

North Central Region Quality Management Plan



Washington State Department of Transportation
North Central Region

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North Central Region Quality Management Plan Endorsement

Date	Name	Title	Signature
_____	_____	Regional Administrator	_____
_____	_____	ARA - Engineering	_____
_____	_____	Engineering Manager	_____

The North Central Region Quality Management Plan (QMP) is intended to assure consistent standard of quality across the region for the development of final plans and design deliverables on design-bid-build projects. This QMP outlines the roles and responsibilities of all involved in the delivery of quality design products, which results in delivery of quality transportation improvement projects.

INTRODUCTION

This Quality Management Plan (QMP) defines the quality control, quality assurance and quality verification processes and responsibilities during the development of a project's plans, specifications, and estimate. In order to deliver quality work products that are thorough, accurate and timely, every work product should be thoroughly reviewed and checked in order to be considered complete. There is a cost associated with poor quality due to rework, loss of integrity and lowering of reputation.

It is recognized that design quality processes are separated into two 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). Both are critical in the delivery of quality transportation projects.

Quality is a continual process, beginning with each person carefully double-checking their own work. Identifying simple errors early in a 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 quality.

All region project team members and support offices are responsible for the following:

- Be familiar with and comply with this Quality Management Plan.
- Confirm that the criteria, standards or other project guidelines are appropriate for the work being performed.
- Perform continuous quality checks of their own work including spelling, grammar, calculations, and presentation clarity.
- Identify any quality issues or deficiencies as they arise.
- Document all quality checks.

The NCR Project Delivery Flowchart (Appendix A) shows the general steps involved in project delivery. The flowchart allocates time for each step in relation to the project's scheduled advertisement date.

DEFINITIONS

- Quality Control (QC) – refers to those actions, procedures, and methods to be routinely employed at the production level, under the jurisdiction of the Project Engineer, during the development of work products to produce the desired quality professional services.
- 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.
- Quality Verification (QV) – refers to those actions, procedures and methods employed at the Region Plans Office and HQ Project Development Division to conduct the Plans Review, and ensure a QMP is implemented, the appropriate project development process was followed, and is reflected in the final contract document.

REVIEW CYCLES

Contract plans, specifications and estimates will 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.

The basic process involves checking, correcting, and verifying that the corrections have been made. Review comments will be logged and documented as they are addressed. This documentation of corrections will be placed in the Project File.

Four types of reviews are identified in this QMP: Design Review, Constructability Review, Plans Review, and Ad Review. The number and types of reviews that a project will undergo depends on the complexity of the project, and will be determined by the criteria shown on the checklist for the respective Review (see Appendices B through E). The plan and schedule for review cycles will be documented in a project's Project Management Plan.

Design Review (30% through PE Phase)

A Design Review will be held for projects that meet the criteria identified on the Design Review Checklist (Appendix B). The purpose of the Design Review is to obtain endorsement of design decisions, geometrics, design parameters, and the project footprint from region management and project support offices. The Design Review is not intended to alter the original scope of a project. If a need for scope adjustment is identified, approval will be obtained from region management.

Constructability Review (60% through PE Phase)

A Constructability Review will be held for all projects. It will be documented on the Constructability Review Checklist (Appendix C). The purpose of the Constructability Review is to validate design decisions that have been made since the Design Review; and to identify, evaluate, and resolve constructability issues. On preservation or other simple projects, the Constructability Review may be combined with the Plans Review at the Engineer of Record's (EOR's) discretion.

Plans Review (90% through PE Phase)

A Plans Review will be held for all projects. It will be documented on the Plans Review Checklist (Appendix D). The purpose of the Plans Review is to ensure that the project is biddable, and to confirm that there are no constructability or budget issues. It is intended to be a full PS&E review. Items missing from the contract will be documented to the reviewers. On preservation or other simple projects, the Constructability Review may be combined with the Plans Review at the EOR's discretion.

Ad Review (100% through PE Phase)

An Ad Review will be held for all projects. It will be documented on the Ad Review Checklist (Appendix E). The purpose of the Ad Review is to ensure that all of the comments from the Plans Review have been incorporated into the project, and that all outstanding items, permits, and approvals are resolved.

