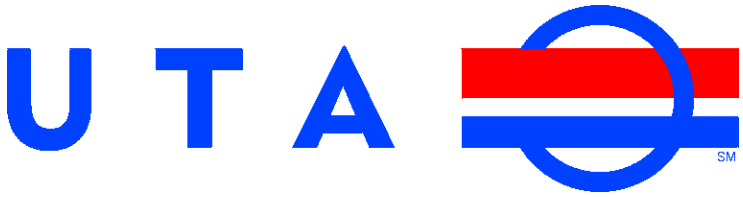

CAPITAL DEVELOPMENT

Construction Quality Plan

(Attachment to the UTA
Quality Management Plan QMP)

April 2012

Revision History

Revision #	Date	Prepared By:	Approved By	Date

Table of Contents

Part I—General

1.1 Summary

This manual, *Construction Quality Procedures* (CQP), provides the guidelines for quality tasks to be performed by the contractor and quality control and the types and frequency of tests required within the scope of a UTA construction contract. This manual indicates the major material qualification and field control tests to be performed and documented by the contractor, as a minimum. The contractor will be required to provide a project-specific construction quality control plan (CQCP) to UTA and receive a statement of no objection prior to project startup. The contractor shall use the table in appendix A as a guide in preparing their CQCP. Omissions and poor descriptions shall not relieve the contractor of his responsibility to perform all tests and inspections required. All QC responsibilities lie with the contractor, with the exception of those tests or inspections specifically identified in the specifications as being performed by others. The CQCP is mandatory and the contractor's work will be checked against these elements.

1.2 References

The primary reference for construction quality standards is the OSHA document, Title 29 ASTM E-329 "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials Used in Construction". Other references include AREMA specifications, UDOT construction specifications, UTA construction specifications, design criteria, etc.

1.3 General Requirements

A. Contractor-Developed CQCP

The contractor shall be responsible for the development, implementation, and maintenance of a CQCP consistent with the requirements of this section, which assures equipment and material conformance to the applicable requirements of every section of the specifications.

B. Quality Control Services

Quality control services include inspections, tests, and related requirements including administration, management, supervision, reports, record-keeping, use of independent testing agencies and labs, or other services. Quality control services do not include quality assurance or contract enforcement activities performed by UTA. Quality control activities, as described in the specifications, shall be provided by the contractor unless specifically stated to be provided by UTA. The quality control services described herein are a minimum and not intended to limit the contractor's quality control activities which may be necessary to achieve full compliance with the contract documents.

C. CQCP Functions

The CQCP shall assure the maintenance of adequate quality throughout all applicable areas of contract performance, such as: design, fabrication, inspection, testing, handling, packaging, shipping, storage, and site construction activities. The CQCP shall provide modes of operation that emphasize the identification, correction, and prevention of deficiencies, discrepancies, and

nonconformance work. Documentation shall include plans, procedures, detailed work instructions, and records. Procedures to implement the CQCP shall be developed, specific responsibilities assigned, and individual job authorities clearly delineated. Procedures shall be established to systematically verify compliance with the requirements of this section and any other requirements of the specifications necessary to show conformance to the contract.

D. Audits

Audits of contractor, subcontractor, and supplier activities will be performed by UTA to verify compliance with contract drawings, specifications, and all referenced standards. Audits will be performed on a systematic basis, coordinated with the CQCP, or as warranted by general quality trends.

E. Quality Control Supervisor

A full-time quality control supervisor with previous QC experience, whose sole responsibility is to ensure compliance with quality management tasks, is to be included in the quality control program. This person is to be assisted by other quality control staff as warranted by specific construction activities and workload.

F. Evidence of Compliance

The contractor shall provide UTA with complete evidence of compliance with the contract drawings and specifications for all items supplied and constructed under this contract. Evidence of compliance shall consist of certificates of compliance and/or test results from the UTA-authorized testing facility for raw products, witnessed test results for manufactured products and systems, and any other information required by UTA.

1.4 Submittals

A. Submittal Requirements

Submittals shall be made in accordance with the requirements specified in the construction contract, except as modified herein.

B. CQCP Distribution and Contents

The contractor shall submit three originals, signed and dated, of the CQCP to UTA within thirty days after notice to proceed. One copy will be given to the project manager, one to the UTA quality manager, and one copy will be given to the document control manager. UTA will return one original to the contractor signed and dated. No work covered by the CQCP shall start until UTA has issued a statement of no objection. The CQCP shall contain a comprehensive account of the contractor's QC procedures that shall be applied throughout the contract. It shall include, but shall not be limited to, the following:

Organizational Chart

The organization chart will identify the contractor's QC supervisor and show that this position is outside the construction staff with clear lines of authority for QC, reporting directly to the contractor's corporate management. The QC supervisor or his designated substitute, acceptable to UTA, shall be present at the work site at all times that any work is in progress. The QC supervisor is responsible for coordination of inspections and testing. QC personnel will be assigned or designated to perform inspections and test the work, as required. QC personnel will be assigned to all work sites at all times that work is ongoing. The QC supervisor and QC personnel shall have the authority to direct on-site correction of work not in compliance with contract requirements. References hereinafter to contractor quality control or CQC shall mean inspection or testing by qualified personnel identified on the approved quality control organization chart.

Inspection and Test Plan

The inspection and test plan is for the preparation of detailed inspection and test procedures required to implement the inspection and test plan and demonstrate compliance with the contract specifications, drawings, and the typical quality control testing and inspection in appendix A. The procedure development plan shall also include an index of all quality control procedures and instructions that will be required to implement the quality control plan. The requirements noted in appendix A shall be considered minimum requirements.

C. Proposed QC Supervisor

Before starting work, the contractor shall submit the name, qualifications, and experience of the proposed QC supervisor, who, on approval of UTA, shall have full authority to represent and act for the contractor on all quality related matters. The quality control supervisor shall have a minimum of five years of construction-related quality control or quality assurance experience, with a minimum of two years in job related supervision or management of quality control or quality assurance work. Names and resumes with qualifications of all QC personnel assigned to the QC supervisor will be submitted to UTA as they are assigned. The contractor shall notify UTA, in writing, in the event the contractor desires to change the QC supervisor, or other key QC personnel identified on the organization chart, and shall provide information specified above for UTA approval of the new QC supervisor. No contractor QC personnel shall be removed from the work without prior written notice to UTA.

D. Evidence of Contractor Training and Implementation

Before starting work, the contractor shall implement the CQCP and instruct, in accordance with the CQCP, the workmen, subcontractors, material suppliers, and others who perform quality control tasks. The instructions shall include, but shall not be limited to, the following:

- Procedures to identify potential quality problems with work or materials, and appropriate directions for solving and reporting such problems.

- Procedures establishing preventive measures and maintaining effective QC practices in all areas of the project.
- Daily work plan "tool box" briefing.

E. List of Suppliers, Subcontractors, and Supplied Items

Prior to procurement of items and materials, the contractor shall submit a list of suppliers and subcontractors that shall include items to be supplied, item numbers, specifications, inspection and test requirements, performance data, anticipated inspection test dates, and other pertinent information as appropriate.

F. Inspection and Test Plan

The contractor shall submit an inspection and test plan from the CQCP as noted in section 1.4.B.2 of this document. This is to be submitted to UTA for approval before beginning work related to the inspection and test plan. Inspection and test activities shall not commence until such approval is granted. The inspection and test plan shall be developed for each specification section and shall identify all required inspections and tests required by that specification section, the required frequency, the accept/reject criteria, records required to document compliance, and the procedures or instructions to be used for control of each activity. The requirements noted in appendix A shall be considered minimum requirements. The contractor shall perform other inspections and tests as necessary to verify the quality of the work. The inspection and test plan shall be in sufficient detail to allow UTA, or any agency having jurisdictional authority over the work, to indicate in the plan any and all operations to be inspected by that organization. Hold points, so indicated, shall not be bypassed by the contractor unless a written waiver is given by the witnessing organization.

G. Index of Records

The contractor shall prepare an index of the records that will be accumulated and maintained during the progress of the work and submit for approval within twenty days after date of the notice to proceed.

H. Reports and Forms

Quality Control Daily Reports

The contractor shall maintain quality control daily reports. They shall identify, at a minimum, material deliveries, work accomplished, tests conducted, results of inspection and tests, nature of defects found, causes for rejection, proposed remedial action and corrective actions taken. Weekly reports summarizing the QC activities will be submitted to UTA’s QC manager and project manager.

Payment Requests

For each payment request, the contractor shall submit to UTA a certification, signed by the contractor's quality control supervisor, that all work for which payment is requested, including stored materials, has been inspected and tested as specified, and is in compliance with contract requirements.

Contractor Certification

Prior to final acceptance, the contractor shall submit a certification to UTA, signed by the contractor's quality control supervisor, that all work has been inspected and tested, and that all work, except as specifically noted, is complete and in compliance with the contract drawings and specifications. A certification shall also be provided from all testing laboratories employed under this contract, confirming that all tests have been completed and that all test reports have been submitted. Tests shall include those required by the basic contract with all conformed modifications.

I. Letter of Authority

A copy of a letter of direction will be provided to the contractor's quality control supervisor outlining his duties and responsibilities and signed by a responsible officer of the firm. This letter shall include the authority to halt construction, reject materials, and to direct removal and replacement of work not in compliance with the contract. This authority shall not be subject to approval of site superintendence. This letter can be included in the contractor's CQMP.

