# BDM Appendix C
# Bridge TS&L Development Process "Retooling"

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Concerns about the content and quality of the Bridge TS&L Report has resulted in a "retooling" of the TS&L development process in 2021. Several things have come from this "retooling":

- A stronger coupling to Desk and Field Scoping (and possible Advanced Investigation)
- A defining of a Bridge TS&L Report, a Bridge Strategy Memo, and an Other Structures TS&L (aka Other Structures Layout Memo).
- A determination of what needs a Bridge TS&L Report, and what doesn't.
- Process tasks defined in more depth in the current vernacular (PDII, etc)
- Roles & Responsibilities defined in more depth/clarity.

[Figure 1 - **Develop and show a figure of the 'Bridge TS&L Report development and Bridge Section review' "racetrack" alongside the Agency racetrack. Label Bridge parts to coincide with numbers of the Activities noted below.**]

## C1: Desk Scoping & Initial Business Case

The goal of scoping is to support the generation of a list of projects within a limited program budget. This goal is achieved by developing sufficient and accessible documentation to communication the high level scope assessment, schedule, budget, risks, opportunities, constraints and assumptions for project selection and programming. The outcome is an established type of project and project goal, with the understanding that changes can happen when more information is added, through Field Scoping, Advanced Investigation, or through the project development process.

Desk Scoping and the Initial Business Case are Program activities. Based on published information, Desk Scoping assesses a possible solution and establishes an initial cost estimate for programing purposes. Where possible, it will also document design elements that are explicitly included or excluded from the final project. The result of Desk Scoping is enough information to draft the Initial Business Case and to understand the cost of solutions sufficiently, such that a suitable number of projects are advanced to the Field Scoping phase. The Initial Business Case notes the Program's goals and expectations (including input to practical design measures).

Key people involved in Desk Scoping and Initial Business Case activity:

- Bridge Program Manager – Leads the Desk Scoping effort; sets needs and expectations.
- Desk Scopers – Develop Desk Scopes and produces Desk Scoping deliverables.
- RBLEs – May be contacted to request input to the work being considered for Desk Scoping.

Decisions to be made:

- For Bridge Program projects, Desk Scoping should be the start of a dialog between Bridge Program, Region and Bridge Design to define the project. The only final decision from Desk Scoping is the establishment of a list of projects that move forward, based on the program budget, risk tolerance, and priorities. Depending on the project, some elements of the scope, such as whether to include bridge rail, may be decided at this time and documented in the Desk Scoping assumptions.

Needs:

- To start Desk Scoping, Bridge Program needs to provide a project type. Projects can include both new and existing bridges, for which the goal of scoping is the same. Desk scopes need to be completed for the Initial Business Case to be finalized.

Informal "Gives":

- The work performed during Desk Scoping (i.e., Initial Business Case supporting data)
- Under Development: A Desk Scoping "summary" form (Bridge Data Sheet) that notes certain information typical to informing an Initial Business Case.

Deliverables (Formal "Gives"):

- Initial Business Case – Delivered by the Program Manager to Area Managers and/or Region Scoping Coordinators. Curtesy copy of link to document to RBLE.

Commentary:
This information provided for "Desk Scoping & Initial Business Case" only applies to Bridge Program projects. Bridge Section is not in a position to speak for other Programs and how they complete their Initial Business Case (or what is included).

Bridge Program expectations set the type of work being scoped and give a sense of scale to the effort. Bridge Program goals shape how the projects are pared down between Desk and Field Scoping. Scoping should establish what scope is expected to be in and out of the project, but also provide a reason why so that future tasks do not require duplication of effort. Desk Scoping provides the basis of the Initial Business Case. It is built on by Field Scoping to inform the generation of the Final Business Case. This

documentation, both from Desk and Field scoping, needs to be made available to the design team along with any data collected after scoping that may impact the project.

During Desk Scoping, the scoping estimate tool and Bridge Data Sheet for each potential project are stored on the Bridge Management server. For projects selected for Field Scoping, these files are provided to the Region Scoping Coordinators to be entered into ProjectWise.

The work group (DC/SA) recommends that Bridge Section document key standards and Bridge Program expectations during Desk Scoping. These expectations would define items such as the required rail test level, level of seismic retrofit, acceptable overlay types, assumed DD/DE that would be supported by Bridge Section, and other key decisions for consideration during Field Scoping. For work programmed by the Region, additional coordination is necessary. This is a key area for improvement, since Bridge Program and Standards does not perform Desk Scoping and does not have Desk Scoping relationships set in place with other Programs. Pavement Preservation Program would be an excellent place to start.

### *C1-C2 Cross-Tie (between Initial Business Case and Field Scoping):*

*The RBLE is a crucial part of the movement and continual flow of information and communication between these two activities. The RBLE reviews the Desk Scopes and Initial Business Case (and may provide comments back to Bridge Program). The RBLE will also work with Region Scoping Coordinators to assist in the interpretation of the Initial Business Case, and answer questions or facilitate communications with Bridge Program to get answers to questions.*

## C2: Field Scoping

Because Desk Scoping and the Initial Business Case are considered program activities, Field Scoping is technically the first activity in the development of the Bridge TS&L.

Field Scoping adds ground proofing, evaluates and documents risks and assumptions, and should include feedback loops with Bridge Program as well as input from supporting disciplines. The final result of Field Scoping is a detailed scoping narrative with practical design opportunities, project class, construction cost estimates, sketches, and photos; a log of assumptions and risks identifying DD/DEs; and recommendations for Advanced Investigation, when necessary.

Field Scoping should have an increased emphasis on beginning the alternatives analysis, including staging assumptions. Any deviations should by confirmed with Standards and documented by starting a DC/SA.

Getting a good strong field scope provides a strong start to the Bridge TS&L. Clear documentation of decisions and assumptions made during scoping, and the list of identified risks, allows for a firm basis for TS&L, where the designers and reviewers know which elements of the scope need analysis and which have been decided. This documentation, both from Desk and Field scoping, needs to be made available to the design team along with any data collected after scoping that may impact the project.

Key people involved in Field Scoping:

- Region Project Sponsor – A person assigned by the Region to provide business context, expertise, and guidance to the Region Scoping Coordinators and act as an escalation point for decisions and issues that are beyond the authority of the Region Scoping Coordinators. They collaborate with the various Program Managers, and sees to the completion of Field Scoping.
- Region Scoping Coordinator – A person assigned by the Region to coordinate the Region Field Scoping effort and lead development of Final Business Case.
- Field Scoping Leads – Typically Region Transportation Project Managers (TPM) or Resident Engineer-CP (RE-CP), or similar. Leads multi-discipline group to field scope potential projects received from various Programs.
- RBLEs – The Bridge discipline representative engaged by Region Field Scoping Leads/Coordinators to assist in informing the scoping team of the project scope, suggested alternatives, assumptions and risks to meet structural needs. Leads Field Scoping activities for Bridge Section; assigns bridge resources to individual Field Scoping tasks. Ensures quality control of bridge discipline scoping products is completed before delivering to the Field Scoping Lead.
- Bridge discipline scoping team participants – people from the Bridge discipline that have appropriate skill set to perform the Field Scoping with the project scoping team and determine scope of potential projects for final programming.
- Other Discipline scoping team participants – people from other disciplines that also perform Field Scoping of potential projects.

