
3.0 Quality Management

The Contractor shall develop a Quality Management Plan (QMP) that documents the Contractor's commitment to quality and all quality requirements of the Contract. The QMP shall include the Contractor's quality policy and approach for Quality Control, Quality Assurance during design, Quality Assurance interface during construction, quality improvement, assignment of quality personnel and resources, and training of the associated Quality Management Systems (QMSs). The Contractor shall submit the QMP for design related Work to CDOT for Approval prior to issuance of NTP1. The entire QMP for all remaining Work on the Project must have CDOT's Approval before NTP2 will be issued. The Contractor shall fully implement the Approved QMP. Any subsequent addendums, required during execution of the Work, shall also require CDOT's Approval.

During Design the Contractor shall be responsible for all Quality Control and Quality Assurance activities for the Project. CDOT will perform Verification, by assessment, of the Contractor's Work for conformance to requirements of the Contract.

During Construction the Contractor shall be responsible for all Quality Control activities for the Project. CDOT will perform Quality Assurance and Verification, by assessment, testing, and inspection of the Contractor's Work for conformance to requirements of the Contract.

The Contractor shall provide a Colorado Registered Professional Engineer in responsible charge of overall quality for the Project.

3.1 Administrative Requirements

3.1.1 Quality Policy

The QMP shall include the Contractor's executive management written definition and endorsement of the Contractor's policy for quality, including objectives and its commitment to quality. The QMP shall delineate procedures used by the Contractor's executive management to implement the Contractor's quality policy. The Contractor's executive management shall ensure that its policy is implemented at all levels of the Project.

The Contractor shall publish and post a statement of its commitment to quality, and the organization's quality objectives, in several locations throughout the Project. The statement shall explain the Contractor's commitment to quality and the responsibility the Contractor has for assuring that it meets the quality requirements for the Project.

The quality policy statement shall be made known to and understood by all Contractor employees, Subconsultants, Subcontractors, and Suppliers. The Contractor shall conduct a formal indoctrination program for all Contractor employees, Subconsultants, Subcontractors, and Suppliers on its quality policy and the QMP.

3.1.2 Quality Planning

The Contractor's QMP shall use industry standard inspection procedures, as well as those outlined in CDOT's Construction Manual, Field Materials Manual, and Standard Specifications.

An examination of the quality of workmanship shall also be conducted to confirm that all Work is being performed in accordance with all Contract requirements. Appropriate follow-up

inspections, sampling, and testing of Materials shall be performed as each item of Work progresses to assure consistency in workmanship, compliance with Contract requirements, (including Design and Construction Documents), and satisfactory performance of the Work in service.

The Contractor shall include in the QMP its planning methods to meet the requirements of the Contract. The Contractor shall include the following activities, at a minimum, in its quality planning efforts to ensure conformance to Contract requirements:

1. Define and develop quality objectives and associated QMSs for the Project.
2. Identify the necessary processes, resources, and Contractor Quality Assurance personnel that are needed to assure the Work meets the requirements of the Contract.
3. Provide methods to ensure the compatibility of design, construction, inspection, and testing procedures.
4. Include procedures to develop and maintain the currency of Quality Control, Quality Assurance, and quality improvement.
5. Identify and define all measurable Contract requirements.
6. Identify construction Quality Assurance hold points for CDOT Quality Assurance testing, inspection, and Verification responsibilities.
7. Identify, define, and implement standards of workmanship for all applicable Work features (e.g., concrete finishing).
8. Identify, define, prepare, and maintain quality records and quality plans.
9. Develop procedures for preparation, control, Approval, and distribution of the QMP.
10. Develop procedures for internal Quality Assurance (auditing) to ensure the Contractor employees, Subconsultants, Subcontractors, and Suppliers understand and are effectively implementing the QMP. The Contractor, as a minimum, shall audit their implementation of the QMP on a quarterly basis.
11. Develop procedures for preventive and corrective measures regarding quality compliance and to address procedures to be taken for Nonconforming Work.
12. Identify the process to ensure the Contractor's executive management reviews implementation of QMP associated QMSs at planned intervals to ensure their continued suitability, adequacy, and effectiveness. Such reviews should include Quality Control results, CDOT's Quality Assurance results, status of corrective/preventive actions, follow-up items from previous executive management reviews, changes to the QMP and associated QMSs, and a summary of positive results with recommendations for any needed improvements.
13. The QMP shall include QC checklists. The QC checklists shall be developed and maintained by the Contractor at the Project Site and organized for execution of each WBS Activities (III, IV, V, VI & VII) and all other associated Contract requirements. The QC checklists shall be available for CDOT personnel review at all times. Unmaintained or not up-to-date QC checklists will constitute immediate Nonconforming Work. Work shall not proceed until the QC checklist is updated and made compliant to the requirements herein. The Contractor shall use current CDOT forms, manuals and handbooks to develop QC checklists.

3.1.3 Quality Control

The Contractor shall be responsible to establish, document, and implement a Quality Control Plan. The Quality Control Plan shall include all procedures necessary for the Contractor to

control the quality of its production processes to meet the requirements of the Contract. The Contractor shall develop a testing and inspection schedule to control the production processes.

Tests or inspections performed by production or Quality Control personnel as part of the Quality Control Plan shall not be used to satisfy the Quality Assurance requirements. All QC personnel shall be capable of performing all tests (both in the field and in the lab), have the necessary personnel to respond to the workload, and provide the equipment/facilities to perform all tests. All testing personnel need to be certified and the labs need to be certified and on the AMRL accredited list.

