Quality Management Guidance for Design and PS&E

Washington State Department of Transportation

September 2020

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Foreword

This guide supports implementation of the WSDOT PS&E Quality Program. The intent is to provide guidance on Quality Plans, tools to utilize, and to further define terms and options for the continuous improvement of the WSDOT PS&E process.

//Policy Analysis and Research Section, Development Division//

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Introduction – PS&E Quality Plan

Quality – The degree to which a set of inherent characteristic fulfills requirements. PMBOK 6th Edition 2018

PS&E – Plans, Specifications and Estimate is prepared by WSDOT and is the contract package that contractors use to develop their bids.

Purpose and Direction

WSDOT's PS&E Quality Plan is a Guidance Document that establishes uniform methods and defines roles for quality management. Regions and Headquarters play a part in the development of final plans, specifications and estimates for WSDOT design-bid-build project delivery. The goal is delivery of PS&E packages that provide a measureable and reliable performance level related to design accuracy.

What is a Quality Management Plan, QMP?

The QMP is developed by the region to ensure a standard of quality for projects the region delivers. The QMP identifies staff and their roles and responsibilities in delivering projects that meet the standard of quality. The QMP is an element of the Project Management Plan, PMP. Why have a QMP?

Implementing quality processes early and throughout the development of final plans ultimately saves time and helps avoid costly change orders, or scheduling delays. A QMP establishes region policy to support these measures.

How is quality accomplished?

Quality is achieved through systematic planning, scoping, communications coordination, supervision, and technical direction; by *providing adequate time in the schedule for thorough reviews.* There must be proper definition of job requirements and procedures. Skilled personnel control quality by performing work functions with a level of care that corresponds to the quality goal.

PS&E quality processes are defined in two phases: Design Quality (ensuring accuracy of the underlying engineering) and Contract Plans Quality (ensuring that the various design elements are fully integrated and contractual expectations are clear and enforceable). Both are critical in delivery of quality transportation projects.

Roles and Responsibilities in Quality

A QMP describes a continual process, beginning with each person carefully double-checking his or her own work. Identifying simple errors early in the project avoids compounding errors and having to make significant corrections later. Consequently, every manager, team lead, engineer, technician, and support staff member is responsible for, and has a role to play in, quality management.

Typically, a project manager, along with a lead designer, would be responsible for initiating the Quality process, monitoring review and checklist procedures, and generally ensuring that the standard of quality established for the project is maintained.

Region project teams are responsible for:

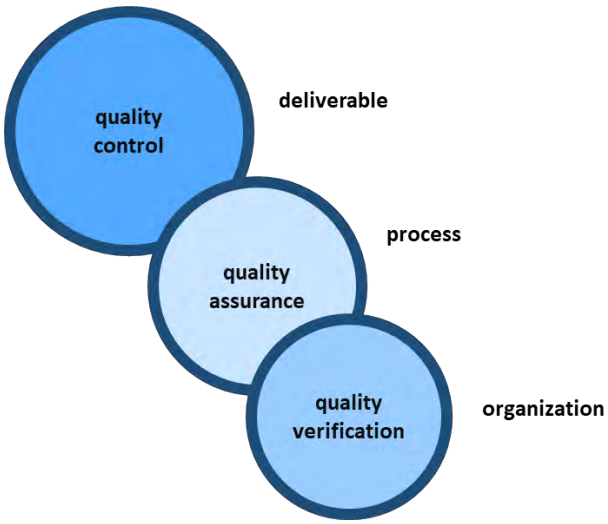
- Following the guidance in this document.
- Confirming that the criteria, standards and other policy and guidelines provided to direct PS&E development are appropriate for the work being performed.
- Performing regular quality checks of their own work including calculations, spelling, grammar, and presentation clarity.
- Addressing quality issues or deficiencies as they are identified.

Definitions

Quality Control (QC) –actions at the production and administrative levels, under the jurisdiction of the Project Engineer, to produce deliverables that meet the specified performance requirements.

Quality Assurance (QA) –actions at management levels under the jurisdiction of the Project Engineer, to observe project processes and ensure prudent quality control procedures are in place and are being carried out in accordance with the QMP.