REVIEW TIME ALLOWANCE

For a complete and thorough review of a PS&E, an appropriate time allowance is needed for each review cycle and should be included in the project schedule. Plans will not be accepted for review if they are received by reviewers less than two weeks prior to the comment due date.

SUPPORT OFFICE QUALITY MANAGEMENT AND REVIEW

Support Offices are expected to participate in Design, Constructability, Plans, and Ad Reviews. If an office receives a request for a review, they will either provide a completed comment sheet back to the designers, or provide concurrence that they have reviewed the project and have no comments. If a support office is unable to provide a review of the project, it is expected that they will inform the designers that they are unable to provide a review.

QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Each project will have a formal, project-specific QA/QC process for both design and contract plan development. The QA/QC process will be documented within the Project Management Plan.

REGION QUALITY VERIFICATION

Region Project Offices will sign off on all review checklists in order to verify that the design, review and editing was completed. A 100% Ad Review will be performed by the region, and will be coordinated with the HQ Development Division Office, as needed. After comments from the Ad Review have been addressed, the Project Office will submit an Ad-Ready PS&E to the Region Plans Office along with a PS&E Transmittal Form (Appendix H). The excel file for the PS&E Transmittal Form can be found at <http://wwwi.wsdot.wa.gov/NorthCentral/DesignPlans/Plans+Office.htm>.

HEADQUARTERS QUALITY VERIFICATION

The HQ Design Office will take an active role in contract development quality verification. Regions will expect HQ to perform PS&E reviews on 15%-25% of the projects.

REGIONAL APPROVAL OF SPECIAL PROVISIONS

Region Project Offices will submit the Special Provision package a minimum 6 weeks prior to advertisement to the Region Plans Office. Two weeks is needed to obtain region approval. The remaining four weeks will be used to get HQ Construction approval. Once the Special Provisions have been approved by HQ Construction, they are ready for final assembly for the Contract.

CONSTRUCTION PROJECTS LESSONS LEARNED

North Central Region will hold an annual Construction Projects Lessons Learned meeting each winter, following completion of the previous year's contracts. This meeting will serve as an opportunity for construction offices to discuss lessons learned from the previous year, and to share feedback and knowledge with the Designers. It is expected that every designer in North Central Region will attend the Construction Project Lessons Learned meeting.

Additionally, all lessons learned will be forwarded to the HQ Quality Office to be placed on the WSDOT Lessons Learned website at

<http://wwwi.wsdot.wa.gov/Projects/Delivery/LessonsLearned/>. This website is an on-line, automated database designed to capture, present, and track lessons learned from the department's project delivery program. The intent of this system is to share lessons and best practices in order to avoid repeating old mistakes.

QUALITY MANAGEMENT PLAN PERFORMANCE METRICS

This QMP establishes the following performance metrics (Figure 1) to track quality performance.

Performance Metric	Performance Target (per contract)	5 Year Historical Average (per contract)	Last Year's Average (per contract)
Number of Addenda	Reduce 25% from the 5 year average	3.3 per contract (2014-2018)	1.75 per contract (2018)
Over/Under Engineer's Estimate	Conn. WA - Bids below Engineer's Estimate All Other +/-10%	Conn. WA – N/A All Other - 45% within +/-10%	Conn. WA – N/A All Other - 50% within +/-10%
Plan Error Change Orders	Reduce 25%	39	29
Notes: 5 year averages are from contracts bid opening between January 2014 and December 2018 for the region. Last year's averages are from contracts bid opening between January 2018 and December 2018.			