3.1.4 Quality Control Plan Requirements

The Contractor shall develop a Quality Control Plan (QCP) to illustrate the Contractor's quality process and provide any supplemental descriptions needed to clarify the Contractor's quality process. This shall include the Contractor's approach to: Design Quality Control, Design Quality Assurance, Construction Quality Control, the interface with CDOT Construction Quality Assurance, the interface with Design issues and changes, show the lines of authority, and effective team communications. The QCP shall illustrate the process for meeting all requirements of the Contract Documents. The Project Quality Manager (PQM) shall educate the Contractor, CDOT and Outside Agency personnel in the quality processes outlined in the QCP in a training session early in the project so all parties can collaborate and understand roles and responsibilities effectively. The QCP should not exceed 15 pages. At a minimum the QCP will address the following:

1. The Contractor's Organization Chart
The Contractor's Organization Chart shall illustrate: lines of authority, lines of communication, interface positions with CDOT, and any Outside Agency's
2. Process Diagrams for:
 - A. Design
 - i. Quality Control
 - ii. Quality Assurance
 - iii. Design Review
 - iv. Released for Construction Documents (RFC)
 - a. Traffic Control Plans (TCP)
 - b. Stormwater Management Plans (SWMP)
 - v. Final Design Documents
 - vi. As-Built Documents
 - B. Construction
 - i. Quality Control
 - a. Product Data Control
 - ii. Quality Assurance Interface
 - iii. Design Interface
 - a. Request For Information (RFI)
 - b. Field Design Changes (FDC)
 - c. Methods of Handling Traffic (MHT)
 - d. Public Information (PI)
 - e. SWMP/MS4/Materials Management Plan Compliance
 - f. Non-Conformance Resolution
 - g. Punch List Resolution
 - h. Substantial Completion
 - i. Final Acceptance

The Contractor's Process Diagrams will illustrate the processes with a flow chart style depiction, and should minimize the written descriptions as much as possible.

As changes are made to the Contractor's Organization Chart or Process Diagrams updates shall be provided within five (5) Days to CDOT for Approval.

3.1.5 Quality Assurance

The Contractor shall be responsible to establish, document, and implement a Design Quality Assurance program. The Contractor shall include in the QMP the Design Quality Assurance methods and procedures by which the Work will be certified by the Contractor as complying with the requirements of the Contract.

Contractor Design Quality Assurance personnel shall not participate in any Quality Control activities and shall be independent of the Quality Control personnel.

The Contractor shall identify in the QMP all necessary resources and personnel to perform all Design Quality Assurance activities required to ensure all Work meets the requirements of the Contract. The QMP shall identify the construction Quality Assurance hold points for CDOT. Quality Assurance testing and inspection and shall describe how the Contractor will notify CDOT so that it may have the opportunity to perform its Assurance and Acceptance responsibilities.

3.1.6 Quality Improvement

The Contractor shall be responsible to establish, document, and implement a program for quality improvement. The Contractor shall include in the QMP the methods for identifying, analyzing, evaluating, and implementing solutions to continuously improve quality. The QMP shall establish and maintain specific procedures to ensure a successful quality improvement program.

The QMP shall establish and maintain documented procedures for planning and implementing Contractor quality audits to measure the effectiveness of the QMP and identify quality improvement opportunities. The Contractor shall schedule and perform internal quality audits on the basis of the status and importance of the activity to be audited.

Personnel that are assigned to audit Work activities shall not have direct quality responsibilities for the respective activities they audit. The results of the audits shall be recorded and reviewed with the personnel having responsibility in the area audited not later than 3 Working Days following completion of the audit.

The Contractor's project management personnel shall ensure timely implementation of the necessary corrective actions to improve any deficiencies found during the audit. The Contractor's follow-up activities shall ensure the implementation and effectiveness of the corrective action taken. Corrective actions shall identify the root causes of deficiencies and shall be developed, implemented, and tracked to prevent the recurrence of future deficiencies. Corrective actions shall be monitored through review of documents, surveillance, or follow-up audits. Records of corrective actions shall be kept together with the respective audit records and submitted to CDOT upon request.

Additionally, the Contractor shall consider CDOT's Assurance efforts to determine where Contractor quality improvement audits shall be performed and potential corrective actions implemented.

3.1.7 Quality Personnel

The Contractor's executive management shall have overall responsibility for successful execution of the QMP and shall ensure that responsibilities and authority are defined and communicated within their organization. The Contractor shall designate a Project Quality Manager (PQM), who shall provide all final checks, approvals, and certifications for quality. The PQM shall have responsibility for the success of the Contractor's quality program, and shall ensure that authority and responsibilities are defined in the QCP and communicated within their organization.

The Contractor shall identify a Design Quality Assurance manager that reports directly to executive management and shall be responsible for all Design Quality Assurance activities for the Project. The Design Quality Assurance Manager cannot be the same individual as the Design Quality Manager. Additionally, the Design Quality Assurance Manager shall ensure design intent is consistent with completed construction. This may require additional oversight and staffing of separate individuals for these associated Quality Assurance activities for the Project.