1.5 Document Control

A. Written Procedures

All activities necessary to satisfy the referenced standards and specifications shall be designated by written procedures in the CQCP. These documents shall be submitted to UTA for a statement of no objection.

B. Submittal Status Log

The document control procedures shall provide for the maintenance of a submittal status log and controls for the receipt and transmittal of submittals, contract drawings, and specifications to assure all documents, required in accordance with the specifications, are received and distributed in a timely manner and contain the necessary technical information.

C. Document Availability

All records and documents which are quality related shall be prepared, identified, and maintained current within three days of the QC activity, by the contractor, and shall be made available to UTA upon request. Records shall be protected from damage, deterioration, or loss. Upon final acceptance of the contract, the contractor shall furnish UTA with all records relating to QC activities.

1.6 Identification and Control of Items and Materials

A. Control Procedures

Control procedures shall be established to ensure that items or materials that have been accepted through shipping or receiving inspection are properly used and installed. Identification and traceability shall be provided throughout all inspections, test activities, and records. For stored items, provisions shall be made for the control of item/material identification consistent with the expected duration and type of storage.

B. Receiving Inspection Log for Contractor-Furnished Materials

The contractor shall develop and maintain a receiving inspection log for contractor-furnished materials, which shall contain the following information, as a minimum:

- Purchase order number
- Item number
- Supplier name
- Quantity
- Item description
- Reference to applicable contract requirements
- Date received
- Heat number, serial number, or other I.D., as applicable
- Verification of receipt of all required supporting documentation
- QC acceptance sign-off and date
- Nonconformance number, if applicable

C. Receiving Inspection Log for Owner-Furnished Materials

The contractor shall develop and maintain a separate receiving inspection log for owner-furnished materials.

1.7 Inspections and Tests

A. Independent Certified Material Testing Laboratory

The contractor shall employ the services of an approved independent certified material testing laboratory, or laboratories, to perform materials testing and control testing of materials incorporated into the work. Any independent testing laboratory to be used must first be accepted by UTA and the local jurisdictions responsible for inspection. The names of proposed laboratories shall be submitted to UTA for acceptance prior to notice-to-proceed.

B. Testing Laboratory Compliance

The testing laboratory shall conform to the standards of the nationally recognized association or agency that promulgates the standards referenced in these specifications for the work performed by said testing laboratory. Some of the specific testing laboratory requirements are:

1. Asphalt, concrete, and soil testing shall be supervised by a professional engineer registered in Utah and shall conform to the requirements of ASTM E-329.
2. Engineering calculations and recommendations shall be prepared by or under the direct supervision of a professional engineer registered in Utah.
3. Electrical systems, power, and distribution equipment shall be tested by an electrical testing laboratory that meets the standards of OSHA, Title 29, Part 1907 and is a certified member of the National Electrical Testing Association (NETA).
4. A registered land surveyor shall perform the layout of the work as required.

5. The contractor shall comply with the special inspection requirements of the International Building Code (IBC), structural tests, and inspections of the fabricated steel in accordance with specification section 05120.

C. Dismissal and Replacement Notification

Dismissal and replacement of the independent certified material testing laboratory shall require written notice to UTA.

D. Test Procedures

Inspections and tests to verify compliance with the specified requirements shall be performed by the QC personnel, or their test laboratory, using recognized national standards (e.g. ASTM) or in the absence of such standards, using written test procedures that have been reviewed and approved by UTA. The written test procedures will include the following as a minimum:

- Prerequisites for the given test
- Required tools, equipment, and instrumentation
- Necessary environmental conditions
- Acceptance criteria
- Data to be recorded
- Test results reporting forms
- Identification of items tested

Acceptance inspection and testing shall be performed by designated personnel other than those performing the work.

E. National Standards and Test Procedures

Procedures and instructions, including copies of recognized national standards and written test procedures, as applicable, shall be readily available to inspection and test personnel at the time of inspection or test. When methods of inspection and test are changed, revisions shall be reflected in approved written procedures prior to implementation of the change on any work. Adherence to methods and processes reflected in approved work procedures and instructions shall be complete and continuous.

F. Written Notice of Assigned Hold Point

The contractor shall provide UTA with not less than forty-eight hours written notice of the occurrence of an assigned hold point, with the exception of any hold point required to be inspected by outside agencies which will require a seven day prior notification.

G. Cost of CQC Inspections

The contractor shall bear all costs for CQC inspections and tests as required and in accordance with the construction contract.

H. Inspection and Test Result

Inspection and test results shall be submitted to UTA prior to incorporation of the items into the work. Inspection/test results indicating non-compliance (failure) with specified requirements shall be reported to UTA immediately upon receipt. Certificates of compliance shall be submitted prior to the products' incorporation into the work.

I. Inspection and Testing by Outside Firms

Inspection and tests, conducted by persons or agencies other than the contractor, shall not in any way relieve the contractor of his responsibility and obligation to meet all specifications and the referenced standards.

J. Inspection and Test Report Content

Records (reports) of inspection and test activity are contained in the weekly QC Report. Reports of inspection and test activities shall identify the following as a minimum:

- Name of items inspected or tested
- Quantity of items
- Inspection/test procedure reference (with organization and document ID)
- Date
- Name of inspector/tester (with name of organization or laboratory)
- Observations/comments
- Specified requirements (with section and paragraph number referenced)
- Type of test or inspection performed
- Acceptability
- Deviations/non-conformances
- Corrective action
- Evaluation of results
- Signature of authorized evaluator

K. Same Day Multiple Source Acceptance

When materials or other products, subject to testing, are supplied from more than one source on the same day, the tests and test frequencies indicated in this section shall apply to each source of supply used.

L. Engineer Inspection of Materials

UTA shall have the option to inspect the materials supplied and installed under this contract throughout the life of the project. The contractor shall provide UTA with sufficient time to review any material in the field, place of manufacture, or at any testing facility. The contractor shall provide UTA with at least fifteen calendar days written notice, unless otherwise indicated, of any off-site manufacture, testing, or other pertinent work to allow UTA to inspect such work.

UTA will not approve any manufactured item that is supplied and installed without prior written notice.

M. Records of Test and Inspection Activities

Records of test and inspection activities shall be maintained current. Records shall be prepared within three days of the test and inspection activity.

1.8 Inspection and Test Status

A documented system shall be developed and maintained to clearly identify the inspections and test status of materials and equipment throughout construction. Identification may be accomplished by means of stamps, tags, or other control devices attached to or accompanying the material or equipment.

1.9 Control of Measuring and Test Equipment

Control of measuring and test equipment (M&TE) shall be provided, calibrated, and maintained to assure that construction conforms to the requirements of the specification. A system to control the accuracy of all such equipment shall be established and maintained. The system shall include provisions for the unique identification of each piece of measuring and test equipment with a number or designation permanently affixed to the device. Calibration of M&TE shall be performed at intervals specified in calibration procedures by the contractor or an agency/vendor specifically approved and traceable to the National Institute of Standards and Technology (NIST). M&TE found to be out-of-tolerance, damaged, or lost during use shall be documented with a nonconformance report. Work inspected or tested with out-of-tolerance or damaged equipment shall not be considered acceptable until the nonconformance is resolved properly, and all characteristics previously inspected or tested have been verified as correct. In the event that no national standards exist for calibration, the basis for calibration shall be documented.

1.10 Nonconformance

A. Nonconforming Equipment and Material

A system shall be established to define the methods and responsibilities for the identification, documentation, control and processing of nonconforming equipment and material. A nonconformance shall be considered to exist when either material or equipment exhibits a deficiency in either physical inspection characteristics or documentation. This system shall apply to all material and equipment including the actions associated with installation or construction which, for any reason, fails to conform to the specifications or other applicable approved product description. The contractor shall provide the following to prevent use of nonconforming items or materials:

- Identification of non-conformances
- Documentation
- Evaluations/recommendations
- Separation/removal
- Immediate notification to UTA

- Cause of nonconformance
- Proposed corrective action
- Corrective action actually implemented

B. Nonconformance Log

The contractor shall develop and maintain a nonconformance log to enable tracking of all non-conformances. This log shall contain the following information, as a minimum:

- Sequential, unique number
- Date issued
- Originator
- System affected, drawing number/serial number
- Description of nonconformance and source (supplier, subcontractor, welder, etc.)
- Recommended final disposition
- Date closed
- CQC supervisor's initials
- Remarks, as applicable

C. Authority to Stop Work

The CQC personnel shall have the authority to stop that portion of the work that does not comply with the contract requirements and to require the removal of nonconforming work.

D. Disposition of Nonconformance Items

The disposition of nonconforming items or materials must be approved by UTA.

E. Removal of Status Tags

Procedures shall be established that control the use—including logging, installation, and removal—of status tags. Authorization for removal shall be defined. Intentional unauthorized removal of nonconformance status tags shall result in immediate dismissal and removal from the job site of all responsible personnel.

1.11 Corrective Action

Prompt action shall be taken to identify the basic cause of nonconformances and the corrective action to prevent recurrence. The results of failure and discrepancy report summaries, supplier evaluations and any other pertinent applicable data shall be used for determining corrective action. Information developed during construction, tests, and inspections that support the implementation of required improvements and corrections shall be used to support the adequacy of corrective action taken.

