresh concrete
  - Check if the protections to wet concrete against adverse weather conditions such as wind, precipitation and extreme temperatures are adequate or not
  - Check if curing compounds or other curing materials / measures are applied to fresh concrete on site
- Check and document if vibration is adequately applied to fill voids and hard-to-reach areas
  - Ensure the proper size and type of vibrations are used
  - Avoid under or over vibration
- Check and document deficiencies found during finishing of fresh concrete
  - Check if excessive hand work is applied to fresh concrete
  - Check if water is added to finishing the water concrete
  - Check if areas with stone segregation are found on concrete surfaces
  - Check if hot weather concrete protection is adequate
  - Check if cold weather concrete protection is adequate
  - Check if barricades are placed to protect wet concrete from pedestrians and/or vehicular traffic
  - Check if depressions and bumps are found on concrete surfaces
  - Check if sidewalks or other structures are constructed with the proper gradients
  - Check if spalling is found on concrete surfaces and at expansion joint cuts
  - Check if honeycombs are developing on finished concrete surfaces
  - Check if cracks are developing on finished concrete surfaces
- Monitor the work performed by the Testing technicians
  - Check and document if cylinders are stored in an acceptable curing box
  - Check and document if the curing box is placed in a secured location on site
  - Check if concrete cylinders are delivered to the testing laboratory in accordance with the time limits

Testing Technician Duties – On Site

- Perform air entrainment tests
- Perform slump tests
- Cast concrete cylinder samples for laboratory compressive strength tests
- Record in all tests reports the air temperature at the site during testing
- Record temperature of plastic concrete at point of discharge
- 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 60m in linear length of structure
- Conduct concrete in-situ properties and quality assurances check by coring samples on site
    - As directed by inspector, contract administrator or City project manager

Testing Consultant Duties - Laboratory Testing

- Trial batching at concrete supply plant; conduct air and slump tests on site, perform 7-day and other compressive strength tests according to the mix types, 30 working days prior to placing concrete
    - One trial batch per concrete mix design per contract
- Perform 24-hour, 7-day, and 28-day compressive strength tests for normal and early strength concrete as specified in contract
    - For all samples taken
- Determine unit weight of concrete sample
    - One test per mix design per contract

Hot Mix (HM) Asphalt

Inspector's Duties On Site

- Check temperature of asphalt mix at point of discharge – minimum 120^{o}C at point of discharge
    - Typically, on the first load of the day and randomly thereafter, unless issues are found
- Collect HM asphalt delivery tickets; review and document details of tickets
- Verify the weight of the loads delivered to the site
    - As per weight verification protocol
- Check and document the condition of the HM asphalt mat
    - Check if there are areas with stone segregation on the mat and at the longitudinal joints
    - Check if all the stones in the mat are adequately coated with asphalt
    - Check if there are areas with flushing / bleeding on the mat, especially on hot days
    - Check and verify thickness of asphalt mat if the asphalt is paid by area or length in contract
        - Every 60 m length of asphalt mat
    - Check if depressions and bumps are found on the surface of the mat
    - Check if roll marks and scratches are found on the surface of the mat
    - Check if oil spills are found on the surface of the mat
    - Check if open and uneven construction joints are found on the mat

    - Ensure that contractor does not open the asphalt pavement to vehicular traffic when the mat is still warm
- Check if contractor applies tack coat to old pavement, vertical face of curbs, cold pavement joints and structures as specified in contract
- Monitor work performed by field testing technicians

Testing Technician's Duties On Site

- Perform compaction tests on HM asphalt mat using nuclear density gauge
    - 1 test section per 300 m of pass (proof rolling); minimum 2 test sections per street; 5 tests per section
- Prepare plate samples of HM asphalt on site for Extraction & Gradation (E&G) tests and Marshall properties tests, for each type of mix (reject samples prepared by shovels)
    - Large quantity paving jobs (example, arterial road paving); first production load from the asphalt plant on each paving day; every 250 tonnes thereafter
    - Small quantity paving jobs; typically, the first load of the day and every 250 tonnes thereafter; at a minimum, 1 sample in the morning and 1 sample in the afternoon
- Visually check the nominal size of the aggregates used in the mix to ensure compliance with the specifications
- Visually check if the type of aggregates used in the mix are complying with specifications
- Determine asphalt mat thickness by coring if the asphalt is paid by area or length in contract
    - Every 60 m length of travelling lane; and as directed by inspector or contract administrator
- Conduct HM asphalt in-situ properties and quality assurances check by coring samples on site
    - As directed by inspector or contract administrator
- Record in test report the air temperature at the site during testing
- Record in test report the temperature of the HM asphalt during sampling

Testing Consultant's Duties – Laboratory Testing

- Trial batching at HM asphalt plant and conduct full Marshall test – E&G, AC content, and Marshall properties tests – on each trial batch 7 working days before asphalt placement
    - 1 trial batch per HM asphalt mix design
- E&G testing and fast track reporting – for large quantity paving jobs as for arterial road paving
    - First production load from the asphalt plant on each paving day
    - Report (email, phone or fax) the E&G results to the inspector / contract administrator, and asphalt plant as soon as the test results are ready
    - Advise changes to production, if necessary
- Conduct HM asphalt E&G tests on the samples taken from site
- Conduct full Marshall tests on samples taken from site
    - Every 500 tonnes after testing of the first load
- Conduct AC recovered penetration test when RAP – Reclaimed Asphalt Pavement – is used in the mix

- 1 test for each day of paving
- Conduct specification conformance tests on Performance Graded Asphalt Cement (PGAC), if required
  - 1 test for each mix design

Granular Aggregates – Crushed Limestone and Recycled Concrete

Inspector's Duties on Site

- For recycled concrete material (RCM) review contractor's supplied test data to ensure material being delivered is under control
  - Every load until consistency is obtained and random checking thereafter
- Visually check for deleterious material (1% max) and document findings
  - Every load until consistency is obtained and random checking thereafter
- Visually check the percentage crushed of aggregate delivered and document findings. If testing recycled concrete include sulphate testing of sampled aggregate
  - Every 250 tonnes per type of material
- Order gradation tests from Testing consultant
  - Minimum of 1 test completed per source of RCM per project
- Order physical property test of aggregates from Testing consultant, if necessary
- Collect aggregate delivery tickets; review and document details of tickets
  - As per weight verification protocol
- Verify the weight of the loads delivered to site if the materials are paid by weight
- Monitor the work performed by the field testing technicians

Testing Technician's Duties On Site

- Conduct compaction tests including moisture content using nuclear density gauge
  - All trench backfills, granular bases and subbases
  - Sewer and watermain trenches
  - Granular bases for roads, curbs, sidewalks, and other structures
- Take samples from stockpiles on site for gradation tests
- Take samples from stockpiles on site for proctor density tests
  - 1 sample per type of material per contract
- Determine granular base thickness by coring or digging test pits
  - Every 50m length of base, and as directed by inspector or contract administrator

Testing Consultant Duties – Laboratory Testing

- Sampling at source (production plant) and perform physical property test and gradation tests to verify the physical properties and gradation of materials, if necessary
  - According to type of material used and as required
- Conduct gradation tests on samples taken from site
- Conduct standard modified proctor density tests on samples taken from site

Imported Earth

Inspector's Duties On Site

- Visually check for deleterious materials and document findings
    - Every load until consistency is attained; random checking thereafter
- Verify the weight of the loads delivered to the site if the materials are paid by weight
    - As per weight verification protocol
- Collect earth delivery tickets; review and document details of tickets
- Monitor the work performance by field testing technicians

Testing Technician's Duties On Site

- Conduct compaction tests including moisture content using nuclear equipment
    - All trench backfills and subgrade
    - Sewer and watermain trenches; 1 test per 0.3m lift for each increment or fraction of 150mm lineal meters of backfill
    - Road or sidewalk subgrade; 1 test per 0.3 lift for each increment or fraction of 500 square meters on each travelling lane
- Take samples from stockpiles on site for soil classification and engineering properties tests
    - Every 250 tonnes per type of material

Testing Consultant's Duties – Laboratory Testing

- Conduct soil classification tests from samples taken on site
- Conduct standard modified proctor density tests from samples taken on site

Crack Filling Material

Inspector's Duties On Site

- Check the temperature of crack filling material on site
    - Every 4 hours of operation
- Monitor the work performed by the field testing technician

Testing Technician's Duties On Site

- Take samples on site for AC penetration tests
    - At commencement of contract and thereafter every 20,000 m
- Inspect and verify all gauges on the melting pot
    - Every day at commencement of operations

Testing Consultant's Duties – Laboratory Testing

- Conduct AC penetration tests on samples taken from site

Appendix D – As-Built Drawing Guidelines

Purpose

The purpose of this section is to provide background material for the preparation of record or as-built drawings. This section is intended for use on City capital improvement projects. Under the Safe Drinking Water Act (SDWA) 2000 Part V, as-built drawings of constructed facilities must be made available if requested by the Ministry of the Environment, Conservation and Parks (MECP). 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, and/or by the contract administrator of an engineering consulting firm overseeing the contract in the field. 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) guideline document "Use of the Professional Engineer's Seal" has a section #7.7, titled "As-Built and Record Documents" and reads as follows:

Professional engineers should use the following distinction between as-built drawings and record drawings. Drawings referred to as "as-built" are generally prepared 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 design engineer during construction. Other information might reflect changes initiated by other parties due to site conditions or other causes. Changes by the design 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 design engineer/contract administrator 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 the 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.
Seal drawings with record information might imply that the engineer is providing some type of warranty or certification of the construction. This is never the case, as the contractor is always responsible for construction.

Definitions

As-Built Drawings: Documentation created by or based solely on information provided by a third party that reflects the installed, constructed or commissioned conditions of a devise, machine, equipment, apparatus, structure, or systems of an engineering project. Since the engineer has not verified that the information is complete or accurate, as-built drawings are not sealed.

Record Drawings: 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: 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 period. Construction drawings are issued after the tender has closed and are the ones used at the construction stage. These are commonly called IFC – Issued for Construction – drawings. They should consist of one paper print of the approved drawing with changes or corrections made as required by the City or the design consultant.