Decisions to be made:

- For Bridge Program projects, Field Scoping should be a continuation of the dialog started in Desk Scoping to continue to define the project (which will eventually culminate in a TS&L report). Many decisions may be made in this stage regarding what is included and what is excluded in the project scope. These decisions must be documented in the Field Scoping Notes. Material that is “design criteria” and “standards” (including practical design items) needs to be documented in the Design Criteria & Standards Assessment (DC/SA).

Needs (“Gets”):

- For Field Scoping, the Funding Program Manager will provide an Initial Business Case to the Region Scoping Coordinator and/or Area Mangers, as well as guidance where practical design is expected (Bridge Rail, Seismic, etc.)

Informal “Gives”:

- DC/SA – Initiated by the RBLE and/or Bridge/Scoping Designer and delivered to the Bridge Design Manager via ProjectWise (for use by anyone that is interested in this information).

Deliverables (Formal “Gives”):

- Field Scoping Notes: a detailed scoping narrative with practical design opportunities, project class, sketches, photos, and recommendations for Advanced Investigation, if any.
- Risk Log: A log of assumptions and risks which also identifies DD/DEs;
- Cost Estimate – Construction estimate and PE estimate
- Work Zone Decision Tree

- All deliverables are delivered by the Field Scoping Leads to Scoping Coordinators via ProjectWise (i.e., loaded to ProjectWise and Program Manager notified of availability by email), who in turn delivers to Program Managers.

Commentary:
Field Scoping is the first activity in which all involved may start to see possible differences between bridges and bridge work in the Bridge Program vs. bridges and bridge work included in other Programs. Currently there is a high probability that bridge work in one Program may be handled differently from bridge work in another Program. This is an area that could be worked in the future that could reap large benefits for the Agency in regards to reducing confusion between all involved in delivering all the different types of bridge work.

Practical Design needs to be incorporated by all disciplines for Bridge Program projects. Currently there may be a reluctance by some disciplines on the PDT to incorporate Practical Design in projects due to a perceived need for more time/schedule. This should be vetted between the Field Scoping Lead (or TPM/RE-CP when already assigned) and the Program Manager when setting the project schedule.

The Project Sponsor role is not always given the attention it needs to ensure a strong scope, schedule and budget for a successful project start. It will be imperative for the Bridge Program Manager to be proactive and collaborate with the Project Sponsor on Bridge Program projects to ensure the Bridge Program's goals, expectations, and practical design measures are understood and carried forward.

Field Scoping data is developed and stored in ProjectWise.

### *C2-C3 Cross-Tie (between Field Scoping and Final Business Case):*

*The RBLE is a crucial part of the movement and continual flow of information and communication between these two activities. The RBLE reviews the Field Scoping (and may provide comments back to the Field Scoping Coordinators). The RBLE will also work with the Region Field Scoping Coordinators to assist in the interpretation of the Field Scoping, and answer questions or facilitate communications with Region to get answers to questions. The RBLE may also work with the Project Sponsor, Region Scoping Lead and the Program Manager to assist in the completion of the Final Business Case.*

## C3: Final Business Case

The Final Business Case serves as an agreement between the Program and the Region on the problem/opportunity/issue description and need, expectations (including practical design), potential solutions, project outcomes goals and priorities, and constraints & risks. The Final Business Case also provides background information, and informs the Project Charter. In essence, the Final Business Case provides direction to the project team regarding the scope and budget, as refined through the Field Scoping process and the Project Development Phase.

Along with the Field Scoping Notes, Risk Log, and Cost Estimate, the Final Business Case may be used to identify Advanced Investigation needs. These documents [Field Scoping Notes, Risk Log, Cost Estimate, and Final Business Case] combined should communicate expectations around deviations or exceptions to standards (implementation of practical design) at this point in time.

Key people involved in the Final Business Case:

- Program Manager – responsible for problem/opportunity/issue description and need, funding, and approval signature. There is shared responsibility with the Project Sponsor in regards to potential solutions, project outcomes, constraints and risks, and additional background information.
- Region Project Sponsor – Responsible for the shared fields noted under Program Manager, Leveraging Opportunities, and approval signature. Interact with the RBLE as desired.
- RBLEs – Review Field Scoping Notes and coordinate with Program Manager and Project Sponsor prior to development of the Final Business Case. The RBLE should also review the draft of the Final Business case. May be called upon by the Project Sponsor or the Program Manager to answer questions or provide advice to aid in the completion of the Final Business Case. Can be crucial involvement for the Bridge Program, to ensure Bridge Program goals and expectations are remaining intact.

Decisions (to be made):

- Documented scope and budget, based on what is known at the completion of Field Scoping.

Needs ("Gets"):

- Field Scoping Notes
    - Project location map
    - Design assumptions
    - Opportunities
- Field Scoping supporting data
- Draft project schedule.
- Documented design standards and design criteria.
- Cost Estimate
- Risk Register
- Work zone decision tree
- Delivery method recommendation

Informal "Gives":

- Bridge Program to make the case for Practical Design expectations to the Region.

Deliverables (Formal "Gives"):

- Final Business Case – Delivered by the Project Sponsor to Program Managers via ProjectWise (ie, loaded to ProjectWise and Program Manager notified of availability by email).

Commentary:
The Final Business Case captures the agreed expectations of the Project Sponsor and Program Manager regarding scope and budget at the time of signature. The Final Business Case, Scoping Cost Estimate and Scoping Notes provide input for the Project Charter.

The Final Business case is based on Field Scoping results and while it is the best information possible at this point in time, it is only a "high level assessment". Once the project is initiated, deficiencies in the project direction, assumptions, and decisions can be identified and escalated so that the correct decision can be made and documented for the Bridge TS&L.

The Final Business Case is developed and stored in ProjectWise.

### *C3-C4 Cross-Tie (between Final Business Case and Project Charter):*

*The RBLE is a crucial part of the movement and continual flow of information and communication between these two activities. The RBLE reviews the Final Business Case (and may provide comments back to either the Project Sponsor or the Program). The RBLE also works with the Region Project Sponsor and person completing the Project Charter to assist in the interpretation of the Final Business Case, and answer questions or facilitate communications with Program to get answers to questions.*

## C4: Project Charter

The purpose and goals of the Project Charter include:

- Formally authorize the existence of a project and provide the TPM/RE-CP with the authority to apply organizational resources to project activities.
- Identify baseline scope elements of the project and design standards (1R, 3R, Replacement, Preservation, etc.) to fulfill the purpose and meet the need of the project.
- Identify project budget and high level project delivery schedule
- Identify scope elements that are included and excluded so the design team can initiate design or a Statement of Work (SOW)
- Identify high level assumptions, risks and project constraints
- Identify discipline team members and their major scope elements; and starts collaborative efforts among the TCDMs, PCO, PDT members and Project Sponsor
- Recommend scope elements based on Field and Desk Scoping, allowing room for alternatives analysis
- Formal agreement between Program and Delivery arms of agency on scope, schedule and budget
- Establish Project Delivery approach (e.g. In-house, Outsourced, design-bid-build)

Key people involved in the Project Charter:

- Project Sponsor –A person assigned by the Region to provide business context, expertise, and guidance to the Region Scoping Coordinators and act as an escalation point for decisions and issues that are beyond the authority of the Region Scoping Coordinators. They collaborate with the various Program Managers, and oversees the completion of Project Charter (including quality control).
- TPM/RE-CP – A person assigned by the Region to lead, manage and deliver projects under the Region's project development and delivery purview. Responsible for development of Project Charter; coordinates reviews and comments between disciplines; routes Project Charter for

signatures; coordinates collaboration between Project Sponsor, Area Managers and Program Manager to author Project Charter; coordinates with PCO for bid let dates.

