REGION 1 TECHNICAL CENTER
QUALITY ASSURANCE AND CONTROL

March, 14, 2005

REGION 1 TECHNICAL CENTER
QUALITY ASSURANCE AND CONTROL

THE NEED FOR WORK REVIEW

The Region 1 Technical Center recognizes that its success will be determined, in part, by the quality of services and products that it provides for it customers. Assuring quality requires not only a commitment but also a well-conceived and systematic approach. The cornerstone of that approach is a process for reviewing work and work products. The reasons for reviewing work include the following:

- To catch and correct mistakes, oversights, and logic errors and to compensate for inexperience. Humans can and do make mistakes despite their best efforts. An independent reviewer can often find mistakes or errors of logic more easily than someone close to the work.
- To assure that most experience and the highest level of technical expertise in the Technical Center (and as necessary Statewide or elsewhere) are routinely brought to bear on all projects not just those that are large or complicated. Many organizations have found that small projects cause them the most problems.
- To assure compliance with design codes, standards of practice, legal requirements, and organizational policy.
- To provide the comfort of a second opinion. Having an experienced person review your work often helps you to be more confident about the outcome.
- To provide mentoring for workers trying develop experience and expand their abilities. Often the best training comes from working on a project with a reviewer who has more experience.

The following sets out the overall review policy for the Region 1 Technical Center. The Technical Center consists of seven units including: Bridge Design, Environmental, Geo/Hydro, Right of Way, Roadway Design, Survey, and Traffic. In addition, most of these units consist of specialists from several different technical disciplines. It is the quality control plans of the units combined, that will comprise the quality assurance process for the entire Technical Center and will set the baseline for the Technical Center Manager to assess performance.

WHAT WORK SHOULD BE REVIEWED?

An effective quality assurance program requires that all Technical Center work be reviewed to some extent; with the review effort depending upon many variables. Work is generally defined as any end result or task that is either delivered directly to a customer or leads to a product that is delivered directly to a customer. Under this definition, **products** could be maps, documented interpretations, drawings, plan sheets, special provisions, memos, design details, design or assessment reports or memos. These can easily be identified as final products because they are almost always presented in writing, stamped by a licensed professional and provided directly to customers. The definition also includes many if not all of the **tasks** that support the end results. **Task** examples include but are not limited to calculations, work requests (i.e. survey requests, drill or laboratory requests, etc…), and

field interpretations and mapping. Most tasks should and usually do lead to a written result that can be reviewed.

For each of the units within the Region 1 Technical Center, lists of tasks and products have been developed which have been identified as needing review (see the appropriate appendices). For each of these tasks or products, the levels of review that have been deemed necessary are provided.

RESPONSIBILITY FOR WORK REVIEWS

The Technical Center Manager and the individual Unit Managers within the Technical Center are ultimately responsible for the quality of all of the work developed within the Technical Center, in addition to and irrespective of the individual responsibility licensed individuals have for the quality of their own work. The managers are the owners of the quality assurance plan and are ultimately responsible for all review.

Generally all staff will be involved in reviewing the work of others but the chief responsibility for quality and review shall fall upon Unit Managers. As a matter of practice, most if not all managers will delegate some or all of their quality control/assurance responsibility to technical staff. Technical staff is defined as those who have significant experience; education and training in a specific discipline and who by virtue of their performance and position have taken a leadership role in dealing with the technical issues of the section. These people shall be identified by the Unit Managers but in some cases might be singled out by job classification. However, anyone could be recognized as technical staff depending upon their qualifications.

It is possible that some units may not have the recognized technical staff, required by the needs of the project, regardless of the job classifications residing there. In these cases, the Unit Manager may need to seek the expertise from other units Statewide or from the consulting community. In these instances, the Unit Manager will coordinate with the Technical Center Manager to identify an appropriate resource for quality control.

Technical staff will be involved in detailed work checking along with other staff members, but their prime role and the one that sets them apart will be to:

- provide second opinions
- bring the greatest expertise to bear on all projects
- provide mentoring,
- assure standards compliance,
- assure that review is taking place,
- help identify the capabilities of other staff for review duties and
- help the Unit Manager fulfill his or her responsibility for quality.

Technical staff will also participate in establishing quality assurance protocols.

The prime role of staff other than technical staff will be detailed work checking although they could be involved in some of same activities as technical staff on a selective basis.

ASSIGNMENT OF REVIEWERS

Technical reviewers will be assigned by the Unit Manager as the project is assigned. Corporate reviews will be by the Unit Manager unless the responsibility is delegated a senior technical staff member.

Typically the technical reviewers will be identified from within the unit; however, where additional technical expertise is needed, technical review assistance will be obtained either from other Regions, the Central Technical Services Section or Consultants.

LEVEL OF REVIEW EFFORT

The level of effort applied to work review is designed to satisfy the five reasons for conducting review listed above.

All identified work products and tasks will undergo a review to catch and correct mistakes, oversights and logic errors. The level of effort required is expected to be detailed but will depend directly on the product or task being reviewed. Protocols for review (a checklist or similar) have been developed for most disciplines and are provided in each appendix. These discipline-specific checklists should be followed as appropriate for each project. By utilizing these checklists, the primary function of the reviewers will be that they are technically capable in whatever they are reviewing. Therefore, reviewers serving this function may be subordinates, peers, or technical level staff. It will be the manager's responsibility to assign the right reviewer to the right project.

In addition, technical staff, the Unit Manager or both will review all work identified as an end product before it is published in final form. Examples include reports, memos or other significant correspondence transmitting recommendations, opinions, and results. The purpose of this review is to bring to bear the experience of technical staff to all projects and to monitor the work for standards of practice and adherence to organizational policy. The level of effort will consist of a general review of the written document. This will not be a detailed review to catch and correct mistakes unless the technical reviewer is also assigned that task.

The business of providing mentoring and additional expertise will be accomplished by involving a technical staff member in the project at any time. The most efficient approach will be to assign a technical person at the start of the project to provide mentoring and also to conduct the primary project review. Also, mentoring and second opinions will automatically be provided as a part of the routine technical review of all work products but input at this stage might not be timely since it would occur after the work is essentially done. In essence, it will be the manager's responsibility to look for and take advantage of opportunities to provide mentoring and second opinions.

Typically the above mentioned levels of review will fall in four different categories. The following table lists the typical levels of review and descriptions of each.

Table 1 - Description of Review Levels

Review Level	Review Description
Peer	***Peer Review*** To find and correct mistakes, oversights, and errors of logic or in judgment. To augment the experience and training of the assigned project staff.
Technical	***Technical Review*** To find and correct mistakes, oversights, and errors of logic or in judgment. Also, to insure standards of practice, legal requirements, and design codes are followed. Also, to insure the most experience and the highest level of technical expertise in the Region and/or Department are routinely brought to bear on all projects.
Management	***Management Review*** In addition to the items outlined above under Technical Review, to assure compliance with organizational policies and procedures.
Mentor	***Mentor Review*** To provide mentoring. This review may be covered by the Peer, Technical or Corporate reviews.

Peer and Mentor reviews are optional, but encouraged. These levels of review not only provide an additional layer of error detection, but also facilitates the transfer of technology within the workforce.

In cases where the task or product must legally be sealed and the author/designer is not appropriately registered, the Technical or Management reviewers will be registered and typically be in responsible charge of the technical work and will stamp for the unregistered individual.

Finally, copies of reviewed work products should be routed to the discipline Unit Manager after publication. The purpose of this review is to enable the Unit Manager to keep abreast of the work being produced and to promote a quality culture. The Manager should scan or read the work products to stay informed. This review also offers the Manager the opportunity to provide direct feedback about the quality of the work.

DOCUMENTING REVIEWS

Signatures and Initials

From the list of work tasks or products requiring review and the checklists, each unit will define work products requiring a review and signature. As a guide, these should be significant items including reports, memos or any other important work products that would also have to be stamped by the licensed professional primarily responsible for the work.

The reviewer signing the work product will be one who conducted the review to catch and correct mistakes, oversights or logic errors. The reviewer would typically not stamp the work unless he or she was also in the responsible charge of the project. A reviewer in responsible charge of the work would sign as a co-author and not as a reviewer.

All other reviewed work products or tasks will be documented in the project file. A separate sheet attached to the file will list the items for review and provide for recording an initial and a date from the reviewer indicating that the review has been accomplished.

Notes and Comments

Review comments and notes should be in writing to the greatest extent possible to promote good communication and minimize misunderstandings. However, to the maximum extent possible, all reviews should be presented verbally to the reviewed. This establishes a personal relationship that helps to blunt possible conflicts of ego. It will generally not be necessary to retain copies of reports or memos with the reviewer's comments.

REVIEWER AUTHORITY

A key issue is the authority reviewers have to require changes in the work products or tasks of the reviewed. The relationship between a reviewer and the licensed professional in responsible charge is also a part of the discussion. The following will clarify Region 1 Technical Center policy regarding these issues:

- The Department has the right, responsibility, and authority to establish the procedures, policies, codes, standards of practice and level of quality under which work products and tasks will be conducted. The only limitation is that practice standards should be no less than the standard of care in the industry.
- All workers, especially licensed professionals, have a duty to complete assigned work in a manner that meets the policies and procedures of their employer. Licensed professionals also have a duty to protect the safety of the public and to practice according to the standard of care in the industry. There is no conflict between these duties unless an employer tries to require a licensed professional to do something that endangers the public.
- Oregon code does not require a person to be a licensed professional to review and comment about the work of another licensed professional.
- Region 1 Technical Center management has the right to assign anyone to review the work of anyone else within the Technical Center.
- Reviewers who are subordinates or peers of the reviewed have the authority to suggest but not require changes to the work that they review. Reviewers who are managers or technical staff compared to the reviewed have the authority to require changes to the work they review. Unit Managers will clearly indicate the rank of reviewers assigned to projects. As a practical matter, all possible efforts should be made to convince the reviewed to make changes voluntarily. Mandatory changes should be invoked carefully and sparingly.
- Reviewers cannot require licensed professionals to change work in a way that would endanger the public. Rarely, but on occasion, a licensed professional will believe that a reviewer is requiring changes to work endangering the safety of the public. It is the

professional's first duty is to try and solve the matter with the reviewer. Failing resolution with the reviewer, the professional shall next work with the Unit Manager and then the Technical Center Manager prior to seeking other ways of resolving the problem.

- Licensed professionals will still be expected to seal work products and accept technical responsibility for projects to which mandatory changes have been made by reviewers. Only if the changes jeopardize the safety of the public would the licensed professional have an argument for not being responsible for sealing the work.

RESPONDING TO REVIEW COMMENTS

All review comments will be thoroughly evaluated by the staff member(s) who have completed the work product or task and either accepted or additional work will be completed and the issue appropriately responded to. It is expected that the project staff member(s) will discuss in person with their reviewers any unclear comments or issues that they do not fully agree upon. Where issues cannot be resolved at a reviewer/project member level, the Unit Manager will participate in resolving the issue. Where issue resolution cannot be resolved at the Unit Manager level, a dispute resolution board will be established.

DISPUTE RESOLUTION BOARD

Disputes centered on complicated technical issues, questions of public safety or accepting responsible charge for reviewer changes may be resolved using a dispute resolution board. The board will operate under authority delegated by the Technical Center management team and the Technical Center Manager. Board makeup will vary but minimum membership will consist of one Unit Manager and one senior technical staff member. Technical staff members should be qualified to deal with the technical issues of the dispute. The Technical Center Manager will define the makeup of individual boards and will define the work each board will produce. Dependant upon the needs of the project and the board, these individuals may be from a different Region or from the Central Technical Services Section.

Individual workers wishing to adjudicate disputes may contact the Technical Center Manager directly to request a Board but only after attempting to resolve the issue first with the reviewer and then with the Unit Manager. The Technical Center Manager is under no obligation to convene a dispute board.

PERIODIC AUDITS

Once per quarter, a quality review team will audit two of the units for compliance with the combined Technical Center and unit review plan. The review team will consist of at least two senior technical staff appointed by the Unit Managers or the Technical Center Manager. The team will review at least two significant projects selected at random from each of the two units. As a minimum, the audit will consist of reviewing the unit review plans, examining file documentation for reviews and interviewing staff involved in the work. The team will prepare a brief written report of their findings to the Technical Center Manager.

Appendix A

Bridge Design Unit

REGION 1 BRIDGE DESIGN UNIT

PRODUCTS AND TASKS TO BE REVIEWED

The following tables outline work products and tasks and levels of review.

