

**THE DESIGN-BUILDER CONSTRUCTION
QUALITY MANAGEMENT PLAN**

DESIGN-BUILD PROJECT

DESIGN QUALITY MANAGEMENT PLAN ENDORSEMENTS

Date	Name	Title	Signature
		Project Manager	_____
		Design Manager	_____
		Design Quality Assurance Manager	_____
		Construction Quality Assurance Manager	_____

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Exhibits

EXHIBIT	Design-Builder Quality Organization
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EXHIBIT	Design Quality Process
EXHIBIT	Review Print Stamp
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EXHIBIT	Document Requirements for Design QA Audits
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EXHIBIT	Release For Construction Stamp
EXHIBIT	Design Quality Process Temporary Construction Design
EXHIBIT	Frequency of QO Field Survey Verification
EXHIBIT	Tolerances for QO Field Survey Verification with Design Intent (least count for measurement, not standard error)
EXHIBIT	Identified Issue by QA/QC
EXHIBIT	Request for Information (RFI)/Field Design Change (FDC)/ Notice of Design Change (NDC) Process

Appendices

A	Quality Design Program
B	NOT USED
C	Forms
D	Document Control Plan
E	Construction Inspection and Testing Quality Plan
F	Construction Quality Training Manual
G	Laboratory Quality System Manual

Revisions

Revisions to this manual are made on a per-page basis as necessary to clarify, refine, or adapt the Plan for new or changed requirements. Each revised page has a revision number and date in the bottom footer. All manual revisions are recorded below by number and date and are distributed via the Design-Builder's tracking software, after approval by the Department.

The following is a current list of revisions, including date and affected pages:

<u>Revision</u>	<u>Revision Date</u>	<u>Affected Pages</u>
0	5/15/08	All (Initial Release)

Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFC	Approved for Construction
ATMS	Advanced Traffic Management System
BMP	Best Management Practices
CADD	Computer-Aided Design Drawing
CAPWAP	Case Pile Wave Analysis Program
CM	Construction Manager
CPE	Construction Project Engineer
CQA	Construction Quality Assurance
CQAM	Construction Quality Assurance Manager
CQO	Construction Quality Organization
CR	Constructability Review
CSBC	Crushed Surfacing Base Course
CSTC	Crushed Surfacing Top Course
DBC	Design-Build Coordinator
DBE	Disadvantaged Business Enterprise
DCA	Document Control Administrator
DCPF	Document Control Processing Form
DCS	Document Control System
DIN	Document Identification Number
DM	Design Manager
DPE	Design Process Exception
DQA	Design Quality Audit
DQAM	Design Quality Assurance Manager
DQO	Design Quality Organization
DQP	Design Quality Procedures
DDL	Design Discipline Lead
ECM	Environmental Compliance Manager
EEO	Equal Employment Opportunity
EOR	Engineer of Record
F and t	Statistical Test Analysis
FDC	Field Design Change
FE	Field Engineer
FOA	Final Owner Acceptance
FPR	Final Package Review
HMA	Hot Mix Asphalt
IA	Independent Assurance
ID	Identification
IDC	Inter-Discipline Design Check
IDCR	Inter-Discipline Coordination Review
ITS	Intelligent Transportation System
MSE	Mechanically Stabilized Earth
NCR	Non-Conformance Report
NDC	Notice of Design Change
OVT	Owner Verification Testing

PCC	Portland Cement Concrete
PDA	Pile-driving Analysis
PDC	Project Document Control
PM	Project Manager
QA	Quality Assurance
QAO	Quality Assurance Organization
QAP	Quality Assurance Plan
QC	Quality Control
QCP	Quality Check Point
QMP	Quality Management Plan
QO	Quality Organization
QV	Quality Verification
QVI	Quality Verification Inspection
QVT	Quality Verification Testing
RCSR	Review Comment Summary and Resolution
RFC	Release for Construction
RFI	Request for Information
RFP	Request for Proposal
TCR	Technical Coordination Review
TCS	Traffic Control Supervisor
TL	Team Lead
URL	Uniform Resource Locator
WEAP	Wave Equation Analysis of Piles
WSDOT	Washington State Department of Transportation

1.0 Management

1.1 Quality Policy

The Design-Builder's quality policy is based on the fundamental concept that the control of quality is a team obligation that recognizes that quality is built into every aspect of the project. Our team will provide quality products and services that meet or exceed Washington State Department of Transportation's (WSDOT's) requirements, delivered safely, on time, and within budget. Quality work will be the responsibility of every individual performing the work. Quality will be obtained through appropriate planning and control of work operations and by specific quality control activities such as reviewing, checking, inspecting, testing, and quality surveillance/audit.

1.2 Format

The Quality Management Plan (QMP) is comprised of this Quality Management Plan and its Appendices. The Appendices Are:

- A – Design Quality Program
- B – Schedule of Review and Check Points (Not Used)
- C – Forms
- D – Document Control Plan
- E – Construction Inspection and Testing Quality Assurance Plan
- F – Construction Quality Training Manual
- G – Laboratory Quality System Manual, and

The QMP describes the overall policies, program, organizational responsibilities, procedures, and the means of ensuring that all items of work are in conformance with the contract drawings and specifications. The Appendices describe the processes, procedures and details of reviews and checks that will be performed on the design of the project components, and the inspections and tests that will be performed on construction materials and workmanship to ensure the overall quality of the constructed project.

The QMP describes and defines participant roles; quality review responsibilities and activities; quality requirements for design/construction integration; the specific quality measures and application instructions; and necessary quality assurance (QA) documentation and verifications to which technical reports, project documents, design drawings, engineering calculations and construction documentation must comply.

The QMP identifies the design quality requirements, including:

1. Certification that the design satisfies the requirements of the Contract
2. Accuracy, adequacy, conformance to standards of practice, compliance with codes and standards, cost effectiveness, quality, and fitness for purpose and function as specified in the Contract.

The QMP requires four phase control of construction quality, consisting of:

-
- 1) Preparatory Phase before construction.
 - 2) Initial Phase at the outset of each new operation.
 - 3) Follow-up Phase of inspection and testing to determine continuation of compliance and workmanship as established in the preparatory and initial phases.
 - 4) Final Acceptance of Work Phase.

1.3 Project Quality Partnering Charter

As members of the Project Partnering Team, we agree on and commit to team values that will guide our behavior and help us establish solid working relationships throughout the project. These ground rules are:

- Honest With Each Other - Trust
- Quality Minded - Earn Respect
- Pride Professionalism
- Responsive and Expeditious Team Work
- Listen - Understand
- Integrity - Do What You Say
- Partner at All Levels
- Resolve Issues at the Lowest Possible Level. Direct, Honest Communication, Will Lead to Coordination and Cooperation

Together, through partnering and team work, using our ground rules as the foundation, it is our aim to successfully achieve the goals we have listed below:

- Meet Project Milestones As Shown In the Proposal
- Minimal Impacts to the Traveling Public - Positive Public Perception
- Quality Work
- No Environmental Violations - Achieve All Bonuses
- Safe Project - Zero Accidents
- Profitable For All
- Team Work
- No Unresolved Issues or Claims at the End of the Project - No DRB Issues
- An Informed Public
- Timely Responses
- A Proud Finish
- Have Fun

1.4 Project Quality Organization

The Design-Build Quality Organization (QO), QMP Exhibit, is comprised of two separate groups; Quality Control (QC) and Quality Assurance (QA).

QC, under the direction of the Project Manager (PM) includes design and construction. The design team is lead by the Design Manager (DM) who is responsible for design QC. The construction team is lead by the Construction Manager (CM). Construction QC, under direct management of the CM is performed by a team of QC personnel and QC laboratories.

QA is managed by two individuals and includes the development and maintenance of QC processes and procedures, oversight and the requirements for QA auditing. Design QA is managed by the Design Quality Assurance Manager (DQAM). Construction QA is under the direction of the Construction Quality Assurance Manager (CQAM). These two individuals will report directly to the Executive Committee, limiting the influence of schedule, performance, or cost on the QA.

The QO will provide the QC procedures and QA review, testing, and inspections necessary to ensure the project quality meets contract requirements

1.4.1 QO Key Positions

The QO includes the following seven key Quality Management positions:

- 1) **Project Manager**—Responsible for the overall management and implementation of the project including the Quality Management Plan.
- 2) **Construction Quality Assurance Manager**—Responsible for quality assurance of the construction.
- 3) **Design Quality Assurance Manager**—Responsible for quality assurance of the project design.
- 4) **Construction Manager**—Responsible for quality control inspection and testing of the construction work.
- 5) **Design Manager**—Responsible for design development and quality control of the design work.
- 6) **Materials Approval Engineer**—Responsible for the approval of materials in accordance with the WSDOT Construction manual.
- 7) **Quality Testing Supervisor**—Responsible for overseeing all materials testing on the project.

1.4.2 Quality Organization's Authority to Stop Work

The key QO staff listed above has the authority to identify quality problems and to recommend, provide, and verify implementation of solutions. If there is evidence that the QMP is not being followed, all QO staff have the authority to stop work until the appropriate quality procedures are implemented.

For the QO to stop work, the DQAM or CQAM must notify the Executive Committee and WSDOT verbally, followed by written notice within 24 hours. The notification shall identify the reason for stopping the work. After receiving verbal notification, the Design-Builder is responsible for completely halting work on the activity. The DQAM, CQAM, and PM will develop a written plan of action to resolve the issues and implement any changes.

When the issues(s) have been resolved to their satisfaction, the DQAM or CQAM will provide verbal notification, followed by written notification, to both the Executive Committee and WSDOT that the stop work directive is removed and work may begin immediately. WSDOT retains the authority to override the Design-Builder's decision if it feels that the proposed solution is not acceptable.

Insert Here - Design-Builder organizational chart

1.5 Roles and Responsibilities

The entire Design-Builder's organization has the responsibility and authority to contribute to the achievement of quality objectives. The responsibilities of all personnel who manage, perform, and ensure the quality of the work include:

- Initiate action to prevent the occurrence of non-conforming work
- Identify, evaluate, and document quality problems
- Recommend or initiate quality improvement solutions

Stop incorporating the work into the Project, when non-conforming work is identified, until the deficiency is corrected.

The primary roles and responsibilities of the individuals that comprise the QO are summarized below.

1.5.1 Executive Committee

- a. Manage the Quality Management Program for the project.
- b. Designate appropriate trained personnel of the QO to perform audits.
- c. Review project quality performance periodically for conformance to the QMP.

1.5.2 Project Manager

- a. Responsible for organization and maintenance of a document control system for all quality data.
- b. Review and certify progress payments for the Design-Builder.
- c. Review and certify any of the Design-Builder payments to utility owners.
- d. Ensure reviews coordinated with outside entities.
- e. Coordinate quality check point (QCP) reviews.
- f. Review and sign off Non-conformance Reports.
- g. Assist in developing a plan for process change to eliminate non-conformance trends.
- h. Initiate evaluation of Field Design Changes (FDCs) at WSDOT's request.
- i. Review change requests to RFC packages (either RFI/FDC or Notice of Design Changes [NDCs]) for conformance with QMP.
- j. Responsible for development and maintenance of shop drawing submittal log.

1.5.3 Construction Quality Assurance Manager

- a. The CQAM or his/her representative will be on site during all construction activities and shall be available or on the Project within two hours of being notified of a problem regarding the quality assurance of any Work.
- b. Develop, implement, and manage the Design-Builder's construction QA program.

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- c. Oversee QA testing and inspection. Coordinate and schedule resources to provide appropriate QA inspection and testing for all construction efforts on a daily and weekly basis.
 - d. Provide training for the Design-Builder to ensure appropriate training quality procedures are in place, through pre-activity meetings and daily on site reviews.
 - e. Ensure all QO inspector staff has appropriate training and certification for the types of construction activities they will be overseeing.
 - f. Verify that all sampling and testing personnel have the appropriate training and certification for the types of materials they will be testing.
 - g. Has authority to stop any and all Work that does not meet the standards, specifications, or criteria established for the Project.
 - h. Maintain a Non-Conformance Report (NCR) log.
 - i. Maintain utility relocations inspection information.
 - j. Develop and maintain a list of lab equipment available, latest calibration data, and date of inspection.
 - k. Schedule quality check points as audits of on-going construction work for the duration of the project.
 - l. Initiate RFI/FDCs due to constructability issues or differing field conditions.
 - m. Provide a monthly Certificate of Compliance to accompany the monthly invoice of all permanent construction and materials for conformance with Conformed RFP and design requirements.
 - n. Coordinate with WSDOT's quality verification testing, inspection, and Independent Assurance (IA) requirements.

1.5.4 Design Quality Assurance Manager

- a. The DQAM or his/her representative will be on site during all design activities.
- b. Implement design portions of the QAP.
- c. Train all design staff in the design quality process. Provide orientation, guidance, and explain to design personnel their responsibilities in fulfilling the QMP.
- d. Audit and certify design packages and release for construction plans for conformance with the QMP.
- e. Ensure appropriate QO engineers review all plan sheets for conformance with the Conformed RFP standards and criteria.
- f. Has authority to stop any and all Work that does not meet the standards, specifications, or criteria established for the Project.
- g. Compile and maintain documentation of design reviews and oversight reviews.
- h. Certify progress payments that design meets the quality requirements.

1.5.5 Sampling and Testing Personnel

- a. At the direction of the CQAM or his designated representative, take appropriate random samples and tests necessary to meet contract requirements, specifications, and plans.
- b. Submit documentation to CQAM daily.

1.5.6 Staff Inspectors

- a. Inspect the work in a variety of areas, as required by the contract, plans, and project specifications, including embankment, PCC and asphalt paving, structural concrete placement, utilities, etc.
- b. At the direction of the CQAM, inspect aspects of the work in which he/she is qualified.
- c. Complete Daily Inspection Reports.
- d. Prepare Materials Receiving Reports to document inspection and acceptance of permanent materials brought to the job site.

1.5.7 Testing Technician

- a. Perform tests on various materials in the laboratory or field in accordance with applicable test standards and procedures.

1.5.8 Geotechnical Engineer & Pile Driving Analyst

- a. Prepare wave equation for pile driving hammer.
- b. Review pile geotechnical data.
- c. Perform dynamic monitoring of pile driving.
- d. Perform CAPWAP analysis.
- e. Inspect foundations.
- f. Monitor drilled shaft construction.
- g. Review general earthwork construction.

1.5.9 QA Surveyor

- a. Monitor and spot check staking data developed by the Construction Surveyor for compliance with QMP.
- b. Perform QA audits of field construction surveying activities by verification of actual surveyed points.
- c. At established quality check points, certify that survey data has been located, checked, and verified by the Construction Surveyor.

1.5.10 Document Control

- a. Organize and maintain records and documents pertinent to QO activities.

1.5.11 Construction Manager

- a. Coordinate with CQAM on the schedule for work elements to ensure adequate staff is available for QC inspection, sampling, and testing.
- b. Cooperate in the development of strategies to correct quality issues.
- c. Review quality issues, NCR's, and weekly inspection reports.
- d. Develop construction procedures and work plans to meet all quality control requirements.
- e. Meet with inspectors to review QC process requirements before starting any work element.
- f. Provide training to all personnel in the appropriate procedure to be used for the work element under construction.

1.5.12 Construction Superintendents

- a. Execute work process according to work plans and procedures to meet all QC requirements.
- b. At the direction of the CM or his designee, manage the taking of QC samples and tests to ensure that the Design-Builder's means and methods during construction are sufficient to meet plans, specifications, and contract requirements.
- c. Submit documentation to CM on a daily or weekly basis.

1.5.13 Process QC Staff

- a. Provide quality control sampling and testing to develop and refine work processes to meet quality requirements and provide conformance to the contract, plans, and specifications.
- b. Submit documentation to the CM on a daily basis as performed and needed.

1.5.14 Design Manager

- a. Direct and manage all design development, plan releases, specification releases, and QC.
- b. Provide adequate staff to meet schedule.
- c. Maintain a current status listing of the design section's work, expected audit dates, outstanding audit findings, and current document checking/review status.
- d. Maintain budget and schedule; report on these on a monthly basis.
- e. Certify that the Released For Construction (RFC) plans meet all project criteria and the contract.

1.5.15 Quality Testing Supervisor

- a. Oversee all QA sampling and testing operations.
- b. Report directly to CQAM.
- c. Ensure that qualified testers are performing tests according to proper test procedures.
- d. Must be onsite during testing.

The primary roles and responsibilities of the individuals who support the QO are summarized below.

1.5.16 Community Involvement and Project Information Manager

- a. Responsible for managing public information and community involvement for WSDOT.
- b. Interact with WSDOT staff in a team effort to educate and help promote public satisfaction.
- c. Provide media interviews and information and deliver messages and materials consistent with WSDOT's messaging and standards.
- d. Create, reproduce, and distribute flyers and graphics to educate the public about the project and construction and traffic impacts.
- e. Quickly and thoroughly respond to community and commuter complaints.

1.5.17 Structures Design Manager

- a. Responsible for ensuring that the bridge and structures design is completed and the design criteria requirements are met.
- b. Must be on site whenever structural design activities are being performed.

1.5.18 Office Assistant

- a. Under the direction of the PM, assist in labeling, filing, typing and data entry functions as required.
- b. Prepare progress payment documentation/certification, checking all documentation
- c. Maintain utility coordination and correspondence
- d. Compile potential change orders
- e. Track non-conforming work, its nature, corrective action, and resolution.
- f. Coordinate sampling and testing schedule.
- g. Track quality staff, labs, and equipment certification.
- h. Track all submittals, forward for approval, etc.
- i. Review environmental documentation.

1.5.19 Materials Approval Engineer

- a. Cooperate with the CQAM to review all RAM submittals and approve all permanent materials to be incorporated in the project.
- b. Will be an employee of the design firm for the Design-Build Team.

1.5.20 Design Discipline Lead

- a. Responsible for all aspects of the design and quality control checking of the project within their respective disciplines.

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- b. Develop a work plan for design that includes a list of work activities and associated schedules and budgets.
 - c. Assign qualified designers to check design work.
 - d. Use project-specific work procedures and forms as required.
 - e. Assign staff to perform design functions, including preparation of drawings, calculations, specifications, and quantities.
 - f. Coordinate the design work effort with the design efforts of other disciplines.
 - g. Assemble and submit the review documents and quality records required by the QMP.
 - h. Oversee technical quality of design plan documents during development.
 - i. Review the draft Design Criteria for conformation with Contract, regulatory, and company requirements.
 - j. Consult on design problems encountered during design.
 - k. Assist in responding to review comments.

1.5.21 Engineer of Record

The Engineer of Record (EOR) is the individual defined as being in responsible charge of the work. Responsible charge is defined as being personally responsible for the control and direction of engineering work within a professional engineer's scope of competence. The EOR shall be a Professional Engineer registered in the State of Washington. It is the responsibility of the EOR to sign and seal the appropriate design documents.

1.5.22 Design Checkers

Perform thorough check of all calculations, plans, special provisions, and estimates evaluating appropriate engineering practice, conformance with the contract and project criteria, and overall completeness for implementation in the field.

1.5.23 Design Engineers

Perform all engineering tasks to complete their portion of the plans, special provisions, or estimate in accordance with project criteria, standards, the contract, and the QMP.

1.6 Reporting Responsibilities

1.6.1 Lines of Authority

The Design-Builder is responsible for measuring the quality of the work product and demonstrating to WSDOT that the work meets the requirements of the contract.

As shown in Organizational Exhibit, the Executive Committee has direct authority over the CQAM and DQAM. All periodic reporting, non-conformance issues, and concerns about quality will be forwarded to both WSDOT and the Executive Committee.

Contractually, the QO is part of the Design-Builder's organization.

The CQAM is responsible for overall QA inspection and testing on the project and manages the QA Inspectors and QA Sampling and Testing Personnel. The CQAM coordinates with the CM to ensure that all elements of the project are inspected and tested in accordance with the QMP.

1.6.2 Communication Requirements

The DQAM and the CQAM will communicate regularly, in person or by phone, with the WSDOT Oversight Engineer, the DM, and the CM. The QO's Daily Inspection Reports and Field Observations will be available electronically for all entities to inspect at all times.

The DQAM will prepare a monthly summary of the design packages audited during that period. The summary will describe any quality issues identified and the resolution of those issues.

Communication of quality issues will be completed in a timely manner. Quality issues will be resolved at the lowest possible level, often at the site, with the appropriate inspector and foreman agreeing on a solution.

WSDOT audits of the Design-Builder quality processes shall be transmitted electronically to the CQAM via the WSDOT Construction Audit Tracking System (CATS) program.

1.6.3 Staffing Levels

The quality organization will provide CQAM, DQAM, Staff Inspectors, and sampling and testing staff to meet the project schedule. The staffing levels indicated in Staffing Exhibit are based on a preliminary construction schedule and represent an approximate number of personnel needed per month. The staffing levels will be adjusted on a monthly and weekly basis, depending on the work being accomplished on each day, so that all work will be inspected and tested according to the QMP.

Utility Owner inspection staff will be given a monthly look-ahead schedule and one-week notice as to when their work will be constructed to allow them to schedule their inspections accordingly.

Insert Here - Design-Builder Staffing exhibit

2.0 Administration

2.1 Personnel Training

All personnel on the project will be made aware of the quality requirements of their position. Personnel will be trained in their job duties and the skills necessary to complete their work right the first time. Training Exhibit lists the types of personnel and the required training.

TRAINING EXHIBIT Staff Training Requirements

Staff Level	Safety	Environmental	Design QC	Construction Quality Plan	Work Element Training	Specification & Construction Requirements
Construction Mgmt Personnel	✓	✓		✓		✓
Design Management*	✓	✓	✓	✓		✓
Design Staff*	✓	✓	✓			✓
Construction Foremen	✓	✓		✓	✓	✓
Crafts & Labor	✓	✓		✓	✓	✓
Quality Management*	✓	✓	✓	✓	✓	✓
Inspectors	✓	✓		✓	✓	✓
Sampling and Testing	✓	✓		✓	✓	✓
Subcontractors	✓	✓		✓	✓	✓

*Safety training only needed for those required to visit the construction site.

Safety training will be presented by the Design-Builder's Safety Manager. Safety training includes orientation training, daily "Short course" field toolbox meetings, a monthly "Stand down" safety meeting, and as-needed training such as railroad safety training.

Design quality training is presented by the DQAM. There may be different versions: one for the management staff to understand the quality requirements of design; another is for design staff to develop a detailed understanding of the quality process.

The CQAM develops the construction quality training for the project. There are three versions of this training.

- One version is for management so they understand the construction QMP processes, including the lines of authority and issue resolution procedures.
- The second version is less formal, consisting of a preparation meeting for the foremen on the daily inspection, sampling, and testing procedures necessary for their work. The CQAM or designee will complete training of any work element to ensure the foremen understand the requirements of the QMP and specifications for that element. The CQAM will provide a review of the sampling and testing requirements for the element and will discuss development of work procedures to meet the quality goals. In addition, sampling and testing personnel are involved in discussing the quality plan for each work element. These

preparation meetings occur before beginning any work element or as a review of the requirements at the start of each day. Refresher training will be conducted as needed at the weekly construction meetings and the Design-Builder's daily toolbox meetings, where the CQAM or his/her designated representatives will provide feedback on process and resolutions on quality issues.

- The third version is the formal training for Construction Quality Assurance (CQA) inspectors. Each inspector goes through a training program consisting of 80 hours of formal training or equivalent experience evaluation (see Appendix E). In all cases there will be a minimum of 16 hours of orientation and safety training.

2.2 Document Control

Documents will be filed and controlled in accordance with the project Document Control Plan (Appendix D). All documents will be maintained for the duration of the contract and organized, indexed, and delivered to WSDOT upon Final Owner Acceptance (FOA), as well as within five business days of receipt of a request from WSDOT.

Files will be maintained in an organized and controlled manner at the Design-Builder's project office, and the QO field office.

The Design-Builder will establish and maintain its own Document Control System (DCS) in accordance with the Conformed RFP for electronically storing QA inspection and testing data.

Digital cameras and video recorders shall be used to document construction of the project. Photos will be added to the website periodically to provide updated information on the project.

2.3 Document Revisions

The QMP, Safety Plan, and Environmental Compliance Plan are documents which are used on an ongoing basis throughout the life of the project. Special distribution, tracking, and revision procedures are established for these documents to ensure that project participants are using only the most up-to-date versions. As updated versions become available throughout the life of the project they will be posted on the Design-Builder's tracking software and properly noted as to which a revision and the date of the revision. The QMP will be revised regularly on an ongoing basis throughout the duration of the project and therefore it is the Design-Builder's intention to distribute this document digitally via the Design-Builder's tracking software.