- RBLEs – Typically called upon by the Project Sponsor or the Field Scoping Lead/Coordinator to review, answer questions or provide advice to aid in the completion of the Project Charter. Can be crucial involvement for the Bridge Program, to ensure Bridge Program goals and expectations are remaining intact; review Charter; review Final Business Case content for agreement with Charter and raise any concerns to Program Manager; provide input on clarity of content, verify accuracy; for non-bridge program projects, verify scope is in line with Region needs/programming; reviews for integration between disciplines based on level of detail from Field Scoping and AI; identify multidisciplinary risk; review Field Scoping notes to incorporate into Charter; identify PDT Bridge resource.
- Program Manager - Review Project Charter and verify it reflects Final Business Case and STIP; speak for Bridge Program purpose, priorities, project goals, and needs; Review Charter for scope of other disciplines to ensure it aligns with Bridge Program and raise concerns to Region; issue resolution.

Decisions (to be made):

- Baseline scope for work on structures included in the project
- Resourcing of project (Bridge only responsible for Bridge resource(s))
- HDM Design Standard (Single Function, 1R, 3R, 4R) in assumptions
- Bridge Design Category (Modernization, Retrofit, Preservation, Maintenance)
- Project schedule, PS&E date set
- Project budget (TPM responsible, however, Bridge Design (RBLE) specifically interested as it relates to Bridge Program funding needed)
- Adjusted scope and risk based on AI information

Needs (“Gets”):

- Project goal and reasoning behind scope stated in Final Business Case
- Ensure there are thorough Field Scoping Notes and cost estimate housed in ProjectWise
- Project Cost Estimates (All project phases; PE, CN, etc.)
- Identification of possible alternative Project Delivery approach (ex. Design-bid-build)
- Structure numbers for existing structures being impacted
- Verification of AI needs identified in scoping

Informal “Gives”:

- Baseline scope elements based on scoping (to provide framework for SOW)
- Structure numbers identified for existing structures being impacted
- High level design risks (to inform SOW, PDT and any AI needs from A&E)
- Assumptions (constraints to inform SOW writing)
- Notification of signed Charter as approval to proceed with next phase of work (notice so the A&E WOC can move forward, when applicable)

Deliverables (Formal “Gives”):

- Project Charter – housed in ProjectWise in Project Initiation folder along with AI documents and other scoping documents that are housed in ProjectWise Scoping folder. Delivered by the

Project Sponsor to Program Managers and other interested parties via ProjectWise (ie, loaded to ProjectWise and Program Manager notified of availability by email).
- Project schedule (to inform funding constraints and A&E schedule)
- Budgets (All project phases; PE, CN, etc.)

Commentary:
Project Charters do not always capture the final Field Scoping Notes and Cost Estimates, and the Bridge Program goals, expectations, and practical design measures of the project as well as they should be. More collaboration by the key Bridge Section staff noted for this activity needs to be done with our project delivery partners to ensure this information is included and is clearly stated.

As related to the Bridge TS&L, the Project Charter should:
- Provide a baseline scope that formally authorizes the purpose of the project, the needs that must be met, and the outcomes desired
- Set objectives for all alternatives developed during a TS&L Report
- Set design standards (1R, 3R, etc.) that help to develop the DC/SA.
- Set Bridge Design Category (Modernization, Retrofit, Preservation, Maintenance).
- Document constraints and risks that must be accounted for in the design.
- Set project on a path for practical design and appropriate allocation of funds to be documented in TS&L and VE study (if applicable)
- Be a reference document for reviewer to summarize previous efforts from Scoping, AI, Program
- Outline background information needed to develop TS&L such as assumptions, risks, key players, constraints, external entities (e.g. RR, Utilities)

Related to initiating the DC/SA, or continuing its development when already started, the Project Charter should:
- State HDM Design Standards (Single Function, 1R, 3R, 4R) so scope can be evaluated appropriately and design criteria established
- State Bridge Design Category
- Identify baseline scope so design criteria can be applied to appropriate elements

Related to writing SOWs for outsourced work, the Project Charter should:
- Identify baseline scope elements, with information available from scoping so that SOW can be written with defined risk and appropriate deliverables
- Set Project Delivery approach which determines what is to be included in WOC.
- Set the path forward for remaining tasks

Project Charter documents are developed and stored in ProjectWise within the Project Initiation Folder. Charter review requests are sent to relevant parties by the TPM or RE-CP. All review comments are documented and tracked in the ProjectWise Charter document. The template for the ODOT Project Charter is posted on the Project Delivery Guide site and also in the ProjectWise template folder.

## *C4-C5 Cross-Tie (between Project Charter and DC/SA):*

*The RBLE is the primary person for Bridge Design to shepherd a project forward from Project Charter into bridge design. The RBLE also initiates or sees to the initiation of the DC/SA to ensure the Program goals and expectations are carried forward into the project design.*

# C5: Bridge Design Criteria & Standards Assessment (DC/SA)

The DC/SA is a living document throughout the Project Initiation, Project Development (DAP Design) Phase and the Project Design Phase. The DC/SA should reach substantial completion by the end of the Project Initiation Phase, with minor edits/additions through the remaining design phases. This encourages engagement of Bridge Section staff and clarifies structure specific standards/deviations/exceptions, confirming expectations for both the design team and Bridge TS&L Report reviewer prior to beginning substantial work on the Bridge TS&L Report. This is anticipated to improve design compliance, maximize implementation of ODOT's Practical Design strategy, and minimize review effort and risk at the DAP milestone.

The goal of the Design Criteria & Standards Assessment (DC/SA) task is as follows:

Design Criteria:

- Specifically define codes and manuals by version and year that apply to the structure design.
- Improve Design Acceptance deliverable compliance by documenting design criteria at Project Initiation.
- Minimize re-design costs by maintaining design criteria continuity through the Project Design Phase.

Standards Assessment:

- Define and clarify applicable standards and guidance provided by the design criteria documents.
- Define project specific standards, as necessary to address gaps in existing standards.
- Improve implementation of ODOT's Practical Design strategy as it relates to bridge specific standards driven by various disciplines.
- Document specific design decisions (e.g.: what type of waterproofing membrane will be used on a paved bridge deck).
- Define necessary deviations and exceptions from the design criteria.
- Provide open and transparent documentation of discussions with Technical Resources, "soft approval" and status of deviations and exceptions.
- Create processes that encourage early engagement of Bridge Program and Standards.
- Create a feedback loop to improve the quality and relevance of Agency standards over time.

Defining the design criteria and standards in the DC/SA should provide for clarity surrounding the "rules" that govern the development of alternatives. This should lead to a suite of alternatives that comply with standards, offer a clearer picture of needs and highlight opportunities for practical design.

Decisions (to be made):

- What is included in the design criteria, which decides and documents the applicable standards/manuals and the order of precedence.

- What is included in the standards assessment, which decides and documents the interpretation of standards, states whether a design complies with that standard, and whether a design deviation or design exception is necessary to support designs that do not comply with standards. The SA also documents project specific standards, when necessary.