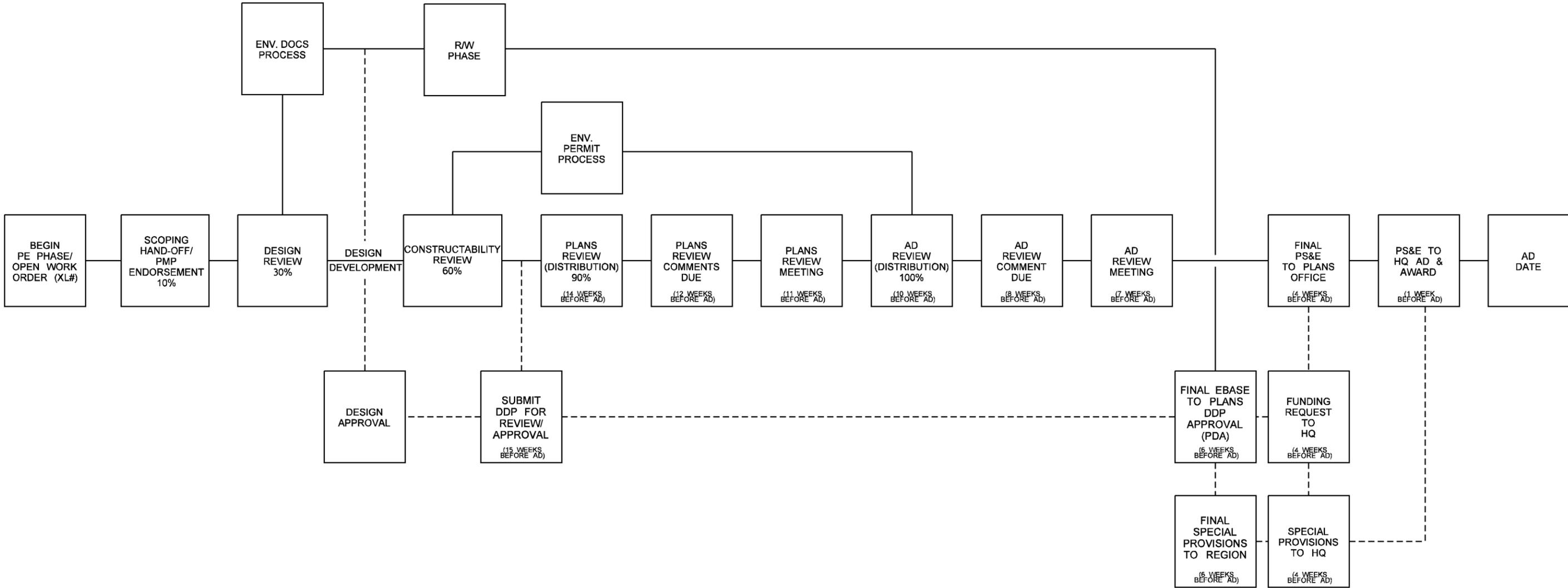
FIGURE 1

WSDOT BEST QUALITY PRACTICES LIBRARY

WSDOT HQ Quality Office will establish and maintain a Best Quality Practices (BQP) library. This library is a repository of tools that will be helpful in producing quality products. The library will provide a baseline set of tools from which offices or regions can choose to insure quality goals are met.

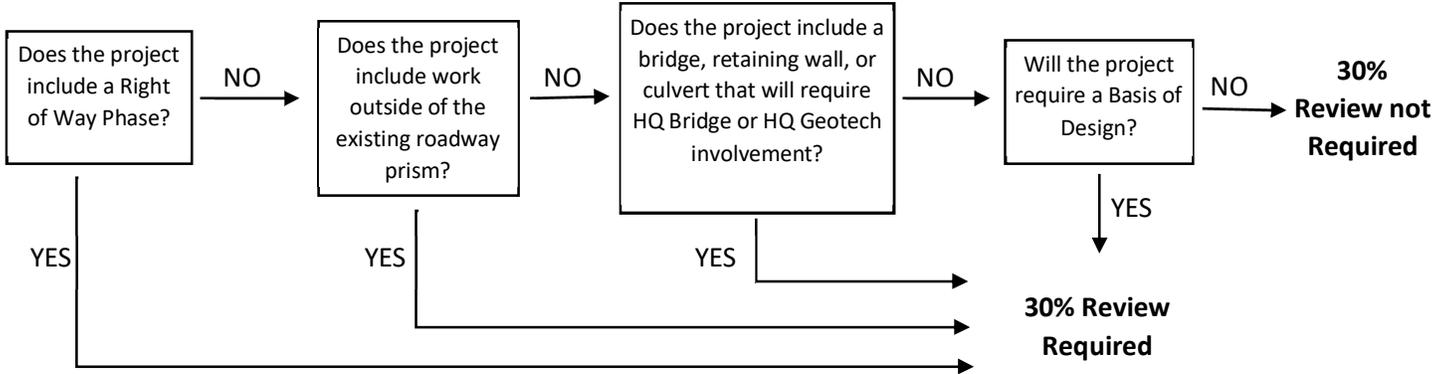
APPENDIX A

NCR PROJECT DELIVERY FLOWCHART



Appendix B Design Review Checklist

*A Design Review should be held **30%** of the way through the PE phase for projects that meet these criteria:*