Process for As-Built Drawings

The process of producing as-built drawings begins at the time the City receives a copy of the tracked changes on the construction drawings assembled by the consultant's site inspector on the project. The task of producing as-built drawings is done by the contract administrator. The process concludes with a set of drawings for the project showing all known construction changes. All projects require the completion of as-built drawings prior to close-out. The site inspector may red-line any changes to the contract drawings whenever they are provided.

Construction Phase

During the construction phase of the project, the contractor for the project is to maintain one set of full-size plans to mark-up for as-built drawing purposes when drawings are provided as part of the tender call package. The contractor's superintendent or authorized representative, together with the consultant's site inspector, will update the plans with as-built information on a daily basis. As-built data includes the final location of all new materials incorporated into the work and all existing improvements encountered during construction. Information is to be shown either by check-marking any original dimension on the drawings, if they are correct, or by having the revised dimensions beside the original dimension.

The drawing status block on the border of the drawing sheet is intended for formal changes made by addendum during the tender phase and for recording changes made during construction. A change is noted by describing it in the revision block, circling or clouding the revised area on the drawing and placing the revision letter or number in a triangle inside the circled or clouded area.

As-Built Drawing Preparation / Completion

Upon completion of construction, the as-built notes will be provided, by the site inspector, to the contract administrator together with the engineering survey field data and notes of the as-built conditions. This information/data will be the basis for the as-built drawing submittal. Changes are to be transferred to the permanent CADD drawing file and labelled as "As-Built Drawing".

Required Information

The following are examples of changes made to a project that are required to be included on the as-built drawings:

- Comments or remarks of field information that may have been provided by the design consultant
- Field information provided on the contractor's construction drawings, assembled by the contractor
- Project change order drawings or change order details indicating changes made to the contract drawings
- Field information provided on the site inspector's construction drawings, assembled by the site inspector
- Survey notes provided by the contractor's survey crew or the consultant's survey crew

Appendix E – As-Built Features Requirements

As-built drawings should show the accurate locations of construction features such as storm sewers, sanitary sewers, combined sewers, watermains and other water appurtenances, structures, conduits, power poles, light standards, vaults, width of streets, curbs, sidewalks, landscaping area, building footprints, channelization, pavement markings, property lines, equipment, and easements.

As-built drawings should indicate all necessary information with respect to the roadway systems, storm and sanitary sewers, water distribution systems (watermains and services), stormwater management facilities, and existing and new utilities, as intended by the design.

Roadways

Roadway information is to be field verified or surveyed or both as outlined in the following Table 1. Table 1 indicates what features should be identified and who is responsible to provide the information.

Table 1 - Roadway Features

Roadway Features	Field Verification (Consultant Inspector)	Survey (Consultant)	Identify on as-built drawing (Consultant)
Pavement	Material, depth, width, type (rigid, flexible or both)	Elevations	Note all changes and correct locations indicated on plans. Redraw on plans any and all roadway features listed if moved 300mm or more
Curb and gutter	Face of curb location		
Driveways	Location, width, material, type (commercial or domestic)		
Boulevards	Location, width, type		
Sidewalks	Location, width, material, depth	Elevations	
Street Lighting	Location, height, material, wattage		
Conduit	Location, material, depth, size, owner		
Handwell	Location, conduit entrance, type (street lighting or traffic)		
Monument	Location, material		

Storm Drainage

Storm drainage information is to be field verified or surveyed or both as outlined in the following Table 2. Table 2 indicates what features should be identified and who is responsible to provide the information.

Table 2 - Storm Drainage			
Storm Drainage Features	**Field Verification (Consultant Inspector)**	**Survey (Consultant)**	**Identify on As-Built Drawing (Consultant)**
Pipe	Size, material, class of pipe, bedding type, drop pipe size	Inverts, drop pipe inverts, location of end of stub or bulkhead	Redraw on plans if pipe has moved horizontally 300mm or more or vertically 150mm or more; Recalculate slope on recorded length and surveyed inverts; Identify all new information on plans
CBs, MHs, outfalls, inlet structures	Size, type, cover type, safety platforms, flow regulators, overflow, weir, grate type	Location, rim elevation, overflow weir invert, inlet/outlet inverts	Redraw on plans if structure moved 300mm or more; Identify all new information on plans
Culverts	Size, material, shape, collars	Location of ends of culverts and inverts	Redraw on plans if culvert moved 300mm or more; Recalculate slope on recorded length and surveyed inverts; Identify all new information on plans
Subdrains	Pipe locations, material, size		Redraw on plans if subdrains moved 300mm or more;
Laterals	Size, material, class of pipe, bedding type		Identify locations on plans

Sanitary Sewers

Sanitary sewer information is to be field verified or surveyed or both as outlined in the following Table 3. Table 3 indicates what features should be identified and who is responsible to provide the information.

Table 3 - Sanitary Sewers			
Sani Sewer Features	**Field Verification (Consultant Inspector)**	**Survey (Consultant)**	**Identify on As-Built Drawing (Consultant)**
MHs	MH diameter, type, manufacturer, safety platform, flow restrictors, overflow	Horizontal location of centre of MH, rime elevations, all invert elevations, and overflow weir invert	Note all changes and correct elevations
Pipe -gravity sewer system	Size, class of pipe, material, bedding type, drop pipe size	Horizontal length of pipe from centre of MH to centre of MH, inverts, drop pipe inverts, locations of end of stub or bulkhead	Redraw on plans if pipe has moved 300mm or more horizontally or 150mm or more vertically; Recalculate slope on recorded length and surveyed inverts; Indicate new information on plans such as slope, length, diameter, etc.
Laterals	Material, size, locations, backflow valves		Indicate location on plans
Pipe - forcemain	Manufacturer, pipe size and class, bedding, point type, fittings; Measure distance between fittings, centre of tee crossings, bends; Location and crossings and invert of any utility crossings; Depth of pipes during installations at every fitting and appurtenance	Horizontal location of forcemain	Redraw on plans if pipe is moved 300mm or more. Indicate new information on plans such as; slope, length, size, etc.
Cleanouts	Size, material, location	Horizontal location of centre of box, rim elevation	Redraw on plans if cleanout moved 300mm or more; Indicate new information on plans
Grease interceptor or oil grit separators	Pipe materials, size, vault size and dimensions	Horizontal dimensions of 4 corners of vault and inverts	Indicate location on plans; Indicate vault dimensions and size; Indicate pipe elevations

Watermains and Services

Water system features / information is to be field verified or surveyed or both as outlined in the following Table 4. Table 4 indicates what features should be identified and who is responsible to provide the information.

Table 4 - Water Distribution Systems			
Water Systems Features	**Field Verification (Consultant Inspector)**	**Survey (Consultant)**	**Identify on As-Built Drawing (Consultant)**
Pipe and fittings	Material, pipe size & class, bedding, joint type, fittings; Measure distance between fittings - c/c of tees, crosses, bends; Location and invert of any utility crossings; Depth of pipes during installation at every fitting & appurtenances, vertical bends; Location where insulation used	Top of pipe, location of valve, horizontal location of bends, tees, and crosses	Redraw on plans if pipe has moved 300mm or more horizontally or 150mm or more vertically Recalculate slope on recorded length and surveyed inverts Indicate new information on plans such as slope, length, diameter, etc.
Valves in chamber such as gate valve, air valve, and butterfly valve			Redraw structure on plans if it moved 300mm or more Indicate new information on plans such as size, type, etc.
Mainline flow meter chambers	Type, size, vault and respective size	Horizontal location of 4 corners of vault; Location of lid; Rim elevation	Redraw vault on plans if moved 300mm or more Indicate new date on plans, such as, size, type, etc.
Pressure reducing valve chamber	Valve size, vault size and drain data	Horizontal location of 4 corners of vault; Location of lid; Rim elevation	Redraw vault on plans if moved 300mm or more Indicate new date on plans, such as, size, type, etc.
Hydrants	Manufacturer; Hydrant burial depth	Horizontal location of hydrant – centre of valve stem; Top of hydrant elevation	Redraw hydrant on plans if moved 300mm or more
Water services	Material, size, type (fire/domestic), location	Curb stop valve location	Redraw service lines on plans if moved 300mm or more; Indicate new data on plans such as, size, type, etc.
Backflow devices at street line	Device brand type, size, service line size, location of drain	Horizontal location of 4 corners of vault	Redraw vault on plans if moved 300mm or more. Indicate new data on plans such as, size, type, etc

Strom water Management Facilities

Stormwater management facilities are intended to control the rate and quality of the rainwater runoff. Stromwater management features / information is to be field verified or surveyed or both as outlined in the following Table 5. Table 5 indicates what features should be identified and who is responsible to provide the information.

Table 5 - Stormwater Management Facilities

Stormwater Management Features	Field Verification (Consultant Inspector)	Survey (Consultant)	Identify on As-Built Drawing (Consultant)
Storage tanks	Material, type, size, control systems such as, orifice size and weir dimensions	Control structure location and access; control elevations such as orifice inverts, weir elevations	Redraw structure on plans if moved 300mm or more horizontally or 150mm or more vertically
Ponds	Size, shape	Topographic survey including bottom elevations; Final volumes; Overflow elevation; Control structure location; Elevations regarding orifice and weir	Redraw pond on plans if moved 3.0m or more Recalculate volume based on water surface and depth Indicate new date on plans such as size, type, volume, etc
Wetlands		Boundary of created or modified wetlands	Redraw wetland on plans if moved 3.0m or more Recalculate volume based on water surface and depth Indicate new date on plans such as size, type, volume, etc
Grease interceptor Oil/grit separation	Material, size, vault dimensions	Horizontal location of 4 corners of vault	Indicate on plans vault dimensions, size, inverts
Infiltration systems; French drains	Material, size; pipe diameter and type	Inlet invert; Outlet invert	Redraw features on plans if moved 300mm or more

Appendix F – Utility Inspections

The main duty of a site inspector at a utility project is to protect the interests of the City and the city's infrastructure while ensuring that the work is done in accordance with City standards and specifications, the permit conditions, and permit drawings.