Before distribution, the author numbers hard copies of each controlled document and maintains a log to document the individual that each copy is assigned to.

When revisions to a controlled document are required, they are reviewed and approved by both Design-Builder and WSDOT. After revisions are approved, they are distributed by formal transmittal to all official document holders. The PM or his designee performs random audits on the controlled documents and the logs to verify that all copies being used are up-to-date and that the logs are current.

2.4 Audits

2.4.1 Schedule of Audits

Audits Exhibit specifies a series of periodic audits to determine the effectiveness of the QMP.

AUDITS EXHIBIT
Schedule of Audits

Item	Audit Date or Frequency
Design Plans and Special Provisions	The DQAM audits each Preliminary Design, Final Design, and RFC submittal for conformance with the Quality Management Plan
Design Changes	The DQAM audits all documents developed as a result of Field Design Changes or Notice of Design Change for conformance with the Quality Management Plan
Construction	The CQAM or their representative will audit construction work as performed through the use of quality check points throughout the duration of the project.
Offsite Plants	Audit plant operations and in-house QC program every 4 months during the construction season
Testing Labs	Audit equipment and personnel every 3 months during the construction season

2.4.2 Audit Personnel

The DQAM or CQAM will designate appropriate trained QO personnel to perform the required audits for the project. These individuals are not involved in either the actual design or construction process and will perform audits in accordance with the written procedures or checklists. The audits of the construction process will be performed via the quality check points.

2.4.3 Non-Conformance Reports for the Quality Process

Should the auditor find areas of non-conformance within any of the quality process areas, a non-conformance report (NCR) will be written and processed. The non-conformance will be described and documented by the auditor. The CQAM and CM for construction non-conformances, or DQAM and DM for design non-conformances, will review and sign off on the NCR. All NCR's will be processed through the CQAM since the CQAM will be responsible for maintaining an NCR log. If trends (four occurrences or less) continue in non-conformance, the CM, DM, CQAM, or DQAM will develop a plan and/or process changes to eliminate the non-conformance in the future, a schedule for implementation, required training, and a follow-up review once the new procedure is in place.

2.4.4 Documentation Procedures

The DQAM audits and certifies design documents using the Design Quality Audit Checklist form (Form DQA) which includes checklist items to evaluate compliance with the QMP.

2.5 Design Changes

Refer to Section 4.9 for processes associated with Design Changes.

2.6 As-Built Drawings

The design team prepares As-Built drawings for the project. As-Built drawings will be compiled towards the end of the project. Changes to the designs will be tracked via the Request for Information/Field Design Change/Notice of Design Change NDC (RFI/FDC/NDC) process to ensure As-builts are accurate. These drawings conform to the CADD standards identified in the Conformed RFP section 2.12.3.4. As-Built drawings will provide sufficient detail for WSDOT to use the drawings for future activities along the roadway.

2.6.1 Data Gathering Procedures

The Design-Builder will prepare field notes and sketches during construction of all project elements including drainage, utilities, Advanced Traffic Management Systems (ATMS) conduit, signal conduit, and other underground features not visible at the surface. These field notes will include enough survey data to locate the features within the project coordinate system.

2.6.2 Quality Control Checking

Field notes will be checked before incorporation into the As-Built drawings. A Checker will check the as-built information, with the field books, to confirm the accuracy of the As-Built drawings, following the procedures for checking design drawings. The QO will provide periodic audits of the As-Built drawings to evaluate conformance with this QMP.

2.7 Review and Submittal Schedule

Refer to Section 4.4 (Design Submittals), Section 4.6 (Design Reviews), and Section 4.12 (Schedule Requirements) for information regarding project reviews and submittals.

2.8 Progress Payment Documentation

2.8.1 Manufacturers' Certificates of Compliance

A manufacturer's certificate of compliance is used for acceptance of materials as required by the Request for Approval of Materials (RAM) and the requirements of the applicable section of the WSDOT Construction Manual, which is noted on the RAM form. The CQA organization obtains and tracks manufacturers' certificates of compliance for all materials accepted via this process.

2.8.2 Quality Documentation

The CQA organization will review monthly progress payment requests to ensure that acceptable quality documentation is on file for all payment items.

Progress payments are made by percent complete for each schedule activity number; therefore, all quality documentation will be filed and controlled by project schedule activity number. For each progress payment, the quality data for each progressed schedule activity number will be reviewed to establish that each item in the progress payment has met all requirements of the contract, plans, and specifications. The CQAM will certify that the quality requirements have been met for all activities for which payment is being requested.

2.9 Contract Price Adjustments

A quality value has been established for various materials, as provided in the Conformed RFP. Any deviations from those specifications are subject to Contract Price reductions as defined in the Conformed RFP. Calculations for price reductions are made by the CQA organization and submitted to WSDOT for approval.

WSDOT bases any price reduction on the documentation of testing and inspecting results provided by the CQA organization, the quantity of noncompliant materials, and/or additional Owner Verification Testing (OVT).

2.10 Documentation

All information required by the contract that is necessary to document acceptable performance of the work will be maintained in an organized manner and available electronically, daily, to WSDOT. CQA inspection reports and material sampling and testing results shall be submitted to WSDOT in electronic format within 24 hours following the inspection or test. Hard copy format of these reports and results will be available upon request by WSDOT. All quality, inspection and test activities, delays encountered, non-conforming work, and corrective action in regards to non-conforming work will be documented. All this information will be stored in a database as described in the Conformed RFP.

2.10.1 Daily Manpower and Equipment Records

The CM or designee will maintain daily staffing and equipment records for all construction-related activities and will require all contractors and subcontractors to provide this information.

2.10.2 Daily Occurrence Log

The CQAM will maintain a daily occurrence log through a combination of the documentation of the inspector's daily reports, materials receiving reports, materials testing reports, a digital daily journal, and any other means that the CQAM deems necessary so as to provide a permanent record of the daily construction activities and events on the project.

2.10.3 Hazardous Materials

The ECM will document any hazardous material uncovered at the construction site. The documents will include notification to WSDOT and any other agency investigating the hazardous material and the actions taken to resolve the hazardous material condition.

2.10.4 Utilities

The CQAM will maintain inspection information on all utility relocations on the project. This information includes sign-offs from owners that their utilities were relocated according to the plans, standards, and specifications.

2.10.5 Specific Items of Work

All items of work (i.e., Mechanically Stabilized Earth (MSE) walls, geotechnical, surveying, public involvement, etc.) will be documented as indicated in the Conformed RFP.

2.10.6 DBE, EEO, Labor Compliance

All required documents showing compliance with the Disadvantaged Business Enterprise (DBE), Equal Employment Opportunity (EEO), and Labor Compliance requirements of the contract documents will be filed as such within the document control system.

2.10.7 QO Monthly Certification

As part of the monthly progress report, the QO will provide a written certification signed by the DQAM and CQAM, indicating that the QMP and all of the measures and procedures provided therein are functioning properly and are complied with fully.

2.10.8 QO Reports

The QO will maintain and post digital records showing that all required activities and/or tests have been performed, including the following:

- Type, number, and results of all current quality management activities, including reviews, inspections, materials analysis, tests, audits, and monitoring of work performance
- Closely related data, such as the qualifications of personnel and the procedures and equipment used
- Identity of the inspector or data recorder, the type of test or observation used, the results and acceptability of the work
- Minutes of all QC meetings
- The nature of any non-conforming work, causes for rejection of work, etc by maintaining a non conformance report log.
- Proposed corrective actions(s) for any non-conforming work, corrective action(s) taken, and results of corrective action(s)

2.10.9 Materials and Equipment Conformance Record

Documents will be maintained to show that materials and equipment conform to the procurement requirements. The material is available for inspection 24 hours before installation or use of such material and equipment. The documents will be retained at the job site and identify specific requirements such as contract documents, codes, standards, and specifications met by the purchased material and equipment. WSDOT has reserved the right to inspect and review these documents at any time.

2.10.10 Weekly Scheduling Notice to WSDOT

The CM will notify WSDOT in writing, by noon Friday of each week, of the planned construction activities, including fabrication within 60 miles of the project. For activities occurring more than 60 miles from the project (fabrication, etc.), notification is given at least 10 business days before starting the planned work.

2.10.11 Substantial Completion

The QO reviews the PM's written notice to WSDOT regarding substantial completion and will certify that the design and construction teams have complied with the requirements of the contract.

2.10.12 Final Inspection

At the completion of work, the CQAM, PM, and WSDOT jointly conduct a final inspection of the project. The final inspection includes inspection of the completed work, associated as-built documents, certifications, and other documentation and contractor punch list item review. The inspection is accomplished within five business days of notification that the project is ready for final inspection.

During the inspection, quality control documentation may be reviewed. WSDOT and the CQAM jointly agree upon the list of non-conforming work and the corrective action to be taken, along with an agreed-upon completion date for the corrective action.

The CQAM will ensure that each deficiency identified during the final inspection is corrected before the agreed-upon completion date.

2.10.13 Final Certificate of Compliance

The PM submits a Certificate of Compliance (Appendix C) signed by the CQAM and the PM indicating that all materials incorporated in the project conform to the contract requirements.

2.10.14 Final Owner Acceptance

WSDOT has sole responsibility and authority for Final Owner Acceptance (FOA) of all work.

3.0 Investigations and Testing

3.1 Procedures to Ensure Consistency & Quality of Materials & Products Supplied by Vendors

The QO inspects all materials brought to the job site. The inspection staff documents the type of material, the general visual condition of the material, and indicates that the material is being stored and handled according to manufacturers' recommendations and specifications. The QO inspector examines the bill-of-lading, the certificate of compliance, and the on-site material to document that certifications are complete for the material and performs testing as necessary. A copy of the materials compliance certification is included with the inspector's daily report. The QO inspector uses the Materials Receiving Report form for this documentation. All of the documents for this inspection are filed under the activity number as outlined in the document control section of this plan (Appendix D).

All materials and products delivered to the job site are marked and tracked in accordance with Section 5.3 (Materials) to ensure only acceptable materials are used and any rejected materials are removed from the job site. The CQA inspectors verify and document material incorporated into the project is from the approved list developed by the CQAM for material application.

The QO inspector documents in his daily inspection reports any issues with the acceptability, handling, or storage of materials and notifies the PM and CM immediately. The Design-Builder will correct these issues within 24 hours or the CQAM or their representative writes an NCR.

3.2 Procedures to Ensure Quality & Documentation of Field Investigations

All field investigations are subject to review for data consistency by a qualified senior engineer (discipline lead). These reviews are documented and any abnormalities checked by the senior engineer. All review comments and subsequent actions taken to provide consistent data are documented. These review documents become part of the design quality control documents for the appropriate Schedule Activity.

All geotechnical information from field investigation and testing is checked according to Section 4.3.3 (Quality Program for Geotechnical Documents) of this QMP. The quality process is audited by the DQAM for conformance with the overall plan.

The construction surveyor checks field surveying and project mapping coordinate systems per Section 8.0 (Surveying) of the QMP. The QA Surveyor audits the survey data sheets and calculations to document conformance to the QMP. Field cross-sections are taken at various locations to determine the accuracy of the computer digital terrain model before using the model for design.

3.3 Procedures to Ensure Laboratory Qualifications

All QA testing will be performed by a WSDOT-approved laboratory reporting directly to the CQAM. The laboratory will meet the requirements of AASHTO R-18 for qualified testers and calibrated/verified equipment and will accomplish the testing according to the test procedure

they are performing. A Laboratory Quality Systems Manual will be developed and maintained. The manual will include:

- Staff qualifications, position description, and qualification process
- Listing of the test procedures used
- Equipment, including verification and calibration procedures and inventory
- Test reports, worksheets, and forms
- Sample management
- Diagnostic and corrective action
- Quality systems review

The CQAM will develop and maintain a list of the approved labs for the project.

4.0 Design

4.1 Quality Organization and Responsibility

The QO is described in Section 1 (Management) of this QMP and shown on Exhibit QMP-1. Design Quality Assurance is under the direction of the DQAM. The Design Quality Control is under the direction of the DM.

4.2 Overview of Design Quality Program

Detailed procedures applicable to the design quality processes are provided in Appendix A, Design Quality Procedures (DQP). The DQPs are referenced within Section 4.0, where appropriate. The DQPs are dynamic documents, and additions/revisions are issued, as needed, when the processes require modifications, refinements, or clarifications.

The design quality program consists of several steps, involving:

- Planning the work.
- Preparing design documents.
- Checking and reviewing the documents.
- Making revisions.
- Auditing and Certifying.
- Releasing documents for construction.

There are iterations to each of the steps, depending on the specific type of document, but the basic design quality process is as shown in Exhibit QMP-5. Specifics regarding the steps are:

1. **Prepare Design Documents.** The design team prepares the design documents, using the established design criteria for the project and appropriate inter-discipline and Task Force coordination (via regular scheduled meetings, written communications, etc.). Task Forces (which include representatives from the Contractor, Designer, and WSDOT) meet weekly or bi-weekly during the design phase and periodically thereafter. Some task forces may be added, combined, or eliminated as design progresses. The Task Forces will generally be discipline specific such as Quality, Roadway/Traffic, and Structures/Geotechnical.
2. **Check.** All design documents are subjected to in-discipline design checking process (red-yellow-green color-code system) per Section 4.3.1.2. For design documents where inter-discipline design checks are warranted, an Inter-Discipline Design Check (IDC) is performed per Section 4.3.1.1. The Checker checks the design documents following the procedures detailed in Section 4.3.
3. **Revise.** Checker corrections and comments and review comments are evaluated and incorporated into the documents by the Originator, as appropriate.
4. **Audit.** The DQAM audits the design documents in accordance with Section 4.5 and certifies them as meeting the requirements of the QMP, using Form DQA.
5. **Document Control.** Document Control logs and copies audited design documents, files them in the project files, and transmits electronic versions to WSDOT and other approved project stakeholders.

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6. **Review.** WSDOT, identified D/B team Reviewers, and other approved project stakeholders review the design documents in accordance with Section 4.6.1 and document comments with Form RCSR.
 7. **Comment Resolution Meeting.** The design team, WSDOT, and other Reviewers meet following the review to discuss and agree on comments, per Section 4.6.1.2.
 8. **Revise.** The design team makes the necessary revisions to the design documents to address the comments as agreed upon and advance the design to the next level.
 9. **Repeat check/audit/review/revise cycle** through each required submittal described in Section 4.4.
 10. **Prepare and Audit RFC Submittal.** The design team prepares the RFC documents in accordance with Section 4.7 and submits the RFC package to the DQAM. Using Form DQA, the DQAM audits and certifies the documents in accordance with Section 4.5, indicating that the documents are approved for RFC. The DQAM stamps the documents “Released for Construction” in accordance with Section 4.7. The package is then returned to the DM.
 11. **Release for Construction (RFC).** The DM transmits the signed and sealed RFC Design Documents stamped “Released for Construction” to Document Control along with the DQAM’s certification that the design package may be released for construction.
 12. **Document Control.** Document Control logs and copies the audited RFC documents, files them in the project files, and transmits electronic versions to WSDOT and other approved project stakeholders.
 13. **Acceptance of Final Design.** WSDOT acceptance of the final design occurs after WSDOT acceptance of construction.

The steps for changes to documents that have been previously released for construction are described in Section 4.9 (Design Changes During Construction).

4.3 Design Checking

General checking procedures applicable to design documents, with the exception of geotechnical documents, are detailed in Section 4.3.1. Processes and procedures specifically applicable to QC of geotechnical documents are detailed in Section 4.3.3.

4.3.1 Design Plans, Specifications, Calculations, Reports, and Other Design and Construction Documents

4.3.1.1 Inter-Discipline Design Check

An Inter-Discipline Design Check (IDC) is used for any design reports, plans, and specifications that involve more than one discipline. The objective of the check is to coordinate design between and within disciplines in order to verify there are no conflicts, omissions, or misalignments between integrated or adjacent work prior to in-discipline design checking (Section 4.3.1.2), audit, and review. The Design Manager is responsible for designating the appropriate Reviewers for each design package.

The Originator (often the designer) prepares a Review Print of the document(s) by reproducing the document and applying the Review Print stamp (Review Exhibit) to the first page of each document and forwarding it to the Design Manager. In the space allotted in the Review Print stamp the Design Manager lists the Reviewers and their review responsibility for the document. The designated Reviewers review the document(s) with respect to their areas of responsibility or

expertise and mark their comments on the documents. Reviews are assigned a color to highlight information that is correct and mark comments so that each Reviewer's mark-up is easily differentiated. Once the Designer examines the Review Prints and resolves and incorporates any comments, the design package is ready for checking per Section 4.3.1.2.

***NOTE:** It is recommended that only one document Review Print be circulated for each review to minimize duplication or conflicting comments. However, when time constraints or distance considerations dictate, more than one copy may be used.*

REVIEW PRINT STAMP EXHIBIT
Review Print Stamp

Design Pkg/Submittal Name:		
Date:		
REVIEW PRINT		
Discipline	Reviewer	Date
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.....
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4.3.1.2 Red-Yellow-Green Color-Code System (In-Discipline Design Checking Process)

Plans, specifications, calculations, reports, and other design documents (with the exception of geotechnical documents) are checked using a red-yellow-green color-code system, which is defined below. The documents are checked for conformance with the criteria, standards, and the Conformed RFP. The person checking the document, the Checker, shall be a qualified professional who has not been involved in the particular aspect of the design being checked.

There are four steps in performing the design checking process:

Check: The Originator makes a copy of the design documents and applies the check print stamp (Checked Exhibit) for all persons involved in the checking process to sign-off. The stamp also includes the design package/submittal number and date, check print number, and signature of the Originator of the document with the date. If all the individuals involved in the checking process will have consistent roles on the entire package to be checked, a cover sheet may be added to the package. A single check print stamp is applied to the cover sheet, instead of each individual sheet in the package. A clear description of what the check print applies to (e.g. sheet numbers or number of pages) must be included on the cover sheet.

The Checker validates all unchecked information on the document, including assumptions, calculations, technical specifications, drawing presentation, and details, using the color-code system as follows:

- Red = an error in the document

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- Yellow = information is correct.
 - Pencil or blue = a comment that is not necessarily an error.

When the check is complete the Checker signs and dates the check print stamp.

Backcheck: The Backchecker (usually the Originator of the document, but may be another designated designer other than the Checker) reviews the Checker corrections and comments (red and blue/pencil marks). If the Backchecker agrees with the comments, he places a green check next to the red. If the Backchecker does not agree with the comments and then explains to the Checker a valid reason why the original item is correct, the Backchecker then writes the word “stet” in green adjacent to the red marks to indicate that the red is no longer valid and that the Checker has withdrawn his comment. Once all corrections/comments are reviewed and color coded, the Backchecker signs and dates the check print stamp.

Correction/Update: The Corrector (usually the Backchecker/Originator) makes the revisions to the original document according to the agreed-upon changes marked on the checkprint. When updates are complete, the Corrector circles, in green, the changes made on the check print and signs and dates the check print stamp on the Corrected line.

Verification: The Verifier (usually the Checker, but may be another designated designer other than the Corrector), reviews that correction/update revisions were made completely and correctly. The Verifier then yellows over the red marks on the check print and signs and dates the check print stamp.

Completion of these design checking procedures are documented by:

- Using the color code system.
- Signature and date on each appropriate line of the check print stamp

4.3.2 Computer Programs

Specific software programs denoted in the Conformed RFP for use by design are considered validated and do not need to be verified. Upon written request, WSDOT can specify other programs that do not require formal verification. All other commercially available software programs shall be verified and added to the Verified Computer Program Log for the project, as noted below.

Verification of Spreadsheets. Internally developed spreadsheets may be used. They shall be verified by performing hand calculations to check output or by checking the formulas used in the calculations, per the checking process defined in Section 4.3.1.2. A comparison shall be made between the computer-generated output and the hand calculations. The spreadsheet and calculations are then audited by the DQAM, and if adequately verified, added to the list of software programs verified for the project.

Verification of Vendor-Supplied Computer Programs. Vendor-supplied computer programs may be verified by one of the following methods:

- Using the hand calculation method as described for spreadsheet verification
- Using the same input in another verified computer program and comparing output
- Supplying documentation from the manufacturer or program writer verifying the accuracy of the program

The documentation is then audited by the DQAM and if adequately verified, the program is added to the Verified Computer Program Log for the project.

Verified Computer Program Log. The DQAM maintains a log of all spreadsheets and computer programs that are considered validated via inclusion in the Conformed RFP, written approval by WSDOT, or formal verification.

Checking of Design Performed with Verified Computer Programs. Once a spreadsheet or computer program is added to the list of programs verified for this project, the design checking process may be stream-lined. The input shall be checked in detail. The computer-generated output shall be reviewed for reasonableness and spot checked for accuracy.

4.3.3 Quality Program for Geotechnical Documents

For development, checks, and reviews of geotechnical documents such as reports, technical memoranda, and calculations refer to (Appendix A).

For additional processes required for checking data from geotechnical investigations refer to Section 3.2 of this QMP.

4.4 Design Submittals

The three types of submittals are described below. Review procedures are defined in Section 4.6.

4.4.1 Preliminary Design Submittal

The intent of the Preliminary Design submittal is to provide a formal opportunity for WSDOT, the Contractor, various design team disciplines, and other approved project stakeholders to review the construction documents in order to ensure that: the design is progressing appropriately and proceeding in the right direction; the plans reflect Contractor requirements for construction; design features are coordinated; and there are no fatal flaws within a given discipline or between disciplines. The contents of the preliminary submittal for each discipline shall be as mutually agreed by members of the applicable Task Force.

4.4.2 Final Design Submittal

The Final Design submittal package is prepared when the design for a given element or area is 100% complete. The submittal may include plan sheets, specifications, technical memos, reports, calculations, and other pertinent data, as applicable. The submittal shall include Form RCSR resulting from the Preliminary Design Submittal. As a result of the on-going discussion and resolution of design and construction issues via the regularly scheduled Task Force Meetings, Core Meetings, and informal reviews, it is anticipated that there will be very few revisions or changes at this stage. If there are no comments on the Final Design Submittal, the package is ready for the RFC Submittal.

4.4.3 RFC Submittal

The RFC submittal is prepared when all comments from the Final Design Submittal have been addressed and appropriately incorporated. Refer to Section 4.7 (RFC Procedure) for details on the RFC process.

4.5 Design QA Audits and Certification

After each design package has been checked and before distribution by Document Control for review or RFC, the DQAM performs an audit to verify that the documents have been checked and/or reviewed in accordance with this QMP. If the design package has previously been reviewed, per Section 4.6, the DQAM will also verify that prior comments have been resolved and incorporated, as applicable. Design QA Audits Exhibit summarizes the document requirements for Design QA audits:

DESIGN QA AUDITS EXHIBIT

Document Requirements for Design QA Audits

Submittal	Original Plan Sheet ²	Check Print of Plan Sheet	IDC Check Print of Plan Sheet	RCSR with final disp. and QC initials/ date	Original Calcs	Checked Calcs	Support Docs	Associated Forms
Preliminary Design	✓	✓	✓		✓	✓	✓	1
Final Design	✓	✓	✓	✓	✓	✓	✓	1
RFC	✓	✓		✓				1
NDC	✓	✓	4		4	4	4	1
RFI/FDC ³	✓	✓	4		4	4	4	1

- 1 = Form DQA, completed by DQAM to document audit.
- 2 = Plan Sheets are signed and sealed for RFC in accordance with Section 4.7 (RFC Procedure).
- 3 = In accordance with Section 4.9 (Design Changes During Construction), QA Audits are not required for RFI/FDC's that do not require re-release of design documents. Design documents which must be re-released (RFC'd) as a result of a RFI/FDC, follow the audit procedures outlined in Section 4.7 (RFC Procedure).
- 4 = The DM determines the need for supporting calculations and internal reviews based on the significance/magnitude of the change.

Form DQA (Design Quality Audit Checklist) is used to perform, record, and certify the audit. A non-conformance with the quality process results in the documents being returned to the Originator to bring the package into compliance. If the audit finds all documents in conformance, the DQAM completes and signs Form DQA to document and certify that the QMP requirements have been followed.

At the appropriate time, the DQAM also uses Form DQA to certify that the design package is approved for RFC (Refer to section 4.7 RFC Procedure).

The DQAM shall conduct audits with care, but in a diligent and timely manner so that the design schedule is maintained. WSDOT shall have access to all audit documentation.

