DISCLAIMER FOR
Design and Engineering Design Standards Documents

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APPLICABILITY FOR
Design and Engineering Design Standards Documents

Project teams shall refer to their advertised or executed project contracts for applicable document versions/revisions.

Approvals:	ENGINEERING DESIGN PROCEDURES	EP- 11 Rev: 3
_____ PSO Chief Engineer	**Small Projects**	
_____ Director of Technical Standards & Requirements	Original Issue Date: 12/6/11 Current Revision Date: 9/27/24	

1.0 PURPOSE

This procedure sets forth the procedures, and responsibilities to ensure consistent and efficient delivery of the engineering services necessary to support Service Delivery Projects (SDP) and other project requests such as signage support, follow on work etc.

2.0 APPLICABILITY

This EP-11 applies to any project totaling less than $20 million.

3.0 SCOPE

This procedure covers staff and consultant responsibilities, requirements for engineering deliverables (reports, drawings, contract specifications, calculations, etc.) prepared for all Sound Transit SDP, follow on work, and operational support projects.

4.0 REFERENCES

- American Railway Engineering and Maintenance-of-Way Association (AREMA)
- Configuration Review Board (CRB)
- Engineering Design Procedures (EP)
- Project Controls Policies and Procedures (PCPP)
- Service Delivery Project Management Guidebook
- Sound Transit Design Technology Manual
- Sound Transit Directive Drawings
- Sound Transit Requirements Manual
- Sound Transit Standard Specifications
- Sound Transit Standard Drawings

5.0 ACROYNMS

- AREMA - American Railway Engineering and Maintenance-of-Way Association
- CRB – Configuration Review Board
- DSDC – Design Services During Construction
- ERC – Executive Review Cabinet
- ESR - Engineering Service Request
- ICE – Independent Cost Estimate
- NTP – Notice to Proceed
- PCPP – Project Control Policies and Procedures
- PE – Professional Engineer
- SDP – Service Delivery Project
- SE – Structural Engineer
- SME – Subject Matter Experts
- SRA – Safety Risk Assessment

6.0 DEFINITIONS

- Service Delivery Projects (SDP): Service Delivery is the collection of work (projects, programs, and portfolios) that supports the business of providing transit services to our customers. This includes the work to maintain and/or enhance existing assets and systems.
- Engineering Services Request (ESR): An Engineering Service Request is the form to use to initiate engineering services. These services may include Investigation Report, Feasibility Study, Engineering Package, and Design Support During Construction (DSDC). See Exhibit EP-11-01 ESR App for definition of ESR types. An ESR is not a project, a project can have multiple ESRs or no ESRs when engineering is not needed.

7.0 RESPONSIBILITIES

7.1 ESR REQUESTOR

Anyone within Sound Transit can request an ESR Type I (investigation report). The Project Manager is the requestor for ESR Type II, III, and IV. Requestor is responsible for initiating a kickoff meeting once the design lead has been assigned to the project. Requestor is responsible for determining staff charge number, the stakeholders, and working with the ESR Manager to determine the staff assigned to the project.

7.2 PROJECT MANAGER

Single point of accountability responsible for delivery and execution of an assigned project. The Project Manager assesses the project intake data and collects any additional information from the Requestor and/or Sponsor. The Project Manager monitors the projects progress and budget and is accountable for CRB, ERC and PCPP compliance. The Project Manager is also responsible to engage contracts and prepare the final contract documents and is familiar with the Service Delivery Project Management Guidebook. For Type I a Project Manager is not needed.

7.3 ENGINEERING MANAGER

The Engineering Manager assigns the ESR to a Design Lead. The Engineering Manager will be the single point of accountability for design and will be responsible for coordinating with the requestor and identifying resources necessary for the ESR. The Engineering Manager is accountable for tracking all designs performed by ST staff, determining if the design needs to be stamped according to the Stamping Requirement and maintaining a log of all in-house stamped designs for insurance purposes. The Engineering Manager is responsible for monitoring the status of the ESR to ensure the schedule and needs are fulfilled.

7.4 DESIGN LEAD

The Design Lead is an engineer and/or architect assigned to the project. Under the direction of the Engineering Manager, the Design Lead may self-perform the design work or use an on-call consultant. Use of an on-call consultant requires approval of the Project Manager.