Some of the activities that the inspector is responsible for are as follows:

- Inspecting work for conformance with permit and requirements
- Preparing site visit inspection reports and meeting reports
- Tracking progress of work
- Prepare weekly or monthly reports
- Advising the project lead such as the engineer or construction supervisor, and the City's project manager / contract administrator of the construction issues
- Attending and documenting pre-construction and any necessary subsequent construction meetings
- Responding to the public and directing them to the proper authority
- Taking photographs where necessary to illustrate issues

Pre-Construction Meeting

For all utility work that will result in a major disruption to vehicular traffic or area residents or both, a pre-construction meeting is required. The meeting should outline and discuss, as a minimum, the following:

- method of construction
- staging
- schedule
- traffic control, and
- restoration requirements

The site inspector should complete the "Utility Pre-Construction Meeting Summary" form after the conclusion of the meeting (see Form A17 in Appendix A – Forms).

Changes in the Work

Changes in the work include, but are not limited to the following:

- deletion or extension to the scope of work
- alteration of line alignment
- alteration of grades and dimensions,
- alterations of the approved construction methods, backfilling, or staging

When approached by the applicant utility company or their contractor to make any changes to the work described on the permit and associated drawings, the site inspector should immediately contact the City's project manager.

No changes are to be permitted without:

- Discussions between the inspector and City's project manager to assess the impact of the requested change. Where necessary, a site meeting should be held, and minutes of the meeting taken
- For any changes to the staging of the work (that is, vehicular traffic disruptions), written approval must also be obtained from the City's transportation section

Public Relations

The site inspector is a representative of the City of Markham, not of the utility project owner. It is important that the inspector be mindful of this relationship at all times. Any concern regarding the work should be forwarded first to the contractor on-site or the contact number printed on the project information sign for the respective utility company. The inspector should only get directly involved if the nature of the concern is a violation of the terms of the permit.

If a public relations issue arises on-site between the utility contractor and a resident, the inspector should notify the utility owner named on the permit and also contact the City's project manager and the construction supervisor to let them know of the situation. The utility project owner is accountable for the actions of their contractor and must provide the necessary oversight. As the City's representative on-site, the site inspector is there only as a facilitator to ensure the resident concerns are taken seriously and the contractor and the utility project owner are tactful in resolving any issues.

Appendix G – 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 of 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 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 the contractor's field representative when they decide to verify the weight of materials delivered to the site.

The City will not compensate contractors for any cost associated with the weight verification process.

Application

This protocol applies to all City transportation, structures, sewer, and watermain construction contracts. The provisions included in this protocol 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 weight shall proceed immediately to the City's eastern weigh scale yard for the truck to be weighed. The yard is located at:

10192 Ninth Line
Markham, Ontario
L3P 3J3

The site inspector is to coordinate with the City's project manager is to ensure that the Road Operations Supervisor is notified at the at the commencement of the project and at least two (2) days prior to using the weigh scale facility. The contact information is as follows:

Supervisor / Road Operations
Operations Department / Community Services Commission

City of Markham / 101 Town Centre Blvd.
Markham, Ontario L3R 9W3
Tel.: (905) 477-7000 Ext. 2275 / Fax (905) 940-1550

The site inspector will issue a Weighing Authorization Slip to the truck driver, who will show it to the yard staff upon arrival at the City's weigh scale facility. A sample Weighing Authorization Slip is shown below. If workload permits, the site inspector or his designate should follow the truck in their vehicle to the weigh scale facility. Otherwise, the site inspector should contact the yard staff to inform them of the incoming truck.

Note: If the material being delivered is hot mix asphalt, the site inspector is to measure the temperature of the hot mix asphalt at the site before and after the weight verification and record it both on the "weighing authorization slip" and on the receipt provided by the weighing scale facility.

WEIGHING AUTHORIZATION SLIP	
Date:	**Slip No.**
Project:	**Contract No.**
Trucking Company:	
Truck License Plate:	
Hot Mix Asphalt Temperature, if applicable:	
Inspector's Signature:	
No charge for weight verification purposes	

A weigh scale receipt is to be issued to the truck driver by the weigh scale facility staff identifying the following information/data:

- Verification of the gross weight of the truck
- Verification of its content
- Date of operation
- Time of weighing
- Name of the facility performing the weighing
- Vehicle's license plate number
- Name of inbound weigh scale operator; and
- Weigh scale facility to produce 3 copies of a receipt – one for them, and two for the truck driver

The truck driver should retain one copy of the weigh scale receipt for record purposes 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 (1%), the site inspector will direct the empty truck to return to the same facility on the same day to verify its tare weight (empty load).

The weigh scale 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 are to retain one copy of the receipt for record and verification purposes.

The weigh scale facility 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 should 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.

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 **1% or less**, the site inspector may instruct the contractor to perform weight verification on other trucks at his or her discretion.

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 1%**, 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 – this includes, for example, asphalt temperature has fallen below specification – shall not be used in the contract and shall be disposed of offsite at the contractor's expense.

Price Adjustment

Should the weight verification show that the verified net weight of the material is less than what is shown on the contactor's weight ticket by **more than 1%**, the payment for the affected load shall be made based on the weight measured by the City's weighing facility.

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 has 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:

Formula:

$$A = 1.0 - (B - C)/B, \text{ where } A \leq 1.0, \text{ and } [(B - C)/B] > 1.0\%$$

Legend:

1.0% = the weight tolerance allowed
A = adjustment factor
B = net weight shown on delivery ticket
C = net weight determined at the City's weighing facility

Adjusted net weight = A x delivery ticket net weight

Example 1:

Net weight shown on delivery ticket = 20,000 kg (B)
Net weight determined at City's weighing facility = 19,920 kg (C)
(B-C)/B = (20,000-19,920)/20,000 = 0.004 = 0.4%
0.4% Is less than 1.0%, **as such, the adjustment is not applied**

Example 2:

Net weight shown on delivery ticket = 20,000 kg (B)
Net weight determined at City's weighing facility = 19,000 kg (C)
(B-C)/B = (20,000-19,000)/20,000 = 0.05 = 5.0%
5.0% is greater than 1.0%, **as such, the adjustment is applied**
A = 1.0 – (20,000-19,000)/20,000 = 1.0 – 0.05 = 0.95
Adjusted net weight = 0.95 x delivery ticket net weight

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 H – Health and Safety

The purpose of the health and safety section in this manual is to provide a quick summary and guideline to City of Markham employees and other personnel working in the field, on construction sites, facilities or areas of similar nature.

All City employees are responsible for familiarizing themselves with and fully complying with applicable legislation, and the City's health and safety policies, procedures, guidelines or best practices, as well as the site specific health and safety requirements of the constructor.

Definitions

The following terms are defined in the Occupational Health and Safety Act (OHSA) as follows:

Competent Person means "a person who

- Is qualified because of knowledge, training and experience to organize the work and its performance,
- Is familiar with OHSA and the regulations that apply to the work,
- Has knowledge of any potential or actual danger to health or safety in the workplace."

Construction "includes erection, alteration, repair, dismantling, demolition, structural maintenance, painting, land clearing, earth moving, grading, excavating, trenching, digging, boring, drilling, blasting, concreting, 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 him/herself or by more than one employer."

Owner "includes a trustee, receiver, mortgage 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."

Project means "a construction project, whether public or private, including:

- 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, watermain, service connection, telegraph, telephone or electrical cable, pipe line, duct or well, or any combination thereof;
- The moving of a building or structure;
- Any work or undertaking, or any lands or appurtenances in connection with construction"

Roles and Responsibilities

The following apply to site inspectors and contract administrators under applicable circumstances:

- Use, wear and inspect any equipment, protective devices or clothing as required
- Attend the contractor's safety orientation / meetings as per the contractor's health and safety program
- Use and operate only the equipment and tools that they are competent and qualified to do so and in a safe manner
- Do not remove or make ineffective any protective device required by the manufacturer or the employer

- Do not remove or deface hazardous material identification
- Report any safety deficiencies such as defective equipment, tools or Personal Protective Equipment (PPE) to their supervisor immediately
- Report any safety violation, contravention or act to their supervisor immediately, regardless of the parties involved

General Safety Rules

Safety in the office site trailer:

- Maintain good housekeeping
- Close filing cabinet doors when not in use
- Use chairs in an appropriate manner
- Use handrails when using stairs
- Practice good ergonomics
- Ensure that Material Safety Data Sheets (MSDS) are on site

Safety in the Field:

- Notify contractor when on site
- Be aware of potential hazards on site
- Use appropriate PPE
- Use only equipment that is good condition such as ladders and fall protection equipment
- Watch for damaged power cords, tripping hazards, unprotected rebar, and other poor housekeeping deficiencies
- Ensure appropriate controls are in place when dealing with hazards
- Become familiar with emergency and rescue procedures
- Know the access and egress points
- Before accessing mobile equipment work zones, make eye contact with the operator to ensure that they have seen and acknowledge your presence
- Know the traffic plan of the site

Personal Protective Equipment (PPE)

Mandatory PPE

- Wear CSA approved footwear (Ω TYPE 1 Boot)
- Wear CSA approved hardhat (TYPE 2 CLASS E)
- Wear appropriate high-visibility vest or other appropriate hi-vis clothing and if at night, wear reflective silver stripes encircling each arm and leg; and
- Other PPE as required

Conditional PPE – as required for specific hazards

- Safety glasses, goggles, visors, face shields, etc.

- Hearing protection
- Respirators
- Tyvek suits
- Fall protection equipment
- Gloves, barrier creams
- Personal flotation devices; and
- Any other PPE as determined through risk assessments

Expectations

City of Markham's Expectations of Contractors

For the purpose of this section, "contractor" includes but is not limited to general contractors, sub-contractors and constructors.

- Ensure compliance with all applicable legislations and regulations
- Provide the City of Markham all of the necessary health and safety documentation required and requested
- Notify the City via a complete written investigation of all incidents, accidents, and near misses
- Ensure that any unsafe act or condition observed within your or their respective site, are corrected in a timely fashion
- Report to the City any unsafe acts and conditions observed onsite regardless of the employer
- Be responsible for the health, safety and environmental conditions of all persons present and activities conducted on your or their work site
- 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 that all Ministry of Labour (MOL) visits are reported immediately to the inspector, contract administrator, and the City's project manager
- Ensure that all MOL orders and notifications are complied with
- Cooperate with the City and other subcontractors or trades on site in protecting the health and safety of everyone in the workplace

City of Markham's Expectations of Consultants

For the purpose of this section, "consultant" includes but is not limited to engineers, architects, and other specialized persons not performing construction activities.