4.6 Design Reviews

WSDOT, the design discipline leads, appropriate construction personnel, and other approved project stakeholders (e.g., affected local government and utilities) shall have input on the design as it is developed through:

- 1) On-going discussion and resolution of design and construction issues through weekly or bi-weekly Task Force Meetings and Core Meetings, as well as unscheduled ad hoc follow-up meetings. The Task Force meetings also include technical coordination discussions, as needed, which address the design approach, suitability, and conformance with contract requirements.
- 2) Formal design reviews performed on the Preliminary and Final Design submittals. (Refer to Section 4.6.1, below)
- 3) Informal WSDOT and other approved project stakeholder Over-the-Shoulder reviews. (Refer to Section 4.6.2.1, below)

This multiple stage review process is used to ensure that all final documents are compatible with project functional and technical requirements, meet required design criteria and contract requirements, and address review comments.

4.6.1 Formal Design Reviews (FDR)

The review process consists of distribution of design packages (including pertinent backup information), preparation of written comments by reviewers (Form RCSR), and a comment resolution meeting. Formal design reviews occur for the Preliminary Design Submittal and the Final Design Submittal.

Preliminary Design Submittal Review – Refer to Section 4.4.1

Final Design Submittal Review – Refer to Section 4.4.2

The RFC Submittal review is handled differently than these submittal reviews and is performed in accordance with Section 4.7 (RFC Procedure)

4.6.1.1 FDR Roles and Responsibilities

After the design package has been checked and audited, the Design Manager distributes the review submittal package via Document Control to all applicable reviewers along with a Review Comment Summary and Resolution form (Form RCSR), see Section 4.6.1.2 below. The review package transmittal letter specifies the date the comments are due and the date of the Comment Resolution Meeting. 14 calendar days are allowed for each Preliminary Design Submittal review and 14 calendar days are allowed for the Final Design Submittal review.

Reviewers shall be individuals who have sufficient relevant experience to provide appropriate critique of the methods, assumptions, and good design practice. Reviewers include WSDOT, qualified representatives from local government and utility owners (when their infrastructure or agreements with WSDOT within the project limits are involved), and representatives of the appropriate disciplines, such as: construction, environmental, geotechnical, drainage, roadway, structures, utilities, traffic, and right-of-way. Each of these entities conducts their respective review with a different focus and objective. The types of reviews to be performed along with roles of the various reviewers are summarized in Design Reviewers Exhibit, below.

DESIGN REVIEWERS EXHIBIT
Role of Design Reviewers

Reviewer	Type of Review	Role
WSDOT Personnel	WSDOT Design Review	Review plans for conformance with the discipline criteria and contract requirements.
Construction Engineering Manager, Construction Manager, Superintendents, and/or the Construction Project Engineer	Constructability Review (CR)	Review documents for overall constructability including: <ul style="list-style-type: none"> ◆ Aspects that affect the construction such as site restrictions, availability of materials, construction equipment requirements, and economics of the proposed construction. ◆ Ability to construct the work, including practicality of achieving specified tolerances, access needed to install or construct work, and inter-discipline conflicts. ◆ Adequacy of information on plans and specifications to construct the work.
Design Leads	Inter-Discipline Coordination Review (IDCR)	Review plans to coordinate design responsibility and design details between and within disciplines. Review the documents for interferences, compatibility between design disciplines, clarity, and completeness. Verify there are no conflicts, omissions, or misalignments with adjacent work.
Environmental Compliance Manager	Environmental Compliance Review	Review documents for compliance with project environmental commitments, mitigation requirements, and permits.
Utility Owners	Utility Review	Review plans for conformance with respective standards and requirements.
Local Governments	Local Government Review	Review plans for conformance with respective standards and other issues of local government concern.

4.6.1.2 FDR Comments and Resolution

Reviewers provide their comments in writing on Form RCSR or equivalent document. Comments are submitted to the DM electronically via Document Control by the date and time indicated on the review package transmittal letter. If a reviewer has no comments, he/she indicates “No Comments” on the Form RCSR and returns it to Document Control and the DM.

The DM conducts a Comment Resolution meeting to document and resolve responses to review comments. Participants include the design engineer, WSDOT, the Construction Engineering Manager or designee, and others as applicable (geotechnical engineer, environmental compliance manager, utility coordinator, right-of-way, representatives from local governments and utilities). Reviewer comments are discussed and agreement reached on the appropriate action to be taken. Should a comment require further investigation before final resolution, the design team prepares more information and discusses, as appropriate, with the DM, the reviewer, and WSDOT to reach final agreement.

A designer is responsible for verifying and signing off (by initialing and dating the “Correction Verified by” column) on the RCSR form that each comment is incorporated into the plan sheets, special provisions, specifications or other submittals, as appropriate.

4.6.1.3 FDR Documentation

The DM shall compile minutes of all Comment Resolution meetings, including:

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- RCSR forms
 - List of participants
 - Items discussed
 - Identification of discrepancies noted and corrective action planned
 - Identification of follow-up action items, due dates, and the responsible party
 - Identification of items needing final resolution (further investigation) and schedule for resolution

The DM shall distribute the minutes via the Design-Builder's tracking software.

4.6.2 Other Reviews

4.6.2.1 Over-the-Shoulder Reviews

Over-the-Shoulder reviews by WSDOT representatives (and other approved project stakeholders, as appropriate) will occur through attendance at the Task Force Meetings, through attendance at Core Meetings, through attendance at the Comment Resolution Meetings that occur at the conclusion of formal reviews, and through routine day-to-day interaction. Feedback from the reviews is documented in the meeting minutes, as appropriate.

The intent of Over-the-Shoulder is to review the design as it progresses in a way that minimizes disruption to ongoing design work while providing timely comments and feedback on the design.

4.6.2.2 Special Discipline Requirements

Utilities—Utility Owner Supplied Designs

Utility Owners prepare a complete package of their design and construction plans, including applicable standards and special provisions, and submit them to the DM for review. The utility package is subject to a Final Design Submittal Review in accordance with Section 4.6.1. Reviewers include WSDOT, the Design-Builder, local government engineers, as applicable, and other utility owners. The DM or designee only verifies that each relocated utility, as designed, is compatible with and interfaces properly with the design and construction of the project. The Design-Builder provides constructability reviews to verify that the design and construction is consistent with the Utility Agreements.

Comments are made in writing on Form RCSR and forwarded to the DM via Document Control by the date and time indicated on the package transmittal letter. The DM returns all review comments to the Utility Owner to be addressed. Comments must be addressed to the satisfaction of the comment originator.

Once comments have been satisfactorily addressed, the package shall be audited by the DQAM to verify that the appropriate reviews have been completed and comments addressed. The package is Released for Construction in accordance with Section 4.7 (RFC Procedure), steps 4 thru 8.

Utilities—Design-Builder Utility Designs

Utility designs prepared by the Design-Builder will be designed, checked, reviewed, audited and approved in accordance with Sections 4.3, 4.5, 4.6, and 4.7.

4.7 RFC Procedure

1. After the Final Design Submittal review, the design team makes the necessary revisions to the design documents to address the comments.

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2. The design team checks all revisions made to the Final Design Submittal package in accordance with Section 4.3
 3. The DM ensures all Final Design Submittal review comments are addressed, resolved, and incorporated.
 4. The DM assembles the RFC Package and has the Engineer-of-Record sign and date their seal on the documents and verify the date and revision number on each. The DM submits the RFC Package to the DQAM for audit.
 5. The DQAM performs the RFC Package Review Audit and Certification in accordance with Section 4.5. The DQAM signs Form DQA to certify that the design package may be RFC'd.
 6. The DQAM stamps each individual plan sheet and/or special provision as Released for Construction Exhibit with the date, and returns the package along with Form DQA to the DM.
 7. The DM transmits the signed and sealed RFC'd documents and the completed Form DQA to Document Control.
 8. Document Control logs, copies, distributes, and files the RFC documents in accordance with the Document Control Plan.

For RFC of documents associated with changes to previously RFC'd documents (i.e. NDCs and RFI/FDC's), refer to Section 4.9 of this QMP.

RFC EXHIBIT

Release For Construction Stamp

Design-Builder

Current Date Is Stamped Here

RELEASED FOR CONSTRUCTION

4.8 Acceptance of Design

WSDOT acceptance of the design will occur after acceptance of construction. The QO audits provide documentation for WSDOT that all design packages released for construction are in compliance with the QMP. For QO certification of constructed work, refer to Section 2.10.13. The following items are transmitted to WSDOT in accordance with the Document Control Plan to document final design:

- As-Built design plans and specifications
- Design calculations
- Design reports
- Electronic files
- Manufacturers' warranties
- Design Documentation Package (DDP) and Project File

4.9 Design Changes During Construction (RFI/FDC/NDC)

For design changes made after drawings have been RFC'd, notification of impending design change is distributed in accordance with the Document Control Plan requirements (for Request For Information/Field Design Change/Notice of Design Change). The design change process allows for design changes during construction to maintain or improve quality, constructability, or to modify the design to address unexpected or changed conditions in the field. All RFI/FDC/NDC's are stored in the RFI module of the Design-Builder's tracking software (refer to Document Control Plan for additional information regarding document control of these issues).

Control of Design Changes. Each time a plan or special provision is released, it is given a sequential number of the release and the date it is released. This number and date are tracked by Document Control to control each plan change that is RFC'd.

Plan sheets or special provisions have the changed area clouded. On plan sheets, the revision number is placed inside a triangle, next to the clouded area and also in the revision box with an explanation of the changes made to the document along with reference to the RFI/FDC/NDC number associated with the change and the date the sheet is RFC'd. For each subsequent revision to the plan sheet, the previous cloud is removed and the new change area is clouded along with adding the associated revision number in a triangle next to the clouded area and in the revision box. The revision box provides a history of the changes to each plan sheet and RFC dates.

4.9.1 Design Change Initiated by Design Team—Notice of Design Change

As design progresses, the design team may determine that a previously released package or plan sheet requires a change to maintain the overall quality of the design. The Designer initiates a notice of design change through the RFI module in the Design-Builder's tracking software to the Construction Project Engineer (distribution of the NDC notification is in accordance with the Document Control Plan). The NDC notification includes a description of the change, the drawings or special provisions the change relates to, and the date when the updated documents will be ready for RFC.

The Design-Builder will not construct any items affected by the identified changes until after the updated plans are RFC'd.

Changes to documents that have previously been RFC'd are made in accordance with "Control of Design Changes" per Section 4.9, above.

All plans, calculations, and special provisions with design changes must meet the same quality control checking procedures as outlined in Section 4.3.1 of this QMP.

During development of the design document revisions, WSDOT is given over-the-shoulder review opportunities so that their comments and feedback can be incorporated prior to the DQAM's RFC audit. When applicable, the Environmental Compliance Manager reviews the documents for compliance with project environmental commitments, mitigation requirements, and permits. The DM determines the need for internal design reviews based on the significance/magnitude of the change.

The NDC package is treated like a Final Design Submittal, and RFC of the documents (including DQAM audit) follows the RFC procedure steps in Section 4.7 of this QMP.

4.9.2 Design Change Initiated in the Field—Request for Information/Field Design Change

An RFI/FDC may be issued to improve constructability, address differing field conditions, increase cost effectiveness, or address errors or ambiguities in the plans.

4.9.2.1 Initiation

WSDOT or the Design-Builder construction staff may initiate a RFI/FDC through Contractor's RFI module in the Design-Builder's tracking software to the Construction Project Engineer.

Via the RFI module, the party requesting the RFI/FDC explains the issue and proposed change, listing any plan sheets or specifications affected by the change, and including any schedule requirements of the change. Red-lined plans sheets or specifications should be attached if necessary to clarify the proposed change.

It is not acceptable to issue an RFI/FDC to address non-conforming work. Work that has not been constructed per plans, specifications, and contract requirements is deemed non-conforming and must be addressed using the process detailed in Section 5.9 (Non-conforming Work) of this QMP.

4.9.2.2 Validity of RFI/FDC Request

The Construction Project Engineer reviews all RFI/FDC's. The Construction Project Engineer determines whether or not the RFI/FDC requires design input and the procedures outlined in either Section 4.9.2.3 or 4.9.2.4 are then followed. Design input is required whenever plan sheets or specifications need to be corrected or revised.

4.9.2.3 RFI/FDC Procedure—Design Input Not Required

For RFI/FDC's where design input is not required and the RFI/FDC is completely handled in the field, the RFI/FDC is distributed and responded to in accordance with the Document Control Plan.

The Design-Builder incorporates changes into the final work. The Design-Builder's design team is responsible for reflecting changes as a result of the RFI/FDC on the as-built plans (see Section 2.6).

4.9.2.4 RFI/FDC Procedure—Design Input Required

For RFI/FDC's where design input is required (i.e., corrections or revisions are required to the sealed documents), the Construction Project Engineer distributes the RFI/FDC to the Design Manager via the Design-Builder's tracking software in accordance with the Document Control Plan (copies to the design team require action, copies to WSDOT at this point are informational).

Revisions to Plans or Specifications that Do Not Require Re-release of Documents

The Design Manager forwards the RFI/FDC, via the Design-Builder's tracking software, to an appropriate member of the design team for review and response. The design team member handling the issue is deemed the Responding Engineer. If the Responding Engineer determines that the changes resulting from the RFI/FDC are minor or a written response will provide sufficient clarification of the issue, the response may consist of a written response provided directly in the "Response" portion of the RFI/FDC within the Design-Builder's tracking software. Where applicable, a hand sketch or a copy of the plan sheet affected may be attached via the Design-Builder's tracking software to the response, with the change clearly marked by hand and clouded with reference to the RFI/FDC number.

During development of the response, WSDOT is given over-the-shoulder review opportunities so that their comments and feedback can be incorporated in a timely manner. The response is checked by another Designer and when applicable, reviewed by the Environmental Compliance Manager. Within the response, the Responding Engineer includes the following, as applicable:

- The name of the person who performed QC on the response and the date
- A statement that environmental concurrence was received, by whom, and when
- A statement regarding information from discussions or over-the shoulder reviews with WSDOT

If calculations are performed in preparation of the response, the calculations are checked in accordance with the procedures detailed in Section 4.3. The calculations are not distributed with the response unless specifically requested; however, the calculations are filed with the other RFI/FDC documents in the Design-Builder's tracking software. Once the design response is complete, the DM distributes the RFI/FDC in accordance with the Document Control Plan.

The Design-Builder incorporates changes into the final work. The Design-Builder's design team is responsible for reflecting changes as a result of the RFI/FDC on the as-built plans (see Section 2.6).

Revisions to Plans or Specifications that Require Re-release of Documents

The DM determines the design team member best suited to address the RFI/FDC and forwards them the RFI/FDC for review and response. The design team member handling the issue is the Responding Engineer. If the Responding Engineer determines that the RFI/FDC requires revisions to plan sheets or specifications, there are two components to the RFI/FDC response:

1) Written Response: When the response is complete, the Responding Engineer documents the required changes directly in the "Response" portion of the RFI/FDC within the Design-Builder's tracking software. Within the response, the Responding Engineer includes the following, as applicable:

- The documents to be RFC'd
- A statement that environmental concurrence was received, by whom, and when
- A statement regarding information from discussions or over-the shoulder reviews with WSDOT

2) RFC of Design Documents: All plans, calculations, and special provisions created or modified as a result of the RFI/FDC response must meet the same quality control checking procedures as outlined in Section 4.3.1 of this QMP. During development of the response, WSDOT is given over-the-shoulder review opportunities so that their comments and feedback can be incorporated prior to the DQAM's RFC audit. When applicable, the Environmental Compliance Manager reviews the documents for compliance with project environmental commitments, mitigation requirements, and permits. The DM determines the need for internal design reviews based on the significance/magnitude of the change.

The RFI/FDC package is treated like a Final Design Submittal, and RFC of the documents (including DQAM audit) follows the RFC procedure steps in Section 4.7 of this QMP.

Changes to documents that have previously been RFC'd are made in accordance with "Control of Design Changes" per Section 4.9, above.

4.10 As-Builts

Refer to Section 2.6 (As-Built Drawings) of this QMP.

4.11 Shop and Temporary Construction Drawings.

Refer to Section 5.7 (Shop and Temporary Construction Drawings) and 5.10 (Supplemental Drawings) of this QMP.

4.12 Schedule Requirements

Proposed design and review activities are identified on the three-week look-ahead schedule that is distributed each week and available on the Design-Builder's tracking software. These activities will also be discussed at the weekly Quality Task Force meeting.

4.13 Forms

The following forms related to design quality are provided in Appendix C:

<u>Form</u>		<u>Reference(s)</u>
Form GDQA	Geotechnical Design Quality Audit	Section 4.3.3,
Form GRCP	Geotechnical Review Check Print	Section 4.3.3,
Form DQA	Design Quality Audit Checklist	Section 4.5
Form RCSR	Review Comment Summary and Resolution	Section 4.6.1
Form SEDQA	Supplier Engineering Document Quality Audit	

4.14 Design Quality Procedures (DQP)

Refer to Appendix A of this QMP for detailed procedures applicable to the design quality processes. Design Quality Procedures include the following:

DQP Number **Procedure Title**

5.0 Construction

This section defines the quality organization and systems designed to ensure that the specified materials are used and that the installation is acceptable to produce the required end product. The implementation of the Construction Quality Plan procedures is fundamental to the success of the project and will ensure that WSDOT receives a product that complies with their requirements and addresses concerns regarding quality, durability, and life-cycle maintenance costs.

5.1 Construction Quality Organization and Responsibility

The QO, as defined in Section 1 (Management) of this QMP, provides the necessary supervision, quality control and quality assurance processes (inspection and testing) of all items of work, including that of all subcontractors and suppliers, which will ensure compliance with the specified requirements.

The QO will conduct the Quality Assurance (QA) inspection and testing in accordance with the contract, including the QMP. The construction materials elements of the QMP will be implemented in accordance with the requirements of the WSDOT Construction Manual and the WSDOT Materials Manual. WSDOT personnel will perform quality verification testing (QVT) to statistically compare and validate the results of the QA's tests. If the QO's QA tests are statistically validated by the WSDOT tests, then the QO's QA test results will become part of WSDOT's basis for acceptance of the work. WSDOT will perform split sampling and testing for Independent Assurance (IA). WSDOT also will provide quality verification inspection (QVI), oversight inspection of the QO's work. The PM and QO will facilitate with WSDOT to fulfill its responsibilities of exercising due diligence in overseeing the construction.

5.2 Work Conditions

The Design-Builder will deliver the Design-Build Project as a model for the construction industry in eliminating or controlling accident risks to construction personnel, the general public and the environment. Our team is founded on a philosophy of health, safety, quality and environmental excellence. Believing that every incident is preventable. Personnel, public, and environmental hazards can be identified and eliminated using this approach; and successful field implementation of the Safety program will contribute to delivering a quality product on schedule and within budget, while minimizing public inconvenience.

5.2.1 Safety Program Commitment

The Design-Builder is committed to excellence and leadership in workplace safety throughout our operations. We will exceed WSDOT expectations through safe, innovative, and environmentally sound practices in delivering this project.

The following core principles guide our team and create a workplace that encourages participation from all staff:

- Management provides the leadership and resources to enhance employee awareness and participation in creating a safe and environmentally sound work environment.

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- Safety and environmental processes are integrated in our business management and project delivery systems, ensuring systematic recognition and reduction of risks to personnel, the general public, and the environment, including pollution prevention.
 - Our subcontractors are required to achieve and maintain excellence in safety and environmental practices.
 - Occupational health and safety regulations and environmental laws are established as our minimum acceptable criteria.
 - The effectiveness of our safety and environmental programs is continually improved by setting and reviewing objectives and targets, and reporting performance metrics to WSDOT and our staff.
 - Construction staff is encouraged to exercise sound safety and environmental practices in all aspects of their lives, not just at work.

5.2.2 Communications

During periods of high levels of construction work and complex construction activities, safety, environmental and quality meetings are held as frequently as once, or even twice a day. These meetings review the tasks before the construction activities begin to ensure these items are addressed throughout activity execution. After a construction activity is completed, any safety, environmental and quality issues observed or ideas for improvement developed are discussed at post-activity review meetings. Because of the high priority we place on safety, quality, and environmental issues, the importance of communication about this critical topic cannot be overemphasized.

5.3 Materials

The CQAM or their designated representative will document and inspect all materials delivered to the job site prior to use and within 24 hours of delivery, as described in Section 3.1 of this QMP. The CQAM will keep records of each delivery, material bill of lading, certificate of compliance, and test results. The CQAM will develop a materials tracking system to track the materials quantities and acceptance status.

The CQAM or their designated representative will identify and log the material. The identification will include any information clarifying where the material is to be used. All material, each piece of equipment, or element of work will be tagged, labeled, or stamped to indicate whether the material has been accepted. To preclude inadvertent bypassing or duplication of such inspections and tests, the items will be identified either when they have satisfactorily passed required inspections and tests or upon acceptance when the materials are delivered to the job site.

All materials will be stored per the manufacturer's recommendations and specifications. Once a month, or as required by the manufacturer, the QO will inspect the storage sites and the stored materials for compliance with the manufacturer's recommendations and project specifications. Additionally, the QO will inspect all materials for damage caused by improper storage or handling before incorporation into the project. If damage has occurred as a result of improper storage or handling, the material may be rejected. The QO inspector will document any issues with storage or handling of materials in his daily inspection report.

Section 1-06.4 and table 6 of the Conformed RFP provide for the statistical acceptance of some project materials. The acceptance by F and t Test analysis is per the Conformed RFP. The analysis will be done using the WSDOT-provided Statistical Analysis of Materials software

(SAM program). The CM can request the acceptance of small quantities without normal sampling and testing frequencies. The CQAM will accept or reject this proposal based on the information included in the request and the Conformed RFP. The CQAM will discuss at the Quality Management Team meetings every week any issue pertaining to materials for the project. Any rejected materials will be removed from the project within 24 hours of rejection or the CQAM will write an NCR.

5.4 Inspection

5.4.1 Work

The CM and the QO meet weekly for quality meetings and on a daily basis as needed to review and update the inspection schedule. The CQAM will provide inspectors for each work activity requiring an inspector. The CQAM also will provide appropriate personnel for QA sampling and testing efforts for all construction activities.

The CQAM will schedule the inspection of utility relocations with the utility owner before construction. These inspections will be documented and placed in the quality record for that particular utility relocation. The CQAM also will schedule quality check point audit inspections with the CM and WSDOT.

The purpose of the daily inspections is to document that construction practice, finished work and sampling and testing meet the requirements of the QMP and project documents.

Before beginning a work activity that requires inspection and testing staff, all inspectors and sampling and testing personnel are at the site of the activity. The CQAM or designated representative will inspect the site before activity starts to determine readiness of the work area. The CQAM will check the quality records to determine if a quality check point conformance has been obtained, if necessary. Once these items are completed, work may begin.

QA sampling and testing will be performed randomly by the QAO in accordance with the testing plan for each material provided to the project. The plan will be developed using a Random Numbers Table or by using a random number table generated in a spreadsheet format and it will reflect the total estimated plan quantity. The plan will be submitted to WSDOT or posted in the Design-Builder's tracking software before placement of the material on the project.

The QO maintains an inspector's daily inspection report (IDR) containing each work activity that has been inspected. The inspector's daily inspection report is part of the activity file. The IDR's will be generated digitally and hard copies will be printed, reviewed, signed and filed.

The Process QC staff will assist in developing appropriate work procedures to meet the requirements for the project. The Process QC staff will make preliminary on-site tests, and will modify the processes as necessary to meet contract, plan and specification requirements for the project. QC testing will be performed at the time and location as determined by the CM.

The CQAM notifies the outside entities two weeks before inspections of their facilities are necessary. The CQAM calls the outside entity 24 hours before the construction activity to allow the entity to provide appropriate personnel for the inspection. The CQAM coordinates any sampling and testing necessary for the entity and provides sampling and testing personnel, as necessary.

Limited Acceptance Inspections by WSDOT

WSDOT will conduct acceptance inspections of the following items. The Design-Builder will conduct quality control for the off-site fabrication of these items in accordance with Quality Management Plans that are approved by WSDOT:

Highway traffic signs

Traffic signal controllers

ITS systems

Fabrication Items

The CQAM will coordinate with WSDOT for the above items as required by the Conformed RFP.

5.4.2 Production Plants

The HMA acceptance sampling and testing in the plant and on the grade will be performed by WSDOT.

The concrete batch plant for the production of Portland Cement Concrete (PCC) will be a National Ready Mix Concrete Association approved plant. For production of PCCP, and structural concrete, the CQAM will review the testing data for conformance with the plans and specifications. The concrete mix design will be developed per the WSDOT Standard Specifications.

5.5 Field Procedures

Design-Builder will use appropriate field procedures to provide a product that meets the requirements of the contract, plans, and specifications.