The Design Lead is accountable for ensuring compliance with applicable Engineering Procedures, ST Requirements Manual, ST Standard Specifications, ST Standard Drawings, ST Directive Drawings, ST Design Technology Manual, agency safety and security management plan and agency quality management plan implementation. The Design Lead may involve ST resources and SMEs with expertise in the project scope in order to advise on the design. Construction Managers need to be involved early in the design to help on constructability.

The Design Lead and the Project Manager are responsible for filling out the Safety Risk Assessment (SRA) at the beginning of the project and obtaining safety acceptance of the SRA. The Design Lead and Project Manager are responsible for coordinating the discussion for the plans/roles/responsibilities for commissioning during design and then again during construction

When the design is performed by an on-call consultant, the Design Lead can perform the duties of the Task Order Manager for on-call consultant services. Design Lead must keep the Project Manager informed throughout the task order process.

The Design Lead is responsible to maintain the ESR log updated on a monthly basis. When the ESR is complete the Design Lead will inform the stakeholders and close the ESR.

7.5 DESIGNER OF RECORD (DOR)

The DOR is the person responsible to stamp and seal the design documents. This can be the Design Lead or someone that is overseeing the design work. This person needs to be engaged in the process from the beginning.

7.6 TASK ORDER MANAGER

The Task Order Manager has the responsibility to oversee the task order. This includes the development of scope and an Independent Cost Estimate (ICE) for design in accordance with PCPP-02 and provide the account and budget information to the GEC Administrator. The Task Order Manager can either be the Design Lead or the Project Manager.

7.7 CONSTRUCTION MANAGER

The Construction Manager is assigned to the project to coordinate efforts related to the construction of the project.

The Construction Manager is responsible for coordinating with the Project Manager, Design Lead, Environmental Affairs & Sustainability (EAS) staff, and contracts manager to ensure constructability of the project in accordance with the contract documents. The Construction Managers will assign reviews of Submittals and Request for Information documents to the necessary stakeholders. The DOR and/or ST Design Lead will approve documents including shop drawings, product data, and construction staging that may affect existing or proposed facilities.

If environmental commitments and/or environmental permit conditions are associated with the project, the Construction Manager will coordinate with EAS staff during construction and include EAS staff in project-related meetings and reviews, as appropriate. Other responsibilities include reviewing changes, adhering to Construction Manual & PCPP's, and interfacing with Safety and Quality.

7.8 ENVIRONMENTAL AFFAIRS AND SUSTAINABILITY (EAS)

Project Manager will coordinate with the environmental group to determine if NEPA/SEPA documentation or any other environmental requirements are necessary and, if so, determine the scope of environmental review. EAS staff will coordinate with the Project Manager and design and construction team to prepare needed documentation and verify that any environmental commitments, permit conditions, and regulations are appropriately addressed during each project phase.

7.9 GENERAL ENGINEERING CONSULTANT (GEC) ADMINISTRATOR

The GEC Administrator is responsible for coordinating aspects of the On Call Task Order procurement, administration, and closeout including obtaining cost proposals and issuing NTP.

8.0 PROCEDURES

8.1 SMALL PROJECT DEVELOPMENT

- An ESR Requestor initiates the request for engineering services by submitting the Engineering Services Request (Exhibit EP-11-01).

- When an ESR has been submitted, the Engineering Manager will assign a Design Lead to the ESR. The Design Lead will review the ESR scope with the Project Manager to establish understanding of the ESR.
- For ESR Type I and ESR Type II the Design Lead will work with the ESR requestor to develop a report or study. A draft report will be issued for comments and a meeting to discuss comments. A quality check needs to be done to the report per Exhibit EP-11-03 QC Process for small projects and with quality checking documents included in the final report/study. The final report will be issued after the review meeting and quality check and the ESR can be closed out.
- Field Verification: The Design Lead or DOR is responsible to field verify when possible, the as-built conditions match what is in the field.
- ESR documentation: All ESR files (working, quality and final documents) are to be stored on the Engineering Documents SharePoint site.