The Contractor shall identify a Design Quality Manager (DQM) for all design activities, who shall review and approve all design submittals required by CDOT before such submittal, and a Construction Quality Manager (CQM) for all construction activities, who shall certify all construction quality control elements. The Contractor's Project Quality Manager (PQM) shall develop and document procedures, instructions, and process controls to ensure the Work being produced by the Contractor meets the requirements of the Contract. The Project Quality Manager shall review and approve the QMP, and any revisions, prior to submittal for CDOT's Approval. The Project Quality Manager shall be responsible for assuring, certifying, and providing documented evidence that the Work meets the requirements of the Contract. At a minimum, the Project Quality Manager shall provide monthly status reports of the Project's quality to CDOT.

Contractor construction Quality Control testing personnel performing concrete and hot mix asphalt (HMA) process control tests shall meet the standards established in Section CP-10 of the CDOT Field Materials Manual.

The Contractor shall ensure that personnel performing Work shall have the education, training, skills, and experience to meet the requirements of the Contract. The Contractor shall maintain appropriate personnel records that may be examined by CDOT upon request. Additionally, all testing and lab facilities and equipment need to be maintained in condition suitable for continued certification and in conformance with the AMRL accredited list requirements.

3.1.8 Training

The Contractor shall establish and maintain documented procedures for identifying training needs and requirements and shall provide training of all personnel performing activities affecting quality. Personnel performing specific assigned tasks affecting quality shall be trained in the specific plans, processes, and procedures as assigned in the QMP (e.g., Contractor auditing procedures, etc.).

The Contractor shall provide training to all personnel that may interface with CDOT's Design Verification and Construction Quality Assurance efforts to ensure it understands its roles and responsibilities for cooperating and responding to CDOT activities.

3.2 Quality Management Plan Requirements

The QMP shall state the Contractor's commitment to quality and provide a clear definition of the scope of activities and detail the methods to ensure the Work meets the requirements of the Contract.

The QMP shall list all deliverables to CDOT as required by the Contract.

3.2.1 Contractor Responsibility to Respond to Nonconformance Notices

For Verification purposes, CDOT will perform assessments, inspections or testing of the Work, independent of the Quality Assurance inspections and testing of materials, to verify design and accept work and materials. These efforts do not relieve the Contractor of responsibility for all Work completed on the Project.

CDOT will forward all assessment, Quality Assurance testing and inspection reports, including notices of Nonconforming Work (if any) to the Contractor. Notices of Nonconforming Work will be issued as a Nonconforming Work Notice (NWN) and identified further by its level of importance (level 1 or 2) with Level 1 being of the highest importance. The Contractor shall respond in writing to CDOT NWNs within 3 Working Days of issuance.

The Contractor's response shall identify how it proposes to remedy the Work identified as Nonconforming Work and the date by which the remedy shall be completed. The Contractor shall describe in the QMP its approach and methodology for resolving and responding to CDOT's NWNs. Remedies shall also consider rejection, removal and replacement of Nonconforming Work according to requirements in Book 1.

3.2.2 Responsibility and Authority

The Contractor shall include in the QMP an organizational chart that illustrates a commitment to an effective quality program to ensure all Work meets the requirements of the Contract. The QMP shall describe the hierarchy of the Contractor's organization. The QMP shall graphically depict the principal quality participants showing lines of responsibility, authority, stop work authority, and communication with CDOT, other involved agencies, Subconsultants, Subcontractors, and Suppliers and any other team members having a significant quality role. The Design Quality Assurance Manager shall be shown on the organization chart to report to the Contractor's executive management and be independent of the Contractor's Project Manager. The organization charts shall be updated and distributed to CDOT when any changes to the organization are made.

The QMP shall describe the roles and responsibilities of the Contractor's Quality Control and Assurance managers, associated staff, and shall describe their authority to implement quality improvements for the Project.

The Contractor's Quality Control/Assurance managers and staff shall have no responsibilities in the production of the Work. The Quality Control/Assurance managers and staff shall have the authority to stop Work that does not comply with requirements of the Contract.

The responsibilities of all personnel who manage, perform, and ensure the quality of the Work include:

1. Initiate action to prevent the occurrence of Nonconforming Work.
2. Identify, evaluate, and document quality problems.
3. Recommend or initiate quality improvement solutions through established organizational channels.
4. Educate personnel and promote the QMP Plan
5. Ensure the implementation of quality improvement solutions.
6. When Nonconforming Work is identified, stop incorporating Work that is affected by the Nonconforming Work into the Project until the deficiency is corrected.

The Contractor's Quality Control and Design Quality Assurance managers shall have the following responsibilities defined in the QMP:

1. Facilitate compliance of Work with the requirements of the Contract and the QMP.
2. Approve Contractor quality processes and procedures.
3. Provide adequate resources and trained personnel for Quality Control and Design Quality Assurance Activities.
4. Ensure the adequacy and enforcement of quality procedures, processes, inspections, and tests for all Work.
5. Establish and implement procedures to control and ensure the Work performed by Contractor employees, Subconsultants, Subcontractors, and Suppliers meet the requirements of the Contract.
6. Ensure the QMP is being implemented and report in writing regularly to the Contractor's executive management regarding the status of the implementation of the QMP.
7. Ensure that quality records are properly prepared, completed, maintained, and delivered to CDOT, as required by the Contract, to provide evidence of quality activities performed and quality results achieved.
8. Ensure that Design Quality Assurance manager and staff are independent of the Contractor's Project Manager, and regularly reports to the Contractor's executive management.
9. Continually promote awareness of the requirements of the Contract throughout the Contractor's entire project organization.