Our team will plan the work effort and prepare all working drawings needed to accomplish the work before beginning construction. The CM shall understand the field procedures, plans, and specifications. The CM will discuss QA requirements with the CQAM or a designated representative before beginning work. The CM will describe the work requirements and QA requirements to all the workers involved in the work.

The CM will begin construction of the work and the Project QC staff will perform the tests deemed necessary by the CQAM to develop processes that provide conformance to the contract, plans, and specifications. The construction team will modify its processes, as deemed necessary by the CM and CQAM, to keep the work in conformance with the contract, plans and specifications.

The CM will provide training to all personnel in the appropriate process to be used for each work element under construction. If processes change, the CM is responsible for training the workers in the new processes.

Special procedures required for unique product or design conditions are outlined in special provisions developed by the design team. These procedures cannot be modified without written change authorization from the design team.

5.6 Dispute Resolution

If a dispute arises in the QO sampling and testing process, the following dispute resolution system is recommended.

Initially, through the Quality Management Task Force meetings, the CQAM, and WSDOT will review technical procedures, test methods, sampling procedures, equipment certifications, and lab procedures to look for procedural or technical causes for test discrepancies. Observation of sampling and testing method, as well as inspection of test equipment will be performed by an IA inspector. Corrective action is to be taken immediately if the cause of the discrepancy is located during this review process. However if there is a problem that requires immediate attention and resolution the CQAM has the authority to stop the work until a satisfactory resolution is reached and the work can safely proceed with the proper corrections. If the cause is not located and corrected, the issue is escalated as follows.

A statistical analysis will be performed using the approved WSDOT procedure. If agreement is not reached, resolution will be reached by following the procedures required by the applicable sections of the Conformed RFP.

5.6.1 Conflict Resolution

When disputes or issues arise, Design Build participants will try to resolve informally through the agreed upon below “Issue Escalation Chart”. If it can not be resolved through the Design Build partnering process it may be brought, with mutual agreement by both parties, to the Dispute Review Board for assistance in resolution.

Insert Here - Design Builder Issue Escalation Chart

5.7 Shop and Temporary Construction Drawings

5.7.1 Shop Drawings

The Project Construction Engineer will obtain appropriate shop and erection drawings (for work permanently incorporated into the project) from fabricators, and vendors and forward to Design via Document Control, where the drawings are assigned a subcontractor submittal identification number. Drawings that require engineering calculations or engineering judgment shall be developed under the supervision of, and sealed by, a professional engineer registered in the State of Washington. The Document Control Administrator then completes the submittal tracking data for the project. The log, which is maintained in the Design-Builder's tracking software, has the following columns of information in the specified order:

- Submittal Identification Number
- Receipt Date of Submittal Document – Logged into the notes of the submittal.
- Date Sent to Reviewer/Design Team
- Date Reviewer Received
- Date Response is due
- Date Received Back from Reviewer/Design Team (Response Date)
- Status/Action or Decision of Review
 - Date Returned to the Submitting Company. - Logged into the notes of the submittal.

Each time a submittal is received, the DM or their designee logs in the submittal. The drawings are forwarded to the design team with all of the above submittal information attached to the shop drawings. If a submittal consists of drawings previously approved, these drawings are forwarded to the design team for information only and do not require review, stamping, or signatures.

If review is necessary, the drawings are first reviewed for constructability by the Project Construction Engineer. Once submitted to the Design Team, the reviewer, chosen from the design staff, places a shop drawing review stamp on the drawings. He/she completes a technical review of the drawings to determine their compatibility with the plans and specifications. The reviewer returns the drawings with his/her comments to the DM; the DM forwards them to the Document Control, who then delivers them to the Construction Quality Assurance Manager (CQAM) for review.

The CQAM reviews the drawings, stamps them “For Construction” and returns them to Document Control to formally transmit and distribute. If the drawings are not approved, they must be returned to the vendor for correction. Revisions are resubmitted through this process until they are approved. Design-Builder supplies WSDOT with a copy of the approved drawings at least one business day before the start of any on-site work detailed in the drawings. For off-site fabrication, the approvals and drawings are forwarded to WSDOT at least seven business days before beginning fabrication. No changes are made to any approved shop or working drawings without resubmitting the drawings and beginning the review process again.

Shop drawings are reviewed and approved by the design team. Falsework, erection, and shoring drawings are stamped and signed by a Professional Engineer licensed in the State of Washington and reviewed by the CQAM..

To be approved, a shop drawing is:

- Submitted to the Engineer of Record for review and comment

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- Signed by the design reviewer
 - Stamped “Approved for Construction”
 - Reviewed by the CQAM or ACQAM, and stamped “For Construction”

For additional requirements for shop and working drawings, refer to Section 5.10 (Supplemental Drawings) of the QMP.

5.7.2 Temporary Construction Drawings

The Project Construction Engineer will obtain appropriate falsework, shoring, and erection drawings from fabricators, vendors, subcontractors, or in house. Drawings that require engineering calculations or engineering judgment shall be developed under the supervision of, and sealed by, a professional engineer registered in the State of Washington. Falsework, shoring, erection, or other temporary construction drawings require a similar QC and QA as other design documents, see Temporary Construction Drawings Exhibit. Temporary construction drawings shall be submitted for one design check and constructability review, revised and issued for construction. The CQAM shall audit and certify temporary construction drawings.

(Design-Builder responsible for exhibit for Temporary Construction Drawings **insert here**)

5.8 Testing

5.8.1 Test Procedures

The QAO completes field sampling per the requirements of the Conformed RFP. These requirements cannot be changed without written authorization of the CQAM and approval of WSDOT.

The CQAM schedules QA sampling and testing staff to support the normal progression of the work.

The QAO performs testing for all work elements requiring acceptance tests. Tests are conducted in accordance with the Conformed RFP requirements. The CQAM performs F and t statistical analysis of the QAO acceptance tests and the quality verification (QV) tests performed by WSDOT personnel. The F and t statistical analysis is performed in accordance with the requirements of the Conformed RFP. If the QAO tests are statistically validated by the WSDOT tests, then they form the basis of acceptance. If they are not validated then the CQAM and the WSDOT project engineer will refer to section 5.6 of the QMP.

Initially, QAO material acceptance tests and the WSDOT QV tests will be performed at the same frequency to establish a confidence level in the results of the QA and QV tests. The QAO will exercise sound judgment in its testing approach and may increase the frequency of testing in situations in which quantities may be small but location is of importance, such as sliver fills.

The QAO documents tests on forms developed by Design-Builder and approved by WSDOT. Test results will be prepared by Design-Builder and documented in the WSDOT-provided Statistical Analysis of Materials Software. The QAO will audit all test procedures to ensure that they meet the AASHTO, ASTM, or the WSDOT requirements.

5.8.2 Equipment Certifications

The CQAM will check all measuring and testing devices to evaluate the working order, condition, calibration and certification of the equipment. The calibration verification of all

testing equipment will meet the requirements of AASHTO R-18. The CQAM or his designee will maintain calibration records of required activities. The calibration program is set up in compliance with the contract documents. The QAO laboratory is required to provide and maintain the following:

- A list of testing equipment proposed for each test procedure, including all calibration data.
- A copy of all laboratory inspection report by WSDOT along with documentation that deficiencies, if any, have been corrected.

QC procedures ensure that tools, gauges, instruments, and other measuring devices are properly maintained, controlled, calibrated, and adjusted. The Laboratory Manager is responsible for the continual calibration and maintenance of the measuring and testing equipment per AASHTO R-18. Label each piece of equipment with the necessary seals or tags that specify the date and by whom it was calibrated. Documents verifying the calibration of test and measuring equipment are retained in the materials testing laboratory.

5.8.3 Instrumentation

All instrumentation is installed, maintained, and monitored in accordance with manufacturer specifications. The appropriate personnel are assigned to install, maintain, and monitor all instrumentation.

5.8.4 Coordination

The CQAM coordinates with local agencies and Utility Owners to insure all inspections and testing requirements are met. The inspections and testing are documented and placed in the quality record for that particular utility or local agency.

5.8.5 Qualifications of Labs

All QA testing will be performed by a WSDOT-approved laboratory reporting directly to the CQAM. The laboratory will meet the requirements of AASHTO R-18 for qualified testers and calibrated/verified equipment and be able to accomplish the testing according to the test procedure they are performing. The CQAM will inspect the labs and check their certification a minimum of once every six months. The labs will provide all equipment certifications and calibration dates to the CQAM for the quality records for the project.

All equipment used, whether at an established laboratory or satellite (field) laboratory, has to be calibrated/verified. The labs have uniform policies and procedures per AASHTO R-18 to ensure that they are providing testing services in compliance with applicable test methods. The policies and procedures address inspection and calibration of testing equipment, as well as a correlation-testing program between the laboratory and portable or satellite facilities.

The QA laboratory will not under any circumstances perform any QC testing whatsoever.

If a laboratory is disapproved, it shall not perform any tests for the project.

5.9 Non-Conforming Work

During construction and placement of materials, QO field personnel reject workmanship or materials that are not in accordance with the specifications. The construction field personal then have the opportunity to correct the workmanship or materials in order to bring the work in

accordance with the specifications. The non-conformance process presented below is followed for completed work or materials that do not meet the plans or specifications.

5.9.1 Non-Conformance Report Identification

The design and construction teams and QO staff are responsible for identifying non-conforming work. WSDOT may also identify potential non-conforming work to the CQAM for action. Any completed work not meeting the plans, specifications and contract requirements is to be deemed non-conforming. Anyone in the QO may prepare a non-conformance report (NCR) for review by the CQAM. This report must detail the area of the problem, and cite from the plans, specifications or contract, how or why the work does not conform. The NCR must be submitted to the CQAM in writing within 24 hours of identification, and a copy posted in The Design-Builder's tracking software for all parties to review. The outstanding reports will be discussed in a review of the NCR log at the weekly quality management task force meeting.

5.9.2 Non-Conformance Remediation

The NCR has several avenues for remediation depending on the severity of the problem. Among them are:

- Remedy the situation—Design-Builder corrects deficient work.
- Prepare an RFI with proposed remedy to obtain the intended design purpose.
- Design-Related NCR Issue—The DQAM or CQAM will issue the NCR and request design review of the non-conformance. The QO is responsible for providing detailed information for the design team to review. The design engineer who signed and stamped the drawing for the work will evaluate and determine whether a non-conformance exists, and the effect of the non-conformance on performance, safety, durability, long-term maintenance, and the life of the item. Remedial actions will be documented and stamped by a Professional Engineer licensed in Washington. The DQAM must also sign the NCR, stating that remedial actions to be used have undergone the same level of checking, inspection, and testing as required for the original design.
- Price Reduction—for the work element outlined in the contract specifications, the CQAM will perform the calculations in accordance with the contract, obtain written approval from the DM of structural adequacy if applicable, and forward this information to WSDOT and the Project Manager for administrative closure of the NCR.
- Remove and Replace—The CQAM may require the CM to remove and replace any non-conforming work.

Remediation must have WSDOT concurrence and may require a change order.

5.9.3 Removal of Work

If WSDOT does not agree with the remedial actions set forth in an NCR, it has the authority to call for removal of the non-conforming work.

5.9.4 Weekly NCR Reports

The QO maintains an on-going log of all NCR's and it is posted in the Design-Builder's tracking software for all parties concerned to review and it is updated on a daily basis as needed. The QO numbers each NCR sequentially; gives a brief description and status of the non-conforming work, and, if the NCR has not been closed, an expected closure date. WSDOT does not grant acceptance for any portion of work that has an outstanding NCR. Any Non-conformance issues

generated from the construction audit tracking system (CATS) by WSDOT personal will also be posted as an NCR in the log as well as responded to in the CATS program.

5.9.5 Department NCI

WSDOT reserves the right to issue NCI's based on its observance of work. WSDOT-generated NCI's require the same review and ultimate closure as NCR's generated by the QO. They will also be posted in the NCR log when generated.

5.10 Supplemental Drawings

5.10.1 Shop and Temporary Construction Drawings

The Document Control department submits signed and stamped RFC Construction drawings to the CM. RFC Shop Drawings are sent back to the Subcontractor with copies sent to the Design-Builder and WSDOT "For Construction" distribution. The Construction Project Engineer generates or obtains supplemental drawings (shop and working drawings) as necessary to define, control, construct, and inspect the work. Working drawings consist of detailed layout of various work efforts to assist the construction team in building the work. Unless engineering judgment or calculations are required these supplemental drawings do not require a professional engineer stamp.

Shop drawings are prepared by subcontractors to Design-Builder for all structural steel fabrication, anchor bolt layouts, shop details, erection plans, or any other items required by the plans, specifications or contract. If the work/design requires an engineer's judgment or engineering calculations in designing the item, the drawings shall bear the stamp and signature of a Professional Engineer, licensed in the State of Washington. These drawings will be reviewed per the QMP.

Shop drawings are logged and reviewed according to the procedures discussed in Section 5.7 (Shop and Temporary Construction Drawings) of this QMP. WSDOT may request to review working or shop drawings at any time.

If necessary, a comment resolution meeting is held with WSDOT, the design team, the PM or his designee, and the CPE to resolve any conflicting comments. This meeting is held at the end of the comment period and comment resolution recorded for quality record.

The design team and/or subcontractor, as appropriate, then modifies the plans in accordance with all comments and resubmits for final approval.

5.10.2 Reviews by Local Agencies and Utilities

As part of the shop and temporary construction drawing review process, the Design-Builder will send appropriate local agencies or utilities copies of shop and temporary construction drawings for their review as specified in the plans, specifications or contract. These drawings are reviewed and approved by the agencies in the same manner as the design team shop drawing review process. Document Control will log the drawings, date sent out, date received back and includes any comments sent by the local agency or utility that must be addressed by the Design-Builder before final approval of the drawings. The agency and utility are given appropriate time to review and respond to the drawings as defined in the specifications.

If necessary, a comment resolution meeting is held with the design team, PM or his designee, utility or local agency and the DM to resolve any conflicting comments. This meeting is held at the end of the comment period and comment resolution recorded for the quality record.

The design team then modifies the plans in accordance with all comments and resubmits to the DQAM or CQAM for final audit and certification. No fabrication or construction occurs without approved shop drawings.

5.10.3 Public Safety

The Design-Builder will send shop or temporary construction drawings that may adversely affect the public health or safety to WSDOT and the local agency for review and approval at the same time the design team is reviewing the drawings. The Design-Builder, vendors, or subcontractors may prepare drawings for work such as shoring, crib walls, cofferdams, falsework, overhead signs, temporary support systems, formwork and other temporary work that may affect public safety. The QO will review the drawings as discussed in the shop or temporary construction drawing process, Section 5.7, or as shown in Temporary Construction Drawings Exhibit.

5.10.4 Bridge Superstructure Shop Drawings

Fabrication of any bridge superstructure elements does not begin until shop drawings for the element have been reviewed and approved by the QO as described in Section 5.7 (Shop and Temporary Construction Drawings) of this QMP.

5.10.5 Design-Builder Responsibility

The Design-Builder is responsible for temporary items used in the work. The receipt of submittals for temporary work in no way constitutes approval of the planned work by WSDOT. The Design-Builder accepts sole risk for any procurement or fabrication of materials without QO-approved shop drawings.

5.11 Quality Check Points (Hold Points)

Hold Points referenced in the RFC are referred to as Quality Check Points in this QMP and are interchangeable with the same meaning.

Quality Check Points (QCP's) will be established at various stages of construction for the project and will provide an opportunity to evaluate the work for acceptability before beginning the next portion of the work. Representatives from WSDOT (when they elect to be present), the PM, design team (when required) and QO will review the progress to date, including the inspection reports, process and QA test reports, settlement data, pile driving records, string-line measurements, audits and other pertinent data. The CQAM meets with WSDOT on a daily basis to schedule quality check points for the following day. No additional work takes place until all parties present mutually agree that the work done up to the QCP is acceptable.

QCP's will be incorporated into the schedule and will occur at the following stages of construction:

Pre-Construction Meetings (Pre Activity Meetings)

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- Prior to starting new work on the project there will a pre-con meeting held with all parties involved in the work represented and present in the meeting. This meeting will in general follow the outline and guidelines of section 2.28.1.2 of the chapter 2 of the conformed RFP.

Temporary Erosion and Sediment Control

- After installation of high visibility fencing around environmentally sensitive areas, clearing limits, travel corridors, and stockpile sites.
- After completion of placement of Temporary Erosion and Sediment Control devices, and prior to any construction operations.

Embankments

- After completion of drainage embankment and utility installations, and before backfill.
- At intervals of embankment construction every 5 vertical feet.

Structures (Bridge, retaining walls, noise walls, curtain, and end walls)

- At completion of bridge embankment or excavation, and before the start of structure foundation.
- Before saw-cutting of concrete occurs.
- Before pile driving or drilled shaft operations.
- After completion of the first piling driven at each structure support, and at the completion of each pile group, for each structure support.
- After completion of each drilled shaft along with Cross Holed Sonic Logging testing, and at the completion of each drilled shaft group, for each structure support.
- Before concrete placement of any subsurface element including concrete for cast in place piles and drilled shafts.
- Grout pad or anchor bolts prior to setting bearing or girder.
- After girder and diaphragm placement.
- Before concrete placement of bridge deck, approach slabs, diaphragms, traffic barrier, and parapet walls (with formwork, inserts, and reinforcement in place).
- After completion of excavation and prior to box culvert construction.
- Before concrete placement for cast-in-place box culverts with formwork, inserts, and reinforcement in place.
- Prior to installation of post tensioning strands or bars.
- Prior to jacking operations for post tensioning with hydraulic jack on the job site.
- After completion of bridge deck grinding and deck repair.
- Prior to application of any paint or pigmented sealer.

Retaining Wall

- After completion of soil foundation and before the placement of the leveling pad of a Structural Earth wall or the foundation of any other type of retaining wall.
- Panel tolerances after completion of placement of panels for each Structural Earth wall prior to beginning of coping placement.

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- Before concrete placement for cast-in-place retaining walls with formwork, inserts, and reinforcement in place.

Noise Wall

- After completion of soil foundation and before the placement of footing formwork.
- For pre-cast panels, after the placement of ten panels.

Drainage

- After placement of pipe or box culvert and prior to backfilling.
- After installation and placement of bands or gaskets and prior to backfilling.
- After placement of catch basins and manholes and prior to backfilling.

In-Water Work

- Before conducting any in-water construction activities and prior to operating any equipment below the ordinary high water mark. This includes Work in wetlands, streams, or mitigation sites.
- Culvert replacement, removal, and extensions.
- Prior to capturing and removing fish from the job site at any area that includes water bypass, in-water coffer dam, and any water area likely to be disturbed.
- Prior to installing riprap or other bank stabilization.

Subgrade, Surfacing, and Pavement

- Completion of subgrade and prior to surfacing placement.
- Completion of surfacing placement and prior to Asphalt Treated Base, HMA, and reinforcement for approach slab placement.

Electrical

- Prior to removal of existing ITS equipment, and new or temporary ITS equipment in place and operational, in accordance with Section 2.18.
- Prior to removal of existing CCTV cameras, and new CCTV cameras in place and operational.

5.12 Audits

Periodic audits of construction and testing, off-site plants, and testing labs are scheduled and performed in accordance with Section 2.4 (Audits) and as outlined within Section 5 (Construction) of the QMP.

6.0 Maintenance of Public Facilities

6.1 Monitoring Procedures Before, During, & After Construction

A Traffic Control Supervisor (TCS) and a Community Involvement/Public Information Officer will monitor safety issues, noise and dust complaints, and review access to businesses. The TCS will review the signs, striping, barrels, etc. for conformance with the plans and specifications. The TCS will review the traffic control set-up after every change and at the beginning of every shift to ensure compliance with the plans and specifications. The Community Involvement/Public Information Officer will be available to respond to and handle public complaints or maintenance issues along the business access areas, sidewalks and other public facilities. The TCS and the Community Involvement/Public Information Officer will report any problems to the Construction Manager and the issues will be remedied.

The CQAM will review the traffic control, debris, noise and dust issues, access to businesses, and safety of detours on a daily basis in accordance with the CCP and TMP. Any areas that are deemed to require maintenance or safety improvements are documented and reported to the CM. The CM will immediately remedy the situation.

6.2 Documentation

The TCS will provide a daily inspection report for the traffic control and will submit a copy to the CQAM. The Community Involvement/Public Information Officer will document all complaints and monitor that they are resolved in a timely manner. A copy of all communication with the public and resolution of issues with the public will be forwarded to the CQAM and WSDOT for inclusion in their records. The CQAM will include traffic control and other safety or public facilities issues in the daily diary.

6.3 Community Outreach

Our approach to community relations for the Design-Build Project responds to the primary community concerns that our team has identified during initial conversations with community organizations, and from previous WSDOT community meetings, and it includes a thorough outreach effort once construction gets underway. In sharing project information with the community early, we will prepare them on potential construction impacts that are heading their way, and give them the opportunity to discuss project scheduling, design, and phasing of construction tasks. Community feedback will help guide the project team throughout the design-build, with the goals of arriving at a community supported design outcome and a process that minimizes construction impacts to the community. This up-front approach to public involvement will then be followed with outreach during construction by providing timely and frequent construction information.

The primary concerns voiced by residents and other stakeholders include:

- Noise
- Placement and design of sound walls
- Demolition of the Wilburton Tunnel and loss of the dinner train.

-
- Traffic control impacts in communities
 - Light pollution resulting from night-time work

6.3.1 General Outreach Tools

Throughout the project, we will implement the following public involvement and community outreach tools.

Community Database

We will develop and maintain a community database based on existing addresses that have been gathered for this project by WSDOT, and that includes everyone who lives within the project corridor. Once construction gets underway, we will expand this database with information received from the community.

Folio

Both WSDOT and the “City” have numerous communication tools available for use to publicize the project. Examples include the project email list and “It’s Your City” newsletter. Use of existing tools will be maximized. Additional materials will be developed on an as needed basis.

Construction Notices

Flyers will be distributed to residents and businesses directly affected by construction activities during each phase. These notices will announce upcoming work tasks and potential impacts, such as traffic, parking, and access changes, noise, utility interruptions, vibration, etc. These notices are up-to-date-reminders that supplement the information provided in the general project folios and are personalized to a specific audience. The need for these construction flyers is decided upon during the weekly project progress meetings.

Construction Emails

The Design-Builder will submit content as needed for WSDOT’s weekly project email list.

Weekly Construction Updates

The Design-Builder will submit information to WSDOT for weekly construction updates to the media. These brief updates will highlight construction that affects traffic for the upcoming week.

Internet Information

The Design-Builder will provide weekly construction updates for posting on WSDOT’s existing website. This web site will provide a means for the public to learn about the project in general, its need and benefits, potential construction impacts, and to submit comments/questions. The URL will be included on all public literature.

Community Meetings

Throughout construction, we will continue to be available to staff public meetings. These meetings serve to provide construction updates and progress reports, explain challenges, and to take a pulse on how community members are coping with construction impacts. The Design-Builder will invite community groups to request meetings with the project team throughout construction and will be available to attend any meetings that are scheduled through the WSDOT staff. The project team may also organize informal briefings with business owners along the project corridor to meet with them on upcoming construction impacts, receive feedback on construction activities, and potentially walk the site to discuss impacts.

Display Signage

Construction signage for this project will be installed at various community locations within the “City.” These signs will include a brief project description and location map, estimated construction timeframe, contact information, and the website URL. Other necessary project signage that will be discussed with WSDOT staff include:

- Variable messaging signs for use on major arterials
- Signs posted by Metro and Sound Transit local bus stops to announce changes in service
- “Businesses are open” signs
- Project information boards to be placed at libraries and community centers or other community groups

Construction Hotline

The existing construction hotline will be used for this project. The WSDOT Public Information staff will check messages on this hot line; and our community relations lead provides the necessary follow up. Follow up must be completed within 24 hours of receiving the phone call. This hot line will be advertised on all project literature and signage, and the website. A construction complaint log will be maintained as a tracking system and to evaluate customer service performance.

The public will be informed to call 911 for emergency situations.

One-on-One Contact with Residents and Businesses

Throughout construction, the communications lead will provide notification to businesses and residences within four blocks of construction activity that impacts traffic. The notification process may include flyers delivered on a door to door basis, or through direct mail, or through e-mail notification.

Coordination with the “City”

Throughout construction, we will work closely with the “City” staff to determine outreach needs, coordinate community events and meetings, and update them on project progress. We will request a representative to be present at our weekly progress meetings as well.

7.0 Surveying

All survey work will be performed in accordance with WSDOT-approved Survey Plan, the plans and specifications, and standard engineering and surveying practices under the responsible charge of a professional land surveyor registered in the State of Washington.

