

TO: All Design Section Staff
FROM: Bijan Khaleghi
DATE: August 11, 2021
SUBJECT: Revisions to BDM Sections 1.4.1, 1.4.3-A7, 1.4.4, and 1.4.5 for Plan Stamping and Signature Policy for Bridges and Buried Structures

This design memorandum specifies WSDOT's Plan Stamping and Signature Policy for all bridges and structures. The stamping and signing of bridge plans are the final step in the Bridge Office QC/QA/ QV procedure. It signifies a review of the plans and details by those in responsible charge for the bridge plans. In the sections below when it refers to Professional Engineer and Structures Engineer, licensure shall be in the State of Washington. A new Bridge Design Manual (BDM) Section 1.4.6 has been added. In addition, BDM Sections 1.4.1, 1.4.3-A7, 1.4.4, and 1.4.5 are revised as follows:

1. Add the following paragraph to Section 1.4.1:

Professional Engineering license stamp is required for all proprietary buried structures as defined in BDM 8.3.3 with at least 2 feet of backfill on top of the structure and placed on spread footings or has a bottom slab. Deep foundations including shafts and piles shall be stamped by a Structural Engineer.

Structural Engineering license is required for all vehicular bridges, pedestrian bridges and non-proprietary buried structures with span lengths greater than 20 ft.

Structure repairs to be performed by WSDOT maintenance forces follow the guidance in Chapter 6 of the Washington State Bridge Inspection Manual (WSBIM). January 2022 revisions to the WSBIM will provide guidance on plan stamping.

The stamping requirement for all other structures shall be as specified in BDM Section 1.4.3 for WSDOT Prepared PS&E, 1.4.4 for Consultant Prepared PS&E/Preliminary Plans on WSDOT Right of Way, 1.4.5 Structural Design Work Prepared Under Design-Build Method of Project Delivery, 1.4.6 Structural Design Work Prepared Under Contractor Supplied Design Method of Project Delivery, and 1.4.6 Structural Design Work Prepared Under Contractor Supplied Design Method of Project Delivery.

2. Replace the section 1.4.3-A7 in its entirety with the following:

1.4.3-A7. General Bridge Plan Stamping and Signature Policy

The stamping and signing of bridge plans are the final steps in the Bridge Office QC/QA/ QV procedure. It signifies a review of the plans and details by those in responsible charge for the bridge plans.

For all contract plans prepared by a licensed Professional Engineer or Structural Engineer, the Design Unit Manager and the licensed Engineer co-stamp and sign each contract plan sheet, except for architectural details, bar list and the layout sheets.

For contract plans prepared by a designer who is not a licensed Professional Engineer or Structural Engineer, the Design Unit Manager and the State Bridge Design Engineer co-stamp and sign the plans except the bridge layout sheet. **Alternatively, Design Unit Manager and the SE Licensed Engineer supervising the design work (if applicable) could co-stamp and sign the plans.**

The Layout sheet for Bridges, Buried Structures, Non-Standard Retaining Walls and Noise Barrier Walls, Sign Structures, Seismic Retrofits, Expansion Joint and Bearing Modifications, Traffic Barrier and Rail Retrofits, and other special projects, shall be sealed and signed by the State Bridge Design Engineer. **The layout sheets for bridge paving projects, and for bridge repairs could be sealed and signed by the project Engineer of Record (EOR) and Design Unit Manager. If the designer is not a licensed Engineer, the layout sheet shall be signed by Design Unit Manager and State Bridge Design Engineer.**

All plan sheets shall be signed electronically using the Certification Sheet process established by WSDOT HQ Design Office, providing a locked PDF plan set for Advertisement.

The revised BDM Section 1.4 is attached

3. Add the following paragraph to Section 1.4.4:

The Consultant Prepared PS&E/Preliminary Plans on WSDOT Right of Way shall follow the General Bridge Plan Stamping and Signature Policy of BDM Section 1.4.1.

4. Add the following paragraph to Section 1.4.5:

The Structural Design Work Prepared Under Design-Build Method of Project delivery shall follow the plan stamping and signature policy of RFP Section 2.13.

Background

The purpose of this memorandum is to clarify signing and stamping requirement for bridges, buried structures, bridge repairs and other structures.