Design Review members:

- | | | |
|----------------------|------------------------------|---------------------|
| Engineer of Record | Project Development Engineer | Engineering Manager |
| Construction PE | Plans Office | Design Team Leader |
| Designer(s) | Utilities Office | Traffic Office |
| Environmental Office | Hydraulics Engineer | Real Estate Office |
| Maintenance | Others as needed | |

Design Review Deliverables:

- Critical Design Parameters (vehicle, lane/shoulder widths, horizontal and vertical alignments)
- Any known design elements that will not meet minimums in the Design Manual
- Draft Surfacing Report
- Draft Basis of Design
- Draft Intersection/Channelization Plans
- Draft roadway cross sections (InRoads 3D Roadway model)
- Aerial photos, plan sheets, or roll plots (as needed) to illustrate the following:
 - Area of Potential Effect
 - Verified Right of Way alignment
 - Potential utility conflicts determined
 - Stormwater management strategy
 - Preliminary traffic management strategy
 - Construction staging (if phased construction is necessary)
 - Delineated wetlands and sensitive areas
 - Railroad impacts
 - Right of Way impacts and CN Easements
 - Detours that may require Agreements with local agencies
- Bridge/wall site data
- Maintenance coordination initiated and maintenance needs identified
- Community Engagement strategy
- Updated Cost Estimate

Checklist Completed By:	
Checklist Reviewed By:	
Plans Office Review	

Appendix C

Constructability Review Checklist

*A Constructability Review should be held **60%** of the way through the PE phase for all projects.*

Constructability Review members:

Engineer of Record	Project Development Engineer	Engineering Manager
Construction PE	Plans Office	Design Team Leader
Designer(s)	Utilities Office	Traffic Office
Environmental Office	Hydraulics Engineer	Real Estate Office
Others as needed		

Constructability Review Deliverables:

- Contract Plan Sheets (As needed for Constructability discussion)
- Special Provisions
 - List of known contract requirements (fish windows, environmental commitments, proprietary items)
 - List of potential contract requirements (environmental, local jurisdiction, etc.)
 - Identify project specific specs
- Updated Cost Estimate
 - Significant cost items quantified (earthwork, surfacing & pavement, structures, walls, signal, illumination, drainage)
 - Minor items identified but may not be quantified. Allowance included for minor items
- Working Days Estimate
- Traffic Control/Staging Concept
- Maintenance Coordination
 - Maintenance access for new and existing features
 - Additional maintenance needs identified
- Conflicts in various below-ground construction items identified
 - Conflicts with existing utilities
 - Conflicts with drainage features
 - Conflicts with bridge footings and piers
 - Excavation and shoring conflicts with staging, roadway, signal and luminaire foundations
 - Traffic signal, signal cabinet, and luminaire footings conflicts
- Wetland/Sensitive Areas
 - Mitigation and protection identified.
 - TESC Plan/turbid water management strategy identified
 - Hazardous materials/contaminated soils identified
 - JARPA Drawings
- Final Surfacing Report
- Draft Geotechnical Report:
 - Summary of Geotechnical conditions, if available
 - Key geotechnical recommendations (groundwater, soil type, footing recommendations)
 - Extra excavation slope stability determination
- Coordination with other WSDOT Contracts, Local Agency projects, Maintenance work

Checklist Completed By:	
Checklist Reviewed By:	
Plans Office Review	

Appendix D

Plans Review Checklist

A Plans Review should be held no later than 90% of the way through the PE Phase for all projects.

Project Development Approval should be obtained prior to the Plans Review.

Plans will not be accepted for review if they are incomplete, or if they are received by Reviewers less than two weeks prior to the Comment due date.

Plans Review Process:

Step 1:

Two months prior to meeting - Schedule Plans Review Meeting and send meeting invite to the distribution list below.

Step 2:

3 weeks prior to meeting - Send out the full PS&E Review set to the distribution list below. Request comments back in writing on a Review Comment Sheet (Appendix G). Allow a two-week review period.