Key people involved in the DC/SA:

- RBLE: Review the DC/SA outlined during Desk and Field scoping; ensures Bridge Program goals and expectations are adequately reflected in the DC/SA; assist internal Engineer of Record, as needed to resolve conflict during DC/SA production.
- Engineer of Record / Bridge Designer:
  - Produce the DC/SA
  - Collaborate with Technical Resources to ensure appropriate design criteria are applied.
  - Collaborate with Technical Resources to ensure appropriate interpretation of design standards.
  - Elevate standards issues to the Bridge Reviewer or Bridge Design Manager, when appropriate.
  - Develop Roadway Design Exceptions related to bridges and Bridge Design Deviations.
- Bridge Standards Technical Resources: Review DC/SA and provide technical concurrence; ensure appropriate design criteria are applied; ensure appropriate interpretation of design standards
- Agency Contract Administrator and Agency Program Manager, when applicable:
  - Provide clarity within work order contracts regarding DC/SA deliverables and schedule.

Needs (“Gets”):
The Project Charter should provide:

- A clear description of the need/scope, but not a defined solution
- One or more potential solutions identified for budgetary purposes
- A defined project classification per the HDM (Single Function, 1R, 3R, 4R)
- A defined Bridge Design Category
- Clear definition of expected deviations/exceptions

Informal “Gives”:

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- Clarity on how the DC/SA process applies during the Bridge Alternatives Analysis phase of work.

Deliverables (Formal “Gives”) –

- Bridge Design Criteria & Standards Assessment – Initial draft delivered by the RBLE to the Bridge Design Manager via ProjectWise for continued development by the assigned Bridge Designer.

Commentary:
The primary function of a TS&L review is to verify that the TS&L fulfills its purpose, as defined by *BDM 3.9.2 Purpose of TS&L*. The last two bullet points in BDM 3.9.2 are most related to the DC/SA, highlighting the need to “document deviations from design practices” and to “provide rational with background information for reviewers, owners, or clients to effectively evaluate and approve an alternative to advance to final design”.

The DC/SA provides a basis for TS&L review. It will improve compliance and encourage engagement of Bridge Section staff prior to submission of the TS&L Report. This is anticipated to minimize re-design costs and prevent projects from proceeding past TS&L, unless they meet design criteria.

The DC/SA is a living document updated at each phase or as changes occur and stored in ProjectWise. This document should be a useful reference for reviewers, openly and transparently documenting project decisions as they relate to standards. The ProjectWise platform allows Technical Resources to review, add their name and date, and send an email confirming their concurrence or correction to the stated standards. This improved documentation will provide a living document through the project lifecycle, regardless of changes in staffing.

Defining the DC/SA should provide for clarity surrounding the rules that govern the development of alternatives. This should lead to a suite of alternatives that comply with standards, offering a clearer pictures of needs and highlighting opportunities for practical design.

The DC/SA should reach substantial completion during the Project Initiation Phase. This encourages engagement of Bridge Section staff and clarifies structure specific standards, deviations and exceptions, confirming expectations for both the design team and TS&L Report reviewer prior to beginning substantial work on the TS&L Report. This is anticipated to improve design compliance, maximize implementation of ODOT's Practical Design strategy, and minimize review effort and risk at the DAP milestone. In the process of reviewing the DC/SA, a Technical Resource may decide that a code or guidance requires updating.

To a large extent, the DC/SA may be completed in the process of developing an A&E WOC, ensuring that the scope of planned work either complies with standards or documents the need for exceptions/deviations that can be incorporated in the SOW.

The DC/SA is a contractual requirement for any project with a Bridge TS&L Report. Bridge Strategy Memo or Calculation Book. Bridge Section is emphasizing the DC/SA. As such, there is likely a need to emphasize this process with the consultant team during WOC development. This is especially true when DC/SA is a known risk to the project or is anticipated to require an extra level of effort, such as is the case for Bridge Rail Retrofit, Seismic Retrofit, and other similar types of work.

The DC/SA will be developed and stored in ProjectWise.

## *C5-C6 Cross-Tie (between DC/SA and BDWO or A&E WOC):*

*The RBLE is the primary person to get the bridge design team pointed in the right direction – regardless of whether in-house or outsourced. The RBLE prepares the BDWO to propose bridge design resources to the Bridge Design Manager to do statewide resourcing, including identifying outsourcing, when necessary. The RBLE works with the assigned Contract Administrator Contract Reviewer (CACR) to develop the outsource contract.*

# C6: Bridge Design Work Order (BDWO) or A&E Work Order Contract (WOC)

The Bridge Design Work Order is used internally to assign statewide bridge design resources and other reasons noted in the commentary.

The A&E Work Order Contract is used to contract out work to A&E firms.

All A&E Work Order Contracts include a STATEMENT OF WORK and DELIVERY SCHEDULE that define the following items:

A. PROJECT DESCRIPTION and OVERVIEW of SERVICES
B. STANDARDS and GENERAL REQUIREMENTS
C. REVIEW, COMMENT, and SCHEDULE OVERVIEW
D. FORMAT REQUIREMENTS
E. TASKS, DELIVERABLES and SCHEDULE
F. CONTINGENCY TASKS
G. ADDITIONAL PROVISIONS FOR WOCs
H. COMPENSATION

The goal of the WOC is to provide a legal basis for performing work for a specific purpose, identify standards applicable to the design, define communication protocols and format requirements, clearly define deliverables and schedule, identify items which may be included in the scope of work, and to provide a mechanism to pay the Consultant for their services.

Key people involved in the BDWO, and the A&E WOC:

- RBLE:
    - Work with the Bridge Design Manager to determine workload versus capacity, prioritize work, and select projects for outsourcing.
    - Work with the Bridge Design Manager to resource for various roles associated with internally delivered and outsourced projects via the Bridge Design Work Order.
    - For contracts administered by the Bridge Design Unit
        - Work with the Bridge Design Manager to assign CA and APM resources
    - For contracts administered by others (Region)
        - Work with the Bridge Design Manager to assign a resource to assist with contract development and perform consultant review
- Sr Structural Design Engineer / Contract Administrator Consultant Reviewer (CACR):
    - Regardless of the party administering the contract, these roles are responsible for owning the contract and are responsible for the Statements of Work (SOW), Internal Cost Estimates (ICE), Breakdown of Costs (BOC), Record of Negotiations (RON), WOC, deliverable review/acceptance/rejection, invoice and progress report review, and contract amendments
    - For contracts administered by others (Region), which contain structures work, a resource assigned by the Bridge Design Unit should:
        - Assist in the development of the items in prior bullet point
        - Review A&E deliverables and recommend their acceptance or rejection

        - Provide "Agency provided" documents and data to the consultant
        - Support to the consultant to deliver Agency expectations
        - Provide invoice review and input to the Agency CPM for Region managed A&E Contracts
        - Support Region construction offices during construction submittals, RFI reviews, and issues
    - Engage Bridge Program and Standards stakeholders during WOC Development and throughout Project Initiation.
- Bridge Program and Standards Manager
    - Provide clarity for WOC development via Business Case and draft Project Charters.
    - Stay engaged with the RBLE during Project Initiation to verify that the Project Charter and Zero Change Management Request address the Bridge Program needs identified by the Final Business Case.
    - Provide clear standards via the BDM and Bridge CAD Manual (BCM)
    - Encourage and support standards staff engagement during:
        - Scoping – To clarify any expectation that would require specific language in the SOW (Design Exceptions, Design Deviations, specific items to be addressed by the Alternatives Analysis).
        - WOC Development - Smooth the Project Development transition and technical resource review by building expectations into the WOC (See Bridge TS&L Alternatives Analysis).
    - Maintain relationships with other Funding Program Managers and Region resources (Area Manager, STIP Coordinator, and Tech Center Managers) so that the role of Bridge Section is known and we (Bridge Section) are included by Region during scoping, business case development, and Charter development for any project including work on bridges.
- Standards Engineers
    - Work with the Bridge Section resource responsible for SOW development (directly or via assistance to Region) to ensure that expectations developed during scoping are carried through the Project Development transition.
        - The need for an Alternatives Analysis should be defined during scoping so that a program expectation is defined for incorporation in the SOW.
    - Maintain engagement during the Project Initiation phase to facilitate further refinement of the DC/SA in support of the review and approval for Design Deviations and Design Exceptions. This can have impacts on effort or contract requirements.