1.12 Personnel Qualifications

A. Qualified Personnel

Activities that require qualified production, inspection, and test personnel shall be identified and the minimum competence level shall be established as part of the CQCP. Personnel performing special processes (e.g., welding, brazing, etc.) or inspection/test tasks shall have the experience, training, certification and, where required, the license commensurate with the scope, complexity or nature of the activity, and shall be approved by UTA. Documentation shall be made for the following:

- Requirements for qualifications
- Orientation
- Evaluation
- Certification credential or license

B. Records of Qualified Personnel

Records of personnel qualifications shall be maintained by the contractor as CQC records.

1.13 Audits

The contractor shall perform scheduled internal audits, using non-project QC personnel, to verify that his QC procedures ensure total compliance with the specifications and all reference standards. A schedule for the audits shall be established as part of the CQCP. Records of self-audits shall be maintained as quality records and shall be submitted to UTA within seven days of the audit completion. The contractor shall provide access to the audit locations upon prior notice by UTA. UTA QA personnel will also perform random, unannounced audits on the CQCP in order to ensure compliance.

1.14 Handling and Storage

Handling, storage, and preservation of equipment and material, from the time of receipt to the time of turnover, shall be performed in accordance with documented procedures to prevent damage, deterioration, distortion of shape or dimension, loss, degradation, loss of identification or substitution. Handling procedures shall include the use of special devices (e.g., crates, boxes, containers, dividers, slings, material handling and transportation equipment, and other facilities) for handling, and control provisions for inspection and maintenance of the special devices. Equipment and material requiring specific time intervals for inspection or test shall be appropriately marked and controlled.

1.15 Quality Control Records

A. Record Index

Records shall be developed, used, and maintained, and shall include, but not be limited to, those specifically prescribed in this section. A complete records index shall be developed based on the requirements for document and data submittals in each specific section of the specifications. The records index shall indicate all records, documentation, and data required by the contract to be furnished by the contractor. The records identified shall provide objective evidence that all

quality control plan activities conform, including evidence that required verification testing has been performed, and that evidence demonstrates the basis for decisions which were made. Records shall include the required authentications, authorities, and any other information which will provide evidence of the authenticity of the records, the adequacy of records, and the timeliness of completion of the records. Records shall be prepared on a systematic basis, at a level of authority commensurate with the nature of the records. Only complete and properly authenticated documents shall be considered quality records. All quality control records shall be indexed, filed, and maintained in a manner that provides for timely retrieval, traceability to, and identification with, and acceptability of, material, equipment, and systems. All quality control records shall be protected from deterioration and damage.

B. Content of Records

At a minimum, records shall contain:

- Name of equipment, material, or system inspected or tested
- Specification reference by section and paragraph (where applicable)
- Quantity of items
- Location of installation
- Inspection and/or test procedure reference
- Date
- Signature of inspector
- Observations and comments
- Test or inspection procedure, required test or inspection results, actual test or inspection results, and comments
- Recommended corrective action pursuant to nonconforming work.

1.16 Supplier Quality Assurance

A documented system shall be developed and maintained to assure that procured products conform to the requirements of these specifications. At a minimum, written procedures shall provide for:

- Evaluation and selection of suppliers, using specified evaluation criteria.
- Transmission of applicable design, manufacturing, quality and other associated technical requirements in purchase documents.
- Periodic assessment of supplier performance.
- An evaluation of the adequacy of procured products.

1.17 Samples

All samples of materials, products, or assemblies to be incorporated into the work shall be retained for a minimum period of one year after the date of the certificate of final acceptance. The contractor shall provide thirty days notice to UTA of intent to discard or destroy such samples as may be in the possession of the contractor or his subcontractors.

Part II—Execution

2.1 General

The contractor's quality control program shall be implemented by the establishment of a separate quality control organization. The only responsibility that any member of this organization shall have on site is quality control.

2.2 Requirements

A. Quality Control Supervisor (QCS)

The quality control supervisor shall have the following qualifications: construction engineer, with a minimum of two years of job related experience in a supervisory quality control position, whose sole responsibility is to ensure compliance with the contract drawings and specifications. The quality control supervisor shall have a minimum of five years experience as a craftsman or supervisor in related work. This person shall be employed on this contract only, shall be physically on the project site during performance of all contract work, and shall be in charge of the contractor's quality control organization. This engineer shall report directly to a responsible officer of the firm above the level of project site management.

B. Supplemental Specialty Inspectors

Structural, mechanical, and electrical personnel, who are either engineers or engineer technicians (except as noted in the specifications), shall be provided during operations such as shoring, bracing, forming, concrete placement, steel erection/bolt-up and installation, testing, balancing, adjusting, and regulating major components of mechanical and electrical devices, equipment, and systems. The occurrence that will require each to be at the project site shall be indicated in the contractor's quality control plan. These inspectors shall report directly to the contractor's quality control supervisor. Specialty inspectors need only be on site when needed for that specialty inspection.

1. The certifiable requirement for engineers shall be a minimum of five years experience as a craftsman or supervisor in related work in addition to one of the following:

    a Registered engineer, or

    b. Graduate engineer, or

    c. A total of not less than four years of college level education, training, and/or technical experience of such nature and extent that, taken in conjunction with any private study, evidences:

    1) a thorough knowledge of the physical and mathematical sciences underlying professional engineering; and

    2) a good understanding, both theoretical and practical, of the engineering sciences and techniques and their applications to that of the respective branch of engineering, substantially equivalent to that furnished by a full four-year professional engineering curriculum.

2. The minimum qualifications for engineer technicians shall be a high school graduate with not less than six years construction experience as a craftsman or supervisor in the field of work for which he is employed on this contract, and minimum ICBD Level II certification or equivalent.

C. Surveyor

Registered land surveyor to perform the layout of the work as required in the contract provisions.

D. Independent Testing Laboratory

An industry recognized, licensed, testing laboratory to perform all tests, both on-site and off-site, in connection with earthwork, bituminous paving, concrete operations, masonry construction, and such other tests as may be indicated by the nature of the construction, or as specifically required under the terms of the contract. Proposed laboratories shall be submitted to UTA's quality manager for approval prior to notice-to proceed.

E. Electrical Testing

An independent testing firm shall perform all electrical testing required. The testing firm shall be a licensed, corporately and financially independent testing organization that can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing firm. The testing firm shall have at least five years experience in the testing of electrical equipment of the type, rating, and voltage used on this project.

F. Staffing Levels

The contractor shall provide sufficient qualified quality control personnel to monitor each work activity at all times. The scheduling and coordinating of all inspection staffing and testing must match the type and pace of work activity.

1. In cases where multiple trades, disciplines, or subcontractors are on site at the same time, each activity shall be inspected and tested by personnel skilled in that portion of the work.
2. In cases where multiple shifts are employed, the quality control staff shall be increased as required to monitor the work on each shift.

G. Site Inspections by UTA

All materials required for the contract shall be new, except where specified otherwise. UTA may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination, to verify compliance with applicable specifications. Inspections and tests performed by UTA shall be for UTA quality assurance and shall not relieve the contractor from the responsibility of meeting the specified requirements, nor shall such inspections or tests be considered to be a guarantee for acceptance of materials that will be delivered subsequent to the time items were inspected and/or tested

H. Nonconforming Work

Nonconforming work is material furnished or work performed which does not comply with contract requirements. The contractor's QC supervisor shall be responsible for informing UTA

immediately upon discovery of nonconforming work. When nonconforming work is discovered, UTA may reject the materials or workmanship, or require its correction. The contractor shall satisfactorily correct rejected workmanship or satisfactorily replace rejected materials at contractor's own expense and promptly segregate and remove rejected materials from the work site and properly dispose of them. Or, UTA may accept the materials or workmanship as suitable for the intended purpose, document the basis of such acceptance, and deduct an equitable amount from the contract price for uncorrected work.

I. Acceptance by Certificate of Compliance

Materials accepted on the basis of a certificate of compliance may be sampled and inspected and/or tested by UTA, or its designee, at any time. The fact that the materials were accepted on the basis of such certificate shall not relieve the contractor of his responsibility to provide materials and equipment which comply with the specifications.

J. Suppliers and Subcontractors QC Requirements

The contractor shall impose upon his suppliers and subcontractors the same QC requirements, including inspection and test procedures, as imposed upon him by the specifications and referenced standards. The contractor shall apply appropriate controls, designed to ensure that all materials supplied comply with the requirements of the specifications.

2.3 Quality Control Plan Approval

A. CQCP Meeting with Engineer

Before the contractor's quality control plan is submitted, the contractor shall meet with UTA's quality manager and discuss the contractor's quality control plan. The meeting shall develop a mutual understanding of the details of the plan, including the forms to be used for recording and communicating the quality control operations, inspections, administration of the plan for both on-site and off-site work, and the interrelationship of contractor and UTA inspection. The contractor shall prepare minutes of the meeting which shall be incorporated in the contractor's quality control plan.

B. CQCP Approval Prior to Fabrication

Unless specifically authorized by UTA's quality manager, no construction or off-site fabrication shall be started until the contractor's entire quality control plan is approved. Construction of any feature of the work will only be permitted after the approval of the quality control plan, or at least approval of that portion of the plan applicable to the specific feature of the work. At the election of the contracting officer, no request for payment will be processed under this contract until the entire quality control plan has been approved.