7.1 Construction Staking Quality Control

7.1.1 Development of Field Books and Supplemental Field Staking Data

Three levels of quality control checking will be performed on the data used for construction staking. The process is outlined in the following paragraphs.

The Construction Surveyor will use released design drawing information to establish field staking information such as coordinate data, station offset data, and property corner and right of way calculations by re-creating the plan set in the software format required by the Conformed RFP. The Construction Surveyor uses the re-created information to check the accuracy of the plan, set coordinates, elevations, offset, bearings, angles and slopes to the given typical sections, profile alignments and super elevations tables. A visual check of the information entered into the required software format in conjunction with spot check comparisons between the generated information and the released plans provides the first level of quality control checking. If any discrepancies are found at this point, the Construction Surveyor will not proceed until the discrepancies are resolved and/or corrected.

The Construction Surveyor will use the confirmed information re-created in the software required by Section 2.1.7 of the Conformed RFP to establish the geometrics for staking. This staking information, in the form of Stations and Offsets is used to develop field books. A separate field book is developed for each staking activity (i.e., utilities, slope stakes, bridges).

The second level of quality control checking occurs by performing spot checks on the survey field staking information entered into the field book. An individual, who has not been involved in the particular aspect of the field book data being checked, will spot-check the information for accuracy. The checker documents his check by placing a red check mark in the field book adjacent to the item checked. If errors are found, they will be corrected before inserting the red check mark.

The third level of quality control on the construction staking data will be performed in the field by the survey Party Chief. The Party Chief once again will make random spot checks of the field notes.

For some locations, supplemental staking plots will be developed in addition to the field books to provide additional information to the survey crew. These supplemental drawings offer an additional level of quality control in more complex areas by providing a visual reference of staking points.

7.1.2 Field Survey

The Construction Surveyor will use conventional surveying for construction field staking. This method will use a total station method measuring angles and distances and derives the horizontal element. Levels are used to acquire the vertical element. The Survey Plan addresses specifics of the Construction Surveyor's method for staking construction points.

7.2 Construction Staking Quality Assurance

7.2.1 QO Verification of Field Book

To ensure that the Construction Surveyor has performed spot checks in accordance with Section 7.1.1 above, the QA Surveyor periodically audits the field books.

7.2.2 QO Verification of Field Survey

The QA Surveyor will provide a series of QA checks on actual staked points to verify that the established points for Project Controls, construction surveying, property surveying, ROW markers, and re-established State and City Monuments are good. The estimated frequency of QO field survey verification is provided in Field Survey Exhibit.

FIELD SURVEY EXHIBIT

Frequency of QO Field Survey Verification

Survey Items	Estimated Total Project Points	Proposed Dedicated QA Check Points	Estimated Frequency	Comments
Slope Stakes	TBD	TBD	1/1000 ft stationing	Random selection both sides, mainline, ramps, and frontage roads
Culverts	TBD	TBD	4 per culvert	Check grade, location at 5 of 11
Pipe	TBD	TBD	1 per 400 ft	Hubs for cut sheets
SD Boxes	TBD	TBD	2 per box	Box location and RP at 30 total boxes
Curb and Gutter	TBD	TBD	1 per 400 ft stationing	Check grade and location
Sidewalk	TBD	TBD	1 per 500 ft stationing	Check grade and location
Signals	TBD	TBD	1 per pole location, 2 per signal for loops	Check location and grade
Major Sign Locations	TBD	TBD	1 per 6	Check location
Retaining Walls	TBD	TBD	1 per 200 feet of wall per wall For walls less than 1000 lineal feet in length – one check shot at each end and one in the middle. For walls 1000 or more lineal feet in length – one check shot at each end and every 500 feet between	Random selection, check grade and location
Barrier	TBD	TBD	1 per 600 ft	Random selection, check grade and location
Right of Way/ Property Lines	TBD	TBD	1 ROW marker per 1000 ft 1 point per 5 property lines	Random selection, check location
Control Points	TBD	TBD	15 control points	Check locations, elevation
Pile Locations	TBD	TBD	1 out of every 5 piles	Check location
Abutment Walls/ Bearing Pads	TBD	TBD	24 points for abutment walls	Check location, grade
Check PCC wire Lines on Mainline and Ramps	TBD	TBD	1 per 400 ft and gore areas	Check for grade and location

Total Points

7.2.3 Tolerances for QO Field Survey Verification

By using a survey method that provides an independent survey check on the Construction Surveyor, the QA Surveyor performs a truly independent check of the construction staking. However, due to the inconsistencies of the methods described and operator differences, exact duplications of surveyed points would be rare. Since the difference in the QO field verifications may be greater than the allowable tolerances, the QA Surveyor will identify the field verified point to either conform to the design intent and/or conform to the project specification tolerances. The QA Surveyor will use the tolerances within Survey Verification Exhibit to establish whether the field verified point conforms to the design intent.

SURVEY VERIFICATION EXHIBIT

Tolerances for QO Field Survey Verification with Design Intent (least count for measurement, not standard error)

Surveying Items	Horizontal Decimals of a Foot	Vertical Decimals of a Foot
Slope Stakes / Roadway Finish Grade Stakes	0.3/0.10	0.10/0.01
Slope Stakes / Sub-grade Finish Stakes	0.3/0.10	0.10/0.02
Culverts	0.3	0.1
Pipe	0.1	0.05
SD Boxes	0.1	0.1
Curb and Gutter	0.1	0.05
Sidewalk	0.1	0.05
Signals	0.1	0.10
Major Sign Locations	0.1	0.1
Retaining Walls	0.1	0.10
Barrier	0.1	0.10
Right-of-Way / Property Lines	0.01 Sufficient to meet accuracy requirements set by the American Land Title Association for Surveys in an urban area.	0.01 Sufficient to meet accuracy requirements set by the American Land Title Association for Surveys in an urban area.
Control Points	0.02 (+/- factor from published value)	0.02 (+/- factor from published value)
Pile Locations	0.1	0.01
Abutment Walls / Bearing Pads	TBD by Geotech	TBD by Geotech
Check PCC Wire Lines on Mainline & Ramps	0.1	0.01

7.2.4 Documentation of QO Survey Verification

The QO will document verification of field survey points using FORM FVR (Field Verification Report). This report will provide a description of the item checked, findings, comments, conformance with specifications and/or design intent, any action taken due to discrepancies, and the resolution of any discrepancies. Any supporting documentation generated for verification of points checked will be attached to the form. The form will be signed and dated at each step of the verification process. A certification signature will be placed at the bottom of the form once all discrepancies have been resolved.

All Field Verification Reports, in accordance with the frequency established in Section 7.2.2, associated with a particular activity, are required at the corresponding established Quality Check Points.

7.3 Coordination between Construction Surveyor & QA Surveyor

To ensure the effectiveness and timeliness of the survey verification process, the Construction Surveyor is responsible for keeping the QA Surveyor up to date on all construction staking activities. Notification will be provided to the QA Surveyor via frequent phone conversations and faxes. This coordination effort is essential for minimizing delays in construction activities.

7.4 Resolving Discrepancies

If errors are identified during the QO field verification, the QO notifies the Construction Surveyor and the CQAM. The QA Surveyor and Construction Surveyor try to resolve the discrepancy. The Construction Surveyor has the opportunity to accept and correct the error or reject the discrepancy. If the discrepancy is not resolved, a meeting is scheduled between the Construction Surveyor, the CQAM, and the QA Surveyor to resolve the discrepancy. If the discrepancy is not resolved at this level, the issue is escalated to the PM and WSDOT for resolution.

7.5 As-Built Documentation

Field records will be maintained for all plan changes and will be submitted to the Design-Builder for inclusion in the electronic files. As-built drawing processes and procedures will be in accordance with Section 2.6 (As-Built Drawings) of this QMP.

8.0 Utilities

This section defines the QC and QA processes for the following elements associated with utility work required for this project.

The DM may prepare plans for utility work and is responsible for the checking of those plans. The DQAM audits all utility relocation, modification or installation plans to ensure conformance to the quality process. The CM is responsible for the quality control for the utility work including checking the work and testing the materials. The CQAM provides the quality assurance inspection, sampling and testing of materials used for the utility work and audits processes for compliance.

Utility activities will be monitored and tracked at the utility task force meetings.

Utilities Exhibit

RFI Exhibit

**THE DESIGN-BUILDER CONSTRUCTION
QUALITY MANAGEMENT PLAN**

**APPENDIX A
DESIGN QUALITY PROCEDURES**

DESIGN-BUILD PROJECT

Appendix A

Design Quality Procedures

1.0 PURPOSE

The purpose of this procedure is to describe and define the quality control and quality assurance methods associated with the preparation of geotechnical documents for this project.

2.0 SCOPE

This procedure applies to the development, review, and audit of all geotechnical documents such as reports, technical memoranda, and calculations.

3.0 RESPONSIBILITIES

Geotechnical Engineer (Originator) — Primary author of the geotechnical document (calculations, memoranda, or report). Responsible for coordinating with the Geotechnical Lead and/or Geotechnical Design Manager to develop appropriate assumptions and approach to analyzing and developing recommendations. Creates the original geotechnical document(s) in a neat orderly manner which is conducive to checking/review.

Technical Editor— Performs Editorial Review on Final Reports to assure uniform format, proper sentence structure, proper syntax, and correct spelling.

Geotechnical Lead — Performs Technical Review by reviewing assumptions and methods and ensuring conformance with Conformed RFP. The Geotechnical Lead may sometimes be the Originator of a geotechnical document in which case the Geotechnical Design Manager is responsible for performing the Technical Review as part of the Principal Review.

Geotechnical Design Manager — Performs Principal Review and approves geotechnical documents for audit. The Geotechnical Design Manager is ultimately responsible for the design assumptions, methods of analyses, and conclusions and recommendations presented in the geotechnical documents. If the Geotechnical Lead is the Originator, the Geotechnical Design Manager is responsible for performing the Technical Review as part of the Principal Review. If the Geotechnical Design Manager is the Originator, the Geotechnical Lead will perform the Technical Review.

Design Quality Assurance Manager (DQAM) – Performs audits to verify that the geotechnical documents have been checked and/or reviewed in accordance with this DQP.

4.0 PROCEDURES

The geotechnical documents are developed and compiled using frequent discussions between the Geotechnical Engineers, Geotechnical Lead, and Geotechnical Design Manager as well as Task Force Meetings and Core Meetings to determine appropriate assumptions and approach. This process allows for incorporation of suggested corrections and guidance in a timely manner.

4.1 Procedures for Calculations and Technical Memos

1. Prior to beginning calculations/analyses activity or writing technical memos/reports, the Geotechnical Engineer meets with the Geotechnical Lead and/or Geotechnical
1. Design Manager to discuss the methods of analyses to be used, the underlying assumptions, and the document outline, as appropriate.
2. The Geotechnical Engineer develops the geotechnical document(s).
3. When the Geotechnical Engineer has completed origination of the geotechnical document, a review copy package is prepared by reproducing the geotechnical document(s) and inserting Form GRCP (Geotechnical Review Check Print) at the front of the review copy package with the appropriate information filled in (document name, package description, Originator, and date). When calculations are completed with commercial software packages or spreadsheets, complete input and output files are submitted as part of the review package. (All commercial software and spreadsheets used for geotechnical design and analysis are verified in accordance with the Conformed RFP.) The review copy package is then given to the Geotechnical Lead.
4. The Geotechnical Lead performs a Technical Review, reviewing the geotechnical document(s) for content and sound engineering. If the geotechnical document(s) had previously been reviewed by WSDOT and others (as part of the Preliminary Design Submittal), the Geotechnical Lead also verifies that prior comments have been resolved and incorporated, as applicable. The Geotechnical Lead marks-up any changes or comments within the review copy package and returns the review copy package to the Geotechnical Engineer. The Originator examines the comments and resolves and incorporates the changes as appropriate to correct mistakes, modify assumptions, modify approach or more clearly document steps. A revised review copy package is prepared and submitted back to the Geotechnical Lead for completion of the Technical Review.
5. Once the Geotechnical Lead is satisfied that all the comments have been appropriately addressed and/or incorporated, he/she signs-off on Form GRCP.
6. The review copy package is given to the Geotechnical Design Manager who performs a Principal Review which consists of a second Technical Review and an Editorial Review (for Tech Memos and Reports). The Geotechnical Design Manager notes any changes or comments within the review copy package and returns to the Originator for modifications.
7. Once the Geotechnical Design Manager is satisfied that all the comments have been appropriately addressed and/or incorporated, he/she signs-off on Form GRCP. The geotechnical document(s) is then ready for audit (refer to Section 4.4, below).

4.2 Procedures for Reports

For reports, the same steps as above are followed except, prior to the Principal Review (Section 4.1, Step 6) the geotechnical document is given to a Technical Editor. The

Technical Editor performs a detailed word by word Editorial Review and makes the appropriate corrections to assure uniform format, proper sentence structure, proper syntax, and correct spelling.

4.3 Documentation of Internal Geotechnical Review

For both preliminary and final submittals, Form GRCP provides documentation that the appropriate individuals have reviewed the geotechnical document(s). Each reviewer signs and dates the appropriate line on Form GRCP after their review has been completed as defined in Section 4.1 or 4.2, above.

4.4 Audit of Geotechnical Documents

After each geotechnical deliverable (tech memo or report) has been reviewed and before distribution by Document Control for review or RFC (see note below regarding “RFC of Geotechnical Submittals), the DQAM performs an audit to verify that the geotechnical documents have been checked and/or reviewed in accordance with this DQP. If the deliverable has previously been reviewed, per Section 4.6 (Design Reviews) of the QMP, the DQAM will also verify that prior comments have been resolved and incorporated, as applicable. Form GDQA (Geotechnical Design Quality Audit) is used to perform, record, and certify the audit. A nonconformance with the quality process results in the documents being returned to the Originator to bring the package into compliance. If the audit finds all documents in conformance, the DQAM completes and signs Form GDQA to document and certify that the QMP requirements have been followed.

At the appropriate time, the DQAM also uses Form GDQA to certify that the design package is approved for RFC (Refer to section 4.7 RFC Procedure of the QMP).

The DQAM shall conduct audits with care, but in a diligent and timely manner so that the design schedule is maintained. WSDOT shall have access to all audit documentation.

Note Regarding RFC of Geotechnical Submittals: Although the geotechnical documents are not actually Released for Construction, the final version (the version after incorporating Preliminary and Final Design review comments), follows the same RFC Procedures as non-geotechnical design documents. RFC of geotechnical submittals means that the submittal is approved as Final.

4.5 Formal Design Review of Geotechnical Deliverables

Formal Design Reviews of each geotechnical deliverable are performed in accordance with Section 4.6 (Design Reviews) of the QMP. The geotechnical deliverables include the Calculation Verification Submittal (CVS), technical memoranda, and reports. Geotechnical documents such as calculations are generally considered interim work products and are audited but are not submitted for Formal Design Review unless specifically requested by the WSDOT reviewers.

5.0 REFERENCES

A Calculation Verification Submittal (CVS) of commercial spreadsheets or math software used for geotechnical calculations is prepared in accordance with Section 2.6.5.1 of the Conformed RFP. The CVS development and review process is in accordance with Section 4.1, above.

6.0 FORMS/STAMPS

Form

Reference

Form GDQA Geotechnical Design Quality Audit DQP Section 4.4

Form GRCP Geotechnical Review Check Print DQP Section 4.3

Form RCSR Review Comment Summary and Resolution QMP Section 4.6.1

7.0 FIGURES

Not Applicable

8.0 REVISION HISTORY

Procedure Revision Date Description

QUALITY MANAGEMENT PLAN
APPENDIX C
FORMS

Design Builder's internally developed forms should include but, are not limited to the following:

- QA Design Audit Checklist
- QA Geotechnical Design Audit Checklist
- Field Design Change (FDC)
- Notice of Design Change (NDC)
- Manufacturer's Certificate of Compliance (MCC)
- Request For Information (RFI)
- Geotechnical Plan Review Checklist
- Request for Approval of Materials (RAM) (WSDOT example form available)
- Materials Receiving Report (MRR)
- Non-Conformance Report (NCR)
- Review Comment Summary and Resolution Form (WSDOT example form available)
- QA Sieve Analysis Worksheet
- QA PCC Testing Worksheet (WSDOT example form available)
- QA Field Density Report Worksheet (WSDOT example form available)
- QA Inspector's Daily Report (WSDOT example form available)

**THE DESIGN-BUILDER CONSTRUCTION
QUALITY MANAGEMENT PLAN**

**APPENDIX D
DOCUMENT CONTROL WORK PLAN**

DESIGN-BUILD PROJECT

1 Purpose

This Document Control Work Plan (DCWP) defines procedures and establishes the document control requirements and responsibilities for Design-Build Team on the Project.

2 Scope

This procedure is applicable to all of the Design-Build Team Members. The Project Document Control (PDC) as described within this document is maintained at the co-located project office. The PDC receives, logs, captures, and files correspondence, documents, and library reference materials that are generated and/or received as outlined by this plan from project initiation through closeout. The PDC generates or captures all incoming and outgoing project related documentation. The Design-Builder established and will maintain the Design-Builder's tracking software as our collaborative web-based document control system (DCS).

3 Acronyms

ADBTM	Design-Builder Design Build Team Member
CDL	Controlled Document Log
CQAM	Construction Quality Assurance Manager
DCA	Document Control Administrator
DCAF	Document Control Audit Form
DCL	Document Control Lead
DCPF	Document Control Processing Form
DCS	Document Control System
DCSOF	Document Control Sign Out Form
DCWP	Document Control Work Plan
DIN	Document Identification Number, unique number assigned by the DCS software
DQAM	Design Quality Assurance Manager
PDC	Project Document Control
QAO	Quality Assurance Organization

4 System Goals and Overview

The goal of the document control systems defined by this DCWP is to provide a thorough and consistent method of controlling the Design-Builder's documentation associated with WSDOT's Design-Build Project. The PDC system has both a paper (hard copy) component and an electronic component. Documents are either generated in, and printed

from, or scanned and uploaded into the document control system, herein after referred to as the Design-Builder's tracking software.

Users of the Design-Builder's tracking software are able to search for any document on a variety of search criteria, to open and view a scanned image of the document, and to print it out if desired. This electronic approach reduces the frequency with which project staff needs to remove hard copies from the project files, which in turn increases the level of control and security on the documents. However, if the hard-copy/original version of the document is needed for some reason, the user can easily determine from the document control software where it is located in the project files or document control library. The following items are also addressed in this Plan:

- Responsibilities
- Specific procedures for getting various document types into the document control system
- (including email)
- Information on how the electronic document control software is used on this project
- Electronic file organization and management
- Project library
- Location of, access to, and maintenance of the project files and library
- DCS backup and recovery
- Submittal Log in DCS

5 Responsibilities

5.1 Document Control Lead

The Document Control Lead (DCL), (Insert individual's name) is responsible for:

- Organizes, maintains, and manage records and documents pertinent to QA
- Organizes, maintains, and manage electronic Document Control System
- Monitoring the DCS system for compliance with QMP requirements.
- Responsible for documenting the specific guidelines
- Establishment and maintenance of a sign-out system for the project files and library.
- Establishment and maintenance of a listing and directory of all materials stored in the project library.
- Responsible for training Construction Design-Build team members on utilizing DCS

5.2 Document Control Administrator

The Document Control Administrator (DCA), (Insert individual's name) is responsible for:

- Complete processing of project documents as indicated by project staff, including electronic logging, scanning, and storage of all incoming and outgoing documents and attachments in the DCS database.
- Filing and storage of all physical documents such as paper documents, manuals, books, CDs, etc., in the project files and library.

5.3 Design-Build Team Members

All Design-Build Team Members are responsible for:

- Submitting to the DCA all relevant incoming and outgoing Project documents (See Section 6.2) for processing and entry into DCS, including all attachments and email.
- Knowledge and consistent use of file codes on all relevant project documents.
- Requesting Document Identification Number (DINs) and including them in outgoing correspondence and other documents.
- Familiarity and compliance with the formats and preparation requirements for documents as defined in this DCWP.
- Following established procedures for access to and removal of hard-copy documents from the project files or library, and for their prompt return.
- Familiarity and compliance with procedures defined in this Plan for management of electronic files.

6 Procedures

6.1 Document Coding

For each document received by PDC, which is NOT generated in the Design-Builder's tracking software, a Document Control Processing Form (DCPF), included in Attachment 2, must be thoroughly completed (either by hand or electronically) and attached to the document before being sent to the DCA for processing. In accordance with Sections 6.2.1 and 6.2.2 below, the DCPF allows for a file number (DIN) to be listed for the document. In addition, each document is assigned a single document type. The available document types are identified in the Document Type List included in Attachment 1. A current electronic version of the Document Type List is also maintained on the DCS server.

6.2 Getting Documents To and Into Document Control

6.2.1 Incoming Documents

Incoming project-related documents, which were NOT generated in the Design-Builder's tracking software, are received and processed as follows:

- For **incoming emails** (that is, emails generated by someone other than Design-Builder), the recipient prints out the email and follows the steps listed below. If there is more than one recipient within Design-Builder's organization, the first recipient alphabetically (last name) is responsible for printing and processing the email. For incoming paper documents received by any means (US Mail, overnight mail, hand delivery, fax, meeting handout, or any other method of transmittal), the addressee proceeds with the steps listed below.
- The addressee fills out a Document Control Processing Form (DCPF; see Attachment 2) by indicating information as appropriate. The addressee then forwards the document and DCPF to the DCA for processing.
- The DCA date stamps the document (if not already stamped), scans it, and logs the document into the Design-Builder's tracking software to obtain a DIN. The DCA files the original document in the project files or library, with the DCPF attached to the back. The entire original document, including any attachments, is filed by the DIN listed on the DCPF.

6.2.2 Outgoing Documents

Outgoing project documents originated by the Design-Builder's staff, and NOT created in the Design-Builder's tracking software, are also sent to PDC and entered into DCS as follows:

- The author attaches a DCPF to a copy of the document and fills it out by indicating the Document Type, Date, and other information as appropriate. The author then forwards the document and attached DCPF to the DCA for processing.
- The DCA date stamps the document, scans and logs it into the Design-Builder's tracking software to obtain a Document Identification Number (DIN). The DCA labels the document with the DIN and files the document in the project files or library, with the DCPF. The entire document, including any attachments, is filed by DIN.
- The DCA will distribute the document as shown on the DCPF.

Insert Here - Project Document Control Flow Chart:

6.3 Document Control System

6.3.1 General Information

Project documents are either created by or logged into The Design-Builder's tracking software to allow for control, tracking, and paperless retrieval (unless hard copies or originals are required for some reason). Document Control Index containing location of electronic files within our DCS, is stored in The Design-Builder's tracking software.

The database is located on a secure document control server. The ability to create, edit, send, view, and search documents will be available to personnel based on authorized access levels.

Our DCS, the Design-Builder's tracking software, is compatible with WSDOT's electronic document control system. All documents stored in our DCS database will retain their native formats (Excel, Word, Autocad, etc.) and would be able to be uploaded by a recipient into Expedition. Most documents created by the Design-Builder's tracking software (Submittals, RFI's, Transmittals, Daily Reports, etc.) are generated in .html and can also be distributed outside of the system via email and uploaded into Expedition by the recipient. From a data standpoint, most of the Design-Builder's tracking software reports can be exported to Excel so information like an RFI log could be transferred to Expedition by importing the excel data into Expedition.

The following information (as applicable) is entered into the document control database for each document, and document searches can be performed on any of these fields:

- File Number, auto generated unique number, (DIN)
- To Company
- To Name
- From Company
- From Name
- Schedule Activity
- Subject (or title of document)
- Date on the document
- Document Type
- Additional Subject Information or Keywords (Description)
- Author of DCPF

6.3.2 Submittal Naming

All submittal packages shall have a unique identifying number. The numbering system used in the DCS follows:

- If the submittal is a Design Submittal, it shall start with DESN and followed by 0001 (or the next submittal number).

- If the submittal is a Construction Submittal the numbering shall start with WXYZ and followed by 0001(or the next submittal number)
- Subcontractor submittal numbering is based on the first four letter of the company name, followed by 0001 (or the next submittal number for that company) ex:
ABC Drilling = ABCDXXXX or Guardrail R US = GRRU0001

In addition to the numbering if the Design Submittals are sets of plans. The submittal should include in the subject line if the package is preliminary (abbreviated as Prelim), Final, or RFC following the unique identifying number. After indicating what stage the package is at, discipline and if applicable location should be indicated in the subject line. Ex: DESN0003 Prelim Survey South Run A Muck Parkway.

6.3.3 Document Scanning

As part of the document capture process, documents NOT generated in Design-Builder's tracking software will be scanned and the resulting *.pdf* files uploaded into Design-Builder's tracking software to allow project staff to view documents electronically.

