Quality Management Plan

Volume 2
Design Quality Management Plan (DQMP)

I-10 Mobile River Bridge

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Kiewit | Massman | Traylor
a joint venture

VERSION HISTORY

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I-10 MOBILE RIVER BRIDGE PROJECT
DESIGN QUALITY MANAGEMENT PLAN

1.0 GENERAL

Kiewit Massman Traylor (KMT) is a fully integrated Joint Venture between Kiewit Infrastructure South Company, Massman Construction Co., and Traylor Bros., Inc to successfully develop the I-10 Mobile River Bridge Project (the Project). The Lead Engineering Firm is KEGI. The Design team is comprised of three major design firms: Kiewit Engineering Group, Inc., Volkert, Inc., and SYSTRA IBT. KEGI is also supported by several minor subconsultant partners.

The Design Quality Management Plan (DQMP) and referenced Design Quality Control Procedures (DQCPs) defines and documents the Project's design quality program. The DQCPs are in Appendix B of this DQMP. The DQMP is subject to an acceptance program which consists of Owner Verification (OV) performed by the Alabama Department of Transportation (ALDOT).

This DQMP applies to Professional Services Work. The scope of the quality program begins at initial Project start-up and extends through to Final Acceptance of the Project. The Project's Quality Management Plan (QMP) consists of this Design Quality Management Plan (DQMP) and the Construction Quality Management Plan (CQMP), which include the scope of the quality management system.

Revisions will be made as the result of any audit corrective actions, when continued improvement opportunities are identified, and annually. If substantial or systemic problems related to the Work are identified, or as directed by ALDOT, revisions will be made within 14 days. Submissions of the DQMP and all updates to the DQMP include a clean copy and a copy tracking all changes since the previous approval.

1.1 QUALITY POLICY AND OBJECTIVES

It is KMT's policy to meet Project requirements as defined by contract documents and to adhere to Project quality objectives. Our principal quality objectives are to meet or exceed ALDOT expectations and to eliminate rework, performing our work "Right the First Time". Meeting ALDOT's expectations will be measured through the monthly Four-Square Matrix which is a quality performance communication tool that identifies negative or positive quality trends that are shared with the entire design-build team so issues can be addressed and corrective actions implemented. An example of the Four Square Matrix is shown below.

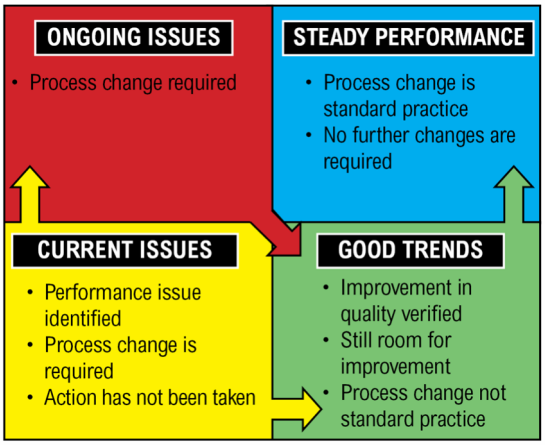


*Figure 1.1 Example of Four Square **Matrix***

We have established this DQMP to ensure compliance with Design-Build Agreement (DBA) quality requirements, engineering specifications, industry guidelines, ISO 9001:2015, and applicable codes and standards. This program provides minimum quality requirements to be used as the foundation for ensuring the quality of Work deliverables for all Work KMT performs.

This DQMP establishes the procedures and policies to implement QC during the design so that all individuals in every work function perform their Work with personal commitment to achieving KMT's quality goals and objectives. Every employee is empowered and responsible to ensure the quality of their own Work. Every team leader is accountable to ensure each team member has the training and skills to produce quality Work. The concept of doing the job "Right the First Time" every time is instilled and reinforced through supervision and training. Implementation of the DQMP is a professional obligation and employment requirement of all working on this Project.

This quality policy is supported by these quality practices:

- Implement the Project's quality management system and optimize its effectiveness.
- Communicate clearly to understand ALDOT's quality expectations.
- Work as a team with ALDOT to enhance ALDOT satisfaction through effective application of our DQMP.
- Continuously strive to avoid schedule impacts and reduce the amount and cost of rework by identifying issues and taking Corrective Action in a timely manner.
- Implement a continuous improvement process by performing Cause Analysis, sharing lessons learned and best practices throughout the company.
- We hold ourselves and our subconsultants accountable using assessments, audits, and common metrics to measure, report, and improve our performance.
- Periodically obtain ALDOT feedback through the monthly Four-Square Matrix for identifying quality issues.

Disciplines covered by the DQMP include but are not limited to:

- Roadway
- Drainage
- Structures
- Geotechnical
- Aesthetics and Landscaping
- Surveying and Mapping
- Traffic Control
- Utilities
- Traffic
- Walls
- Environmental
- ROW
- ITS/Illumination

1.2 ORGANIZATION - PERSONNEL AND STAFFING

Each KMT team member is responsible for the quality of Work they produce. The quality management team will have adequate support to manage the quality related activities on the Project. This may be a full or part-time position filled by staff trained and qualified to manage design quality.

Organization

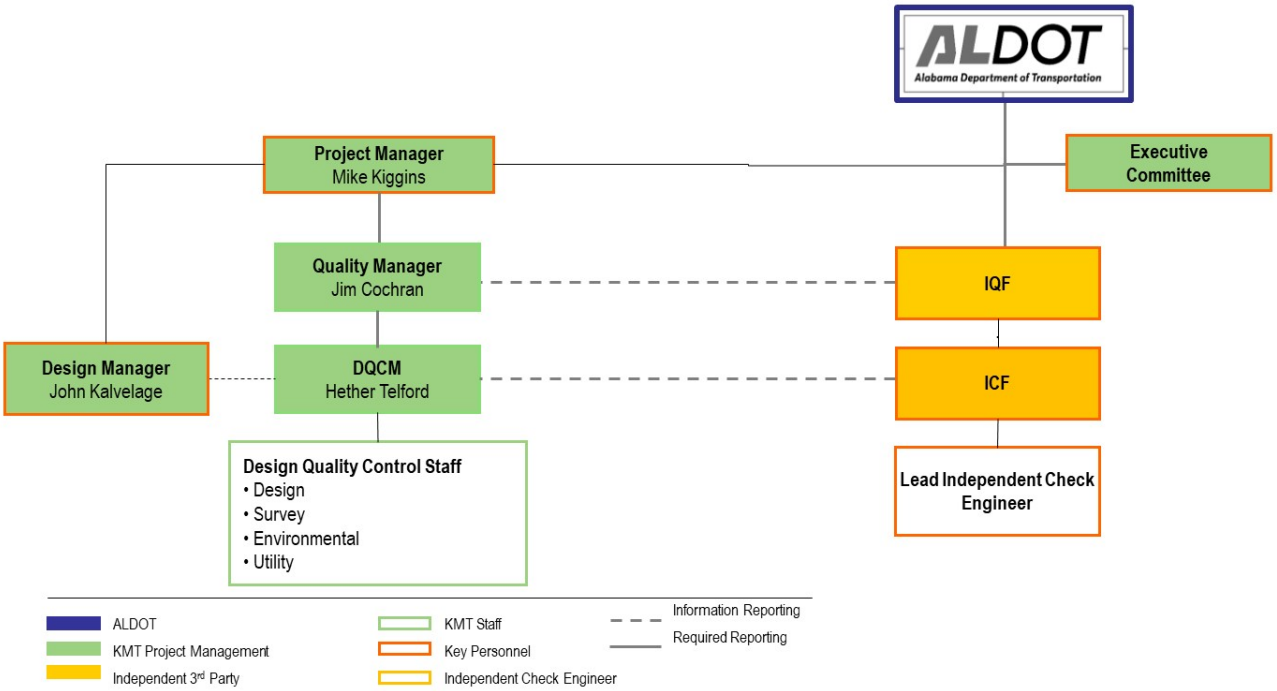
The design quality functions are organized and structured in such a manner where:

- Quality is achieved and maintained by those assigned responsibility for performing the Work.
- Independent persons or organizations evaluate quality effectiveness.

The individuals responsible for design quality will have sufficient authority, access to Work, and organizational freedom to identify quality problems; verify implementation of solutions; and ensure that further processing, delivery, or installation is controlled until proper disposition of a discrepant condition has occurred. Quality representatives will report to a level of management with the authority and organizational freedom to ensure appropriate action is taken to resolve quality issues.

Figure 1.1 depicts KMT Quality Management Organization. The Quality Management team will be engaged during all Project activities. The authorities and responsibilities of the persons within the design quality organizational structure are defined in this section.

Figure 1.2 DB Contractor's Quality Management Organization



Responsibilities

Project Manager

The Project Manager (PM) is responsible for providing vision, leadership, and direction to ensure all Project quality objectives and goals are met. The PM will ensure specific responsibilities and authorities are defined, assigned, and communicated within the organization.

Quality Manager

The Quality Manager (QM) is responsible for managing the quality control of the design and construction work for the project, implementing quality planning and training, and managing the team's quality management processes. The QM provides certification of compliance for Design Submittal Documents by signing DQCP-16 FRM2 Design Builder Design Certification. The Quality

Manager Reports directly to the Project Manager, is independent of Design-Builder's production team, and has the authority to stop work.

Design Quality Control Manager

The Design Quality Control Manager (DQCM) will be responsible for confirming compliance of the design QC program through oversight. The DQCM will be a licensed professional engineer (PE). The DQCM shall not be involved with direct scheduling or delivery production activities and report directly to the PM and QM.

Specific responsibilities of the DQCM include the following:

- Establishing and overseeing the implementation and management of the Project DQMP.
- Ensuring that the DQMP is understood, implemented, and maintained at all levels of the Project design organization.
- Developing Project quality procedures, circulating the procedures for review by applicable Project staff, and then submitting the procedures to Project Management for approval.
- Certifying that each design submittal meets the requirements of the DQMP and the Contract Documents prior to submitting to the client.
- Ensuring subconsultants also follow the DQMP.
- Managing the QC process for the Design, Environmental, ROW, Utilities, and Survey.
- Maintaining record of quality activities and prepare a monthly progress report to summarize quality activities for auditing purposes.
- Providing Certification of Compliance using DQCP-16 FRM1 QA Review and Certification of Compliance and DQCP-16 FRM2 Design Builder Design Certification.
- Compiling and maintaining documentation of oversight reviews and comment reconciliation for any submittals necessary from the Designer.
- Verifying KMT has obtained approval from applicable Third Parties prior to issuance of a Certificate of Compliance. Subsequently, ALDOT to provide written concurrence.
- Authority to stop work.

Design Manager

The Design Manager is responsible for ensuring that the overall Project design is completed, and design criteria requirements are met. The Design Manager shall be a Registered Professional Engineer.

The Design Manager (DM) will be responsible for all elements of design and integration of all design requirements. The DM is the ultimate person responsible for Design Quality Control (QC). The DM is supported by Discipline Leads. Specific quality-related responsibilities of the DM include the following:

- Ensuring the design criteria are established and communicated to the design team.
- Ensuring all codes and standards to be used are known and verified.
- Ensuring internal design team checks of drawings, specifications, reports, calculations, and other design documents prepared for execution of the Work are performed in accordance with the DQMP.

- Verifying that all comments are addressed, and if required, incorporated into the design deliverables prior to its next submission.
- Collaborating with construction to assure the builder's means and methods are addressed as design packages are completed, developed, reviewed, approved, and issued for construction.
- Scheduling and overseeing constructability reviews of the design packages.
- Resolving design/construction issues quickly to keep the Project moving forward.
- Ensuring all QC procedures for design and design review are effectively implemented, as described in the DQMP.
- Authority to stop work.

Discipline Design Leads

The Discipline Leads (DL) are responsible for assigning QC reviewers and assuring that QC checks and QC reviews are performed in accordance with the DQMP and per the schedule. The DLs will participate in the Interdisciplinary Design Reviews, as the representative for their discipline. Subconsultants, under the direction of Discipline Leads, will adhere to the project DQMP.

Design Quality Control Staff

The Design Quality Control (DQC) staff will work under the direction of the DQCM to perform oversight and review of all Professional Services Work. The DQC staff will meet the following requirements:

QC Reviewers are engineers responsible for performing checks of calculations, plans, special provisions, standards, and special specifications and quantities. They will evaluate appropriate engineering practices, conformance with the contract and Project criteria, and overall completeness for implementation in the field. Design Discipline Checklists will be completed during the review process. These reviewers will not be directly involved with the original development of the design item being quality checked (QC'd).

QC Reviewers will have sufficient knowledge and experience such that they can effectively perform the QC review of the item to which they are assigned to check. The QC Reviewer will have at least 4 years of experience in the discipline they are reviewing and be a PE in any of the 50 states and/or a PEng in Canada.

Engineer of Record

Each Engineer of Record (EOR) will be a PE responsible for all elements of design and integration of all design requirements within their specific discipline. The EOR will sign and seal the Professional Services product for a given discipline. Where Discipline Lead is referenced throughout the DQMP, this may refer to the EOR. Specific quality related responsibilities of the EOR for a specific discipline include the following:

- Ensuring the design is developed and documented in accordance with the contract requirements.
- Ensuring all codes and standards used by the discipline are known and verified.
- Ensuring the disciplines internal design team checks of drawings, specifications, reports, calculations, and other design documents prepared for execution of the Work are performed in accordance with the DQMP.

- Verifying all discipline-specific comments are addressed, and if required, incorporated into the design deliverables prior to its next submission.
- Managing design development to promote on schedule delivery of submittals.
- Collaboration with construction to assure the builder's means and methods are addressed as the design packages are completed, developed, reviewed, approved, and issued for construction.
- Resolves design/construction issues quickly to keep the Project moving forward.
- Producing a design that meets the contract requirements in conformance with the DQMP requirements.
- Interdisciplinary coordination.

1.3 QUALITY PLANNING

For design, Project quality planning begins with a schedule for Project activities, including milestones, milestone deliverables, quality checks, and ALDOT review activities.

Risk and Opportunity

When planning Project quality, the QM and DM will consider external and internal issues relevant to the Project. These include requirements and expectations of ALDOT, third-party agencies, and organizational strengths and limitations that present risks and opportunities. ALDOT's expectations will be measured through the monthly Four-Square Matrix. Some of these items can be mitigated through a properly prepared and executed DQMP throughout the design process to:

- Communicate to ALDOT and stakeholders the DQMP can achieve intended results.
- Enhance ALDOT and third-party agency satisfaction.
- Prevent or mitigate ALDOT and stakeholder dissatisfaction with design nonconformances.

Professional Engineer Seal

RFC Design deliverables will be signed and sealed as mandated by the Alabama Board of Engineers and Land Surveyors. The PE stamp, date, and signature are required for final acceptance certification, signifying that design deliverables align with the design and development inputs.

1.4 QUALITY MANAGEMENT OF SUBCONSULTANTS

Work by subconsultants will conform to this DQMP. The subconsultants submittals and their QC process are subject to quality audits by the DQCM based on the DQMP and contract requirements.

Subconsultants engaged in field work (Geotechnical and Surveying, etc.) must submit a quality plan for testing and inspection along with equipment calibration reports required by the contract. The subconsultant quality processes will be verified for conformance with KMT requirements. See DQCP-13 Quality Program for Subconsultants for additional details.

1.5 COMMUNICATION

Organizational and technical interfaces consist of the means in which design information is communicated throughout the organization and between distinct technical disciplines. It is also how KMT interfaces with ALDOT. The key organizational and technical interfaces are:

1. Internal Discipline Communication
2. Designer Interdisciplinary Communication
3. Designer and Construction Communication
4. DB and ALDOT Communication
5. DB and Third-Party Communication
6. Designer and QC/QA Communication

Discipline Communication

KMT uses Task Force meetings to establish weekly communication within technical disciplines. Task Forces consist of individuals from a relevant discipline, from both construction and design, and include management and schedulers as necessary to discuss the issues pertaining to the design, constructability, utilities, scheduling, budget, environmental, and public outreach regarding this Project for the discipline. These meetings are held weekly or as needed during the design phase of the Project.

The Discipline Lead is responsible for conducting these meetings and documenting all pertinent discussions and decisions. The Discipline Lead is also responsible for ensuring consistency within the discipline and compliance with the contract requirements. Constructability and stakeholder requirements will be emphasized in these meetings to minimize the potential for Design Changes. Ultimately, these Task Force meetings are the guidance for the design team as the design moves through Conceptual Plan Submittal ,60% Design Submittal, Final Design Submittal, and Release for Construction (RFC) Submittal. The goal of this process is “no surprises” for ALDOT and quick review.

Interdisciplinary Communication

In addition to the Task Force meetings, the DM will hold meetings as necessary to ensure compliance, consistency, and quality of the Work. These meetings are held weekly or as needed during the design phase of the Project. An Interdisciplinary Review (IDR) will be performed in accordance with DQCP-24 Interdisciplinary Review and will utilize Bluebeam Studio Sessions for review and resolution of comments.

These meetings and IDR Sessions assist in the coordination of Work performed by different persons, firms, or disciplines on related tasks in the same Project segment or in adjacent Project segments. This communication helps ensure that no conflicts, omissions, or misalignments occur between drawings or between the drawings and the specifications.

Designer and Construction Communication

Designer and construction communication occurs during weekly design Task Force meetings.

A second form of communication between the designer and construction team is Constructability Reviews (CR). This review is performed in accordance with DQCP-25 Constructability Review and will utilize Bluebeam Studio Sessions for review and resolution of comments.

The final communication between the design and construction team is during construction. Some key design team members will be co-located with the construction team in the Project office to review

construction operations and observe actual field conditions as construction progresses. Designers will assist construction engineers to provide plan interpretation/clarification, discuss Work sequencing, construction issues, safety, traffic handling, incident management, constructability, and identification of changes beneficial to the quality and execution of the Work.

When issues, conflicts or deficiencies are discovered, interface among construction, design and design quality is essential. Engineering Services During Construction (ESDC) provides many processes for resolving quality issues, including FDCs, nonconformance evaluations, record document development, and verification of field conditions and design implementation. Procedures for ESDC processes are prescribed by DQCP-20 Field Design Change (FDC).