3.3 Design/Construction Quality Processes and Procedures

The QMP shall establish the Contractor's procedures for procuring design/construction services to complete the Work for the Project. The procedures shall include a review and approval process by the Contractor's organization for adequacy of specified technical requirements and adherence to quality requirements. Documentation shall be provided that contains data clearly describing the services needed and measures to be taken to ensure that Contractor employees, Subconsultants, Subcontractors, and Suppliers meet, implement, document, and maintain the QMP requirements.

3.3.1 Design Quality

The QMP shall include procedures that address all Work elements of design. The Contractor shall identify in the QMP all applicable computer programs to develop and check designs.

The QMP shall describe how the design team schedules the design efforts, including task force meetings, design reviews, constructability reviews, design meetings, independent design checks, and a schedule for Released for Construction and As-Built Documents.

The Contractor shall identify in the QMP the requirements for QC design input. The Contractor shall perform ongoing Design QA audits of these QC design input requirements. The Contractor shall maintain an accessible, centrally controlled design manual, database, or list that contains all relevant QC design inputs to be used by design personnel for the Project. The Contractor shall provide a process in the QMP to ensure that the QC design inputs are communicated to and are accessible by the relevant designers responsible for the design. The Contractor shall include in the QMP how changes to QC design inputs are identified, reviewed, and approved by authorized personnel prior to their implementation.

The QMP shall also include:

1. Procedures to control and independently ensure that the design meets the requirements of the Contract.
2. Procedures to identify and track Design Document deliverables.
3. Procedures for approval, tracking and recording revisions to Design Documents.
4. The Contractor shall have a formal procedure for comment resolution included in the QMP.
5. Procedures for approval of Released for Construction Document

The Contractor shall conduct weekly task force meetings to coordinate the design development within the Contractor's organizations, CDOT and other affected agencies. As a minimum, the Contractor shall prepare an agenda and conduct each meeting to discuss the status of the design, coordinate the design development between design disciplines, discuss constructability issues, and identify any questions associated with design requirements. The Contractor shall take meeting minutes for all task force meetings and provide minutes to CDOT for Acceptance within 2 Working Days after each meeting.

The Contractor shall hold design progress review meetings at certain key milestones of the design development process (e.g., 30%, 60%, 90% completion) and coordinate with CDOT to attend. The design progress meetings shall be scheduled, conducted, and documented by the Contractor. The meetings minutes shall be taken by the Contractor and submitted to CDOT for Acceptance within 5 Working Days after each meeting.

Released for Construction Documents, and revisions to these documents, shall be coordinated to include a schedule of items, approximate quantities to be incorporated into the project, and a reference to the method of acceptance required by CDOT. This information shall give testing quantities, frequencies and Quality Assurance inspection hold points in conformance to requirements of the Contract. The Project Quality Manager shall approve these documents prior to their release for construction. One hard copy and an electronic file of the documents shall be submitted to CDOT prior to the Contractor beginning construction. The Contractor's Quality Control process for the documents shall be thoroughly documented in the Contractor's QMP. Released for Construction Documents for structures shall conform to the requirements of Section 15 – Structures.

As-Built Documents shall be submitted to CDOT for Acceptance. CDOT may assess As-Built Documents to ensure completeness and compliance with the requirements of the Contract. CDOT shall not Accept As-Built Documents until the Contractor has adequately addressed any prior Contractor QC reviews, QA audits or CDOT assurance/testing. The Contractor shall ensure and provide documentation to CDOT that all have been addressed. The Acceptance of As-Built Documents does not constitute Final Acceptance or Partial Acceptance of work and the Project. The As-Built Documents submittal shall include:

1. All plans reflecting Released for Construction Documents or any revisions to Released for Construction Documents
2. Resolution of prior Contractor QC reviews, QA audits or CDOT assessments/testing
3. Design calculations
4. Design reports
5. Specifications
6. Electronic CADD files, as specified elsewhere in the Contract

The Contractor shall include in the QMP a process for a Colorado Registered Professional Engineer in responsible charge for the design to prepare, review, and approve all Released for Construction Documents, revisions to Released for Construction Documents, field design changes and As-Built Documents. The Contractor shall maintain a master list of approved submittals, revisions and field design changes. The QMP shall include a process to communicate design changes to the construction Site on a timely basis consistent with the progress of construction activities.

3.3.2 Design Quality Assurance

In the Quality Control Plan (QCP) the Contractor shall illustrate the process to certify the Work as compliant with the requirements of the Contract Documents. The Contractor shall collaborate with CDOT during the design process to ensure the appropriate product is produced and requirements are met. During construction the Project Quality Manager (PQM) will ensure that Release for Construction (RFC), Traffic Control Plans (TCP), Method of Handling Traffic (MHT), Request for Information (RFI), Stormwater Management Plans (SWMP), and Public Information (PI) release documents are compliant with the requirements of the Contract Documents.

The QCP shall include the process to address applicable elements of design including, civil, structural, geotechnical, survey, hydraulic, environmental, traffic, safety, public information, and temporary work. The Contractor shall identify in the QCP all applicable computer programs to develop and check designs. The QCP shall illustrate the design effort, including design reviews, constructability reviews, design meetings, independent design checks, and a basic schedule for RFC and Final Design Documents.

The Contractor shall identify in the QCP design input requirements. The Contractor shall illustrate how changes to design inputs are identified, reviewed, and approved by authorized personnel prior to their implementation.