C. Deficiencies in the CQCP

If UTA's quality manager determines that the quality control plan, personnel, inspections, tests, or records are not adequate, corrective actions shall be taken immediately as appropriate to cure the problem.

D. Notifications of Changes to UTA

The contractor shall notify UTA's quality manager, in writing, of any proposed change to the contractor's quality control plan. No such change shall be implemented prior to approval in writing by UTA's quality manager.

2.4 Quality Control Plan Implementation

Implementation of the quality control plan is the responsibility of the contractor. This implementation will be closely monitored by the UTA and deficiencies therein will be corrected by, or at the expense of, the contractor.

2.5 Record Keeping

A. Current Quality Control Records

The contractor shall maintain current quality control records, on UTA approved forms, of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including: precise location of test or inspection made, type and number of inspections or tests involved, results of inspections or tests, nature of defects, causes for rejection, etc.; and proposed remedial action and corrective actions taken. These records must cover both conforming and defective or deficient features and include corrective actions taken, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records must be furnished to UTA's quality manager in the weekly quality report. The records shall cover all work placed subsequent to the previously furnished records and shall be verified by the contractor's quality control supervisor. The contractor shall document inspection and tests as specified in the technical provisions of the specifications. These records shall be available for review by UTA's quality manager or his authorized representative throughout the life of the contract.

B. Specific Records

Specifically, the contractor shall maintain the following records.

1. Weekly Quality Control Summary Reports

The contractor's quality control supervisor shall submit signed daily quality control summary reports to UTA's quality manager on a weekly basis. These reports shall address both project progress and project quality control activities and the following sections:

a. Section I - Project Progress: shall identify prime and subcontractor personnel on site, equipment on site, idle equipment and personnel, material deliveries, weather conditions, work accomplished, and other required information.

b. Section II - Project QC Activity: shall summarize the day's inspection and testing activity including: meetings; preparatory, initial and follow-up inspections; QC problems encountered or resolved; failing test results received or corrected; and other significant events impacting project quality or contract compliance.

c. Contractor's inspector's daily reports and test reports shall be attached to the weekly QC summary report.

d. Weekly quality control summary reports shall include the following, or similar, certification:

"On behalf of (name of contractor), I certify that this report and the inspector's daily reports are complete and correct, and that all materials and equipment used, and work performed, during this reporting period are in compliance with the drawings, specifications, and contract provisions, except as noted in the inspector's daily reports."

2. Inspector's Daily Reports

Each contractor's inspector shall maintain a daily log of all inspections he/she performs for both contractor and subcontractor operations on the appropriate UTA form. These inspector's daily reports shall provide factual evidence that continuous quality control inspections and tests have been performed including, but not limited to, the following: compliance with approved shop drawings, proper storage of materials and equipment, job safety, and computations employed in the work.

a. The inspector's daily reports shall identify inspections and tests conducted, results of inspections and tests, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

b. The original and one copy each of daily progress report and the inspector's daily reports shall be retained for turnover at project closeout.

3. Tests Reports

A copy of all test results shall be sent directly from the contractor's independent testing laboratory to UTA's quality manager. A copy of any failing report shall be sent immediately. All test reports must be reviewed and signed by a professional engineer, registered in Utah.

4. Daily Field Test Reports

A copy of all daily field test reports (technicians' hand-written reports), as well as file copies of official laboratory test reports received that day, shall be attached to the weekly quality control summary report.

5. Testing Control Log

The contractor shall maintain a log to record and track each test performed. The log shall indicate date of test, test designation or type, location, specification test result requirements, initial test results, causes for failing test, recommended remedial actions, and reference to subsequent retests and their results.

6. Punch-List

The contractor shall maintain a continuous log, or "rolling punch-list" to record and track all inspections and tests which remain "open" or uncorrected at the close of each workday or shift. The log shall number each item in successive, chronological order and shall briefly describe the nature and location of the work, the nature of the inspection or test, causes for rejection, corrective actions recommended, identity of inspector or technician, date the item was corrected, and identity of inspector or technician who verified the corrective action.

7. Sign-Off Sheets

The contractor will be responsible for establishing a system of sign-off sheets certifying that all work required prior to the construction or start-up of critical work elements has been constructed and installed in accordance with the plans and specifications.

a. Critical work elements are defined as:

- Work activities concealing any feature of the work from subsequent inspection, for example: concrete placement, spray fireproofing or waterproofing installation of suspended ceilings, etc.
- Start-up activities potentially damaging to work in place (i.e., energizing transformers and switch-gear, bumping motors, running in pumps, hydro testing pipelines)

b. Sign-off sheets shall be initialed by each contractor's QC inspector responsible for insuring the quality of the work and signed by the contractor's quality control supervisor.

c. Contractor shall provide a copy of the completed sign-off sheet to UTA's quality manager prior to performing each critical work element.

2.6 Laboratory Testing

A. Contract Specifications

The independent commercial testing laboratory selected by the contractor shall meet the standards set forth in the contract specifications including the following:

1. "Recommended Requirements for Independent Laboratory Qualifications", published by the American Council of Independent Laboratories
2. ASTM E-329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials Used in Construction"

B. Capability Check

UTA reserves the right to check laboratory equipment for compliance with the standards set forth in the contract specifications and to check the laboratory technicians' testing procedures and techniques. Calibration records must be in order.

C. Capability Recheck

If nonconformities are discovered during the capability check, or any succeeding recheck, the contractor will be assessed a charge of $500.00 to reimburse UTA for each recheck of the laboratory or the checking of a subsequently selected laboratory. These charges will be deducted from the total amount due to contractor.

D. Control and Verification Tests

Control tests are those tests made for the contractor, under the quality control plan, to assist the contractor in maintaining control of his operations. As described above, the contractor shall procure the services of an independent commercial laboratory to perform the required routine control tests. The specifications contain testing criteria, frequency of testing, procedures,

methods, and other information from which the contractor can determine, based on this method of construction, the number of control tests to be made for each phase of the work. UTA's quality manager is to be notified a minimum of twenty-four hours in advance of the time samples will be taken by the contractor for quality control testing. UTA's quality manager will then notify its own testing laboratory contractor so verification test samples may be taken.

E. Check Tests

The contractor shall furnish to UTA's quality manager the quantities of materials to be used for check testing as required in the specifications. Check testing will be performed by the UTA at an independent laboratory at no cost to the contractor. No direct payment will be made to the contractor for the furnishing of materials used for check testing.

2.7 Field Testing

A. Test Locations

UTA reserves the right to approve the location from which test samples will be taken and/or at which location on-site tests are conducted.

B. Methodology

Prior to performing field tasting, the contractor shall:

1. Verify that field testing procedures comply with applicable codes and contract requirements.
2. Verify that facilities and testing equipment are available and comply with applicable codes and testing standards.
3. Check test instrument calibration against certified standards. Copies of test instrument calibration certificates shall be maintained by the contractor.
4. Verify that recording forms and test procedures have been prepared and distributed.

2.8 Quality Awareness Program and Training

The contractor shall develop a program to ensure continuing attention to the production and installation of error-free work, complying with contract requirements. The quality awareness program shall provide for education, training, tool-box meetings, meetings with subcontractors and suppliers, and other activities designed to

1. Emphasize the importance of high-quality work.
2. Stress the concept that quality is best achieved during initial fabrication and/or installation of the work; i.e., "Do it right the first time".
3. Enhance the exchange of technical and other information pertaining to quality throughout the contractor's project organization.
4. Eliminate noncompliant work requiring rework or replacement.

The contractor shall implement this program with all members of the project team, all subcontractors, suppliers, fabricators, and consultants, as well as all levels of the contractor's own organization.

2.9 Surveillance BY UTA (Quality Assurance)

A. Quality Assurance Role

UTA will perform a quality assurance role, closely monitoring performance of the contractor's quality control program to make sure it is effective. The basic measure of effectiveness is that the work is performed correctly the first time. Secondarily, if a problem does occur, action is immediately taken not only to correct the problem, but to make sure it will not occur again.

B. Spot Checks

UTA Quality oversight engineers will spot check construction primarily for assurance that the contractor's quality program is functioning efficiently. UTA inspection does not supplement contractor inspection.

C. Surveillance of Materials and Equipment

All materials and equipment shall be subject to surveillance by UTA at the point of production, manufacture, or shipment, to determine if the producer, manufacturer, or shipper maintains an adequate inspection system which insures conformance to the applicable specifications and drawings with respect to materials, workmanship, construction, finish, functional performance, and identification. In addition, all materials, equipment, and work in place shall be subject to surveillance by the UTA at the site for the same purposes. Surveillance by UTA does not relieve the contractor of performing quality control inspections of either on-site or off-site contractor's or subcontractor's work.

D. Purchase Orders

Upon determination by UTA's quality manager that an item will require surveillance by UTA at the point of production, manufacture, or shipment, the contractor will be notified, in writing, of such determination. Copies of documented quality control operations, inspections, and tests shall be made available to the UTA representative at the points of production, manufacture, and/or shipment.

E. Code Requirement and Acceptance

UTA is responsible for code requirement and acceptance special inspection, with related testing. UTA is responsible for UBC Section 306 Special Inspection.