Table A1: Bridge Design Unit - Work Products

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Bridge Scoping (includes Estimate, and design budget)	Required	Required
TS & L Bridge Plans	Required	Required
TS & L Narrative and Estimate	Required	Required
Preliminary Bridge Plans	Required	Required
Advance Bridge Plans	Required	Required
Final Bridge Design Plans	Required	Required
Bridge Design Check Calculations (Class 1 or 2)	Required	Required
Retaining Wall Design Plans	Required	Required
Soundwall Design Plans	Required	Required
Protective Screening Design Plans	Required	Required
Emergency Repair Plans (Collision Damage, EQ, Scour, etc.)	Required	Required
Culvert Design Plans	Required	Required
Calculation Books	Optional	Required
Misc. Structure Design (Sign Supports, Signal Supports, Structure Mount Sign Supports)	Required	Required
Special Provisions/ Final Quantity Estimate	Required	Required
Rail Retrofit Design Plans	Required	Required
Seismic Retrofit Design Plans	Required	Required
Bridge Widening Design Plans	Required	Required
Bridge Deck Overlay Plans	Required	Required

Bridge Raising Design Plans	Required	Required
As Constructed Plans	Required	Optional

Table A2: Bridge Design Unit - Design Tasks

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Scoping	Optional	Required
Setting up the bridge job record folder	Optional	Required
Set up/monitor project schedule & budget	Optional	Required
Bridge design tasks- at TS& L (See List)	Optional	Required
Bridge design tasks- Preliminary through final plans at TS& L (See List)	Optional	Required
Stay current on bridge design specs.	Optional	Required
Class 1 bridge design checks	Optional	Required
Class 2 bridge design checks	Optional	Required
Review consultant designs on ODOT Br's	Optional	Required
Review consultant designs on Local Agency Br's	Optional	Required
Review Local Agency designs	Optional	Required
Bridge maint. support- design	Optional	Required
Bridge maint. support- Inspection	Optional	Required
Bridge maint. support- const. support	Optional	Required
Provide design details to drafter	Optional	Required
Mentor other designers	Optional	Required
Provide Construction support to the field	Optional	Required
Provide design/checking assistance to other regions	Optional	Required
Maintain the required no. of PDH's for PE	Optional	Required
Field trips- Scoping phase	Optional	Required

Field trips- During design phase	Optional	Required
Field trips- During construction	Optional	Required
Maintain project file containing pertinent phone conversations, meeting minutes, project correspondence, project related documents (i.e., Geotech and hydraulic reports), special contract requirements, shop drawings, design exception documentation, etc.	Optional	Required
Maintain design and check notes that contain all calculations and notes that fully support the final design, quantity estimates, documentation of design code deviations and appropriate checklists	Optional	Required
Check and process shop drawings	Optional	Required
Write memos and letters to parties both inside and outside the Agency	Optional	Required

Table A3: Bridge Design Unit - Design Tasks at TS&L

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Review Job Record Folder	Optional	Required
Determine whether the structure work proposed in the bridge scoping is the correct solution for the problem	Required	Required
Study the field conditions at bridge site	Required	Required
Consider R/W restrictions	Required	Required
Consider various permits and restrictions	Required	Required
Consider the utility conflicts/ restrictions	Required	Required
Consider Railroad clearances and restrictions (both horizontal and vertical)	Required	Required
Verify roadway width, horiz. Alignment and grades with Roadway designer	Required	Required
Verify waterway opening, high water elev. and other hydraulic issues with the Hydraulics designer	Required	Required
Consider bank or bent protection	Required	Required
Consider floodway information	Required	Required

Verify preliminary foundation information with the Geotech designer (substructure type, required bearing capacity, settlement, soil parameters for L-Pile analysis, etc.)	Required	Required
Determine span lengths and span arrangement	Required	Required
Determine the superstructure type (after considering alternate structure types and their estimated costs)	Required	Required
Determine the substructure type(s)	Required	Required
Determine stage construction details and detour requirements	Required	Required
Determine the appropriate type of bridge rail	Required	Required
Determine the need for expansion joints	Required	Required
Consider constructability of the proposed design	Required	Required

PROJECT CHECK LISTS

For verification that quality control processes are occurring and the appropriate items are being checked, project checklists will be utilized. These checklists identify the typical tasks to be accomplished as well as the period or time frame when technical review check points should occur.

Reviewers and project staff are responsible to insure that quality control reviews are occurring. After each interim review, the technical and/or corporate reviewers are responsible to initialize and date the appropriate area of the checklist to verify the quality control check has occurred. The project checklist(s) will follow the project through to completion.

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
TS&L							
Preliminary Data Collection • Project Prospectus • Vicinity Map or Data • Foundation Report • Hydraulic Report • Grades & Alignments • Location Narrative	1 to 2 weeks						
Plan & Elevation Drawing(s) • Alignment Data • Roadway Width • Intersection Stations & Angles • Span Lengths & Numbers • Angles between Bents & Centerline • Existing Structures • Right-of-Way lines • Detours • Utilities • North Arrow • Location map (w/North Arrow, Project Location Arrow and Nearest Town) • Live Loading (Sketch and note) • Type of bridge Rail • Expansion & Fixed joints • Elevation Datum • Existing Ground Line • High Water Elevation • Proposed Ground Line • End Slope & Protection • Hydraulic Data • Grade Lines • Typical Bent Section • Roadway Clearances • Railroad final and Construction Clearance	1 to 8 weeks						

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
• Guardrail Transitions • Footing Elevations & Pile Types • Datum Elevation • Title Block w/MP location, bridge number							
TS&L Estimate • Based on rough calcs per square foot • Account for tall abutments using projected quantities	1 to 5 days						
TS&L Narrative Report • General Background: o Project Development & justification o Right-of- way restrictions o Permits and restrictions o Utility conflicts or restrictions o Railroad Clearances & Restrictions • Geometry and Lay-out: o Roadway Width, ADT, Grades & Alignment (exception for AASHTO as necessary) o Sidewalks, bridge rails & protective screening • Hydraulics: o Waterway openings, High water elevation, and Clearances o Embankment or bent protection o Floodway information, when appropriate • Foundations: o Piling, drilled shafts, spread footings o Fills, surcharges o Settlement o Lateral Earth, Seismic loads o Liquefaction Potential • Structure Features (discussion items):							

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
o Span length and span arrangements o Type of superstructure o Type of bents & location o Alternate structure types considered and estimated costs o Stage construction & detour requirements. • Design Concepts (decision/assumptions): o Building a new bridge vs. widening existing one o Use a bridge vs. culvert o Foundation support assumptions o Assumed pile or drilled shaft bearing capacity loads o Assumed lateral soil pressure against end bent o Seismic load assumptions • Biological Assessment Considerations(applies to many bridge replacements): o Project timing and chronology o Alignment and size of the new bridge in relation to the existing (.ie., no. of spans, length) o Quantity of impervious bridge surface, existing vs. new o Type of new deck and construction methods o Type of new bridge railing and construction methods o Proposed treatment of the runoff o Number and sizes of bents/footings added for new bridge within OHWM and the wetted channel. Discuss							

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
construction of new footings, bents & piles. o Type of isolation methods used during construction (i.e., coffer dam) o If a detour bridge, working bridge or Falsework are required, discuss how many bents & types of temporary supports that may be within the OHWM and wetted channel. Discuss the construction and removal methods that might be used. o Extent and duration of in-water work (i.e., heavy machinery in wetted channel) o Amount or extend of fill or rip-rap	1 to 8 weeks						
FINAL DESIGN							
o Plans o Plan & Elevation Drawings o Footing Plan shown o Alignment & Bearing shown o Skew angles shown o Bent Fixity (free, exp., hinge, etc.) shown o Slope Paving shown o Footing Elevations o Pile Bearing or min. Tip Elevation shown o Drainage provided for o Military Loading noted and shown o Stationing shown o Clearances shown o Railroad	1 to 6 months						

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
o Navigation o Highway o Minimum Construction Clearances shown o Bridge Rail Ends shown o Location Map shown o Detour shown o Existing Structure shown o Utilities shown & located o Grade Line Diagram shown o Elevation Datum shown o General Notes complete o Accompanying Drawings shown correctly o North Arrow shown o Hydraulic Data & High Water Mark shown o o Superstructure Details: o Deck Elevation – Shown o Bearing Devices – Shown & Detailed o No. of Bearing Devices – Given o Expansion Allowances – Shown o Camber Diagram – Shown o Joints – Shown & Detailed o Stage Construction – Detailed o Pour Schedule – Shown o Concrete Finish Sketch – Shown o o Beam Details: o Beams Located & Dimensioned o Beam Cross Sections – Shown o Prestressed Beam Details – Shown o Interim Bars – Shown @ Top of Stem							

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
o Bar Extensions – Adequate o End Anchorages of Longitudinal Bars – Sufficient o Post-tensioning Details/Data – Included o o Bent Details: o Column Steel - properly dim. w/splices o Neg. moment at X-Beam - Reinforced o Footing Elevations – Shown o Skew Angles – Shown o Utility Holes – Shown & Noted o Hinges – Shown & Detailed o Seismic Restraints – Shown & Detailed o Guardrail Connections at end bents o Concrete finish - Shown o o Specifications o Prepare & assemble: o Specifications o Supplemental Specifications o Special Provisions o o Estimates o Calculate quantities for all materials o Construction Time Estimate o Graph format o Critical stages shown o Cost for construction assistance o o Calculation Books - Design o Structural Analysis & Design of							

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
bridge & critical components o Documentation of work with o Hand calculations o Computer output o Detailed notes o o Class I Check o Class I Check is a comprehensive design review covering all aspects of the project. It will be done primarily for: o Major Complex Structures o Steel and post-tensioned bridges o Structures designed by an inexperienced Designer o Structures checked by an inexperienced Checker o Checker's responsibilities: o Review of location data and correspondence files o Review of construction time and seasonal requirements, permit applications, work-in-stream restrictions, and utility installations and conflicts o Review foundation and hydraulic requirements o Check of consistency of alignment and details with roadway plans o Thorough check of geometry, alignment, grades, clearances, and construction details o Verification of structure length, roadway width, structure type selection, aesthetic treatment,							

Bridge Design Unit Checklist

TASK	Typical Duration	Actual Duration	Target Date	Completion Date	Completed By	Reviewed By	Date Reviewed
span arrangement, bent type and configuration, and bridge rail type o Complete independent structural analysis according to design specifications and current design practices. o Make a quick long hand check of the most important structural elements before beginning a computer analysis of the design o Independent check of Final Estimate quantities and reconciliation of figures with Designer o Class II Check o Class II Check is a review of design concepts and construction details and does not necessarily include structural analysis. It will be done primarily for: o Minor Bridges designed by an experienced designer o Checker's Responsibilities: o Review of correspondence, job files, and design calculations o Confirmation that foundation and hydraulic requirements are met o Verification of geometry, alignment, and structure type selection o Confirmation with Designer that structural critical elements have been analyzed during the final design o Completeness of plans							

Bridge Design Unit Checklist							
TASK	**Typical Duration**	**Actual Duration**	**Target Date**	**Completion Date**	**Completed By**	**Reviewed By**	**Date Reviewed**
o Check of construction details and Final Estimate quantities							

Appendix B
Environmental Unit

PRODUCTS AND TASKS TO BE REVIEWED- Work Products and Tasks

The following tables outline work products and tasks and levels of review. The tasks that are shaded will have quality control checklists produced for them for use by the reviewers.

Table B1 – Biology Product or Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	**Management**
Baseline Report	Required	Optional
Biology Report	Required	Optional
Botanical Survey	Required	Optional
Owl Survey	Required	Optional
Programmatic Section 7 Consultation (e.g., SLOPES)	Required	Required
LAA Biological Assessment	Required	Required
NLAA BA	Required	Required
No Effect memo	Required	Required
Monitoring Report	Required	Optional
Internal Letters or Memos	Required	Optional
Letters or Memos to Regulatory Agencies	Required	Required
Letters or Memos to Stakeholders	Required	Required

Table B2 –Cultural Resources Product or Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Baseline Report	Required	Optional
Recon Report	Required	Optional
Cultural Res. Report (EIS)	Required	Optional
NSA Cultural Res. Report	Required	Optional
Prelim Det. of Eligibility	Required	Optional
Determination of Eligibility	Required	Required
Finding of No Effect	Required	Required
Finding of No Adverse Effect	Required	Required
Finding of Adverse Effect	Required	Required
Prog. Agreement Memo	Required	Optional
Prog. Section 4(f) Eval.	Required	Required
Section 4(f) Evaluation	Required	Required
Mitigation Plan	Required	Optional
Memorandum of Agreement	Required	Required
Construction Monitoring Report	Required	Optional
Internal Letters or Memos	Required	Optional
Reports, Letters or Memos to Reg. Agencies	Required	Required
Reports, Letters or Memos to Stakeholders	Required	Required

Table B3 – Environmental Project Manager Product or Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	**Management**
Environmental Assessment	Required	Required
Revised Environmental Assessment	Required	Required
Finding of No Significant Impact	Required	Required
Draft Environmental Impact Statement	Required	Required
Final Environmental Impact Statement	Required	Required
Record of Decision	Required	Required
Recreational Section 4(f) Evaluation	Required	Required
Continuing Validity Study for NEPA documents	Required	Required
Internal Letters or Memos	Required	Optional
Reports, Letters or Memos to Regulatory Agencies	Required	Required
Reports, Letters, or Memos to Stakeholders	Required	Required

Table B4 Permits/Water Quality Product or Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Corps/DSL Joint Permit Application	Required	Required
Coast Guard Permit	Required	Required
Water Resources Report	Required	Optional
Stormwater Management Plan (for non-engineered BMPs)	Required	Required
Internal Letters or Memos	Required	Optional
Reports, Letters or Memos to Regulatory Agencies	Required	Required
Reports, Letters, or Memos to Stakeholders	Required	Required

Table B5 Environmental Coordinator Product or Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Project Prospectus Part 3	Required	Required
Expanded Part 3	Required	Required
Scoping Report	Required	Optional
Baseline Report	Required	Required
Maintenance Project Report	Optional	Optional
Construction Monitoring Report	Required	Optional
Internal Letters or Memos	Required	Optional
Reports, Letters or Memos to Regulatory Agencies	Required	Required
Reports, Letters, or Memos to Stakeholders	Required	Required

Table B6 Wetlands Product or Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	**Management**
Baseline Report	Required	Optional
Wetland Report	Required	Optional
Wetland Determination	Required	Required
Wetland Delineation	Required	Required
Wetland Mitigation Plan	Required	Required
Internal Letters or Memos	Required	Optional
Reports, Letters or Memos to Regulatory Agencies	Required	Required
Reports, Letters, or Memos to Stakeholders	Required	Required

PROJECT CHECK LISTS

For verification that quality control processes are occurring, project checklists will be utilized. Reviewers and project staff are responsible to insure that quality control reviews are occurring. After each review, and prior to PS&E, the reviewers and producers are responsible to initialize and date the electronic **Environmental Unit Quality Control Verification Form** to verify the quality control check has occurred.