8.2 ESR TYPE III ENGINEERING PACKAGE, AND TYPE IV DESIGN SUPPORT DURING CONSTRUCTION:

- The Project Manager/Requestor is responsible to ensure that the project has CRB approval.
- The Project Manager and DOR/Design Lead will develop a design schedule including milestones and deliverables for contract documents to allow for development and review of the design.
- The Design Lead in collaboration with the Project Manager will determine if the work will be performed in house or by on-call consultant. When using an on-call consultant the Design Lead and Project Manager work with the GEC Administrator for the necessary approvals.
- The Project Manager and Design Lead, in close coordination with Construction Manager, will determine the appropriate level of the specification package required for the project and the type of contracting method.
- The Project Manager will provide the scope to EAS staff to determine if NEPA/SEPA documentation and environmental permits will be required.
- Design deliverables and reviews to be defined at the start of the project.
- At 100% design the contract documents must be reviewed by the Construction Manager, SME, and ESR Manager and other stakeholders. The Design Lead will develop a reviewer list and administer the review and comment resolution process. The completed comment resolution process needs to be documented and included in the final package.
- Prior to submittal of the final deliverables, the design package must be independently checked according to the quality control process provided in Exhibit EP-11-03 QC Process for small projects and with quality checking documents included in the final deliverables. The ESR Manager will work with the Design Lead to assign the checker, for in house design.

- The Project Manager must meet with Sound Transit Permitting to identify any required permits. All permit conditions and requirements must be incorporated into the contract documents. The Project Manager is responsible to ensure that all necessary permits are secured prior to advertising the project for construction.
- The Design Lead along with the Project Manager will develop the construction ICE with support from Sound Transit Cost Engineers or design consultants as stated in PCPP-02.
- Final contract documents must be stamped and sealed by the DOR, as required per Section 8.4 Stamping Requirements. Final contract documents need to be approved by the ESR Manager. Contract documents to include updates to ST's panel schedule calculation native files when there are impacts to panel schedules.
- The DOR or Design Lead will provide design support during construction on technical issues and construction submittals. If the DOR is from an on-call contract, their services will be covered in the task order.
- The Design Lead will reach out to the construction team to provide final information and photos of on-site installations in order to incorporate into master set as-builts. Final native files for calculations and configuration settings that are required per the project are to be provided to Design Lead for review.
- The project documents will identify responsible party for as-built and record drawing preparation. As-built and record drawings will be prepared in accordance with current Sound Transit Design Technology Manual and other current applicable Sound Transit requirements. Contractor may be tasked with preparing and/or assisting with the preparation of as-built and record drawings. Sound Transit Design Technology and Design Lead/DOR will review and approve the as-built and record drawings before they can be accepted. The Design Lead will receive and ensure that the drawings are submitted to Design Technology and Configuration & Document Management.

8.3 QUALITY CONTROL AND CHECKING

- Prior to submittal of the deliverables, the package will be independently checked according to the quality control process provided in Exhibit EP-11-03 QC Process for small projects and with quality checking documents included in the deliverables. This applies to in house or consultant delivered small projects.
- An independent member of the design team will provide quality assurance documentation in accordance with the checklist provided in Exhibit EP-11-03. This applies to in house or consultant delivered small projects.
- Contract documents shall have construction quality requirements (hold points, independent inspection requirements, certifications etc.)

8.4 STAMPING REQUIREMENTS

- All stamping requirements must follow the RCW and WAC. Additional requirements are listed below.

- All Consultant work: plans, specifications, and reports must be stamped.
- Requirements for Stamping – ST Staff Only
    - The following does not require stamping:
        - Replacement of in kind equipment or materials.
        - Memos, basis of design reports, investigation reports, inspection reports, and recommendations provided by Sound Transit staff.
    - Requirements for stamping
        - AHJ specific guidelines requiring licensed professional must be adhered to.
        - Additional discipline specific stamping requirements:
            - Architecture
                - Alterations that impact egress, accessibility clearances, life safety, fire ratings, structure.
            - Building Controls
                - Budget Threshold: $50k new or alterations beyond replacement to fire life-safety or power systems.
            - Civil & Track
                - All design drawings, specs and supporting calculations.
            - Communications and Electronic Security
                - New or alterations to supporting fire life-safety excludes emergency fire life safety network design.
            - Electrical
                - Lighting projects affecting continuous lighting for more than 4,000 square feet.
                - Documentation required by NEC to be stamped:
                    - Selective Coordination NEC 708.54
                    - Series ratings: NEC 240.86(A)
                    - Support of overhead conductors: NEC 399.30
                    - PV systems: NEC 690.7(A)(3), NEC 690.8(A)(1)(2), NEC 691.6, NEC 691.7
                - Alterations to fire life-safety power systems and medium voltage systems.