- Ensure compliance with all applicable legislations and regulations
- Provide the City of Markham all of the necessary health and safety documentation required and requested

- Notify the City via a complete written investigation of all incidents, 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
- Advise the City when contractor safety performance is negative or when a contractor's safety behaviour/record can negatively impact the City

Reporting Incidents, Accidents, and Near Misses

Events with City of Markham Employees

- All incidents, accidents and near misses must be reported immediately to the supervisor
- The supervisor must immediately report all incidents, accidents and near misses to the City's Senior Health and Safety and Wellness Specialist.
- Supervisor must complete the incidents forms which are found on the City's website: http://checkmark.markham.ca/corporate-corner/Documents/Forms/AllItems.aspx?RootFolder=%2fcorporate%2dcorner%2fDocuments%2fWorkplace%20Health%20and%20Safety%2fContractor%20Safety&FolderCTID=0x0120008011B76EF3341147B79591C4660886CD → under CHECKMARK

Events with Contractors

- All incidents, accidents, and near misses must be reported immediately to the site inspector, contract administrator, and the City's project manager
- The City's project manager must immediately report all incidents, accidents, and near misses to the City's health and safety personnel
- An incident form is to be completed by the project manager and is found on the City's website as mentioned above
- The project manager is to obtain a copy of the contractor's investigation and provide to the City's Senior Health and Safety and Wellness Specialist

Safety Contraventions and Violations

When known contraventions of the OHSA Regulations are witnessed, the actions taken by the site inspector or contract administrator will depend on whether or not the contraventions pose an immediate danger to life or health. The actions are illustrated in the following two (2) scenarios:

Scenario 1
There is an immediate danger to life or health. In this scenario, the site inspector or contract administrator may stop the activity or worker in question:

- If possible and safe to do so, take a photograph

- 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; and copy the City's project manager, his/her supervisor, and the City's Senior Health and Safety and Wellness Specialist
- The site inspector or contract administrator always has the option and the right to contact the MOL directly. However, 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 prior to contacting the MOL. But, the site inspector or contract administrator should not hesitate to involve the MOL in dangerous circumstances, repeat offences, or where the contractor refuses to comply with OHSA Regulations

Scenario 2

There is a known contravention, but it does not constitute an immediate danger to life or health. In this scenario, the site inspector or contract administrator is not to direct the contractor or their employee to comply:

- The inspector or contract administrator should contact the City's project manager if further direction is required, 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; and copy the City's project manager, his/her supervisor, and the City's Senior Health and Safety and Wellness Specialist
- The site inspector or contract administrator always has the option and the right to contact the MOL directly. However, 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 prior to contacting the MOL. But, the site inspector or contract administrator should not hesitate to involve the MOL in dangerous circumstances, repeat offences, or where the contractor refuses to comply with OHSA Regulations

Emergency Response Program

- Ensure that current emergency contact numbers are posted and available
- Ensure there is a map and directions to nearest hospital
- Become familiar with the Contractor's emergency response plan including:
  - Fire extinguisher locations
  - Eye wash station locations, if applicable
  - First aid kit locations
  - First aiders available on site at all times, and
  - Spill kit locations
- Follow the contractor's emergency response plan when on their site

Appendix I – Filing System

CAPITAL PROJECTS - CONSTRUCTION FOLDER FILING STRUCTURE TEMPLATE

Link to Template: \\markham.ca\data\devsrv\Development\Engineering\CAPITAL\Templates\Project Folder Structure\2_Construction
Link to Construction Folder: \\markham.ca\data\devsrv\Development\Engineering\CAPITAL\02_CONSTRUCTION PROJECTS
Folder Name: 20XX\XXXXXX_Project Title
Last Update: Aug-25

NOTES:
* Use Project # for the project folder title (i.e. replace XXXXX with appropriate project #).
* When a project is complete, move the project folder from the CAPITAL PROJECTS folder to ARCHIVED PROJECTS at: \\markham.ca\data\devsrv\Development\Engineering\CAPITAL\06_ARCHIVED PROJECTS
* Where there is a filename extension and * (i.e. suffix such as .doc*, .xls*, ...), a blank template is provided.
* Where there is a filename extension and ** (i.e. pdf**), the file name format protocol is provided.
* Where "shortcut -->" is noted, ensure correct shortcut is provided.
* Stakeholders & specialties are identified as a template. Additional folders can be added as required based on project needs.

Main Folder	Sub-Folder Level 1	Sub-Folder Level 2	Sub-Folder Level 3	Sub-Folder Level 4	Sub-Folder Level 5	Sub-Folder Level 6
1 Contract & Design Documents	1 Design (shortcut)	1 *shortcut --> Design Folder*				
	2 Drawings	1 IFC				
		2 As-Built				
	3 Specifications & Technical Data					
2 Financial	1 CA	1 Budget	1 Working Files			
			2 Approved Budget Request			
		2 COAT Form	1 Working Files	1 COAT-Form.xls*		
			2 Approved COAT Form			
		3 Purchase Orders	1 PO			
			2 CO	1 CO # X	1 Working Files	1 Change-Order-Form.xls*
					2 Approved CO	
				2 CO Summary.xls*		
			3 POAF	1 POAF # X	1 Working Files	1 Purchase-Order-Adjustment-Form.xls*
					2 Approved POAF	
		4 Invoices	1 INV # - 20XX-XX-XX	1 Working Files		
				2 PD #####_Consultant Name_Inv#####_YYMMDD.pdf**		
			2 Budget Summary.xls*			
	2 GC	1 Budget	1 Working Files			
			2 Approved Budget Request			
		2 COAT Form	1 Working Files	1 COAT-Form.xls*		
			2 Approved COAT Form			
		3 Purchase Orders	1 PO			
			2 CO	1 CO # X	1 Working Files	1 Change-Order-Form.xls*
					2 Approved CO	
				2 CO Summary.xls*		
			3 POAF	1 POAF # X	1 Working Files	1 Purchase-Order-Adjustment-Form.xls*
					2 Approved POAF	
			4 CD	1 CD # X	1 Working Files	1 Change-Directive-Form.doc*
					2 Approved CD	
		4 Payment Certificates	1 PC # - 20XX-XX-XX	1 Working Files		
				2 PD #####_Contractor Name_Inv#####_YYMMDD.pdf**		
			2 PC # - 20XX-XX-XX (HB Release)	1 WSIB Clearance Certificate		
				2 Statutory Declaration		
				3 Lien Search		
				4 Working Files		
				5 PD #####_Contractor Name_Inv#####_YYMMDD.pdf**		
			3 Budget Summary.xls*			

CAPITAL PROJECTS - CONSTRUCTION FOLDER FILING STRUCTURE TEMPLATE

Link to Template: \\markham.ca\data\devsrv\Development\Engineering\CAPITAL\Templates\Project Folder Structure\2_Construction
Link to Construction Folder: \\markham.ca\data\devsrv\Development\Engineering\CAPITAL\02_CONSTRUCTION PROJECTS
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Main Folder	Sub-Folder Level 1	Sub-Folder Level 2	Sub-Folder Level 3	Sub-Folder Level 4	Sub-Folder Level 5	Sub-Folder Level 6
3 Construction Management	1 Acquisition	1 CA	1 RFP	1 Working Files		
				2 Official Bid Document		
				3 Addendum		
				4 Request for Clarifications		
				5 Conflict of Interest Declaration	1 Conflict-Of-Interest-Declaration-Form-Staff-Developing-Scope-Of-Work.pdf*	
			2 Bids & Evals	1 Bid Submissions		
				2 Bid Evaluation		
				3 Bid Analysis		
				4 Reference Checks		
				5 Conflict of Interest Declaration	1 Conflict-Of-Interest-Declaration-Form-RFP-Evaluator.pdf*	
			3 Award	1 Working Files		
				2 Approved	1 Award Report	
					2 Notice of Award	
		2 Tender	1 RFT	1 shortcut --> Design Folder (7_Tender & Construction\1_RFT)		
			2 Bids & Evals	1 Bid Analysis		
				2 Reference Checks		
				3 Bonds & Insurance Docs		
			3 Award	1 Working Files		
				2 Approved	1 Award Report	
					2 Notice of Award	
	2 Schedule	1 Preconstruction				
		2 Progress				
	3 Progress	1 Photos	1 Preconstruction			
			2 Progress Meetings	1 20XX-XX-XX		
			3 Substantial Performance			
			4 Warranty			
		2 Inspection Reports	1 Daily Reports			
			2 Weekly Reports			
		3 Site Records	1 FI			
			2 RFI			
			3 RFQ			
			4 Shop Drawings			
			5 Material Docs	1 Geotechnical Investigation		
				2 Weighted Material	1 Tickets	
				3 Chemical Soils Analysis		
				4 QC Docs		
			6 Safety Reports			
		4 Site Meetings	1 Preconstruction	1 Meeting Agenda - 20XX-XX-XX.pdf		
				2 Meeting Minutes - 20XX-XX-XX.pdf		
			2 Progress Meetings	1 20XX-XX-XX	1 Meeting Agenda - 20XX-XX-XX.pdf	
					2 Meeting Minutes - 20XX-XX-XX.pdf	
			3 Substantial Performance	1 Meeting Agenda - 20XX-XX-XX.pdf		
				2 Meeting Minutes - 20XX-XX-XX.pdf		
			4 Warranty	1 Meeting Agenda - 20XX-XX-XX.pdf		
				2 Meeting Minutes - 20XX-XX-XX.pdf		
	4 Performance Evaluation	1 CA	1 Interim	1 Working Files	1 Vendor-Evaluation-Form.xls*	
				2 Approved		
			2 Substantial Performance	1 Working Files		
				2 Approved		
			3 Warranty	1 Working Files		
				2 Approved		
		2 GC	1 Interim	1 Working Files	1 Vendor-Evaluation-Form.xls*	
				2 Approved		
			2 Substantial Performance	1 Working Files		
				2 Approved		
			3 Warranty	1 Working Files		
				2 Approved		