Decisions (to be made):

- What is included in WOCs, which detail the deliverables and schedule including TS&L review necessary to deliver the scope as identified by the Project Charter. The WOC, SOW and associated BOC help the agency decide whether or not it has sufficient funds to deliver the scope on schedule.

Needs ("Gets"):

- The Project Charter (or draft Project Charter) needs to provide a clear definition of the scope, schedule, budget, constraints/assumptions/risks, and expected deviations/exceptions. The

Project Charter needs to be consistently available during the Project Development transition, since it will form the basis of the WOC. The (draft) Project Charter work must be vetted during the Project Initiation Phase, solidifying the Final Project Charter prior to the Region Phase Gate.
- The DC/SA (when available)

Informal "Gives":
During WOC development, the Agency may be less familiar with the appropriate solutions for the site than the consultant will be during Project Development. As such, the Agency should be careful to provide flexibility in the expectations rather than direct the consultant work. This oftentimes requires focus on objectives, rather than specific solutions.

A "Bridge Design Alternatives Scoring Matrix" deliverable will be added to the Design Verification Package prior to selecting alternatives for evaluation.

The WOC needs to convey Agency and Bridge Section expectations for the Bridge Alternatives Analysis, providing the Agency with the ability to hold the consultant accountable for fulfilling these duties at a specific time. Consistently communicating these expectations is a key area for improvement. Expectations are likely to include:
- Whether an alternatives analysis must be included in the TS&L Report
- Whether a Design Alternatives Scoring Matrix must be produced.
- A minimum/maximum number of alternatives expected to be studied
- Specific or unique alternatives for consideration, when appropriate.
- Deliverable timelines.

Deliverables (Formal "Gives"):
- Bridge Design Work Order – Delivered by the RBLE to the Bridge Design Manager, and saved on the Bridge Share Drive. A pdf of the BDWO is shared with the TPM or RE-CP.
- A&E WOC – For contracts administered by Bridge Design Unit, delivered by the CACR or RBLE to the Bridge Design Manager, Bridge Design Coordinator, and ultimately OPO. A copy of the signed contract is eventually loaded to ProjectWise in order for the A&E Consultant to gain access to the ODOT ProjectWise system.

Commentary:
The Bridge Design Work Order also:
- Formally documents a request from someone outside of Bridge Section for Bridge Design resources; which informs the Bridge Design Manager that Bridge Design is expected to be on the PDT, that Bridge Design has something to be produced (ie, a deliverable), and that we can charge the project EA.
- Is the only document that initiates a project be added to the Bridge Design Project Tracker for statewide resourcing purposes (it aids in keeping order/structure to the statewide resourcing process(es)).
- Separates the Scoping work from the design work (a BDWO is not written for Scoping).
- Is the starting document of the Bridge Design quality process, and is the first document that should be reviewed whenever an audit is conducted of Bridge Design Section
- Documents all the resources assigned to the project and their role(s)

- Clarifies the Bridge Design scope should the project scope not clarify adequately enough
- Clarifies all the deliverables that will be produced for the request, and who the deliverables go to.
- Sets the Bridge Design schedule to complete both the design work and the QC/QA work before delivering to the TPM.

Commentary related to A&E WOCs…

Standard contract language in SOW Section *B. STANDARDS and GENERAL REQUIREMENTS* identifies the Bridge Design Manual (BDM) as a portion of the contract. When task language identifies a TS&L report as a deliverable, *BDM 3.9 Preliminary Design/DAP/TS&L* provides general expectations for TS&L Reports. Bridge Section often times has a specific set of expectations for the level of study necessary in a complete TS&L Report. These discipline specific expectations are not often clear in the Business Case or Project Charter. The SOW offers a chance to state these expectations contractually, so that effort and schedule are planned accordingly. The Agency does not consistently state these expectations, which can introduce a conflict during the development of the TS&L Report.

During the previous phases work (Scoping, Business Case Development, Draft Project Charter Development) the Agency and Bridge Section ought to know whether the scope of work warrants an alternatives analysis. The Agency and Bridge Section are also likely to have developed expectations regarding the suite of alternatives requiring further study. Although the BDM discusses alternatives analysis in general, the SOW should provide the team with specific Alternatives Analysis expectations.

Opportunities for WOC improvements are largely driven by more clearly stating program and standards expectations through Stage 1 of the Project Lifecycle and being more intentional about re-engaging program and standards staff at key touchpoints during the project initiation phase. Bridge Section needs to define and endorse these engagements in this Task.

The WOC should provide reviewers with authority to hold the consultant accountable to an expectation, including expectations regarding TS&L Report contents and Agency review of that content. Clear expectations enable teams to target stated goals rather than guess at Agency wants. This should improve TS&L quality, enabling the study of solutions that stay in scope. Quality TS&L Reports should require less review from the agency and fewer corrections late in the TS&L process.

A draft Project Charter should be available during WOC development, informing the scope/schedule/budget for which the WOC is built. The documents should complement, not contradict.

Emphasizing the DC/SA during WOC development is anticipated to improve the quality of projects and improve compliance with the Agency goal of delivering Design Exceptions and Design Deviations at the Statewide DAP Phase Gate.

The WOC should intentionally identify additional standards applicable to design (Local Agency Guidance, the FHWA Seismic Retrofit Manual, Railroad Grade Separation Guidelines, FHWA Wildlife Crossing, or other) when known/appropriate. When unknown, the DC/SA deliverables in the Project Initiation and Project Development Phases offers the consultant an opportunity to confirm the DC and clarify standards at an appropriate time in the project lifecycle.

An A&E WOC may require amendment after Project Initiation based on findings of the scoping validation and substantial completion of the DC/SA. An amendment may be necessary to include an updated number of design deviations/exceptions. An amendment may also be necessary to address an updated project scope that more closely complies with the standards or capitalizes on opportunities to implement ODOT's Practical Design Strategy.

The WOC should live in ProjectWise, available for all team member's reference. This reference is necessary, as the contract is binding for the consultant and Agency. The Agency's Consultant Reviewer needs to be familiar with the WOC to ensure that the consultant is fulfilling the needs of the contract and to ensure that the Agency's requests are reasonable within the context of the WOC. Review tied to the SOW is an area of improvement.

Furthermore, Agency expectations for the use of ProjectWise in all WOCs are defined by the following:

- Standard SOW *B. STANDARDS and GENERAL REQUIREMENTS* (Includes Technical Guidance)
- Standard SOW *D. FORMAT REQUIREMENTS*
- Standard SOW *ATTACHMENT D – ODOT's ProjectWise Network*
- Technical Guidance
    - Technical Services Directive TSB16-01(D) Use of ProjectWise for Project Design (Engineering/Non Engineering) Data Management
    - Technical Services Bulletin TSB 17-01(B) ODOT ProjectWise Naming Convention

Many WOCs are developed and executed by the Regions. Not all of these WOCs contain adequate language for Bridge Design and Bridge deliverables. Bridge Section / Bridge Design needs to be proactive to improve collaboration with project delivery partners to ensure appropriate language is included in all Region developed WOCs with bridge work.