- Fire Protection/Fire Detection
    - Alternate Materials and Methods/Code Modification Request if developed in house.
    - Engineering Judgements to be submitted to an AHJ as defined by the IBC.
- Geotechnical
    - All reports, design drawings and calculations.
- Mechanical
    - All projects with a total budget threshold over $50k.
    - Scope affecting fire life-safety functionality of HVAC systems.
- Structural
    - All design drawings and supporting calculations need a PE/SE stamp.
    - SE Stamp requirement:
        - For building structures, any design that is related to or will affect the post-tension concrete, major structural. components (columns/ beams/ shear walls/ CMU walls/ foundations), cladding and stairs.
        - For aerial guideways or bridges, any design that is related to or will affect the major support system (girders / decking / plinths / bearings / bents / columns / foundations), and shock transmission units.
    - Minor isolated concrete spall repair or crack repair does not require an SE stamp.
- Train Control
    - Alterations to the vital system circuit and vital software as defined in AREMA.
- Traction Electrification System
    - Alterations to the clearance, safety, protection, and controls of traction power electrification system.
    - Modifications to the OCS support system and hardware.

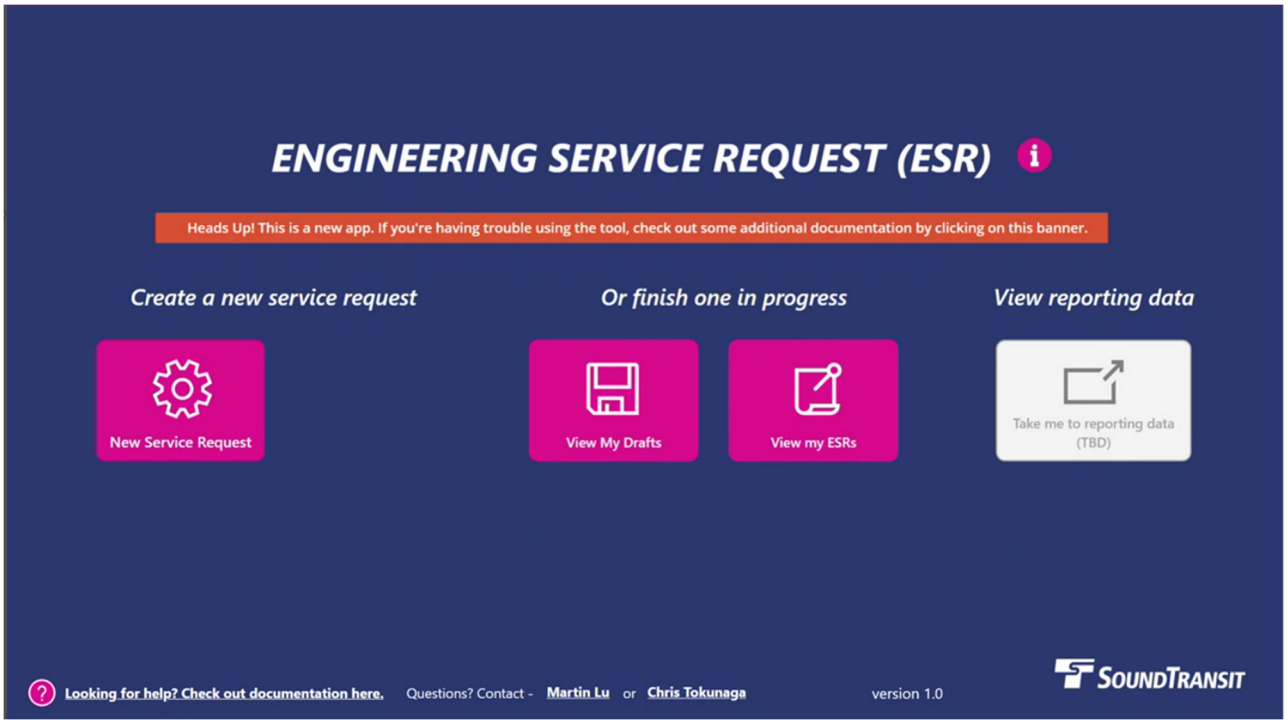
8.5 CLOSE OUT PROCEDURES

- Once the scope of work has been complete the Design Lead has the authority to close the ESR.
- If the ESR is inactive (the engineer has not worked on the ESR) for 1 month, the Design Lead should put the ESR on hold/close and update the comment log. The ESR can be reopened in the future when engineering support is needed.
- If a project is on hold for over 3 months and has no defined activity in the future, the project should be reevaluated with the requestor and be closed by the Design Lead.