Quality Verification (QV) –actions employed at HQ Project Development Division *and* Region, under the jurisdiction of the State Design Engineer, or designee, to selectively review final products to ensure a QMP was implemented; the appropriate project development process was followed and reflected in the final contract document.



Performance

Headquarters quality verification process will review regions performance on a yearly basis. The table below identifies performance metrics. As the Quality Program moves forward some metrics may be removed and replaced.

Performance Metric	**Performance Target** (per contract)	**5 Year Historical Average** (per contract)	**Last Year's Average** (per contract)	**Target for 2020**
Number of Addenda	Reduce 25% from the 5 year average/program	2015 • **1.93** 2016 • **1.93** 2017 • **2.11** 2018 • **2.04** 2019 • **2.15**	P1 • **2.04** P2 • **1.91** I-Program • **2.72**	**1.52** Addendums per project
Over/Under Engineer's Estimate	Conn. WA - Bids below Engineer's Estimate All Other +/-10%	Conn. WA – **N/A** All Other - 43% within +/-10%	Conn. WA – **46%** All Other - **44%** within +/-10%	**50%** Of all projects within +/- 10%
Plan Error Change Orders	Reduce 25%	2015 • **8.03** 2016 • **7.77** 2017 • **8.68** 2018 • **7.05** For all years, projects < $50m • **7.07** For all years, projects > $50m • **57.83**	2019 – **5.41** (2019 target was 5.29%) For projects < $50m – **5.00** For projects > $50m – **N/A**	**4.06** projects < $50m **43.37** projects > $50m
Contract Changes exceeding 4% contingency	Reduce 25%	**In 2019** On average Final dollars paid to the Contractor tend to be at or below the Low Bid amount Plus the 4% contingency price	Percentage exceeding 4% contingency (all contracts) P1 • + **1.16%** P2 • **- 0.81%** Imp. < $50m • **- 3.54%** Imp. > $50m • N/A	**Keep on Track**
Figures reflect 5 years averages from contracts reaching completion between January 2015 and December 2019 for the region. Last year's averages are from contracts completion between January 2019 and December 2019.				

Figure 1 - Performance Metrics

Leading performance indicators[1] verification by regions

Regions are on the front lines of quality verification. Regions are best positioned to verify actions are occurring that portend improved quality and progress toward identified quality performance targets. To that end the following leading performance indicators are identified.

Leading Performance Indicator	Performance Target
Project Management Plans, PMP Is the project management plan current and complete? Schedule includes quality reviews, estimate updates, risk management, VE.	100% Note: PMPs are scalable & commensurate with project size/ complexity
Basis Of Estimate, BOE completed Is the project cost estimate and basis of estimate current?	100% Note: BOEs are scalable; every estimate should have a current BOE
Risk Management Has the appropriate level of risk analysis been completed? Are risks being managed and monitored?	100% Note: of required level of risk assessment (qualitative or quantitative)
Value Engineering Is a VE study required for the project? If yes, has it been accomplished or is it in the project schedule?	100% Note: of required level of risk assessment (qualitative or quantitative)
Note: For larger design projects, spanning multiples seasons, it may be appropriate to have update workshops.	

Figure 2 - Leading Indicators

Quality Management Plans and Scalability

Creation of the project QMP is a team building opportunity. Every project should have a formal QC/QA process for design and contract plan development. The Project Engineer establishes and finalizes the project QMP with the project team. The project Quality Management Plan is scalable and should be commensurate to project size, complexity and level of risk. A properly scaled QMP appropriately allocates region resources in the quality effort. The QMP can be a single page or multiple pages. It should be able to serve as a standalone document and is an element of the Project Management Plan. The criteria shown in the following figure offers guidance on whether to use a project specific QMP or a simplified quality management approach that is reflected in the Project Management Plan.

[1] Leading performance indicators define actions to achieve goals with measurable outcomes. They serve as inputs that "lead" to success in project delivery and meeting quality objectives.