The Design Process Diagram shall also include:

1. Process to control and independently ensure that the design meets the requirements of the Contract Documents, including provisions for sub-consultant's designs
2. Process for approval of RFC Documents and revision control
3. Process to identify and track Design Document deliverables
4. Process to identify, record, and track Field Design Changes (FDC), and RFI responses

5. Process to deliver Final Design Documents and As-Built Documents that include all RFC Documents

3.3.3 Design Quality Program

The Contractor's design quality program shall include:

1. Design Progress Meetings: The Contractor shall conduct meetings to coordinate the design development within the Contractor's organizations, CDOT, and other affected agencies. At a minimum, the Contractor shall prepare an agenda and conduct each meeting to discuss the status of the design, coordinate the design development between design disciplines, discuss constructability issues, and identify any questions associated with design requirements. The Contractor shall take meeting minutes and provide meeting minutes to CDOT for Acceptance within two (2) Working Days after the meeting.
2. Released for Construction (RFC) Documents: RFC Documents allow the Contractor to initiate construction in advance of Acceptance of the Final Design Documents by CDOT. The RFC Documents shall include all plans, quantities, method statements, and schedule required to complete a given portion of Work. The RFC plans shall be signed and stamped by the Contractor's Engineer. The RFC Documents shall be printed on yellow paper so that they are easily identified in the field. The schedule shall include: submittal date, planned construction start date, inspection hold points, and planned duration. Failure to provide RFC Documents that comply with the Contract in a timely manner will be cause for the Contractor not being permitted to work on that portion of the project until a proper submittal is made. All schedule delays due to incomplete RFC Documents shall be the responsibility of the Contractor. The Contractor's Project Quality Manager (PQM) shall approve RFC Documents prior to submittal to CDOT. RFC Documents shall be submitted to the CDOT Project Manager for Acceptance a minimum of two (2) weeks before planned construction. A schedule of items, approximate quantities to be incorporated into the project, and a reference to the method of acceptance required by CDOT, and Quality Assurance inspection hold points shall be submitted with each of the RFC Documents. This information is to include the item of work with its placement location and dates. The Contractor shall immediately notify the CDOT Project Manager, in writing, if the items of work or quantities are revised. Written Acceptance of the RFC Documents must be received from CDOT before the Work begins on that portion of the RFC.
3. The Contractor shall include in the QCP a process for the Engineer responsible for the design to prepare, review, approve, and seal (if required) all changes, including Field Design Changes (FDC), and Request for Information (RFI) responses. FDC and RFI responses must meet the requirements of RFC documents; however, the submittal timeline shall be as soon as possible, but not more than 10 working Days.
4. Final Design Documents: The Contractor shall submit signed and stamped Final Design Documents to the CDOT Project Manager for Acceptance. CDOT shall not Accept the Final Design Documents until the Contractor has completed all design and has addressed, resolved, and incorporated, to the satisfaction of CDOT, any prior Contractor, CDOT, or Outside Agency Acceptance Review comments. The PQM shall ensure and provide documentation to CDOT that all review comments have been addressed.

5. As-Built Documents: As-Built Documents shall be stamped by the Contractor's Engineer and submitted to the CDOT Project Manager for Acceptance. CDOT may audit As-Built Documents to ensure completeness and compliance with the requirements of the Contract Documents.

The Contractor shall maintain a master list of Approved design changes. The QCP shall include a process to communicate design changes to the construction site on a timely basis consistent with the progress of construction Activities.

3.3.4 Construction Quality

The Contractor shall be responsible for performing and documenting all required construction Quality Control activities necessary to control the Work. The QMP shall extend to both permanent and temporary Work (erosion control, traffic control, etc.). Records of inspection and testing activities shall be submitted to a CDOT. Materials test reports will also require analysis and comparison to CDOT Assurance Test results.

As a minimum, the Contractor's Construction Quality Control Program shall include the elements defined below:

1. Inspection: CDOT shall conduct inspections. The Contractor shall document whether the inspections passed or failed based on the "pass/fail criteria" established in the procedure and the requirements of the Contract; (e.g., concrete depth checks on deck pours, rebar clearance/size, locations, elevations, stationing etc.). The Contractor shall include failing inspection results, when applicable, in the inspection documentation.
2. Certificates of Compliance (COCs) / Certified Testing Results (CTRs): The Contractor shall include in the QMP a method of handling and documenting Work/products accepted in the Work by COC or CTR. The Contractor shall obtain and submit to CDOT COCs / CTRs prior to incorporation in the Work and before inclusion on the monthly invoice, and maintain a complete log of all COCs and CTRs. The log and all COCs / CTRs shall be available for CDOT's Verification at any time. The Contractor shall include in the COC/CTR log, signed certification that all Materials represented by each COC/CTR was installed in the Work. The Contractor shall submit a Buy America Certification with each monthly invoice. Certification shall be according to requirements of the Contract.
3. Quality Reviews: The Project Quality Manager shall document formal reviews to verify that the QMP is being effectively implemented.

3.3.5 Reporting and Record-Keeping of Construction Quality Control Documentation

The Contractor shall maintain construction workmanship and materials quality records of all CDOT inspections and tests performed per the QMP. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of Nonconforming Work and causes for rejection, etc.; proposed remedial action; and corrective actions taken. These records shall cover both conforming and nonconforming Work, and shall include a statement that all supplies and materials incorporated in the Work are in full compliance with the Contract Documents.