9.0 EXHIBITS

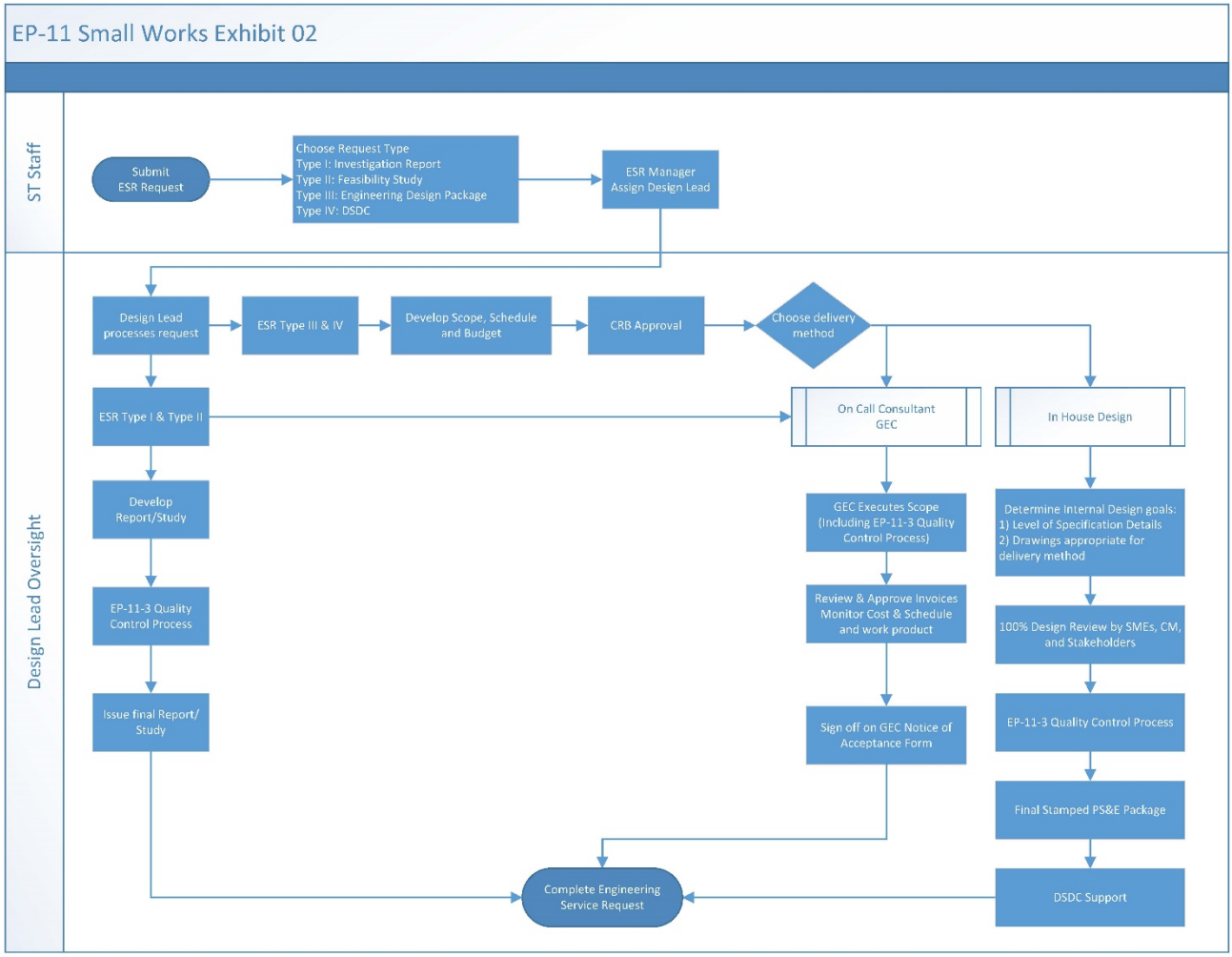
- EP-11-01 ESR App
- EP-11-02 Small Project Flow Chart
- EP-11-03 QC Process for Small Projects

EP-11-01 ESR APP



ESR TYP	Description	Deliverables	ESR Completion	Estimated Time
Type I: Investigation Report	Investigation of an issue or diagnosis of a problem at the request of an individual business unit. Not yet determined that a project may be necessary	Written report or memo	Final written report or memo (engineering report)	1 to 4 months
Type II: Feasibility Study	Initial feasibility study assessment and alternatives analysis that is informing the scope/ROM cost of a project. Can be done as a "pre-project" effort to inform project budget request	Written report or memo, ROM for Construction and design pricing, schematic design	Final written report or memo (engineering report)	2 to 4 months
Type III Engineering Package	Preliminary and final design in support of a planned project	Reviewed and stamped design drawings, calcs, specs and construction ICE	Engineering Package (Plans, Specs and Estimate)	3 to 6 months
Type IV: Design Support during Construction	Design support during construction of project	Design support during construction, including technical submittals, shop drawing and RFI reviews and well as design changes related to change orders	Construction substantial completion	1 to 6 months