2.10 Non-Compliance

A. Noncompliant Work

UTA's quality manager will notify the contractor of any noncompliance with the foregoing requirements. The contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered to the contractor or his representative at the site of the work, shall be considered sufficient notice. If the contractor fails or refuses to comply promptly, UTA may:

1. Issue an order stopping all or part of the work until satisfactory corrective action has been taken. It is understood and agreed that time lost due to any such stop order shall not entitle the contractor to:

- a. Extensions of time, or
- b. Compensation for excess costs or other damages incurred by the Contractor

2. Repair, replace, or otherwise remedy the defective work at the contractor's expense. Costs incurred by the UTA to correct defective work shall be deducted from the total amount due the contractor.
3. Withhold an amount from the payment due the contractor as may be deemed necessary, at the discretion of UTA's quality manager.
4. Terminate the contractor for default after providing proper notice.

B. Ineffective Quality Control Program

In cases where the contractor does not comply with the quality control plan or the contract provisions, or where the contractor fails to properly operate and maintain an effective quality control program, UTA's quality manager may:

1. Order the contractor to replace ineffective or unqualified quality control personnel or subcontractors.
2. Assign UTA or contracted outside professional staff to carry out the functions and operations of the contractor's approved quality control plan.

C. Noncompliance Record

The contractor shall maintain and submit a detailed record of every noncompliance and corrective action taken.

2.11 Failure to Perform

In the event the contractor fails to adequately perform any or all of the provisions of this section, UTA, at its sole discretion, reserves the right to have UTA or a designee perform any or all of the provisions of this section and back charge the contractor for the actual cost to UTA of such services. This remedy for contractor's failure to perform shall be in addition to any other right or remedy available to UTA according with the terms the construction contract.

Appendix A—Typical Quality Control Testing and Inspection Schedule

Note: This sample inspection schedule is taken from procedure 5D: Construction Quality Audit/Oversight and Material Testing, of the *Capital Development Procedures* documentation.

Section 01400, Quality Control Appendix A

TESTING AND INSPECTION SCHEDULE

EXPLANATORY NOTES

TYPE A Material/component acceptance testing shall be certified prior to incorporation into the works.

TYPE C Construction testing on-site during the work to verify specification compliance.

TYPE I Documented inspection report of material/work.

TYPE R Review and approval of UTA required prior to proceeding with the next phase of the work.

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
01010 Summary of Work	None					
01013 Definitions	None					
01014 Work Sequence	None					
01015 Hours of Work	None					
01019 Owner Furnished Materials	None					
Locomotives and Coaches	Final Car Book stating Compliance with Specification	Per Specification	C, I, R	Off	Daily oversight and inspection to occur at the Builders facility.	UTA
01025 Measurement and Payment	Weight Scale Certification	Per Specifications	C	On	Before use, every 6 months	Contractor
01040 Cooperation with Other Contractors	None					
01042 Relations with Operating Railroads	None					
01050 Field Engineering	Qualification of Surveyors	Per Specifications	A, R	Off	Once, 10 days prior to start of work	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
01200 Project Meetings	None					
01300 Submittals	None					
01310 Project Schedules	None					
01370 Schedule of Values	None					
01400 Quality Control	Qualification of Quality Control Manager Qualification of Independent Testing Laboratory	Per Specifications Per Specifications	A, R A, R	Off Off	Once, prior to starting or work. Once, prior to start of work.	Contractor Contractor
01440 Safety Requirements	Safety Program	Per Specifications	R	Off	Provide Plan 30 days following the NTP and maintain through completion.	Contractor
01505 Mobilization	None					
01510 Watering	None					
01520 Street Cleaning and Site Maintenance	None					
01540 Security	None					
01560 Traffic Control	Maintenance of Traffic Plan Street Closure Permits Qualification of Traffic Control Supervisor	Per Specifications Per Agency Requirements Per Specifications	A A A	Off Off Off	30 days prior to the start of any new construction activity. 30 days prior to the start of any new construction activity. Once, prior to the start of work.	Contractor Contractor Contractor
01566 Pollution Controls	None					
01710 Project Closeout	None					
01720 Project Record Documents	Marked-Up Drawings to Show Changes	Per Specifications	C, I	Off	Once per month for Engineer's review prior to Progress Payment Submittal	Contractor
01730 Operating and Maintenance Manuals	O&M Manuals	Per Specifications	R	Off	Until approval	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
02050 Demolition and Removal of Obstructions	Utility Certificates of Severance	Per Specifications	A, R	Off	15 days before any demolition is performed	Contractor
	Demolition Permits	Per Specifications	A, R	Off	15 days before any demolition is performed	Contractor
	Traffic Permits	Per Specifications	A, R	Off	15 days before any demolition is performed	Contractor
02056 Common Fill	Gradation Analysis	Per Specifications			15 days prior to the start of work	Contractor
	Moisture-Density Relationship	Per Specifications			15 days prior to the start of work	Contractor
02082 Water Meter	None					
02100 Clearing and Grubbing	None					
02121 Adjustment of Incidental Structures	None					
02142 Dewatering	Permits	Per Specifications	A, R	Off	15 days prior to the start of work	Contractor
02151 Maintenance and Support of Existing Utilities	None					
02160 Trees	Proof of having secured all plant materials	Per Specifications	A,R	Off	Once, 120 days maximum after NTP	Contractor
	Pictures of each type of plant material	Per Specifications	A,R	Off	Once, 120 days maximum after NTP	Contractor
	Soil laboratory analysis of existing soil with soil amendment recommendations	Per Specifications	A,R	Off	Once, 60 days minimum before beginning landscape work	Contractor
	1/4 cubic foot of imported topsoil proposed for use throughout the Project	Per Specifications	A,R	Off	Once, 60 days minimum before beginning landscape work	Contractor
	Schedule indicating dates, areas, and types of work to be performed	Per Specifications	A,R	Off	Once, 60 days minimum before beginning landscape work	Contractor
		Per Specifications	A,R	Off	Once, 14 days prior to acceptance	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Schedule for maintenance work	Per Specifications	I,R	On	Upon completion of the subgrade preparation.	Engineer
	Inspect all landscape work	Per Specifications	I,R	On	Upon completion of finish grade preparation.	Engineer
	Inspect all landscape work	Per Specifications	I,R	On	Upon layout of all plant materials.	Engineer
	Inspect all landscape work Inspection for final acceptance	Per Specifications	I	On	Upon completion of all landscape installation work	Engineer
02212 Finish Grading	None					
02221 Trench Excavating and Backfill	Trench Backfill Compaction	AASHTO T99	C	On		Contractor
02222 Structure Excavation and Backfill	<u>Excavation</u> - Soil Proctor	ASTM D1557	C	Off	One per soil type per structure if underlying soil is disturbed	Contractor
	- Field Density (if underlying soil is disturbed)	ASTM D1556 or ASTM D2922	C	On	Minimum two test per station platform (footings), traction power substations (foundations), retaining walls, and signal communication building	Contractor
	<u>Granular Wall Backfill Qualification</u> - Gradation	AASHTO T11 & AASHTO T27	A	Off	One per type	Contractor
	- Moisture/Density Curve	ASTM D1557	A	Off	One per type	Contractor
	<u>Granular Fill (Job Control)</u> - Moisture/Content	ASTM D2216, ASTM D3017	C	On	Once per 2,000 tons or minimum of two tests per each structure backfilled	Contractor
	- Field Density	ASTM D1556, ASTM D2922	C	On	One test per 2,000 tons or minimum of two tests per each structure backfilled	Contractor
	<u>Qualification of Fill Source</u>		A, R		Minimum of 21 days prior to incorporating material on the project.	