QMP Documentation	Project Type	Project Complexity	Constructability Risks	Project Costs	CN Duration
Project Management Plan	***Preservation:*** • P1 Pavement Rehab • P2 Bridge Replacement • P3 Drainage ***Improvement:*** • I1 Improvement • I2 Safety • I3 Mobility • I4 Fish Passage	***Lower*** • Geometrics • Utilities • Drainage • Environmental • Geotechnical • Traffic Staging • Railroad • CN Access • Hazardous Materials	***Lower*** • Geometrics • Utilities • Drainage • Environmental • Geotechnical • Traffic Staging • Railroad • CN Access • Hazardous Materials	***Project Cost Less than $50 Million***	***Two CN Seasons or Less***
Project Specific Quality Management Plan	***Preservation:*** • P1 Pavement Rehab • P2 Bridge Replacement • P3 Drainage ***Improvement:*** • I1 Improvement • I2 Safety • I3 Mobility • I4 Fish Passage	***Higher*** • Geometrics • Utilities • Drainage • Environmental • Geotechnical • Traffic Staging • Railroad • CN Access • Hazardous Materials • Innovative/ Accelerated Bridge Construction	***Higher*** • Utilities • Drainage • Environmental • Geotechnical • Traffic Staging • Railroad • CN Access • Hazardous Materials • Groundwater	***Project Cost More than $50 Million***	***More than two CN Seasons***

Figure 3 - Determine Management Plan Type

Quality Management – Review Milestones

Review Cycles

Review milestones are established early in the project and documented in the Project Management Plan. These milestone reviews provide the project team and subject matter experts an opportunity to consider completion of the tasks provided in the checklists (see Appendix A, B and C), and the quality associated with those tasks. In addition to determining completion of the listed task, consider measureable quality elements appropriate at the given design level for each checklist item, such as accuracy, omissions, and assumptions.

Review Time Allowance

For a complete and thorough review of a PS&E, appropriate time is needed for each review and should be included in the project schedule (see figure below). Time for each review depends on project complexity and can vary between one to two weeks. [At the 30% level, a preliminary schedule can be evaluated by the PEO, and other supporting offices.]