If you have any questions regarding this policy memorandum, please contact Michael.Rosa@wsdot.wa.gov at (360) 705-7156 or Bijan Khaleghi Bijan.Khaleghi@wsdot.wa.gov at (360) 705-7181.

cc:

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1.4 Quality Control/Quality Assurance/Quality Verification (QC/QA/QV) Procedures

1.4.1 General

1.4.2 WSDOT Prepared Bridge (or Structure) Preliminary Plans

1.4.3 WSDOT Prepared PS&E

1.4.4 Consultant Prepared PS&E/Preliminary Plans on WSDOT Right of Way

1.4.5 Structural Design Work Prepared Under Design-Build Method of Project Delivery

1.4.6 Structural Design Work Prepared Under Contractor Supplied Design Method of Project Delivery

1.4.1 General

The purpose of the QC/QA/QV procedure is to improve the quality of the structural designs and plans. The key element to the success of this process is effective communication between all parties. The objectives of the QC/QA/QV procedure are to:

- Design structures that improve public safety and meet state regulations.
- Design structures which meet the requirements of the *Bridge Design Manual M 23-50*, AASHTO LRFD *Bridge Specifications*, current structural engineering and architectural practices, and geometric criteria provided by the Region.
- Create contract documents that meet the customer's needs, schedule, budget, and construction staging requirements.
- Maximize plan quality.
- Produce an organized and indexed set of design calculations with the criteria and assumptions included in the front after the index.
- Minimize structural and architectural design costs.

The goals are listed in order of importance. If there is a conflict between goals, the more important goal takes precedence.

The Design Unit Supervisor determines project assignments and the QC/QA/QV process to be used in preparation of the structural design. The intent of the QC/QA/QV process is to facilitate plan production efficiency and cost-effectiveness while assuring the structural integrity of the design and to maximize the quality of the structural contract documents.

Professional Engineering, PE license stamp is acceptable for proprietary buried structures made of either precast concrete, metal, or composites, with at least 2 feet of backfill on top of the structure and placed either on spread footings or supported by the structure's own integral floor/bottom slab system. The stamping requirement for all other structures shall be as specified in BDM Section 1.4.3 for WSDOT Prepared PS&E, 1.4.4 for Consultant Prepared PS&E/Preliminary Plans on WSDOT Right of Way, 1.4.5 for Structural Design Work Prepared Under

Design-Build Method of Project Delivery

1.4.2 WSDOT Prepared Bridge (or Structure) Preliminary Plans

A. Description of Terms

Quality Control (QC)

- A thorough and detail-oriented check of the engineering content of the Preliminary Plans is performed. A set of check prints is created and retained for QC documentation.
- Alignment, profile, super-elevation rates, vertical clearances, and geometry data shown on the Preliminary Plans are checked. Geometry checks may be performed by a Structural Detailer, using the appropriate CADD software.
- A set of check prints is created and retained for QC documentation.
- The job file shall be reviewed for key design decisions, and any hydraulic, geotechnical or environmental complications, etc.
- Confirm that the current design guidelines (BDM, AASHTO) and current WSDOT Bridge Office Design Policies have been followed.
- Particular attention shall be paid to documentation regarding justification for structure type selection.
- The QC task is traditionally carried out by the Preliminary Plan Checker of Record

Quality Assurance (QA)

- A review of the Preliminary Plans is performed, based on knowledge, experience and judgment.
- Verification that the QC process has been properly followed. Verify the existence of the QC check prints.
- Confirm that the current WSDOT Bridge Office Policies and overall Preliminary Plan protocols have been followed.
- Responsibility for the QA task belongs with the Bridge Projects Unit Supervisor.

Quality Verification (QV)

- Confirm that the QA process has been properly followed.
- A review of the Preliminary Plans is performed, based on knowledge, experience and judgment (this may also add QA value).
- The QV task is traditionally carried out by the State Bridge Design Engineer.

The QC/QA/QV procedures may vary depending on the type and complexity of the Preliminary Plan being created, and the experience level of the

Engineers involved. More supervision, review, and checking may be required when the Engineers are less experienced.

1.4.3 WSDOT Prepared PS&E

A. Plans, Calculations and Quantities Prepared by WSDOT Bridge and Structures Office

1. Description of Terms

Quality Control (QC)

- A thorough and detail-oriented check of the engineering content of the plans is performed. A set of check prints is created and retained for QC documentation.
- The Designer's calculations are also checked. A set of check calculations is created and retained for documentation.
- The QC task is traditionally carried out by the Checker of Record.