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
02225 Excavating, Embankment, Backfilling and Compacting	- Gradation - Moisture /Density - Moisture Content - Liquid Limits - Plasticity Index	ASTM D1140, ASTM D422 ASTM D1557 ASTMD 2216 ASTM D4318 ASTM D4318	 A A A A	Off Off Off Off Off	One per material type One per material type One per material type One per material type One per material type	Contractor Contractor Contractor Contractor Contractor
	<u>Job Control Backfill, Embankment, Surcharge</u> - Gradation - Field Density	 ASTM D422, ASTM D1140 ASTM D1556 or ASTMD 2922	C C	On On	One per 5000 CY One test per 1,000 CY or minimum of one test for each shift of compaction operation or minimum one test per road crossing. Retest after re-compaction of any failing areas.	Contractor Contractor
	Surcharging	Per Specifications	C, R	On	Throughout surcharge duration	Contractor
	Moisture Density	ASTM D1557	C	On	One per material type	Contractor
	Moisture Content	ASTM D2216 or ASTM D3017	C	On	Same Frequency as in-place density	Contractor
02226 Embankment for Structures	<u>Excavation</u> - Soil Proctor	ASTM D1557	C	Off	One per soil type per structure if underlying soil is disturbed	Contractor
	- Field Density (if underlying soil is disturbed)	ASTM D1556 or ASTM D2922	C	On	Minimum two test per station platform (footings), traction power substations (foundations), retaining walls, and signal communication building	Contractor
	<u>Granular Wall Backfill Qualification</u> - Gradation - Moisture/Density Curve	AASHTO T11 & AASHTO T27 ASTM D1557	A A	Off Off	 One per type One per type	Contractor Contractor
	<u>Granular Fill (Job Control)</u> - Moisture/Content - Field Density	ASTM D2216, ASTM D3017 ASTM D1556, ASTM D2922	C C	On On	Once per 2,000 tons or minimum of two tests per each structure backfilled One test per 2,000 tons or minimum of two tests per each structure backfilled	Contractor Contractor
02233 Untreated Base Course	<u>Qualification of Source Material</u>	Per Specifications	A, R	Off	Once per every aggregate source and once per 100 tons from a single source.	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Job Control - Gradation	AASHTO T27	C	On	One test per 1,000 tons	Contractor
	- Density in Place	AASHTO T191, 205, 238	C	On	One test per 1,000 tons or each shift of compaction operation	Contractor
	- Moisture Content	ASTM D2216	C	On	Whenever density in place test is taken	Contractor
	- Proof Rolling	As Specified in 2233	C	On	Continuously for each layer of fill to be observed	Contractor
	- Moisture Density Curve	ASTM D698-78	C	On	One per material type	Contractor
02273 Geotextile Fabric and Geocomposites	Qualification of Material	Submittal of Certificate	A	Off	Once prior to incorporating into the project	Contractor
02276 Soil Erosion and Sediment Control	Erosion Control Plan	Per Specifications	R	Off	Once prior to start of construction.	Contractor
	Qualification of Material	Per Specifications	R	Off	Once prior to incorporating into the project	Contractor
01050 Field Engineering	Qualification of Surveyors	Per Specifications	A, R	Off	Once, 10 days prior to start of work	Contractor
02350 Sheeting, Shoring and Bracing	Sheeting, Shoring and Bracing Plan	Per Specifications	R	Off	Once prior to start of construction.	Contractor
	Qualification of Engineer	Per Specifications	R	Off	Once prior to start of construction.	Contractor
	Qualification of Contractor	Per Specifications	R	On	Once prior to start of construction.	Contractor
02360 Driven Piles	Wave equation analysis of hammer/pile/soil system.	Per Specifications	A,R	Off	Prior to commencing with the work	Contractor
	Pile driver analyzer data or static-load tests results in accordance with the geotechnical report	Per Specifications	C,R	On	Within two days of completion of tests.	Contractor
	Driving records of each pile	Per Specifications	I	On	Not later than two days after driving	Contractor
	Welder Qualifications	AWS D1.1 "Structural Welding Code - Steel."	A,R	Off	Prior to commencing with the work	Contractor
02376 Overhead Contact System Pole & Downguy Foundations	Qualification of Material, Mill Certification	Per Specifications	A	Off	Prior to incorporating into the project	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
02450 Horizontal Boring	None					
02455 Rail Clips and Cast Shoulders	<u>Rail Clips</u> - Mill Test Certifications - Wet Fluorescent Magnetic Particle Tests <u>Cast Shoulders</u> - Material Conformance Inspection Certificates - Hardness tests - Test bars - Fatigue Test Report	 Per Specifications ASTM E709 Per Specifications Per Specifications Per Specifications Per Specifications	 A A A A A A	 Off Off Off Off Off Off	 Prior to commencing production Prior to commencing production Prior to commencing production Prior to commencing production Prior to commencing production Prior to commencing production	 UTA UTA UTA UTA UTA UTA UTA
02456 Concrete Ties	Rail Seat Positive Moment Test Center Negative Bending Moment Test Rail Fastener Shoulder Pull-Out Test	Per Specifications Per Specifications Per Specifications	A A A	Off Off Off	Prior to commencing production Prior to commencing production Prior to commencing production	UTA UTA UTA
02459 Subballast	Qualification of Material Proctor <u>Job Control</u> - Gradation - Dry Density	AREA CH, 1 PT, 2.11 ASTM D1241 ASTM D1557 ASTM D2922 ASTM D1556 (alternate)	R R C C,I	Off Off On On	Once at 30 days prior to incorporating the materials into the project Once per material unless, material changes One test per 500 tons One test per 200 LF of route	Contractor Contractor Contractor Contractor
02466 Trackwork	Mill Test Certification to Verify Compliance with Specification	Per Specifications	A	Off	Prior to commencing production Prior to shipment	UTA
02466 Trackwork - Direct Fixation Track Construction	Work Plan Restrained Pull-Out Test Unrestrained Pull-Out Test Torsion Test	Per Specifications Per Specifications Per Specifications Per Specifications	R C C C	Off On On On	30 days prior to the start of the DF construction 4 tests per every 500 inserts installed 4 tests per every 500 inserts installed 4 tests per every 500 inserts installed	Contractor Contractor Contractor Contractor
		Per Specifications	R	Off	Prior to commencing with the work	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
02466 Trackwork - Ballasted Track Construction	Designation of Lines and Profile	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Track Installation Procedures	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Installation Procedure for Station Bracing	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Ballast Tamping Procedures	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Qualification of Material	Per Specifications	R	On	Prior to commencing with the work	Contractor
	Zero Thermal Stress Method and Equipment	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Ballast Compaction - Procedure Qualification	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Records and Measurement for Second Hand Rail	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Track Inspection Car, model and catalogue	Per Specifications	R	On	At the conclusion of work	Contractor
	Track Geometry Inspection	Per Specifications	I	On	Every 2500 feet of track	Contractor
	Ballast Compaction - Spot Checks	Per Specifications	C	On	On an as-needed basis	UTA
	Rail Train Inspections and Safety Cables	Per Specifications	C	Off	Prior to commencing with the work	Contractor
	Rail Train Brake Calculations	Per Specifications	C	On	At the time of laying and anchoring CWR adjusting the gap between rail ends	Contractor
	Rail Temperature	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Rail Vibration Equipment					