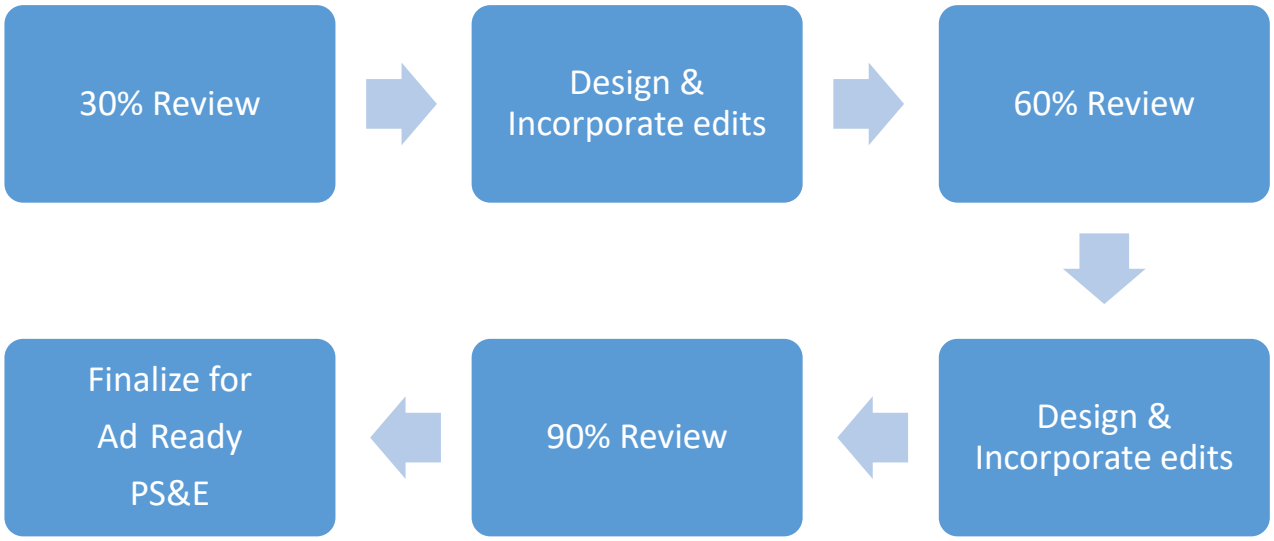


Figure 4 - Review Cycle

Contract plans, specifications & estimates should be reviewed for completeness relative to the project scope; adherence to applicable codes and standards; consistency and accuracy with design calculations; clarity and consistency across the drawing set; and constructability, operability and maintainability. Typically, a review is done at approximately the 30 percent, 60 percent, and 90 percent level of plan completeness. The basic process involves checking, correcting, and verifying that the corrections have been made. Review comments received should be logged and documented as they are addressed. This is critical on large multi-disciplinary projects.

30% Review

A thirty-percent review should be considered for all bridge replacement, fish passage projects, and widening and improvement projects over $5 million in construction. The purpose of a 30% quality review is to get endorsement of the design decisions, geometrics, storm water and Temporary Erosion and Sediment Control (TESC) strategy, utility conflict identification and resolution strategy, staging and work zone traffic control strategy, illumination and signal foundation conflicts and to identify and evaluate potential constructability conflicts to be considered as design is advanced. [Each region may have their own forms for documentation. Attachment A provides a suggested checklist for the 30% quality review considerations.]

60% Review

A sixty-percent review is used as an evaluation and validation of design decisions since 30% quality review, endorsement of construction staging, and identification, evaluation, and resolution of constructability issues. The 60% quality review is scalable and performed on all projects, except for perhaps pavement preservation projects. The primary purpose of the 60% quality review is to ensure constructability and verify contract plans layout, scale, and formatting is consistent with Plans Preparation Manual. [Each region may have their own forms for documentation. Attachment B provides a suggested checklist for the 60% quality review considerations.]

90% Review

A ninety-percent review is intended to be a near-final PS&E review, and items missing from the contract should be documented to the reviewers. On preservation or other small simple projects, 90% quality review may be combined with final (Region/Ad) PS&E review. Primary purpose of the 90% quality review is to perform preliminary contract review and ensure project is biddable and there are no major constructability issues. [Each region may have their own forms for documentation. Attachment C provides a suggested checklist for the 90% quality review considerations.]

Specialty Office Quality Management and Review

Specialty offices are responsible for QC and QA of their design work products. Each specialty office will have their own Quality Management Plan, which defines their role in the multi-disciplinary review cycles and the integration of their work products.

Quality Management

Assurance, Control and Verification

Region Quality Control

Region Project Lead will sign off on actions, procedures and methods implemented during the production of the plans, specifications, and estimates.

Region Quality Assurance

Region management - Project Engineer, Plans Engineer, Project Development Engineer, Region Construction Engineer, and Engineering Manager - will oversee quality assurance, observing and ensuring prudent quality control procedures are in place and are being carried out.

Region Quality Verification

Region Project Engineer Office will sign off on all quality PS&E checklists, verifying that the design, review and editing was completed.

A 100% Ad-Ready PS&E review will be done by the region. Region will coordinate with the HQ Development Division as needed.

Headquarters Quality Verification

The HQ Design Office will take an active role in quality verification. Up to 10% of projects, at 100% PS&E and randomly selected, will be reviewed by HQ. On occasion HQ may focus on specific focus areas as part of the reviews.

Special Provisions

Regions are delegated approval authority for special provisions in accordance with their Region QMP. Reviews include input from project relevant subject matter experts. The region ASCE, during pdoc review for each project, will give particular attention to the project specific specials and approves their use for the project. Region specials are approved ahead of time when modified by the ASCE and so have prior approval for project use.

Depending on the topic of the special provision, consider including the following parties in a project strategy discussion before any Special Provision writing takes place:

- Construction Project Engineer,
- Region Construction Engineer,
- Region Project Development Engineer,
- HQ ASDE and
- HQ ASCE

Discuss concepts and potential conflicts with specifications early and resolve them to produce a successful specification. Engage appropriate Subject Matter Experts in the discussion (e.g. HQ Construction, hydraulics, region materials lab, structures) to help refine the provision. Make sure the problem is thoroughly understood prior to developing the solution through the proposed Special Provision.