Each Permit and Clearance highlighted above will have a separate QC checklist that the technical reviewer will use to ensure a quality final product. These checklists will be developed by the environmental specialist staff responsible for that discipline, and approved by the Unit Manager. The checklist may be partially or completely based on existing guidance, and will be used internally for QC review.

The following products for each discipline will have a checklist developed to assist review, if such checklist is not already available:

- **Biology**: programmatic consultation documentation; Biological Assessment; No-Effect Memo
- **Cultural:** Determination of Eligibility; Finding of No Effect; Finding of No Adverse Effect; Finding of Adverse Effect; Section 4(f) Evaluation; Programmatic Section 4(f) Evaluation; Memorandum of Agreement
- **EPM**: EA; REA; FONSI; DEIS; FEIS; ROD; Continuing Validity Study
- **Permits / Water Quality**: Corps/DSL Joint Permit Application; Coast Guard Permit; Stormwater Permit
- **REC**: Project Prospectus Part 3; Expanded Part 3; Baseline Report
- **Wetlands**: Wetland Determination; Wetland Delineation; Wetland Mitigation Plan

The following agencies will be consulted with early and often as needed on a project by project basis:

- FHWA - Oregon Division
- ODFW
- NOAA Fisheries
- USFWS
- EPA
- DSL
- ACOE
- SHPO

The following permits and clearances may be required:

- Section 4(f)
- ACOE section 404 permit
- DSL removal/fill permit
- DEQ Indirect source Air permit
- Coast Guard permit
- NPDES permit
- ESA Section 7 consultation with NOAA fisheries and/or USFWS
- SHPO determination of eligibility and finding of effect
- Noise compliance
- Erosion and sediment control plan

The following page will be placed on the Region 1 Environmental Unit server for each project and initialed prior to PS&E to verify that QC has been completed.

ENVIRONMENTAL UNIT QUALITY CONTROL VERIFICATION FORM

Name of project here

Environmental work has been completed for the project listed above. This form certifies that quality control has been completed in compliance with the Region 1 quality control plan. Items are listed as N/A if not applicable for the particular project. The "Reviewer" is the technical reviewer. Management level review, if warranted, will be documented by signature of the transmittal cover sheet on ODOT letterhead.

	Reviewer (Enter Initials)	Date	Final Submittal (Enter Initials)	Date
Environmental Coordination				
Biology				
Cultural				
Wetlands				
Permits				

Appendix C

Geo/Hydro Unit

GEO/HYDRO UNIT

PRODUCTS AND TASKS TO BE REVIEWED- Work Products and Tasks

The following tables outline work products and tasks and levels of review.

Table C1 Geotechnical and Hydraulic Work Products

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	**Management**
GEOLOGY, GEOTECHNICAL, and HYDRAULICS reports, memos, letters or addenda.	Required	Required
Documents containing geologic, geochemical or hydrogeologic interpretations, geotechnical, or hydraulics recommendations, specifications, or drawings.	Required	Required
Emergency response actions (geology, hydraulics and geotechnical).	Required	Required
Plan sheets portraying geologic, geochemical, geotechnical, and hydraulics data (e.g. Geotechnical Data sheets) when separate from reports.	Required	Required
Maps, cross sections and profiles that include geologic, hydrogeologic, geochemical, geotechnical, or hydraulic interpretations when provided to parties outside the unit.	Required	Required
Boring logs and interpretations when provided to parties outside the unit.	Required	Required
Design details, drawings, specifications and quantity estimates separate from reports.	Required	Required
Work scopes – plan, budget, schedule	Required	Required

Table C2 Geotechnical or Hydraulics Tasks

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	**Management**
Drilling and sampling	Required	Optional
Material classification (by reviewing samples, core and test results).	Required	Optional

Monitoring results and graphs	Required	Optional
Exploration Plans	Required	Optional
Site/watershed characterization, evaluations of existing conditions of facilities.	Required	Optional
Calculations (all computer generated or manual analyses)	Required	Optional

Table C3 Hazmat Work Products

	Minimum Review Level (See Table 1)	
Work Products or Tasks	**Technical**	**Management**
Hazardous Materials Reports, memos, letters or addenda.	Required	Required
Documents containing geologic, geochemical or hydrogeologic interpretations.	Required	Required
Emergency response actions (HazMat).	Required	Required
Maps, cross sections and profiles that include geologic, hydrogeologic or geochemical interpretations when provided to parties outside the unit.	Required	Required
Boring logs and interpretations when provided to parties outside the unit.	Required	Required
Design details, drawings, specifications and quantity estimates separate from reports.	Required	Required
Work scopes – plan, budget, schedule	Required	Required

Table C4 Hazmat Tasks

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Drilling and sampling	Required	Optional
Material classification (by reviewing samples, core and test results).	Required	Optional
Monitoring results and graphs	Required	Optional
Exploration Plans	Required	Optional
Calculations (all computer generated or manual analyses)	Required	Optional

Table C5 CAD Work Products and Tasks

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical[1]	Management
Design details, drawings, pipe data sheets, profiles, etc…	Required	Required
Plan sheets or profiles (cross sections) portraying geologic, geotechnical, hydraulics, or hazardous material data (i.e. Geotechnical Data sheets)	Required	Required
Maps, cross sections and profiles that include geologic, hydrogeologic or geotechnical, hydraulic, or geochemical interpretations.	Required	Required

Note 1:Typically for CAD or CADD related products, Technical review will be by the requestor of the work and a peer with CAD related background (may be from a different Unit).

PROJECT CHECK LISTS

For verification that quality control processes are occurring and the appropriate items are being completed and checked, project checklists will be utilized. These checklists identify the typical tasks to be accomplished as well as the period or time frame when technical review check points should occur.

Reviewers and project staff are responsible to insure that quality control reviews are occurring. After each interim review, the technical and/or corporate reviewers are responsible to initialize and date the appropriate area of the checklist to verify the quality control check has occurred. The project checklist(s) will follow the project through to completion.

Geotechnical Checklist							
TASK	**Typical Duration**	**Actual Duration**	**Target Date**	**Completion Date**	**Completed By**	**Reviewed By**	**Date Reviewed**
Research (perform prior to field trip)							
Review project prospectus							
Complete project information sheets							
Obtain & review prelim plans & X-sections							
Discuss plans with appropriate designers							
Review office files for previous subsurface information							
Obtain & review background data (as needed)							
• Previous files in area							
• Aerial photos							
• Old as built plans							
• DOGAMI bulletins							
• Other geologic sources (i.e. Hazmat Reports etc)							
• Discuss with Maintenance Sec regarding issues							
Identify & list preliminary concerns, hazards & material within project limits (see geo hazard checklist)							
Develop preliminary interpreted geologic models (X-secs in areas of concern and maps)							
Develop preliminary drill program with map showing locations and depths.							
Discuss with reviewers							
Field Reconnaissance							
Develop agenda							
Make Site Vist							
• Verify materials/hazards found in research							
• Refine geologic interpetations							
• Verify anticipated material units (including engineering properties)							
• Verify existing cut and fill slope angles &							

performance • Locate springs & groundwater on maps • Run field developed geologic cross sections with interpretations in areas of concern • Verify need for, type of & locations of subsurface exploration locations • Stake hole locations and identify potential drill access concerns/requirements • Identify potential biological or wetland issues							
Identify & list preliminary concerns, hazards & material within project limits (see geo hazard checklist)							
Develop prelim interp geologic models (X-secs in areas of concern and maps)							
Develop preliminary drill program with map showing locations and depths.							
Discuss with reviewers							
Scope of Work							
Revise the following: • Geotechnical Concerns • Interpreted geologic X-sec and plan map • Exploration plan map							
Contact Environmentalists regarding drilling							
Develop • Exploration summary • Cost Estimate (from this sheet) • Schedule							
Discuss with reviewers							
Write Scope of Work							
Submit for Review							
Revise Scope of Work and Distribute							
Exploration Program							
Initiate purchase of required Instrumentation							
Identify drilling related information/obtain permits							
Traffic control method (if necessary)							

Right of Way needs							
Obtain Level I Hazmat Clearance							
Coordinate with Maintenance & Construction							
Complete Contract Drilling Project Information Sheet (may take up to 8 weeks from initiation to drilling)							
Contract Development							
Stake Holes							
Request Drill hole survey							
Request right of entry or other permits							
Inform TMOC and/or Community Affairs about drilling							
Utility locates: Obtain information & call in.							
Field Work							
• Meet with drillers regarding procedures							
• Meet with Survey regarding drilled holes							
• Daily log holes and revise x-secs							
• Submit logs for typing nightly							
• Submit samples for testing							
• Install instrumentation							
• Notify team daily regarding conditions							
Sample check classification							
Prepare lab test program and send samples							
Observe lab testing							
Review lab test results and interps./spreadsheet							
Submit revised logs with units for typing							
Revise interpretations and submit for drafting							
Review final logs							

Photograph core							
Write and submit water resource hole reports							
Monitoring Instruments							
Read & Reduce data							
Add information to interpreted cross sections.							
develop spreadsheet and graph of groundwater information.							
Provide information to Geo Project Team as necessary.							
Summary of Geological Interpretations							
Prelim. Interps.							
Revise interpretations as necessary							
Discuss interpretations with reviewer							
Submit sheets for drafting							
Write draft geological sections of report							
Discuss report sections with reviewer							
TSL Stage Analysis							
Determine							
Preliminary foundation design							
Preliminary cut slopes							
Preliminary embankment slopes							
Discuss findings with reviewer							
Prepare Draft Preliminary Geotechnical Report							
Submit for review							
Finalize Preliminary Geotechnical Report							
Develop engineering model(s): • Geometry • Properties							
Perform & document analyses							
Shallow foundations: • Bearing • Settlement							

Deep foundations: • Type • Axial Capacity • Lateral Capacity • Settlement • Special analyses							
Soil cut slopes: • Surficial stability • Global Stability • Material Use							
Rock Slopes: • Stability • Fall Out							
Embankments: • Soft Foundations (Subex., ect) • Settlement (quantity, time rate, special improvements- i.e. wick drains) • Surficial stability • Global stability • Stage Construction							
Retaining Walls: • Settlement • Stability • Structural design							
Develop special provisions and drawings							
Analyses and concept Review by Technical Reviewer							
Report Preparation							
Draft report							
Technical and Corporate (as necessary) review							
Revisions as necessary.							
Tasks After Design Work is Complete							
Meetings w/project team							
Review preliminary, advanced and final plans							
Discuss proposed design with construction personnel. Attend meetings as requested.							
Provide construction support							
After Construction							
Archive files							
Purge files as appropriate							