DB Contractor, ALDOT Communication and Third-Party Communication

KMT will interact with stakeholders and other third parties prior to and during all major Design Package deliverable phases to plan and coordinate review activities. When necessary, stakeholders and third parties will be communicated with for interface during design activities.

The QM and DQCM are the primary points of contact with ALDOT regarding design quality. The QM and DQCM will interact with the Project team and ALDOT to coordinate documentation, resolve issues, and implement ALDOT oversight procedures. All Quality Records and any noncontractually required data will be available and transmitted to ALDOT upon request.

Designer and Design QC/QA Communication

Each Design Package will undergo QC checks as outlined in the DQMP. QA Audits will be a form of communication from the DQCM to the QM, DM, and ALDOT that the processes within this DQMP are functioning properly.

1.6 PLANNING

Design Quality Planning begins with a resource loaded schedule for project activities, including milestones, milestone deliverables, quality checks and client review activities. The project design schedule will specifically includes all relevant quality control and quality assurance activities such as QC, IDR/CR, Certifications and Client Reviews. These tools are used for planning and are continually updated throughout the life of the project. Items and activities associated with Design Planning include:

Deliverables Quality Matrix

The Deliverables Quality Matrix is developed in accordance with DQCP-12 Quality Planning. The Design Manager and Design Quality Manager, in concert with the Design Discipline Leads, shall determine the quality checks and reviews necessary to assure quality for each deliverable. The Deliverables Quality Matrix is a quality record.

The resulting Deliverable Quality Matrix serves to communicate to the project team the quality check and review activities to be carried out on each deliverable prior to submittal to the client. The matrix, and/or the project schedule, shall identify the start and end dates for quality check and review

activities to facilitate time for effective reviews and resolution of resulting comments prior to due dates to clients.

2.0 QUALITY CONTROL PROGRAM

This section describes the requirements for control of design activities associated with the Project or specific assignments. This section includes a discussion of Project design phases, design input and output requirements, design reviews, and design DQCPs. The DQCPs are in Appendix B of this DQMP.

Design Requirements

Design requirements are accomplished through three distinct phases: design, design QC, and design QA. The three phases, when implemented properly, are the program processes that deliver a quality design deliverable. As with any process, continuous improvement is a byproduct of nonconformance control and Corrective and Preventive Action.

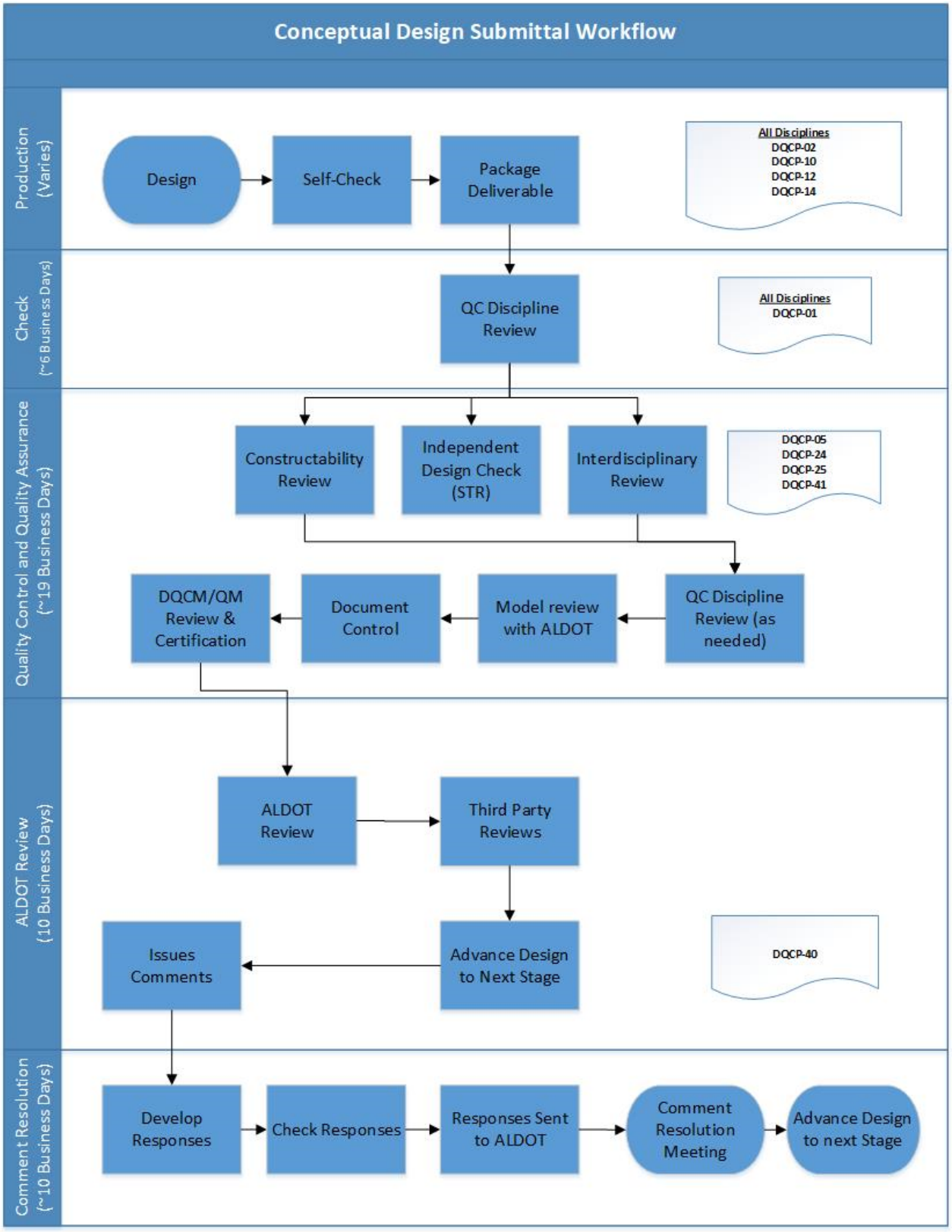
The design will be developed and reviewed for accuracy and completeness according to the DQMP and the DQCPs referenced in the DQMP.

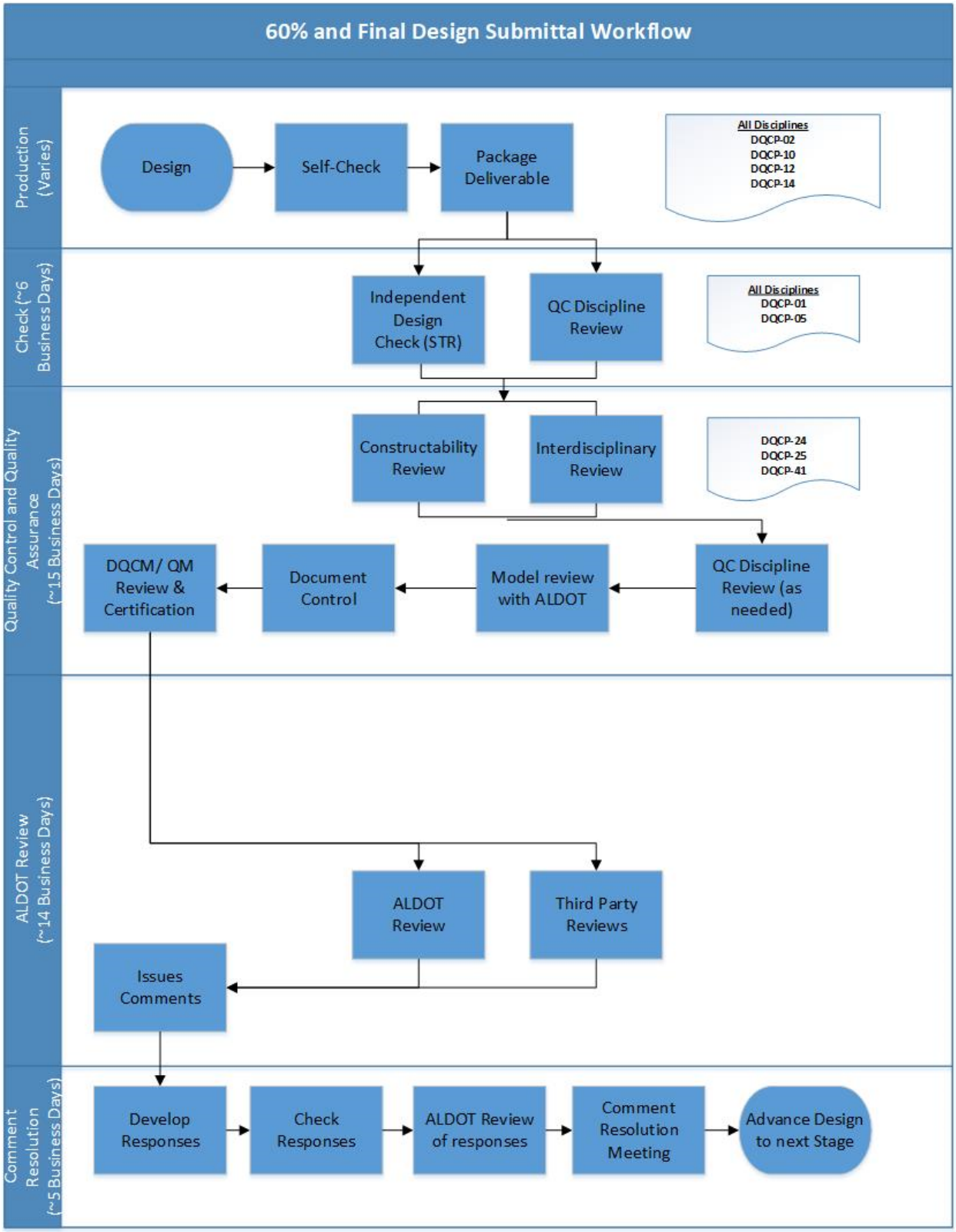
Design Stages

Design Packages will progress through the following stages but vary based on Project requirements or type of submittal. QC Reviews and assurances will take place at each stage of design:

1. Conceptual Plan Submittal
2. 60% Design submittal
3. Final Design Submittal
4. RFC Submittal
5. Record Drawings

Following are flowcharts depicting the first three stages of the design review process:





RELEASED FOR CONSTRUCTION (RFC)

The Released for Construction (RFC) Documents will serve as the final set of Plans and will incorporate all previous comments. The DQCM will participate in formal review meetings with ALDOT after review of the 60% and final designs.

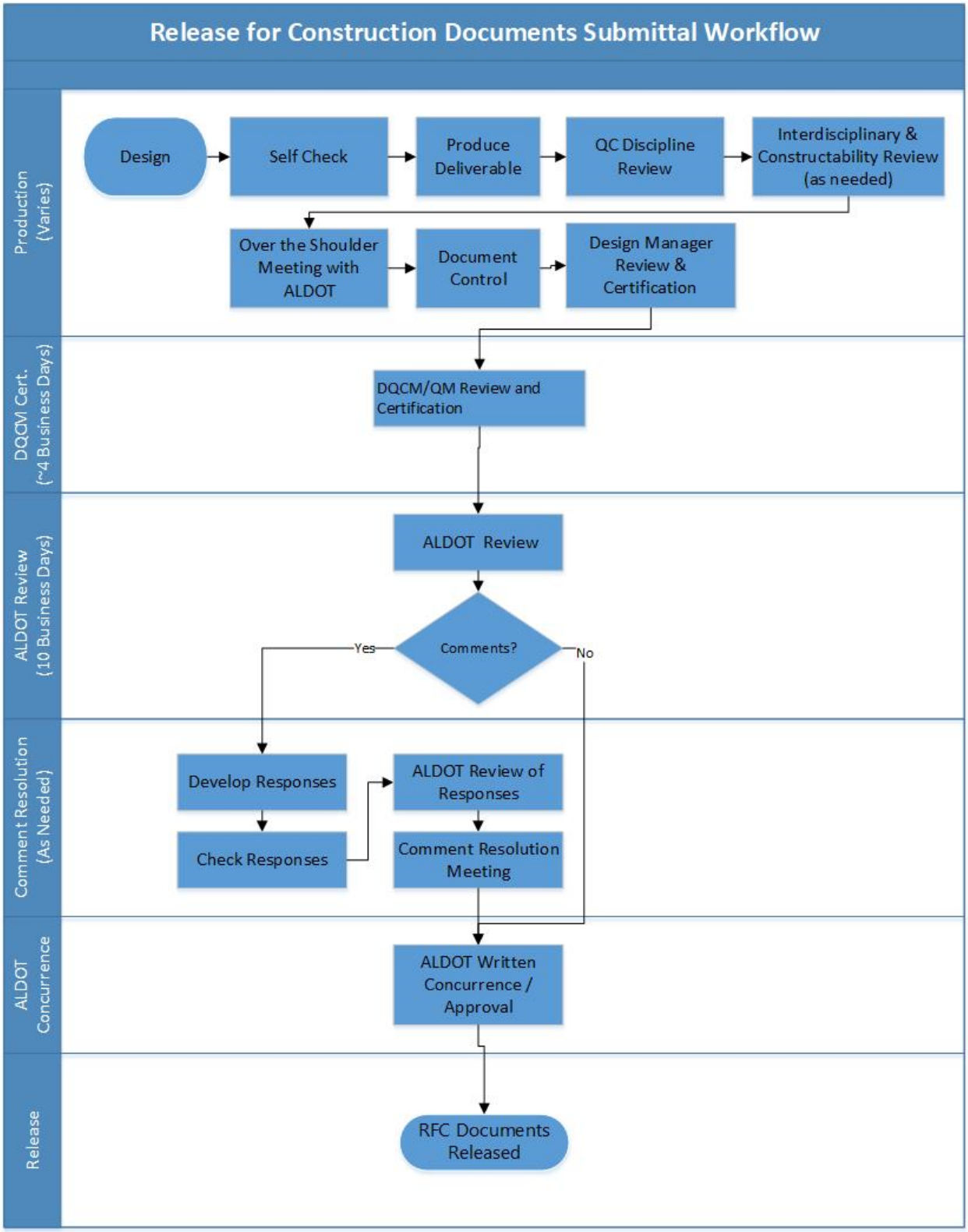
All RFC documents will follow the quality procedures shown in the RFC Submittal Workflow below and described in this DQMP.

The DQCM audits and certifies that design packages released for construction are in compliance with the DQMP. Concurrence of the final design will be done at RFC Design submittal when the entire package is submitted, and all comments and concerns have been resolved. The Design-Builder formally submits the following items to ALDOT to document final design:

- Design Drawings
- Design Calculations
- Design Reports
- Specifications
- Electronic Files
- Documentation required for ROW
- Government Approvals
- Utility Owner Approvals

These packages will be detailed, complete, constructible, and shall allow for verification of design criteria and compliance with the contract.

InEight Document will be used to submit RFC Documents following the detailed processes described in the Document Management Plan. RFC document history and distribution will be tracked through InEight Document from project start to construction completion.



Review and Quality Control

The following sections describe quality checks and reviews required. It is required that Project deliverables are in a completed state (for that milestone or phase) when submitted for quality checks and reviews. The check or review is conducted on the deliverable as it would be presented to ALDOT, ensuring additional design Work does not escape checks and reviews.

While the quality check and review processes described apply to quality check and review activities performed prior to submittal of deliverables to ALDOT, it is important to note day to day quality checking activities are an essential part of the quality process and are key to meeting schedule dates and minimizing rework.

The QC Disciplinary Check DQCP-01 is completed on all design submittals. DQCP-16 QA Review and Certificate of Compliance, DQCP-24 Interdisciplinary Review (IDR), and DQCP-25 Constructability Review (CR) detail the entire quality process and include flowcharts for visualization. All required checks and reviews must be completed, with comments resolved and verified prior to the QA Review. The primary purpose of QA Review is to ensure all required checks and reviews have been completed and comments are resolved and verified. All required checks and reviews shall be completed, comments resolved, and verified prior to submittal of any deliverable to ALDOT. All design submittals must be certified by the DQCM prior to submittal of any deliverable to ALDOT. It is for this reason that it is imperative to understand the necessary quality checks and reviews required when developing the Work Plan, so they can be incorporated into the Project Schedule and those timeframes maintained to facilitate proper execution of the DQMP.

During Work planning, the DM assesses the requirements of the Work and resources available. The DM, in collaboration with Discipline Leads, will determine the appropriate skills, qualifications, and experience required to execute design tasks and subsequent design staff will be identified. The DQCM will confirm registrations and maintain a log or list of staff assigned as EOR and/or QC Reviewers. Staff will provide feedback and input to the process and communicate progress.

Selection, Validation, and Use of Software

The DM and Discipline Leads shall determine and select appropriate design and development software/application, based upon Project design and development, the need to coordinate with other disciplines, and the need to effectively communicate design development with ALDOT while meeting their requirements. When using software/application for the development of Project deliverables, it is imperative designers understand the way the software/application translates design inputs into design outputs. They also need to be able to accurately interpret the results of the application.

Validation of design and development software/application is performed through an assessment of inputs and a review of outputs to confirm appropriate results. Validations are performed following DQCP-09 Software Validation and as specified in DQCP-01 QC Disciplinary Check. Validation can be performed with independent hand calculations or by another suitable replication of the results. Changes in software versions and design criteria shall be considered for re-validation. Formulas utilized in spreadsheets shall be validated with manual calculations the first time and spot checked thereafter following DQCP-10 Spreadsheet Checking.

Self-Check

KMTs quality culture is to own and take responsibility for the quality of their Work, with a determined effort to prevent rework and do the job “Right the First Time”. This quality approach can be summarized as:

KNOW IT:

- Every team member understands the DQMP and applies it to their Work.
- Read the contract and technical specification requirements.

DESIGN IT:

- Project design risks are identified, tracked, and mitigated.
- Deliverables meet the requirements of all design and development inputs.

CHECK IT:

- Self-check your Work (engineering calculations, drawings, specifications, etc.).
- Trust but verify - Own your signature.
- Verify subconsultants Work meets Project quality expectations.