Statewide Lessons Learned

Regions participate in the annual statewide HQ Design/Plans Engineer peer exchange, which facilitates coordination on new developments, policy, etc. regarding design and PS&E development.

Additionally, Region designers and construction personnel are to create an annual lessons-learned meeting. This time for reviewing the prior year's design and construction season. This is an open discussion as to what worked well and what did not. Several regions are already doing this. Meetings can be conducted with candor and with a spirit of positive attitude toward sharing and learning. It is not a tool to point fingers and place blame. Problems arise on even the smallest project, and we can use this annual region review to share and learn.

Design Offices should review the change orders that occurred on their projects in construction. This for accuracy of the coding, and as a review to understand the things that actually occurred out there on the project. Emphasis on accuracy of change order coding directly influences the value of lesson learned for future project that they will be designing.

Best Quality Practices, BQP Library

Regions and offices may have quality control processes in place that have been used effectively for many years, and should continue.

Additionally, WSDOT HQ Design will establish, and maintain, a Best Quality Practices library. The WSDOT BQP library is a repository of information and tools helpful in producing quality products. The BQP library is not meant to replace quality tools or processes currently used, it is merely meant to augment them.

Appendix A - Quality Review Check Lists 30%, 60% and 90%

Project Development Deliverable Checklist 30% Quality Review)

30% Project Development Quality Review Considerations

The 30% quality review should be considered for all bridge replacement, fish passage projects, and widening and improvement projects over $5 million in construction. In order for the 30% quality review to be successful, the design team should consider including the following review team member and must complete the following deliverables prior to performing the review (consider including in the initial scopes of work at the start of the project):

Design Quality Review Members

- ❑ Required - Engineer of Record (EOR), Project Development Engineer (PDE), Region Construction Engineer (RCE) or Engineering Manager (EM), Construction PE, Design Team Lead, Designer(s), Hydraulics designer, Traffic (WZTC, illumination and/or signal designer)
- ❑ Optional (As needed) – Program Management representative, Environmental permits coordinator, Maintenance representative, Geotechnical Engineer or designee, Bridge Design representative, Utilities Engineer or Designee, Plans Engineer/Engineering Services Manager or designee, Landscape Architect, Asst. State Design Engineer (ASDE), Asst. State Construction Engineer (ASCE)

Required Design Review Deliverables*

- ❑ Project Management Plan
  - Communications Plan
  - Quality Management Plan
  - Risk Management Plan
  - Change Management Plan
  - Project Cost Estimate with Basis Of Estimate
  - Project Schedule
- ❑ Value Engineering, VE completed or scheduled, if required
- ❑ Approved Basis of Design & Alternative Comparison Table
- ❑ Completed Critical Geometric Design Parameters
  - Horizontal Alignment (lane & shoulder widths, curve radius, superelevation, horizontal stopping sight distance (SSD), intersection SSD, etc.)
  - Vertical Profile (grade, cross slope, vertical SSD, vertical clearance, etc.)
  - Quantitative analysis for lane and shoulder widths?
- ❑ Known Design Analysis – For elements not meeting minimum values in DM
- ❑ Draft Intersection and/or Interchange Channelization Plans
- ❑ Inroads 3D roadway model:
  - Final roadway cross-sections
  - Staged roadway cross-sections for proposed Staging Strategy (if applicable)
- ❑ Verified Survey Datum, Control, and Right of Way alignment
- ❑ Utilities identified and potential conflicts determined
- ❑ Surfacing type determined