Hazmat Level 1 ISA Checklist

Task	Projected Time		Est. Time	Actual Time	Due Date	Comp Date	Reviewer Initials
	Intersection or Rural Corridor	2-Mile Urban Corridor					
Scope of Work: - **CHECK IN POINT** • Set schedule and budget • Discuss database search radii and other project specifics with Technical Reviewer	1 hour	1 hour					
Site Visit: Conduct reconnaissance from ODOT ROW and publicly accessible areas. Do not enter private property unless you have permission through the Right of Way agent. Note and take photographs of any of the following: • Adjacent property uses (put on sketch map) • Heating oil tanks • ASTs • USTs, fuel pumps, fill and vent pipes • drums and other HazMat storage • Hazardous waste • Floor drains, separators and UICs • Septic systems • Stains or odors • stressed vegetation • Solid waste • suspect asbestos • suspect lead-based paint • Potential PCB equipment (ballasts, transformers, hydraulics, etc.) • Fluorescent or mercury vapor lights • Treated timbers • Wells, monitoring wells or remediation systems	1 hour + Travel	6 Hours + Travel					

Task	Projected Time		Est. Time	Actual Time	Due Date	Comp Date	Reviewer Initials
	Intersection or Rural Corridor	2-Mile Urban Corridor					
• Land slope direction • Nearest water body • Any other environmental concerns							
Historic Resources: Always obtain and review the following: • Aerial Photographs (available from ODOT Geometronics) Then review one or more of the following, in order of preference. Try to get records going back at least 50 years. • Sanborn Fire Insurance Maps (available on-line from state library) • Reverse City Directories (available from local libraries) • Other historic maps • Local building and/or planning records	2 Hours 2 Hours	8 Hours 8 Hours					
Environmental Records: Search the following databases for sites within the specified distance from the project: • NPL (1 mile) • CERCLIS (0.5 miles) • RCRA CORRACTS TSD (1 mile) • RCRA non-CORRACTS TSD (0.5 miles) • RCRA Generators (Site and adjacent) • ERNS (Site only) • ECSIS – CRL and CRLI (1 mile) • Fire Marshals Spills (0.5 miles) • Landfills (0.5 miles) • LUST (0.5 miles)	4 Hours	16 Hours					

Task	Projected Time		Est. Time	Actual Time	Due Date	Comp Date	Reviewer Initials
	Intersection or Rural Corridor	2-Mile Urban Corridor					
• USTs (Site and adjoining)							
Data Compilation: - **CHECK IN POINT WITH REVIEWER** • Compile environmental database in report tables • Review historic and current land uses • Discuss findings with technical reviewer • Discuss recommendations and report format	1 hour	2 hours					
DEQ File Reviews: Complete DEQ file reviews for identified Sites that have a potential to impact the project. Look for the following information: • Source of contamination • Media contaminated • Concentrations detected • Extent of contamination • Remediation conducted • Has contamination been identified on ODOT ROW? or could it have migrated to ODOT ROW?	4 Hours	16 Hours					
Complete ISA Checklist	½ hour	½ hour					
Prepare a report that draws conclusions regarding potential impact to construction activities, acquisition of property for the project, and the need for additional research or testing.	6 Hours	24 Hours					
Prepare Appendixes: • Maps and Figures • Site Photographs • ISA Checklist • References • Environmental Database Search • Supporting Documentation	2 Hours	8 Hours					

Task	Projected Time		Est. Time	Actual Time	Due Date	Comp Date	Reviewer Initials
	Intersection or Rural Corridor	2-Mile Urban Corridor					
Report Review: - **CHECK IN POINT** • Submit report for technical review and complete edits • Submit report for corporate review and complete edits • Produce report and send to Project Team	4 hours	8 hours					

Hazmat Level 2 PSI Checklist

TASK	Projected Time	Actual Time	Due Date	Comp Date	Comp By	Reviewed By/Date
Scope of work: - **CHECK IN POINT** • Number and depth of borings • Drilling and sampling methods • Type of monitoring wells (temporary, permanent or none) • Soil samples to analyze (staining? PID? depth? groundwater?) • Groundwater sample locations • Laboratory analyses (TPH, VOCs, PAHs, etc.) • Groundwater elevation measurements • Sketch map of sampling locations • Estimate costs and schedule • Review with technical reviewer	4 to 8 hours					
Health and Safety Plan (at least 2 weeks before field work): • Prepare plan using template • Submit to Jerry Shultz for air monitoring plan or attach generic air monitoring plans for petroleum • Submit to David Solomon for review	2 to 4 hours					
Schedule drillers: • Scope of Work stating they need their own Health and Safety Plan in contract (work with Fred Gullixson) • Equipment Rental Contract (work with Fred Gullixson) • Purchase Order (work with BMS Staff)	2 hours					
Schedule other help: • Call-Before-You Dig (and other utility locator, if needed) • Property access agreement (ROW) • GPR/Magnetometer surveyor • Concrete/pavement cutter • Traffic control • Surveyors • Laboratory (ask Melanie Hughes for Purchase Order) • Investigation derived waste storage and disposal	1 to 6 hours					
Drill and sample	4 to 8 holes/day					
Review Field Findings **– CHECK IN POINT** • Discuss field observations with technical reviewer	1 hour					

TASK	Projected Time	Actual Time	Due Date	Comp Date	Comp By	Reviewed By/Date
• Confirm lab analyses to be performed • Discuss any changes from original scope of work						
Return for groundwater sampling	6 wells/day					
Compile Lab Data: - **CHECK IN POINT** • compile lab data summary tables • Discuss report issues • Develop recommendations	2 to 6 hours					
Write Level 2 PSI Report: • Site location, reason for sampling and previous assessments • Field methods employed • Geology/hydrogeology encountered • Analytical results • QA/QC review • Findings and recommendations	16 to 40 hours					
Prepare soil boring logs: • write neatly for GINT transcription by office admin • provide edits for typed GINT logs	1 hour per hole					
Write special provisions: • Health and safety • Decon plan • Contaminated soil excavation, transport and disposal • Contaminated groundwater permitting, treatment and disposal • Pipe trench seals	2 to 8 hours					
Prepare Appendices: • Maps and Figures • Photos • Boring Logs • Tables • Laboratory Data Packages • IDW disposal documentation (if applicable) • Draft Special Provisions	4 to 8 hours					
Complete edits for report, specs and appendices	2 to 16 hours					

Hydraulics Scoping- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Bridge			Culvert			Channel			Bank Protect				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Hydraulics Staff Included																
Scope of Work																
Project Name																
Key Number																
Structure Location	Existing Structure No.															
	Hwy Name, Number, M.P.															
	Stream Name (crossing)															
	County															
Design Narrative																
FEMA FIS Study Areas	Floodway															
	Floodplain															
Structure Type	Type / Size															
	Length															
	Skew															
	Cover Height															
	Culvert Burial Depth															
	Bent Type & Location															
Abutmentment/Bank	Side Slope															
	Protection Measures															
Pier Arrangement																
Flow Direction																
End Treatment (Existing)	Headwalls / Wingwalls															
	Slope Paved															
	Exposed Pipe															
	Tide Gate															

	Trash Rack																
	Outlet Protection																
Site Issues	Wetlands																
	Railroads																
	Geomorphology	Bed Material															
		Woody Debris															
		Tidal															
		Horizontal Stability/ Meander															
		Slides and Slumps															
	Standing Water/Lake																
	Coastal	Seawalls															
		Dynamic Revetments															
		Tidegates															
		Goal 18 Requirements															
Fish Passage Improvements Required?																	
Temporary Water Management Needed?																	
Trenchless Installation Required?	Jacking																
	Boring																
	Pipe Bursting																
	Tunneling																
	Micro Tunneling																
	Directional Drilling																
Trenchless Rehabilitation Required?	Sliplining																
	Fold and Form																

Spiralwound System															

	CIPP (Cast in Place Pipe)															
Summary of Findings																
Cost Estimate	Professional Services															
	Construction															

Hydraulics Concept Plans- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Bridge			Culvert			Channel			Bank Protect				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Design Narrative																
Design Storm																
Research	FEMA FIS Study Areas	Floodway														
		Floodplain														
	Maintenance History															
	State Parks															
	BLM															
	Local Ordinances															
	Navigational Clearance Requirements															
	Recreational Use															
	Riparian Oridinances and Regs															
	Irrigation Districts															
	Watershed Councils															
	Noise Restrictions															
	Local County Flood Ordinances															
Drainage Area	USGS Quad Map	Delineated Basin Map														
	Other Source															
Hydrology	Design Storm (Conveyance)															
	Design Storm (Fish Passage- Low Flow)															
	Design Storm (Fish Passage - High Flow)															

	Design Storm (TWM)																
	Discussion of source	NRCS TR55															
		Regression Equations															
		Rational Method															
		Existing or Historic Gages															
		Flood Insurance Studies															
		Historic Flood or Unusual Damage															
		Flash Flood Susceptibility															
		Parole Evidence															
		Other															
	Runoff Coefficients																
	Flow Path																
	Time of Concentration																
	Rainfall Intensity																
OHW (Ordinary High Water) Elevation																	
In-Stream Work Period																	
Video Inspection																	
Geotechnical Investigation																	
Abutment/Bank Protection Alternatives	Rip Rap																
	Biostabilization																
	Concrete																
	Articulated Concrete																
	CMU with Plantings																
	Other																

End Treatment (Proposed)	Headwalls / Wingwalls																
	Slope Paved																
	Exposed Pipe																
	Tide Gate																
	Trash Rack																
	Outlet Protection																
Temporary Water Management	Construction Sequence																
	Fish Removal Sequence																
	Work Zone Isolation	Sediment Curtains/Barrier															
		Cofferdams															
		Bi-Pass/Culvert															
	Dikes and Diversion	Gravity Flow															
		Bi-Pass Pumping															
	Fish Passage Requirements while TWM in place.																
Fish Passage Requirements	Design Species																
	Max Jump Height																
	Jump Pool Length																
	Stream Simulation	Slope															
		Width															
		Habitat Structure															
	Retrofit	Weirs / Baffles															
		Fish Ladder															
Trenchless Installation Alternative Selection																	
Trenchless Rehab Alternative Selection																	

Hydraulics Preliminary Plans- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Bridge			Culvert			Channel			Bank Protect				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Title Sheet																
Introduction	Elevation Datum															
Engineers Stamp																
Structure Location	Existing Structure No.															
	New Structure No.															
	Hwy Name, Number, M.P.															
	Stream Name (crossing)															
	County															
Design Narrative																
Hydraulic Modeling (Existing and Proposed)	HEC-RAS															
	HY-8															
	Culvert Master															
	Manning's Open Channel															
	Other															
Roadway Overtopping Flood	Equal to 500 yr event															
	Less than the 500 yr event															
Culvert/Channel Capacity and Overtopping	Design Storm (Roadway Class & ADT)															
	Centerline Elevation															
	Fogline Elevation															
	Edge of Asphalt Elevation															

FEMA FIS Study Areas	Floodway																
	Floodplain																
Structure Type (Existing and Proposed)	Type / Size																
	Length																
	Required Freeboard																
	Bridge Deck Elevation																
	Low Beam Elevation																
	Skew																
	Invert Elevations																
	Slope																
	Alternate Material Evaluation																
	Cover Height																
	Depth of Bed Material																
	Culvert Burial Depth																
	Bent Type & Location																
Abutmentment/Bank Protection	Side Slope																
	Stability Evaluation																
	Toe Trench Elevation/Location																
	Protection Measures	Rip Rap															
		Biostabilization															
		Concrete															
		Articulated Concrete															
		CMU with Plantings															
		Other															
Pier Arrangement	Pile Tip Elevations																
	Top of Bent Elevations																

Flow Direction																	
Scour Evaluation	Pier Scour																
	Contraction Scour																
	Long Term Agradation or Degrad.																
Invert Protection																	
End Treatment (Existing)	Headwalls / Wingwalls																
	Slope Paved																
	Exposed Pipe																
	Tide Gate																
	Trash Rack																
	Outlet Protection																
Site Issues	Wetlands																
	Railroads																
	Upstream Reservoirs or Dams																
	Standing Water/Lake																
	Geomorphology	Flood Storage															
		Headcuts															
		Aggradation/Degradation															
		Floodplain Longit. Connectivity															
		Bed Material															
		Woody Debris															
		Tidal															
		Horizontal Stability/Meander															
		Slides and Slumps															
	Dynamic (Big Rolling Rocks)																
	Debris / Mud Flow																
	Ice and Debris Passage																

	Dykes, Groins, Weirs																
	Downstream flooding impacts																
	Effects on Adjacent bank/Property																
	Legal / Liability Issues																
	Coastal	Seawalls															
		Dynamic Revetments															
		Tidegates															
		Goal 18 Requirements															
Temporary Water Management	Construction Sequence																
	Fish Removal Sequence																
	Work Zone Isolation	Sediment Curtains/Barrier															
		Cofferdams															
		Bi-Pass/Culvert															
	Dikes and Diversion	Gravity Flow															
		Bi-Pass Pumping															
	Fish Passage Requirements while TWM in place																
	Min Pipe Size to convey diversion flow.																
	Min Pipe slope to convey diversion flow.																
Fish Passage Requirements	Design Species																
	Min Depth at Low Design Flow																
	Avg Velocity at High Design Flow																
	Max Jump Height																
	Jump Pool Length																
	Stream Simulation	Slope															