Over-the-Shoulder Reviews

Over-the-Shoulder (OTS) Reviews are conducted by the Discipline Lead performed on Project deliverables, following DQCP-15 Over the Shoulder (OTS) Reviews, when required for the Project. OTS Reviews represent informal opportunities to check in with ALDOT and other stakeholders between formal deliverable submittals to confirm that the design, as it progresses, fulfills requirements and expectations relative to design criteria and scope. Meeting minutes will be kept documenting the activity and any design comments. These reviews also represent an opportunity to improve cost effectiveness of construction and verify suitability with intended construction means and methods. OTS Reviews may also be utilized when otherwise advantageous for the Project and supported by ALDOT. It will be important to refer to contractual requirements and approved design criteria during OTS Reviews to provide leading indicators to potential design deviations or exceptions. Comments generated through OTS Reviews shall be documented for communication back to the Project team.

QC Disciplinary Check

QC Disciplinary Check is required prior to submittal to ALDOT on all Project deliverables. This check applies to the detailed checking of plans, calculations (including quantities and construction estimates), specifications, reports, and studies. Procedure DQCP-01 describes this process in detail. During QC Disciplinary Check, the QC Reviewer shall perform detailed checks in accordance with:

- DQCP-01 QC Disciplinary Check
- DQCP-02 Checking of Computer Input
- DQCP-09 Software Validation
- DQCP-10 Spreadsheet Checking
- DQCP-14 Visual and CADD Compliance Check
- DQCP-41 Control of 3D Model

A Conformance Check (performed by the QC Reviewer) will verify the deliverable meets the design criteria, including any approved Design Changes.

> **Note:** Conformance Checks shall be performed using the design criteria itself and a discipline-specific checklist. These checklists are not intended to be duplicates of the design criteria, but are intended to capture, based on experience, discipline-specific critical items. The checklists will be completed and held as a quality record with other QC documentation. The Conformance Check will also include a check that environmental and other commitments made during the estimate phase have been incorporated.

- An Accuracy Check to verify that deliverable inputs and outputs are correct, and that assumptions and conclusions are accurate.
- A Scope Check to ensure the deliverable meets the required level of completeness for the phase/milestone being submitted.
- A check of compliance with applicable computer-aided drafting and design (CAD) standards and style requirements. This check may be more effectively performed by a CAD Manager or similar responsibility on the Project.
- A check of Comment Response, verifying comments to prior submittals or during collaborative or OTS Reviews are specifically addressed and resolved (or closed).

Reviews

Upon completion of design, internal design reviews are performed across disciplines and to address construction coordination. All design packages are subject to these reviews which are coordinated by the Design Manager and Discipline Leads who will assemble the documents in a Bluebeam Studio Session. All IDR and CR comments will be addressed prior to submittal to ALDOT, this may include deferring to the next submittal and tracking to closure prior to the subsequent submittal.

Interdisciplinary Review

The IDR process facilitates how design is coordinated between and within disciplines to identify conflicts, omissions and misalignments between discipline designs. The design review team is a group of experienced Discipline Leads selected by the DM to review the documents at each level of submittals.

An Environmental Review will be conducted as part of the IDR process. This environmental review will be focused on ensuring the project design meets the environmental commitment laid out in the applicable environmental documents, TP Attachment 5-1, and DQCP-22.

See DQCP-24 Interdisciplinary Review for additional details.

Constructability Review

The CR facilitates how construction, maintenance and operations related expertise is incorporated into the design and provides a formal process for feedback and resolution between the Design Team and Construction, Maintenance and Operations staff. Maintenance considerations will be included within the CR review process. See DQCP-25 Constructability Review for additional details.

Independent Design Check

An Independent Design Check (IDC) shall be performed on Main Span Bridge and High-Level Approaches as required by the contract and the requirements listed in DQCP-05. The QC Disciplinary Review will be performed prior to the IDC.

The Independent Checking Firm (ICF) will perform an independent set of calculations for the design of all structural elements of the Main Span Bridge and the High-Level Approaches as required by the contract. Where software or computer-aided tools are used to perform calculations, different software programs shall be used by the ICF and the Design-Builder's design team, unless otherwise approved by ALDOT.

CAD and Graphical Standards Compliance Check

CAD and Graphical Standards Check (visual check) is required on all deliverables. Visual Check is performed to ensure deliverables are complete, in order, and have been scanned, printed or converted (e.g., to PDF) as intended and representative of the electronic files that have been checked/reviewed, updated, and verified in accordance with the DQMP. A CAD Manager will participate in the Interdisciplinary Review sessions in accordance with DQCP- 14 CAD and Graphical Standards Compliance Check and sign off on a CAD Compliance Form prior to client submission.

QC Model Review

Discipline QC Model Review is required for all Project deliverables prior to the Project milestones (see DQCP-41 QC Model Review). This procedure applies to the discipline QC of all model deliverables, regardless of milestone or phase, with checks commensurate with the level of detail available for the milestone or phase of the deliverable being checked.

Existing Surface QC Review

Existing Surface QC Review is required for an existing surface provided by others (see DQCP-44 Existing Surface QC Review) and serves to define a process for the validation of an existing surface prior to use. This procedure mitigates risk associated with the possible assumption that existing surface data provided by others is accurate and checks factors such as working units and coordinate systems.

Quality Assurance Review

QA Review is required prior to submittal to ALDOT on all design deliverables and shall be the last review completed in the series of quality checks and reviews. For the final design submittal, it is important to note that QA Review activities will be started as soon as practical but cannot be considered complete until all other required checks and reviews have been completed, with resulting comments resolved and verified.

QA Review shall be performed by the DQCM. Through examination of records of quality checks and reviews, the DQCM shall assess compliance with the DQMP and shall confirm the completion of required checks and reviews.

ALDOT/Third-Party Review Comments

ALDOT, in consultation with the Design-Builder, will make mutually agreed upon decisions on the need for 3rd party reviewers. Upon submittal of scheduled deliverables, ALDOT or third-party may make comments requiring response and resolution. Third-party reviewers will be coordinated with ALDOT according to contract requirements. ALDOT will return comments through the agreed upon methods documented in the Document Management Plan. Bluebeam Studio Sessions will be used to make comments and receive responses. The DM shall be responsible for ensuring consistency between responses of multiple disciplines. It will be important to refer to contract requirements and approved design criteria when reviewing ALDOT/third-party comments to identify any potential contract changes.

Dependent upon the proposed resolution and the potential design Work involved, the DM and QM shall collectively determine the level of quality checks and reviews that are required for revised deliverables prior to resubmission. Discipline Leads shall make agreed upon revisions to deliverables, which shall be verified and documented. Records of ALDOT/third-party Comment Resolution shall be maintained as a Quality Record. In coordination with the ALDOT Comment Resolution Form, KMT will follow DQCP-40 Client/Third Party Review to ensure that all client comments are addressed and recorded in the internal system.

Quality Management of Design Changes

Revisions or changes to design deliverables shall undergo the same quality check and review processes as defined within the DQMP as the original deliverables. Consideration shall be given to the scope of the revision or change; however, and if such changes do not impact the design configuration, they may require only limited checking and potentially no constructability or interdisciplinary reviews, as determined by the DM and QM.

Records of Design Changes shall be maintained. Procedure DQCP-19 Notice of Design Changes describes these processes in detail.

2.1 QUALITY CONTROL DOCUMENTS

KMT has established Project-wide document control procedures outlined in the Document Management Plan and procedure DQCP-08 Design Quality Document Control describes these processes in detail. At a minimum, this will comprise a filing plan with defined protocols for the retention and issue of design-related documents incoming and outgoing design documents. SharePoint, ProjectWise, and InEight Document will be utilized.

This section establishes the requirements for the naming and control of quality related documents, records, drawings, and data. These controls are necessary to ensure that design team participants and subconsultants (if required) shall have access to the latest and current version of each document.

Quality Record File Naming

Project file naming is supplemented with an additional QC Code field to clarify the specific type of Quality Record document. The QC Code will be inserted in the filename along with a description, document version number, and date to help track versioning of files.

Typical QC Code values include:

- CHK = Detailed Check Print
- CLN = Clean Document revised as per accepted Checker markups or reviewer comments
- Checklist = Discipline Checklists
- DCL = Deferred Comment Log
- CRF = Comment Resolution Form/Bluebeam Session
- IDRCR = IDR_CR documentation such as BlueBeam Session and signoff form.

Control of Quality Records

Control of documents shall include the review of documents by authorized personnel, distribution and storage of those documents, archival or elimination of obsolete documents, and control of changes within the documents. Whenever possible, changes to the controlled documents and data shall be reviewed by the same personnel who reviewed and approved the original documents.

The QM will review document control activities for adherence to the DQMP procedures. The QM will maintain a record of the quality team participants, including a master list of names and initials they use in performing their quality activities.

2.2 ENGINEERING SERVICES DURING CONSTRUCTION

KMT will be responsible for Engineering Services During Construction (ESDC). The management guidelines listed below are to be used in conjunction with their respective Quality Control Procedures (DQCP):

- Request for Information (RFI) Guidelines and Related Materials
- Shop Drawing Guidelines
- Working Drawings (i.e. falsework drawings)
- Notice of Design Change (NDC) Guidelines
- Field Design Change (FDC) Guidelines
- Nonconformance Reports (NCR) Guidelines
- As-Built Guidelines and Related Materials

Responses to RFIs

Responses to RFIs will be subject to DQCP-01 QC Disciplinary Check for the complete QC checking process. When responses to RFIs are major in nature or impact multiple disciplines, the procedures DQCP-19 Notice of Design Change (NDC) or DQCP-20 Field Design Change (FDC) process shall be used as described in DQCP-21 Request for Information (RFI) procedure.

Shop Drawings

DQCP-43 Design Review of Construction Shop Drawings and Submittals should be referenced for more information regarding review of shop drawings. The contract requires Structural Shop Drawings and Working Drawings to be prepared by or under the direct supervision of a PE. The Originator (preparer) and Checker will be two different engineers as required by DQCP-01 QC Disciplinary Check.

Notice of Design Change and Field Design Change

All changes to RFC Design deliverables, whether generated through a NDC or FDC, shall be subject to the same quality checks and reviews as the original design deliverable, with corresponding records

maintained. See DQCP-20 Field Design Change (FDC) for more details. Designer will coordinate with ALDOT to expedite review of Work products.

Nonconformance Assessments

Responses to NCRs may involve deliverables, such as review comments, calculations, estimates, or recommendations. The quality checks and reviews performed on these deliverables are dependent upon the disposition proposed.

When the proposed disposition is to Use As-is or to Repair or Rework the nonconformance such that an engineering evaluation is required, that Nonconformance Assessment or NCR response shall be subject to QC Disciplinary Review, Visual Check, and QA Review, at a minimum. When responses or recommendations relative to NCRs are major in nature or impact multiple disciplines, then optional IDR and/or IDC will be necessary. These decisions shall be made by the DM and Discipline Lead with concurrence of the QM. All corresponding records of checks/reviews shall be maintained.

Dispositions proposed to Remove or Replace the nonconforming condition do not require an engineering evaluation, so no quality check or review is required on these NCR responses.

See DQCP-42 Nonconformance Assessment (NCA) for additional details.

Record Drawings

The construction team will provide red-lined drawings (including incorporated changes), specifications, or both (representing the Work as constructed) upon completion of construction on a particular Design Package or element of Work. DQCP-45 Record Drawings (As-Builts) can be referenced for further information.

2.3 CONTROL OF NONCONFORMANCE

KMT will promote continuous improvement to learn and improve during the Project. Nonconformances from the Project requirements will be addressed promptly and effectively. They will also be handled as learning opportunities and opportunities for improvement.

Design Changes

Requests to deviate from requirements and standards to designs will be made when they are in the best interests of the Project, as determined by the DM. DQCP-19 Notice of Design Changes (NDC) and Variances can be referenced for more information.

Nonconformance

If nonconformances are discovered, they will be documented by the design team through the QM. An NCR workflow (DQCP-42 Non-Conformance Assessment) is used to document, address, and correct the issue. NCRs will be documented in InEight and the KMT team will utilize quality management software to track these incidents.

The procedure for nonconformance reporting includes:

- Identification and description of nonconforming conditions.
- Proposed disposition (i.e., Reject, Rework, Repair, Accept-As-Is)
- Root cause analysis

- Proposed Corrective and Preventive Actions
- Verification of implemented approved Corrective and Preventive Actions

2.4 CORRECTIVE AND PREVENTIVE ACTION

Corrective and Preventive Action is initiated and tracked when design procedures, standards, or processes result in Work not meeting requirements. Corrective Action tracking is not required for planned QC Reviews, where changes or corrections are part of the planned review process.

Design Nonconformance Report

The NCR documentation for design-related items is maintained by the QM. A design NCR is raised with the QM, who assesses the underlying cause and determines whether the issue requires tracking. Issues are treated as nonconformances until the issue has been reviewed and a response provided by the QM. The documentation includes:

- Description of the nonconformance – A detailed explanation of the nonconformance with specific evidence contrasted to the Project requirement.
- Basis for the nonconformance – The source of the Project requirement not reflected in the design documents.
- Root cause – The basic underlying cause of the nonconformance that – if corrected – would have prevented the occurrence of the nonconformance.
- Corrective actions – Actions taken to rectify the impact of the nonconformance and correct any undesirable outcomes that have already occurred.
- Preventive actions – Actions to be taken that will help prevent a recurrence of the nonconformance and create an improved result in the future.

Corrective and preventive action records contain details for monitoring the effectiveness of the follow-up actions. The process varies depending on the nature of the nonconformance and the actions taken. The reviewers and auditors are included in the NCR reporting. They are asked to monitor subsequent Work to confirm necessary corrections are effective in eliminating the root cause of the nonconformance.

Corrective Action

Nonconformances will be recorded in InEight and tracked through resolution. This includes nonconformance identified in Interdisciplinary Checks, CR, and Independent Reviews. Corrective actions typically warrant changes or preventive actions depending on the nature of the nonconformance.

Causal Analysis

Effective Corrective and Preventive Actions require a thorough understanding of the root cause of the nonconformance. Failure to diagnose the true root cause may result in treating a problem's symptom rather than treating the actual source of the problem. The source must be addressed to effectively reduce the likelihood of the problem repeating in the future.

A variety of quality tools may be used to determine the root cause of a nonconformance. Fishbone diagrams, "five why" exercises, and other similar tools are helpful in diagnosing the root source of a problem. Examples are:

- Fishbone Diagram: Identifies many possible causes for an effect or problem. Can be used to structure brainstorming sessions to determine causes of a problem.

  http://asq.org/learn-about-quality/cause-analysis-tools/overview/fishbone.html

- 5 Whys: Define, Measure, Analyze, Improve, Control. By repeating the question "Why", you can expose symptoms that can lead to the root of a problem.

  http://www.isixsigma.com/tools-templates/cause-effect/determine-root-cause-5-whys/

The QM or designee will lead team members in a Causal Analysis to determine the underlying cause of a nonconformance. A description of the root cause is included in the NCR form. The Corrective and Preventive Actions will relate directly to the root cause, so they are targeted at the problem's source and effective.

Preventive Action

Preventive Actions will be implemented to eliminate potential cause(s) of nonconformance. Such actions will include but not be limited to detailed Work planning, use of inspection and test plans, training, and formal management review meetings.

2.5 QUALITY RECORDS AND DOCUMENT MANAGEMENT

A Quality Record is a completed document that furnishes objective evidence attesting to the quality of an item and/or the Work. Specific Quality Records requirements for QC checks and reviews are listed in the specific procedures (DQCPs). Examples of Design Quality Records are:

Design Drawings, Calculations or Reports and associated Checks

Discipline Specific Checklists (as applicable)

Specifications and Checks

IDR/CR Documentation

DQCM Certifications

The DQCM collects and retains the design quality records required by the Contract and the DQMP, maintains the files, and keeps the records available for client review. QC documentation is maintained on ProjectWise and a project specific quality file structure is developed and implemented to maintain quality records.

The Document Management Plan defines the document and records management systems used on the project which are as follows:

ProjectWise: Used for design development and QC documentation

SharePoint: Used as a repository of shared documents and resources such as administrative items, project controls, site visit reports and photos.

InEight Document: Used for all submittals and transmittals to ALDOT including RFIs, NDCs, FDCs, NCRs, etc.

Records Retention

Quality Records will be maintained as required in the contract. All project data with be transferred to ALDOT in a jointly acceptable manner at the end of the design and construction period per the contract requirements as stated in the Document Management Plan.

2.6 QUALITY ASSESSMENTS AND AUDITS

The DQCM has responsibilities for planning, scheduling, and performing Audits to verify compliance with design control requirements. Audits will be conducted per DQCP-11 Quality Assessments and Audits. The KIE District Quality Manager or designee will perform internal assessments.

Overview

Design-related activities shall be assessed for compliance and implementation of quality activities required by contract documents and quality plans. Internal and/or external Quality Assessments and Audits shall be scheduled to provide coverage and coordination with on-going design-related activities. Assessments shall be performed at a frequency commensurate with the status and importance of the activity.

A schedule for Quality Audits shall be maintained by the DQCM. Audits will be scheduled to occur after conceptual design submittal and the 60% design submittal.. The schedule shall be reviewed periodically and revised as needed to ensure the appropriate frequency of assessments is maintained. Regularly scheduled assessments will be supplemented by assessments of specific subjects when necessary to provide adequate coverage. ALDOT Interviews will be conducted as appropriate. Subconsultants will be audited to verify that their work is in accordance with the DQMP and other contract requirements.

Assessments/Audits

Assessments/Audits shall be evaluated against specified requirements, including objective evaluation of the quality related practices, procedures, instructions, activities, and products. Objective evidence, such as documents and records, shall be examined to the depth necessary to determine whether the quality plan is effective and properly implemented. This could include evaluation of an overall management system (e.g., execution plan, standards, and procedures) or a discipline Work product (e.g., drawings, data sheets, and calculations).

A debrief meeting is held with management covering the areas being assessed/audited to evaluate and validate the findings, if any, and formulate a proposed Corrective Action and schedule to resolve the findings using the procedure DQCP-38 Corrective and Preventative Action. Results shall be documented, analyzed by the DQCM and QM, and reported to the Project Manager and DM for review and appropriate action. Audit Reports including findings and Corrective Actions are to be maintained as Project Quality Records and submitted to ALDOT.

2.7 TRAINING

This section describes the responsibilities for identifying training needs and providing for the instruction and training of the design team personnel who will be performing activities affecting the

quality of the design documents produced for the Project. Training is to be delivered to personnel prior to performing their specific Work activities.

