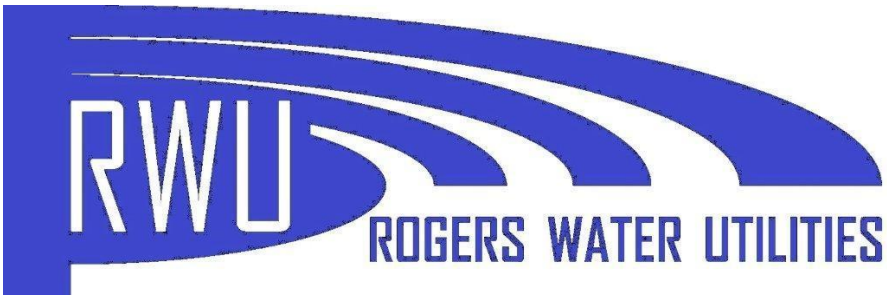

INSPECTION PROCEDURES MANUAL

FOR

INFRASTRUCTURE DEVELOPMENT

SEPTEMBER 2018

CONSTRUCTION INSPECTION MANUAL

PRECONSTRUCTION &POST CONSTRUCTION RESPONSIBILITIES

RECORDS AND REPORTS

CONSTRUCTION INSPECTION MANUAL
GENERAL INFORMATION

INTRODUCTION

The Inspector's job is vital to achieving high quality construction on every utilities infrastructure project. It is one of verifying that construction operations produce the results called for by the Plans and Specifications. This role is one of the toughest jobs in construction industry and demands knowledge, awareness, keen observational skills, and diplomacy. The Inspector has the responsibility to identify deviations from project Plans and Specifications and to bring them to the attention of the Contractor, Engineer and Rogers Water Utilities. This manual provides the Inspector the knowledge of practice and policy required during the construction of utilities infrastructure at Rogers Water Utilities.

PURPOSE OF INSPECTION

The purpose of inspection on construction projects is to ensure the **quality** of the work, and to verify that the finished construction meets project requirements. To accomplish this, the Inspector must be familiar with the Plans and Specifications. Together the Plans and Specifications explain requirements that the Contractor must observe to install or build a satisfactory project and receive payment in full for his work.

Plans are the Contract Documents that show the location, physical aspects, and dimensions of the work. The Plans include layouts, profiles, cross-sections, and other necessary details. The Specifications are the written technical directions and requirements for the work. Also, the Specifications complement the Plans by providing instructions that are not specifically indicated on the drawings. Specifications are the means of communications among the Engineer, the Contractor and Rogers Water Utilities. The Plans and Specifications are dynamic documents, subject to revisions as unknown conditions and requested design changes are encountered on the project. Therefore, it is imperative that the Inspector maintain a current awareness of these documents.

QUALIFICATIONS OF INSPECTOR

The personal attributes of the Inspector extend beyond those expected of ordinary workman or technician. The Inspector must be:

- honest and able to conduct himself/herself in a fair, straight forward professional manner;

- able to maintain his/her composure and make good decisions; and

- a skilled diplomat, able to handle tough situations without causing hostility.

In addition to these positive personal attributes, the Inspector must have the organizational and technical ability to perform his/her job. The Inspector shall have a technical background, preferably with additional technical study or previous construction experience. The Inspector must:

- know how to read and interpret Plans, Specifications, and other documents to understand the requirements of the work;

- be able to observe ongoing construction progress, and identify existing or potential construction operations that are not according to the Plans and Specifications;

- have the verbal communication skills to notify the Contractor in a courteous manner that unsatisfactory conditions exist, or that the Specifications are not being met;

- have the writing skills to properly document and record the daily work progression and any factors affecting the progress or quality of the work;

- be able to perform accurate mathematical calculations;

- be knowledgeable of the physical characteristics of the materials involved in construction projects; and

- understand the principles of materials testing, including the interpretation of test results.

INSPECTOR AUTHORITY

The Inspector is responsible for determining that the work being done and the materials being used meet the requirements of the Plans and Specifications. The Inspector has the authority to reject defective material or work that is being done improperly. The Inspector also has the authority and obligation to notify the Contractor when unusual conditions have been created or encountered during construction. The Inspector should realize that implementation of the authority should be regularly supplemented with advice and assistance from the Engineer.

The Inspector should realize that he/she is not authorized to revoke, alter, or relax any requirements of the Contract; or to issue a Stop Work Order to the Contractor. These actions are among the responsibilities of the Developer's Engineer and the Rogers Water Utilities administration.

CONSTRUCTION INSPECTION MANUAL
PRECONSTRUCTION & POST CONSTRUCTION RESPONSIBILITIES

INTRODUCTION

During the pre-construction phase, the Inspector shall review all required aspects of the project, and shall try to resolve any errors or conflicts which he/she observes. In general, the Inspector shall obtain and review all Contract Documents, review pertinent engineering reports, visit the job site prior to construction, and attend the pre-construction conference.