CAPITAL PROJECTS - CONSTRUCTION FOLDER FILING STRUCTURE TEMPLATE

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Main Folder		Sub-Folder Level 1		Sub-Folder Level 2		Sub-Folder Level 3		Sub-Folder Level 4		Sub-Folder Level 5		Sub-Folder Level 6
4	Project Correspondence	1	Markham									
		2	CA & SI	1	Health & Safety	1	Statutory Declaration Form					
						2	Insurance Certificate					
						3	WSIB					
		3	GC	1	Health & Safety	1	Statutory Declaration Form					
						2	Insurance Certificate					
						3	WSIB					
		4	York Region									
		5	Agency	1	DFO							
				2	MECP							
				3	TRCA							
		6	Utilities	1	Alectra							
				2	Enbridge							
				3	Hydro One							
				4	TC Energy							
		7	Indigenous Communities									
		8	Public									
		9	Others									
5	Permits, Property & Approvals	1	Environmental	1	TRCA							
				2	MECP							
				3	Tree Removals	1	Parks & Forestry					
						2	By-Law Enforcement					
				4	DFO	1	SARA					
		2	Road Occupancy									
		3	Utilities									
		4	Property	1	PTE							
				2	Easement							
				3	Property Acquisition							
		5	Other									
6	Performance & Closeout	1	Substantial Performance	1	Substantial Performance Letter							
				2	Certificate of Publication							
				3	Declaration of Last Supply							
				4	Certificate of Substantial Performance							
				5	Certificate of Completion of Subcontract							
		2	Deficiency Logs	1	Progress Meetings							
				2	Substantial Performance							
				3	Warranty							
		3	Construction Liens									
		4	Construction Claims									
		5	Warranty	1	Warranty Inspections	1	Warranty Inspection # X - 20XX-XX-XX					
				2	Final Acceptance Letter							

Appendix J – Watermain Testing Information Package Revision 3.0 (January 2023)

New Watermain Testing Information Package

REVISION 3.0 – JANUARY 2023

Waterworks, Environmental Services Department
CITY OF MARKHAM | 8100 WARDEN AVENUE, MARKHAM. ONTARIO, L6G 1B4

INTRODUCTION

Scope
This procedure covers the cleaning, disinfection, hydrostatic testing and sampling of new watermains. Unless specified otherwise this procedure applies to all new watermains and to include temporary watermains, relining of watermains, commercial water connections, and private watermain systems.

Definitions
Project Engineer – shall be the Consulting Engineer, or their designate.

Workforce - shall be a City Watermain Commissioning Contractor whose personnel have current MECP Certification, Ontario Regulation 128/04 (Class 1 - Distribution).

Disinfectants - Calcium or Sodium Hypochlorite that meets or exceeds AWWA Standard B300.

Neutralizing Agent - Sodium Thiosulfate that meets or exceeds ANSI/AWWA Standard C651.

References
The following procedures in this document are based on, and are to be used in conjunction with most current versions of the Ontario Provincial Specifications (OPS), the American Waterworks Association (AWWA), ANSI/AWWA Standard C651, and the Ontario Safe Drinking Water Act, 2002 (SDWA), MECP Watermain Disinfection Procedure and the City of Markham's Municipal Drinking Water License (MDWL) and Drinking Water Works Permit (DWWP).

General Requirements
Project Engineers and all workforce involved in the City's new watermain projects shall adhere to the procedures and requirements in this information package. Keep pipes clean and dry. Take precautions to protect the interiors of pipes, fittings, and valves against contamination. Cap all openings with watertight plugs/seals. Remove plugs only when making connections. Complete joints of all pipes in trenches before any stoppage of work, i.e. at the end of the workday. Pipes shall not be laid in water.

General Site Requirements
Testing of new watermains in new subdivisions and site plans will not commence before the following conditions exist:

1. Base course asphalt on roadway,
2. Hydrants and valve chambers fully accessible,
3. Copper sampling tail pieces at all sample locations located such that confined space entry is not required to draw a sample

Supervision, Testing, and Records
The project engineer and Waterworks Operator shall witness all cleaning, disinfection, hydrostatic testing and sampling activities. The workforce carrying out the cleaning and disinfection in conjunction with the project engineer is to take and record measurements on City approved forms. All such records shall be submitted to the City's representative as part of the building permit request package documentation.

Valve Operation
During the Flushing, Swabbing and Removal of Super Chlorinated Water processes a Waterworks Department operator, certified under Ontario Regulation 128/04, will be on site to witness and operate the feed valve or valves. The project engineer is to notify the Manager of Municipal Inspection, or their designate, 3 working days in advance to make arrangements for the operation.

Forms
The following forms are attached in the appendices of this information package:

1. Sample Schedule Form - Isolation Valves and Physically Separated (Appendix A)
2. Chlorine Residual Form (Appendix B)
3. New Watermain Disinfection, Pressure Testing & Acceptance Form – Isolation Valve and Physically Separated (Appendix C)
4. City Standard Drawings MWIA & MW26 (Appendix D)
5. New Watermain Water Quality Maintenance Program (Appendix E)
6. New Watermain Flushing/Chlorine Sampling Program (Appendix F)

TESTING OF NEW WATERMAINS

Comply with the requirements of the City's DWWP and ensure the most current version of the ANSI/AWWA Standard C651 is followed for any addition, modification, replacement or extension of watermains to an existing distribution system. However, the backflow protection provisions within ANSI/AWWA C651 shall be mandatory and provisions outlined in ANSI/AWWA Standard C651 for final connections to existing mains are also mandatory.

The low end chlorine residual to be tested with an electronic tester such as a Hach Pocket Colourimeter or equivalent.

1. Loading of Watermain – Physical Separation

a) The new watermain is to be physically separated and to be loaded via a temporary watermain connection. The bypass to be used for all water supply issues unless otherwise noted. Minimum size of bypass should be **50mm.** All materials for bypass to conform to the City's Approved Material List. For details on the installation of the temporary bypass see City's Standard Drawing W-1A (attached Appendix D). The Backflow Prevention provisions within Section 4.8.9 of ANSI/AWWA Standard C651-14 shall be mandatory for the installation of new watermain. A CSA approved reduced pressure (RP) backflow preventer which has been selected, installed and tested in accordance to CSA Standard B64.10 is required and shall be field tested according to CSA standard B64.10 and a copy of the backflow certificate is to remain on site with Markham Waterworks Operator. All water used MUST be metered with approved device at all times.

The temporary bypass is to be removed once all testing completed and accepted. For direct bury installations the saddles are to be removed and a repair clamp installed in their place. For chamber installations the mainstop can be removed and downsized to a 25mm mainstop.

b) For site plan applications there are to be test point(s) installed by the isolation valve(s), refer to City's Standard drawing MW26. The loading of the watermain will be done, from the bypass isolation valve, once they have ensured there is a flow to the discharge. All direct bury test points within the Municipal Right of Way are to be removed and a repair clamp installed in its place once all testing completed and accepted.

* In the event that physical separation cannot be achieved a hydrant which is NSF 61/372 certified can be used as the feed however, approval from Waterworks is necessary. Before hydrostatic testing can be done 1 set of satisfactory bacteriological samples must be received before pressure test can commence.

Watermain By-pass Requirements

- The minimum size of the by-pass shall be 50mm diameter or larger so that a flushing velocity of 0.91 m/sec (3.0ft/sec) can be achieved. The by-pass must be fitted with a reduced pressure (RP) backflow preventer and field tested according to CSA standard B64.10.
- Meter to be installed as per Appendix D.

2. Sample Request and Drawings

Sample request drawings, 4 sets, to be submitted to the Manager of Municipal Inspections (Public Works) or to the Manager of Building Inspections (Private Works) a minimum of 2 weeks prior to chlorinating with consideration given to sectioning off areas as required.

All proposed watermains to be highlighted including all stubs and commercial services. Supply points to be indicated. One copy of the sample drawing will be returned to the Consulting Engineer.

All sample points are to be brought to the surface complete with a valve. Pressure test boundaries are to be the same as the valved off sections of the sample drawings unless otherwise directed by the engineer.

Proposed work schedule to be submitted a minimum of 3 working days prior to chlorinating. Work schedule to be submitted to the Manager of Municipal Inspections.

3. Flushing and Swabbing

Flushing and swab new, replaced or relined watermains prior to the start of disinfection. Flushing shall attain a scouring velocity of 3.0ft/sec (0.91m/sec) and where not practical or achievable alternate cleaning consisting of flushing 2-3 pipe volumes can be used at the discretion of the operating authority. A physical separation MUST be maintained at all times between the active (potable) distribution system and the new (installed) watermain.

A minimum of 3 swabs per section of pipe are required and all swabs that are inserted into the watermain and removed, either during construction or after is to be witnessed by the project engineer and numbered.

The project engineer is to record the number of swabs inserted and retrieved on the form in appendix C.

The watermain is to be swabbed in such a manner that all pipes in the system have been swabbed.

All swabs are to be new and sized a minimum of one size larger.

All stubs to be provided either with a temporary flushing hydrant or watermain launch with a removable restraining cap to allow for the removal of the swabs.

The operation of the isolation valve to be done by the City Waterworks Operator.

The watermain is to be flushed at all hydrants and blow-offs to eliminate all air pockets and particles, and to achieve and sustain a turbidity of less than one nephelometric turbidity units (< 1 NTU).

Swabbing of site plans will be at the discretion of the City Engineer.

The City Waterworks Operator to operate valve once they have ensured there is flow, via the bypass, to the discharge.

The locations of where the turbidity samples are taken will be indicated on the sample drawing.

The turbidity testing will be performed by the Workforce and recorded by the project engineer.

4. Hydrostatic Testing

A safety restraint is required on all riser caps and the RP backflow assembly and hose must be removed during this process. The watermain to be pumped to 1035 kPa and maintained there for 2 hours. The test section is not to exceed any of the isolated sections as indicated on the sample drawing.

If the test pressure drops significantly the test section to be isolated to a manageable area.