Quality Assurance (QA)

- A review of the plans is performed, based on knowledge, experience and judgment. A set of check prints is created and retained for QA documentation.
- The Designer's calculations are reviewed, based on knowledge, experience and judgment. Spot-checks may be included. Independent calculations are not typically produced.
- Verification that the QC process has been properly followed. Verify the existence of QC Check Prints and Check Calculations.
- Confirm that the current design guidelines (BDM, AASHTO) and current WSDOT Bridge Office Design Policies have been followed.
- The QA task is traditionally carried out by the Design Unit Supervisor.

Quality Verification (QV)

- Confirm that the QA process has been properly followed. Verify the existence of QA Check Prints.
- A review of the plans is performed, based on knowledge, experience and judgment (this may also add QA value).
- The QV task is traditionally carried out by the State Bridge Design Engineer.

The QC/QA/QV procedures may vary depending on the type and complexity of the structure being designed, and the experience level of the design team members. More supervision, review, and checking may be required when the design team members are less experienced.

2. Designer Responsibility

The Designer is responsible for the engineering content of the contract plansheets, including structural analysis, completeness and correctness.

Upon completion of the QC/QA/QV process, the Designer shall prepare the QC/QA/QV Checklist and obtain signatures/initials as required. This applies to all projects regardless of type or importance (bridges, retaining walls and noise barrier walls, overhead sign structures, bridge deck overlays, traffic barriers, etc.). Refer to Appendix 1.4-A1.

3. Checker Responsibility

The Checker is responsible to the Design Unit Manager for Quality Control of the structural design, which includes checking the design, plans, calculations and quantities to assure accuracy and constructability. The Design Unit Manager works with the Checker to establish the level of checking required. The checking procedure for assuring the quality of the design will vary from project to project. Following are some general checking guidelines:

i. Job File

Scan the job file for unconventional or project specific items relating to geometrics, hydraulics, geotechnical, environmental, etc.

ii. Design Calculations

The design calculations may be checked by either of two methods:

Design calculations may be checked with a line-by-line review and initialing by the Checker. If it is more efficient, the Checker may choose to perform his/her own independent calculations.

Iterative design methods may be best checked by review of the Designer's calculations, while standard and straight-forward designs may be most efficiently checked with independent calculations. The Designer and Checker calculations shall both be retained for archiving.

Revision of design calculations, if required, is the responsibility of the Designer.

iii. Structural Plans

The Checker's plan review comments are recorded on a set of check prints, including details and bar lists, and returned to the Designer for consideration. These check prints are a vital part of the checking process,

and shall be preserved. If the Checker's comments are not incorporated, the Designer should provide justification for not doing so. If there is a difference of opinion that cannot be resolved between the Designer and Checker, the Design Unit Manager shall resolve any issues. Check prints shall be submitted to the Design Unit Manager at the time of 100 percent PS&E turn-in.

If assigned by the Design Unit Manager, a structural detailer shall perform a complete check of the geometry using CADD or hand calculations.

Revision of plans, if required, is the responsibility of the designer.

iv. Quantities and Barlist

The Checker shall provide an independent set of quantity calculations. These together with the Designer's quantity calculations shall be placed in the job file.

Resolution of differences between the Designer and Checker shall be completed before the Bridge PS&E submittal. See Section 12.2.2 for procedures and requirements. The Checker shall also check the barlist.

4. Specialist/Bridge and Structures Architect Responsibility

Specialist reviews are typically cursory in nature, are not intended to fulfill the role of the Checker and should be considered as Quality Assurance (QA). Specialists shall perform reviews and initial the Project Turn-In QC/QA/QV Worksheet of BDM Appendix 1.5-A1 at the 100 percent completion stage of certain projects including:

- **Bearing and Expansion Joint Specialist** – All expansion joint or bearing rehabilitation projects. All new bridges with modular expansion joints, unique strip seal joints (high skew, raised steel sliding plates at sidewalk, traffic islands, etc.), and bearings other than conventional elastomeric pads.
- **Concrete Specialist** – All post-tensioned super and substructures, and complex prestressed girder superstructures (long spans, large skews, tapered girders, etc.). All structures utilizing mass concrete, self-consolidating concrete (SCC), shotcrete or Grade 80 reinforcement.
- **Steel Specialist** – All new and retrofit steel superstructure projects or projects involving significant or complex welding.
- **Substructure/Seismic Specialist** – All drilled shaft foundations, and any foundations involving Concrete Filled Structural Tube

(CFST) or Reinforced Concrete Filled Structural Tube (RCFST) technology. All retrofit projects, and new bridges with complex seismic design requirements.