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
02467 Trackwork - Rail Handling, Plant Welding and Storage	Welding Procedure Qualification	Per Specifications	R	On	Prior to beginning of production welding on each machine	Testing Lab
	- Five Test Welds	Per ASTM E142	R	Either		Testing Lab
	- Radiographic Testing	Per ASTM E709	R	Either	Prior to beginning of production welding on each machine	Testing Lab
	- Magnetic Particle Testing	Per ASTM E10	R	Either		Testing Lab
	- Hardness Testing	Per Specifications	R	Off	Prior to beginning of production welding on each machine	Contractor
	- Testing Lab Program and Procedures	Per Specifications	R	Off	Prior to beginning of production welding on each machine	Contractor
	Welding Program and Schedules	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Qualification of Welders, Equipment and Previous Project	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	CWR Production	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Schedule of Track Removal	Per AREA	C	On	Prior to commencing with the work	Testing Lab
	Qualification of Independent Testing Lab	Per ASTM E709	C	On	30 days prior to commencing with the work	Testing Lab
	Visual Inspection	Per Specifications	C	On	Each weld	Testing Lab
	Magnetic Particle Testing	Per Specifications	C	On	Each weld	Contractor
	Straightedge Test	Per Specifications	C	Off	Each weld	Contractor
	Daily Weld Report				Every working shift of welding plant operations	
	Brush Recorder Charts				As required by the Engineer	
02469 Trackwork - Field Rail Welding	Procedure Specification	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Qualification of Test Welds - 6 Each	Per Specifications	R	On	Prior to commencing with the work	Contractor
	Qualification of Independent Testing Lab	Per Specifications	R	Off	Prior to commencing with the work	Contractor
		Per Specifications	R	Off	Prior to commencing with the work	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Qualification of Weld Testing Program	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Qualification of Material					
	Qualification Test Welds:	Per ASTM E10	R	Either	Prior to commencing with the work	Contractor
	- Hardness tests	Per Specifications	R	Either	Prior to commencing with the work	Contractor
	- Weld Inspection	Per ASTM E142	R	Either	Prior to commencing with the work	Contractor
	- Radiographic Testing	Per ASTM E164	R	Either	Prior to commencing with the work	Contractor
	- Ultrasonic Testing	Per ASTM E709	R	Either	Prior to commencing with the work	Contractor
	- Magnetic Particle Testing	Per Specifications	R	Either	Prior to commencing with the work	Contractor
	- Chemical Etch Test	Per Specifications	R	Either	Prior to commencing with the work	Contractor
	- Qualification of Welding Supervision	Per Specifications	C	On	Daily during field weld production	Contractor
	- Field Welding Record	Per Specifications	R	On	Prior to commencing with the work	Contractor
		Per ASTM E142	R	Either	Prior to commencing with the work	Contractor
	Qualification of Welding Crew:	Per ASTM E709	R	Either	Prior to commencing with the work	Contractor
	- Visual Inspection	Per ASTM E10	R	Either	Prior to commencing with the work	Contractor
	- Radiographic Testing	Per Specifications	I	On	14 days prior to the start of production welding by newly qualified crews	Contractor
	- Magnetic Particle Testing	Per Specifications	C	On	Each weld	
	- Hardness Testing	Per Specifications	C	On	Each weld	Contractor
	Qualification of Test Record	Per Specifications	C	On	Each weld	Contractor
	Visual Inspection of Weld Quality	Per ASTM E142	C	On	1) 100% of the first 10 mainline welds 2) 20% of the next fifty mainline welds 3) 10% of the remaining mainline welds	Contractor
	Alignment	Per ASTM E164	C	On	All mainline welds not subject to radiographic testing	Contractor
	Finishing	Per ASTM E709	C	On	All mainline yard field welds	Contractor
	Radiographic Testing					
	Ultrasonic Testing					
	Magnetic Particle					
02470 Trackwork - Special Trackwork	Qualification of Materials	Per Specifications	R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Installation Procedure for Glued Insulated Rail Joints	Per Specifications	R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	Test Results of Isolation Plate	Per Specifications	I,R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	Switch Heater	Per Specifications	A,R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	- Shop Drawings	Per Specifications	A,R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	- Layout	Per Specifications	A,R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	- Operations Procedure	Per Specifications	R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	Qualification of Rail End Hardening and Procedures	Per Specifications	R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	Qualifications of Independent Testing Laboratory for Rail End Hardening	Per Specifications	R	Off	Once at 30 days prior to incorporating the materials into the project	Contractor
	Color Coded Watch Marking for Relocated Special Trackwork	Per ASTM E10	R	On	For each weld	Contractor
	Rail End Hardness Test	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Cropping and Rail Replacement Procedure					
02482 Trackwork - Miscellaneous Trackwork Elements	Qualification of Insulated Joint Installation Procedures	Per Specifications	R	Off	Once at 30 days, prior to installation of first insulated joint	Contractor
	Installation Procedure for LRV Bumping Posts	Per Specifications	R	Off	Prior to commencing with the work	Contractor
		Per Specifications	R	Off	Prior to commencing with the work	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Work Plan for Existing Bumping Post Removal and Installation	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Work Plan for Sliding Derail Removal and Installation	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Work Plan for Split Switch Derails, Removal and Installation	Per Specifications	R	Off	Once at 30 days, prior to installation of first insulated joint	Contractor
	Qualification of Materials	Per Specifications	R	Off	Once at 30 days, prior to installation of first insulated joint	Contractor
	Qualification of Electrical Test Procedures and Equipment	Per Specifications	C	On	After installation of each insulated joint	Contractor
	Electrical Test					
02484 Timber Ballast Curbs	None					
02488 Ballast	Qualification of Independent Laboratory	Per Specifications	R	Off	Once at 30 days prior to commencing with the work	Contractor
	Qualification of Ballast Handling and Placing Plan	Per Specifications	R	Off	Once at 30 days prior to commencing with work.	Contractor
	Qualification of Ballast	Per Specifications; ASTM C117, C142, C131, C88, C127, D4791, C702, C29, C136; AREA	R	On	Once per each ledge or different quality of stone five days prior to production of ballast	Testing Lab
	Quality Control Testing	Per Specifications; ASTM C136, C17, C88; AREA and other test as required by the Engineer	C	On	Once every 1,000 cubic yards of ballast as required by the Engineer	Testing Lab
02510 Asphalt Concrete Pavement	Certification of Asphalt Products for the Job Mix Formula	Per Specifications	A, R	Off	30 days prior to producing mix for the project	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Job Control - Aggregate Gradation and Asphalt Content	Per Specifications	C	On	3 per 500 feet of each lift or days of production or each job	Contractor
	- Pavement Compaction and Thickness	Per Specifications	C	On	At random locations determined by the Engineer. Numbers of cores not exceeding one core per 100 sq. Yd. Of pavement or 2 cores per shift, whichever is greater. If deficient, three core samples as directed by the Engineer	Contractor
02512 Portland Cement Concrete Pavement	Qualification of Materials for Joint Sealant	Per Specifications	A, R	Off	14 days prior to placing concrete	Contractor
	Qualification of Joint Layout	Per Specifications	A, R	Off	14 days prior to placing concrete	Contractor
	Source Quality Control - Coarse & Fine Aggregate	ASTM C33 ASTM C566	C C	On On	Once per every five shifts Before batching is started	Contractor Contractor
	- Moisture Content	AASHTO T22, T23	C, I	On	One set of four cylinders per 100 Cubic Yards	Contractor
	Job Control - Compression Strength	ASTM C143	C	On	Same time and frequency as cylinders. Additionally test the first load of concrete delivered.	Contractor
	- Slump	ASTM C138	C	On	Same time and frequency as cylinders. Additionally test the first load of concrete delivered.	Contractor
	- Air Content	ASTM C138	C	On	Same time and frequency as cylinders	Contractor
	- Yield					
02580 Temporary Pavement Markings	None					
02581 Permanent Pavement Markings	Certification of Material Compliance	Per Specifications	A	Off	Until approved	Contractor
02633 Casings	Casing installation schedules	Per Specifications	A,R	Off	Prior to incorporating into the work	Contractor
	Material list of HDPE and steel casings and the type of casing insulators/spacers to be used.	Per Specifications	A,R	Off	Prior to incorporating into the work	Contractor
		Per Specifications	A,R	Off	Prior to incorporating into the work	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Certified affidavit of compliance					
02683 Disinfection of Water Distribution Systems	Qualification of Disinfection Plans and Procedures	Per Specifications	A, R	Off	Prior to testing	Contractor
	Bacterial Testing	Per Specifications	C	Off	After pressure testing and functional and performance testing of pipelines	Contractor
02685 Natural Gas Piping						
02710 Subdrainage Systems	<u>Certificates of Compliance for Materials</u> - Corrugated Polyethylene Tubing	ASTM F405 AASHTO M252	A, R	Off	Once prior to incorporation into the project	Contractor
	- Drain Rock Gradation	AASHTO T176	A, R	Off	Once prior to incorporation into the project	Contractor
	- Filter Fabric	Per Specification Section 02273	A, R	Off	Once prior to incorporation into the project	Contractor
	Trench Backfill and Compaction	Per Specification Section 02221	C	On	See Specification Section 02221	Contractor
	Field Inspection for Defects	Per Specifications	C	On	Before lowering into the trenches	Contractor
02810 Landscape Irrigation	Qualification of Materials	Per Specifications	R	Off	60 days prior to commencing with work	Contractor
	Point of Connection Pressure Test	Per Specifications	R	On	Prior to start on irrigation work	Contractor
	System Pressure Test	Per Specifications	C	On	All main supply lines prior to backfill	Contractor
	System Pressure Test	Per Specifications	C	On	All lateral lines prior to backfill	Contractor
	Operational Test	Per Specifications	C	On	Entire system after all construction is complete, including backfill	Contractor
02831 Fencing and Gates	Qualification of Materials	Per Specifications	A, R	Off	Once prior to incorporation into the project	Contractor
02845 Traffic Warning Systems	Test each system to verify proper operation	Per UDOT Specifications Section 830 and	I	On	After installation is complete	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
		manufactures operating parameters				
02846 Signing	None					
02850 Traffic Barriers	None					
02870 Site Furnishings	None					
02884 Mechanically Stabilized Earth (MSE) Retaining Walls	Qualification of Materials	Per Specifications	A, R	Off	Once prior to incorporating into the project	Contractor
	Certification of Applicator Licensing	Per Specifications	A, R	Off	Once prior to beginning work on the project	Contractor
	Backfill	Per Specification Section 02222	C	On	Per Specification Section 02222	Contractor
	Foundation Stabilization	Per Specification Section 02225	C	On	Per Specification Section 02225	Contractor
	Certificate of Compliance	Per Specifications	I	Off	Prior to Acceptance	Contractor
02910 Landscape Maintenance	Inspection of all Landscape Areas	Per Specifications	C	On	After 90 day warranty period	Contractor (with UTA representative)
02930 Grass Sodding	Inspection of all Landscape Areas	Per Specifications	C	On	Prior to Acceptance	Contractor (with UTA representative)
03100 Concrete Formwork	Approval of Formwork Working Drawings	Per ACI 347	A, R	Off	60 days prior to placing concrete	Contractor
03150 Concrete Flatwork	None					
03200 Concrete Reinforcement	Qualification of Materials and Bending Diagrams	Per Specifications	R	Off	Prior to Fabrication of Reinforcing	Contractor
	Certification of Welders and Welding Procedures	Per Specifications	R	Off	Until approved	Contractor
	Qualification of Epoxy Coating and Repair Materials	Per Specifications	R	Off	Prior to commencing with the work	Contractor
	Certification of Materials and Fabrication	Per Specifications	R	Off	Prior to material shipment to the job site	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Inspection of Coating for Damage	Per Specifications	C	On	Prior to placement of all coated rebar	Contractor
03300 Cast-In-Place Concrete	Qualification of Design Mix, Lab Test Results, and Manufacturer Certificates	Per Specifications	R	Off	Minimum 30 days prior to placing concrete	Contractor
	Certification of Compliance for Commercial Products	Per Specifications	R	Off	Minimum of 30 days prior to placing concrete	Contractor
	Qualification of Concrete Control Technician	Per Specifications	R	Off	Prior to commencing work on the project	Contractor
	Batch Tickets	Per Specifications	C	On	Provide tickets for all concrete delivered to the project	Contractor
	Inspection of Forms, Reinforcement and Embedded Items	Visual Inspection by QC Manager	C, I	On	Prior to all placement of reinforced structural concrete (Contractor must provide a certificate of compliance)	Contractor
	<u>Source Quality Control</u> - Concrete Aggregates	ASTM C33	C	Off	Once at start of production and every five shifts of producing concrete	Contractor
	- Fine Aggregate Moisture Content	ASTM C566	C	Off	Prior to batching and at any time there is a visible detectable change in moisture	Contractor
	- Coarse Aggregate Mixture Content	Visual Inspection	C	Off	The quality control technician shall be present during all concrete placements	Contractor
	Inspection of Concrete Placement	Visual Inspection	C, I	On	Unless specified elsewhere, minimum of 1 test per day when reinforced concrete is placed. Additionally, 1 test for each 100 CY of concrete placed in any 1 day or if there is discernible change in concrete. This applies to each class of concrete placed.	Contractor
	Concrete Compressive strength	ASTM C39 ASTM C31	C, I	On	Conduct an air test each time that test cylinders are made. Additionally, test the first load of concrete delivered.	Contractor
	Concrete Air Content	ASTM C138	C, I	On	Conduct a slump test each time that test cylinders are made. Additionally, test the first load of concrete delivered.	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Concrete Slump Test	ASTM C143	C, I	On	Conduct a yield test each time that test cylinders are made.	Contractor
03304 Portland Cement Concrete	Qualification of Design Mix, Lab Test Results, and Manufacturer Certificates	Per Specifications	R	Off	Minimum 30 days prior to placing concrete	Contractor
	Certification of Compliance for Commercial Products	Per Specifications	R	Off	Minimum of 30 days prior to placing concrete	Contractor
	Qualification of Concrete Control Technician	Per Specifications	R	Off	Prior to commencing work on the project	Contractor
	Batch Tickets	Per Specifications	C	On	Provide tickets for all concrete delivered to the project	Contractor
	Inspection of Forms, Reinforcement and Embedded Items	Visual Inspection by QC Manager	C, I	On	Prior to all placement of reinforced structural concrete (Contractor must provide a certificate of compliance)	Contractor
	<u>Source Quality Control</u> - Concrete Aggregates	ASTM C33	C	Off	Once at start of production and every five shifts of producing concrete	Contractor
	- Fine Aggregate Moisture Content	ASTM C566	C	Off	Prior to batching and at any time there is a visible detectable change in moisture	Contractor
	- Coarse Aggregate Mixture Content	Visual Inspection	C	Off	The quality control technician shall be present during all concrete placements	Contractor
	Inspection of Concrete Placement	Visual Inspection	C, I	On	Unless specified elsewhere, minimum of 1 test per day when reinforced concrete is placed. Additionally, 1 test for each 100 CY of concrete placed in any 1 day or if there is discernible change in concrete. This applies to each class of concrete placed.	Contractor
	Concrete Compressive strength	ASTM C39 ASTM C31	C, I	On	Conduct an air test each time that test cylinders are made. Additionally, test the first load of concrete delivered.	Contractor
	Concrete Air Content	ASTM C138	C, I	On	Conduct a slump test each time that test cylinders are made. Additionally, test the first load of concrete delivered.	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
	Concrete Slump Test	ASTM C143	C, I	On	Conduct a yield test each time that test cylinders are made.	Contractor
03310 Concrete Slope Protection	In accordance with Specification Sections 03300 and 03304					
03390 Concrete Curing	None					
03375 Flowable Fill	Certified Test Results	Per specifications	A	Off	7 days prior to placement	Contractor
03924 Structural Concrete Repair	Product data including material specifications, evidence of successful utilization for similar applications, confirmation of compatibility with other materials, and application procedures	Per specifications	A,R	Off	Prior to commencing work on the project	Contractor
	Applicator qualifications	Per specifications	A,R	Off	Prior to commencing work on the project	Contractor
	Certification from product manufacturers that applicator is sufficiently qualified to perform job.	Per specifications	A,R	Off	Prior to commencing work on the project	Contractor
	Applicators schedule of construction.	Per specifications	A,R	Off	Prior to commencing work on the project	Contractor
	Staging and screening plans					
05120 Structural Steel	Fabricator Certification	Per Specifications	A	Off	Prior to commencing with the work	Contractor
	Welder Qualifications	Per Specifications	A	Off	Prior to commencing with the work	Contractor
	Inspection, testing, qualification, quality control, procedures, and documentation	AREMA Chapter 15, Part 3.5	A,C,I,R	Off, On	Per Specifications	Contractor
05500 Walkway	None					
		Per Specifications	A,R	Off	Prior to start of work	Contractor

