Washington State
Department of Transportation

Memorandum

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SUBJECT: Design Guidance – Design-Bid-Build Quality Management

PURPOSE AND DIRECTION

Purpose

To document the process for ensuring quality of PS&E's for design-bid-build projects statewide. To adopt uniform definitions and define roles and responsibilities for quality management within each Region's quality plan.

Background

"Constructability and quality of design plans have been identified as significant national issues in need of being addressed and improved upon."[1] The situation with respect to quality is just as true today. WSDOT and other transportation agencies face increasing technical complexities, increasing regulation, and pressure to deliver quality projects on time, within budget and with no change to scope.

WSDOT has determined that it is a priority to provide for improvements to the process used in providing quality on each phase of Project Delivery. WSDOT has successfully been performing

[1] WSDOT, *A Manual of Instruction for the Implementation of the Constructability Review Process,* 1997.

quality control (QC) and quality assurance (QA) in various ways from region to region, specialty office to specialty office, and program to program for many years. However, at this time there is no single policy or centralized process guiding the conduct of this function statewide.

Executive action established a quality director to oversee WSDOT agency quality. This action is recognition of quality's importance and the need for more emphasis in this area. A significant amount of outreach has been conducted, with input from regions as well as industry partners, which has determined there is widespread need to establish baseline processes for ensuring quality and minimum expectations for statewide consistency.

The proposed quality process is expressed as two distinct phases. Design Quality (ensuring accuracy of the underlying engineering), and Contract Plans quality (ensuring that the various design packages are fully integrated and contractual expectations are clear and enforceable).

NCHRP Project 20-68A[2] concluded that in order to have a successful QA/QC program, ". . . it is important to have the support of upper management." As a result of this initiative, the Development Division hereby provides a framework for addressing quality on design-bid-build projects within WSDOT, as described below.

Definitions

The following uniform definitions of quality terms are adopted for WSDOT quality management:

a. *Quality Control (QC)* refers to those actions, procedures, and methods that are to be routinely employed at the production and administrative levels, under the jurisdiction of the Project Engineer (or Engineer of Record), during the development of work products to produce the desired quality.

b. *Quality Assurance (QA)* refers to those actions, procedures, and methods to be employed at management levels, under the jurisdiction of the Project Engineer (or Engineer of Record) and Project Development Engineer, to observe and ensure prudent quality control procedures are in place and are being carried out, and the desired results of quality are being achieved.

c. *Quality Verification (QV)* refers to those actions, procedures and methods employed at the Region Plans Office and Headquarters Design Office, to review final products to ensure quality management was implemented, the appropriate project development process was followed, and is reflected in the final contract document.

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[2] *Best Practices In Quality Control and Assurance In Design*, National Cooperative Highway Research Program, 2011.

Direction

Regions are ultimately responsible for the delivery of their assigned projects within the Highway Construction Program; including the quality of the final PS&E developed for each project, with specific responsibilities as follows:

- Region design office staff, including those working in specialty offices (Bridge, Geotechnical, etc.), are responsible for QC and QA of their own engineering and design work products. This work includes the engineering requirements associated with special provisions.
- The Design Project Engineer is responsible for QV of the QC and QA work performed by their staff, as well as QC and QA of the work required to integrate the design work products developed by various specialty offices. This work includes conflict recognition and resolution, as well as finalizing all special provisions. Although QC and QA responsibilities of the Project Engineer can be delegated, QV responsibilities cannot.
- The Region Plans Engineer has the responsibility for quality verification efforts as part of their plan review process. This work includes documenting compliance with provisions of the WSDOT Plans Preparation Manual and Special Provisions approval as outlined in the Region's quality plan.
- The Region Project Development Engineer is responsible for QV associated with the QC and QA work performed by their region staff.

The HQ Design Office is responsible for stewardship of the quality function as it applies to PS&Es statewide. This work includes statistical sampling of PS&Es, reviewing design error change orders, modifying policies and guidance as needed, ensuring the WSDOT Design and Plans Preparation Manual provides clear guidance, while allowing flexibility to maximize innovation. HQ Design also provides research and support in the form of access to proven quality management tools via a website.

<u>Region Quality Management Plans</u>

It is recommended that region quality management plans address and incorporate the following provisions:

a. *Project Specific Quality Management Plans & Scalability* – Every project identifies formal QC/QA processes for both design & contract plan development either in the project management plan or in a standalone project specific quality management plan. Smaller less complex projects may utilize the project management plans to document

quality process, whereas larger more complex projects require a standalone quality management plan. Regions identify the criteria that will be used to determine complexity based on project risk, cost, etc. to be used in this determination.

b. *Review Cycles* – All projects receive multi-disciplinary reviews, scaled to the complexity of the project. The level and number of reviews are generally dependent on project type, complexity, risk, cost, etc. In order to provide consistent expectation for project review, regions develop their own criteria for formal project review cycles (30/60/90/Ad) based on project type, complexity, risk, and any other appropriate factors that may affect the project quality.

c. *Review Cycle Deliverables* – In order for the review cycles to be successful, regions will identify a set of common deliverables that need to be developed by the project team for performing the multi-disciplinary, and constructability, project reviews for each review cycle (30/60/90/Ad). Additional project specific deliverables may also be identified by the project team at the start of the project as part of their program of quality reviews.