- **State Bridge and Structures Architect** – Responsible for review and approval of all Bridge & Structure projects for appropriate application of the Context Sensitive Design process and related architectural design. The Architect's involvement shall include, but not be limited to, TS&L studies, Preliminary Plans, and PS&E design-level plans.

5. Design Unit Supervisor Responsibility

The Design Unit Supervisor is responsible to the Bridge Design Engineer for Quality Assurance (QA) of the structural design, which includes reviewing the design, plans and specifications for consistency and constructability. The Design Unit Supervisor shall review the plans for the following:

Review the Design

Criteria. Design Criteria

- Seismic design methodology, acceleration coefficient ("a" value), and any seismic analysis assumptions.
- Foundation report recommendations, selection of alternates.
- Deviations from AASHTO, this manual and proper consideration of any applicable Design Memorandums. Review constructability issues. Are there any problems unique to the project?

The Design Unit Supervisor shall also review the following:

- Overall review of sheet #1, the bridge layout for:
 1. Consistency — especially for multiple bridge project
 2. Missing Information
- Review footing layout for conformance to Bridge Plan and for adequacy of information given. Generally, the field personnel shall be given enough information to "layout" the footings in the field without referring to any
- other sheets. Plan details shall be clear, precise, and dimensions tied to base references, such as a survey line or defined centerline of bridge. Any special circumstances regarding excavation quantities (structure exc. vs. roadway exc. delineation) shall also be detailed.
- Review the sequence of the plan sheets. The plan sheets should adhere to the following order: layout, footing layout, substructure, superstructure elements, miscellaneous details, barriers, railings,

bridge approach slab, and barlist. Also check for appropriateness of the titles.

- Review overall dimensions and elevations, spot check for compatibility. For example, check compatibility between superstructures and substructure. Also spot check bar marks. Use common sense and experience to review structural dimensions and reinforcement for structural adequacy. When in doubt, question the Designer and Checker.

6. State Bridge Design Engineer's Responsibilities

The State Bridge Design Engineer is responsible for Quality Verification (QV) of the structural design process, and acts as the coach, mentor, and facilitator for the WSDOT QC/QA/QV Bridge Design process. The following summarizes the key responsibilities of the State Bridge Design Engineer related to QC/QA/QV.

- The State Bridge Design Engineer shall perform a structural/constructability review of the plans. This is a Quality Verification (QV) function as well as meeting the “responsible charge” requirements of state laws relating to Professional Engineers.
- Review unique project special provisions and *Standard Specifications*

7. General Bridge Plan Stamping and Signature Policy

The stamping and signing of bridge plans are the final step in the Bridge QC/QA/QV procedure. It signifies a review of the plans and details by those in responsible charge for the bridge plans.

The revised bridge and structures plan stamping, and signature policy requires at least one licensed Structural Engineer, SE stamp and sign each contract plan sheet except for architectural detail sheets, bar list, and as specified herein:

- Structural Engineering license, SE is required for all vehicular and pedestrian bridges with span lengths greater than 20 ft
- Structural Engineering license, SE is required for non-proprietary buried structures with span lengths greater than 20 ft that are designed by the WSDOT Bridge Office or Consultants.
- Structural Engineering, SE license is required for the foundation elements of proprietary buried structures placed on pile or shaft foundation. The non-foundation elements may be stamped by a Professional Engineer
- Structure repairs to be performed by WSDOT maintenance forces

follow the guidance in Chapter 6 of the Washington State Bridge Inspection Manual (WSBIM). January 2022 revisions to the WSBIM will provide guidance on plan stamping.

For contract plans prepared by a licensed Civil or Structural Engineer, the Design Unit Manager and the licensed Civil or Structural Engineer co-stamp and sign the plans, except the bridge layout sheet. The bridge layout sheet is stamped and signed by the State Bridge Design Engineer.