Design team personnel performing or managing quality activities shall be required to be familiar with specific requirements of contract documents and all other applicable documents pertaining to their assigned responsibilities. All personnel shall receive instruction regarding their activities related to the achievement of the quality and technical requirements of the contract documents and the DQMP. If needed, personnel performing activities that require specific training and certification shall be identified and shall receive the proper training and certification. The extent of instruction and training required depends on the following elements:

- Scope, complexity, and nature of the activity.
- Education, experience, and proficiency of the person.
- Specific requirements of the contract documents regarding training and certification.

Scope

Quality training will focus on the Project requirements in the DQMP. Training will emphasize the importance of quality and the responsibility each team member has to achieving quality.

Audience

All team members who will work on design deliverables will be trained on the DQMP. The DM and DQCM are responsible for determining the required audience for training.

Training Materials

Training materials will be delivered through a mix of platforms. Actual Project examples will be used whenever possible to make the training more relevant to the team and specific to the Project requirements. Training materials will be posted on SharePoint. Training on the DQMP will be developed by the DQCM.

Training Formats

The DQCM will deliver the training in-person in the design locations where feasible. However, remote video/audio conference training will also be offered to maximize the audience for the training. Training will be interactive in nature, with questions asked of the trainees during the sessions. If additional topics are to be discussed beyond that limit, separate training sessions are typically used. Training may be recorded, so attendees can review the material presented after the training at their convenience.

Tracking

Training is tracked via sign-in sheets at the on-site training events. Remote trainees must complete sign-in sheets and submit them to the trainer at the end of the training event.

A master log of Project team members who completed the training will be maintained by the DQCM on SharePoint. This log will be reviewed by the QM quarterly against the list of people actively working on the Project to confirm the training is reaching the necessary audience. The training log is a Quality Record stored on SharePoint and made available to auditors upon request.

APPENDIX A – TERMS AND DEFINITIONS

CAD	Computer-Aided Design
CEPP	Comprehensive Environmental Protection Plan
CQAM	Construction Quality Assurance Manager
CQCM	Construction Quality Control Manager
CQMP	Construction Quality Management Plan
CR	Constructability Review
CRF	Comment Resolution Form
CSI	Construction Specification Institute
DB	Design-Build
DBA	Design Build Agreement
DCAP	Design Corrective and Preventive Action Process
DM	Design Manager
DL	Discipline Lead
ECM	Environmental Compliance Manager
EOR	Engineer of Record
ESDC	Engineering Services During Construction
ESDCM	ESDC Manager
FDC	Field Design Change
ICF	Independent Checking Firm
IDC	Independent Design Check
IDR	Interdisciplinary Review
IFC	Issued for Construction
IQ	Independent Quality
IQF	Independent Quality Firm
IQP	Independent Quality Procedures
MQRSD	Model Quality Review Summary Document
MSE	Mechanically Stabilized Earth

NCA	Nonconformance Assessment
NCR	Nonconformance Report
NDC	Notice of Design Change
OTS	Over-the-Shoulder
PDS	Post Design Services
PE	Professional Engineer
PMP	Project Management Plan
DQC	Design Quality Construction
DQCM	Design Quality Control Manager
QM	Quality Manager
DQMP	Design Quality Management Plan
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QC'd	Quality Checked
DQCP	Design Quality Control Procedures
QM	Quality Manager
QMP	Quality Management Plan
QMS	Quality Management System
QSP	Quality System Procedure
RFC	Released for Construction
RFI	Requests for information
RFP	Request for Proposal
RQD	Rock Quality Designation
SOP	Standard Operating Procedures
KMT	KMT Massman Traylor
S.U.E.	Subsurface Utility Engineering
TSCD	Temporary Structures and Construction Devices
UDC	Utility Design Coordinator

UM Utility Manager

VAR Value-Added Response

Accept-As-Is - A potential disposition proposed by a DB Contractor to address a nonconforming condition. This disposition suggests the DB Contractor prefers to do nothing and seeks engineering and potentially ALDOT approval of this disposition. This disposition requires an engineering evaluation and response, which is subject to quality check and review activities in accordance with this quality plan.

Accuracy Check - A check performed during the QC Disciplinary Review to verify that Project deliverable inputs and outputs are correct, and that assumptions and conclusions are accurate.

Backchecker - An individual, typically the Originator of a deliverable, who is responsible for reviewing comments made by a Checker and documenting agreement or disagreement with those comments. The Backchecker is also responsible for resolving any differences of opinion with the Checker.

Bluebeam - A software application that facilitates the electronic QC Disciplinary Review, Interdisciplinary Review, and Constructability Review while providing all reviewers simultaneous access to the Check Print with visibility to all comments.

Bluebeam Revu - A full licensed version of Bluebeam used to mark up, edit, create, and collaborate on PDF documents.

Bluebeam Studio Session - As part of Bluebeam Revu, the studio session provides cloud-based collaboration tools and allows multiple users, located anywhere, the opportunity to proactively collaborate and create mark ups on PDF documents at the same time, in real time and with account-based user access.

Change Management Plan - A Project-specific plan, required by the Project Plan Standard of Performance, that describes the process by which contract changes will be managed.

Checker - A qualified individual with sufficient, relevant experience in the area of what is to be checked, and in some cases possessing specific subject matter expertise. The Checker shall be independent of the production of the deliverable being checked but will have familiarity with ALDOT, contractual requirements, and the approved design criteria.

Check Print: A hardcopy or electronic copy of a deliverable submitted for the quality check and review process. This term may apply to plans, specifications, reports, studies, calculations, or other Project deliverables. The Check Print is used to record Check, Backcheck, Update, and Verify activities.

Conformance Check - A check performed during the QC Disciplinary Review to verify the deliverable meets the design criteria, or other deliverable requirements. Conformance Checks are performed using the design criteria itself (when sufficiently detailed), a ALDOT-provided design criteria report or checklist, or a discipline-specific design criteria checklist developed by the Discipline Lead to ensure key discipline-specific criteria are fulfilled.

Constructability Review - A review of deliverables performed to identify and address opportunities to improve the cost effectiveness of construction, the suitability of the design to traditional construction means and methods, and the clarity of the construction documents.

Corrective Action - An improvement action taken in response to a confirmed nonconformance, to address and prevent recurrence of the root cause of the nonconformance.

Deliverables - Formal Project deliverables provided to ALDOT as documented within the Project scope and internal deliverables captured during the Work planning process.

Discipline Lead - A qualified individual responsible for the production and quality of Project deliverables within a given discipline.

Design Quality Control Procedure - See Design Quality Control Procedures as part of Appendix A.

Design Quality Management Plan - See Project Quality Plan.

Field Design Change - Design Changes initiated by the DB Contractor to documents approved and Released for Construction (RFC) are typically completed under an FDC. FDCs are subject to quality check or review activities.

Field Review - A review of the design conducted by the Task Lead or Designer in the field to confirm the adequacy of the design to the actual location.

Final Design - The last submittal of design deliverables to ALDOT, representing the final milestone submittal.

Independent Checking Firm – Firm that will complete the independent design check of the Main Span and High-Level Approaches.

Independent Design Check - An independent check performed on Project deliverables, when required, to gain a higher level of confidence that inputs and outputs used in the design are correct, to verify compliance with design criteria, and to conduct independent analysis of critical Project elements. IDC is performed through the development of independent calculations, without reference to the original calculations.

Interdisciplinary Review - A review performed on deliverables comprised of multiple disciplines to ensure consistency of the design between disciplines and segments; between design prepared by the Designer and its subconsultants; between design of the Project and potential adjacent Projects; between design of the Project and the potential affected facilities owned by other stakeholders; and to prevent coordination errors in construction documents.

Interface Management - A proactive process by which Discipline Leads, including subconsultants collaborate and coordinate early on and throughout the development of the design to identify and subsequently resolve potential interface conflicts in the design. Interface management is encouraged and will be utilized on Projects that involve multiple disciplines and potential interfaces with existing Projects and/or facilities to prevent coordination issues in advance of Interdisciplinary Review.

Managed Status - A Bluebeam custom setting that allows users to set a prescribed set of statuses and options for a line item in the markups list based on a defined workflow.

Markup List - A specialized tab within Bluebeam, with a horizontal layout like Excel, that provides features for processing, accessing, reviewing, and summarizing the annotations on a PDF.

Nonconformance Reports - During the execution of a DB contract, there are instances where some aspect of the design or construction is not in accordance with the contract requirements. The nonconformances are documented using an NCR.

Notice of Design Change - Design Changes initiated by the designer to documents approved and RFC are typically completed under an NDC. NDCs are subject to quality check or review activities.

Originator: An individual responsible for producing a Project deliverable. In the case of a Corrective or Preventive Action, the Originator is the individual who becomes aware of an improvement opportunity and initiates the Corrective/Preventive Action process.

Over-the-Shoulder Review - A review of Project deliverables performed with ALDOT in between formal submittals to confirm that the design, as it progresses, fulfills requirements and expectations relative to design criteria and scope.

Preventive Action - An improvement action taken in response to a nonconformance to address and present occurrence of the root cause of the nonconformance.

Profile - A Bluebeam pre-configured user interface, which provides the users with custom toolsets and managed statuses associated with a particular workflow.

Project Quality Plan - A documented plan, required for each Project, describing how quality is managed for the Project.

QC Disciplinary Review - The first in the sequence of quality checks and reviews performed on all Project deliverables by an independent qualified QC Reviewer/Checker within the discipline to check the conformance, accuracy, scope, and style of a Project deliverable. The QC Disciplinary Review process involves Checking, Backchecking, Updating, and Verifying.

Quality Assurance - Those activities performed to assure that QC activities were performed on Project deliverables in accordance with the Project Quality Plan and to assure that those QC activities were effective to meet Project requirements.

Quality Assurance Review - The final quality review completed on Project deliverables. This QA Review, typically performed by the Design Quality Assurance Manager, is performed to assure that all other required quality checks and reviews have been performed and that corresponding records are available.

Quality Audit - A systematic process by which an independent and qualified party performs an objective review to confirm implementation of the DQMP and to identify opportunities for improvement in processes and systems.

Quality Control - Those activities performed to check and review Project deliverables to assess compliance with Project requirements and to subsequently correct nonconformance.

Quality Management - Those activities performed to plan for, control, monitor, and assure that Project deliverables meet Project requirements. The entirety of the processes described in the DQMP.

Quality Planning - The process of developing a quality plan for Projects to ensure that Project deliverables meet requirements, including the determination of necessary QC and QA activities.

Quality Record - A record, potentially a completed form, Check Print, or other documented evidence (either in electronic or hardcopy format) to indicate execution of and compliance with the Quality Management System or a DQMP.

Record Drawing - An official record of the Project at the time construction is completed based on the original construction documents revised to show all additions, deletions, or any other changes made during construction. Record Drawings are subject to quality check or review activities.

Repair - A potential disposition proposed by a DB Contractor to address a nonconforming condition. This disposition suggests the DB Contractor prefers to repair the nonconforming condition such that form, fit, or function are restored; however, the repaired condition will not fully comply with plans or specifications, and seeks engineering and potentially ALDOT approval of this disposition. This disposition requires an engineering evaluation and response, which is subject to quality check and review activities in accordance with this quality plan.

Replace - A potential disposition proposed by a DB Contractor to address a nonconforming condition. This disposition suggests the DB Contractor prefers to fully replace the nonconformance and return full compliance with plans or specifications. Response to this disposition does not require any engineering evaluation, so this response is not subject to quality check or review activities.

Requests for Information - During construction, RFIs are used to formally ask a question or request direction or clarification. Responses to RFIs are subject to quality check or review activities.

Responsible Manager - An individual with appropriate responsibility and authority to address nonconformance or nonconformance in accordance with the Corrective/Preventive Action process.

Rework - A potential disposition proposed by a DB Contractor to address a nonconforming condition. This disposition suggests the DB Contractor prefers to fully rework the nonconformance and restore full compliance with plans or specifications. Response to this disposition does not require any engineering evaluation, so this response is not subject to quality check or review activities.

Scope Check - A check performed during the QC Disciplinary Review to ensure the design meets the required level of completeness for the phase/milestone being submitted.

Style Check - A check performed during the QC Disciplinary Review to verify compliance with applicable CAD standards and style requirements.

Updater: An individual responsible for making updates or corrections to Project deliverables in accordance with the Backchecker’s resolution of the Checker’s comments.

Verifier - An individual, typically the Checker, who is responsible for verifying that Checker comments have been resolved as intended.

Visual Check - A Visual Check of the final Project deliverable to confirm that it is complete, in the proper order, and printed/plotted or electronic appearance is in accordance with requirements.

Work Plan - A resource-loaded critical path schedule that includes the Work break-down structure, workflow diagram, schedule, staffing plan, and budget for the Project.

APPENDIX B – LIST OF QUALITY PROCEDURES

Below is a list of DQCPs in Appendix B. The following procedures are Kiewit Infrastructure Engineers Quality Procedures which detail quality control and assurance processes and procedures. In some cases, the titles are not identical, but the intent is the same. The ALDOT designation of "Design Quality Control Manager" is shown as "Design Quality Assurance Manager" throughout these procedures.

Procedure Number	Description
DQCP-01	QC Disciplinary Check
DQCP-02	Checking of Computer Input
DQCP-05	Independent Design Check
DQCP-07	Design Risk Assessment
DQCP-08	Design Document Quality Control
DQCP-09	Software Validation
DQCP-10	Spreadsheet Checking
DQCP-11	Quality Assessments and Audits
DQCP-12	Quality Planning
DQCP-13	Quality Program for Subconsultants
DQCP-14	CAD and Graphical Standards Compliance Check
DQCP-15	Over The Shoulder (OTS) Reviews
DQCP-16	QA Review and Certificate of Compliance
DQCP-17	Design Quality Reporting - DevonWay
DQCP-18	Control of Third Party Supplied Documents and Materials
DQCP-19	Notice of Design Change (NDC)
DQCP-20	Field Design Change (FDC)
DQCP-21	Request for Information (RFI)
DQCP-22	Environmental Compliance
DQCP-24	Interdisciplinary Review (IDR)
DQCP-25	Constructability Review (CR)
DQCP-26	Data Collection and Field Investigations
DQCP-38	Corrective and Preventive Action
DQCP-40	Client/Third Party Review
DQCP-42	Nonconformance Assessments
DQCP-43	Design Review of Construction Shop Drawings
DQCP-44	QC Existing Surface
DQCP-45	Record Drawings (As-Builts)

APPENDIX C – QUALITY FORMS

DQCP FORMS	Revision	Date
DQCP-14 FRM1 CAD Compliance Form	0	June 2023
DQCP-16 FRM1 DQCM Certification of Compliance	0	June 2023
DQCP-16 FRM2 Design Builder Design Certification	0	June 2023
DQCP-24 FRM1 IDR/CR Signoff Form	0	June 2023
DQCP-24 FRM2 IDR/CR Deferred Comment form	0	June 2023

QC DISCIPLINARY CHECK

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	01/01/16
Drew Litchfield	Approval/Revision history page, and header revised. Appendices and References clarified; hyperlinks for documents and forms created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Restructure for usability; resolve duplication	2.0	06/15/2020
David Williams	Combined DQCP-01, 03, 04 and 06 into DQCP-01	3.00	01/25/2021
David Williams	Update title, Added reference to DQCP-39	3.01	11/29/2021
Kathleen Ehlke	Updated DQCP-39 references to WI-01, updated check print stamp	3.02	07/11/2022
Christopher Barr	Revised section 5.3 Checker to clarify optional use of Checker's calculations to verify Originator's calculations	3.03	11/04/2022

APPROVAL FOR THIS PROCEDURE:

Revision 3.03

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). This procedure defines roles, responsibilities and process for the detailed, discipline specific QC check of project deliverables. This Procedure specifies Conformance Checks, Accuracy Checks, Scope Checks and Style Checks.

2. SCOPE

This procedure shall apply to the Quality Control (QC) check of all project deliverables prior to Issue for Estimate or submission to a client. This procedure applies to drawings, specifications, calculations (including quantities and construction cost estimates), reports, and studies, etc. All deliverables, regardless of milestone or design stage, shall undergo QC Disciplinary Check commensurate with the level of detail available for the milestone or stage of the deliverable being checked. While this procedure may not formally apply to interim or working drafts, it is important to note interim, day to day QC checking is essential throughout the design process to maintain project schedules and avoid rework. QC Disciplinary Check fulfils the standard of care expectation of more than one qualified person reviewing the work to meet the requirements.

3. DEFINITIONS

- QC – Quality Control. A part of quality management focused on confirming adherence to requirements.
- QA – Quality Assurance. A part of quality management focused on confirming quality control.

4. RESPONSIBILITIES

Design Manager (DM), or designee, is responsible for assigning staff and scheduling checks and reviews. The DM is supported by Discipline Leads. The Design Manager or the Discipline Leads (if not in the role of the Checker) are expected to monitor the QC comments, to ensure consistency and conformance with the Scope.

Design Quality Assurance Managers (DQAM) will oversee and assess the processes for conformance to the DQMP and project specific plans and documents.

Originator has the initial responsibility for accuracy and adequacy. The Originator of each document is responsible for making the check print, however produced, that is carried through subsequent quality control reviews. The Originator is responsible for following the document through the checking process and obtaining required signoffs.

Checker is a qualified individual with sufficient, relevant experience in the area of what is to be checked. The Checker is independent of the Originator for the deliverable being checked, but should have familiarity with the client, project requirements and the approved design criteria. The Checker completes applicable design review checklists during the checking process.

The Checker must be a PE in the discipline, or otherwise qualified and approved by the DM and the DQAM.

Backchecker (ideally the Originator). The Backchecker reviews the Checker's marks on the check print and either agrees with the Checker's red-marked changes or coordinates with the Checker to resolve disagreement. Markups or comments that cannot be resolved between the Backchecker

and Checker are escalated to the Discipline Lead, DM or Engineer of Record (EOR). The Backchecker cannot serve as the Checker.

Updater, revises and updates the original document to comply with the changes and markings on the backchecked (agreed-to) check print.

Verifier does not re-check the document content but verifies implementation of the Updater's work by reviewing a copy of the updated document against the check print. If the corrections are not made or are erroneous, the check print with instructions is returned to the Updater. The Verifier cannot serve as Updater.