- ❑ Preliminary soil investigation information:
  - Boring logs
  - Soil Types
  - Groundwater elevation
- ❑ Completed storm water management & treatment strategy including locations of storm water facilities
- ❑ Completed Bridge Type, Size, and Location (TS&L) and bridge site date
- ❑ Retaining Walls Type, Size, and Location identified and wall site date completed
- ❑ Hydraulics Preliminary Basis of Design complete (for fish passage projects)
- ❑ Fish Passage Culvert Type, Size, and Location (for fish passage projects)
- ❑ Temporary and permanent signal/illumination locations and conflicts identified
- ❑ Construction Staging Strategy
- ❑ Traffic Management Strategy
- ❑ Wetlands & Sensitive Areas identified
- ❑ Defined Roadside restoration and landscaping strategy
- ❑ Types of Permits identified (Environmental, detour, coast guard, etc.)
- ❑ Railroad impacts and coordination requirements identified
- ❑ Proposed right of way and construction easements
- ❑ Initial maintenance review completed and any known deficiencies identified
- ❑ Roll Plots or Plan Sheets with information to show any known or potential conflicts between various disciplines:**
  - Alignment and Right of Way
  - Existing features
  - Project Footprint (cut/fill limits)
  - Existing Utilities and Potential Conflicts
  - Construction Staging Plans & construction access locations
  - Existing and proposed drainage System (w/ pond/treatment locations)
  - Bridge TS&L plans and foundation locations
  - Retaining Wall type, size, and location
  - Illumination and Signal foundation locations

Project Delivery Method Selection

Constructability Evaluation Considerations*: (Responsibility – CN PE, EOR, Design Team, PDE, RCE)

- ❑ Evaluate and identify potential conflicts for below ground construction items such as:
  - Drainage structures and pipes
  - Ponds
  - Culverts
  - Bridge foundations and piers
  - Wall foundations
  - Structure excavation
  - Extra excavation or shoring limits
  - Existing monuments (DNR, WSDOT, property corners)

- ❑ Traffic Staging and Management strategy review and verification
- ❑ Construction Access review including haul routes and/or need for detour agreements
- ❑ Sensitive areas protection and turbid water management strategy review
- ❑ Contaminated soils identification and evaluation
- ❑ Contractor staging and/or stockpiling
- ❑ Environmental considerations & review:
  - Known commitments in EIS or NEPA
  - Environmental permit drawings and Level 2 information
  - Noise concerns
- ❑ Maintenance accessibility needs
- ❑ Potential non-standard items & special provisions

Recommended Format:

- ❑ Kickoff Meeting to discuss expectations, comment format, and disseminate information
- ❑ Discipline Review and Comments
- ❑ Roundtable to discuss critical and significant comments

**The Design Review Deliverables and Constructability Evaluation Considerations provided in this document do not provide an exhaustive list and should be supplemented with other items of importance for individual regions, project offices, and specific type of projects.*

*** Since 30% quality review is not intended for contract plan reviews, Roll plots or PDFs with multiple CADD layers and levels shown maybe more appropriate to identify conflicts among various disciplines. If roll plots are used, scale them appropriately and include the North arrow...*

Project Development Deliverable Checklist (60% Quality Reviews)

60% Project Development Quality Review Considerations

In order for the 60% quality review to be successful, the design team should consider identifying the critical review team member and must complete the deliverables listed in this section prior to performing the review:

Design Quality Review Members

- ❑ Required - Engineer of Record (EOR), Project Development Engineer (PDE), Region Construction Engineer (RCE) or Engineering Manager (EM), Construction PE, Design Team Lead, Designer(s), Plans Engineer or Designee, Hydraulics designer, Traffic Engineer (WZTC, illumination and/or signal designer), Plans Engineer/Engineering Services Manager or designee,
- ❑ Optional and as needed –Environmental permits coordinator, Maintenance representative, Geotechnical Engineer, Bridge Design Engineer, Utilities Engineer or Designee, Landscape Architect, Asst. State Design Engineer (ASDE), Asst. State Construction Engineer (ASCE), Program Management representative