As an exception to the requirements above, the State Bridge and Structures Engineer reserves the right to stamp and sign any plan sheet, while in conformance with and meeting the legal requirements of RCW 18.43.020.

For contract plans prepared by a designer who is not a licensed Civil or Structural Engineer, the Design Unit Manager and the State Bridge Design Engineer co-stamp and sign the plans except the bridge layout sheet. Alternatively, Design Unit Manager and the S.E. Licensed Engineer supervising the design work (if applicable) could co-stamp and sign the plans. The bridge layout sheet is stamped and signed by the State Bridge Design Engineer.

For Non-Standard Retaining Walls and Noise Barrier Walls, Sign Structures, Seismic Retrofits, Expansion Joint and Bearing Modifications, Traffic Barrier and Rail Retrofits, and other special projects, the Design Unit Supervisor with either the licensed designer or the State Bridge Design Engineer (if the designer is not licensed) co-seal and sign the plans except for the layout sheet. The layout sheets for these plans are sealed and signed by the State Bridge Design Engineer.

Hard copy plans shall be signed in blue ink. The process outlined above applies also to the application of the digital signatures for stamping and signing of plans using authorized software.

~~The stamping and signing of bridge plans is the final step in the Bridge QC/QA/QV procedure.~~

~~It signifies a review of the plans and details by those in responsible charge for the bridge plans. At least one Licensed Structural Engineer shall stamp and sign each contract plan sheet (except for architectural detail sheets and the bar list). Structural Engineering license is required for all bridges and buried structures with span lengths greater than 20 ft.~~

~~For contract plans prepared by a licensed Civil or Structural Engineer, the Design Unit Manager and the licensed Civil or Structural Engineer co-stamp and sign the plans, except the bridge layout sheet. The bridge layout sheet is stamped and signed by the State Bridge Design Engineer.~~

~~For contract plans prepared by a designer who is not a licensed Civil or Structural Engineer, the Design Unit Manager and the State Bridge Design Engineer co-stamp and sign the plans except the bridge layout sheet. The bridge layout sheet is stamped and signed by the State Bridge Design Engineer.~~

~~For Non-Standard Retaining Walls and Noise Barrier Walls, Sign Structures, Seismic Retrofits, Expansion Joint and Bearing Modifications, Traffic Barrier and Rail Retrofits, and other special projects, the Design Unit Supervisor with either the licensed designer or the State Bridge Design Engineer (if the designer is not licensed) co-seal and sign the plans except for the layout sheet. The layout sheets for these plans are sealed and signed by the State Bridge Design Engineer.~~

~~Hard copy plans shall be signed in blue ink.~~

~~The process outlined above applies also to the application of the digital signatures for stamping and signing of plans using authorized software.~~

B. Specifications and Estimates (S&E) Prepared by WSDOT Bridge and Structures Office

1. Description of Terms

Quality Control (QC)

- A thorough and detail-oriented check of the Specifications Run List is performed. Special Provisions are reviewed for content, and for consistency with the Plans. Fill-in values in the Special Provisions are reviewed for accuracy.
- Transcription of the Designer-supplied quantities into the Engineers Estimate is checked. Unit bid prices assigned are reviewed.
- Project Duration calculations, and any required project scheduling assumptions are checked for accuracy and consistency.
- A set of QC Review Comments is created, and retained for documentation.
- The QC task is traditionally carried out by the Specification and Estimate Engineer assigned to the Project.

Quality Assurance (QA)

- A review of the Specifications and Estimate is performed, based on knowledge, experience and judgment.
- Consistency with the Plans shall be emphasized.
- Verification that the QC process has been properly followed.

Verify the existence of QC Review Comments.

- Confirm that the current WSDOT Bridge Office Policies and overall S&E organization protocols have been followed.
- Responsibility for the QA task belongs with the Bridge Projects Unit Manager.

Quality Verification (QV)

- Confirm that the QA process has been properly followed.
- A review of the Specifications and Estimate is performed, based on knowledge, experience and judgment (this may also add QA value).
- The QV task is traditionally carried out by the State Bridge Design Engineer.