The Project Quality Manager shall ensure that quality records are properly prepared, completed, maintained, and delivered to CDOT at a minimum on a monthly basis or as required by the Contract, to provide evidence of quality activities performed and quality results achieved. No invoice shall be approved nor payment made until the quality records have been received by CDOT.

The Contractor shall submit all Quality Control test measurements and test results, including failing results, and inspection records. The Contractor shall submit test data and approved test results to CDOT. The responsible technician and the technician's supervisor shall sign the daily test reports.

The Project Quality Manager shall also maintain a daily log of all inspections performed for both Contractor and Subcontractor operations. The daily inspection reports shall identify inspections conducted, dates of inspections, results of inspections, locations and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed. The responsible technician and the technician's supervisor shall sign the daily inspection reports. These daily inspection reports shall document the day's events, activities, and discussions in a format consistent with the requirements contained within the CDOT 2014 Field Materials Manual and CDOT Construction Manual.

To enhance coordination of CDOT's Quality Assurance and Verification activities during construction, the Contractor shall provide CDOT with a weekly look-ahead of specific scheduled construction activities designating location and planned quantities of materials to be placed, and protocols for identifying completed Work. The Contractor shall provide CDOT with the actual construction activities conducted during the previous week, designating location and quantities of materials that were placed.

3.4 Nonconforming Work

The Contractor shall include in the QMP procedures to develop and maintain a system to prevent, identify, control, remedy and report Nonconforming Work, including Nonconforming Work identified by CDOT. The QMP shall include procedures to identify Nonconforming Work and to withhold progress payment requests on the monthly Invoice until the Nonconforming Work is remedied. The Contractor shall remedy Nonconforming Work in accordance with the QMP. The responsibility for review and for the disposition of Nonconforming Work shall be established in the QMP. The Contractor shall identify Nonconforming Work by completing a Nonconformance Report (NCR). A NCR shall include:

1. Identification of Nonconforming Work, including tagging Work products
2. Evaluation of the Nonconforming Work
3. Recommendation for "repair" or "use as is" dispositions
4. Cause of Nonconforming Work
5. Proposed corrective action to prevent recurrence
6. Responsibility for accomplishing corrective action
7. Schedule of Work with a date of remedy completion
8. Signature lines for the Project Quality Manager and CDOT verifying that the Nonconforming Work recommended remedy has been completed in accordance with the approved disposition

Nonconforming Work identified by CDOT shall be conveyed by either a CDOT Form 105 Speed Memo, an Assessment Report, or verbally if a resolution can be achieved within 48 hours to conform to the Contract.

The Contractor's Engineer shall approve the recommended remedy for the Nonconforming Work prior to its submittal to CDOT. The Contractor shall not perform the recommended remedy prior to its submittal to CDOT for "repair" or "use as is" dispositions.

The Contractor shall develop and maintain a Nonconforming Work log to track and identify the status of Nonconforming Work. An updated log shall be submitted to CDOT weekly and shall be used by the Contractor to look for Nonconforming work trends to determine if corrective actions are needed.

All NCRs shall be recorded by the Contractor and provided to CDOT.

The Contractor shall include in the QMP procedures for controlling the use of Nonconforming Work including the tagging of Nonconforming Work products. Nonconforming Work product tags shall only be removed by the originator of the NCR or the originator's supervisor, and only when the Contractor demonstrates to CDOT that the Nonconforming Work product meets the requirements of the Contract.

3.4.1 Corrective and Preventative Action

The QMP shall describe corrective and preventative action procedures that the Contractor shall use to identify and improve processes that produce, or may produce, systemic Nonconforming Work identified by the Contractor or by CDOT. The Contractor's corrective and preventative action procedures shall include:

1. Methods to investigate the cause of systemic Nonconforming Work and to determine what corrective action is needed to prevent recurrence
2. Methods to analyze all processes, Work operations, quality records, service reports, and CDOT assessments/testing to detect and eliminate the possibility of systemic Nonconforming Work from occurring
3. Methods to prioritize corrective and preventive action efforts based upon the level of risk to the quality of the Work
4. Controls to ensure that effective corrective and preventative actions are taken when the need is identified
5. Methods to implement and record changes in procedures resulting from corrective and preventative actions

3.4.2 Punch List Work

The Contractor shall develop a Punch List and Punch List log as required in the Contract. The Punch List and Punch List log shall be completed by Quality Control and Quality Assurance personnel. CDOT, including CDOT Maintenance, and other affected agencies shall be invited by the Contractor to attend walks of the Work to include items on the Punch List. The Contractor Punch List and Punch List log shall be provided to CDOT.

3.5 CDOT Owner Quality Assurance and Verification Reviews

3.5.1 CDOT Construction Quality Assurance

CDOT will provide the construction acceptance testing and inspections on the Project. All payments for items accepted on the Project shall be based on current CDOT testing and inspection procedures. Minimum sampling and testing frequencies of the product will be based on the CDOT Field Materials Manual, Book 2, Section 19 – Modifications to Standard Special Provisions, and Book 2, Section 20 - Project Special Provisions in effect at the time of Final Request for Proposals (RFP).

The Contractor shall ensure the compatibility and integration of design, construction, installation, traffic management, and public information with CDOT's inspection and testing procedures.

Materials accepted on the basis of a Certificate of Compliance (COC) or Certified Test Result (CTR) may be sampled, inspected, and tested by CDOT at any time.

The Contractor shall follow CDOT's July 21, 2010 on Buy America. Buy America Certifications shall be submitted for Acceptance with Monthly Invoices.