		Channel Width															
		Streambed Material															
		Habitat Structure															
	Retrofit	Weirs / Baffles															
		Fish Ladder															
Trenchless Installation Alternative Selection																	
Trenchless Rehab Alternative Selection																	
Right-of-Way Footprint																	
Summary of Findings																	

Hydraulics Final Plans- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

		Bridge			Culvert			Channel			Bank Protect				
		YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Title Sheet															
Engineers Stamp															
Introduction															
Structure Location	Existing Structure No.														
	New Structure No.														
	Hwy Name, Number, M.P.														
	Stream Name (crossing)														
	County														
Design Narrative															
"No-Rise" Certificate															
FEMA FIS Study Areas	Floodway														
	Floodplain														
Structure Type (Existing and Proposed)	Type / Size														
	Length														
	Required Freeboard														
	Bridge Deck Elevation														
	Low Beam Elevation														
	Skew														
	Invert Elevations														
	Slope														
	Alternate Material Evaluation														
	Cover Height														

	Depth of Bed Material															
	Culvert Burial Depth															
	Bent Type & Location															
Abutmentment/Bank	Side Slope															
	Protection Measures															
Backwater Calculation																
Hydraulic Data Sheet	Existing to Natural Channel															
	Proposed to Natural Channel															
Waterway Opening Drawing																
Abutment/Bank Revetment Drawing																
Roadway Stationing																
Elevation View Drawing																
Outfall Protection Revetment Drawing																
Temporary Water Management	Construction Sequence															
	Fish Removal Sequence															
	Work Zone Isolation															
	Dikes and Diversion															
	Fish Passage Requirements while TWM in place.															
Fish Passage Requirements	Max Jump Height															
	Jump Pool Length															

	Stream Simulation	Slope														
		Channel Width														
		Habitat Structure														
	Retrofit	Weirs / Baffles														
		Fish Ladder														
Referenced Data	Oregon Water Resources															
	Previous Study by PE															
	COE Hydraulic Study															
	FEMA Flood Study															
	Biological Assessment (BA)															
	Environmental Impact Statement (EIS)															
	Standard Local Operating Procedures for Endangereed Species (SLOPES II)															
	Other															
Trenchless Installation Alternative Selection																
Trenchless Rehab Alternative Selection																
Summary of Findings																

Hydraulics PSE Document- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Bridge			Culvert			Channel			Bank Protect				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Engineers Stamp																
Consistency between Report and Plans																
Plan View																
Typical Cross-Section																
OHW (Ordinary High Water) Elevation																
Low Beam Elevation																
Abutment/Bank Protection Details	Side Slope															
	Toe Trench Elevation/Location															
	Layer Thicknesses															
	Bio-Stabilization	Plantings														
		Growing Media														
End Treatment Details	Headwalls and Wingwalls															
	Slope Paved															
	Outlet Protection															
Invert Protection																
Pipe Slope																
Pipe Material																
Temporary Water Management	Construction Sequence															
	TWM Estimated Dischage Table															

	Work Zone Isolation Plans & Details	Sediment Curtain/Barrier														
		Cofferdams														
		Bi-Pass/Culvert														
	Dikes and Diversion Plans & Details															
	Removal of Water in Work Zone Details	Pumping/ Screening														
		Gravity Flow/Diversion Pipe														
		Settling Basin/ Treatment														
		Energy Dissipater (outfall)														
	Fish Passage Requirements															
	Min Pipe Slope															
	Min Pipe Size															
Fish Passage	Stream Simulation	Slope														
		Channel Width														
		Streambed Material														
		Habitat Structure														
	Retrofit	Weirs/Baffles														
		Fish Ladder														
Trenchless Installation Specifications																
Trenchless Rehab Specifications																

Water Quality Scoping- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

		Storm Drain			Roadway Drainage			Water Quality			Detention				
		YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Hydraulics Staff Included															
Scope of Work															
Project Name															
Key Number															
Structure Location	Hwy Name, Number, M.P.														
	County														
Design Narrative															
Water Body Name (Outfall)															
FEMA FIS Study Areas	Floodway														
	Floodplain														
Structure Type	Type / Size														
	Length														
Natural Flow Direction															
End of Pipe Treatment (Existing)	Headwalls / Wingwalls														
	Slope Paved														
	Exposed Pipe														
	Tide Gate														
	Trash Rack														
	Outlet Protection														
New Impervious Area															
Edge of Pavement Treatment (Existing)	Sheet Flow to Natural Infiltration														
	Ditches, Vegetated														

	Ditches, Non-Vegetated															
	Curb / Dike															
	Wetlands															
	Railroads															
	Standing Water/Lake															
	Coastal	Tidegates														
		Goal 18 Requirements														
Site Issues	Utility Conflicts															
TV Inspection Required?																
	Jacking															
	Boring															
	Pipe Bursting															
Trenchless Installation Required?	Tunneling															
	Micro Tunneling															
	Directional Drilling															
	Sliplining															
	Fold and Form															
	Spiralwound System															
Trenchless Rehabilitation Required?	CIPP (Cast in Place Pipe)															
Summary of Findings																
	Professional Services															
Cost Estimate	Construction															

Water Quality Concept- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Storm Drain			Roadway Drainage			Water Quality			Detention				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Design Narrative																
Design Storm																
	DEQ	TMDL's														
		Well Head Area														
		UIC's														
	Local Drainage Masterplan															
	FEMA FIS Study Areas	Floodway														
		Floodplain														
	Maintenance History															
	State Parks															
	BLM															
	Local Ordinances															
	Navigational Clearance Requirements															
	Recreational Use															
	Riparian Oridinances and Regs															
	Irrigation Districts															
	Watershed Councils															
	Local County Flood Ordinances															
Research	WQ Impact Assessment															

Ultimate Outfall Locations Identified																
OHW (Ordinary High Water) Elevation																
Video Inspection																
Flow Direction of Proposed Facilites																
Edge of Pavement Treatment (Existing & Proposed)	Sheet Flow to Natural Infiltration															
	Ditches, Vegetated															
	Ditches, Non-Vegetated															
	Curb / Dike															
New Impervious Area																
Engineered Solution																
BMP Solution																
Dip Sections																
End Treatment (Proposed)	Headwalls / Wingwalls															
	Slope Paved															
	Exposed Pipe															
	Tide Gate															
	Trash Rack															
	Outlet Protection	Rip Rap														
		Vegetation														
Groundwater Elev Investigation Requested																
Infiltration Rate Investigation Requested																

Trenchless Installation Alternative Selection														
Trenchless Rehab Alternative Selection														

Water Quality Approved Design- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

		Storm Drain			Roadway Drainage			Water Quality			Detention				
		YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Design Narrative															
Structure Type (Proposed)	Type / Size														
	Length														
	Slope														
	Cover Height														
	Pipe Alignments														
Ultimate Outfall Locations Identified															
Flow Direction of Proposed Facilites															
Off-Site Flow Addressed															
Downstream Impacts															
Utility Conflicts															
Edge of Pavement Treatment	Sheet Flow to Natural Infiltration														
	Ditches, Vegetated														
	Ditches, Non-Vegetated														
	Curb / Dike														
Engineered Design															
BMP Design															
Dip Sections															
Inlet Type Selection	Grate														
	Curb Opening														
	Slotted Drain														

	Sag in Gutter Grade															
	Upstream of Median Break															
	Upstream of Ramp gore															
	Upstream of cross walks															
	Upstream of street intersections															
	Upstream and Downstream of Bridges															
	Upstream of Cross Slope Reversals															
	On Side Street Upstream of Intersection															
	End of channels in cut sections															
	Behind curbs, shoulders or sidewalks.															
	Downstream end of curb termination															
	Where necessary to collect Snow Melt															
Inlet Locations	Not in path of pedestrians															
	Headwalls / Wingwalls															
	Slope Paved															
	Exposed Pipe															
	Tide Gate															
	Trash Rack															
End Treatment (Proposed)	Outlet Protection	Rip Rap														
		Vegetation														

Groundwater Elev Known															
Infiltration Rate Known															
Trenchless Installation Alternative Selection															
Trenchless Rehab Alternative Selection															
Right-of-Way Footprint	Access														
	Side Slope														
	Set Back														
	De-Watering Area														
	Construction														
	Outfall Protection														

Water Quality Calculations- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Storm Drain			Roadway Drainage			Water Quality			Detention				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Title Sheet																
Engineers Stamp																
Introduction																
Design Narrative																
Hydrology Methodology	Design Storm(s)															
	Discussion of source	NRCS TR55														
		Regression Equations														
		Rational Method														
		Historic Flood or Unusual Damage														
		Parole Evidence														
		HYDRO														
		HEC-HMS														
		HYD														
		PeakFQ														
		SBUH														
		Other														
	Runoff Coefficients															
	Flow Path															
	Time of Concentration															
	Rainfall Intensity															
	Drainage Area	On-site														
		Off-site														
		Delineated Basin Map														
		USGS Quad Map														
		Other Source														
Peak Runoff	Pre-Construction															

	Post-Construction														
	Pre-Construction														
Runoff Volume	Post-Construction														
	Pre-Construction														
Flow Duration	Post-Construction														
Structure Type (Existing and Proposed)	Type / Size														
	Length														
	Required Freeboard														
	Invert Elevations														
	Slope														
	Cover Height														
Hydraulic Modeling (Existing and Proposed)	FlowMaster (Inlets & Single Section)														
	HEC-HMS (Routing)														
	HEC-RAS (Open Channels)														
	HYCHL (Channel Linings)														
	HYDRA (Storm Drains)														
	Manning's Open Channel														
	NUINLET (Inlets)														
	ROUTE (Routing)														
	Storm & Sanitary														
	StormCAD (Storm Drains)														
	SWMM (Storm Drains)														
	Visual Urban (Inlets & Single Section)														
	WSPGW (SD & Open Channels)														

	Other														
	Cleanout (3 ft/sec min)														
Velocity	Erosive?														
Manning's n															
Flow Depth															
Capacity															
Hydraulic Grade Line															
Energy Grade Line															
Pressure Flow															
Split Flow															
Flow Control															
Emergency Overflow															
Inlet Locations															
Inlet Clogging Factors															
Inlet Efficiency															
Inlet Bypass															
Pavement Cross-Slope Reversal Sheet Flow															
Flow Spread															
Alternate Manning's n Evaluation															
Stormwater Retention Time															
Min WQ Swale Length															
Min WQ Swale Width															
Outfall Protection Stability															
Downstream Impact Analysis															

Summary of Findings														

Water Quality PS&E- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

		Storm Drain			Roadway Drainage			Water Quality			Detention				
		YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Engineers Stamp															
Utility Conflicts															
Private Drainage Connections															
Min / Max Pipe Cover															
Blind Connections	No blind connect for new construction														
	Single inlet blind connect OK for retrofit														
Pipe Alignment	Constructability														
	R/W requirements														
Manhole spacing (for maintenace access)															
Inlet spacing (for maintenance access)															
Manholes	Constructability														
	R/W requirements														
	Large														
	Drop														
	Flat Top														
Outfall Protection															
Roadside Ditch Protected from Erosion															
Temporary Drainage for Staging															

Match crowns of pipes															
	Sag in Gutter Grade														
	Upstream of Median Break														
	Upstream of Ramp gore														
	Upstream of cross walks														
	Upstream of street intersections														
	Upstream and Downstream of Bridges														
	Upstream of Cross Slope Reversals														
	On Side Street Upstream of Intersection														
	End of channels in cut sections														
	Behind curbs, shoulders or sidewalks.														
	Downstream end of curb termination														
	Where necessary to collect Snow Melt														
Inlet Locations	Not in path of pedestrians														
	Inlet box located in front of curb														
Grate Inlet	Cannot add length via sweeper inlet														
Curb Opening	Inlet box located behind curb														

	Can add length via sweeper inlet														
Slotted Drain	Only use in sags if tapered slot provided														
	Slot located 1/2 pipe diameter in front of curb face.														
	Provide clean-out on upstream end.														
Valley Gutter Detail															
Dip Section Detail															
Bridge Piping include clean-outs															
Bridge Piping Eliminate 90 degree bends.															
Flatten side slopes for maintenance															
3 ft flat bench around perim of pond															
Maintenance Access	Facility Bottom														
	Outlet Control Structures														
	Porous Paving system to support large maintenance equipment														
Primary control structure Details	Orifice screen assembly (6 in or smaller)														
Emergency Overflow Detail															
Haz Mat Spill Control Detail															
De-Watering Area for removed material															

Sump Depth for inlet/MH																
Oil Storage Capacity																
Sediment Storage Capacity																
Freeboard																
Road Subgrade above design Water Surface																
Access Control Fence (if needed)																
Setbacks	Check Flood High Water to Embankment slopes > 10% side slope = 200 ft.															
	Check Flood High Water to Well = 100 ft.															
	Toe of Berm to Property Line = 1/2 Berm height or 5 ft min.															
Weir Detail for split-flow manhole interior																
Orifice Plate Detail																
Swale	Side Slopes	WQ Flow depth = 1:4 or flatter														
		10-yr Flow depth = 1:2 or flatter														
	Min Length = 100 ft															
	Min Bottom Width = 4 ft															
	WQ Manhole upstream of Swale															
	Flow Spreader	At Beginning of Swale														

		At 150 Ft spacing max.														
		Weir Board														
	Located away from Leafy Vegetation															
Consistency between calcs and plans.																