Capitalizing on opportunities for Bridge Section engagement during the development of WOC SOWs will improve consultant understanding of Agency and Bridge Section expectations. Facilitating this understanding prior to completing the Bridge TS&L Report will improve the quality of the report, minimize unplanned "VE Lite" initiatives and the corresponding schedule impacts, minimize TS&L surprises, and simplify review.

### *C6-C7 Cross-Tie (between BDWO or A&E WOC and Bridge TS&L Alternatives Analysis):*

*The RBLE is the primary person to get the bridge design team pointed in the right direction – regardless of when work is in-house or outsourced. The Bridge Reviewer keeps tabs on the in-house design and development of the Bridge TS&L Alternatives Analysis, and keeps the RBLE informed.*

## C7: Bridge TS&L Alternatives Analysis

Using information from the Project Charter, the DC/SA, and the SOW when applicable, the Bridge TS&L Alternatives Analysis provides a comprehensive and collaboratively developed and analyzed list of

alternative solutions and a recommended alternatives based on evaluation criteria established for the project. This includes early collaboration with Bridge Standards, Program, and Region Tech Centers to identify, develop, and evaluate a range of alternatives so that an adequately vetted recommended alternative can be forwarded in the process. The collaborative efforts includes an 'Alternatives Development Workshop' where possible alternatives are brainstormed and selected for further analysis.

The alternatives should be evaluated against an agreed upon set of criteria (***Design Alternative Scoring Matrix***) established to ensure the solution meets the project purpose and need, project budget, and other elements identified by key stakeholders. The Design Alternative Scoring Matrix is developed by the Project Team and Stakeholders at the beginning of the Bridge TS&L Alternatives Analysis.

Decisions (to be made):

- PDT development of the *Design Alternative Scoring Matrix*.
- Brainstorming of various alternatives
- High level evaluation to forward alternatives to an options analysis
- Detailed evaluation of alternatives
- Detailed design decisions that affect other disciplines (ie foundation type, roadway width, staging, etc.)
- Clear justification for the selection of the preferred alternative
- Alternative selection

Needs ("Gets"):
As many of the following pieces of information that are applicable are needed to ensure a quality Bridge TS&L Alternatives Analysis study and Bridge TS&L Report:

- Scoping documents,
- Completed Project Charter including (but not necessarily limited to):
    - a clear concise scope
    - list of assumptions
    - list of risks as understood in the earlier stages
    - alternatives (if any) that are requested to be investigated or excluded
    - the standards that are to be followed/considered
- Executed WOC, when applicable, including (but not necessarily limited to):
    - a clear concise scope
    - list of assumptions
    - list of risks as understood in the earlier stages
    - alternatives (if any) that are requested to be investigated or excluded
    - the standards that are to be followed/considered
    - minimal requirements for TS&L analysis (e.g. - study a minimum of three structure alternatives (PC/PS, steel)), list of tasks required to successfully complete a TS&L Alternatives Analysis)
- DC/SA, including (but not necessarily limited to):
    - a summary of key standards,
    - list of Design Deviations and Design Exceptions (known at the time) that are expected and current approval status
    - documented decisions that were collaboratively determined between the technical resource and the designer (e.g.: type of waterproof membrane type)

In-House Design:

Key people involved in the Bridge TS&L Alternatives Analysis:

- RBLE – meets with Bridge Reviewer, Bridge Designer, and Bridge Standards Engineer (as assigned) and kicks off the bridge design by going over the BDWO; Final Business Case; Bridge Program goals & expectations, including practical design aspects; and DC/SA. Helps land on bridge alternatives to analyze. Sets level of design and calculation needs for TS&L and DAP Package. Goes over the internal bridge design and quality control schedule; gets project off to a strong start.
    - Ensures processes are followed (alternatives developed and analyzed, proper QC taken);
    - Contributes to the development of proposed alternatives, alternative analysis development, and proposed alternative selection by proactively guiding, coaching, and mentoring the Bridge Designer.
    - Supports the Bridge Designer in identifying all supporting information and documents from other disciplines and sections and ensuring documents are obtained and incorporated.
    - Communicates with TPM/RE-CP and Bridge Section Managers when supporting information and documents are needed from other disciplines are not delivered on time or are not adequate to support the Bridge TS&L Alternatives Analysis.
- Bridge Designer – Primary person developing the Bridge TS&L Alternatives and the Bridge TS&L Report. Primary person ensuring all information is obtained and accounted for. Performs alternatives analysis and preliminary design/calculations. Completes alternatives analysis matrix. Works collaboratively with the Reviewer throughout the project design.
- Bridge Reviewer – Meets with Bridge Designer several times as design develops to ensure staying on scope and schedule. Reviews DC/SA regularly with bridge designer. Performs the design quality control of the Bridge TS&L Report.
- Bridge Standards Engineer – As assigned by Standards Unit, attends bridge design kick-off meeting with RBLE, Bridge Designer, and Bridge Reviewer. Helps determine bridge alternatives to analyze. Meets with the Bridge Reviewer and Bridge Designer when they meet to perform an internal “over-the-shoulder” review of the design as it develops to ensure meeting program goals and expectations, and practical design measures. Ideally, the Bridge Standards Engineer’s “over-the-shoulder” review should be substantially complete with the completion of the TS&L Alternatives Analysis Matrix, assuming all agree with the preferred alternative selected.
    - Assists with continued development of the DC/SA
    - Assists in identifying, developing, and evaluating the alternatives
    - Assists in the development of the evaluation criteria (*Design Alternative Scoring Matrix*)
    - Review and recommends approval of Design Exceptions (DE) and Design Deviations (DD)
    - Reviews to ensure standards and DE/DD measures are correctly implemented.
- Bridge Program and Standards Manager – Reviews/collaborates to ensure project goals are being met; Reviews/collaborates to ensure standards are being met and appropriate DE/DD decisions are being implemented.
- Tech Center Reps (roadway engineer, geotechnical engineer, hydraulic engineer, etc) – For highest quality Bridge TS&L, collaborates with and supports the Bridge Section during alternative development and analysis to ensure that the proposed alternatives are achieving project goals and the needs of their respective discipline are met.

- TPM/RE-CP - Ensures project scope, schedule, and budget, as described in the Project Charter, is being addressed and followed. Ensure early collaboration between disciplines is being conducted. Prepares CMR and other appropriate project documentation for changes to project scope, schedule or budget.

Informal "Gives":

- Individual design packages for each alternative analyzed, including preliminary design calculations, quantity and cost estimates commensurate with the Alternatives Analysis and TS&L stage of the design.

Deliverables (Formal "Gives") (in-house design):

- A complete and collaboratively developed Bridge TS&L Alternatives Analysis that contains a thoroughly documented and vetted alternatives analysis, completed (***Design Alternative Scoring Matrix***), and recommended alternative.