6.3.4 Access Rights

The DCA will have administrative rights to Design-Builder's tracking software. Other members of the Design-Builder's organization and WSDOT will have create, read, edit, view, search permissions based on what types of documents they need to access/create.

6.4 Document Control Library

Certain documents are more suitably stored in a library arrangement rather than in the project files. These documents are generally thick or oversized documents that are used and referenced on an ongoing basis by the project staff. These documents are logged in the document control database, similar to other project documents, but with a notation that they are stored in the document control library. Each document receives a file number, and the documents in the library are organized alphanumerically by file number. The DCA keeps a log of all library contents in the document control database.

6.5 Document Control – General Information

6.5.1 Physical Location

The project files and project library are kept at the Design-Builder's on-site co-located project office.

6.5.2 Access Restrictions

The project files (physical files) are kept in the Design-Builder on-site co-located project office, and access by project staff must be cleared through the DCA. Access to the project library is unrestricted. However, the sign-out sheet (Attachment 3) must be filled out whenever documents are removed from the immediate area and when they are returned.

6.5.3 Maintenance Responsibilities

The DCA has primary responsibility for filing and for maintenance and upkeep of the project files and library. The DCA performs monthly audits of the library contents to verify that all documents are accounted for and shelved correctly. The DCA also performs monthly audits of the project files to verify that no folders are missing or misfiled. These audits are documented on the Document Control Audit Form (Attachment 4), which are printed out; signed by the DCA, Project Manager, DQAM, and CQAM; attached to the monthly invoice; and filed in document control.

6.6 Controlled Documents

Certain documents are used or referenced by various members of the project team on an on-going basis, and it is imperative that copies being used are up-to-date at all times. The DCL is responsible for the distribution of copies and the tracking of approvals and revisions of all “controlled documents” that are prepared by the Design-Builder.

Once a controlled document has been approved and the electronic distribution list prepared, the DCA will maintain a controlled hard copy set in the document control library and will be responsible to transmit changes to the distribution list electronically through the DCS.

A list of Project controlled documents is included as Attachment 5. The Controlled Document Log format is included as Attachment 6. Documents prepared by other entities on the project team (e.g. WSDOT) are controlled in accordance with the requirements of that entity’s document control plan.

6.7 Verbal Correspondence

Significant face-to-face and telephone conversations by and between the Design-Build team members and any other parties are documented in writing by a Telecon Form (see Attachment 7) or a memorandum addressed to the file and copied to PDC and uploaded as detailed in Section 6.2.

6.8 Document Retention

All project documents will be stored and maintained as defined in this Plan through the completion of construction and Final Owner Acceptance (FOA). Throughout the term of the contract, project documents will be retained and archived in accordance with these procedures. After completion of the contract, the PDC project documents are delivered to WSDOT.

6.9 Management of Electronic Files

6.9.1 Scanned Documents

Per Section 6.3.2, above, documents are scanned and the resulting files uploaded into the program. All documents are stored on a secure server and are saved redundantly at the time of entry. In addition, a complete tape backup of all data in the system is performed once daily. These are the final, official record electronic files for project documents.

6.9.2 System Backups

The **DCS server**, where all project files are located (including the document control database, document files in their native format, and scanned image files that are linked to the database), is backed-up in accordance with the following rules:

1. A full backup of all electronic data is performed nightly to tape
2. Monthly backups are performed and kept permanently.
3. The alternate week daily backups along with the weekly and monthly archives are all stored in a secured off site facility

6.10 Submittal Log

Submittal log is stored in the DCS, and can be view and/or printed.

7 ATTACHMENTS

1. Document Type List
2. Document Control Processing Form (DCPF)
3. Library/Document Control Sign-out Form (DCSOF)
4. Document Control Audit Form (DCAF)
5. List of Controlled Documents
6. Controlled Document Log (CDL)
7. Telecon Record

7.1 DOCUMENT TYPE LIST

The following is the list of Document Types that may be assigned to a document to facilitate document searches in the document control database. A current electronic version of the Document Type List is also maintained on the server. (Also see discussion in Section 6.1 of the body of this Document Control Work Plan.)

Only one document type may be assigned to a document package. Therefore, choose the document type that best suits the majority of the documents within a package.

Audit Non-conformance Report

Audit Report
Calculations
Contract/Agreement
Drawings/Plans
Email
Exhibit
Fax
FDC—Field Design Change
File
Invoice/Progress Payment
Letter
Materials Receiving Report
Meeting Minutes
Memorandum
NCR—Non-conformance Report
NDC—Notice of Design Change
Permit
Proposal
Report
RFI—Request for Information
Schedule
Specifications
Subcontract
Telecon
Other

7.2 DOCUMENT CONTROL PROCESSING FORM

The Document Control Processing Form (DCPF) is included at the end of this attachment. This is the vehicle for providing document information to the DCA.

DCPF guidelines:

- Enter the File Number (this is to be done by the DCA after the documents and/or files have been uploaded).
- Accuracy is extremely important when listing File Numbers. If a code is missing a zero, the document will not be a match in a database search.
- “To Company” is generally the original addressee’s company.
- “To Name” is generally the original addressee.
- “From Company” is generally the company of the original author of the document.
- “From Name” is generally the original author of the document.
- “Date Received” is the date the document was received.
- Up to eight different “Activity Codes”, from the Schedule, may be given to any document.
- “Subject” is generally the title, name, or subject line of the document.
- “Document Date” is the date of the original document.

- “Document Type” is chosen from the list provided in **Attachment 1**. Only one document type may be used per DCPF package. Therefore, choose a document type that best suits the majority of the documents within the package.
- Under “Additional Subject Information or Keywords” give a brief description of the document contents and/or a list of all words or phrases that could logically be used for a search for the document. The DCA will enter this information in the “Description” field.
- “Author” is the name of the responsible for filling out the DCPF and sending the document(s) to document control. This name should be printed legibly or typed so that they can be contacted if the DCA has any questions regarding the document.
- “Distribution” lists to whom copies were/are to be sent.
- “Attachments” indicates if the document has attachments with it.

The Design/Builder needs to develop their versions of the following:

Attachments

1. Document Type List (refer to section 7.1)
2. Document Control Processing Form (DCPF) (refer to section 7.2)
3. Library/Document Control Sign-out Form (DCSOF)
4. Document Control Audit Form (DCAF)
5. List of Controlled Documents
6. Controlled Document Log (CDL)
7. Telecon Record

**THE DESIGN-BUILDER CONSTRUCTION
QUALITY MANAGEMENT PLAN**

**APPENDIX E
CONSTRUCTION INSPECTION AND TESTING QUALITY
PLAN**

DESIGN-BUILD PROJECT

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Attachment A – Construction Inspection and Testing Procedures List

Acronyms

AASHTO American Association of State Highway and Transportation Officials
ACI American Concrete Institute
ATMS Advanced Traffic Management System
BMP Best Management Practices
CADD Computer-Aided Design Drawing
CITQP Construction Inspection and Testing Quality Plan
CM Construction Manager
CPE Construction Project Engineer
CQA Construction Quality Assurance
CQAM Construction Quality Assurance Manager
CQO Construction Quality Organization
CSBC Crushed Surfacing Base Course
CSTC Crushed Surfacing Top Course
DBE Disadvantaged Business Enterprise
DCA Document Control Administrator
DCS Document Control System
DM Design Manager
DQA Design Quality Audit
DQAM Design Quality Assurance Manager
DQO Design Quality Organization
DQCC Design Quality Control Coordinator
DRC Discipline Review Comments
ECM Environmental Compliance Manager
EEO Equal Employment Opportunity
EOR Engineer of Record
F and t Statistical Test Analysis
FDC Field Design Change
FOA Final Owner Acceptance
HMA Hot Mix Asphalt
IA Independent Assurance
ID Identification
ITS Intelligent Transportation System
JV Joint Venture
LQSM Laboratory Quality Systems Manual
MSE Mechanically Stabilized Earth
NCR Noncompliance Report
NDC Notice of Design Change
OVT Owner Verification Testing
PCC Portland Concrete Cement
PDA Pile-driving Analysis
PM Project Manager
QAO QA Organization

QC Quality Control
QCP Quality Checkpoint
QMP QMP
QO QO
QPL Qualified Providers List
QTS Quality Testing Supervisor
QV Quality Verification
QVI Quality Verification Inspection
QVT Quality Verification Testing
RAM Request for Approval of Materials
RFC Release for Construction
RFP Request for Proposal
TCS Traffic Control Supervisor
TBD To be determined
WEAP Wave Equation Analysis of Piles
WSDOT Washington State Department of Transportation

1.0 Introduction

The Construction Inspection and Testing Quality Plan (CITQP) will be implemented to meet the quality requirements for the Design-Build Project, in accordance with the contract requirements. Processes are referenced in the Design-Build Project QMP, prepared by the Design-Builder for this Project. Other quality processes defined in the QMP are referenced as applicable in this document.

1.1 General

The CITQP outlines the Design-Builder quality procedures for achieving product conformity according to the Washington State Department of Transportation (WSDOT) requirements. This plan describes the roles and responsibilities of the construction inspection and testing, and materials sampling and testing team members, with the expectation that these team members will perform their part of the overall project QMP. This plan describes various construction and materials sampling and testing activities, and provides instructions on how to perform them.

1.2 Quality Focus

In order to ensure implementation of the CITQP, the Design-Builder and its Subcontractors will:

- a. Communicate to their staff the importance of fulfilling WSDOT's requirements and adhering to the laws and regulations in effect,
- b. Implement this quality plan for Construction Inspection and Testing,
- c. Rectify and revise deficiencies identified by WSDOT in the CITQP within seven (7) calendar days of Notice of Deficiency.
- d. Request clarifications when the requirements are ambiguous or missing,
- e. Ensure that Quality Objectives are developed with the aim of meeting product requirements and being measurable and consistent with the *QMP*,

- f. Conduct management reviews in order to review and continuously improve the quality plan, and hold regular meetings to monitor operations performance and work progress, and
- g. Ensure that the resources and infrastructure are available, as required, for successful Project execution.
- h. Subconsultants to the Design-Builder will explain in detail any additional steps and measures they will implement during the execution of their work in their respective Quality Plans.

1.3 References

- WSDOT Construction Manual
- WSDOT Standard Specifications
- WSDOT Materials Manual
- Project Contract Documents, Plans and Special Provisions

2.0 Team Roles and Responsibilities

2.1 Lines of Authority

The Design-Builder’s QAO is responsible for performing QA inspections for acceptance of materials and construction, demonstrating to WSDOT that the work meets the requirements of the contract.

As shown by the QO chart (QO chart Exhibit) within the QMP, the Executive Committee supervises the QO with direct authority over the CQAM. All periodic reporting, nonconformance issues, and concerns about quality will be forwarded to both WSDOT and the Executive Committee.

The CQAM is responsible for overall QA inspection and testing on the project and manages the QA Inspectors. The CQAM coordinates with the Construction Manager to ensure that elements of construction are inspected in accordance with this plan.

2.2 QA Personnel

The roles and responsibilities of the QA personnel are presented below.

Role	Name	Responsibilities
Construction QA Manager	(Insert Name Here)	<ul style="list-style-type: none"> • The CQAM or his representative will be on site during all construction activities. • Develop, implement, and manage the Design-Builder QA program. • Oversee QA testing and inspection. Coordinate and schedule resources to provide

		<p>appropriate QA inspection and testing for all construction efforts on a daily and weekly basis.</p> <ul style="list-style-type: none"> • Provide training for the Design-Builder to ensure appropriate quality procedures are in place, through pre activity meetings and/or daily on site reviews. • Ensure all QO inspector staff has appropriate training and certification for the types of construction activities they will be overseeing. • Verify that all sampling and testing personnel have the appropriate certification for the types of materials they will be testing. • Maintain a non-conformance report (NCR) log. • Maintain utility relocations inspection information. • Develop and maintain a list of lab equipment available, latest calibration data, and date of inspection. • Schedule quality checkpoints. • Initiate FDC's due to constructability issues or differing field conditions. • Provide monthly certificates of Compliance of construction and materials for conformance with Conformed RFP and design requirements. • Coordinate with WSDOT's verification testing, inspection, and Independent Assurance (IA) requirements.
Document Control Administrator	(Insert Name Here)	<ul style="list-style-type: none"> • Organize and maintain records and documents pertinent to QO activities.

Quality Testing Supervisor	(Insert Name Here)	<ul style="list-style-type: none"> • Oversee all sampling and testing operations. • Report directly to CQAM. • Ensure that qualified technicians are performing tests according to proper test procedures.
Staff Inspectors	Construction Inspection Technicians	<ul style="list-style-type: none"> • Inspect the work in a variety of areas, including embankment, PCC paving, structural concrete placement, utilities, etc. • At the direction of the CQAM, inspect aspects of the work in which he/she is qualified. • Complete daily Inspection Reports. • Prepare Materials Receiving Report to document inspection of materials brought to the job site.
Sampling and Testing Personnel	Sampling and Testing Technicians	<ul style="list-style-type: none"> • At the direction of the CQAM or his designated representative, take appropriate samples and tests necessary to meet contract requirements, specifications, and plans. • Submit documentation to QAM daily.
Laboratory Technician	Construction Materials Laboratory Technician	<ul style="list-style-type: none"> • Perform tests on various materials within the laboratory environment and in accordance with applicable procedures.

3.0 QA – Construction Inspection and Testing

3.1 Introduction

The purpose of the CITQP is to provide an official guide to the Design-Builder’s staff that documents construction inspection and testing QA procedures for the Design-Build Project. Inspection and testing will be in accordance with the contract documents, the QMP, the WSDOT *Construction Manual and Standard Specifications*, the WSDOT *Materials Manual*, and submitted Testing Plans for each construction material. This plan also contains a list of procedures and frequencies as Attachments. These lists are not intended to be complete, but to serve as a plan for the development and inspection and testing procedures for the Design-Build Project. This CITQP will describe the QA inspection and testing activities to be conducted. This CITQP will:

3.1.1 Identify the test required and select the appropriate test equipment. Tests required are identified in Attachment “A” and the required accuracy as well as the appropriate test equipment is specified in the test methods (WSDOT test procedures are specified).

3.1.2 Define procedures to calibrate all test equipment prior to initial use and at prescribed maintenance intervals against certified equipment and measurement standards as specified in the LQSM. Where no standard exists, the basis for calibration shall be developed in writing based upon the best-available information and technology. Specific calibration requirements are specified in the LQSM and WSDOT test procedures.

3.1.3 Identify test equipment with a suitable indicator to show the calibration status of the test equipment. Status of the test equipment calibrations will be in accordance with WSDOT specifications and the LQSM.

3.1.4 Maintain current calibration records for test equipment. Calibration records will be kept up to date according to re-calibration dates.

3.1.5 Define procedures to ensure that environmental conditions are suitable for calibrating test equipment. Environmental conditions for calibrating test equipment will be in accordance with WSDOT procedures and the LQSM.

3.1.6 Define procedures to ensure that the handling and storage of test equipment is such that the accuracy is maintained. The handling and storage of test equipment will be in accordance with the LQSM for each piece of test equipment.

3.1.7 Define procedures to safeguard test equipment, including test hardware and test software, from adjustments that would invalidate calibration settings. Test equipment will be safeguarded from adjustments that would invalidate calibration settings by following the procedures specified in the LQSM.

3.2 Product Measurement and Monitoring

Product measurement and monitoring ensures that the construction materials used on the Design-Build Project conform to WSDOT requirements, and identifies the sources of nonconforming products to prevent their use on the job. The Design-Builder uses the following procedures for measuring and monitoring products:

3.2.1 Sampling

Sampling is used for acceptance of aggregates, soil and structural fill, PCC and AC, as well as less frequently used materials such as geosynthetics or grout. Samples are submitted to the QA materials testing lab and tested for conformity with Project requirements. Once a material has been tested and approved for use on the Project, random sampling will be performed to ensure continued conformance with requirements. Sampling frequency shall be consistent with WSDOT's *Materials Manual* and the "Conformed RFP" section 1-06.7(4) Table 6. Random Sampling shall be performed in accordance with applicable WSDOT procedures.

3.2.2 Testing

Testing is used for acceptance of materials. Concrete, asphalt, and soil/aggregate are materials that require acceptance testing. Testing frequency shall be consistent with WSDOT's *Standard Specifications* and the "Conformed RFP" section 1-06.7(4) Table 6. Random Sampling shall be performed in accordance with WSDOT procedures.

3.2.3 Inspection

Inspection of construction materials delivered to the site will be completed for acceptance in accordance with Project Specifications, the RAM guidelines, and/or QPL submittals. All materials must be inspected and catalogued prior to use in construction. Visual inspection for acceptance of as-constructed elements will be conducted for compliance with project documents.

Materials and construction activities will be inspected at pre-determined checkpoints as specified and outlined in the QMP. Inspections will serve as documentation for measurement of materials used for construction.

Non-conforming materials or construction will be identified to the Construction Manager and the Quality Management Team. Items identified as non-conforming will be reinspected upon notice of completion of corrective action by the QC Manager for the Construction Manager.

3.2.4 Submitting Inspection Reports

The QA Inspector responsible for inspection and/or testing of the work will complete an Inspection Daily Report on a daily basis, sign the form(s) and submit it to the QTS. The QTS will review the report for completeness, sign it, and submit one copy for entry into the Document Control System, and the signed original for the CQAM for review and paper filing. Reports not in conformance with QA reporting procedures will be returned to the appropriate author for corrective action. The Inspection Report includes the name of the Inspector, date of inspection, location, type of inspection performed, results of inspection, corrective action needed, if necessary, and reinspection required.

3.2.5 Reviewing QA Documentation for Completeness

The CQAM will review the documentation provided by the QTS, including inspection reports or test reports, as well as occasional performance of field inspections. The CQAM will document the observations made regarding the completeness and accuracy of the QA reports.

4.0 QA – Materials Sampling and Testing

4.1 Introduction

The *Materials Sampling and Testing Section* of this CITQP provides a guide to the Design-Builder's for the documentation of construction materials on the Design-Build Project. This plan presents policies, procedures, and guidelines to assure the quality of materials on Design-Build Project in accordance with the contract documents.

Detailed information on specific sampling and testing methods and procedures may be found in the WSDOT *Construction Manual* and the WSDOT *Materials Manual*. The random testing frequencies presented in the "Conformed RFP" section 1-06.7 are considered the minimum necessary to have the required degree of acceptance testing. If a valid reason exists, a modification to test methods or frequencies may be accepted upon approval by the CQAM and WSDOT. Disputes regarding test method and frequency modifications will be resolved by the Executive Committee.

4.2 Definitions

Acceptance Program – All factors that comprise the Design-Builder determination of the quality of the product as specified in the contract requirements. These factors include sampling, testing, and inspection.

Accredited Laboratory – A laboratory that is accredited by the AASHTO Accreditation Program (AAP).

Qualified Sampling and Testing Personnel – Personnel who are capable of performing sampling and testing as defined by the QMP and CITQP.

QA (QA) – All those planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

Random Sample – Generally, a sample drawn from a lot in which each increment in the lot has an equal probability of being chosen. Differences may exist with concrete sampling where specific sample locations and/or frequencies are specified in the WSDOT *Standard Specifications*. All samples used for quality control and QA sampling and testing shall be random samples.

Vendor – A supplier of materials incorporated into the Project. A vendor may or may not be the Manufacturer, but the distributor of a product.

Sampling and Testing – Sampling and testing performed by the Design-Builder to validate the quality of the product for acceptance.

4.3 Policy

4.3.1 QA Program

It is the policy of the Design-Builder's to have a QA Program, which will assure that materials, products, and workmanship incorporated in the Design-Build Project, are in conformity with the requirements of the approved plans and specifications, including any approved changes.

4.3.2 Capabilities of the Design-Builder's

It is the policy of the Design-Builder's to maintain an adequate, qualified staff to administer its QA Program.

4.3.3 WSDOT Capabilities

WSDOT shall maintain an adequate, qualified staff to administer its Owner Verification and Independent Assurance Programs.

4.3.4 Quality Verification Program

Quality Verification sampling, testing, observations, or other procedures will be performed by qualified sampling and testing personnel employed by WSDOT or its designated agent.

4.3.5 QA Sampling and Testing

It is the policy of the Design-Builder's to have all QA sampling and testing performed by qualified testing personnel employed by the Design-Builder or its designated agent employed by a qualified laboratory.

1. All samples used for QA sampling and testing will be random samples chosen from a Random Numbers Table are from a random number generated from an Excel spreadsheet.
2. The results of these tests will be used in the acceptance decision as specified in the contract requirements and all approved changes.

4.4 Scope of the QA Program

The Design-Builder's will assume the primary responsibility for the overall quality of the work, including products of Subcontractors, required fabricators, suppliers, and vendors under the oversight of WSDOT in coordination with relevant governmental agencies.

4.5 Acceptance Program

It is the responsibility of the CQAM to accept or reject materials and/or products based on documentation submitted. The CQAM has the authority to accept or reject a material for construction based solely on a catalog cut, RAM or QPL, documented QA testing, or professional judgment.

4.5.1 Project QA Sampling and Testing

Project QA sampling and testing will be accomplished on the Design-Build Project according to specific submitted Testing Plans or the WSDOT *Construction Manual*, whichever is stricter in requirement. Documentation will be on the Design-Builder's forms.

Sampling and testing procedures used are those identified in the WSDOT *Materials Manual*. The term QA testing indicates sampling conducted by the Design-Builder's CQA personnel. CQA is for acceptance only, and is independent of the Contractor's QC sampling and testing.

The WSDOT Construction Manual and Materials Manual contain additional reference material such as schedules and tables, random sampling methodology, and testing procedures, which shall aid in completing Project sampling, testing, inspection, and proper documentation.

The results of all Project QA tests will be made available to WSDOT within 24 hours of the testing via the Design-Builder's tracking software, and in maintained paper files within the Design-Builder's office. QA test results will be input into a project specific Statistical Analysis of Materials software (SAM) web-based program.

4.5.2 Sampling and Testing Personnel Qualifications

Testers will meet the project requirements as defined in the QMP, CITQP and confirmed RFP.

4.5.3 Laboratory Qualification/Accreditation Program

All laboratories shall be WSDOT approved and meeting the requirements of

AASHTO R-18, and report directly to the CQAM. The laboratory shall conduct calibration checks at the minimum frequencies required in the LQSM. The results of the calibration checks shall be included in the laboratory's documentation for the CQAM and review by WSDOT.

4.5.4 Independent Assurance Program

WSDOT has an internal program that is administered and performed by WSDOT personnel or designated agents from an AASHTO-accredited laboratory. The Design-Builder understands this program is to be applied by WSDOT to the Design-Build Project. The Independent Assurance Program is separate of the Owner Verification Testing (OVT). Differences between QA testing and the results of the OVT will be identified and clarified.

4.6 Project Materials Certification

A "Materials Documentation Record" will be developed by the Construction QA Manager for each element of construction. The Form will list the minimum sampling and testing requirements for each product or material.

A "Letter of Materials Certification" will be prepared that documents that the material incorporated in the construction work, and the construction operations controlled by this QA sampling and testing, are in conformance with the approved plans and specifications.

4.7 Maintain QA Program Requirements

It will be the responsibility of the CQAM to maintain and periodically update the QA program as required. The Executive Committee and the CQAM will meet as required to review the QA Program and recommend revisions.

4.8 Distribution of Materials Records and Retention of Sampling and Testing Records

All originating materials (original document) records for construction Projects are to be kept in the Project file in the Design-Build Project office. These include, but are not limited to, Daily Field Reports, RAM's, and all Forms that document test results for acceptance of materials or products used on construction Projects.

5.0 Materials Documentation – General Requirements

Materials Documentation is to be prepared and reviewed as provided in this portion of the Design-Builder's *CITQP*, for the Design-Build Project. Details of documentation procedures for individual items are contained in the applicable Sections of this plan and cover most situations encountered; however, exceptions may require special attention.

5.1 Responsibility for Finals Materials Documentation

The CQAM is responsible for Materials Documentation on this Project. The CQAM shall take measures to assure that Documentation Procedures are followed according to the QMP. The CQAM will be responsible for the “Letter of Materials Certification.” Prior to acceptance of the Project by WSDOT, the CQAM shall have at hand all the documentary evidence needed to show that the Design-Builder has complied with the requirements of the contract documents for all materials.