Required Design and Contract Plans Deliverables

- ❑ Project Management Plan
  - Communications Plan
  - Quality Management Plan
  - Risk Management Plan
  - Change Management Plan
  - Project Cost Estimate with Basis Of Estimate
  - Project Schedule
- ❑ Design Documentation
  - Completed design parameters
  - Approved design analyses
  - Approved Plans for Approval or Channelization Plans
  - Completed Design Approval
- ❑ Contract Plan Sheets (60% unless noted otherwise)
  - Vicinity Map **(100%)**
  - Roadway Sections
  - Construction Staging Plans **(100%)** (if applicable)
  - Alignment/Right of Way Plans **(100%)**
  - Site Prep Plans **(90%)**
    - Include all removal items
    - Saw cut limits
  - Existing Utilities **(100%)**
    - Include proposed relocations
  - Roadway Profiles & Superelevation
    - Profiles and Superelevation **(100%)**
    - Earthwork Quantities
  - TESC Plans including
    - Proposed Storm water Treatment BMPs

        - Groundwater management Plan
    - Drainage Plans with cut/fill limits **(90%)**
    - Drainage Profiles
        - Station and offset **(90%)**
        - Rim and flow line grade/elevations
        - Identify existing utility crossings **(90%)**
    - Drainage ponds
        - Layout and excavation limits **(100%)**
        - Control Structure
    - Pond Details (30%)
    - Paving Plans
    - Paving Details (30%)
    - Pavement Marking Plans (30%)
    - Pavement Marking Details (30%)
    - Retaining Wall Plans & Profiles
    - Bridge Plans
        - Bridge layout **(100%)**
        - Superstructure Plans (60%)
        - Pier and Substructure foundation type and locations **(100%)**
        - Substructure Plans (60%)
    - Traffic Signals Plans
        - Foundation locations **(90%)**
        - Signal cabinet and conduit locations **(90%)**
    - Illumination Plans
        - Foundation locations **(90%)**
        - Conduit locations **(90%)**
    - Traffic Control Plans (30%)
        - Lane closure hours **(100%)**
        - Detours **(90%)**
    - Landscape Plans
        - Soil amendments **(90%)**
        - Irrigation conduit location **(90%)**
- ❑ Special Provisions
    - List of known contract requirements (fish windows, environmental commitments, proprietary items)
    - List of potential contract requirements (environmental, local jurisdiction, etc.)
    - List of all non-standard items
    - Any draft specifications prepared to date
- ❑ Estimates
    - Summary of Quantities
        - Significant cost items quantified (earthwork, surfacing & pavement, structures, walls, signal, illumination, drainage) (90%)
        - Minor items are identified but may not be quantified (30%)
    - Appropriate allowance for minor items
- ❑ Draft Geotechnical Report:
    - Summary of Geotechnical conditions, if available.

- Key geotechnical recommendations (groundwater, soil type, footing recommendations, etc.)
- Extra excavation slope stability determination

Contract Plans Review Considerations (Responsibility – CN PE, Design PE, PDE, RCE, Plans Review)

- ❑ Contract Plans Formatting Review per Chapter 4 of Plans Prep Manual
  - Drafting requirements and details
  - Plan sheet scale and layout
  - Plan Sequence
- ❑ Contract Plans Content
  - Roadway Sections – Surfacing matches pavement design report, Paving limits match paving plan, slope tables accurate.
  - Alignment & Right of Way – Curve data, horizontal SSD, right of way limits and easement limits shown correctly, cut and fill lines within R/W.
  - Utilities – Verify all existing utilities shown and any relocations identified
  - Roadway Profiles – Curve Data, superelevation transitions, vertical stopping sight distance
  - Drainage Plans – Verify water flow paths and catch basin locations, consistency with Maintenance of Traffic (MOT)
  - Drainage Profiles – Verify elevations against finished DTM, grades, inlets and outlets
  - Drainage Ponds – Groundwater elevation vs pond bottom, liner, excavation limits in relation to MOT and construction staging plans
  - Paving Plans – Width accommodates channelization
  -
- ❑ Contact Special Provisions
  -
  - Agree on measurement and payment for non-standard items
- ❑ Contract Estimate
  - Review quantity calculations for significant cost items

Constructability Review Considerations (Responsibility – CN PE, Design PE, PDE, RCE, Plans Review)