At the end of the 2 hour test period the volume of water used to maintain the 1035 kPa is to be recorded. **There is to be zero leakage. No allowable leakage is permitted.**

- For High Density Polyethylene (H.D.P.E.) pipe the test section is not to include any other materials. A 3 to 4 hour deformation period, maintaining 1035 kPa, will be required immediately prior to the hydrostatic testing.
- If the test is not successful the leak is to be found, repaired and the hydrostatic test to be applied again until it is successful.

5. Disinfecting Watermain

The method of disinfection to be used is the Continuous Feed Method. However, where chlorinating using the tablet, continuous feed or slug chlorination methods for disinfecting newly constructed watermains as per the procedures in ANSI/AWWA Standard C651, the minimum contact times, initial chlorine concentrations, and maximum allowable decreases in chlorine concentration as listed in Table 1 shall be used:

Table 1: Chlorine Concentrations and Contact Times for New Watermains

Disinfection Method	Minimum Contact Time	Initial Chlorine Concentration	Maximum Allowable Decrease in Chlorine Concentration
Tablet or Continuous Feed	24 hours	≥ 25 mg/L	40% of the Initial Chlorine Concentration to a Maximum of 50 mg/L (If there is a decrease of more than 50 mg/L re-chlorination is required)
Slug	3 hours	≥ 100 mg/L	25 mg/L
Spray	30 minutes	≥ 200 mg/L	Measurement not required

Where copper pipe is used for smaller diameter watermains, Table 1 does not apply. Copper watermains shall be disinfected using the Continuous Feed method, with an Initial Chlorine Concentration of ≥ 50 mg/L. Due to the chlorine demand exerted by the copper, no minimum chlorine concentration is required following the 24 hour contact time, and the effectiveness of the disinfection process shall be demonstrated by the Microbiological sampling.

Continuous Feed Method

- The chlorine is to be injected into the system through the bypass/test point.
- **There is to be no use of the isolation valve during this process.**
- The chlorine solution is to be thoroughly mixed prior to pumping it into the system.
- The chlorine solution shall be applied so that the chlorine concentration is a minimum of 50 mg/L throughout the system and does not exceed 100 mg/L.
- The chlorine solution is to be flowed through each hydrant and blow-off. The high chlorine residual is to be measured by the workforce at each sample location and recorded by the project engineer.
- Once the desired level of chlorine has been achieved the remaining solution within the tank is to be neutralized and disposed of. The high chlorine will be isolated in the system for 24 hours.
- After the required contact time the chlorine residual is to be taken at each sample by the workforce location and recorded by the project engineer.
- Flow required to take the residuals to be provided through the bypass.
- The maximum allowable decrease in chlorine concentration is 40% of initial chlorine concentration however to a maximum decrease of 50 mg/L.
- If the residual is above 60% of the original concentration the chlorine is ready to be discharged. In the event that the residual is less than 60% the chlorine in the system is to be discharged, swabbed and then rechlorinated.
- Before watermain is flushed, a City of Markham Waterworks Operator In Charge (OIC) must be present to check chlorination and make decision to either flush or re-chlorinate.

Disinfection of Bypass Service Hoses

All bypass services hoses to be used shall be of potable water grade (NSF 61).

- Service hoses to be chlorinated at 25 mg/L continuous feed method
- Service hoses isolated for a maximum 24 hour contact time
- Service hoses de-chlorinated, and residual to match that of existing water supply
- Service hoses are to be isolated for minimum 16 hour incubation period
- Bacteriological sample will be taken from each hose bundle
- Service hoses to be capped on both ends with brass caps
- Service hoses will not be installed on bypass piping until the day of the change over from distribution watermain to the above ground bypass watermain.

Slug Method

- Upon approval of the Waterworks Department, or their designate, the watermain contractor may use the slug method of disinfecting watermain.
- The slug method consists of placing calcium hypochlorite granules in the main during construction; completely filling the main to eliminate air pockets; flushing the main to remove particulates; and slowly flowing through the main a slug of water dosed with chlorine to a minimum chlorine concentration of 100 mg/L.
- The slow rate of flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours.
- The maximum allowable decrease in chlorine concentration is 25 mg/L.
- If at any point the chlorine concentration has decreased by more than 25 mg/L, the flow shall be stopped and additional chlorine shall be added to restore the chlorine concentration in the slug to not less than 100 mg/L.
- Before watermain is flushed, a City of Markham Waterworks OIC must be present to check chlorination and make decision to either flush or re-chlorinate.

6. Removal and Disposal of Super Chlorinated Water

Removal

- Watermain to be flushed to remove super chlorinated water. A discharge to be set up for the removal of the super chlorinated water prior to the City opening the isolation valve. Super chlorinated water must not remain in the pipe over the weekend.
- Watermain to be valved in such a manner that the direction of the flow is known to promote the expedient and complete removal of the chlorinated water.
- The chlorinated water to be flushed from the main through all hydrants and sample points with the chlorine residual being checked at each sample point by the workforce, and recorded by the project engineer, until the chlorine residual matches that of the existing distribution system (supply location) or does not exceed 0.5 mg/L.
- Once this is achieved the system is to be flushed for an additional 30 minutes.

Disposal

- For the disposal of super chlorinated water the consultant engineer is to ensure throughout the disposal process that the neutralized water does not exceed 0.5 mg/L.
- Super chlorinated water may not be disposed of to a storm sewer or watercourse unless the residual is reduced to a maximum of 0.5 mg/L.
- Methods of disposal include flushing through a neutralizing dam (ensuring 0.5 mg/L being achieved) flushing to a neutralizing tank. Neutralizing Chemicals as per ANSI/AWWA C655
- The fresh supply water is to be left isolated within the system for 24 hours and or when approved by Markham Waterworks a minimum of 16 hours.
- For above ground bypass watermains the isolation period can be shortened to 16 hours.

7. Sampling

- Before approving a main for release; take an initial set of samples, then resample again after 24 hours and or when approved by Markham Waterworks a minimum of 16 hours using the sampling site procedures outlined in the approved sampling location drawing. If the initial disinfection fails to produce satisfactory bacteriological results, or if other results indicate unacceptable water quality, the main may be re-flushed and be resampled. If check samples fail to produce acceptable results, the main shall be re-chlorinated by the continuous-feed method or slug method until satisfactory results are obtained. For more information, see ANSI/AWWA C651-14.
- All samples will be collected by Markham Waterworks Operators. For Site Plan the "Workforce" will be responsible to deliver samples to a MECP licensed and accredited laboratory for analysis and provide satisfactory reports to Markham Waterworks.

  * New watermain guidelines for Bacteriological test results are as follows:

  HPC <=100, Background <=50, Total Coliform =0, E.Coli =0
- The City of Markham Waterworks OIC will ensure the bypass is open and take a bacteriological sample at each sample location and deliver it to a MECP licensed and accredited laboratory for analysis..
- The City of Markham OIC shall ensure that bacteriological samples taken in accordance with ANSI/AWWA Standard C651.
- The cost of all bacteriological sampling is included in the subdivision agreement unless otherwise specified. However, if more than 2 sets of samples are required to obtain release of the new watermain, the owner/developer/contractor shall reimburse the City for the additional cost incurred by the City resulting from the additional testing and sampling of the watermain section. The cost will include administration, additional water usage, laboratory fees, staff and resource charges.
- The City will receive the sample results, via email, approximately 48 hours after the samples are delivered.
- The City will notify the project engineer, via email, of the sample results.
- If sample results meet SDWA requirements, then final connection can take place.
- The final connection must be completed no more than 30 days after the second set of samples have passed.
- If sample results do not meet SDWA, the failed section must be disinfected again and resampled at sample locations determined by the City.

8. Installation of Closure Piece/Connecting New Watermain

- The closure piece must be less that one pipe length (Generally<6m) shall be undertaken in accordance with section 4.10.1 of ANSI/AWWA Standard C651-14
- At the time of scheduling with the Waterworks Department, a drawing indicating the affected area (those impacted by the shutdown) along with a water disruption notice shall be submitted. It is the responsibility of Owner/Developer/Contractor to provide minimum 48 hours' notice to those that will be affected by the water service distribution.

- Closure piece installation must be witnessed by a City of Markham Waterworks Operator (OIC). If a Waterworks Operator is not available to witness the connection then closure piece must be rescheduled.
- All piping must be thoroughly cleaned and disinfected using 1% Sodium hypochlorite solution. Fittings/pipe shall be sprayed with chlorine solution and pipe hand swabbed with chlorine solution.
- City of Markham OIC operator will operate isolation valves to flush through the connection until an acceptable disinfectant concentration is achieved (Chlorine Residual) and then take 1 microbiological sample. Where possible, the section of watermain is to remain isolated until acceptable test results are received. Once the microbiological sample result meets SDWA requirements the Waterworks OIC will open all valves and take a chlorine residual. Results are usually available within 48 hours from when the sample was taken.
- For Capital Projects, water services are not to be transferred to the new watermain until the sample that was taken after the connection/closure piece meets SDWA requirements unless written confirmation is given from Markham Waterworks.

9. Flushing Program

It is the sole responsibility of the Owner/Developer to ensure that the newly constructed watermain maintains the regulated secondary disinfectant (Chlorine Residuals) as required per Ontario regulation 170/03. Please refer to the document “New Watermain Water Quality Maintenance Program” (Appendix E).

Appendices

Sample Schedule Form – Isolation Valve

Company Name

Address

City, Province,

POSTAL CODE

Date:

Project Name: City File #:

Request:

We hereby certify that the water system for the above project was constructed as per City Standards and Specifications and that the watermains are ready to be pressure tested and chlorinated as per City specifications and criteria.

We therefore request the City to take the water samples at the above project. Site servicing plans previously submitted.

Schedule:

	Time	Date
Swab/Turbidity Testing		
Chlorinate		
De-chlorinate		
First Sample		
24 hrs. after de-chlorination (Min-16 hours)		
Pressure Test		
Second Sample		
24 hrs. after pressure test (Min-16 hours)		

Yours truly,

_____ _____

NAME / SIGNATURE / TITLE NAME & STAMP OF P. ENG.

All requests shall be submitted a minimum of 3 working days prior to scheduled work date and time.