5.2 Materials Documentation Record Documentation Procedures

Documentation Procedures should include, but are not limited to the following:

5.2.1 Before Construction

1. CQAM develops Materials Documentation Record (MDR) for each construction element listing all materials, their quantities, required tests, and testing frequencies. MDR will include RAM and QPL submittals.
2. CQAM checks Project Special Provisions for unusual or modified testing procedures that have been approved by WSDOT and/or the QMT and discusses them with the inspectors and testers after they have reviewed the Plans, Specifications and Special Provisions.
3. CQAM, QTS, and Technicians meet minimum requirements for training as defined in the Training Manual. CQAM will maintain record of training.
4. CQAM assures that items included in other work are accounted for in the Materials Documentation Record or for Pre-inspection.
5. CQAM checks the Materials Documentation Record for that work element.
6. QTS submits the List of Pre-inspected Items to Construction QA Manager.
7. CQAM sets up Random Sampling Schedules.
8. CPE submits the List of Proposed Materials Suppliers to CQAM.
9. CPE submits the list of sources of materials to CQAM.
10. CQAM approves construction materials.
11. CQAM conducts a Pre-Testing Meeting for each work element with construction Field Engineer/Superintendent, testers, and inspectors.

5.2.2 During Construction

1. Sample and Test according to WSDOT Materials Manual and Testing Frequencies.
2. The Construction QA Manager shall work with the QTS to assure that the inspectors, testers, and WSDOT are aware of activities, production, materials or product deliveries, altered quantities, and additional items not considered on the Materials Documentation Record.
3. QA personnel complete daily sampling and testing documentation in general accordance with the WSDOT Construction Manual, and/or the Testing Plan for each specific material, whichever is stricter.

4. QA personnel file all completed paperwork daily.
5. CQAM maintains list of non-conformances and outstanding items.
6. CQAM monitors plan quantities versus actual quantities.
7. CQAM monitors actual quantities versus number of tests.
8. CQAM keeps an updated list of approved exceptions to specifications.
9. CQAM prepares written explanations for each exception, presents the exception to the
 1. Quality Personnel at Quality Management Meetings for discussion and acceptance, and keeps the written explanations in the Project file.
10. CQAM participates in Weekly Quality Management Team meetings with WSDOT and the Design-Builder's personnel. Meetings shall resolve any outstanding quality issues, and approve or reject exception to specifications and standards.
11. Disputed testing conducted by the QA organization or WSDOT QV personnel will be resolved by the Projects dispute lab. The results of the dispute lab will be considered resolution of a dispute. The Executive Committee will resolve disputes for modifications to specifications and standards, which are not resolved at the Quality Task Force Meetings.

5.2.3 After Construction

1. CQAM sorts and arranges all Project Materials Documentation.
2. CQAM compares final quantities to the Materials Documentation Record.
3. CQAM makes sure all Pre-Inspected items have been documented, when applicable.
4. CQAM provides Certification of Compliance (COC). The COC will include:
 - a. Entering Final Materials Quantities.
 - b. Inclusion of Quantities added during construction.
 - c. Breakout and inclusion of Quantities not listed separately in the original Schedule.
 - d. Verification that minimum testing frequencies have been accomplished.
 - e. Explanation of Exceptions for Material Specification Deviations.
 - f. Documentation of Exceptions for comparison differences between QA (QA) Test results and Owner Verification Test (OVT) and Independent Assurance Test (IAT) results.
 - g. Documentation of Exceptions for an insufficient number of tests.
 - h. Documentation of Exceptions for a lack of tests for items included in extra work.

5.4 Finals Materials Documentation – Checking Procedure

For each Major Structure or Segment a complete review of all Project documentation from the completed Project file is to be performed by the CQAM. Any unresolved differences will be identified in the Complete Review and explained to the satisfaction of all parties.

A Complete Review will include the following:

1. Compare Final Quantities to the completed Materials Documentation Record for accuracy and note any discrepancies. (The Materials Documentation Record is likely the only place “Final Quantities” are going to be presented.)
2. Make sure Field Sheet/ Serial Numbers on the Materials Documentation Record match Project documents, and are accurate.
3. Make sure the correct numbers of tests were reported. If information or data is missing, complete a “Request for Materials Documentation” Form and immediately contact the appropriate QA personnel. The “Request for Materials Documentation” Form is to be retained in the Project Files.
4. Complete the review when the missing documentation is submitted.
5. Prepare the “Letter of Materials Certification.”
6. Prepare the “Explanation of Exceptions.” Address all materials deviations from plans and specifications and the action taken, and any comparison differences between QA Test results and OVT and/or IAT results.
7. Copy and attach to the “Letter of Materials Certification.”
8. Verify that QA Data is complete.
9. Price reduction calculations have been completed, if applicable.

5.5 Form Distribution

5.5.1 Materials Documentation Record

Original: Retained by the Design-Builder’s Document Control for inclusion with the Project Final Documentation.

Copy: WSDOT Project Engineer
The Design-Builder’s, Construction Manager
QTS

5.5.2 Letter of Materials Certification

Original: Retained by the Design-Builder’s Document Control for inclusion with the Project Final Documentation

Copy: WSDOT Project Engineer

5.5.3 Materials Documentation Request

Original: Retained by the Design-Builder’s Document Control for inclusion with the Project Final Documentation

Copy: WSDOT Project Engineer
QTS
Appropriate Technician(s)

5.5.4 Materials Documentation Review and Checklist

Original: Retained by the Design-Builder's Document Control for inclusion with the Project Final Documentation

Copy: WSDOT Project Engineer

All originating materials (original document) records for construction Projects are to be kept in the Project file at the Design-Builder's Project office. These include, but are not limited to, RAM's, QPL's, COC's, and all Forms that document test results for acceptance of materials or products used in construction. These records can be made available to WSDOT by request.

All document and reporting forms must be dated and signed by the appropriate and specified personnel.

Project field work sheets should be handled in the following manner:

- The first form will have a printed name and signature.
- Thereafter, the form can be initialed by the same person.
- If at any time the Project personnel are changed, the above process will be started over.

Listing of the Testing Procedures

Procedure Number	Test Method
Aggregate Testing	
AASHTO T-2	WSDOT FOP for AASHTO for the Sampling of Aggregates
AASHTO T-27/T11	FOP for WAQTC/AASHTO for the Sieve Analysis of Fine & Coarse Aggregates
AASHTO T-176	WSDOT FOP for AASHTO for Determining the Plastic Fines in Graded Aggregate by Use of the Sand Equivalent Test
AASHTO T-248	WSDOT FOP for AASHTO for Reducing Field Samples of Aggregates to Testing Size
AASHTO T-255	WSDOT FOP for AASHTO for Determining the Total Moisture Content of Aggregate by Drying
AASHTO TP-61	FOP for AASHTO for Determining the Percentage of Fracture in Coarse Aggregate
Concrete Testing	
AASHTO T-23	WSDOT FOP for AASHTO for Making and Curing Concrete test Specimens in the Field
AASHTO T-119	WSDOT FOP for AASHTO for Determining the Slump of Hydraulic Cement Concrete
AASHTO T-152	FOP for WAQTC/AASHTO for Determining the Air Content of Freshly Mixed Concrete by the Pressure Method
WAQTC TM-2	Sampling Freshly Mixed Concrete
AASHTO T-309	WSDOT FOP for AASHTO for Determining the Temperature of Freshly Mixed Portland Cement Concrete
WSDOT TM 716	Method of Random Sampling for Location of Testing and Sampling Sites
ASTM C 805	FOP for ASTM for Test Method for Rebound Number of Hardened Concrete
ASTM C 939	FOP for ASTM for Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
Density Testing	
AASHTO T-310	WSDOT FOP for AASHTO for In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Method
WSDOT TM 606	Method of Test for Compaction Control of Granular Materials
WSDOT SOP 615	Determination of the % Compaction for Embankment & Untreated Surfacing Materials Using the Nuclear Moisture-Density Gauge
AASHTO T-99	WSDOT FOP for AASHTO for Moisture-Density Relations of Soils Using a 5.5-lb (2.5-kg) Rammer and a 12-in. (305-mm) Drop
AASHTO T-180	WSDOT FOP for AASHTO for Moisture-Density Relations of Soils Using a 10-lb (4.54-kg) Rammer and an 18-in. (457-mm) Drop
WSDOT TM 914	Practice for Sampling of Geotextiles for Testing

**THE DESIGN-BUILDER CONSTRUCTION
QUALITY MANAGEMENT PLAN**

**APPENDIX F
Construction Quality Training Manual**

DESIGN-BUILD PROJECT

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1.0 OVERVIEW

The purpose of this Training Program is to educate, train and certify, as appropriate, personnel performing activities affecting or measuring the quality of the work and ensures that they achieve and maintain reasonable proficiency and ensure that personnel performing the work do so according to the Quality Management Plan (QMP). This manual has been created for and tailored to the specific Quality Assurance operations of the Design-Build project. Qualification training of manpower is in three primary areas: 1) Management; 2) Inspection; and 3) Testing. Before an individual may be considered qualified to perform the duties in any of these areas, the individual must first complete 80 hours of training or provide verification of equivalent experience. Upon acceptance of the verification by the design-builder and WSDOT, the individual's pre-job training may be reduced to 16 hours of training, with primary focus on familiarizing the individual with the project specific activities related to other design-build projects. As a basic guideline one year of equivalent experience in testing or inspection in a particular discipline will be documented as the equivalent of 20 hours of training. Therefore an inspector who has five years or more experience in their particular field would already meet the required 80 hours of training. However every inspector and tester will still need to complete the minimum 16 hours of orientation and safety training.

Initial required training for every inspector and tester will consist of 16 hours of orientation to the project site, project offices, project QA documentation and a web based safety training program and will include an assessment of each individuals overall qualifications. Based upon this initial assessment, further training will be required as needed with emphasis on the different areas of testing and inspection applicable to the individuals performing their duties during the duration of the project.

The training will primarily consist of reviewing project specific activities and verifying personnel's understanding of inspection, testing and documentation procedures related to each activity. Inspection and testing will be discussed relative to ensuring quality construction; understanding of construction techniques and procedures, potential problems that commonly occur, safety and communication. Documentation is considered a key component of a successful project, and as such, significant time will be spent in this area. This will include, but not be limited to proper and timely completion of Inspectors Daily Reports, adequacy of report content, completeness of observations and notes, test documentation, sample history, obtaining activity ID numbers, maintaining project diaries, certification logs, daily document submittal, tracking documents, maintaining and updating Certificates of Compliance, weekly electronic document backup, maintaining and updating miscellaneous logs, contracts, minutes of meetings, raw test data, final test data, audits, etc. Throughout the duration of the project the CQAM or his designated representative will conduct on-site training sessions as needed to fit and fulfill the requirements of the project QA program.

Each person working on the Project will receive training regarding the specific aspects of the project they will be associated with. This training will be provided at the onset of work on the project and will continue throughout the duration of the project, in the form of

reviews and update training. The Construction Quality Assurance Manager will assess the level of the proposed employees' understanding of QMP requirements in relationship to their specific function. Qualified personnel from within the QA organization will provide the required training. Through conformance and adherence to the Training Program, staff members are made aware of their involvement and influence on the quality of service provided to the Design-Builder and WSDOT Project Team.

All employees will also receive an orientation on the demands of the project's work program, and their individual responsibilities at the start of their job on the project.

The Construction Quality Assurance Manager, in addition to carrying out his duties of auditing work products, as well as internal audits, will assess the level of the current employees' understanding of QMP requirements in relationship to their specific function. Where it is determined that an individual is not performing their duties in conformance with QMP requirements this individual will be required to attend update and review training to improve their understanding of the QMP requirements. This review will consist of the individual in question being asked questions related to the proper quality procedures and their responsibilities. Additional training needs may also be identified. These training sessions will be fully documented, including a list of participants, date and time, subject matter and corrective actions.

In addition to the Construction Quality Assurance Manager's assessment, the training process will evaluate the project staff's comprehension of the QMP, inspection and testing requirements and the applicable QA processes. If, during the training process, it is determined that there is evidence of staff misunderstanding, then this shall be noted in the training log and the Quality Assurance Manager will initiate an item specific training/briefing session as described above.

All training documentation and records are maintained as project quality records.

2.0 MANAGEMENT TRAINING

The management roles and responsibilities for personnel involved in the Quality Assurance program for the Project are summarized below. This training will apply to the following positions as applicable. Where the personnel designated will have minimal contact with a specific section, this training will be minimized. For example, the Lead Laboratory Technician may have minimal contact with the activity of providing the monthly Certificate of Compliance, but they will be involved in updating records applicable to this activity.

The following personnel will be required to participate in this training:

- Construction Quality Assurance Manager
- QA Document Control Personnel
- Quality Testing Supervisor
- Lead Field Inspector
- Lead Laboratory Technician

This module will consist of the following training and review subjects:

- Train personnel to develop, implement and manage the Design-Builders Construction QA program
- Train personnel to oversee QA testing and inspection.
- Train personnel to coordinate and schedule resources to provide appropriate QA inspection and testing for all construction efforts on a daily and weekly basis
- Train personnel to provide training for the design-builder to ensure appropriate quality procedures are in place, through pre-activity meetings and daily on-site reviews
- Train personnel to ensure all QA inspector staff has appropriate training and certification for the types of construction activities they will be inspecting and/or testing
- Train personnel to understand and be familiar with all requirements of the contract documents
- Train personnel in procedures to meet documentation requirements and document control for the filing of QA inspections and test reports
- Train personnel to control receipt and issuance of QA documents, such as instructions, procedures, drawings, changes thereto, which prescribe activities affecting quality
- Train personnel to verify that QA documentation is distributed to appropriate members of the Design-Builder and WSDOT, as applicable.
- Train management personnel to perform and/or assist in regular audits to verify effectiveness of the Quality Program, and act to incorporate actions to correct deficiencies
- Train personnel to identify, evaluate and document quality problems
- Train personnel to recommend and or initiate quality improvement solutions
- Train personnel to stop incorporating non-conforming work into the Project until the deficiency is corrected
- Train personnel to verify the adequacy of project-specific operational manuals such as this CQA Training Manual, the Laboratory Quality Systems Manual, etc
- Train Personnel to verify that qualified staff has been assigned to conduct checking and/or independent reviews of the applicable output
- Train personnel to issue notices of non-conformances with the QMP and follow up to verify that cited non-conformances are corrected
- Train personnel to report non-conformances with construction quality procedures to the Quality Manager, Project Manager, Public Information Manager, Environmental Manager, Safety Manager, Maintenance of Traffic Manager, or others, as required to resolve non-conformances
- Train personnel to update the QMP as required
- Train personnel to verify that comments from checks and/or reviews identified in the QMP have been resolved and required revisions to the output have been made
- Train personnel to contact the Quality Manager to recommend issuing stop work orders if deficiencies are not corrected as identified in corrective action procedures
- Train personnel to conduct informal periodic “over the shoulder” audits to verify that work is being performed in conformance with procedures identified in the QMP

- Train personnel to participate in weekly Management Team Meetings.
- Train personnel to maintain non-conformance logs and daily occurrence logs
- Train personnel to maintain and update utility relocation inspection information
- Train personnel to maintain and update laboratory equipment inventories, calibration data, and date of laboratory inspections
- Train personnel to provide monthly Certificates of Compliance of construction and materials for conformance with Conformed RFP and design requirements
- Train personnel to verify that required staffing levels are maintained, and to notify the design-builder and WSDOT of staffing changes
- Train personnel to provide backup of all electronic documentation on a regular basis and deliver to an off-site storage location
- Train personnel to maintain and submit weekly records with evidence that all required activities and/or tests have been performed
- Train personnel to review monthly progress payment requests to ensure that acceptable quality documentation is on file for all payment items
- Train personnel to obtain and track manufacturer's certificates for all materials accepted by certifications and document receipt of "Approved for Shipment" certificates.
- Train personnel in requirements of Radiation Safety and Nuclear Gauge Restrictions
- Train personnel in requirements for inspections and tests at hold points
- Train personnel in holding pre-activity meetings
- Train personnel in preparing and maintaining Job Hazard Analyses
- Train personnel in producing and maintaining MSDS records

The following documents will be referenced during the course of the Management training session:

- Quality Management Plan (QMP)
- WSDOT Construction Manual
- WSDOT Standard Specifications for Road and Bridge Work
- Design-Builder Training Manual
- Laboratory Quality Systems Manual
- Qualified Products List

3.0 INSPECTION TRAINING

The inspection roles and responsibilities for personnel involved in the Quality Assurance program for the Project are summarized below. This training will apply to the following positions as applicable. Where the personnel designated will have minimal contact with a specific section, this training will be minimized. For example, the Project Manager may have minimal contact with the activity of inspecting bridge girder placement and bracing, but they will be involved in updating records applicable to this activity.

The following personnel will be required to participate in the training contained in this module:

- Construction Quality Assurance Manager,
- QA Document Control Personnel
- Quality Testing Supervisor
- All Field Inspectors
- Lead Laboratory Technician

This module will consist of the following training and review subjects:

- Training personnel in plan reading and interpretation
- Training personnel in documentation including Daily Field Reports, material certification logs, Record log pages,
- Training personnel in determining site locations
- Training personnel in reading and interpreting survey stakes
- Training personnel in material certification verification
- Training personnel in earthwork construction, including excavation, placement, compaction, moisture conditioning and equipment capabilities
- Training personnel in underground construction inspection, including trench excavation, utility placement including CMP, RCP, CIP concrete, CBC, SS, SD, communications and gas and water
- Training personnel in structural steel and welding construction inspection including erection procedures, bracing procedures, shoring procedures, bolting, welding operator verification, welding procedure acceptance, welding material acceptance and NDT requirements (AWS Certification required where applicable)
- Training personnel in asphalt concrete construction inspection including delivery procedures, ground surface suitability, equipment, laydown procedures, compaction, temperature
- Training personnel in concrete construction inspection including batch plant inspection, material batching, rotations, water/cement ratio, hydration, temperature, time limits, form work, reinforcing steel, placement, consolidation procedures, finishing, form stripping and backfilling limits

The following documents will be referenced during the course of the Inspection training session:

- Quality Management Plan (QMP)
- WSDOT Construction Manual
- WSDOT Standard Specifications for Road and Bridge Work
- Design-Builder Training Manual
- Laboratory Quality Systems Manual
- Preliminary Project Plans
- Qualified Products List
- ACI 301/318
- ACI Concrete Manual
- AWS D1.1 Structural Steel Welding Code
- AWS D1.5 Structural Steel Bridge Welding Code

4.0 FIELD AND LABORATORY TESTER TRAINING

The testing roles and responsibilities for personnel involved in the Quality Assurance program for the Design-Build Project are summarized below. This training will apply to the following positions as applicable. Where the personnel designated will have minimal contact with a specific section, this training will be minimized. For example, the Construction Quality Assurance Manager may have minimal contact with the activity of sampling and testing concrete aggregates, but they will be involved in verifying compliance with the sampling frequency and testing procedures specified in the project documents.

The following personnel will be required to participate in the training contained in this module:

- Construction Quality Assurance Manager,
- QA Document Control Personnel
- Quality Testing Supervisor
- Lead Field Inspector
- All Laboratory Technicians

This module will consist of the following training and review subjects:

- Sampling Materials
- Random sampling and testing procedures
- Acceptance Sampling and Testing Frequency
- Tolerance Limits
- Maintaining Materials Logs
- Maintenance of material samples including storage, retention and disposal
- Basic Aggregates – including sample size, sample reduction, sieve analysis, moisture content, plasticity index and liquid limit
- Soils/Aggregate – including earthwork construction, excavations, compaction control, moisture control, in-place density testing, compaction curves, specific gravity, sand equivalent, unit weight, fractured faces, flat and elongated particles
- Portland Cement Concrete – including batching, time limits, rotations, hydration, water/cement ratio, sampling fresh concrete, temperature, slump, air content, unit weight, yield, flexural strength of beams, casting cylindrical test specimens, density of hardened concrete, coring concrete
- Reinforcing Steel, Prestress/Post-tensioning cable
- Coring asphalt concrete and Portland cement concrete
- Use and care of testing equipment
- Equipment Calibration/Verification
- Red-Tagging out-of-tolerance Equipment
- Laboratory Temperature Controls
- Test Result Documentation

Before a technician may become qualified in Soils/Aggregate, Hot Mix Asphalt, and Portland Cement Concrete, the technician must first become qualified in Basic Aggregates.

The following documents will be referenced during the course of the Field and Laboratory Tester training session:

- Quality Management Plan (QMP)
- WSDOT Construction Manual
- WSDOT Standard Specifications for Road, Bridge and Municipal Construction
- Design-Builder Training Manual
- Laboratory Quality Systems Guidelines Manual
- WSDOT Test Methods
- Report Forms and Worksheets

4.2 PERIODIC PERSONNEL COMPETENCY REVIEW

All personnel shall receive periodic informal performance reviews during the course of the Design-Build Project. In addition to these informal reviews, formal competency reviews will be performed to document Quality Assurance procedures. The following training procedure shall be followed for each review:

1. Formal personnel performance shall be reviewed annually.
2. The personnel shall have access to the latest copy of the applicable documents.
3. The applicable Quality Testing Supervisor or Laboratory Supervisor shall observe the personnel and document his/her ability to perform the required duties.
4. If necessary, individual performance will be reviewed more often than annually.
5. The supervisor shall record the work demonstrated, the date of review, and performance results.
6. If an unsatisfactory result is recorded, the personnel involved shall review the requirement and/or test method and repeat the evaluation.
7. Competency review documentation records will become part of the project records.

5.0 PROJECT DOCUMENTS

Following is a summary of Documents that will be incorporated into the QA Training Program for the Design-Build Project. Each of the referenced documents will be available for review in the office of the Construction Quality Assurance Manager. Copies of applicable documents will also be available for review in the offices of the Quality Field Supervisor and the Laboratory Supervisor.

- Project Quality Management Plan (QMP)
- WSDOT Construction Manual
- WSDOT Standard Specifications for Road and Bridge Work
- Design-Builder's Training Manual
- Laboratory Quality Systems Manual
- WSDOT Test Methods
- Preliminary Project Plans
- ACI 301/318
- ACI Concrete Manual
- AWS D1.1 Structural Steel Welding Code
- AWS D1.5 Structural Steel Bridge Welding Code

Additional mandatory project documents and supplemental guidelines are listed in Tables 2.8.1, 2.8.2 and 2.8.3 in the RFP and will be provided upon request.

6.0 TEST RECORDS AND REPORTS

The Design-Builder will develop their own versions of the following: Summary and samples of the Inspection, Test and Documentation forms that will be incorporated into the QA Training Program for the Design-Build Project. Each of the referenced forms will be available for review in the office of the Construction Quality Assurance Manager. Copies of applicable documents will also be available for review in the offices of the Construction Quality Assurance Manager and the Laboratory Supervisor. This section of the Training Manual contains the following information:

- Typical data sheets (Inspection, Test and Documentation forms) used for all tests and inspections performed by the Quality Assurance Staff.
- Samples of completed forms for all tests covered by the Quality Manual.
- Materials logs containing date, sample ID, project number, description, and remarks.
- A description of the methods used to produce test records and reports, including methods to check and amend reports.