Within thirty (30) Days of the completion of the Work, the Contractor shall furnish CDOT with a completed CDOT Form #250 – Materials Documentation Record, listing items utilized to construct the Project and the approximate quantity of each item, for Acceptance.

CDOT's Owner Verification will use a sampling approach to assess the Contractor's compliance with the requirements of the Contract Documents. CDOT reviews of sampled Work for Contract compliance are defined as Verification reviews. The four types of CDOT Verification reviews are:

1. Design Verification reviews: Design Verification reviews will be performed on the products of design (drawings, specifications, and other design deliverables). Design Verification reviews are performed on an ongoing basis during the Project.
2. Construction Verification Inspections: Construction Verification Inspections will be performed on construction activities.
3. Construction Acceptance Testing: CDOT will perform Quality Assurance sampling and testing of Materials to determine acceptance and payment.
4. Process assessment: Process assessments will be performed on the implementation of all Contractor Work activities. Such activities may include the requirements of the Contract, such as public information, Maintenance of Traffic, environmental compliance, safety, project management processes, and meeting the requirements of the QMP.

Verification reviews will entail the collection and documentation of objective evidence to determine whether the requirements of the Contract have been met. The results of CDOT Verification reviews will be recorded by CDOT.

3.5.2 CDOT Independent Assurance

CDOT will perform independent assurance reviews and tests to ensure that:

1. CDOT Quality Assurance personnel are trained, certified and demonstrate that they understand the test procedures they are performing.
2. The test equipment used by the CDOT Quality Assurance personnel is calibrated.

3. Split sample test results correlate.
4. The facilities used are AMRL certified

Independent assurance test results will also be used as referee tests to assess statistically significant differences, determined by CDOT in its sole discretion, between Contractor Quality Control tests and the CDOT Quality Assurance tests.

3.5.3 Governmental Agency Inspections

Governmental Agencies such as FHWA and the City of Pueblo shall have the right to inspect the Work, provided that the Outside Agency has jurisdiction over the Work and as required by Applicable Law.

3.6 Deliverable Requirements

3.6.1 Quality Management Plan

The Contractor shall submit the QMP for design related Work to CDOT for Approval prior to issuance of NTP1. The entire QMP for all remaining Work on the Project must have CDOT's Approval before NTP2 will be issued. The Contractor shall fully implement the Approved QMP. Any subsequent addendums, required during execution of the Work, shall also require CDOT's Approval. This information shall be submitted in hardcopy form and electronically.

3.6.2 Design Deliverables

The Contractor shall submit to CDOT all Structure Concept Plans (SCP), Release for Construction Documents (RFC), Revisions to Release for Construction Documents, Final Design Documents, and As-Built Documents.

The Contractor shall identify on its Contract Schedules when the Design Deliverables identified above will be submitted to CDOT. The Contractor Schedules shall also include CDOT design review time of a minimum of 10 working Days unless otherwise stated in the Contract Documents. Additional review time may be necessary for the following, but shall not be limited to: other Governmental Agencies, Utility Companies, Permitting Authorities, Railroad, and Local Agencies.

The Contractor shall provide three (3) hard copies (11 x 17 inches for plans, 8.5 x 11 inches for specifications) and one set of electronic files on CD-ROM of the design deliverables to CDOT. As-Built Documents shall show all changes, including field installed changes from the Final Design Documents. All changes shall be noted using CADD. Hand-drawn changes will not be Accepted.

The design deliverables shall be delivered to CDOT indexed and clearly marked to indicate the date of issue and stage of development (e.g., Released for Construction Documents). The Final Design Documents Submittal is required to facilitate CDOT's review and Acceptance of the design while the Contractor still has significant design resources on the Project.

All design deliverables shall include a title block, consistent with the standard Project drawing format established as part of the QMP, with the following information:

1. Date of issuance and including all prior revision dates
2. Contract title and number

3. The names of the Contractor, Sub-consultants, Subcontractors, Suppliers, and manufacturers as applicable
4. Subject identification by Contractor drawing or Contract reference

All design deliverables shall be sealed by the Engineer consistent with applicable Legal Requirements. All design deliverables shall include a sufficient blank space, in the lower right corner, just above the title block on the drawings, and in the lower right corner of the title page of specifications and calculations, in which the Contractor's Engineer may indicate the action taken, indicating their review and approval.

If a design deliverable requires review approval from a Local Agency or permitting authority, the Contractor shall gain written concurrence prior to submitting the design deliverable to CDOT.

Specifications applicable to a design deliverable shall be submitted with the design deliverable.

When calculations accompany drawings in a submittal, the body of the calculations shall contain cross-references to the individual drawing to which the pages of the calculations pertain. Calculations required shall demonstrate conformance with the requirements of the Contract Documents.