SECTION/TITLE	TEST DESCRIPTION	STANDARD PROCEDURE	TYPE	ON/OFF SITE	MINIMUM FREQUENCY	CONDUCTED BY
05830 Expansion Joint	Submit product data for each sealant material Material certifications	Per Specifications	A,R	Off	Prior to start of work	Contractor
07900 Joint Sealers	Advise From Technical Rep.	Site Visitation	C	On	Prior to start of work	Contractor
09900 Painting	Qualification of Color and Workmanship Verification of Paint Thickness	Visual Inspection to establish the expected standard Mil Gage	R, C C	On On	See Section 09900 See Section 09900	Contractor, UTA Contractor

09992 Structural Steel Repairs	Submit paint schedule, indicating products to be used at specific locations. Submit manufacturer's standard color charts showing paint colors to be used. Written Compliance Program Quality Control Plan and Work Plan Verification of Paint Thickness	Per specifications Per specifications Per specifications Per specifications Mil Gage	A,R A,R A,R A,R A,R	Off Off Off Off Off	Prior to commencing with the work Prior to commencing with the work Prior to commencing with the work Prior to commencing with the work See Section 09992	Contractor Contractor Contractor Contractor Contractor
16010 Electrical General Requirements	Testing as required by 16950					
16110 Raceways	None					
16116 Underground Ductbanks	Inspection	Visual inspection prior to placement of concrete encasement	R	On	All ductbanks before concrete pour	Contractor
16118 Vaults, Pull Boxes, Manholes, and Handholes	Inspection	Visual inspection prior to backfill of manholes	R	On	Prior to backfill placement	Contractor
16120 Wire and Cable	Inspection Testing as required by 16950	Visual inspection prior to installation	C	On	All cable and wire	Contractor
16136 Boxes	Qualification of Materials	Submit product sample of finish and verification	R	On	All conduits and supports	Contractor
16140 Receptacles	Tests each receptacle to verify circuiting and wiring	Per specifications	C	On		Contractor
16190 Raceway and Equipment Supports	None					
16450 Grounding	Weld Strength	Stick Weld with a two-pound hammer	C	On	All welds	Contractor

	Electrical Resistance of Ground Mat	Section 16950	C	On	All ground mats prior to backfill	Contractor
	Electrical Resistance of DC Ground	Section 16950	C	On	All DC grounding systems	Contractor
	Mechanical and Comparison Connector	Per Specifications	C	On	All proposed connectors	Contractor
	Inspection of Ground Systems	Visual Inspection	C	On	All grounding systems prior to backfilling or placing concrete over connections	Contractor
16740 Panelboards	Testing as required by Specification Section 16470 and 16950					
16510 Exterior Lighting	Test Luminaries	Check circuiting and switching per specifications and plans	C	On	All luminaries	Contractor
	Product Data	Per specifications	A,R	Off	Prior to commencing work	Contractor
16740 Overhead Contact System	Material Certifications	Per specifications	A,R	Off	Prior to commencing work	Contractor
	Testing and Inspection	Per specifications	A,R	On		Contractor
16750 Communication System	Testing as required by Specification Section 16950					
16755 Grade Crossing Warning Systems	Complete and full shop drawings, working drawings, parts catalogs and other data for approval including such literature as installation and operating instruction manuals, maintenance manuals and parts lists where applicable.	Per specifications	A,R	Off	Prior to Manufacture	Contractor
	Latest Revisions	Per specifications	A,R	Off	For each submittal.	Contractor
	Quantities: four printed copies plus two diskettes of computer program listings	Per specifications	A,R	Off	For each submittal.	Contractor
	Contract Deliverable Requirement List	Per specifications	A,R	Off	Monthly with the Contract Schedule.	Contractor
	Test Plan	Per specifications	A,R	Off	30 days prior to testing	Contractor

16760 Signal System	Complete and full shop drawings, working drawings, parts catalogs and other data for approval including such literature as installation and operating instruction manuals, maintenance manuals and parts lists where applicable.	Per specifications	A,R	Off	Prior to Manufacture	Contractor
	Latest Revisions	Per specifications	A,R	Off	For each submittal.	Contractor
	Quantities: four printed copies plus two diskettes of computer program listings	Per specifications	A,R	Off	For each submittal.	Contractor
	Contract Deliverable Requirement List	Per specifications	A,R	Off	Monthly with the Contract Schedule.	Contractor
	Test Plan	Per specifications	A,R	Off	30 days prior to testing	Contractor
16950 Testing	Test reports	Per specifications	C	On	Within 14 days after completion of each test.	Contractor
	Qualifications of testing company or agency	Per specifications	A,R	Off	Prior to commencing with the work	Contractor
	Detailed written description of the proposed testing plan for preliminary approval by the Engineer	Per specifications	A,R	Off	Prior to commencing with the work	Contractor
	List of instruments to be used for the electrical testing. The list shall include the manufacturer's name, model number, serial number and calibration certificate for each instrument	Per specifications	A,R	Off	Prior to commencing with the work	Contractor
	Test data sheet showing the proposed format for test data documentation	Per specifications	A,R	Off	Prior to commencing with the work	Contractor