During the post construction period, the Inspector shall review and verify that all aspects of the job have been completed, and shall review project record documentation for accuracy and completeness.

Definitions

Benchmark - Point of known or assumed elevation used as a reference in determining and recording elevations.

Punch List - A summary of additional or corrective work required for completion of a project usually prepared after a site walk-over.

Record Drawings (As-Builts) - Engineering plans which have been revised to reflect all changes to the plans which occurred during construction. The Record Drawings also depict water and sewer appurtances locations, in accordance to the Standard Guidelines and Details for Water and Sanitary Sewer Construction Drawings Manual.

Subgrade - Soil exposed in a trench or roadbed and upon which the pipe bedding material or pavement base material will be placed.

PRE-CONSTRUCTION RESPONSIBILITIES

The Engineer's inspector is required to attend the pre-construction meeting. The Inspector is responsible for having a thorough understanding of the project Plans and Specifications and other appropriate parts of the Contract Documents. A complete and knowledgeable understanding by the Inspector of these documents is essential in performing proper inspections during construction. The Specifications represent detailed descriptions of the materials, workmanship, and testing methods required on the project. The Plans present layouts, profiles, dimensions, cross-sections, and details necessary to construct the project. Together, these documents define the scope and nature or the work to be performed.

During this review, the Inspector shall make note of any items in the Contract Documents which are unclear and discuss these with the Engineer. In addition, and detected errors, omissions, discrepancies, or deficiencies shall be reported to the Engineer and Rogers Water Utilities. At this time, any questions by the Inspector regarding the contents of the Contract Documents or scope of project shall be resolved.

Site Visits

The Inspector shall visit the site prior to construction, and shall walk the site with the Plans in hand. At this time, the Inspector shall become familiar with the proposed area of construction and the proposed locations of all structures and earthwork indicated on the Plans. The Inspector shall look for any obvious errors in the Plans, as well as any areas which may require special attention during construction. All items for concern, error, or discrepancies noted by the Inspector shall be discussed with the Engineer and Rogers Water Utilities Coordinator during the pre-construction meeting, as appropriate.

During the site visit, the Inspector shall look for the following items:

(1) job site alterations which may have occurred since preparation of site plans contained within the Contract documents;

(2) the obvious presence of any existing utilities which are not marked on the Plans but which may present problems during construction;

(3) the location of any trees or plants which are marked "Do Not Disturb" on the Plans. These trees/plants shall be marked by the Contractor with flagging to avoid any possible confusion later;

(4) the location of any bench marks (BMs) or temporary bench marks (TBMs) shown on the Plans. The Inspector shall confirm the bench mark locations are as shown on the Plans. If the bench marks have been obviously disturbed, they shall be replaced prior to construction.

In addition, during the site visit, the Inspector shall take a series of pre-construction photographs. These photographs shall be logged and indexed to allow future reference, if necessary.

Pre-Construction Conference

A pre-construction conference will be scheduled by the Rogers Water Utilities Project Coordinator and the Developer, Developers Engineer, Contractor, Inspector as well as other appropriate Rogers Water Utilities Staff shall attend. During the conference, matters such as the coordinating work, construction schedule, traffic controls, utility conflicts, and special construction considerations are addressed. The Inspector shall make it a point to introduce himself/herself to each contact, and begin building professional relationships to ensure open communication throughout the project.

POST-CONSTRUCTION RESPONSIBILITIES

Preparation of Punch List

After Rogers Water Utilities activates the subject utilities, the Inspector shall assist the Project Coordinator, Engineer and Contractor with preparing a punch list that itemizes all of the work tasks still necessary for completion of the project. When preparing the punch list, the Project Coordinator and/or RWU Staff, Inspector, Engineer and Contractor shall walk the project site and note any areas which require additional or corrective work. The field review shall be very thorough because successful completion of these tasks will indicate that the project is complete. During this walkover, the project status can be reviewed and discussed in detail to avoid any misunderstanding of the work required for final acceptance.

As the Contractor completes items on the punch list, Rogers Water Utilities Staff and the Inspector shall inspect each item. Items on the punch list shall be checked off only when Rogers Water Utilities and the Inspector has reviewed the work and decided that it is acceptable. The project is considered completed after all items on the list have been checked off and approved by Rogers Water Utilities.

Review of Record Drawings (As-Builts)

The project Record Drawings are a set of drawings that illustrate the as-constructed details and layout of the project as described in "Rogers Water Utilities Standard Guidelines and Details for Water& Sewer Construction Drawings". The Engineer shall be responsible for maintaining and updating the Record Drawings as construction progresses to reflect:

- minor design changes,
- deviations from the original Plans,
- unknown field conditions, and
- unknown utilities locations.