Sample Schedule Form – Physically Separated

Company Name

Address

City, Province,

POSTAL CODE

Date:

Project Name: City File #:

Request:

We hereby certify that the water system for the above project was constructed as per City Standards and Specifications and that the watermains are ready to be pressure tested and chlorinated as per City specifications and criteria.

We therefore request the City to take the water samples at the above project. Site servicing plans previously submitted.

Schedule:

	Time	Date
Swab/Turbidity Testing		
Pressure Test		
Chlorinate		
De-chlorinate		
First Sample **24 hrs. after de-chlorination (Min-16 Hours)**		
Second Sample **24 hrs. after first sample (Min- 16 Hours)**		

Yours truly,

_____ _____

NAME / SIGNATURE / TITLE NAME & STAMP OF P. ENG.

All requests shall be submitted a minimum of 3 working days prior to scheduled work date and time.

Chlorine Residual Form

Date: _____ Subdivision/City Contract No.: _____

Project : _____

Watermain Location (Supply): _____

Contractor: _____ Consulting Engineer: _____

The chlorine residual shall be confirmed with a calibrated colorimeter. The low chlorine results shall be re-tested with a calibrated colorimeter.

Location or Sample Number	Turbidity Result (NTU)	Initial Chlorine Concentration (mg/L) **50-100 mg/L**	24 hr. Chlorine Result (mg/L) (Max. Decrease 40% of Initial Concentration, no more than 50 mg/L decrease)	Low Chlorine Result (mg/L)
City Supply				

_____ Engineers Stamp

Project Engineer

_____

City of Markham (OIC) Column #5 (Print Name and Signature)

_____

City of Markham (OIC) Column #6 (Print Name and Signature)

New Watermain Disinfection, Pressure Testing & Acceptance Form -Isolation Valve

Date: _____ Subdivision/City Contract No.: _____

Project: _____

Contractor: _____ Consulting Engineer:_____

Step	Work Description	Work Performed by	Comments		Witnessed by (initial)*
1.	Loading of Watermain	Contractor			
2.	Sample Request and Drawings	Consultant			
3.	Flushing and Swabbing	Contractor	# In	# Out	
4.	Turbidity (< 1 NTU)	Contractor/City			
5.	Disinfecting Watermain **(Initial chlorine concentration 50-100 mg/L)**	Contractor			
6.	24 hour Check **(Maximum decrease 40% of Initial Concentration, no more than 50 mg/L decrease)**	City Waterworks			
7.	Pre-removal of Super Chlorinated Water check	City Waterworks Staff			
8.	Removal and Disposal of Super Chlorinated Water, as per AWWA C651-14 (residual 0.5 mg/L max.)	Contractor			
9.	First Sample- After 24 hours (Min-16 hours)	City Waterworks Staff			
10.	Introduce Fresh Water	Contractor/City			
11.	Hydrostatic Testing	Contractor			
12.	Second Set Of Samples	City Waterworks Staff			
13.	Sample Results	City Waterworks Staff			
14.	Final Sample (after connection)	City Waterworks Staff			

Please Note: This form to be accompanied by the Chlorine Residual / Turbidity results and the Maintenance Schedule.

Project Engineer's Certification: **Firm:**_____

We hereby certify that the workforce carrying out the above mentioned work is licensed, by the MECP as an operator, and that watermain has been charged, pressure tested and disinfected in accordance with the City of Markham procedures as set out herein.

_____ Engineers Stamp

Print Name and Signature

New Watermain Disinfection, Pressure Testing & Acceptance Form -Physically Separated

Date: _____ Subdivision/City Contract No.: _____

Project: _____

Contractor: _____ Consulting Engineer:_____

Item	Work Description	Work Performed By	Comments		Witnessed by (initial)*
1.	Loading of Watermain	Contractor			
2.	Sample Request and Drawings	Consultant			
3.	Flushing and Swabbing	Contractor	# In	# Out	
4.	Turbidity (< 1 NTU)	Contractor/City			
5.	Hydrostatic Testing	Contractor			
6.	Disinfecting Watermain **(Initial chlorine concentration 50-100 mg/L)**	Contractor			
7.	24 hour Check **(Maximum decrease 40% of Initial Concentration, no more than 50 mg/L decrease)**	City Waterworks Staff			
8.	Pre-removal of Super Chlorinated Water check	City Waterworks Staff			
9.	Removal and Disposal of Super Chlorinated Water, as per AWWA C651-14 (residual 0.5 mg/L max.)	Contractor			
10.	Introduce Fresh Water	Contractor/City			
11.	First Sample- After 24 hours (Min-16 hours)	City Waterworks Staff			
12.	Second Sample- 24 hours after first sample (min 16 hours)	City Waterworks Staff			
13.	Sample Results	City Waterworks Staff			
14.	Final sample (After Connection)	City Waterworks Staff			

Please Note: This form to be accompanied by the Chlorine Residual / Turbidity results and the Maintenance Schedule.

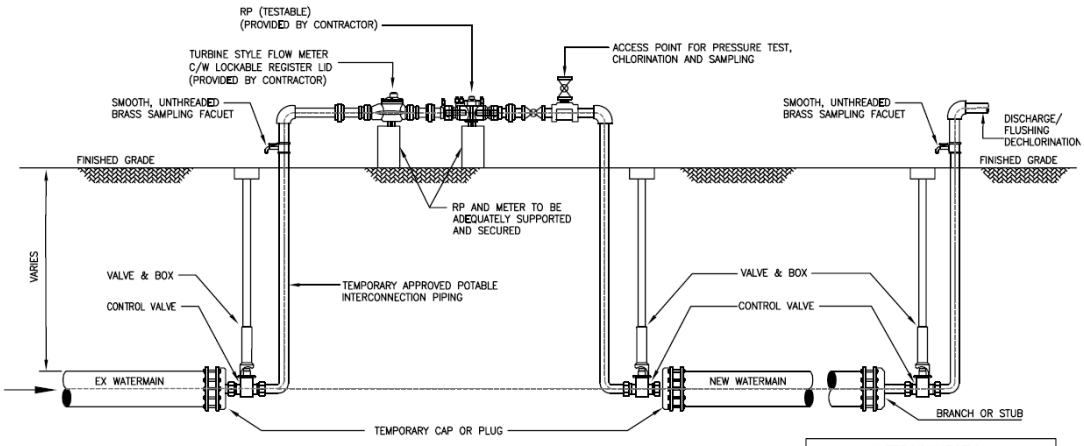
Project Engineer's Certification: Firm:_____

We hereby certify that the workforce carrying out the above mentioned work is licensed, by the MECP as an operator, and that watermain has been charged, pressure tested and disinfected in accordance with the City of Markham procedures as set out herein.

_____ Engineers Stamp

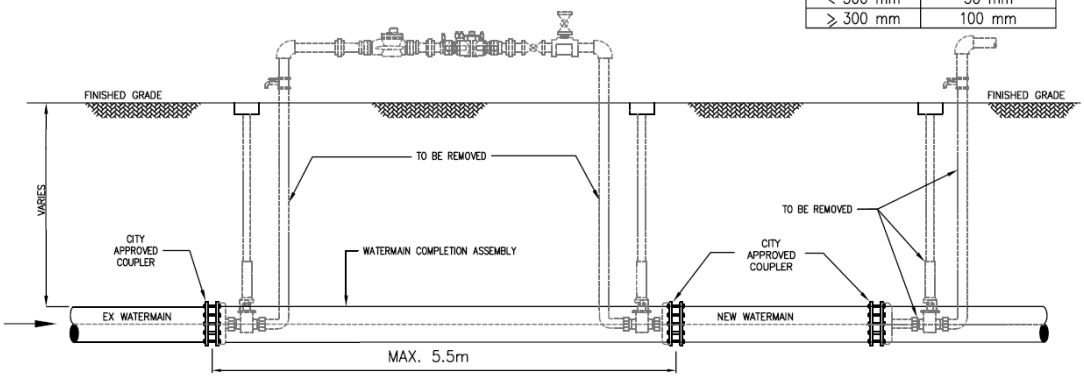
Print Name and Signature

City Standard Drawing -MWIA



BACKFLOW PREVENTION VALVE AND FLOW METER ASSEMBLY FOR WATER TESTING

INTERCONNECTION	
WM SIZE	MINIMUM CONNECTION SIZE
< 300 mm	50 mm
≥ 300 mm	100 mm



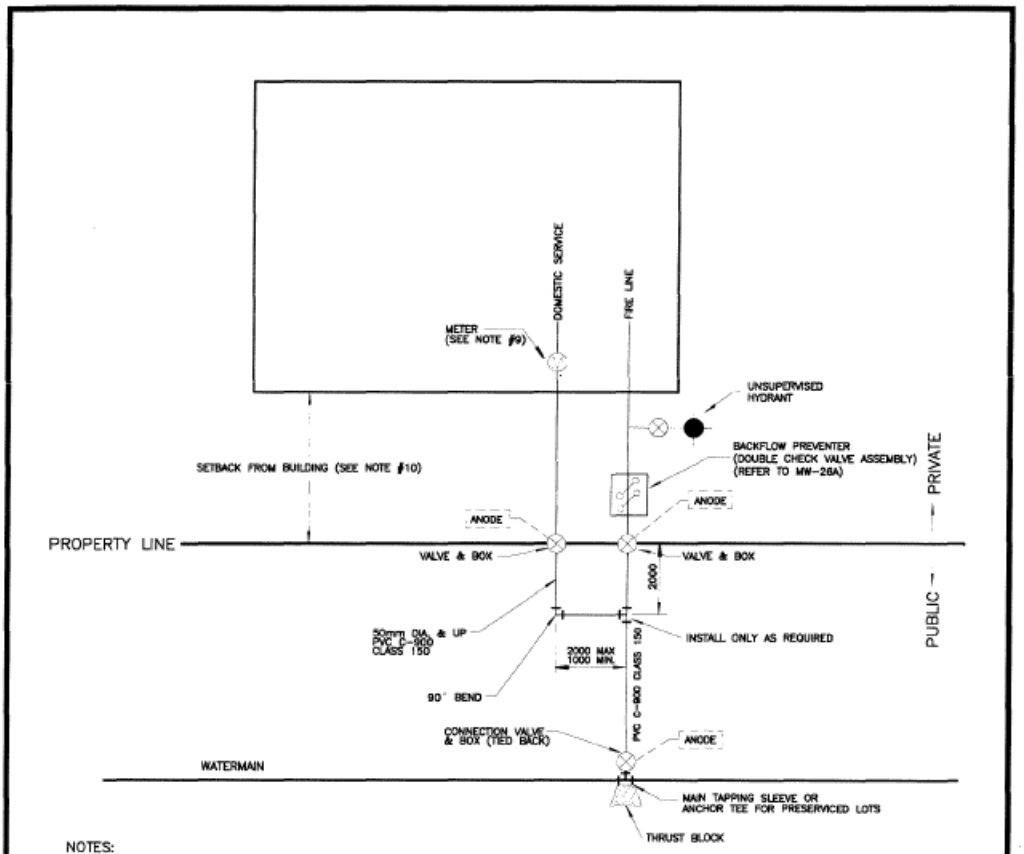
WATERMAIN COMPLETION ASSEMBLY AFTER WATER TESTING