EP-11-02 Small Project Flow Chart



EP-11-03 QC Process for Small Projects

EP-11-03 QC Process for Small Projects

QC Process Illustration for Small Projects

Definitions of QC Roles:

Checker: The Checker checks the design documents to determine that all information is correct, in conformance with all agency and industry standards, complete, and consistent. The Checker must be independent of the document originator but must have equivalent or greater experience.

Back-Checker: The Backchecker is responsible for reviewing the Checker's additions and deletions and clarifying any notes or instructions provided by the Checker, and in case of disagreement, to meet with the Checker to reach resolution.

Corrector/Updater: The corrector incorporates the agreed-to changes to the native Clean Print of the document

Verifier: The Verifier reviews the corrected Clean Print to confirm that agreed-to changes were correctly applied.

These QC roles apply to all formats of QC checking: hard copy, Bluebeam, or MS Word.

The following pages provide QC procedure tips for each format of checking

A Quality Assurance (QA) form follows QC procedure tips.

Compatible Roles:

	Originator	Checker	Backchecker	Updater	Verifier
Originator	■		■	■	
Checker		■			■
Backchecker	■		■	■	
Updater	■		■	■	
Verifier		■			■

Black Boxes mean that one person can fulfill both QC roles white boxes mean that these roles cannot be the same person.

QC Process Illustration for Small Projects

Hard Copy QC Checking Procedure

Quality Control Color Code:

When an originator provides a set of design documents for QC checking, the QC process must be documentable and auditable. A QC design check print set is complete if it contains Checker comments, has been back-checked by the originator, and the corrections have been verified.

In order to provide this process documentation, a color coded QC Check will be used as summarized below:

Originator: Black signifies original design documents.

Checker: Highlights in yellow each correct part. Marks in Red signifies additions, deletions, and/or corrections to design documents. Marks, clarifications and notes in blue.
Every item on the sheet must be highlighted or marked up in red.

Backchecker: Green checkmark indicates each agreement and additions are marked in green. Marks in blue signify Backchecker notes to a review comment. Backchecker must meet with Checker to resolve the disagreement and update the QC checkprint with resolution notes and the Checker's initials

Corrector/updater: Circle in blue each correction as it is made to the Clean print.

Verifier: Yellow Highlight in the blue circles to verify the correction has been incorporated on the Clean Print.
Mark instructions in orange if all corrections were not made.

QC Check-stamp:

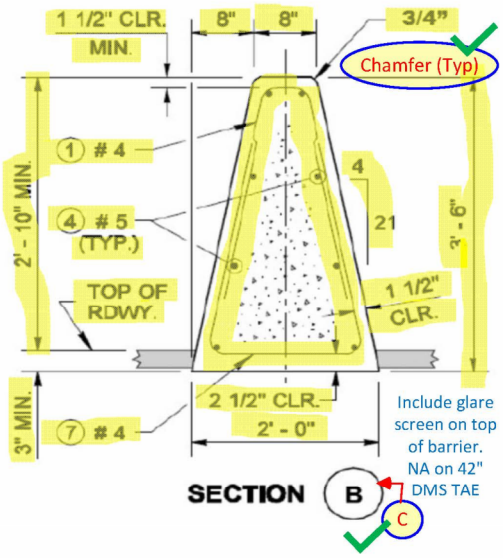
Each participant in the QC process shall provide their initials next to their role on the QC check-stamp, as well as the date of completion.