5. PROCEDURE

5.1 Process Flow

This process is for all deliverables - drawings, calculations, reports or any submittal to a client, estimator, independent reviewer, constructability reviewer or stakeholder in the design process. Deliverable review is planned in accordance with DQCP-12 Quality Planning.

The QC Disciplinary Check may be accomplished in a Bluebeam Studio Session (BBSS) in accordance with **WI-01, Conducting QC Disciplinary Check Using BB Studio Session**.

5.2 Originator

The Originator shall prepare the deliverable in accordance with contract requirements, approved design criteria, level of completeness for the design stage, and in accordance with the schedule in the DQCP-12 FRM1, Deliverable Quality Matrix.

The Originator shall perform a self-review of the deliverable to ensure compliance with requirements including approved design criteria, design changes, CADD standards, and accuracy of the deliverable. The Originator shall verify comments from a previous milestone or stage to be addressed within this milestone or stage, (including comments from the client), and applicable Over the Shoulder (OTS) Review comments have been incorporated as indicated.

The Originator shall utilize design criteria, design review checklists, client provided checklists (as applicable) or discipline specific design criteria developed by the Discipline Lead to aid in the preparation and self-check of the deliverable. Standard templates for discipline checklists are posted to the KIE Quality page in the Design Review Checklist tile.

The Originator shall prepare a check print stamp (electronic or hardcopy) on the deliverable and submit to the Checker. A deliverable submitted for review should be complete for the milestone or stage.The check performed represents the deliverable as it will be progressed (i.e submitted for IDR/CR, to client, etc.). Subsequent design work is to be checked.

The checkprint stamp is applied on the cover of the study, report or specification section, on each drawing, and on the front cover of each set of calculations.

Calculations shall be documented so a knowledgeable reviewer can follow the progression. Calculation using spreadsheets shall be prepared so the reviewer can confirm cell references and formulas. Calculations using software packages or spreadsheets must present the inputs, their sources or references, and the output values in accordance with DQCP-02, Checking of Computer Input or DQCP-10, Spreadsheet Checking, respectively.

Specifications, Special Provisions, Reports or Studies prepared in MS Word may reviewed using Track Changes or markup to a PDF. The DQAM and the DM will determine which to use.

If using Track Changes, the Originator shall submit the file to the checker with a file name indicating it is the initial file in the QC progression. The checker returns the file with the markups and creates a PDF (showing the comments and changes) for the QC records.

If PDF markups are used, the color code conventions and process in this procedure are applied.

Originator

Self-checking is the first step in the quality process. The Originator shall ensure project documents are organized to facilitate checking. The Originator shall submit the documents to the Checker only after performing a complete self-check.

- Create a check print. Check prints may be either hardcopy (paper) or electronic (PDF).
- Make a copy of the complete project document. The QC check print must match the source document.
- Place a check print stamp (Appendix B, Figure 2) on the front sheet.
- Sign and date the check print stamp. Use at least first initial, last name.
- Calculations to include a cover or memo to show references, assumptions and, as appropriate, software.

5.3 Checker

The Design Lead, working with the Design Manager, shall plan for checking (documented per DQCP-12), including the applicable criteria and if checklists are used. The Checker shall perform:

- **Conformance Check.** Using the design criteria itself (including design changes), a client provided criteria checklist (if applicable), or discipline specific criteria checklists. Methods used to perform the conformance check may include:
    - Comparison with a similar design
    - Performing alternative calculations
    - Independent measurement, test or calculation
- **Accuracy Check**. The Checker shall verify:
    - design deliverable outputs are correct,
    - calculation inputs and outputs are correct and do not contain mathematical inconsistencies,
    - methodologies and assumptions and conclusions are accurate,

- supporting reports and studies are accurate,
- conclusions are supported by calculations and data, and
- information shown on drawings is consistent with the results of calculations and study reports.

Formulas utilized in calculations performed by spreadsheets shall be validated using manual calculations upon the first use and spot checked thereafter. Hand calculations shall be confirmed by the checker. Procedures for Checking Computer Input (DQCP-02), Spreadsheet Checking (DQCP-10) and Software Validation (DQCP-09) provide guidance.

- **Scope Check.** The Checker shall verify the deliverable is complete and required components, such as drawings, specifications, reports, etc., are present.The Checker shall verify the deliverable represents the level of completeness required for the design stage or milestone of the deliverable (e.g. Preliminary, issue for estimate, Final, issue for construction/release for construction.). The Scope check shall also confirm the work meets the requirements of the contract.
- **Style Check.** The Checker shall verify a deliverable is compliant with CAD requirements and graphical standards, including any Style Guide or other requirements relative to the appearance of the deliverable, including fonts, use of language, grammar and spelling.

  Depending on the complexity of the deliverable, the Checker will either:

  - Review and confirm the style and formatting are correct directly, or;
  - Confirm DQCP-14 CAD and Graphical Standards Compliance Check is performed.
- **Comment Response.** The Checker shall verify revisions resulting from comments on a previous milestone or stage, comments from client/owner review, and/or revisions made as a result of OTS Review comments have been incorporated.

The Checker shall sign and date the check print stamp if the review is of check prints in hardcopy or PDF markups or in accordance with Work Instruction WI-01 Conducting QC Disciplinary Check using BB Studio Session. If the Checker has no comments on a sheet, they shall make a single diagonal Yellow slash across the sheet to indicate contents are correct.

For specifications, special provisions, reports, memos or studies, the Checker may use Word Track Changes for QC Disciplinary Check comments, making changes or additions to the text or comments in the margin. A PDF print file, with markups shown, shall be retained as a record of Checking. A check print stamp, on the first page, is used to record the review process and confirm the Checker has fully reviewed the work, especially if no comments or markups were made.

The Independent Design Check, Interdisciplinary Review, Constructability Review and the Environmental Compliance Review are other planned review activities, separate from the QC Disciplinary Check. The DM should plan to ensure they are staged efficiently, to minimize overlap but provide for comprehensive review.

Checker

- Complete a line by line check of each component of work.
- Document the QC check on the check print:
  - Highlighting checked, correct items in yellow
  - Mark corrections, additions or deletions in **red**.
  - Questions, notes and comments for clarification or direction, but not to be changed or drafted, in **blue**.
    - For calculations, in lieu of a line by line check of the Originator's calculations, the Checker may perform their own separate calculations to validate the results calculated by the Originator, using the steps described below:
      - Place a note in blue along the right-side edge of the QC check print stamp stating: "See Checker's calculations".
      - Label the sheets as "QC Check Calculations"; number, sign and date the sheets.
      - Insert the Checker's separate calculations to the check print at the end of the subject section as a record.
      - Compare the result(s) of the Checker's calculations with the result(s) of the Originator's calcultions. Highlight the Originator's result in yellow if correct, or mark corrections in red.
- Sign and date the check print stamp when the check is complete. Each element or page checked should have a yellow highlight or a comment included next to the check print stamp indicating no comments.
- Give the completed and signed check print to the Backchecker.

Where no corrections, additions or deletions are made, backchecking or further signatures on the check print stamp are not necessary. The Checker shall indicate in **blue** next to the check print stamp that there were no corrections, additions or deletions.

5.4 Backchecker

The Backchecker shall review all the Checker's comments and note agreement or disagreement with the comments on the check print in accordance with the Color Code. The Backchecker shall sign and date the check print stamp if using hardcopy, or in accordance with WI-01 Conducting QC Disciplinary Check using BB Studio Session.

For specifications, special provisions, reports or studies, the Backchecker shall utilize Word Track Changes to note agreement or disagreement with comments, making changes or additions to the text or comments in the margin. The Backchecker shall also sign and date the check print stamp. A

PDF print of the document, with mark ups and comment shown, shall be retained in the project files as a record of the Backchecker's review.

In cases where the Backchecker disagrees with the Checkers comment, the Backchecker should document the rationale for disagreement with the Checker and obtain documented concurrence from the Checker. If disputes remain, the issue shall be escalated to the Discipline Lead and DM, or EOR for resolution.

Backchecker

- Review the Checker's corrections and notes on the check print.
- Document the backcheck review process as follows:
  - Place a green check mark ✓ by each item marked in red to indicate agreement with the change.
  - Write "stet"* in **green** and cross out the **red** mark up when not in agreement with the change.
  - Mark up additional corrections, additions or deletions in **green**.
  - Meet with the Checker to discuss the "stet" dispositions; the additional corrections, additions or deletions; and notes:
    - If the Checker agrees with the "stet" disposition, an addition, correction or deletion in **green**, the Checker places a red check mark ✓ next to the Backchecker's change to indicate agreement with the change.
    - If the Checker disagrees with the "stet" disposition, an addition, correction or deletion, the Backchecker and the Checker work together to determine the correct change and the Backchecker marks up the agreed upon change in **green** and the Checker indicates agreement with a red check mark ✓.
- Sign and date the check print stamp when the backcheck is complete.

Changes made after the beginning of the QC check but before verification must be marked on the check print either by the Checker or Backchecker, including subsequent calculations and sketches that arose due to changes. When there are significant changes to one or more sheets, a new check print can be created to save time in marking all changes. The Checker must check all information on the new check print, not just the changes. If changes occur after verification, a new check print is required.

*stet – editors convention for "let it stand"; retain material previously cancelled; no changes necessary.

5.5 Updater

In some project teams, changes by the Checker are delegated to an Updater, if not done by the Originator. The Updater shall make the necessary updates to the native format of the deliverable and shall note completion of updates on the check print, in accordance with Color Codes. Once updates have been made, the Updater shall prepare a clean check print and provide it to the Verifier with the original markups.

In the case of deliverables such as specifications, special provisions, reports or studies, the Updater shall utilize track changes to accept or reject changes and incorporating comments as indicated by the backchecker. A PDF print file, with markups shown, shall be retained as a record of the checking. When hard copy is used, the Updater shall sign and date the check print stamp on the Updater line.

Updater

- Make the corrections to the original drawing and circle the correction on the check print in green when incorporated.
- Verify design based on the drawing update is revised appropriately.
- Sign and date the check print stamp when all corrections are made.

When backcheck and updating processes are combined into a single step the green check and green circle may be replaced by highlighting in green. In those instances, the updater also signs as the backchecker.

5.6 Verifier

The Verifier shall verify that agreed upon updates have been made to the deliverable, and shall note such verification on the check print, including concurrence with Backchecker's status of agreement, in accordance with the appropriate procedures and shall sign and date the check print stamp if using hardcopy. A PDF print file, with markups shown, or a Bluebeam QC Disciplinary Review Summary Log shall be retained as a record of the Checking. QC Disciplinary Check should be complete by the date documented in the DQCP-12 FRM1 Deliverable Quality Matrix, including the verification of all updates.

Verifier

- Compare the check print corrections with the updated version of the drawing to confirm that all corrections are incorporated without error.
- Highlight the green circled/highlighted item in blue on the check print if the correction is made properly.
- Annotate the check print with instructions in **black** and return the check print to the updater/originator if the correction is not made properly or is in error.
- Updater/originator makes the correction and prints a new updated print for the verifier.
- Sign and date the check print stamp and return the check print and the updated original drawings to the originator once all revisions are verified.

5.7 Quality Records

If the check was completed using Bluebeam Studio Session, the Originator shall generate a QC Disciplinary Review Summary Log as a PDF, showing comments, status as evidence of backcheck, update and verification. The project shall maintain a copy of the summary report along with copies of all electronic check prints in accordance with DQCP-08 Design Quality Document Control Procedures.

If the check was completed using hardcopy, the Originator shall ensure copies of check prints with completed check print stamps, comment responses, supporting calculations, etc. are retained in the quality record folders.

If the check was completed using Track Changes, a PDF print, with track changes visible and comments, will be retained in the project files.

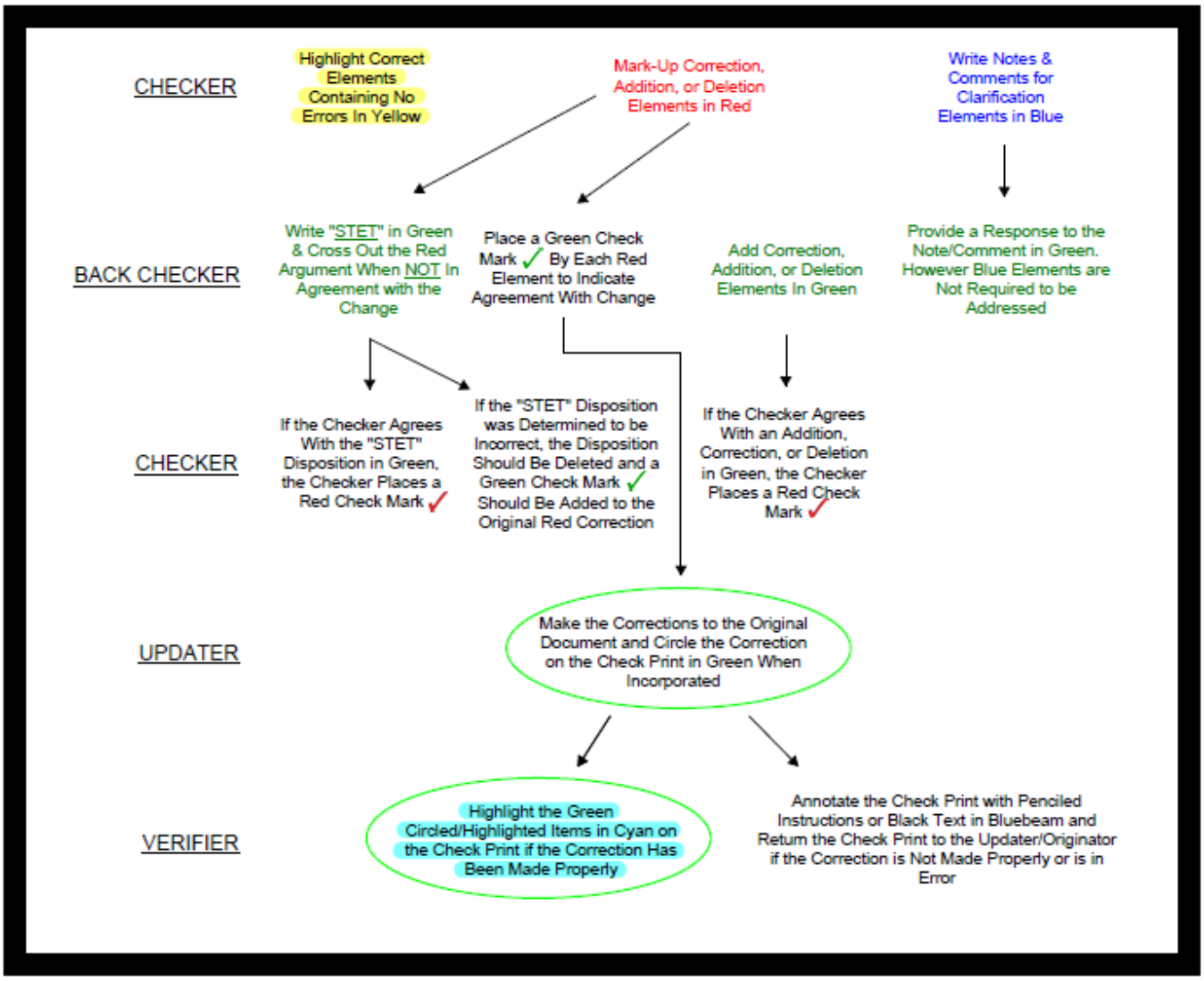
6. REFERENCES

- DQCP-08 Design Quality Document Control Procedures
- DQCP-10 Spreadsheet Checking
- DQCP-14 CAD and Graphical Standards Compliance Check
- WI-01 Conducting Disciplinary Check Using BB Studio Session

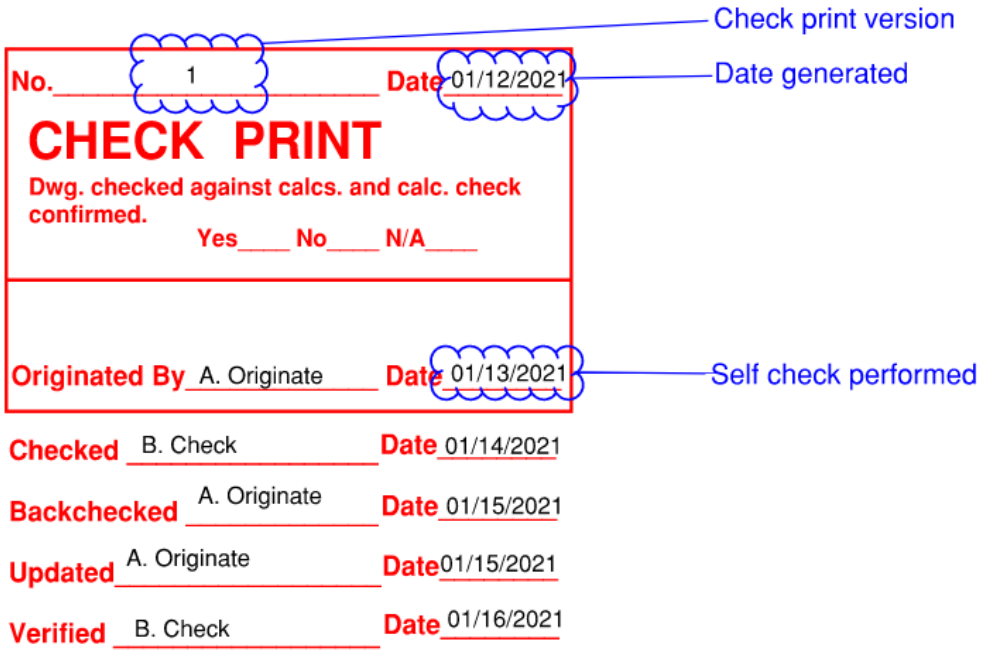
7. QUALITY RECORDS

- Bluebeam Review Session Record; or
- PDF prints of document markups; and
- Deliverable with completed Check Print Stamp