- ❑ Identify any conflicts in various below ground construction items:
  - Drainage (ponds, vaults, drainage structures, culverts & storm water pipe elevations, etc.)
  - Bridge footings and piers conflicts (utilities, drainage, etc.)
  - Structure excavation, extra excavation, and shoring envelope conflicts with staging, roadway, signal and luminaire foundations, etc.
  - Traffic signal, signal cabinet, and luminaire footings conflicts
- ❑ Traffic Staging review and conflict identification
- ❑ Sensitive areas protection and turbid water management strategy evaluation
- ❑ Shoring or extra excavation limits and evaluation
- ❑ Hazardous materials and contaminated soils determination and evaluation
- ❑ Maintenance access for new and existing features (luminaires, sign bridges, ponds, vaults, etc.) and special maintenance needs identified
- ❑ Review risk allocation and potential mitigation

Project Development Deliverable Checklist (90% Quality Reviews)

90% Project Development Quality Review Considerations

The following items should be complete prior to the review.

Design Quality Review Members

- ❑ Required - Engineer of Record (EOR), Project Development Engineer (PDE), Region Construction Engineer (RCE) or Engineering Manager (EM), Construction PE, Design Team Lead, Designer(s), Plans Engineer or Designee, Hydraulics designer, Traffic Engineer (WZTC, illumination and/or signal designer), Plans Engineer/Engineering Services Manager or designee,
- ❑ Optional and as needed –Environmental permits coordinator, Maintenance representative, Geotechnical Engineer, Bridge Design Engineer, Utilities Engineer or Designee, Landscape Architect, Asst. State Design Engineer (ASDE), Asst. State Construction Engineer (ASCE), Program Management representative

Design and Contract Plans Review (Responsibility – Design Team, EOR, PDE, Plans Review)

- ❑ Project Management Plan
  - Communications Plan
  - Quality Management Plan
  - Risk Management Plan
  - Change Management Plan
  - Project Cost Estimate with Basis Of Estimate
  - Project Schedule
- ❑ Contract Plans Formatting Review per Chapter 4 of Plans Prep Manual
  - Drafting requirements and details
  - Plan sheet scale and layout format
  - Plan Sequence
- ❑ Contract Plan Sheets
  - Completeness Review (Contract Plan sheets should be near 100% and missing elements should be documented to the reviewers)
  - Formatting Review (Per Chapter 4 of Plans Prep and Drafting per the XX Manual)
  - Consistency & Accuracy Review
    - Quantities shown on various plan sheets (Q-tabs, Roadway Profiles, Structure Notes, etc.) match Summary of Quantities total
    - Bid item names and measurement on various plan sheets (Q-tabs, Roadway Profiles, Structure Notes, etc.) match those in Summary of Quantities
    - Standard Plan and Standard Specs references are correct
- ❑ Special Provisions
  - Completeness Review (Special Provisions should be near 100% and missing elements should be documented to the reviewers).
  - Most of the Environmental Restrictions are known and incorporated
  - All non-standard bid items have a special provision
  - Includes number of working days
  - Traffic control lane restriction are included

- ❑ Cost Estimate
  - Summary of Quantities are complete
  - UBA for all bid items
  - Lump Sum cost estimate detail complete
  - Below the line items identified
  - Construction Engineering
- ❑ Geotechnical Report Complete
  - Summary of Geotechnical conditions included
  - Geotechnical recommendations incorporated into the design and the contract.
- ❑ Hydraulics Report Approved

Constructability Review (Responsibility – CN PE, Design PE, PDE, RCE, Plans Review)

- ❑ Verify no known conflicts in various below ground construction items:
  - Drainage (ponds, vaults, drainage structures, culverts & stormwater pipe elevations, etc.)
  - Bridge footings and piers conflicts (utilities, drainage etc.)
  - Structure excavation, extra excavation, and shoring envelope conflicts with staging, roadway, signal and luminaire foundations, etc.
  - Traffic signal, signal cabinet, and luminaire footings conflicts
- ❑ Traffic Staging review and conflict identification
- ❑ Sensitive areas protection and turbid water management strategy evaluation
- ❑ Shoring or extra excavation limits and evaluation
- ❑ Hazardous materials and contaminated soils determination and evaluation
- ❑ Maintenance access for new and existing features (luminaires, sign bridges, ponds, vaults, etc.) and special maintenance needs identified