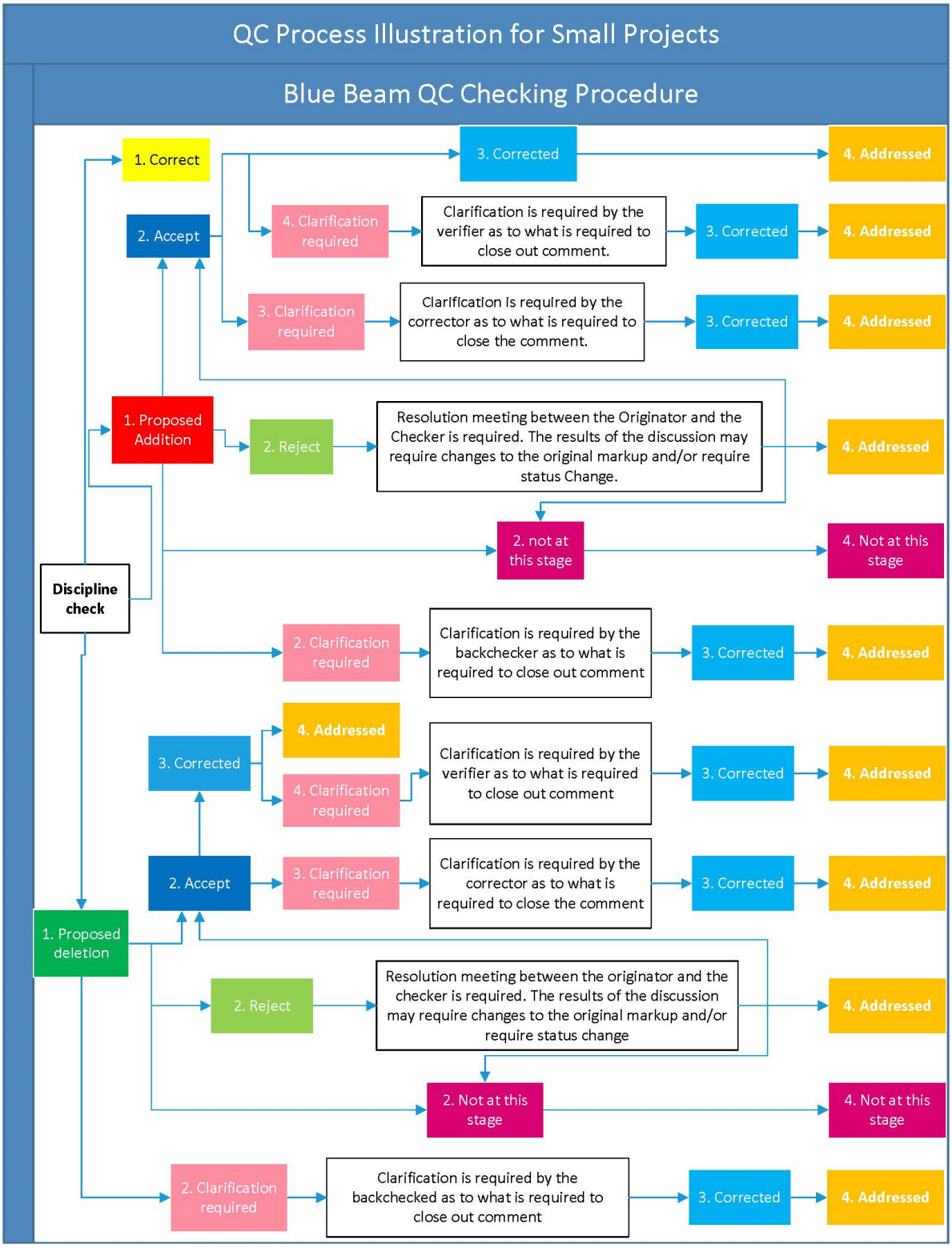
The QC check-stamp is shown below, followed by an example of a document being revised.