APPENDIX A– WORK INSTRUCTION FOR QC CHECK COLOR CODE

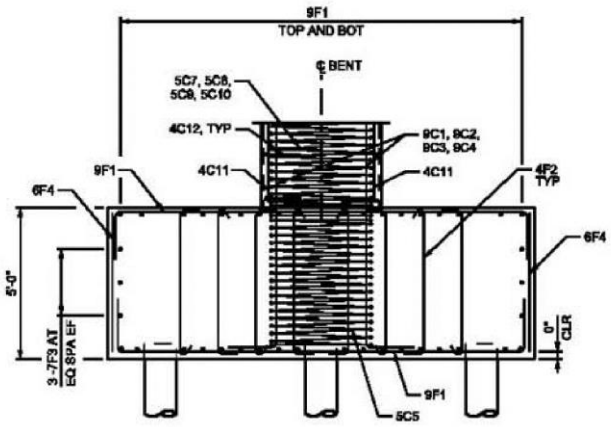


APPENDIX B – CHECK PRINT STAMP (WITH GUIDANCE)



APPENDIX C – EXAMPLE DRAWING QC CHECK

Originator



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

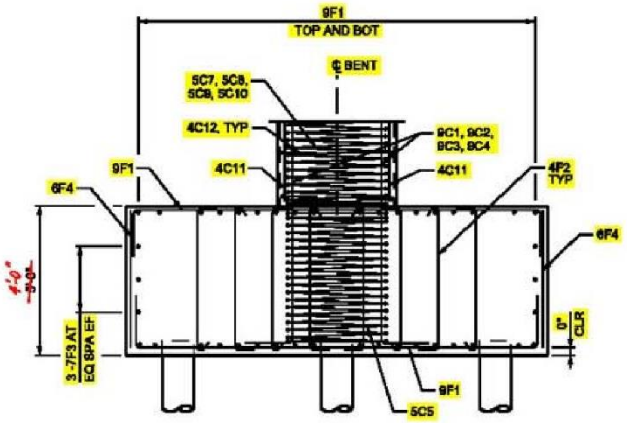
Checked _____ Date _____

Backchecked _____ Date _____

Updated _____ Date _____

Verified _____ Date _____

Checker



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

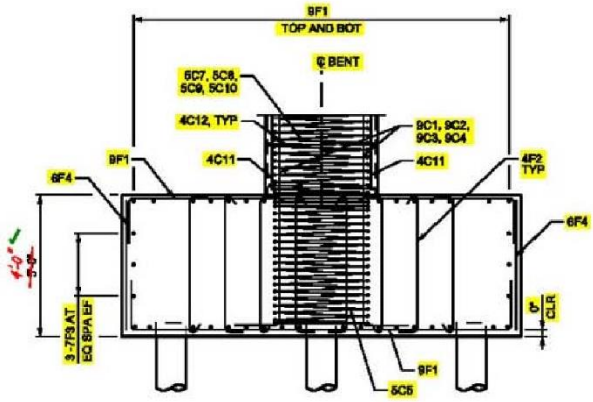
Checked MR Date 08/17/15

Backchecked _____ Date _____

Updated _____ Date _____

Verified _____ Date _____

Backchecker



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

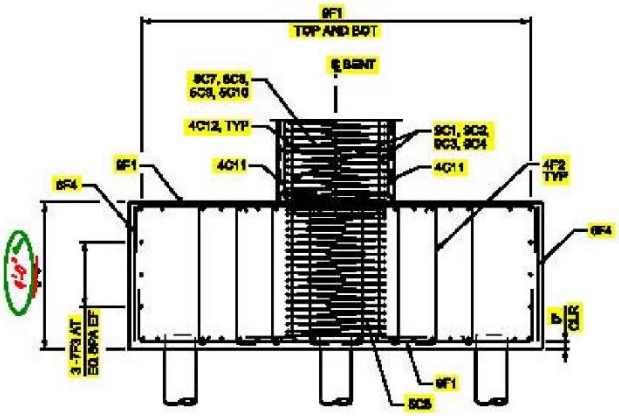
Checked MR Date 08/17/15

Backchecked JD Date 08/18/15

Updated _____ Date _____

Verified _____ Date _____

Updater



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

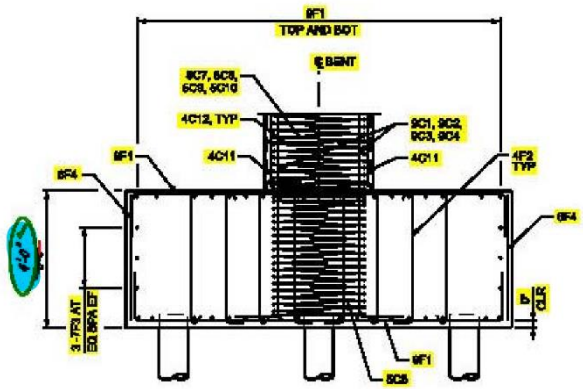
Checked MR Date 08/17/15

Backchecked JD Date 08/18/15

Updated JD Date 08/18/15

Verified _____ Date_____

Verifier



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

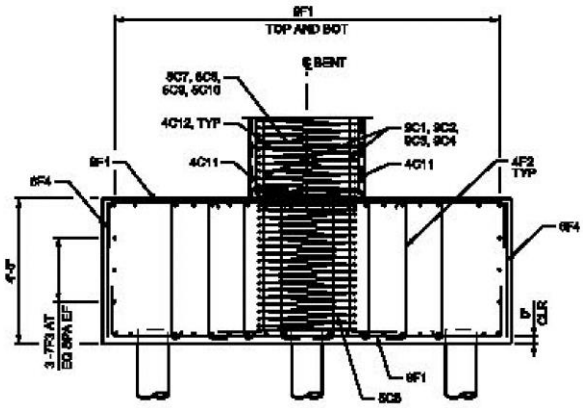
Checked MR Date 08/17/15

Backchecked JD Date 08/18/15

Updated JD Date 08/18/15

Verified MR Date 08/19/15

Final Version



APPENDIX D – EXAMPLE DESIGN CALCULATION QC CHECK

Originator

The dead load of the barrier per foot of length is calculated as:

$$A_{barrier} = (0.5)\left(\frac{8''}{12}\right)\left(\frac{51''}{12}\right) + \left(\frac{51''}{12}\right)\left(\frac{9''}{12}\right) = 4.6042\ ft^2$$

$$W_{barrier} = \left(4.6042\ ft^2\right)\left(145\frac{lb}{ft^3}\right) = 667.6042\frac{lb}{ft} \text{ or } 0.6676\frac{kip}{ft}$$

The barrier can be evenly distributed to all four girders:

$$W_{barrier} = \frac{0.6676\frac{kip}{ft}}{4\ girders} \times 2\ barriers = 0.3338\frac{kip}{ft}$$

No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

Checked _____ Date _____

Backchecked _____ Date _____

Updated _____ Date _____

Verified _____ Date _____

Checker

The dead load of the barrier per foot of length is calculated as:

$$A_{barrier} = (0.5)\left(\frac{8''}{12}\right)\left(\frac{\text{51}''\ \to\ 42''}{12}\right) + \left(\frac{\text{51}''\ \to\ 42''}{12}\right)\left(\frac{9''}{12}\right) = \text{4.6042}\ \to\ 3.7917\ ft^2$$

$$W_{barrier} = \left(\text{4.6042}\ \to\ 3.7917\ ft^2\right)\left(\text{145}\ \to\ 150\ \frac{lb}{ft^3}\right) = \text{667.6042}\ \to\ 568.75\frac{lb}{ft} \text{ or } \text{0.6676}\ \to\ 0.5688\frac{kip}{ft}$$

The barrier can be evenly distributed to all ~~four~~ five girders:

$$W_{barrier} = \frac{\text{0.6676}\ \to\ 0.5688\ kip/ft}{\text{4}\ \to\ 5\ girders} \times 2\ barriers = \text{0.3338}\ \to\ 0.2275\frac{kip}{ft}$$

No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

Checked MR Date 08/17/15

Backchecked _____ Date _____

Updated _____ Date _____

Verified _____ Date _____

Backchecker

The dead load of the barrier per foot of length is calculated as:

$$A_{barrier} = (0.5)\left(\frac{8''}{12}\right)\left(\frac{\text{51}''\ \to\ 42''}{12}\right) + \left(\frac{\text{51}''\ \to\ 42''}{12}\right)\left(\frac{9''}{12}\right) = \text{4.6042}\ \to\ 3.7917\ ft^2$$

$$W_{barrier} = \left(\text{4.6042}\ \to\ 3.7917\ ft^2\right)\left(\text{145}\ \to\ 150\ \frac{lb}{ft^3}\right) = \text{667.6042}\ \to\ 568.75\frac{lb}{ft} \text{ or } \text{0.6676}\ \to\ 0.5688\frac{kip}{ft}$$

The barrier can be evenly distributed to all ~~four~~ five girders:

$$W_{barrier} = \frac{\text{0.6676}\ \to\ 0.5688\ kip/ft}{\text{4}\ \to\ 5\ girders} \times 2\ barriers = \text{0.3338}\ \to\ 0.2275\ \to\ 0.1422\frac{kip}{ft}$$

No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

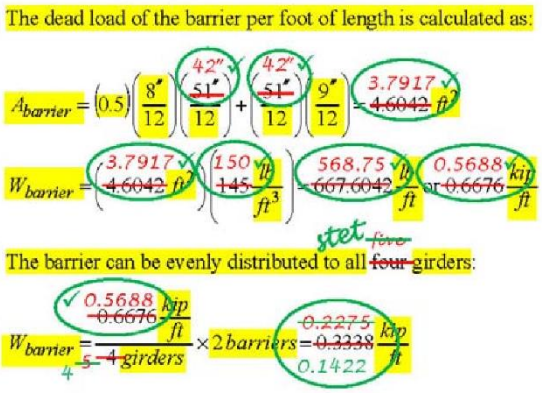
Checked MR Date 08/17/15

Backchecked JD Date 08/18/15

Updated _____ Date _____

Verified _____ Date _____

Updater



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

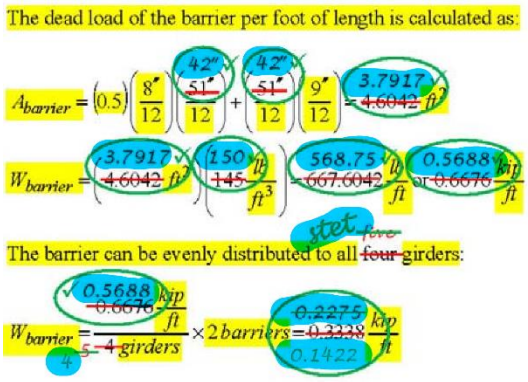
Checked MR Date 08/17/15

Backchecked JD Date 08/18/15

Updated JD Date 08/18/15

Verified _____ Date _____

Verifier



No. 1 Date 08/15/15

CHECK PRINT

Dwg. checked against calcs. and calc. check confirmed.

Yes____ No____ N/A____

Originated By John Doe Date 08/15/15

Checked MR Date 08/17/15

Backchecked JD Date 08/18/15

Updated JD Date 08/18/15

Verified MR Date 08/19/15

Final Version

The dead load of the barrier per foot of length is calculated as:

$$A_{barrier} = (0.5)\left(\frac{8''}{12}\right)\left(\frac{42''}{12}\right) + \left(\frac{42''}{12}\right)\left(\frac{9''}{12}\right) = 3.7917\ ft^2$$

$$W_{barrier} = \left(3.7917\ ft^2\right)\left(150\frac{lb}{ft^3}\right) = 568.75\frac{lb}{ft} \text{ or } 0.5688\frac{kip}{ft}$$

The barrier can be evenly distributed to all four girders:

$$W_{barrier} = \frac{0.5688\frac{kip}{ft}}{4\ girders} \times 2\ barriers = 0.1422\frac{kip}{ft}$$

CHECKING OF COMPUTER INPUT

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	01/01/2016
Drew Litchfield	Approval/Revision history page, and header revised. Appendices and References clarified; hyperlinks for documents and forms created; minor grammatical/formatting corrections.	1.0	9/20/2018
David Williams	Align with DQMP; update references, records	2.01	01/29/2021

APPROVAL FOR THIS PROCEDURE:

Revision 2.01

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). This procedure will describe how to effectively complete a check of computer software input.

2. SCOPE

This section defines the procedure for checking of computer software input and output. This procedure is only applicable to software that has previously been validated per ***DQCP-09 Software Validation Procedures***. If the software used has not been validated then the computer output must be checked using the detailed checking procedures in lieu of spot checking. This procedure may be modified on a case by case basis to reflect unique aspects or project specific requirements.

3. DEFINITIONS

- QC – Quality Control

4. RESPONSIBILITIES

Design Manager (DM), or designee, is responsible for assigning required checks and reviews. The DM is supported by Discipline Leads.

Design Quality Assurance Manager's (DQAM) will oversee and assess the processes for conformance to the DQMP and project specific plans and documents.

5. PROCEDURES

5.1 Process Flow

5.2 Procedure

A separate software input check is required for each computer design program used.

Step 1 – Self Checking (Originator)

- Self-checking is the first step in the checking process.
- The Originator shall self-check all software input and output for accuracy and applicability.
- The Originator shall only initiate formal checking of the software input and output by others, after performing a complete self-check.

Step 2 – Prepare Software Check Form (Originator)

- Prepare the Software Check Form (Appendix A, Figure 1) by filling in the information at the top of the form (Project Number, Project Name, Task Number, Task Name & Software Used). Similar forms or checklists may be utilized in place of

the one provided in Figure 1 if they contain similar information and are more applicable to the software being checked.

Note: If all pertinent information for software inputs and outputs are included in the calculation package, the comments may be made and resolved as described DQCP-01 QC Disciplinary Review in lieu of using the Software Check Form.

- Write a brief description of what the software was used for and what the output of the analysis will be used for.
- Provide the checker with the Software Check Form and the location of the software file that he/she can access to complete the check.

Step 3 – Perform Software Check (Checker)

- The checker shall be familiar with the software being checked and the intended purpose of the output.
- Access the software file to conduct an on-screen check of the input & output.
- Provide a brief description of what is being checked on the Software Check Form.
- Check the software input for applicability and accuracy.
- Check the software output for accuracy and applicability.
- Record all comments on the Software Check Form.
- Provide the Originator with the Software Check Form.

Where no comments are noted, the Originator does not need to make any revisions to the software input.

Step 4 – Comment Resolution (Originator)

- Meet with the Checker to resolve all comments.
- If comments cannot be resolved, the Management Reviewer will be consulted for resolution.
- Provide response and disposition for each comment.

Step 5 – Updating (Originator)

- Make the agreed upon revisions to the software input.
- Rerun software and inform checker that the revisions have been made.

Step 6 – Verifying (Checker)

- Check the software input to verify that agreed to revisions have been made.
- Check the software output for accuracy and applicability.
- Ensure all comments have been addressed based on agreed to dispositions.

The Originator shall include this comment sheet with the calculation check prints. The Design/Task Manager shall be responsible for filing the Software Check Form with the calculation check prints.

6. REFERENCES

- DQCP-01 QC Disciplinary Review
- DQCP-09 Software Validation Procedures

7. QUALITY RECORDS

- Appendix A, DQCP-02_FRM1 - Software Check Form

Kiewit	Kiewit Infrastructure Engineers		Page 1 of 1
	DQCP-02 FRM1: Software Check Form	Rev: 1.1	Rev Date: October 2020

Project Number & Name:		
Task Number & Name:		
Software Used:		
Originator:		Date:
Checker:		Date:

Brief description of what the software is being used for (Originator):

Brief description of what is being checked (Checker):

Comments:

No.	Comment	Response	Disposition	Checker Approved
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐

Comment Disposition Legend: C = Complied with comment; R = Complied with agreed upon revisions; D = Deleted

APPENDIX A – FRM1: SOFTWARE CHECK FORM

INDEPENDENT DESIGN CHECK

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	01/01/16
Matthew Reuer	Title, editorial changes	0.1	06/06/2016
Drew Litchfield	Approval/Revision history page, and header revised. Appendices and References clarified; hyperlinks for documents and forms created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Align with DQMP; update references, records	2.01	01/29/2021

APPROVAL FOR THIS PROCEDURE:

Revision 2.01

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). This procedure will describe how to effectively complete an Independent Design Check.

2. SCOPE

This procedure defines the requirements for performing an Independent Design Check (IDC). Engineers with previous design roles on the project, whether direct design, design collaboration or quality checking, cannot perform the IDC or tasks directed by the individual performing the IDC. This procedure may be modified on a case by case basis to reflect unique aspects or project specific requirements.

3. DEFINITIONS

- QC – Quality Control

4. RESPONSIBILITIES

Design Manager (DM), or designee, is responsible for assigning required checks and reviews. The DM is supported by Discipline Leads.

Design Quality Assurance Manager's (DQAM) will oversee and assess the processes for conformance to the DQMP and project specific plans and documents.

5. PROCEDURES

5.1 Process Flow

5.2 Procedure

Step 1 – Prepare Deliverables (Originator)

- Make a copy of the complete drawings; the drawings can be unchecked.
- Prepare a **Quality Control Review Comment Sheet** (See Appendix A) and indicate that it is an IDC by checking the IDC box.
- Give the drawings to the assigned independent design check engineer responsible for the IDC along with any design documents from which the drawings were developed, including design criteria, assumptions and constraints.
- Do not provide any part of or reference the original design calculations.

Step 2 – Perform Independent Design Check (Independent Design Checker)

- Become familiar with the drawings.
- Generate a separate set of calculations on the specific elements independent from the original design calculations:

- Delegate analysis tasks as necessary to personnel under responsible charge.
- Accept responsible charge for the delegated tasks.

- Identify non-conformance with design requirements and make recommendations that will address the comments.
- Document all non-conformance on the Quality Control Review Comment Sheet.
- Send the Quality Control Review Comment Sheet to the Originator along with any associated redlines that accompany the comment form.
- Meet with the Originator to discuss the comments.

Where no comments are made, the Originator is not required to revise the design or drawings. Indicate on the Quality Control Review Comment Sheet that there were no comments to document that the IDC occurred with no comments and send to the Originator.