Listing of the Testing Procedures

Procedure Number	Test Method
Aggregate Testing	
AASHTO T-2	WSDOT FOP for AASHTO for the Sampling of Aggregates
AASHTO T-27/T11	FOP for WAQTC/AASHTO for the Sieve Analysis of Fine & Coarse Aggregates
AASHTO T-176	WSDOT FOP for AASHTO for Determining the Plastic Fines in Graded Aggregate by Use of the Sand Equivalent Test
AASHTO T-248	WSDOT FOP for AASHTO for Reducing Field Samples of Aggregates to Testing Size
AASHTO T-255	WSDOT FOP for AASHTO for Determining the Total Moisture Content of Aggregate by Drying
AASHTO TP-61	FOP for AASHTO for Determining the Percentage of Fracture in Coarse Aggregate
Concrete Testing	
AASHTO T-23	WSDOT FOP for AASHTO for Making and Curing Concrete test Specimens in the Field
AASHTO T-119	WSDOT FOP for AASHTO for Determining the Slump of Hydraulic Cement Concrete
AASHTO T-152	FOP for WAQTC/AASHTO for Determining the Air Content of Freshly Mixed Concrete by the Pressure Method
WAQTC TM-2	Sampling Freshly Mixed Concrete
AASHTO T-309	WSDOT FOP for AASHTO for Determining the Temperature of Freshly Mixed Portland Cement Concrete
WSDOT TM 716	Method of Random Sampling for Location of Testing and Sampling Sites
ASTM C 805	FOP for ASTM for Test Method for Rebound Number of Hardened Concrete
ASTM C 939	FOP for ASTM for Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
Density Testing	
AASHTO T-310	WSDOT FOP for AASHTO for In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Method
WSDOT TM 606	Method of Test for Compaction Control of Granular Materials
WSDOT SOP 615	Determination of the % Compaction for Embankment & Untreated Surfacing Materials Using the Nuclear Moisture-Density Gauge
AASHTO T-99	WSDOT FOP for AASHTO for Moisture-Density Relations of Soils Using a 5.5-lb (2.5-kg) Rammer and a 12-in. (305-mm) Drop
AASHTO T-180	WSDOT FOP for AASHTO for Moisture-Density Relations of Soils Using a 10-lb (4.54-kg) Rammer and an 18-in. (457-mm) Drop
WSDOT TM 914	Practice for Sampling of Geotextiles for Testing

**THE DESIGN-BUILDER CONSTRUCTION
QUALITY MANAGEMENT PLAN**

**APPENDIX G
LABORATORY QUALITY SYSTEM MANUAL**

DESIGN-BUILD PROJECT

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Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ATMS	Advanced Traffic Management System
BMP	Best Management Practices
CADD	Computer-Aided Design Drawing
CM	Construction Manager
CQA	Construction Quality Assurance
CQAM	Construction Quality Assurance Manager
CQO	Construction Quality Organization
CSBC	Crushed Surfacing Base Course
CSTC	Crushed Surfacing Top Course
DBE	Disadvantaged Business Enterprise
DCS	Document Control System
DM	Design Manager
DQA	Design Quality Audit
DQAM	Design Quality Assurance Manager
DQO	Design Quality Organization
DQCC	Design Quality Control Coordinator
DRC	Discipline Review Comments
ECM	Environmental Compliance Manager
EEO	Equal Employment Opportunity
EOR	Engineer of Record
F and t	Statistical Analysis
FDC	Field Design Change
FOA	Final Owner Acceptance
HMA	Hot Mix Asphalt
IA	Independent Assurance
ID	Identification
ITS	Intelligent Transportation System
JV	Joint Venture
LQSM	Laboratory Quality Systems Manual
MSE	Mechanically Stabilized Earth
NCR	Noncompliance Report
NDC	Notice of Design Change
OVT	Owner Verification Testing
PCC	Portland Concrete Cement
PDA	Pile-driving Analysis
PM	Project Manager
QAO	Quality Assurance Organization
QC	Quality Control
QCP	Quality Checkpoint
QMP	Quality Management Plan
QO	Quality Organization
QTS	Quality Testing Supervisor

QV	Quality Verification
QVI	Quality Verification Inspection
QVT	Quality Verification Testing
RFC	Release for Construction
RFP	Request for Proposal
TCS	Traffic Control Supervisor
WEAP	Wave Equation Analysis of Piles
WSDOT	Washington State Department of Transportation

1 Management

1.1 Quality Policy

Our laboratory quality systems policy is based on the fundamental concept that the control of laboratory testing quality is a team obligation that recognizes that quality must be achieved in every aspect of the project. The Design-Builder will provide quality laboratory testing services that meet or exceed WSDOT's requirements, delivered safely, on time, and within budget. Quality laboratory testing will be the responsibility of every individual performing the work. Quality will be obtained through appropriate planning and control of testing operations and by specific quality control activities such as reviewing, checking, testing, and quality surveillance/audit. The foundation of the Laboratory Quality Systems Manual (LQSM) is to provide services with staff that is properly trained, experienced, and educated, using equipment that meets the requirements of AASHTO R-18 and WSDOT.

1.2 Format

This LQSM provides the overall policies, program, organizational responsibilities, procedures, and the means of ensuring that all items of work are in conformance with the contract specifications, and describes the reviews and checks that will be performed in providing laboratory testing service to ensure the overall quality of the constructed project.

The LQSM will include:

- Staff qualifications and position descriptions
- Listing of the test procedures used
- Equipment, including verification and calibration procedures and inventory
- Sample management
- Diagnostic and corrective action
- Quality systems review

2 Key Positions

The laboratory testing key positions for the Design Build Project include the following:

- **Construction Quality Assurance Manager:** The CQAM is in responsible charge of all relevant testing services.
- **Quality Testing Supervisor:** Responsible for the sampling and testing operations for quality assurance. This position reports operationally to the CQAM.
- **Laboratory Technician:** Responsible for performing tests on various materials within the laboratory in accordance with applicable procedures. This position reports operationally to the QTS.

3 Test Procedures

The laboratory testing procedures will be performed in accordance with WSDOT specifications, outlined within the WSDOT Materials Manual (M46-01), WSDOT Construction Manual (M41- 01), and 2006 Standard Specifications (M41-10), made a part of the LQSM by reference.

4 Equipment

The laboratory facility will be completely equipped with florescent lighting and sunlight for proper control of lighting. The lab will also be equipped with heating and air conditioning for temperature control, humidifiers and dehumidifiers for humidity control, and ventilation hoods for dust and fume control, as appropriate to the standard test procedures for tests performed by the local office. As required by the standard test procedure, these environmental conditions are monitored, controlled, and recorded. The offices will have the equipment required to perform tests listed in Section 3.0.

The equipment that will be used for this project is shown on the local office inventory list presented in Attachment C.

Equipment will be calibrated in accordance with WSDOT requirements. In certain cases, equipment may be calibrated by technician staff. Calibration records will be maintained in the specific laboratory and at the Project office.

5 Test Reports

5.1 Typical Formats

The appropriate standard will be followed in preparing the written results (i.e., required information to be included on the test form). Standard WSDOT test procedures that were performed will be specifically denoted on test reports. Deviations from the designated standard procedure shall be noted.

Each sample for which test results are presented shall be identified in the report by sample number together with other appropriate identification information, such as materials supplier, materials source, material type, sample location, date sampled, name of party who obtained sample, date received, date tested, tests performed, etc. When required, the method of sampling shall be recorded, as discussed in Section 5.0. Test results are presented for each sample, and, where applicable, project or other material specifications may be presented and compared to the test results with a pass or fail disposition. Field reports of observations shall include similar project information and identify the nature of the observation, the item being observed, and a precise description of the location of the observation.

Typical laboratory data sheets provide spaces for data to be recorded. This data includes sample measurements and other measurements and values used to calculate test results. Whether handwritten or computerized forms, data spaces shall not be “pre-filled” with typical data. This includes measurements and factors from calibrating or verification of equipment such as mold volumes, dynamometer factors, or specific gravities of materials used in the test. This data shall be input for each test based upon the current calibration or verification of the specific piece of equipment or material used.

5.2 Date

The date of a report denoting the date the report was sent to the client shall be noted on the each page

5.3 Amending Reports

If it becomes necessary to revise or amend a report, the original report date and the date(s) of revision will be shown on the report.

Supplemental reports shall clearly be so identified, with the original report being identified in the report introduction.

5.4 Files and Report Retention

All correspondence, reports, test data, field reports, drawings, specifications, submittals, and other written or electronic communications shall be maintained by the CQAM in accordance with the QMP.

5.5 Electronic Transmittals

When test results or reports are transmitted electronically, they shall comply with the requirements set forth in this section.

6 Sample Management

6.1 Identification

When samples are received in the laboratory, they will be identified in a unique way to distinguish one from another. As each sample is received into the materials laboratory, it is immediately logged into the appropriate sample log book. There are two log books: one book for compressive and flexural strength testing (concrete, grout, mortar, masonry prisms, soil-cement, etc.) and the second book is for all other testing (soils, aggregates, bituminous concrete, etc.). The primary difference between the two log books is that the strength testing book also assigns test dates for samples that are to be tested at specific ages, such as 7 and 28 days of age.

Each log book contains a different series of consecutive numbers. As each sample is logged in, it is assigned its own unique number. As a minimum, the following description is also logged into the book: project name, project number, name of supplier, material source, material type, mix identification (if applicable), location sampled, date sampled, sampled by name, date received, sample number, test(s) required, and condition of the sample when received.

The sample number and test date of strength test samples are marked on the side of the sample with indelible ink. All other samples are identified by marking on the side of their container, tags in the container, or both, with the following information, as a minimum: sample number, project name and/or number, and test(s) to be performed.

Samples are observed for defects or abnormalities. If noted, the client should be contacted for further instructions. If any defects or abnormalities are believed to have had a material effect on the test results, the defects or abnormalities should be identified in the report.

6.2 Storage

Samples received by the laboratory for analysis or testing are stored and conditioned in accordance with the requirements of the testing procedures that are to be performed on these samples. These conditions include but are not limited to: prevention of moisture loss, drying under a variety of specified conditions, storage at specified temperatures, storage at specified humidity, freezing, soaking in specified mediums, cycling through wetting and drying, freezing and thawing, or saturating and drying in special mediums, and so on.

6.3 Retention

Samples will be disposed of immediately following testing unless specifically requested for holding by the CQAM. QA tests are for verification of accepted work, and are not open for challenge by Project personnel.

6.4 Disposal

Samples or portions of samples which have not been altered as a result of testing may be retained at the discretion of the appropriate Manager for further testing or reference. Retention of any sample longer than 24 hours after testing is completed will be by special arrangement only.

6.5 Shipping and Handling

As stated above, the original lab number must be conspicuously displayed on all samples or portions of samples at all times until final disposal. Samples or portions of samples sent to another laboratory (internal or external) for particular tests require the following information:

- The name of the originating lab.
- A transmittal form identifying the sample and the exact testing instructions; sent by mail and with the sample.
- If the sample is prepared for testing by the originating lab, it should be stated on the transmittal form.
- If a sample could be part of legal proceedings, the transmittal should so note together with any special *chain of custody* or sample retention requirements.
- Certain samples require special care in handling. The receiving laboratory should be notified in advance of shipping of such requirements. Appropriate containers, adequate markings, and adequate care and protection should be provided such that undesired changes do not occur in physical and/or engineering properties as a result of shipment, transport, or handling.

6.6 Concrete

Field Technician will perform various QA tests on fresh concrete sampled at the project site for acceptance testing in accordance with the Project Documents. Tests performed shall include slump, air content, unit weight and the fabrication of concrete strength specimens as required in the WSDOT Construction Manual and Standard Specifications.

After specimens are fabricated according to the WSDOT FOP for AASHTO T-23 test procedure the technician will store the cylinders at the project site in an environment as required by WSDOT FOP for AASHTO T-23. Acceptance testing for compressive strength shall be conducted at the same frequency as the acceptance tests for temperature, consistency, and air content.

The Design-BUILDER shall provide, and maintain cure boxes for curing concrete cylinders. The Design-BUILDER shall also provide, maintain and operate all necessary power sources and connections needed to operate the curing box. Concrete cylinders shall be cured in a cure box in accordance with WSDOT FOP for AASHTO T 23. The cure boxes shall maintain a temperature between 60°F and 80°F for concrete with specified strengths less than 6000-psi and between 68°F and 78°F for concrete with specified strengths of 6000-psi and higher. A minimum/maximum thermometer shall be installed to measure the internal temperature of the cure box. The thermometer shall be readable from outside of

the box and be capable of recording the high and low temperatures in a 24-hour period. The cure boxes shall create an environment that prevents moisture loss from the concrete specimens. The top shall have a working lock and the interior shall be rustproof. A moisture-proof seal shall be provided between the lid and the box. The cure box shall be the appropriate size to accommodate the number of concrete acceptance cylinders necessary or the Design-Builder shall provide additional cure boxes. Once concrete cylinders are placed in the cure box, the cure box shall not be moved until the cylinders have been cured in accordance with these Specifications. When concrete is placed at more than 1 location simultaneously, multiple cure boxes shall be provided.

The Design-Builder shall protect concrete cylinders in cure boxes from excessive vibration and shock waves during the curing period in accordance with Section 6-02.3(6)D.

Immediately after molding and finishing, the specimens shall be stored in a cure box for a period 24 ± 8 hours, unless Contractor provides initial curing information for final set. For concrete with a specified strength less than 6000 psi the cure temperature shall be between 60°F and 80°F and for concrete with specified strengths of 6000 psi and higher the cure temperature shall be between 68°F and 78°F. A minimum/maximum thermometer shall be mounted on the cure box such that the thermometer reads the internal temperature of the box but is visible from the outside. Keep a record of the minimum and maximum temperatures at intervals of 24 hours during the initial curing time.

Do not exceed the capacity of the cure box. When concrete is placed at more than one location simultaneously, each location must have its own cure box. Once concrete cylinders are placed in the cure box, the cure box shall not be moved until the cylinders are ready to be transported to the final cure location. Prior to transporting, cure and protect specimens as required in Section 9 of WSDOT FOP for AASHTO T 23. Specimens shall not be transported until at least 8 h after final set. (See Note.) During transporting, protect the specimen with suitable cushioning material to prevent damage from jarring and transport in an upright position. During cold weather, protect the specimens from freezing with suitable insulation material. Prevent moisture loss during transportation by use of tight-fitting plastic caps on plastic molds. Transportation time shall not exceed 4 h.

Note: If a specimen does not attain final set within 32 hours, it is to remain in place until final set is reached. The time of final set shall be provided by the concrete producer. After final set is reached, it can then be transported

Upon arrival at the laboratory, each specimen is logged into the previously discussed sample log and a master break book. Each set of cylinders is given a distinctive set number and specimen letter (i.e. 19A). Unless otherwise required by the specified test procedure, the specimen are removed from their molds within 30 minutes and then placed in the thermostatically controlled cure room or curing tank for the designated laboratory curing period.

7 Diagnostic and Corrective Action

7.1 Proficiency Sample Programs and On-site, Third Party Inspections

The materials testing laboratory participates in on-site inspection and proficiency sample programs by outside third parties. These third parties include retained consultants administering voluntary programs, such as the AMRL, CCRL, AASHTO, and ICBO, federal government agencies, such as the Corps of Engineers, and state government agencies, such as WSDOT.

Proficiency sample test result and on-site inspection reports for the local office are filed in the Laboratory Manager's office.

7.2 Poor Results or Deficiencies

In the event poor proficiency sample test results (results that deviate two or more standard deviations from the population average test value; or an AMRL/CCRL rating of two or less) are received, we will make every attempt to identify the cause of the problem, implement appropriate corrective actions, and respond to the AMRL/CCRL Program Administrator within 60 days. Procedures for resolution of poor results are as follows:

- Verify the AMRL/CCRL Program Administrator correctly entered our data on their report.
- Verify we transferred the correct test results onto the report form sent to the AMRL/CCRL Program Administrator.
- Recheck all data calculations leading to the reported test results.
- Verify equipment used conformed to the test requirements.
- Interview the technician who performed the test and determine if the procedures used conformed to the test requirements using the applicable competency verification checklist.
- Take corrective action to repair or take steps to replace defective equipment or instruct the technician of the correct procedures.
- Prepare report summarizing the results of the investigation, identifying causes of the poor results, if determined, and describing any corrective actions taken and forward copy to AMRL/CCRL Program Administrator. The Laboratory Manager shall prepare the report, which shall be approved and signed by the CQAM and filed in the Laboratory Manager's office. A copy of the AMRL/CCRL Program Administrator's report and our response, if any, shall be forwarded to the CQAM.

If deficiencies are noted during third party on-site inspections, we will determine if the equipment meets test procedure requirements using the calibration verification procedures and forms. We will then take corrective action procedures as outlined under Calibration Verification Procedures in this Manual.

7.3 Record Calibration Verification

- a. Procedural Deficiencies:
 - Discuss the procedural proficiency with the technician who performed the test.
 - Have the technician review the procedure.
 - Verify the technician's competency to perform the test following the Competency Verification Procedures outlined in this manual.
 - Record the Competency Verification as required by this manual.
- b. Quality System Deficiencies:
 - The Technical Manager shall review each deficiency with the responsible employee.
 - An action plan to correct the deficiency will be developed and implemented by the responsible employee as approved and verified by the CQAM.

7.4 Technical Complaints or Non-Conforming Work

The procedure listed below shall be followed when a technical complaint from either internal or external sources is received or failed tests are discovered.

- a. The Technical Manager and CQAM shall be notified immediately
- b. The complaint is brought to the attention of the appropriate Laboratory and Supervisory Technicians.
- c. At the assignment of the CQAM, the Technical Manager shall contact the individual who identified the non-conformance, failed test or lodged the complaint and verify the details of the concern and establish the expectations regarding resolution and resolution date.
- d. All reports, records, and pertinent data shall be collected and reviewed; all calculations shall be checked.
- e. The technician who performed the work shall be interviewed.
- f. The involved Technical Manager shall develop and implement an action plan under the direction and approval of the CQAM. Such plans may include: determination of the acceptability of the work, re-sampling, re-testing, re-inspection, consultation with in-house or outside technical experts, testing by a third party agency, in-house or outside split sample testing, equipment calibration verification, employee competency verification, or development of specialized testing procedures, such as non-destructive or full scale load tests. The plan should also include conditions for the resumption of work.
- g. A designated manager, supervisor, or in-house expert shall report the findings verbally or in writing, depending upon the severity of the concern to the CQAM. The Technical Manager under the direction and approval of the CQAM shall make an appropriate reply to the individual who identified the non-conformance or lodged the complaint. The CQAM shall be responsible for determining when satisfactory resolution has been achieved and authorizing the resumption of work. If satisfactory resolution can not be achieved, the CQAM shall escalate the concern in accordance with the QMP.
- h. At any point during this process, any technician has the authority to halt continuing work believed to be non-conforming with the Quality System

Objective, our contractual requirements with our clients, or the specified, published standard.

- i. Where appropriate to the developed action plan, written documentation should be maintained in the project file.

7.5 WSDOT Reviews

All work is performed under a project team approach. WSDOT will have access to the laboratory and other work areas to observe the performance of the work.

7.6 Analysis of Deficiency Impact

For each deficiency noted through third party on-site inspections, in-house audits, proficiency sample programs, employee training and competency verification programs, equipment calibration, or technical complaints, or if any equipment, test procedure, or analysis technique is found by any means to be defective, the CQAM shall assess the impact of this deficiency on other previous work.

If the CQAM determines the deficiency may have affected other work, he shall immediately inform the WSDOT.

The CQAM shall assign individual(s) to develop a plan by a specified date that includes the following:

- a. Identify the root causes of the deficiency.
- b. Identify work materially affected by the deficiency.
- c. Determine urgency of corrective actions. In urgent cases, WSDOT will be informed of potential concerns immediately, even before corrective measures are implemented.
- d. Identify corrective measure requirements, which may include all or some of the following: resample, retest, re-measure, recalculate, and revised engineering analysis, perform analysis of significance of deficiency, revised reporting.
- e. Develop a schedule for corrective actions.
- f. Present plan to WSDOT.
- g. Finalize plan with WSDOT's concurrence.
- h. Perform corrective measures.
- i. Develop plan for and implement revised reporting.
- j. Develop a plan for monitoring the effectiveness of the corrective action.
- k. Where problems are identified that cast doubt on the ability of the laboratory to comply with the Quality System Objective, a plan for focused internal reviews should be developed and implemented.

Records shall be maintained in the related project file and be the responsibility of the CQAM.

8 Quality Systems Review

8.1 Scope

The CQAM or their designee working under their direct supervision shall perform internal quality system reviews to ensure that the established quality system procedures are being followed and consisting of the following:

- a. Proficiency sample reports and responses.
- b. Third party on-site inspection reports and responses.
- c. Equipment Inventory List
- d. Equipment calibration verification records.
- e. Technician training and competency verification records.
- f. Records of calibration verification of equipment and materials received during the review period, including new equipment, capping compound, concrete cylinder molds, etc.
- g. Follow-up verification of deficiency corrections noted in previous reviews.

8.2 Frequency

Internal quality system reviews are conducted annually.

8.3 Individuals Responsible

The CQAM is responsible to assure the reviews are performed, that corrective action plans are developed and implemented, and that reports are prepared and distributed. The Laboratory Manager is responsible for compliance with the requirements of the quality system, preparation and performance of the corrective action plan, reporting of corrective actions, and recording keeping.

8.4 Report Preparation and Distribution

The individual performing the inspection shall prepare a report of their findings, which shall be distributed, to the Laboratory Manager and the CQAM.

8.5 Corrective Action

A plan for corrective action shall be developed and implemented by the Laboratory Manager and approved by the CQAM. Upon completion of the corrective action plan, a report shall be prepared by the Laboratory Manager and submitted to the CQAM and WSDOT.

**ATTACHMENT A
TABLES**

Table No. 1 – *Field Materials Testing Services*

Table No. 2 – *Materials Laboratory Tests*

TABLE NO. 1

FIELD MATERIALS TESTING SERVICES

Embankment & Surfacing Densities	Bolt Testing & Metals
Field Density by Nuclear Gauge Maximum Density Test Modified Proctor	Skidmore Wilhelm Bolt Tension Calibrator Torque Wrench Anchor Bolt Testing Device N.D.T. Welding and Base Metal Testing Reinforcing Steel Placement Visual Welding Inspection N.D.T. Welding Inspection Sampling Structural Steel Placement
Soils & Aggregates	Concrete & Fiber Reinforced Concrete
Sampling of Stockpiles Sieve Analysis Sand Equivalent Percentage of Fracture Percentage of Moisture in Aggregates Field Sample Reduction to Testing Size	Cast Cylinders for Compression Testing Air Content Slump Test Temperature of Fresh Concrete

TABLE NO. 2
ROUTINE LABORATORY TESTS

SOILS AND AGGREGATE TESTS	CONCRETE
Compaction Curves Standard Modified, 4" and 6" WSDOT T-606 Basic Soil and Aggregate Properties Sieve Analysis Unit Weight Plasticity Index Liquid Limit Sulfate Soundness Moisture Determination and Unit Weight Hydrometers	Compression Test, Concrete Cylinders Air Content of Freshly Mixed Concrete Splitting Tensile Strength Test 6" x 12" Compression Test on Cored Concrete Specimens Unit Weight of Concrete Cylinders Modulus of Elasticity Test on 6" x 12" Concrete Cylinder Review of Concrete Mix Design Flexural Strength, Concrete Beam
STRUCTURAL STEEL	
Metals Pre-Stress Strand, Tensile and Elongation Proof Test on Post-Tension Assembly Bolt Testing Bolts-Proof Load, Ultimate Load, Hardness Nuts-Proof Load, Hardness Washers-Hardness Weight of Coating Procedure Tests Groove Weld-Limited Thickness, Unlimited Thickness Pipe Welding-1G, 2G, 5G Position	Welding Qualifications-Light Gauge Structural Metals Plug Weld Test Light Gauge Butt Weld, Vertical and Overhead

Listing of the Testing Procedures

Procedure Number	Test Method
Aggregate Testing	
AASHTO T-2	WSDOT FOP for AASHTO for the Sampling of Aggregates
AASHTO T-27/T11	FOP for WAQTC/AASHTO for the Sieve Analysis of Fine & Coarse Aggregates
AASHTO T-176	WSDOT FOP for AASHTO for Determining the Plastic Fines in Graded Aggregate by Use of the Sand Equivalent Test
AASHTO T-248	WSDOT FOP for AASHTO for Reducing Field Samples of Aggregates to Testing Size
AASHTO T-255	WSDOT FOP for AASHTO for Determining the Total Moisture Content of Aggregate by Drying
AASHTO TP-61	FOP for AASHTO for Determining the Percentage of Fracture in Coarse Aggregate
Concrete Testing	
AASHTO T-23	WSDOT FOP for AASHTO for Making and Curing Concrete test Specimens in the Field
AASHTO T-119	WSDOT FOP for AASHTO for Determining the Slump of Hydraulic Cement Concrete
AASHTO T-152	FOP for WAQTC/AASHTO for Determining the Air Content of Freshly Mixed Concrete by the Pressure Method
WAQTC TM-2	Sampling Freshly Mixed Concrete
AASHTO T-309	WSDOT FOP for AASHTO for Determining the Temperature of Freshly Mixed Portland Cement Concrete
WSDOT TM 716	Method of Random Sampling for Location of Testing and Sampling Sites
ASTM C 805	FOP for ASTM for Test Method for Rebound Number of Hardened Concrete
ASTM C 939	FOP for ASTM for Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
Density Testing	
AASHTO T-310	WSDOT FOP for AASHTO for In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Method
WSDOT TM 606	Method of Test for Compaction Control of Granular Materials
WSDOT SOP 615	Determination of the % Compaction for Embankment & Untreated Surfacing Materials Using the Nuclear Moisture-Density Gauge
AASHTO T-99	WSDOT FOP for AASHTO for Moisture-Density Relations of Soils Using a 5.5-lb (2.5-kg) Rammer and a 12-in. (305-mm) Drop
AASHTO T-180	WSDOT FOP for AASHTO for Moisture-Density Relations of Soils Using a 10-lb (4.54-kg) Rammer and an 18-in. (457-mm) Drop
WSDOT TM 914	Practice for Sampling of Geotextiles for Testing