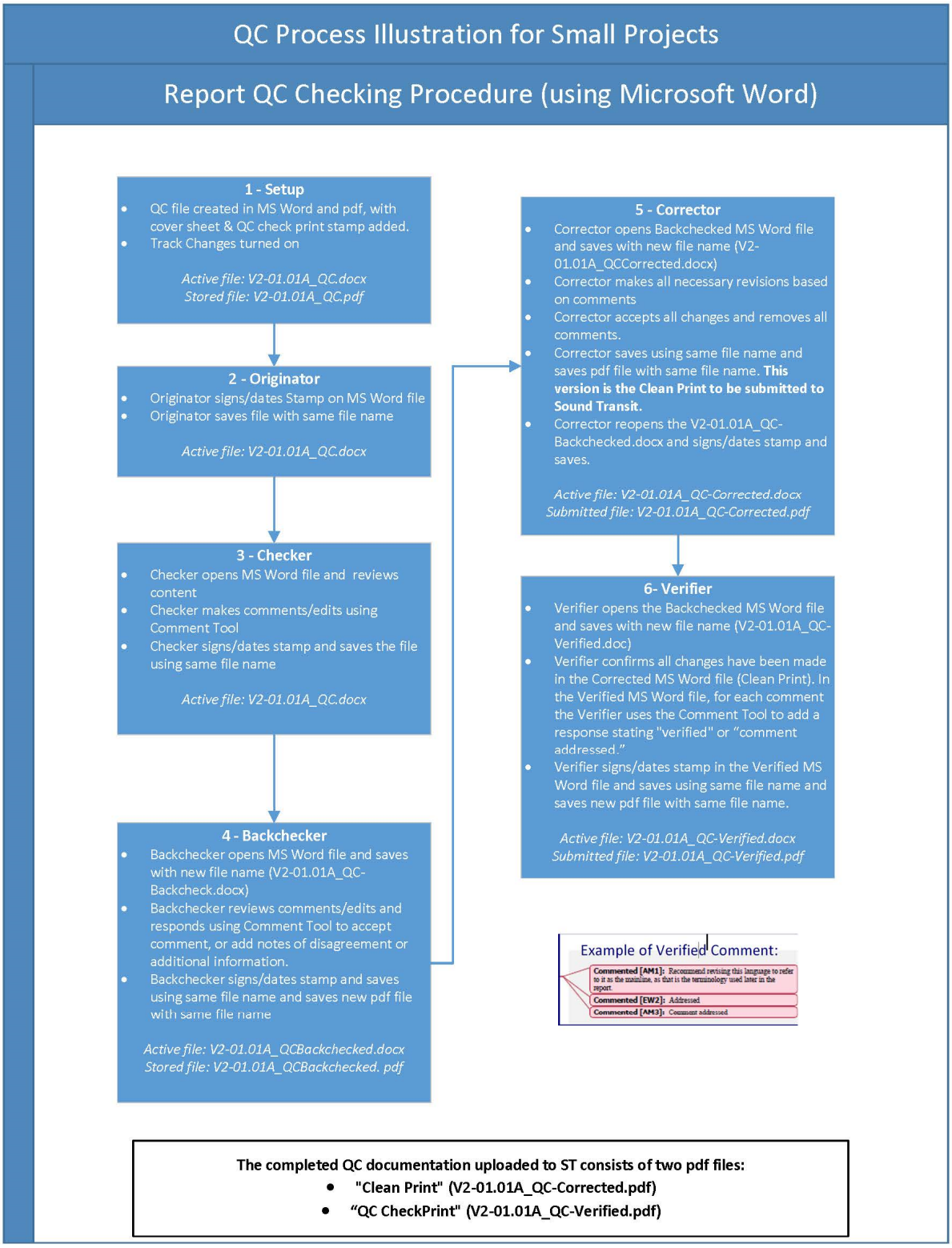
Quality Control Check

Originator: _____ Date: _____
Checked: _____ Date: _____
Backchecked: _____ Date: _____
Corrected: _____ Date: _____
Verified: _____ Date: _____

Example Correction:







QA Process Illustration for Small Projects

DESIGN QUALITY ASSURANCE CHECKLIST

Project: _____ Contract/Task No.: _____
Deliverable Name: _____
Version/Completion Level: _____
☐ Sound Transit
☐ Consultant Firm Companies: _____
Deliverable Design Lead: _____Design Quality Manager:
Dates of QC: _____ Dates of QA Review: _____

Document Type(s) included in Deliverable:
☐ Cost Estimates ☐ Design Calculations ☐ Technical Specifications or Contracts
☐ Study, Report, Memo ☐ Plans/Drawings ☐ Other: _____

Quality Audit Checklist	Y	N	N/A
QC check prints w/ all QC procedures complete	☐	☐	☐
QC check prints for all appendix material	☐	☐	☐
QC check print stamp completed	☐	☐	☐
Agency/AHJ comments on previous draft incorporated	☐	☐	☐
Final corrected document (clean print) provided	☐	☐	☐
Checkprints match clean prints (comments incorporated)	☐	☐	☐
Correlation between calculations and drawings	☐	☐	☐
Verified software programs / spreadsheets used	☐	☐	☐

Comments/Observations:
Corrective/Preventive Actions Required:

☐ **Compliant** ☐ **Incomplete** ☐ **Design Team Resubmit***

Signed: _____ _____
Design Quality Manager Date

* If "Resubmit" the QA process will start anew and a new QA checklist will be created for the resubmittal.