d. *Review Time Allowance* – In order to provide a thorough review, appropriate time allowance for each review cycle is necessary and is included in the project schedule. Guidance for review time allocation for various quality reviews (2-4 weeks), depending on project complexity, can improve adherence to project timelines, and may also be considered as standards in the region quality plan.

e. *Region QA Roles and Responsibilities* – The Region's quality management plan defines quality assurance responsibilities, in addition to those given in "Direction" above, for the Project Engineer, Plans Engineer, Project Development Engineer, Region Construction Engineer and Engineering Manager, as well as their roles in multi-disciplinary quality reviews.

f. *Specialty Office Quality Management and Review* – Specialty Offices are responsible for QC and QA of their design work products. Regions will include QC/QA guidance for region support offices in their quality management plan, and define their roles in the multi-disciplinary review cycles including review of design office plan integration of their work products.

g. *Region QV Process* – Define the Plans Office roles and responsibilities in quality verification for both Design and Contract Plan review elements of a project.

h. *Performance Measures* – Performance metrics to track performance through contract completion are included in the quality plan. Examples include measures such as: number of addenda; number of plan error change orders; variance of bids to the estimate; and number of clarifying questions from contractors during the bid period.

i. *Lesson's Learned* – Include guidance on identifying, tracking, and sharing lesson's learned among region project teams and offices.

j. *Annual Region Review of Design/Construction* – Provide for an annual meeting of construction and design offices (normally during the winter) to discuss lessons learned, best practices, and potential improvements to guidance on quality, design, etc.

Special Provisions

a. *Special Provision Guidance:* For any given project, there may be multiple authors with different levels of expertise preparing special provisions for their respective disciplines. Special provisions override WSDOT Standard Specifications, and can result in costly change orders if not written clearly. Special provisions that are clear, concise and utilize performance based specifications over prescriptive (method) specifications are preferred. HQ Design Office has guidance for preparing contract special provisions in the Plans Preparation Manual. This guidance will be revised as necessary based on lessons learned and change order trends. Regions are expected to monitor revisions and updates to this guidance, and update to their region quality management plan accordingly.

b. *Special Provisions Approval:* The approval of project specific special provisions currently resides with HQ Construction Office. Special provisions approvals, which have been provided by the HQ Construction Office, are hereby delegated to the regions upon adoption of a formal review and approval process for project specific special provisions in the region quality management plan. When a region takes responsibility for special provision approval, it is recommended that the approval role be assigned to the Engineering Manager/Region Construction Engineer level or higher.

Quality Verification (Region)

a. *PS&E reviews* – Regions conduct 100% PS&E and Ad Ready PS&E reviews that focus on compliance with the WSDOT Plans Preparation Manual, and may, at their discretion, include QV reviews by the HQ Design Office.

b. *WSDOT Peer Exchange* – Regions participate in a semi-annual statewide HQ PS&E Engineer peer exchange convened by HQ Design. The expectation is that region staff are prepared to share lessons learned, best practices, new methods and developments, emerging policies, etc. regarding project design and PS&E quality processes.

Quality Verification (Headquarters)

To ensure consistency in quality verification, HQ Design Office will develop a quality verification plan that includes:

a. *Process Reviews* – Identify scope and frequency of process reviews on region quality management processes and develop standardized checklist for utilization during process audits.

b. *PS&E Reviews* – Perform PS&E reviews on 15%-25% of the projects by volume on specific focus areas based on data and design/plan error trends in collaboration with HQ Construction.

c. *Change Order Trend Tracking* – Track change order trends in order to drive policy changes based on the root cause of the design and/or contract administration related change orders. Review "design error" change orders over for opportunities to change policy or guidance.

d. *Lesson's Learned Evaluation* – Provide coordination services for Regions and HQ Construction that facilitate an evaluation of lesson's learned for incorporation into the design guidance as necessary.

e. *Peer Exchange* – Organize and lead the statewide Design/Plans Engineer peer exchange.

f. *Provide training in estimating and plans development* – A new cost estimating class is now being deployed and is available through LMS. Other PS&E training is being reviewed for updating and future implementation.

g. *Provide results and progress reporting* – This will be provided semi-annually to the Development Division Director.

h. *Keep Up To Date on National Discussions* – This will be accomplished through established AASHTO and TRB websites and committees.

i. *Submit Research Need Statement* – There is a tremendous amount of research on Design-Build and Construction quality, but very little on Design-Bid-Build quality. Working title for this statement is: "Performance Measures of Managing Design-Bid-Build Quality."

Headquarters Quality Management Website

HQ Design will maintain a website devoted to design and PS&E quality management. The website will contain downloadable tools (templates, checklists, etc.) that have been proven to enhance the quality of PS&E's. Over time, effective quality tools being used by individual regions can be added to the website to make them available statewide.

ACTIONS REQUIRED

1. Regions to develop region quality management plan in accordance with the requirements of this memo by February 15, 2019.
2. HQ Design Office to develop quality verification plan and establish a quality management website including a library of quality management tools.

Additional information
Please contact your region's Assistant State Design Engineer for any additional information.

JC:bd

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