Water Quality SW Report- Quality Control Checklist
Region 1 Geo/Hydro Unit

(Designer check appropriate box while doing design. Reviewer initial and date last two boxes on the right when quality control check has been done.

			Storm Drain			Roadway Drainage			Water Quality			Detention				
			YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	YES	NO	N/A	Rev. By	Date
Title Sheet																
Engineers Stamp																
Introduction																
Design Narrative																
Design Storm																
Research	DEQ	TMDL's														
		Well Head Area														
		UIC's														
	Local Drainage Masterplan															
	FEMA FIS Study Areas	Floodway														
		Floodplain														
	Maintenance History															
	State Parks															
	BLM															
	Local Ordinances															
	Navigational Clearance Requirements															
	Recreational Use															
	Riparian Oridinances and Regs															
	Irrigation Districts															
	Watershed Councils															
	Local County Flood Ordinances															

	WQ Impact Assessment															
Ultimate Outfall Locations Identified																
OHW (Ordinary High Water) Elevation																
Video Inspection																
Flow Direction of Proposed Facilites																
Edge of Pavement Treatment (Existing & Proposed)	Sheet Flow to Natural Infiltration															
	Ditches, Vegetated															
	Ditches, Non-Vegetated															
	Curb / Dike															
New Impervious Area																
Engineered Solution																
BMP Solution																
Dip Sections																
End Treatment (Proposed)	Headwalls / Wingwalls															
	Slope Paved															
	Exposed Pipe															
	Tide Gate															
	Trash Rack															
	Outlet Protection	Rip Rap														
		Vegetation														
Groundwater Elev Investigation Requested																

Infiltration Rate Investigation Requested																
Trenchless Installation Alternative Selection																
Trenchless Rehab Alternative Selection																
Hydrology Methodology	Design Storm(s)															
	Discussion of source															
	Drainage Area	On-site														
		Off-site														
		Delineated Basin Map														
		USGS Quad Map														
		Other Source														
Peak Runoff	Pre-Construction															
	Post-Construction															
Runoff Volume	Pre-Construction															
	Post-Construction															
Flow Duration	Pre-Construction															
	Post-Construction															
Structure Type (Existing and Proposed)	Type / Size															
	Length															
	Required Freeboard															
	Invert Elevations															
	Slope															
	Cover Height															
Hydraulic Modeling (Existing and Proposed)	FlowMaster (Inlets & Single Section)															
	HEC-HMS															

	(Routing)														
	HEC-RAS (Open Channels)														
	HYCHL (Channel Linings)														
	HYDRA (Storm Drains)														
	Manning's Open Channel														
	NUINLET (Inlets)														
	ROUTE (Routing)														
	Storm & Sanitary														
	StormCAD (Storm Drains)														
	SWMM (Storm Drains)														
	Visual Urban (Inlets & Single Section)														
	WSPGW (SD & Open Channels)														
	Other														
	Cleanout (3 ft/sec min)														
Velocity	Erosive?														
Manning's n															
Flow Depth															
Capacity															
Hydraulic Grade Line															
Energy Grade Line															
Pressure Flow															
Split Flow															
Flow Control															
Emergency Overflow															
Inlet Locations															

Inlet Clogging Factors														
Inlet Efficiency														
Inlet Bypass														
Pavement Cross-Slope Reversal Sheet Flow														
Flow Spread														
Alternate Manning's n Evaluation														
Stormwater Retention Time														
Min WQ Swale Length														
Min WQ Swale Width														
Outfall Protection Stability														
Downstream Impact Analysis														
Summary of Findings														

Appendix D
Right of Way Unit

PRODUCTS AND TASKS TO BE REVIEWED- Work Products and Tasks

The following tables outline work products and tasks and levels of review.

Table D1 Right of Way Work Products

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Project Scoping Report	Required	Optional
Right of Way Estimate for Draft STIP/Prospectus	Required	Optional
Review and Verify Project Prospectus	Required	Optional
Right of Way Portion of Final Environmental Impact Statement (EIS)	Required	Optional
Draft Approved Plans and Preliminary Right of Way Acquisition Drawing/Descriptions	Required	Optional
Right of Way Authorization	Required	Optional
Appraisal	Required	Optional
Final Right of Way Report Packet	Required	Optional
Relocation Claim	Required	
Recommendation for Condemnation Packet	Required	Optional
Right of Way Certification	Required	Optional
PS&E Plans	Required	Optional
Recommendation for Condemnation Packet	Required	Optional

PROJECT CHECK LISTS

For verification that quality control processes are occurring, project checklists will be utilized. These checklists identify the typical tasks to be accomplished as well as the period timeframe when technical review check points should occur.

Reviewers and project staff are responsible to insure that quality control reviews are occurring. After each interim review, the technical and/or corporate reviewers are responsible to initialize and date the appropriate area of the checklist to verify the quality control check has occurred. The project checklist will follow the project through to completion.

Right of Way Checklist				
Quality control reviews of deliverables are to be conducted to ensure compliance with the U.S. Uniform Relocation Assistance and Land Acquisition Policies Act of 1970; and in accordance with the Oregon Department of Transportation Right of Way Manual, Title 49, Code of Federal Regulations , Part 24 and Title 23, Code of Federal Regulations, Parts 140, 630, 635, and 710.				
Stage in Process Delivery Map	**Review Subject (Report, Plans, etc.)**	Level of Review	Date Reviewed	Reviewed By
Scoping Phase	**Deliverable 1 — Project Scoping Report**			
		Technical Review		

Review and verify project scoping report provided to project team leader.

- Verify site visit by Right of Way staff.
  - ❖ Includes drawings and photos.
  - ❖ Contaminated property identified.

	• Need for forest service easement or other government files identified. • Railroad involvement verified. ❖ Railroad notified, in writing, of impending project and potential impact. • Non-operating railroad (if any) identified. • Copies of documentation in project file. • Project Development Work Plan data base updated.			
	Deliverable 2 — Right of Way estimate for draft STIP/Prospectus			
	Review and Verify Right of Way Estimate. Preliminary cost estimate is reasonable and based on accurate information: • Land and Improvement Costs • Personnel Costs: ❖ Appraisal, ❖ Acquisition, ❖ Relocation. • Relocation Benefits Costs • Demolition Costs • Title Insurance Costs • File Processing Costs • Legal and Contingencies Costs	Technical Review		
	Review and Verify Project Prospectus.			
	Parts 1 & 2 – Prospectus – Project Request and Project Details • Number of Files is correct. • Area (total taking) is correct. • Number of and type of relocations is correct. • Number of fee title acquisitions is correct. • Number of temporary and permanent easements is correct.			
	Part 3 – Prospectus – Project Environmental Classification • Check for correct type of environmental classification. • Check Right of Way elements for accuracy.			
	Part 4 – Prospectus – Preliminary Engineering Authorization • Preliminary Engineering – check that Right of Way elements are accurate. • Units performing activities identified. • Review estimated costs for reasonableness.	R/W Project Manager		
	Deliverable 3 — Draft environmental document			

	Review draft environmental documents, if any. • Review for appropriate level of detail relating to Right of Way acquisition and relocation impacts. • Verify that current "Acquiring Land for Highways and Public Projects" and "Moving Because of the Highway or Public Projects" brochures are included in appendix. • Verify that Right of Way impacts for alternatives are addressed. • Verify that the Right of Way cost estimate is updated.	R/W Project Manager		
Plan Development Phase	**Deliverable 4 — Final Environment Impact Statement (EIS)**			
	Review Final EIS for accurate Right of Way information. • Review for appropriate level of detail relating to Right of Way acquisition and relocation impacts. • Verify that current "Acquiring Land for Highways and Public Projects" and "Moving Because of the Highway or Public Projects" brochures are included in appendix. • Verify that Right of Way impacts for alternatives are adequately covered. • Access management alternatives and costs identified. • Verify that the Right of Way cost estimate is updated.	R/W Project Manager		
Approved Plans Phase	**Deliverable 5 — Draft approved plans**			

	Review draft approved plans & preliminary Right of Way acquisition drawing and descriptions • Verify participation in Right of Way layout meeting with project team. • Review access management issues. ❖ Access management sub team formed, if required. ❖ Access management standards for alignment verified. ❖ Access management decisions incorporated into Right of Way layout. ❖ Right of way historical research completed. ❖ Legal/illegal approaches identified. ❖ Inventory, strategy and recommendations reviewed. ❖ Access rights to be purchased identified. ❖ Access list. • Review drawings and descriptions ❖ Property descriptions adequate, free of ambiguities and based on centerline stationing. ❖ File and property ownership information correctly shown on the drawing. ❖ All acquisition parcels shown on drawing and correctly identified for property rights acquired (i.e. fee, easement for slopes, etc.) ❖ Access control rights to be acquired are shown correctly on the R/W acquisition drawing and noted in the legal description addendum. • Final R/W Drawing shows ODOT acquisition.	R/W Project Manager		
Right of Way	**Deliverable 6 — Right of Way authorization process**			

and Permits Review	**Review Right of Way authorization.** Review Right of Way programming estimate. • Correct form with proper breakdown used. • Verify OTC or LPA resolution to condemn. • Verify OTC or LPA resolution to condemn. Right of Way services agreement in place if local project. • Verify authorization from Right of Way headquarters received prior to appraisal activity. • Documentation sent to landowners, improvement owners, lessees and other parties who have property interests included the following: ❖ General information letter. ❖ Ownership information sheet. ❖ Acquisition and Relocation pamphlets. ❖ Right of Way map.	Technical Review		
	Deliverable 7 — Appraisal			

	Appraisal checked prior to sending to Right of Way Headquarters for official review. • Type of Report complies with appraisal assignment/contract. • Subject property is identified by file number, location and ownership. • Five-year sale history of subject is identified and utilized if appropriate. • Owner contact report is included in the report or attached. • Subject's land and improvements are adequately described (Before & After, if applicable). • Highest and Best Use Analysis is discussed (Before & After if applicable). • All approaches to value as specified in the appraisal assignment/contract are included (Before & After if applicable). • Analysis & discussion of damages as specified in the assignment/contract is included. • Analysis & discussion of special benefits as specified in the assignment/contract is included. • Reconciliation and conclusion of value is included. • Value conclusion is properly allocated (separate allocation page included for metric projects). • Signed ODOT appraiser's certificate page is included. • Report includes verified and signed comparable sale sheets and sale photos. • Report includes sufficient sales map to locate each sale. • Report includes adequate photos of subject (interior and exterior if applicable). • Report includes the current Exhibit A or description upon which the appraisal is made. • Report includes a copy of the r/w map or adequate sketches of the subject property. • Construction plans and cross sections that are pertinent are included. • Report is prepared in a professional manner and is easy to read.	R/W Project Manager		
	Deliverable 8 — Final Report Packet			

	Final report packet checked prior to sending to Right of Way headquarters. • Original signed Final Report included. • Social Security or Federal ID number of all parties receiving payment included. • Completed and signed IRS Form W-9 included. Separate form obtained for each party receiving payment. • Justification Letter included if settled over reviewed amount. • Originals of signed deeds or easements included. • Originals of signed releases included. • Signed Assignment of Proceeds form included, if needed. • Offer Benefit Letter, Acquisition Summary and Relocation Benefits Summary included and contain all required elements. • 15-day Notice to Owner of Appraisal Inspection included. • Relocation Eligibility Listing (if applicable) included. • Tenant offer letters (if applicable) included. • All Office Title Report issues addressed. • Report of Personal Interview included. • Signed Statement of Negotiator included. • State's Obligation (if applicable) included and approved. • Grantor's Obligation (if applicable) included. • Road Approach Permit (if applicable) included. • Copy of all correspondence included. • Salvage Value Appraisal (if applicable) included. • Copy of title report and/or vesting information included, as required • Copy of the General Information Notice included. • Copy of all appraisals and appraisal reviews included. • Copy of most recent Exhibit A, Right of Way Description included. • Verify all timelines were met according to the Uniform Act.	R/W Project Manager		
	Deliverable 9 — Relocation			

	Review relocation claims prior to submitting to Right of Way headquarters. • Verify claims made in accordance with the Right of Way Manual and federal regulations. • Payee clearly identified. • Mailing address is correct, if different from the displacement address. • If an escrow account is involved, escrow account number is entered. • Claim was generated in RAIN so that the amount of the claim is entered in database. • Dollar amount is correct. • Comments to support claim filled in where required. • EA information entered correctly. • Inspection date included. • Form signed and dated by the displaced person. • Form signed and dated by the agent. • Assignment of proceeds form signed, dated and attached, if applicable. • Appropriate supporting documentation attached.	R/W Project Manager		
	Deliverable 10 — Recommendation for Condemnation			