2. General Specification and Estimate Stamping and Signature Policy

The stamping and signing of the Certified Bridge Specifications and Estimate is the final step in the S&E QC/QA/QV procedure. It signifies a completed review of the Specifications and Estimate by those in responsible charge. The Specifications and Estimate Engineer responsible for S&E for the project shall stamp and sign the Specifications and Estimate Cover Sheet. The Certified Bridge Specifications and Estimate document is sent to the Project Engineer of the Region PE Office responsible for the overall design of the project for the retention in the Project Design File.

The Specifications and Estimate Cover Sheet shall be signed in blue ink.

1.4.4 Consultant Prepared PS&E/Preliminary Plans on WSDOT Right of Way

Plans, Quantities and Calculations, or Specifications and Estimates, or Preliminary Plans prepared by consultants shall follow the individual Consultant's own QC/QA procedures. Also, as a minimum, the Consultant's QC/QA procedures shall include the features described above for similar WSDOT prepared work.

Preliminary Plans prepared by consultants shall be reviewed and approved by WSDOT Bridge Office and Regional Engineering Manager (or Project Development Engineer) for the project.

The Consultant Prepared PS&E/Preliminary Plans on WSDOT Right of Way shall follow the General Bridge Plan Stamping and Signature Policy of BDM Section 1.4.3-A7.

WSDOT's role in consultant-prepared engineering work will be Quality Verification only. The Consultant shall be relied upon to provide their own QC/QA effort and oversight.

WSDOT'S QV task is traditionally carried out by the designated WSDOT Bridge Design Reviewer or Coordinator for the project. The WSDOT Bridge Design Reviewer/Coordinator's QV responsibilities shall include:

- a. Review Consultant's Preliminary Plans. Upon resolution of all review comments, the Preliminary Plan Reviewer shall submit the Preliminary Plans to the Bridge Design Engineer and to the Regional Engineering Manager (or Project Development Engineer) for their review and signature.
- b. Review Consultant's design calculations and plans for completeness and conformance to Bridge Office design practice. The plans shall be checked for constructability, consistency, clarity and compliance. Also, selectively check dimensions and elevations.
- c. At the 100 percent turn-in milestone, verify that the Consultant's own QC/QA processes have been followed, and, as a minimum, that WSDOT's QC/QA requirements for similar work have been met.

1.4.5 Structural Design Work Prepared Under Design-Build Method of Project Delivery

Structural design work prepared by others under a Design-Build contract shall follow the QC/QA procedures outlined in the approved project-specific Quality Management Plan (QMP). As a minimum, the QMP procedures shall include the features described above for similar WSDOT prepared work.

The Structural Design Work Prepared Under Design-Build Method of Project delivery shall follow the General Bridge Plan Stamping and Signature Policy of RFP Section 2.13.

WSDOT's role in Design-Build engineering work will be Quality Verification only. The outside designers shall be relied upon to provide their own QC/QA effort and oversight. WSDOT'S QV task is traditionally carried out by the designated WSDOT Bridge Design Reviewer or Coordinator for the project. The WSDOT Bridge Design Reviewer/Coordinator's QV responsibilities shall include:

- a. Review Design-Build calculations and plans for completeness and conformance to Bridge Office design practice. The plans shall be checked for constructability, consistency, clarity, and compliance. Also, selectively check dimensions and elevations.
- b. At the Release for Construction (RFC) turn-in milestone, verify that the required QC/QA processes have been followed (as outlined above), and, as a minimum, that WSDOT's QC/QA requirements for similar work have been met.

1.4.6 Structural Design Work Prepared Under Contractor Supplied Design Method of

Project Delivery

The Structural Design Work Prepared Under a Contractor Design Method of Project delivery shall follow the General Bridge Plan Stamping and Signature Policy described in BDM 1.4.3A7 A, B and C above.

WSDOT's role in Contractor Supplied Design engineering work will be Quality Verification only. The Contractor's designers shall provide their own QC/QA effort and oversight. WSDOT'S QV task is traditionally carried out by the designated WSDOT Bridge Technical Advisor or Coordinator for the project.

As a minimum, the QC/QA/QV procedures shall include the features described above for similar WSDOT prepared work.

The WSDOT Bridge Technical Advisor or Coordinator's QV responsibilities shall include: Review Contractor Supplied Design calculations and plans for completeness and conformance to Bridge Office design practice. The plans shall be checked for constructability, consistency, clarity and compliance, and will also selectively check dimensions and elevations.