Step 3 – Comment Resolution (Originator)

- Meet with the independent design check engineer responsible for the IDC to resolve any disagreements.
- If the back checker and the checker cannot reach an agreement on the change, the Task Manager or Engineer of Record resolves the differences. See DQCP-01, QC Disciplinary Review, for escalation of these design comments/issues.
- Provide Response, Status and Date for each comment on the Comment Sheet.
- Document any required changes to the design calculations and deliverables following the QC Procedures for the specific document type.

Step 4 – Updating (Updater)

- Make the agreed upon revisions and recommendations to the design documents following the QC Procedures for the specific document type.
- Provide updated drawings to the independent design check engineer.

Step 5 – Verifying (Verifier)

- Review the final drawings and verify that the findings and recommendations have been addressed and agreed to modifications made.
- Sign the IDC portion of the **KIE Quality Review Summary Document (QRSD) form** indicating that all comments have been resolved.

6. REFERENCES

- Appendix A, Quality Control Review Comment Sheet

7. QUALITY RECORDS

- Quality Review Summary Document (QRSD), or
- Bluebeam Review Session Record

APPENDIX A, DQCP-05 FRM1: QUALITY CONTROL REVIEW COMMENT SHEET

Kiewit	Kiewit Infrastructure Engineers		Pg. 1 of 1
	DQCP-05-FRM1: Quality Control Review Comment Sheet	Rev: 2	Rev Date: May 2020

Project: _____ Task Manager: _____

Review Type: ☐ IDC ☐ TQR ☐ DCR ☐ MR Reviewer: _____

Sheet: _____ of _____ Date: _____

Sheet/Page #	Comment #	Reviewer Comment	Response	Disposition	Date	Reviewer Approved?

Disposition Code: C = Complied; R = complied w/ agreed upon Revisions; D = Deleted; O = Open

DESIGN RISK ASSESSMENT

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	01/01/16
Drew Litchfield	Approval/Revision history page, and header revised. Definitions incorporated into Section 3. Appendices and References clarified; hyperlinks for documents and forms created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Align with DQMP; update references, records	2.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 2.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

Assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). Assist assessing design risks associated with permanent design tasks. This procedure will describe how to effectively complete a design risk assessment for a task.

2. SCOPE

The procedure defined in this document establishes a requirement for assessing design risk for the purpose of determining the level of Quality Control required for each task. This procedure should be modified basis to reflect unique aspects or project specific requirements. Substantive changes to this procedure require approval by District Quality Management before implementation.

3. DEFINITIONS

- ECONOMIC IMPACT - The overall economic impact to a Kiewit job in the event of a design error.

- TECHNICAL COMPLEXITY - The technical complexity represents the relative complexity of design and construction.

- DESIGN TEAM EXPERIENCE - The design team experience represents the directly relevant experience of the designers in respect to the specific components that he/she is designing.

- MANAGEABILITY OF DESIGN - The levels of difficulty of managing the typical project constraints of a design task. Project constraints consist of scope, schedule and budget. For instance, if the scope is not well defined, the design process may result in re-work or complete design changes. A compressed schedule may increase the chances of design errors. Also, a small budget may result in pressure to reduce the number of design staff, which could lead to difficulties in performance efficiency. The Task Manager is responsible for evaluating the manageability of each design task.

4. RESPONSIBILITIES

Design Manager (DM), or designee, is responsible for assessing design risks associated with each design task. The DM is supported by Discipline Leads.

Project Manager is responsible for reviewing and approving each risk assessment completed for their specific project.

Task Manager is responsible for assessing any and all design risks associated with each design task that they are managing.

Design Quality Assurance Manager's (DQAM) will oversee and assesses the processes for conformance to the risk assessment process, DQMP and project specific plans and documents.

Risk Reviewer – Approved by Operations/Business Management to validate risks and mitigations identified by the project team.

5. PROCEDURE

5.1 Process Flow

5.2 Procedure

Step 1 – Define Scope

- DM works with Task Manager and defines the scope of work and determines design tasks.

Step 2 – Assess Risk

- Task Manager uses the **TSCD Manual** (Construction Engineering Tasks) or Permanent Design Risk Classification Matrix (**Appendix A**) to assess the design risk for each task.
  - For each category circle the appropriate severity level.
  - The category with the highest severity governs
  - Determine the likelihood of occurrence (Temporary Design) or the level of manageability (Permanent Design)
  - Determine the risk exposure number at the intersection of the governing severity level and the likelihood of occurrence (Temporary Design) or manageability level (Permanent Design).
- Indicate the Risk Classification on the Quality Review Summary Document (QRSD), utilizing either the electronic version contained within the **Task Summary Form** (TSF) (found in Construction Engineering guidance), or on the **QRSD** form (**Appendix B**).
- If the risk classification used is different from the classification obtained from matrix or TSCD manual, explain the reason in the Key Risk Issues section of the QRSD form.
- For Construction Engineering Design tasks, the Tables in Chapter 3 of the *Temporary Structures and Construction Devices Manual* may be used in lieu of the Risk Classification Matrix.

Step 3 – Review & Approve

- The Reviewer, as identified in the DQMP and approved by the Department Manager, reviews the Risk Assessment for each design task and approves if in agreement.
- If Reviewer does not agree with design risk assessment, the Reviewer and Task Manager shall discuss and come to agreement.
- If agreement cannot be reached, the Department Manager shall determine which risk assessment will be used.
- Reviewer signs and dates the Risk Assessment section of the QRSD form.

6. REFERENCES

- Temporary Structures and Construction Devices (TSCD) Manual
- Appendix A - Permanent Design Risk Classification Matrix - Example
- Appendix B – DQCP-16-FRM1. EXAMPLE Quality Review Summary Document

7. QUALITY RECORDS

- Permanent Design Risk Classification Matrix; or
- QRSD Form; or
- Task Summary Form (TSF)

Kiewit	Kiewit Infrastructure Engineers		Pg. 1 of 1
	DQCP-07-FRM1 Permanent Design Risk Classification Form	Rev: 0	

Project: _____ Design Task: _____

Instructions:

1) Determine the severity level (1-5) for each of the six categories (A) through (F)
2) The highest severity level (1-5) among the six categories governs
3) Determine the manageability of the design task (1-5)
4) Find the risk exposure number at the intersection of the governing severity level and the manageability level
5) Use the risk exposure number to classify the design risk from the number ranges in the Risk Exposure Classification table

Risk Exposure Classification	
1-4	LOW RISK
5-14	MODERATE RISK
15-25	HIGH RISK

SEVERITY	(A) ECONOMIC IMPACT	(B) TECHNICAL COMPLEXITY	(C) DESIGN TEAM EXPERIENCE	(D) EXPOSURE TO LIABILITY AND PUBLIC IMPACT	(E) DESIGN REQUIREMENT COMPLIANCE	(F) LONG TERM MAINTENANCE	MANAGEABILITY OF DESIGN				
							VERY MANAGEABLE (1)	SLIGHTLY MANAGEABLE (2)	MANAGEABLE (3)	CHALLENGING TO MANAGE (4)	VERY CHALLENGING TO MANAGE (5)
1	Low Impact	Low Complexity	Highly Experienced	Low Exposure	Fully Compliant	No Maintenance Concern	1	2	3	4	5
2	Minor Impact	Limited Complexity	Significant Experience	Minor Exposure	Design Exception Justified and Documented	Minor Maintenance Concern	2	4	6	8	10
3	Moderate Impact	Moderately Complex	Moderate Experience	Moderate Exposure	Design Exception Questionable	Moderate Maintenance Concern	3	6	9	12	15
4	Significant Impact	Significantly Complex	Limited Experience	Significant Exposure	Design Exception Difficult	Significant Maintenance Concern	4	8	12	16	20
5	Extreme Impact	Highly Complex	Very Little Experience	Extreme Exposure	Non-Compliant	Extereme Maintenance Concern	5	10	15	20	25

Overall Risk Classification:_____

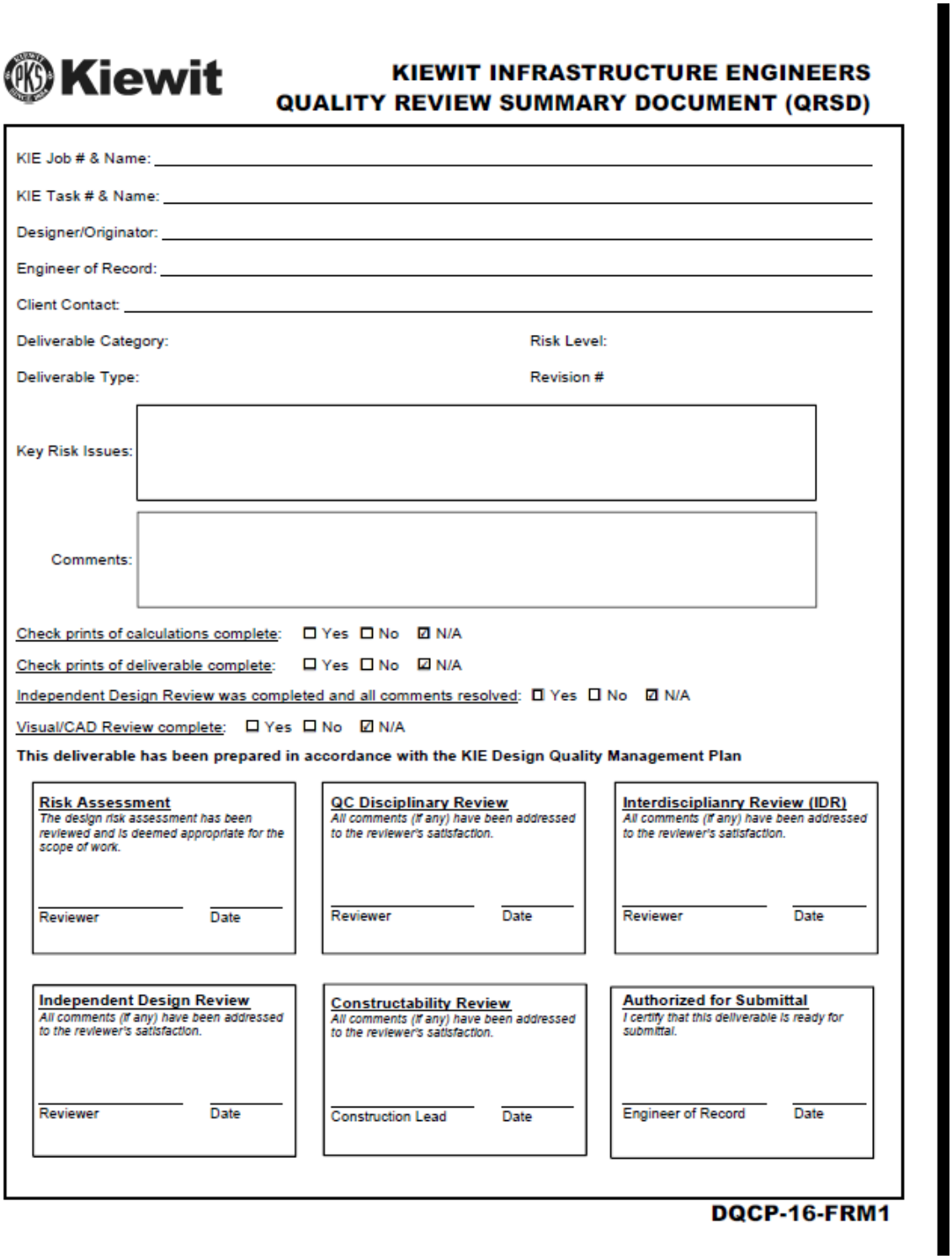
Task Manager:_____ Date:_____

Project Manager:_____ Date:_____

Sponsor/Area Manager:_____ Date:_____

Kiewit Infrastructure Engineers 1

APPENDIX A – EXAMPLE PERMANENT DESIGN RISK CLASSIFICATION FORM



Kiewit

KIEWIT INFRASTRUCTURE ENGINEERS
QUALITY REVIEW SUMMARY DOCUMENT (QRSD)

KIE Job # & Name: _____

KIE Task # & Name: _____

Designer/Originator: _____

Engineer of Record: _____

Client Contact: _____

Deliverable Category: Risk Level:

Deliverable Type: Revision #

Key Risk Issues:

Comments:

Check prints of calculations complete: ☐ Yes ☐ No ☑ N/A

Check prints of deliverable complete: ☐ Yes ☐ No ☑ N/A

Independent Design Review was completed and all comments resolved: ☐ Yes ☐ No ☑ N/A

Visual/CAD Review complete: ☐ Yes ☐ No ☑ N/A

This deliverable has been prepared in accordance with the KIE Design Quality Management Plan

Risk Assessment
The design risk assessment has been reviewed and is deemed appropriate for the scope of work.
Reviewer Date

QC Disciplinary Review
All comments (if any) have been addressed to the reviewer's satisfaction.
Reviewer Date

Interdisciplianry Review (IDR)
All comments (if any) have been addressed to the reviewer's satisfaction.
Reviewer Date

Independent Design Review
All comments (if any) have been addressed to the reviewer's satisfaction.
Reviewer Date

Constructability Review
All comments (if any) have been addressed to the reviewer's satisfaction.
Construction Lead Date

Authorized for Submittal
I certify that this deliverable is ready for submittal.
Engineer of Record Date

DQCP-16-FRM1

APPENDIX B – DQCP-16-FRM1. EXAMPLE QUALITY REVIEW SUMMARY DOCUMENT

DESIGN QUALITY DOCUMENT CONTROL PROCEDURES

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	08/15/2016
Drew Litchfield	Approval/Revision history page, and header revised. Sections 5.2.1 and 5.2.2 added/clarified. Appendices and References clarified; hyperlinks for documents and forms created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Align with DQMP; update references, records	2.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 2.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). This procedure provides a system for identification, collection, indexing, filing, accessing and storing design quality documents and records.

2. SCOPE

This procedure applies to quality records produced by KIE Design Services group. This procedure may be modified to reflect unique aspects or project specific requirements. Substantive changes to the procedures in this document require approval by the District Quality Manager before implementation.

3. DEFINITIONS

- N/A

4. RESPONSIBILITIES

Design Manager (DM) is responsible for assigning required checks and reviews. The DM is supported by Discipline Leads.

Design Quality Assurance Manager's (DQAM) will oversee and assesses the processes for conformance to the DQMP and project specific plans and documents.

It is the responsibility of each KIE employee to ensure quality records are legible and complete.

Each Task Manager is responsible for ensuring all required documents are stored in the appropriate locations.

5. PROCEDURE

5.1 Design Quality Control

After completion of quality control of design deliverables, the Task Manager shall:

- Ensure the Quality Review Summary Document (QRSD) (DQCP-16-FRM1) and the Certification of Compliance (DQCP-16-FRM2) is completed and includes required signatures.
- Ensure the Check Print Stamp is completed on the final check print copies of deliverables.
- Ensure the Quality Review Comment Sheet (if used) is completed accurately for all applicable reviews (IDC, TQR, DCR or MR).
- File the QRSD for each task deliverable in the task QA/QC folder on ProjectWise.
- Place final check prints and review comment sheets for each task deliverable in the task specific QA/QC folder in ProjectWise.

5.2 Quality Assurance/Assessments/Audits

- After completion of assessment or audits of selected projects/tasks, the Assessor or Auditor shall:

- Ensure the DQCP-11-FRM1 Design Quality Assessment or DQCP-11-FRM2 Design Quality Audit record is completed.
- Ensure the DQCP-11-FRM3 Design Quality Report is completed.
- File the records in the audit repository.

6. REFERENCES

- Control of Documents (PKS-PRO-SOP-02)
- Control of Records (PKS-PRO-SOP-03)
- DQCP-11 Quality Assessments and Audits
- DQCP-16 QA Review and Certificate of Compliance

7. QUALITY RECORDS

- Check Print Stamp
- Quality Review Summary Document (QRSD) (DQCP-16-FRM1)
- Certification of Compliance (DQCP-16-FRM2)
- Quality Control Review Comment Sheet
- DQCP-11-FRM1 Design Quality Assessment
- DQCP-11-FRM2 Design Quality Audit
- DQCP-11-FRM3 Design Quality Report

SOFTWARE VALIDATION PROCEDURES

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	08/15/16
Brian Medcalf	Appendix A – Software list updated; Approval/Revision history page, and header revised. Appendices and References clarified; hyperlinks for documents and forms created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Align with DQMP; update references, records	2.0	06/15/2020
David Williams	Add approval by Chief Engineer, move list to a dynamic register posted to the Quality page	3.00	01/25/2021
David Williams	Add approval when software produced under a recognized quality system or when supported by a published academic paper	4.00	3/24/2022

The official controlled digital copy of this Procedure and Approval is the signed Word document held within our KIE Document Control - SOPs SharePoint Library, and is visible to all authorized users. All printed copies, and all electronic copies and versions, except the ones described below, are considered uncontrolled copies which should be used for reference only. KIE Document Control group manages the protected access to said SharePoint library. KIE personnel will have read-only access. All changes/revisions must be submitted to KIE_Document_Control@Kiewit.com.

Please refer to the KIE Document Control - SOPs SharePoint Library for the current controlled revision and approval records.

APPROVAL FOR THIS PROCEDURE:

Revision 4.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

This procedure describes validation and documentation required before using computer software (other than spreadsheets), that may be used for performing design calculations or modeling.

The intent is to manage quality by confirming software and applications used to produce designs and recommendations is of a known source and has been evaluated by independent checking or experience. Software, calculators and web-based applications available on web sites, as freeware or vendor toolboxes are not always rigorously checked or transparent in assumptions and references.

2. SCOPE

The requirements for validation of software apply to all software procured or developed by KIE (other than spreadsheets) to prepare design calculations or models. Detailed procedures for checking and validating spreadsheets (Microsoft Excel, etc.) are described in **DQCP-10 Spreadsheet Checking**.

3. DEFINITIONS

- N/A

4. RESPONSIBILITIES

- Task Managers are responsible for ensuring software used on the tasks they are managing have been validated prior to use.
- All KIE employees are responsible for understanding which software has been validated and which software has not.

5. PROCEDURE

5.1 Process Flow

Not Applicable

5.2 Procedure

Software and applications approved for use by Kiewit Infrastructure Engineering are listed on the KIE Quality Page in the Quality Forms tile.