Outsource Design:

Key people involved in the Bridge TS&L Alternatives Analysis:

- CACR or RBLE – typically named as CA and/or APM of bridge outsourced contracts. In CR role, performs "substantial conformity" review of A&E submitted deliverables to ensure all work is complete and ready for "owner" review. In APM role, notifies A&E consultants of acceptance of deliverables. Holds bridge design kick-off meeting with consultant shortly after issuing NTP; kicks off the bridge design by reviewing the contract expectations, including design criteria and standards; SOW; and Program goals & expectations, including practical design aspects; and DC/SA. Meets with A&E consultant as noted in contract to discuss development of the alternatives analysis. Reviews A&E consultant TS&L Alternatives Analysis.
- Consultant Reviewer (CR) – may be assigned to assist CACR to review bridge outsourced contracts; may be assigned to Region outsourced contracts that contain bridge or other structures work. Performs "substantial conformity" review of A&E submitted deliverables to ensure all work is complete and ready for "owner" review. Works with APM in providing A&E consultant notification of acceptance of deliverables. Reviews A&E consultant Bridge TS&L Alternatives Analysis.
- Bridge Standards Engineer – As assigned, attends bridge design kick-off meeting with RBLE and/or CACR, and CR (as assigned). Meets with the CR and A&E consultant when they meet to review progress of the A&E's alternatives analysis. Reviews and provides comments to the APM to be included in the "owner" review package, as outlined in the A&E contract. Ideally, the Bridge Standards Engineer's review should be substantially complete with the completion of the Bridge TS&L Alternatives Analysis Matrix, assuming all agree with the preferred alternative selected.
- Bridge Program Manager – Reviews/collaborates to ensure project goals are being met.
- Bridge Standards Manager – Reviews/collaborates to ensure standards are being met and appropriate DE/DD decisions are being implemented.
- Resident Engineer-CP - Ensures project scope, schedule, and budget, as described in the project charter, is being addressed and followed. Ensure early collaboration between disciplines is being conducted. Prepares CMR and other appropriate project documentation for changes to project scope, schedule or budget.

Informal "Gives":

- Individual design packages for each alternative analyzed, including preliminary design calculations, quantity and cost estimates commensurate with the Alternatives Analysis and TS&L stage of the design.

Deliverables (Formal "Gives") (outsource design) per contract, and should include:

- A complete and collaboratively developed Bridge TS&L Alternatives Analysis that contains a thoroughly documented and vetted alternatives analysis, completed (***Design Alternative Scoring Matrix***), and recommended alternative.

Commentary:
The development of the Bridge TS&L requires an iterative process with other disciplines to adequately and appropriately determine the most feasible bridge alternative. Projects are so dynamic that we cannot expect that a 'check the box process' will result in a complete and reliable TS&L Alternatives Analysis. We need to understand that a successful TS&L involves many people that help brainstorm solutions and vet alternatives throughout the development of the TS&L. Too often the TS&L Alternatives Analysis 'fails' due to the analysis being produced in a box or by un-collaborative team members. (A TPM's success in delivering a well "integrated" project package lies in taking an interest in the disciplines early collaboration which includes providing appropriate interdisciplinary information at appropriate times.)

The Bridge TS&L Alternatives Analysis is a critical part of a complete TS&L package. When the Alternatives Analysis is developed in a collaborative method it eases the effort required for review, and generally eliminates the need for additional alternative analysis or external review (VE Lite) after the TS&L is completed.

The Bridge TS&L Alternatives Analysis materials will be developed and stored in ProjectWise. ProjectWise gives a common location for files and adds to ease of collaboration and transparency. Provides a clear and consistent review and documentation process for Alternatives Analysis reviews by the Bridge Design Unit, the Bridge Standards Unit, and other reviewing parties.

### *C7-C8 Cross-Tie (between Bridge TS&L Alternatives Analysis and Bridge TS&L Internal Review): - N/A*

## C8: Bridge TS&L Internal Review

See BDM 3.5.6.5. A Bridge Section "internal review" (aka, quality assessment (also known in industry as a quality audit)).

The Bridge TS&L Internal Review occurs concurrently (ie, "over-the-shoulder") with the Bridge TS&L Alternatives Analysis, and any prior DC/SA work. It is intentionally being described here separate from these other activities so not to lose its emphasis amongst the other activities.

Decisions (to be made):
- Accept the Bridge TS&L
- Reject the Bridge TS&L (Should this occur a quality audit of the TS&L Internal Review must be conducted to determine where the break down occurred, because when done properly this collaborative "development and review" should not result in a "rejection".)

Needs ("Gets"):
- Materials being developed for the Bridge TS&L Report (i.e., DC/SA, Bridge TS&L Alternatives Analysis, Bridge TS&L Report, estimates)

In-House:

Key people involved in the Bridge TS&L Internal Review:
- Bridge Standards Engineer – Primary reviewer for the "internal Bridge Section review" of the Bridge TS&L Report (which contains the Bridge TS&L Alternatives Analysis).
- Bridge Reviewer – Reviews the Bridge TS&L Report for Bridge Design quality control purposes.
- Bridge Designer – Responds to comments from the Bridge Standards Engineer, and other reviewers.
- RBLE – Supports the Bridge TS&L Internal Review; facilitates resolution of conflicts should they occur at this stage.

Informal "Gives":
- Review comments – by the Bridge Standards Engineer
- Responses to review comments – by the Bridge Designer

Deliverables (Formal "Gives") – N/A

Outsource:

Key people involved in the Bridge TS&L Internal Review:
- Bridge Standards Engineer – Primary reviewer for the "internal Bridge Section review" of the Bridge TS&L Report (which contains the Alternatives Analysis).
- A&E consultant – Responds to comments from the Bridge Standards Engineer.
- RBLE and/or CACR – Supports the Bridge TS&L Internal Review; facilitates resolution of conflicts should they occur at this stage.

Informal "Gives":
- Review comments – by the Bridge Standards Engineer
- Responses to review comments – by the Bridge Designer

Deliverables (Formal "Gives") – N/A

Commentary:
"Internal Review" of the TS&L Report should be a fairly minor effort provided the reviewer(s) have been engaged early in the kick-off of the TS&L Alternatives Analysis, and has been involved in "over-the-shoulder" review of the development of the TS&L Alternatives Analysis Matrix – regardless of when in-house or outsourced.

The "internal review" should always be done concurrently with the Bridge TS&L Alternatives Analysis, since this allows for the greatest potential for collaboration in determining the recommended alternatives. When not done concurrently, there is a higher probability of poorly chosen alternatives and delayed projects.

Ultimate approval of a Bridge TS&L resides with the State Bridge Engineer. Signature approval included on the Bridge TS&L document – along with the Design Engineer's signature – will include both the QC Bridge Reviewer and when applicable the "Internal Reviewer" Bridge Standards Engineer. All other interested parties provide input to one or both of these reviewers to either approve or reject the Bridge TS&L.

Should conflicts occur, the escalation process shall follow the process which is provided in greater detail in the implementation paper for the Bridge TS&L Internal Review (a separate Bridge Section document that supports this BDM section).

- Notify the Region (TPM, AM, TCM)
- Notify Bridge Design Manager(s)
- Notify the Program Manager(s)

The Bridge TS&L Internal Review will be performed and stored in ProjectWise

### *C8-C9 Cross-Tie (between Bridge TS&L Internal Review and Bridge TS&L Report Finalization & Submittal):*

*The Bridge Reviewer and the RBLE/CACR are the primary people to ensure the Bridge TS&L Report is complete and ready to submit to the Bridge Design Manager and TPM for in-house projects, or the RE-CP for outsourced projects.*

## C9: Bridge TS&L Report Finalization and Submittal

The Bridge TS&L Report Finalization is the final step before verifying acceptance and final submittal of the TS&L Package. The goal is to have a complete, reviewed Bridge TS&L Package in compliance with BDM 3.9 with Designer responses and acceptable agreement on any necessary changes without a complete re-write and re-analysis. An approved Bridge TS&L Package at the end of the DAP Design Phase will help in the transition to the Project Design Phase. Resolution measures to address concerns or issues that should be corrected prior to Final DAP need to be developed.