These drawings are important because they represent the final record of the constructed facility; these drawings are often relied upon for reference during future maintenance and expansion of the infrastructure system.

The Inspector, as a result of his intimate knowledge of day-to-day construction activities shall regularly review the Record Drawings, with the Rogers Water Utilities Project Coordinator, during construction to confirm that the drawings are accurately maintained. At the completion of the project, the Inspector shall review the Record Drawings. The Inspector shall note any errors or omissions observed on the drawings and report these immediately to the Engineer and Rogers Water Utilities.

RECORDS AND REPORTS

Introduction

Construction records and reports provide documentation of the data, activities, transactions, and verbal communications relating to the project. The importance of good construction records and reports cannot be overemphasized. During execution of the project, records and reports enable other personnel who are not directly involved with its construction to monitor and assess the work as it progresses. Following completion of construction, the records and report provide permanent documentation of the work as performed. This information may be used for resolution of disputes and re-creation of the job history.

Reporting of the work should be secondary to the actual observation of the construction process. While it is essential that the Inspector not allow report writing to interfere with the prime objective of his job, records and reports must be considered as an integral part of the inspection process. Records and reports must be accurate and shall be written promptly while job occurrences are still easily recalled by the Inspector.

All records and reports must be completed in a neat and organized manner. The inspector should remember that his/hers reports and records will be viewed by others, and that they may be presented in a court of law as evidence relative of the project.

Inspection Report Forms

The Daily Field Report is used as a permanent record of the job history, and to provide a means for re-creating job progress on a day-to-day basis. Any job-related items which the Inspector feels is relatively important shall be included in the Daily Field Report.

All Daily Field Reports must be completed daily, preferably as soon as possible after specific events occur. The Inspector will submit Daily Reports to the Engineer and Rogers Water Utilities bi-weekly or as specified by Rogers Water Utilities at the pre-construction meeting.

Daily Field Reports shall have, as a minimum, the following information:

1. Site Specific Information - The project name, date, Inspectors time of arrival and departure, Contractor's representatives, equipment on site, and visitors on site.

2. Weather - The daily temperature, sky conditions, presence of rain, snow, or wind.

3. Daily Work Completed - Summarize the construction activities of the day. List as much detail as possible such as: (began installing 12" pvc sanitary sewer pipe at Manhole station 5+00 ended at approximate station 11+25).

4. Unusual Occurrences - List any adverse conditions encountered such as soft soil conditions, unexpected bedrock, and presence of ground water, utility conflicts, equipment breakdowns, and unsafe conditions. Report any delays, and identify causes for the delays. Discuss any controversial matters, noting any deficiencies or violations by the Contractor with respect to the drawings and specifications, such as: (the Contractor indicated that he has no intentions of providing the required 4" bedding beneath the pipe due to rock. The Inspector pointed out to the Contractor that he has no choice per the specifications must have 6" bedding below pipe)... Also, describe any corrective measures undertaken by the contractor.

5. Instructions Issued and Received - Any instructions pertaining to the project that issued or received by the Inspector shall be recorded. The recipient or source of the instructions must be identified.

TESTING

The Inspector shall be responsible for the coordination with RWU, completion of required testing forms, and supervising testing methods and procedures.

CONSTRUCTION PHOTOGRAPHS

Construction photographs shall be taken with a digital camera having an automatic date recording function.

The importance of routinely taking and logging construction photographs cannot be over emphasized. These photographs are important for documenting construction activities, site conditions, and weather conditions. The Inspector shall make a habit of photographing all aspects of construction and not just those activities that may present potential conflict. The Inspector shall prepare a description log of each photograph when the photograph is taken.
This description shall include measurements to valves, fittings and appurtenances including two (2) point measurements to locate the top of valve box at surface grade and depth from surface to top of valve or appurtenance.

The log shall specifically identify the subject of the photograph and its location. The photographs should also be properly labeled to include as applicable station numbers, viewing observation point (North, South, East and West) Photographs and logs shall be submitted to the Engineer as soon as practicable.

RECORD DRAWINGS (AS-BUILTS)

The Record Drawings represent the final record of the as-constructed alignment, layout, and details of the facility. These drawings will be relied upon by Rogers Water Utilities for future expansion and maintenance planning. The Record Drawings are a dynamic set of plans that are continually updated by the Engineer during construction to reflect minor design changes,

deviations from the original plans, and the location of previously unknown utilities and site conditions.

Considering the Inspector's knowledge of the site and construction activities, it imperative that he/she routinely review the Record Drawings during construction and at the completion of the project. The Inspector's independent review will reduce error and omissions present in the final documents.

The Developers Engineer and Inspector will also be responsible to insure that the Final Digital Record Drawings will properly geo-reference onto the Rogers Water Utilities Geographic Information System (GIS) Base Map.