Step 3:

Comments Due Date, 1 week prior to meeting - Receive comments from Reviewers, make edits and respond to comments prior to meeting

Step 4:

Plans Review Meeting - Hold the Plans Review meeting to go over major comments/issues to be resolved with the group

Plans Review members:

Engineer(s) of Record	Project Development Engineer	Engineering Manager
Construction PE	Plans Office	Design Team Leader
Designer(s)	Materials Office	ASDE
Hydraulics Engineer	Traffic Office	Environmental Office
Utilities Office	Maintenance	Office Engineers
Documentation Engineer	Local Agencies	State Materials Lab
HQ Development Division	Others as needed	

Plans Review Deliverables:

- Contract Plan Sheets
 - Biddable Contract – Plan sheets and specs should be 100% complete
 - Formatting (Per Chapter 4 of Plans Prep and Drafting per the CADD Checklist)
 - Consistency & Accuracy Review
- Cost Estimate
 - Summary of Quantities complete
 - Unit prices analyzed using UBA and bid history for all bid items
 - Lump Sum cost estimate detail complete
 - Below the line items identified
- Completed CAD checklist (Appendix F)
- InRoads Quantities checked by _____
- Cost Estimate quantities and bid prices checked by _____
- Environmental Commitment Meeting Completed
- Environmental Commitment Meeting Memo

Checklist Completed By:	
Checklist Reviewed By:	
Plans Office Review	

Appendix E

Ad Review Checklist

An Ad Review should be held 100% of *the way through the PE Phase for all projects.*

Plans will not be accepted for review if they are incomplete, or if they are received by Reviewers less than two weeks prior to the Comment due date.

Ad Review members:

Engineer(s) of Record

Project Development Engineer

Engineering Manager

Construction PE

Plans Office

Design Team Leader

Designer(s)

Others as needed

ASCE

Plans Review Deliverables:

- Contract Documents
 - Biddable Contract – Plan sheets and specs should be 100% complete
 - Consistency & Accuracy Review
- Cost Estimate
 - Summary of Quantities are complete
 - Lump Sum cost estimate detail complete
 - Below the line items identified and quantified

Checklist Completed By:	
Checklist Reviewed By:	
Plans Office Review	

Appendix F CAD Review Checklist

Project Title:	Date:
Reviewer:	Sheet File Location:

Plans - General	Yes	No	N/A
Scale bar and north arrow (top or right)			
State boundary, county line, corporate limit			
Reservations, park or forest boundary			
Project limits noted			
Construction limits noted			
Federal Aid sections noted			
Ultimate construction detailed ("FA" jobs)			
Note "bridge included" or "bridge not included"			
Equations noted			
Contract reclamation plan included			
Individual index sheet (more than 30 sheets)			
Designed/ entered/checked by, PE, RA			
Project title block same on all sheets			
Sheet title block			
Sheet/ reference numbers			
PE stamp			
Plan sheets in proper order			
Plan symbols in accordance with EEDS			
Minimum lettering height 0.07"			
All alignments have an alpha designator			
Text on all plan sheets readable from top or right			
Leader lines not crossing			
Stations, elevations, mileposts, etc., rounded to the same decimal			
Stationing left to right, ticks and labels on top			
Line styles at the correct scale for the sheet			

Vicinity Map	Yes	No	N/A
Reasonable scale to show the project			
Project limits by milepost and stationing			
Construction limits by milepost and stationing			
Equations and exceptions			
Distance to towns - rural projects only			
Detour routes			
Railroad line - IMPORTANT to show any in area			
Note "bridge included" or "bridge not included"			
Wetlands and mitigation sites			
Cadastral information (township, range, section)			

Summary of Quantities	Yes	No	N/A
All necessary groups per Plans Prep 400.06(5)			
Separate groups for agreement work			
All items tabulated			
Check quantities from plans			

Contract Reclamation Plans	Yes	No	N/A
Existing contour lines			
Available raw material is indicated			
Details of materials to produce or reclaim			
Specific directions for excavation			