Decisions (to be made):

- Verification that all comments are closed, and the Bridge TS&L Package is complete.

Needs ("Gets"):

- A complete and collaboratively developed Bridge TS&L Alternatives Analysis that contains a thoroughly documented and vetted alternatives analysis, completed (***Design Alternative Scoring Matrix***), and recommended alternative.

In-House:

Key people involved in the Bridge TS&L Report Finalization and Submittal:

- Bridge Designer – completes the Bridge TS&L Report; submits the TS&L Package to the Bridge Design Manager and TPM/RE-CP via ProjectWise. CC's the Bridge Standards Engineer, Bridge Reviewer, and RBLE on email communicating the Bridge TS&L is ready in ProjectWise for further project team review and use.
- Bridge Standards Engineer – Verifies that comments have been answered and closed out.
- RBLE – Supports the TS&L Package; facilitates resolution of conflicts should they occur at this stage.

Informal "Gives":

- Information to complete the DAP Narrative

Deliverables (Formal "Gives"):

- Signed Bridge TS&L Package
- Verified responses to comments by the Bridge Standards Engineer

Outsource:

Key people involved in the Bridge TS&L Report Finalization and Submittal:

- A&E consultant – submits the TS&L Package to the contract APM via ProjectWise. CC's the CR and the Bridge Standards Engineer on email communicating the TS&L Package has been uploaded to ProjectWise, and ready for further project team review and use.
- Bridge Standards Engineer – Verifies that comments have been answered and closed out.
- RBLE and/or CACR – Supports the TS&L Package; facilitates resolution of conflicts should they occur at this stage.

Informal "Gives":

- Information to complete the DAP Narrative

Deliverables (Formal "Gives"):

- Signed Bridge TS&L Package
- Verified responses to comments by the Bridge Standards Engineer

Commentary:
The Bridge TS&L Package will be developed and stored in ProjectWise

### *C9-C10 Cross-Tie (between Bridge TS&L Package Finalization & Submittal and Quality Assessment):*

*Should a Quality Assessment be conducted for Bridge TS&L Package, the RBLE is the primary person to facilitate between the Quality Assessment Lead/team and the impacted Bridge Designers. The Bridge Reviewer may also assist the RBLE when still engaged in the project.*

# C10: Quality Assessment

A Quality Assessment, also known in industry as a Quality Audit, is a means by which the "owner" can audit, or check, that certain things are being done as expected. For example, an audit or assessment can be made of a random sample of projects to see when a particular deliverable is being prepared such that it meets the standards in the owner's development manual. More specifically to bridge design, to see when a random sample of Bridge TS&L Reports are being prepared meeting the standards and guidance in the Bridge Design Manual. The assessment could be limited to just Bridge TS&L Reports from one Program, or it could include Bridge TS&L Reports from several Programs.
A Quality Assessment is used to improve the processes and the quality of the work/deliverables. It is a tool to create awareness and future consideration. Typically a Findings Report is generated that describes the findings of the audit. The findings can either be used to improve the owner's guidance materials to be applied to future projects; or it can be addressed provided the project(s) are still active.

Decisions (to be made):

- For in-house work, was the work completed as agreed to (ie, Business Cases, Project Charters, DC/SAs, etc.
- For outsourced work, was the work completed as contracted (ie, per the A&E WOC/Contract).

Needs:

- Access to project documents

In-House:

Key people involved in the Bridge TS&L Quality Assessment:

- Quality Assessment Lead – An ODOT Bridge Standards Engineer (preferably not the project Standards Reviewer), by themselves or with a small team, to review one or more randomly selected projects for pre-determined review subjects.
- Bridge Designer – Answers questions of the Quality Assessment Lead/team; provides documentation when requested.
- RBLE - Supports the Quality Assessment; facilitates resolution of conflicts should they occur at this stage.

Informal "Gives" – N/A

Deliverables (Formal "Gives"):

- Quality Assessment Findings Memo or Report – Prepared by the Quality Assessment Lead/team.
- Responses to the Findings Memo/Report – Prepared by the Bridge Designer.

Outsource:

Key people involved in the Bridge TS&L Quality Assessment:

- Quality Assessment Lead – An ODOT Bridge Standards Engineer (preferably not the project Standards Enigneer), by themselves or with a small team, to review one or more randomly selected projects for pre-determined review subjects.
- A&E consultant – Answers questions of the Quality Assessment Lead/team; provides documentation when requested. (Assessment must be completed before the contract expires. Quality Assessment language must be included in the contract.)
- RBLE and/or CACR - Supports the Quality Assessment; facilitates resolution of conflicts should they occur at this stage.

Informal "Gives" – N/A

Deliverables (Formal "Gives"):

- Quality Assessment Findings Memo or Report – Prepared by the Quality Assessment Lead/team.
- Responses to the Findings Memo/Report – Prepared by the A&E consultant.

Commentary:

- Bridge Section will develop two types of "quality assessments" for internal use. The first is a quality assessment in which a random sample of projects is identified, an audit conducted, Findings Memos/Reports prepared, and standards and other guidance materials revised accordingly. The second is an "over-the-shoulder internal review" of the deliverable as it is prepared, in which findings and comments are provided and incorporated "on the fly". The Bridge Program and Standards Unit will determine the projects to be assessed, assessment criteria, frequency, etc. The first type of assessment can be done at any time without any prior announcement. The second type of assessment needs to be identified before or by the start of the project.
- These quality assessments will be used on both in-house and outsourced projects. When used on outsourced projects the Contract will include appropriate language for the assessment.
- ProjectWise will be used to the maximum extent possible for developing, storing, and accessing information to be assessed; commenting on information; and reporting on the assessment.

# Acronyms:

A&E = Architecture & Engineering. An OPO contract term.
AI = Advanced Investigation
APM = Agency Project Manager. An OPO contract term.
BCM = Bridge CAD Manual
BDM = Bridge Design Manual
BDWO = Bridge Design Work Order
BOC = Breakdown of Cost. An OPO contract term.
CA = Contract Administrator. An OPO contract term.
CACR = Contract Administrator / Consultant Reviewer. A Bridge Design PE2 position.
CR = Consultant Reviewer. A Bridge Design PE1 position.
DAP = Design Acceptance Package
DC = Design criteria
DC/SA = Design Criteria & Standards Assessment
DD = Design Deviation
DE = Design Exception
EA = Expenditure Account
HDM = Highway Design Manual
OPO = ODOT Procurement Office
PCO = Project Controls Office
PDII = Project Development Improvement Initiative. Work done by the Agency circa 2018 to improve the project development processes.
PDT = Project Development Team
PW = ProjectWise. One of ODOT's electronic data management systems.
QA = Quality assurance, or Quality assessment, or Quality audit. Note: These three items are not the same.
QC = Quality control
QCQA = Quality Control Quality Assurance (aka, QAQC)
RBLE = Regional Bridge Lead Engineer. A Bridge Section position.
RE-CP = Resident Engineer – Consultant Projects. An ODOT position.
SA = Standards assessment
SOW = Statement of Work. An OPO contract term.
TS&L = Type, Size & Location
TPM = Transportation Project Manager. An ODOT position.
VE = Value Engineering
WOC = Work Order Contract. An OPO contract term.

# Glossary

For Future Development