	Review Recommendation for Condemnation Packet • Condemnation recommendation form complete: ❖ Includes valid street address for all parties. ❖ Includes names and addresses of attorneys. ❖ Includes Social Security or Federal ID number of all parties receiving payment. • Summary letter of key issues and proposals discussed with property owners to resolve issues. • All Office Title Report issues addressed. • Offer Benefit Letter and Acquisition Summary Statement contain all required elements. • Relocation Summary Statement complete. • Relocation Eligibility Listing (if applicable) included. • Tenant offer letters (if applicable) included. • Copy of Report of Personal Interview included. • Copy of all correspondence included. • Copy of title report and/or vesting information, included as required. • Copy of all appraisals and appraisal reviews included. • Copy of most recent Exhibit A, Right of Way Description included. • Reasonable time allowed for negotiations. ❖ Grantor allowed at least 40 days to consider offer. ❖ At least 20 days elapsed between final offer and deposit into court. • All documents complete. • Required possession clearly indicated on Recommendation for Condemnation form. • Timeframe complies with federal regulations.	R/W Region Manager		
	Deliverable 11 — Right of Way Certification			

	Review Right of Way certification for completeness: • Certification received on time. • Form properly filled out with all sections complete. • Identified holdouts were pre-approved. • Specifications person notified of any changes. • Verify that utilities have been relocated.	Technical Review		
PS&E Review	**Deliverable 12 — Plans in Hand and PS & E Plans**			
	Review and verify Plans in Hand and PS&E plans are complete. • Review for inclusion of Right of Way obligations and/or holdouts.	R/W Project Manager		

Appendix E

Roadway Unit

PRODUCTS AND TASKS TO BE REVIEWED- Work Products and Tasks

The following tables outline work products and tasks and levels of review.

Table E1 Roadway Design Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Concept Plans	Required	Optional
Preliminary Plans	Required	Optional
Advance Plans	Required	Optional
Final Plans	Required	Optional
Final Quantities	Required	Optional

Table E2 Specifications

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Bid Item List	Required	Optional
Review Advances	Required	Required[1]
New Job-Specific Specials	Required	Required[1]
Final Specs	Required	Required[1]
New Specials (hazmat, etc)	Required	Required[1]

Note 1: If involved in writing that section

Table E3 Preliminary Design

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Approved Design	Required	Optional

Table E4 Construction Scheduling

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Constructability	Required	Optional

PROJECT CHECK LISTS

We will use project checklists to verify that we are using quality control processes and checking the appropriate items. These checklists identify the typical tasks to be accomplished as well as the period or time frame when technical review check points should occur.

Reviewers and project staff must ensure that quality control reviews occur. After each interim review, the technical and/or corporate reviewers must initialize and date the appropriate area of the checklist to verify that they performed the quality control check. The project checklist(s) will follow the project through to completion.

Roadway Checklist			
Review Subject (Report, Plans, etc.)	**Level of Review**	**Date Reviewed**	**Reviewed By**
Check to ensure all the sheets are present, and are in the index.	Technical		
Check the stationing to ensure that project limits are correct and that the sheets and the title sheet run in the same direction.	Technical		
Follow the plans through from beginning to end of the project to ensure that they are complete, and that they are understandable. Note any areas that are not clear; these may become clearer as you review the details.	Technical		
Check the title block to ensure the names and the stamp are correct.	Technical		
Check the typical sections for: • Stationing • Fill depth and material (for specialized locations using unusual material) • Lane widths • Shoulder and median widths • Bike lane width • Cross-slopes • Sidewalk width and cross-slope • Depth of sub-base, base, and pavement • Pavement removal, if appropriate (if grinding, make sure that the widths and stations make sense and are constructible) • Pavement specification • Curb type, height, and placement • Ensure typicals and stack(s) match adjacent typicals and stack(s).	Technical		
Check the title block to ensure the names and the stamp are correct.	Technical		
Check the typical sections for: • Stationing • Fill depth and material (for specialized locations using unusual material) • Lane widths • Shoulder and median widths • Bike lane width • Cross-slopes	Technical		

• Sidewalk width and cross-slope • Depth of sub-base, base, and pavement • Pavement removal, if appropriate (if grinding, make sure that the widths and stations make sense and are constructable) • Pavement specification • Curb type, height, and placement • Ensure typicals and stack(s) match adjacent typicals and stack(s).			
Check the plan view sheets for: Stationing • Notes – check that all note numbers have notes, and that all notes are referenced. Ensure that the note covers the work being done or intended. • Details – check that all referenced details are on the detail sheets. • Standard Drawings – Check that all listed standard drawings in construction notes are on the title sheet. Also check to ensure the correct standard drawings are being used. • Traffic Control Plans – Check to ensure the staging plans match the roadway plans for the type of work being done. Review to make sure they are easily understandable. • Earthwork Brackets – check that the earthwork quantities make sense (i.e. if doing guardrail flares there should not be large quantities)	Technical		
Follow the plans from beginning to end looking at pavement, to check for consistency, and to ensure that transitions make sense.	Technical		
Follow the plans through from beginning to end to check drainage.	Technical		
Make list of any unique items, use list to review the special provisions to make sure the items are covered with construction, measurement and payment specials.	Technical		
Review the special provisions - Check the bid item list, is there a special provision for each item.	Technical		
Check the special provisions for missing bid items. (Read the measurement and payment section to make sure the bid item is missing.)	Technical		

Appendix F
Survey Unit

PRODUCTS AND TASKS TO BE REVIEWED- Work Products and Tasks

The following tables outline work products and tasks and levels of review.

Table F1 Cadastral Group Work Products

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Cost and Scheduling Estimates for Right of Way Engineering	Required	Optional
Field Packets for Survey Crews	Required	Optional
Check files from field for Location Right of Way Map	Required	Optional
Draft Location Right of Way Map	Required[1]	Optional
Right of Way Descriptions	Required	Optional
Right of Way Authorization	Required	Optional
Appraisal	Required	Optional
Final Right of Way Report Packet	Required	Optional
Relocation Claim	Required	Optional
Recommendation for Condemnation Packet	Required	Optional
Right of Way Certification	Required	Optional
PS&E Plans	Required	Optional

[1]Review also by Technical Services Unit in Salem

Table F2 Field Group Work Products

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Horizontal Control	Required	Optional
Vertical Control	Required	Optional
Monument Ties	Required	Optional

Strategic Points	Required[1]	Optional
Topographic Survey	Required	Optional
Post Processing of Field Data	Required	Optional

Table F3 Mapping Group Work Products

	Minimum Review Level (See Table 1)	
Work Products or Tasks	**Technical**	**Management**
Base Map	Required	Optional
Digital Terrain Model	Required	Optional

PROJECT CHECK LISTS

For verification that quality control processes are occurring, project checklists will be utilized. These checklists identify the typical tasks to be accomplished as well as the period timeframe when technical review check points should occur.

Reviewers and project staff are responsible to insure that quality control reviews are occurring. After each interim review, the technical and/or corporate reviewers are responsible to initialize and date the appropriate area of the checklist to verify the quality control check has occurred. The project checklist will follow the project through to completion.

Cadastral Group Services and Products

The Cadastral Group provides Recovery, Retracement and Monumentation surveys and Right of Way Design expertise related to property management/acquisition for ODOT/Local Agency projects.

The Cadastral Group will actively participate in the review process during the development of Location Right-of-Way and Recovery Surveys. This will greatly facilitate in streamlining the RW Drawing and RW Description phases. The Cadastral Group estimates a 25% to 50% efficiency gain by being involved earlier in the process.

Products and Services	Quality Control	Task By		Review By	
		Initial	Date	Initial	Date
Cost Estimate and Background Informaiton. ✓ Cadastral Group will prepare cost estimates for the Right of Way Engineering portion of projects to ensure enough time/funds are included in the project estimate for Right of Way Engineering to minimize cost overruns. ✓ Prepare Field Packet for the Survey Crew. The Field Packet will include any available horizontal and vertical control, including private surveys, government corner notes, road notes, as-builts, right of way maps Bench Marks etc. ✓ Meet with field crews to discuss contents of field packet and discuss any special needs.	✓ Check to insure cost estimates for the Right of Way Engineering portion of projects and schedule is appropriate. ✓ Check Field Packet to insure all appropriate information has been gathered for field crews. ✓ Insure meeting with field crews has occurred. .				
Prepare Location Right of Way Map ✓ Senior Surveyor will note on the Assessor's Maps (http://www.gis.state.or.us/data/ormap/statemap.htm) which properties to retrace ✓ Request deeds from Title Company (First National Title Co. of Oregon [503.796.6604]), and request the latest updated r/w map and	**Quality Control** ✓ When we have received the files from the field we will check the held points for the least squares adjustment, and check that the points in the .dgn have the same coordinates as the report.				

field book from (title) (Lloyd Bledsoe [(503) 986-3792]). Once you have obtained the latest r/w map, obtain copies of the ODOT deeds listed on the map – generally you have to contact the Business Management Section (Francis Vandervelden [506 986 3632]) in Salem for these. ✓ Retrace Record Alignment/Build Parcels--can be done while waiting for the field crew to complete their monument search. ✓ Obtain the original field notes (and copies) from Senior Surveyor (Field) after he has reviewed them. Obtain the electronic files from field crew. (see "CAiCE Project Report Checklist" located at: G:\1810only\CAICE PROJECT TRACKING\CAiCE_Tips\Report_Documents for a complete list of documents required by office staff).					
Assembling the Location R-W Map Use the ODOT Menu>Right Of Way>Existing. Alignment text size and line spacing shall be 6.25, all other text and spacing shall be 5. All text shall be font 24, except for tables and coordinates which will be font 4. Be sure to review the alignment with the Senior Surveyor before completing the rest of the Location R-W map.	**Quality Control** ✓ Location R-W Map Review ✓ Review to be performed by someone other than the original creator to ensure that our basic drafting standards are met and also check for any errors. Final review will be done by the Senior Surveyor before releasing the file to the designers and other project team members.				
Prepare Right of Way Drawings (A Right of Way Drawing is an internal ODOT document used to design and show proposed right of way takings for ODOT projects) ✓ The r/w drawing serves as an index of our right of way files and property rights and is	**Quality Control** ✓ Once the project team accepts the Right of way design layout the Senior Surveyor (Finalist) reviews the drawing for standards and completeness.				

used to record sales of excess ODOT property and serves as a research resource for our highway system, access control and reservations. ✓ Upon receiving the final design foot print for a project the Lead Surveyor designs and produces a right of way drawing utilizing criteria from the Highway Design Manual and input from the project team.	✓ Because Right of Way Engineering is a new discipline to the Region the drawing is submitted to Right of Way Engineering (Headquarters in Salem) for review. After review by Headquarters the final drawing is stored in Salem.				
Prepare Right of Way Descriptions ✓ Upon acceptance of the Right of Way drawing the Lead Surveyor writes the property descriptions. After the descriptions are written the Senior Surveyor (Finalist) reviews the descriptions. The Senior Surveyor (Finalist) makes any edits/modifications to the descriptions.	**Quality Control** ✓ As with the Right of Way drawing the descriptions are submitted to Right of Way Engineering (Headquarters in Salem) for review. After review by Headquarters the final descriptions are stored in Salem and are ready for use by the Right of Way Unit.				
Consultant Work					
	Review work by consultants ✓ The Right of Way Engineering Unit reviews work by others. The level of review depends on the wording in the STATE OF OREGON PERSONAL/PROFESSIONAL SERVICES CONTRACT for the given project				

Field Group

The Field Group will actively participate in the review process during the development of all Region 1 Location Basemap, Right-of-Way and Recovery Surveys.