Roadway Sections	Yes	No	N/A
Mainline, Ramps, Frontage roads			
City/ County roads at intersections			
Road approaches			
Detours			
Trails			
Bridge approach slab			
Bridges			
Label sections			
Standard limits for each section- entire length of roadways			
Check for overlap and gaps in stationing			
Conformance to Pavement Design Report			
Guardrail widening detail			
Shoulder dressing detail			
Slope rounding detail			
Broken back subgrade shoulder detail			
HMA planing detail			
Table for variable slopes			
Legend on all sheets			
Reference notes			
Note equations and exceptions			
Lift thickness for HMA and surfacing (individual per HMA type)			
No "min" or "max" surfacing and paving depths or slopes			

Appendix F CAD Review Checklist

Alignment, R/W, Grading and Existing Features	Yes	No	N/A
Curve data, super elevation rates			
Show cut and fill lines			
High visibility fence to protect sensitive areas and buffers			
Monumentation - protect existing, install new			
Legend of reference note on all sheets			
Alignment plan must show R/W centerline (incl. curve data) and construction centerline with ties			
R/W and L/A must agree with approved R/W and L/A plan			
Show railroad alignment and railroad R/W			
Are easements and/or permits required			
Show turn-back lines			
Complete topography and utilities			
Show site prep and demolition work			
All items to be removed shown			
show fencing and guardrail			

Quantity Tabulations	Yes	No	N/A
Same order and nomenclature as SOQ			
Round quantities per Plans Prep 400.06			
Correct totals (sheet and project)			
Project totals match SOQ			
Consistency on Structure notes, plans, profiles, and specials			
Agreement items noted			
Steel, alum, and concrete pipe alterations			
Alternate treatment for steel and alum pipe			
Max/ Min height of cover column on structure notes on separate level in CAD files			
Note beveled end sections			
Leave every 5th item column blank			
Appropriate special provision referred to in the general notes			

Drainage Plans and Profiles	Yes	No	N/A
Legend or reference note on all sheets			
Need profiles for major culverts and sewer systems			
Conformance with hydraulics report			
Pipes over 30 in. diam. Need design review by hydraulics			
Details required for work NOT covered in Std. Plans			
Pipe lengths			

Utility Plans	Yes	No	N/A
Existing utilities must be shown in plans			
Utility franchise/ permit, easements			

Wetland, Mitigation and Detention Plans	Yes	No	N/A
Show wetlands that could be impacted			
Wetland mitigation sites identified as "existing" or "to be constructed."			
Allowable work area is delineated by cut/ fill lines			
Show stormwater treatment areas			

Paving/ Pavement Marking Plan	Yes	No	N/A
Paving plan and roadway section must agree			
Legend of reference note on all sheets			
Show paving plan for I/C and intersections			
Channel details			
Show guideposts, especially at I/C and intersections			
Show pavement markings			

Plan Detail Sheet	Yes	No	N/A
Required for work NOT covered by standard plans			

Illumination Plans, Schedule and Details	Yes	No	N/A
Legend or reference notes on all sheets			
Conflicts with existing features, I.e. utilities, drainage and sidewalks			
All work within R/W or construction permit areas			

Traffic Signal Plans, Schedule and Details	Yes	No	N/A
Legend or reference note on all sheets			
Conflicts with existing features			
Traffic signal approval/ permit number			
All work within R/W or construction permit areas			
Intelligent Transportation System (ITS) Plan			

Signing Plans and Sign Specifications	Yes	No	N/A
Legend or reference notes on all sheets			
Separate set of plans sheets for construction signs			
Separate plan sheet specifications for sign removal/ relocation			

Roadside/ Landscape	Yes	No	N/A
Contour grading plan			
Planting Plan/ Roadside Restoration Plan			
Planting detail and Plant Materials list			
Signed by region landscape architect			
Review by HQ Design landscape architect			

Traffic Control Plans	Yes	No	N/A
Construction signing			
Special plans required for I/C and intersections			
Detour plans if needed			
Detour sign details			
General notes			
Data boxes for variable dimensions			
Legend or reference note on all sheets			

**Appendix G
Review Comment Sheet**

Project Title:			Review:
Reviewer:			Comments Due Date:
No.	Sheet No.	Reviewer's Comment	Designer's Response
1			
2			
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18			

**Appendix G
Review Comment Sheet**

Project Title:			Review:
Reviewer:			Comments Due Date:
No.	Sheet No.	Reviewer's Comment	Designer's Response
19			
20			
21			
22			
23			
24			
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