The CADD drawings and associated documents shall be organized in a logical manner, have a uniform and consistent appearance, and clearly depict the intent of the design and construction. In addition:

1. The software requirements for all submitted design deliverables shall be InRoads/Microstation, in accordance with the current CDOT standards in effect at the time of Proposal submittal by the Contractor. Project files shall be organized and submitted in accordance with CDOT's ProjectWise format.
2. All design deliverables shall be in English units. The Project coordinate system shall comply with the CDOT Survey Manual.
3. The Final Design Documents and As-Built Documents shall be compiled in sequential order. All drawings/plan sets be produced using CDOT's CADD standards. The Final Design Documents and As-Built Documents submittal shall include, but not be limited to, the following:
 - A. Title Sheet
 - B. Index
 - C. Standard Plan List
 - D. Roadway Design Data
 - E. General Notes
 - F. Pavement Details
 - G. Roadway Details
 - H. Drainage Details
 - I. Geotechnical Plans
 - J. Environmental Mitigation, as necessary
 - K. Permanent Signing Plans
 - L. Traffic Signal Plans
 - M. Aesthetic Elements
 - N. Roadway Typical Sections
 - O. Roadway Geometric Layout Plans
 - P. Roadway Geometric Layout Tables

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- Q. Roadway Plan
 - R. Roadway Profile
 - S. Detour Construction and Phasing Plans
 - T. Detour Construction and Phasing Profiles
 - U. Intersection Plans
 - V. Bike Path Plan and Profile
 - W. Pavement Plans
 - X. Drainage Plans
 - Y. Pavement Marking Plans
 - Z. Utility Plans
 - AA. ITS Plans
 - BB. Landscape/Seeding Plans
 - CC. Grading Plans
 - DD. Lighting Plans
 - EE. Bridge Plans
 - FF. Wall Plans
 - GG. Park Plans
 - HH. Other Details, as needed
 - II. Specifications
 - JJ. Quantities
- 4. Estimated Quantities for Final Design Documents
 - 5. Actual Quantities for As Built Documents
 - A. Shop Drawings, design, and design check calculations
 - B. Electronic CADD files as specified elsewhere in the Contract Documents.

The Contractor shall provide one set each of electronic files on CD-Rom of Utility As-Built Documents to CDOT and to the respective Utility Owner for Utility Work constructed by the Contractor, within 90 Days after the Utility Owner has accepted the Utility Work in conformance with the requirements of Section 7 - Utilities. These electronic deliverables shall conform to those requirements set forth in the Contract for CADD requirements, except as modified by the specific requirements of the individual Utility Owners. The Utility As-Built Documents shall show locations of existing Utilities, structures, trees, streets, and existing highway right-of-way limits. Additionally, the Contractor shall obtain from each Utility Owner, performing its own construction, one set of Utility As-Built Documents for their Utility Work showing the foregoing information with electronic files on CD-Rom provided to CDOT. The Contractor shall be required to show this information on the As-Built Documents. All As-Built Documents electronic files shall be submitted in *.dgn and *.pdf format.

CADD files shall be in accordance with the appropriate requirements of the Contract and those agencies requiring this information as part of the Contractor's Work. Highway-related files shall conform to CDOT Standards. All CADD files shall be documented in a tabular format describing the path, file name, and description. All As-Built Documents electronic files shall be submitted in *.dgn, *.dtm, *.rwk and *.pdf format.

Field changes to any Contractor designed roadway, bridge, wall, or structural detail Released for Construction Documents (RFC) shall be stamped by the Contractor's Engineer, and also stamped "Release for Construction" by the Contractor's DQM and submitted to the CDOT Project Manager, before construction of that portion of the Work may commence. The

Contractor shall develop and document procedures, instructions, and process controls to ensure the Work being produced by the Contractor meets the requirements of the Contract Documents.

3.6.3 Document and Data Approval

The Project Quality Manager (PQM) shall ensure that all deliverables include a signed and dated certification by the originator of the deliverables and that the deliverable is complete and meets the requirements of the Contract.

3.6.4 Document and Data Changes

The Project Quality Manager (PQM) shall ensure that any changes to deliverables provided to CDOT as revised are in a format that can enable changes to be readily apparent and trackable (e.g., documents use the redline/strikeout method).

3.6.5 Product Data

The Contractor shall submit to CDOT for Acceptance two hard copies of all manufacturers' warranties, guarantees, instruction sheets, parts lists, and other product data within 20 Days of installation of the items to which they relate. The Contractor shall ensure that the product data cited is organized and indexed in a manner that allows easy retrieval of information. The Contractor shall maintain proper records of product data.

3.7 Deliverables

At a minimum, the Contractor shall submit the following to CDOT for review, Approval and/or Acceptance:

Deliverable	review, Acceptance or Approval	Schedule
Quality Management Plan	Approval	For design related Work, prior to issuance of NTP1. The entire QMP for all remaining Work on the Project must have CDOT's Approval before NTP2
Quality Management Plan Revisions	Approval	Prior to release
Other Meeting Minutes (defined in QMP)	Acceptance	5 Working Days after meeting
Task Force Meeting Minutes	Acceptance	2 Working Days after meeting
Design Progress Meeting Minutes	Acceptance	2 Working Days after meeting
Released for Construction Documents	Acceptance	Two (2) Weeks prior to planned construction
Revisions to Release for Construction Documents	Acceptance	As defined in the Contract
As-Built Documents	Acceptance	As defined in the Contract
Utility As-Built Documents	Acceptance	Within ninety (90) Days after Utility Owner Acceptance
Two hard copies of all manufacturers' warranties, guarantees, instruction sheets, parts lists, and other product data	Acceptance	Within 20 Days of installation of the items to which they relate
COC/CTR Record	Acceptance	Within thirty (30) Days of Completion of the Work <u>Prior to installation of material</u>
<u>Buy America Certifications</u>	<u>Acceptance</u>	<u>With Monthly Invoices</u>
Final Materials Documentation and CDOT Form #250 Materials Documentation Record	Acceptance	Within thirty (30) Days of Completion of the Work