Products and Services	Quality Control	Task By		Review By	
		Initial	Date	Initial	Date
Scoping When possible, the field crew assigned to a project will attend the Survey Scoping meeting organized by the Project Leader. If the specific crew has not been assigned, a Field Crew Chief will attend to provide a field perspective at the Scoping Meeting. After the Cadastral Group has thoroughly researched the project and prepared a Field Packet, the field crew will review the packet and make an on-site visit to the project.					
Horizontal Control Network In most cases, a Control Network (as apposed to the more traditional Traverse) is required to provide a basis on which to survey the project.	**Quality Control** ✓ Tripods, with tribrach and target will be used for all back-sights and foresights and will be calibrated periodically to ensure accuracy ✓ Distance measurements will be included with all observations unless impractical ✓ Point identifier inscribed on the Network points when possible ✓ Redundant (more than two) observations to each Network Point providing redundancies to serve as a blunder check ✓ Field notes (a primary source of evidence of a survey) include detailed point descriptions and vicinity sketch				

	✓ Cross ties within the survey which provide a means to "tighten up" the geometry ✓ Computation by Least Squares, which servers to distribute errors proportionately throughout the survey ✓ Sights to adjacent control points are made in the forward (FACE I) and reverse (FACE II) orientations to aid in eliminating errors. ✓ Network points are placed at locations that provide a strong geometric figure and allow for maximum visibility of future work to be performed.				
Vertical Control (to provide elevation information for the project)	**Quality Control** Vertical Control will be provided at or above the level required by the project needs and will normally be provided by existing Bench-Marks (BM) in or near the project site. Vertical Control may be brought to the project by ✓ Transferring elevations through the project from one approved BM to another ✓ Creating a "Level Loop" from an existing BM (or other approved vertical datum) and proceeding through the project and back to the original BM. ✓ Creating a project-specific datum through GPS ✓ Creating a random or assumed elevation point if the actual elevation is not required and no existing Vertical Datum is within a reasonable, cost-effective location relative to the project.				
Monumentation Ties (property corners, Rectangular System Government Corners, DLC Corners): When required by the scope of the project,	**Quality Control** ✓ The same criteria that apply to Control Networks apply to Monument Ties except				

monuments will be located and recorded. Geodetic and boundary monuments will be tied in to provide firm basis on which to orient the control for the surveys and construction tasks to follow.	that ties to Monuments only require sighting two other Controlled Points.				
Strategic Points (points set as an adjunct to the Control Network) Strategic Points will be set when the Control Network does not provide the visual coverage needed for Monument Ties or Topographic data collection	**Quality Control** Ties to Strategic Points fall under two categories. ▪ (Controlled Strategic Point) Ties to Monument Corners ▪ Ties to Topo Features ✓ The above categories differ in that the Controlled Strategic Point will be tied in a Network type file and be reduced using the least squares method. ✓ The topo-tie will be tied in the same manner, but may be collected in the same file as topographic features which does not provide for least squares reduction, but does contain all of the information needed for that reduction if need be. ✓ To provide consistency, Strategic Points are typically tied as Controlled Points.				
Topographic Survey Topographic Survey provides a base-map, in essence a 2D plot of the existing terrain and a DTM (Digital Terrain Model), a 3D model of the existing terrain. The Topo Survey will include all features (including, but not even remotely limited to natural and man-made features such as:	**Quality Control** ✓ Recording the precise locations of all features named above using sophisticated electronic and manual instruments to provide vertical and horizontal data representing the locations in a numerical format ✓ Detailed field notes serving as a narrative of the information collected and recorded. ✓ **Confidence Points** (additional points measured in the field to: ✓ Verify the accuracy of the DTM ✓ Provide a level of confidence to the designer				

	who will rely on this model as a base for the design ✓ Provide evidence just prior to construction that the DTM is a reasonable representation of the original ground for computation of volumes and pay quantities.				
Post-Processing of Field Data (reducing the field data and converting it to a readable format) This step is performed as soon as the Field Crew returns from the field.	**Quality Control** ✓ Each day the electronic data collected will be downloaded to a .sav file and write-protected to ensure against loss or inadvertent edits ✓ When a file is deemed complete due to a specific completed task or by the size of the file it will be post-processed by either the Field Crew (under the leadership of the Crew Chief) or handed off to a qualified processor for reduction. ✓ Network and Monument files and notes will be reviewed by the Senior Surveyor in charge of the Field Crews for accuracy and clarity after the files have been reduced ✓ Network and Monument Tie information will be handed off to the Cadastral Group for analysis ✓ Topo files will be handed off to the Mapping Group to prepare the base-map and DTM ✓ The Field Crew will review the final results and will participate in a physical review on the project site to ensure efficacy of the base-map/DTM				

Mapping Group The Mapping Group will actively participate in the review process during the development of Survey Basemaps and DTMs. This will aid in streamlining the RW Drawing and RW Description phases. Mapping Group anticipates a significant gain in efficiency by being involved earlier in the process.					
Products and Services	Quality Control	Initial	Date	Initial	Date
Base Map (A plan view of the project site including all existing surface features (both man-made and natural and locations of underground utilities—normally includes a detailed drainage study) The Base Map is developed from a topographic field survey (compiled from field data) and generated in Micro Station Version 8. Field data is post-processed by the field crew and delivered to the Mapping Group for grooming.	**Quality Control** ✓ Cadastral Group will deliver Project Horizontal and Vertical Control to the Mapping Group ✓ Upon completion of the Base Map (or agreed upon intervals, as dictated by project needs) a paper copy of the Base Map will be plotted out for a field review for accuracy and completeness by: (1) A member of the Field Crew (2) The Base Map groomer and/or (3) The Lead Surveyor (TE-1) for the Mapping Group ✓ Base Map is archived when the Survey Unit completes the project				
Digital Terrain Model: A 3-D model of the original ground composed of conturable terrain points and break-lines generated in Micro Station Version 8 and InRoads.	**Quality Control** **Confidence Points** (additional points measured in the field) ▪ Verify the accuracy of the DTM according to ODOT standards ▪ Provide a level of confidence to the designer who will rely on this model as a base for the design ▪ Provide evidence just prior to construction that				

	the DTM is a reasonable representation of the original ground for computation of volumes and pay quantities. ▪ Questionable Confidence Points will be reviewed to determine if a significant problem exists ✓ The model is turned on its side to inspect for anomalies, such as spikes or holes in the surface ✓ A drive-thru version of the model is generated to see if there are any irregularities ✓ Contours are generated to make sure that there are no blunders in model ✓ A map of the model is plotted out for a field review in the same manner as the Base Map ✓ The Mapping Lead Surveyor (TE-1) reviews the model to make sure that all of the items requested in Survey Request are noted in the model according to standards. ✓ A master copy of the base map and terrain model files are recorded to CD-ROM to preserve the files that were released to the project designers or consultants ✓ DTM is archived when the Survey Unit completes the project				

Appendix G
Traffic Unit

Region 1 Traffic Unit

PRODUCTS AND TASKS TO BE REVIEWED- Work Products and Tasks

The following tables outline work products and tasks and levels of review.

Table G1 Traffic Design Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Prepare scoping-level PE and Construction cost estimates for traffic design features (Traffic control, signs, signals, illumination and striping)	Required	Optional
Prepare preliminary plans for traffic design features	Required	Optional
Prepare advance plans and specifications for traffic design features	Required	Optional
Prepare final plans and specifications for traffic design features	Required	Optional
Prepare advance construction cost estimate for traffic design features	Required	Optional
Prepare final construction cost estimate for traffic design features	Required	Optional

Table G2 Traffic Signals

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Develop traffic signal timing plans for individual traffic signals	Required	Optional
Develop traffic signal system timing plans	Required	Optional
Develop ramp meter timing plans	Required	Optional
Prepare reports, memos and other documentation related to traffic signal and ramp meter operation	Required	Optional

Table G3 Access Management

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Develop access management strategy for STIP projects	Required	Optional
Develop draft access management plans, access management plans for interchanges, and/or interchange area management plans	Required	Optional
Develop final access management plans, access management plans for interchanges, and/or interchange area management plans	Required	Required
Develop findings for access management decisions on STIP projects and for proposed developments	Required	Optional
Write reports, memos and other documents related to access management issues	Required	Optional

Table G4 Traffic Analysis

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Prepare traffic analysis for project scoping, selection and development.	Required	Optional
Prepare traffic analysis for transportation planning studies.	Required	Optional
Develop traffic data for Environmental Assessment and Environmental Impact Studies.	Required	Optional
Prepare traffic analysis reports and technical memos for project development and transportation planning studies.	Required	Optional
Conduct technical review of traffic impact studies prepared by consultants and local agencies for highway improvement projects.	Required	Optional

Table G5 Development Review Task List

Work Products or Tasks	Minimum Review Level (See Table 1)	
	Technical	Management
Prepare traffic analysis scoping documents for local development proposals.	Required	Optional
Conduct technical review of traffic impact studies prepared by consultants for local development proposals.	Optional/ Required*	Optional
Conduct supplemental analysis to determine accuracy/adequacy of consultant studies (see above task).	Optional/ Required*	Optional
Prepare technical findings and recommendations based on review of traffic impact studies prepared by consultants and supplemental analysis performed by ODOT staff.	Optional/ Required*	Optional
Review and/or prepare traffic scoping documents for TGM projects.	Required	Optional
Conduct technical review of traffic impact studies prepared by consultants for TGM projects.	Required	Optional
Prepare technical findings and recommendations based on review of traffic impact studies prepared by consultants for TGM projects.	Required	Optional

* For cases in which a recommendation of denial is anticipated or for cases involving political factors (i.e. active neighborhood groups, contested mitigation, anticipated LUBA appeal, etc.), Technical Review is required.

PROJECT CHECK LISTS

For verification that quality control processes are occurring, project checklists will be utilized. These checklists identify the typical tasks to be accomplished as well as the period timeframe when technical review check points should occur.

Reviewers and project staff are responsible to insure that quality control reviews are occurring. After each interim review, the technical and/or corporate reviewers are responsible to initialize and date the appropriate area of the checklist to verify the quality control check has occurred. The project checklist will follow the project through to completion.

Traffic Engineering	Review Level Required:	Done By:	Date:	Okay? (Y or N)	Follow-Up Req'd (Y or N) Details Below

N/A ☐

Sign Design

Prepare scoping-level PE and Construction cost estimate	Technical				
Prepare Preliminary Plans	Technical				
Prepare Advance Plans, Specifications and cost estimate	Technical				
Prepare Final Plans, Specifications and cost estimate	Technical				

N/A ☐

Signal Design

Prepare scoping-level PE and Construction cost estimate	Technical				
Prepare Preliminary Plans	Technical				
Prepare Advance Plans, Specifications and cost estimate	Technical				
Prepare Final Plans, Specifications and cost estimate	Technical				

N/A ☐

Illumination Design

Prepare scoping-level PE and Construction cost estimate	Technical				
Prepare Preliminary Plans	Technical				
Prepare Advance Plans, Specifications and cost estimate	Technical				
Prepare Final Plans, Specifications and cost estimate	Technical				

N/A ☐

TP&DT Design

Prepare scoping-level PE and Construction cost estimate	Technical				
Prepare Preliminary Plans	Technical				
Prepare Advance Plans, Specifications and cost estimate	Technical				
Prepare Final Plans,	Technical				

	Specifications and cost estimate					

N/A ☐

Striping Design

	Prepare scoping-level PE and Construction cost estimate	Technical				
	Prepare Preliminary Plans	Technical				
	Prepare Advance Plans, Specifications and cost estimate	Technical				
	Prepare Final Plans, Specifications and cost estimate	Technical				

Access Management

N/A ☐	Develop access management strategy	Technical				
N/A	Develop draft access management plans, access management plans for interchanges, and/or interchange area management	Technical				
N/A ☐	Develop final access management plans, access management plans for interchanges, and/or interchange area management	Technical / Management				
N/A ☐	Develop findings for access management decisions	Technical / Management				
N/A	Write reports, memos and other documents related to access management	Technical				

Traffic Analysis

N/A ☐	Prepare traffic analysis for project scoping, selection and development	Technical				
N/A ☐	Prepare traffic analysis for transportation planning studies	Technical				
N/A	Develop traffic data for Environmental Assessment and Environmental Impact Studies	Technical				
N/A	Prepare traffic analysis reports and technical memos for project development and transportation planning studies	Technical				
N/A ☐	Conduct technical review of traffic impact studies prepared by consultants and local	Technical				

	agencies for highway improvement projects					

Development Review

N/A ☐	Prepare traffic analysis scoping documents for local development proposals	Technical				
	Conduct technical review of traffic impact studies prepared by consultants for developments	Technical				
	Conduct supplemental analysis to determine accuracy / adequacy of consultant studies	Technical				
	Prepare technical findings and recommendations based on review of traffic impact studies	Technical				
N/A ☐	Review and / or prepare traffic scoping documents for TGM projects	Technical				
	Conduct technical review of traffic impact studies prepared by consultants for TGM projects	Technical				
	Prepare technical findings and recommendations based on review of TGM traffic impact studies	Technical				

Traffic Investigations

N/A ☐

	Prepare speed zone investigations	Technical / Management				
	Prepare parking prohibition investigations	Technical / Management				
	Perform traffic investigations	Technical				
	Respond to "Ask ODOT" e-mails	Technical				
	Review STIP Project Plans	Technical				
	Investigate SPIS sites	Technical				
	Develop concepts for safety projects	Technical				
	Provide technical assistance to local governments	Technical				
	Review road construction plans from developers and local governments	Technical				

Traffic Signals (Operation)

N/A ☐

	Develop traffic signal timing	Technical				

	plans for individual traffic signals					
	Develop traffic signal system timing plans	Technical				
	Develop ramp meter timing plans	Technical				
	Prepare reports, memos and other documentation relating to traffic signals	Technical				

Other

All quality control checks or N/A determinations approved by:	