NOTE

1. REDUCED PRESSURE BACKFLOW PREVENTER (RP) MUST BE PROVIDED BY THE CONTRACTOR AND TESTED AS PER CSA B64-10. THE TESTING LOGS MUST BE ON SITE AND AVAILABLE FOR REVIEW BY THE CITY OF MARKHAM AT ANY TIME.
2. BACKFLOW PREVENTION VALVE FLOW METER ASSEMBLY SHALL BE DISCONNECTED DURING WATERMAIN PRESSURE TESTS.
3. THE WATERMAIN COMPLETION ASSEMBLY SHALL BE COMPLETED ONLY AFTER AUTHORIZATION BY THE CITY OF MARKHAM.
4. WATERMAIN SHALL BE DRAINED BY CONTROLLED MEANS AND TEMPORARY CAP OR PLUGS INSTALLED AS REQUIRED. SUFFICIENT TRENCH DEWATERING CAPACITY SHALL BE USED WHEN THE EXISTING AND NEW WATERMAINS ARE DRAINED PRIOR TO THE FINAL CONNECTION TO ENSURE NO BACKFLOW OF TRENCH WATER INTO EITHER WATERMAIN.
5. WATERMAIN SHALL BE CUT BACK TO REMOVE THE TAPPING POINTS OF THE BACKFLOW PREVENTION VALVE ASSEMBLY. ENSURE COMPLETION PIECE IS LESS THAN 5.5m AND DISINFECTED ACCORDING TO AWWA 651-05.
6. ONLY THE CITY OF MARKHAM STAFF SHALL OPERATE CITY OWNED VALVE.
7. ALL NEW PIPING AND APPURTENANCES PLACED IN THE CONNECTION SHALL BE THOROUGHLY DISINFECTED WITH 1-5% SOLUTION OF SODIUM HYPOCHLORITE SOLUTION (ANSI/NSF60 CERTIFIED) ACCORDING TO AWWA C651 AND PROVINCIAL WATERMAIN DISINFECTION PROCEDURE.
8. A PHYSICAL SEPARATION MUST BE MAINTAINED AT ALL CONNECTION POINTS OF NEW WATERMAINS TO THE EXISTING SYSTEMS UNTIL BACTERIOLOGICAL TESTS HAVE PASSED. A SAMPLING TAP MUST BE PROVIDED AT THE END OF EACH BRANCH OR STUB.
9. THIS DETAIL IS FOR SCHEMATIC INFORMATION ONLY. THE ACTUAL CONFIGURATION USED MUST SATISFY THE INTENT AND ELEMENTS OF THIS DRAWING.
10. FREEZING PROTECTION MUST BE PROVIDED WHEN APPLICABLE. INSULATION IS REQUIRED BETWEEN FROST BOX & GROUND TO PREVENT ADHERENCE TO GROUND.
11. ALL TEMPORARY CAPS AND WATERMAIN COMPLETION ASSEMBLY TO BE EITHER FULLY RESTRAINED OR APPROVED ALTERNATIVE AND MUST BE REMOVED AFTER COMPLETION OF THE TEST. ALL RESTRAINED JOINTS AS PER PIPE MANUFACTURER'S SPECIFICATIONS.
12. RP AND FLOW METER TO BE LOCATED IN THE BOULEVARD.
13. ASSURE TRACER WIRE CONTINUITY IN FINISHED PRODUCT CONFORMS TO CITY STANDARD DRAWING #MW11.

	ENGINEERING DEPARTMENT, CITY OF MARKHAM	REV. 2	JULY 2019
MARKHAM	TEMPORARY BYPASS AND PERMANENT CONFIGURATION INSTALLATION	MWIA	
		N.T.S.	

City Standard Drawing -MW26



NOTES:

1. REFER TO WATERWORKS MATERIAL SPECIFICATIONS
2. FOR PRESERVICED VACANT LOT, DO NOT INSTALL DOMESTIC SERVICE
3. ANODES TO BE PROVIDED ON ALL IRON FITTINGS
4. ALL FITTINGS TO BE PROTECTED WITH CORROSION COATINGS
5. VALVE AT MAIN MUST BE RESTRAINED
6. TRACER WIRE TO COME UP AT STREET LINE VALVE BOX/CHAMBER
7. FOR SITES THAT DO NOT REQUIRE A FIRE SERVICE, THE CONNECTION SHALL BE MADE TO THE FIRE LINE AND THE DOMESTIC SERVICE SHALL BE ABANDONED
8. MIN. FIRE LINE TO BE 150mmø WHEN HYDRANT IS REQUIRED
9. FOR APPROPRIATE WATER METER, REQUEST WATERWORKS DEPARTMENT
10. FOR BUILDINGS WITH A SETBACK BELOW 4.0m, THE BACKFLOW PREVENTOR FOR THE FIRE LINE SHALL BE LOCATED INSIDE THE BUILDING ACCORDING TO THE BUILDING CODE
11. WATER CONNECTIONS ON PRIVATE SIDE ARE GOVERNED BY BUILDING CODES AND ARE SUBJECT TO REQUIREMENTS FROM THE BUILDING DEPARTMENT

MARKHAM ENGINEERING DEPARTMENT	DRAWING NAME: WATER SERVICE CONNECTIONS FOR SINGLE ICI/ COMMON ELEMENT CONDOMINIUM BUILDING	SCALE: NTS REV: 0 DATE: MAY 2012	APPROVED BY: DIRECTOR OF ENGINEERING DWG. NO. MW26

New Watermain Water Quality Maintenance Program

Purpose:

This document outlines the requirements of an Owner/Project Engineer to maintain the water quality (through flushing and chlorine residual sampling) of new development sites from when water is turned on until 80% occupancy is reached.

1. The Owner/Project Engineer must submit the “New Watermain Flushing/ Chlorine Residual Sampling Program Tracking Sheet” (Appendix F) using Markham’s template to the City of Markham Waterworks for approval prior to the start of microbiological sampling. The plan must detail sequence of flushing, necessary to maintain water quality of new watermains. (contact Markham to obtain a template of the “New Watermain Flushing-Sampling Program Tracking Sheet” Appendix F)
2. A drawing with opening/closing valve and flushing/sampling hydrant highlighted is required to be submitted to the City together with the plan
3. The City of Markham will approve the flushing/chlorine residual sampling plan.
4. The approved flushing and chlorine residual sampling plan must begin two (2) weeks after the City of Markham provides notification that all microbiological sampling has passed.
5. All fields within the “New Watermain Flushing-Sampling Program Tracking Sheet” must be completed and forwarded to the contacts listed below.
6. The flush point is the same as the sample point.
7. The volume must be recorded with each flush.
8. During the flushing and chlorine residual sampling program should the combined chlorine residual be less than 0.40 mg/L or greater than 2.1 mg/L the Contractor must IMMEDIATEY contact City of Markham (contact information listed below).
9. Contact City of Markham Waterworks @ waterquality.markham.ca if you require any further information.
10. Owner/Project Engineer must use City of Markham approved list of Contractors.

(Note: this contactor list might change, please contact Waterworks to confirm before hiring the contractor)

The Owner/Project Engineer may request to use another Contractor. However prior to starting any work, the Contractor must provide the following to the City of Markham:

- A copy of current Ministry of Environment, Conservation and Parks (MECP) certified operator licenses/certificates of their staff
- Signed acknowledgement of the City of Markham's Quality Management System prior to any involvement with new watermain activities.

These items must be received and approved by the City of Markham prior to any involvement with new watermain activities.

11. Owner/Project Engineer to maintain the flushing/chlorine residual sampling program until such time as 80% occupancy has been achieved along each street and the City of Markham has assumed the system.
12. Failure to execute this program on a predetermined schedule will result in the program being carried out by City staff at the expense of the Owner/Developer

Invoice to be issued by the City of Markham to the Owner/Project Engineer for the water consumption during the flushing/chlorine residual sampling program.

NEW WATERMAIN FLUSHING/CHLORINE SAMPLING PROGRAM TRACKING SHEET

DWS : City of Markham

Contact email: waterquality@markham.ca

Project Name: **Project Reference #:**

Site Location: **Contractor :**

				Valving & Flushing Details			Water Consumption (m3)				Chlorine Residual (mg/L)			Operator Information	
Date (yyyy/mm/dd)	Time	Sequence #	Flushing Location	Open Valve / Chamber	Close Valve / Chamber	Flush Point (Sample Point)	Meter Read Start	Meter Read End	Duration (minutes)	Total Volume (m3)	Total (mg/L)	Free (mg/L)	Combined (m/L)	Name	Initials

Submit completed form within 1 week of sample date to waterquality@markham.ca unless the combined chlorine reading is outside the City's operational standards listed below
Please contact City of Markham IMMEDIATELY at 905-477-7000(talk to a live person) if Combined Chlorine Residual is **less than 0.40mg/L or over 2.1mg/L** (City's Operations Standard)
O. Reg. 170/03 Section 6-10. (1) The owner of a drinking water system and the operating authority for the system shall ensure that, for every sample required by this Regulation or by an approval, municipal drinking water licence or order, including an OWRA order, a record is made of the following information:
The date and time the sample was taken, the location where the sample was taken and the name of the person who took the sample.