When it is determined a new software is required for engineering calculations or modeling, the software shall be validated and documented using one of the following methods:

1) Hand Calculation
   - For internally developed programs a hand calculation with the same formulation or a parallel technique must be documented and checked in accordance with **DQCP-01, QC Disciplinary Review**.
   - The same input and assumptions used in the hand calculations are formatted and input to the computer to check the software.
2) Previously Checked Designs/Analysis

- Checked calculations from a previous project may be substituted for original hand calculations. The previously checked calculations shall conform to the requirements of DQCP-01 and the input of the software being validated shall be checked in accordance with **DQCP-02, Checking of Computer Input**.

3) Independent software validation. A previously validated software may be used to replicate the calculations or output of the new program. A record of a comparison of the two, with equivalent results, is evidence of validation. The input for each software shall be checked in accordance with DQCP-02.

   The output of the software is compared to the results of the validation technique with each corresponding result annotated as equivalent values. Differences, which are not obviously accountable to rounding, are to be explained on the output sheet

4) Applications may be approved by the Discipline Chief Engineer. Upon approval, the program is added to the Approved software list.

5) Software produced under a recognized software quality assurance standard or system, either self-declared or independently certified. Standard publishers include ISO, IEEE, ASTM and other consensus bodies.

6) Academic papers published in journals or for university academic credit (i.e. Masters or PhD thesis) demonstrating the application.

The list of validated software is maintained on the KIE Quality page. Documentation of the validation, including checked calculations, computer input, annotated output, and a brief description of the processes followed are maintained in the Quality Documentation folder.

Anytime a software is updated or revised it shall be re-validated by repeating the steps above. A list of approved industry standard software is provided in Appendix A of this document

Prior to completion of the validation process the software validation must be checked and reviewed to ensure that all aspects of the software have been validated correctly and the results of the software output meet the intention of the software. Software validation must be performed or directed by an office or District Discipline Lead with experience working with the software or in the practice where the software is used.

6. REFERENCES

- DQCP-01 QC Disciplinary Review
- DQCP-02 Checking of Computer Input
- DQCP-10 Spreadsheet Checking

7. QUALITY RECORDS

N/A

SPREADSHEET CHECKING PROCEDURE

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	08/15/16
Brian Medcalf	Approval/Revision history page, and header revised. Appendices and References clarified; hyperlinks for documents created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Align with DQMP; update references, records	2.01	01/29/2021

APPROVAL FOR THIS PROCEDURE:

Revision 2.01

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). This procedure describes requirements for checking non-validated spreadsheets that will be part of design calculations and/or deliverables and for validating spreadsheets for future use.

2. SCOPE

The requirements of this procedure apply to all spreadsheets used for project related work. This procedure may be modified to reflect unique aspects or project specific requirements. Substantive changes to this procedure shall require approval by District Quality Manager before implementation.

3. DEFINITIONS

- **Validated Spreadsheets** are developed for repeated use and have been checked and documented in accordance with the requirements of this procedure and in accordance with DQCP-09 Software Validation. The file is protected from accidental change by protecting cells or sheets. When used, they are modified only to incorporate project specific information in the header and/or specific input data.
- **Modified Validated Spreadsheets** are Validated Spreadsheets used on a specific task and have been revised in some way to accommodate project specific requirements, excluding modifications to incorporate header information or input data.
- **Non-Validated Spreadsheets** are developed for a specific task and have not been previously checked, documented, validated or approved for use as a Validated Spreadsheet. They may include downloaded spreadsheets that are not accompanied with required checking, verification and documentation.

4. RESPONSIBILITIES

Design Manager (DM), or designee, is responsible for assigning required checks and reviews. The DM is supported by Technical or Discipline Leads.

Technical or Discipline Lead is responsible to verify a validated spreadsheet is applicable to the work. The Lead must have sufficient knowledge of the underlying calculations, assumptions, limitations and applicability of the spreadsheet to confirm its use for the work.

Design Quality Assurance Manager's (DQAM) will oversee and assesses the processes for conformance to the DQMP and project specific plans and documents.

5. PROCEDURE

5.1 Process Flow

Not Applicable

5.2 Procedure

In order to be considered a Validated Spreadsheet, the spreadsheet formulas and cell results must be checked to verify accuracy, and documentation verifying the cell formulas and results must be maintained.

Checking Requirements

The Checker shall use the Detail Check Method identified in DQCP-01 QC Disciplinary Review, to check complete spreadsheet results and printouts. The accuracy and results of cell formulas may be verified in one of the following ways:

A spreadsheet printout with formulas displayed within the cells may be used for checking spreadsheets with short formulas that can be fully printed and legible.

- Hand calculations (including MathCAD) may be used to verify the accuracy of spreadsheet cell results. Hand calculations, if used, shall be performed on computation sheets. When hand checking spreadsheets used for multiple applications, caution should be taken to verify the accuracy and validity of all hard-coded variables, and of all possible logical decisions within the spreadsheet.

Validated Spreadsheets shall include a tab that includes information that identifies the author of, date developed, checker and date checked and validated. Each subsequent revision shall be documented in a similar manner with a description of the revision(s).

Validated Spreadsheets are used routinely and trusted to be accurate without additional checking for each use. Given this important characteristic, all validated spreadsheets shall have a management review conducted as part of the validation process.

Application and Use Requirements

The requirements for using & checking a **Validated Spreadsheet** are as follows:

- Users shall not modify the Validated Spreadsheet except to enter project-specific header information or input data. If items other than the header information or input data are revised in any way, the spreadsheet shall be considered a Modified Validated Spreadsheet or a Non-Validated Spreadsheet.
- For normal operation, only the header and input cells shall be open for editing; all other spreadsheet cells shall remain locked/protected.
- The Checker shall use the Detail Check Method identified in DQCP-01 QC Disciplinary Review, to check the header and all input data. The Checker shall also verify the reasonableness of the spreadsheet results.

The requirements for using & checking a **Modified Validated Spreadsheet** are:

- The Checker shall check all modified cell formulas.
- The Checker shall review the entire spreadsheet to verify the modifications do not alter other portions of the spreadsheet.
- For subsequent use after modification and modification checking, the spreadsheet user and Checker shall follow the procedures for a Validated Spreadsheet.

The requirements for using and checking a **Non-Validated Spreadsheet** are:

- The Checker shall check all cell formulas.
- For subsequent use after checking, the spreadsheet user and Checker shall follow the procedures for a Validated Spreadsheet.

6. REFERENCES

- DQCP-01 QC Disciplinary Review
- DQCP-09 Software Validation

7. QUALITY RECORDS

Tab in spreadsheet file that includes information identifying the author, date developed, checker, date checked and validated. Subsequent revisions shall be documented in a similar manner with a description of the revision(s).

QUALITY ASSESSMENTS AND AUDITS

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Matthew Reuer	Initial Release	0	08/15/16
Drew Litchfield	Approval/Revision history page, and header revised. References clarified; hyperlinks for documents created; minor grammatical/formatting corrections.	1.0	09/20/2018
David Williams	Align with DQMP; update references, records	2.00	06/15/2020

The official controlled digital copy of this Procedure and Approval is the signed Word document held within our KIE Document Control - SOPs SharePoint Library, and is visible to all authorized users. All printed copies, and all electronic copies and versions, except the ones described below, are considered uncontrolled copies which should be used for reference only. KIE Document Control group manages the protected access to said SharePoint library. KIE personnel will have read-only access. All changes/revisions must be submitted to KIE_Document_Control@Kiewit.com.

Please refer to the KIE Document Control - SOPs SharePoint Library for the current controlled revision and approval records.

APPROVAL FOR THIS PROCEDURE:

Revision 2.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). This procedure establishes requirements for quality assurance processes including the verification the quality control procedures and related results comply with planned activities as part of DQMP as well as continuous improvement processes.

2. SCOPE

This procedure is aligned with 1Kiewit Tier 1 requirements. This procedure applies to all projects where deliverables are submitted and are subject to the requirements of the DQMP and project quality planning.

Design quality assurance activities shall be planned, documented and conducted in a manner to provide adequate review of the Quality Assurance procedure requirements. This procedure may be modified to reflect unique aspects or project specific requirements. Substantive changes to this procedure require approval by management before implementation. Evidence of compliance with this procedure is created and retained in accordance with PKS-PRO-SOP-08 Quality Assurance.

3. DEFINITIONS

- **Assessments**: A proactive review of a process/operation's implementation, adherence, suitability, and effectiveness to department, company or project requirements. Assessments are self-performed or conducted by internal / external subject matter experts.

- **Audits:** A detailed review, performed by a trained/qualified Auditor, to verify quality program implementation and adherence based on the Quality Manual, Standard Operation Procedures (SOPs), the Project Quality Plan, contract requirements, and applicable project codes and standards (USACE, ASME, AISC, and ISO).

4. RESPONSIBILITIES

- KIE District Quality Manager – plans for and manages Audits of select projects and business operations within KIE. Advises or provides resources to projects to conduct Assessments per the DQMP or Project quality plan.

- Design or Estimate Manager (Design Manager) – Primary responsibility for the technical and commercial success. Plans and resources Assessments. Supports audits by the District Quality Manager and Kiewit corporate.

5. PROCEDURE

5.1 Process Flow

Not Used

5.2 Procedure

Quality Assessments and Audits are conducted in accordance with 1Kiewit SOP-08 Quality Assurance.

5.2.1 Quality Assessments

Conducted by the Design Quality Assurance Manager, Projects shall plan for at least two Assessments in both Get Work and Build Work phases:

Quality Readiness Review. An assessment of the quality program's development and incorporation prior to start of project or within 10-15% of completion.

- Goal: Overall project quality process performance review and documentation verification. Also, to ensure roles, responsibilities and expectations are clearly identified.
- Participants: Operations/Technical representative, Subject Matter Expert (SME), quality professional, engineering and design professionals, and other technically qualified individuals to support comprehensive review of overall project quality execution.
- Responsibilities: Review specification and contract, inspection and test plans, checklists content and execution, work plans and quality of work, certifications, inspection documentation, subcontractor quality plan and process, client engagement, turnover documentation plan and execution, one-on-one client interviews.

Quality Operations Review: An assessment conducted by the Design Quality Assurance Manager to determine overall effectiveness of the quality program implementation. Typically, these reviews occur periodically throughout the life of the project (e.g. 25%, 50%, 75%) or as scheduled by project management.

- Goal: A detailed discipline-specific review to verify quality requirements are being met with proper documentation and ensure roles, responsibilities and expectations are clearly identified.
- Participants: *Design Manager, Discipline leads.* Operations/Technical representative, Subject Matter Expert (SME), quality professional, engineering and design professionals, and other participants who are deemed qualified to add value to the verification process.
- Responsibilities: Develop an Assessment Plan. Review specification and contract, inspection and test plans, checklists content and execution, work plans and quality of work, certifications, inspection documentation, subcontractor quality plan and process, client engagement, turnover documentation plan and execution, one-on-one client interviews.

Assessments, led or performed by an assigned quality representative, are planned to align with key stages of project development.

- Get Work
  - Developing Pursuit Budget Phase – the Quality Readiness Review identifies quality reviewers and timing for pursuit phase deliverables.
  - Estimating Phase – the Quality Operations Review validates the QC and QA activities of the design and estimating work. The product of the review is input for District Management and the Sponsor to approve the Proposal or Bid.

- Build Work
  - An Operational Readiness Review is to be conducted within 10-15% of the project budget.
  - Depending on schedule and effort, and commensurate with project progress, key touch points for Build Work Quality Operations Reviews can be
    - Conceptual (10-15% Level of Completion)
    - Preliminary (30-35% Level of Completion) with selected support documents/reports
    - Intermediate (60-65% Level of Completion) with selected support documents/reports
    - Final (95-100% Level of Completion) with selected support documents/reports/design calculations
    - Issued for Construction (IFC)
    - Released for Construction (RFC)
- Construction Engineering Services in support of Temporary Structures and Construction Devices
  - Work may be assessed or audited at the direction and schedule of the District Quality Manager and the Construction Engineering Operations Director.

The District assessment plan is developed quarterly. The District Quality Manager will select the assessors. Assessors will use DQAP-11-FRM1, augmented with project specific items (from the DQMP) to guide the review:

- Management support for quality requirements
- Training and understanding of quality requirements
- Status, location and completeness of quality control records.
- Project quality control and assurance activities
- Change management and change control
- Subcontractor and software quality management

On completion of the audit, the assessor will present observations, including non-compliances, providing an opportunity for the Design Manager to discuss.

The ***DQCP-11-FRM3 Design Quality Report*** will document results. Nonconformances will be identified, documented and addressed in accordance with ***DQCP-38 Corrective and Preventive Action*.**

5.2.2 Quality Audits.

The District Quality Manager will coordinate with 1Kiewit Quality to support audits of Projects and Offices in accordance with requirements of SOP-08 and with direction and input of KIE management.

Audit types include:

- QMS Implementation
- Temporary Structures and Construction Devices
- Subcontractor/supplier
- Certified ISO projects/districts
- Subject to codes and standards (USACE, ASME, and AISC).

6. REFERENCES

- PKS-PRO-SOP-08 Quality Assurance
- DQCP-08 Design Quality Document Control
- DQCP-38 Corrective and Preventive Action

7. QUALITY RECORDS

- Appendix A, DQCP-11-FRM1 Design Quality Assessment
- Appendix B, DQCP-11-FRM2 Design Quality Audit
- Appendix C, DQCP-11-FRM3 Design Quality Report

APPENDIX A - DQCP-11-FRM1 DESIGN QUALITY ASSESSMENT

ENGINEERING QUALITY ASSESSMENT	
Project:	**Examiner(s):**
Assessment Dates:	**Interviewees:**
Project Description:	
Subs & Scopes	
Good Practices: •	
Pending or Follow-up Issues: •	
Recommendations/Opportunities for Improvement: •	
Findings/Non-Conformances •	

Operation/Area/Contact:	**Date:**			
	Sat	**OFI**	**UnSat**	**Comments / Evidence**
DQMP or PQP established; staff trained?				
Adequate staff assigned to the engineering team?				
Design Quality Manager or Project Quality Representative?				
Design team performs design quality audit or assessment?				
Corrective actions are implemented as necessary				
Preventative actions are implemented as necessary				
BOD (basis of design) is well understood and being followed				
Project codes and standards are established				
Design deliverable format is established and acceptable				
Local jurisdictional requirements understood				
Project Quality Plan (or DQMP specific to work)?				
Detailed Submittal Quality Checklist?				
Design Risk Assessment?				
Deliverables Quality Matrix?				
EOR (Eng of Record) matrix is established with verification of required Licenses				

APPENDIX B - DQCP-11-FRM2 DESIGN QUALITY AUDIT

Kiewit	DESIGN QUALITY AUDIT CHECKLIST		Pg. 1 of 2
	Doc Number: DQCP-11-FRM2	Rev: 2	

THIS SECTION TO BE COMPLETED BY AUDITOR:

Project # and Name: _____ Discipline Lead/Task Manager: _____

Task # and Name: _____ Deliverable: _____

DQMP Work Type/Deliverable Category: _____ Risk Level: _____

Date of Audit: _____ Lead Auditor: _____

ITEM No.	Audit Item	Reference	Response			Remarks If No or N/A, provide explanation of why not complete or N/A. If Yes, provide description of process used.
			Yes	No	N/A	
1	Was Risk Assessment completed?	DQMP, DQCP-07	☐	☐	☐	**Method Used**: (TSCD or DQCP-07)
2	Is QRSD header information complete?	DQMP, DQCP-08	☐	☐	☐	**QRSD Type**: (PDF or TSF)
3	Was correct work type selected within QRSD header?	DQMP, DQCP-08	☐	☐	☐	
4	Have necessary reviews been documented on the QRSD? (TQR, DCR, etc.)	DQMP, DQCP-06	☐	☐	☐	
5	**CALCULATION/ANALYSIS:**					
5(a)	Which method was used for the Technical Quality Review?	DQMP, DQCP-05	**IDC** ☐	**DC** ☐		
5(b)	IF DESIGN CHECK WAS USED: Are calculation/analysis check prints (redlines) available?	DQCP-01	☐	☐	☐	
5(c)	IF DESIGN CHECK WAS USED: Are detailed checking procedures of check prints being followed?	DQCP-01, DQCP-03 & DQCP-04	☐	☐	☐	
5(d)	IF INDEPENDENT DESIGN CHECK WAS USED: Are IDC findings documented in writing?	DQCP-05	☐	☐	☐	
5(e)	Is the checking of computer input being accomplished?	DQCP-02	☐	☐	☐	
5(f)	Are non-standard programs & spreadsheets being checked?	DQCP-09, DQCP-10	☐	☐	☐	
6	**INDEPENDENT DESIGN REVIEW** (per the Corporate TS&CD Manual):					
6(a)	Is an Independent Design Review required?	DQMP, DQCP-06	☐	☐	☐	

Kiewit Infrastructure Engineers

APPENDIX C - DQCP-11-FRM3 DESIGN QUALITY REPORT

ENGINEERING QUALITY ASSESSMENT	
Project:	Examiner(s):
Assessment Dates:	Interviewees:
Project Description:	
Subs & Scopes	
Good Practices: • •	
Pending or Follow-up Issues: • •	
Recommendations/Opportunities for Improvement: • •	
Findings/Non-Conformances • *All findings must be addressed in accordance with **DQCP-38 Corrective and Preventive Action.***	

Lead Assessor/ date:_____

KIE District Quality Manager/ date:_____

Kiewit Infrastructure Engineers

QUALITY PLANNING

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). This procedure describes and defines the roles, responsibilities and process by which client deliverables are identified and the applicable quality check and review activities associated with each deliverable are determined.

2. SCOPE

This procedure shall apply to KIE design projects or assignments and covers quality check and review activities for deliverables to a client, at each phase of the project.

3. DEFINITIONS

- **Deliverable Quality Matrix (Matrix)** lists assignments and quality checks and reviews for each deliverable.

4. RESPONSIBILITIES

Design Manager (DM) or designee, is responsible for:

- Reviewing the contract and assist with the development of the resource loaded schedule.
- Determining, in concert with the Design Quality Assurance Manager (DQAM) and DL the quality check and review activities for each deliverable.
- When required, submitting the Project DQMP to the client.
- Supporting the DQAM in the development of the Project DQMP.

Design Quality Assurance Manager (DQAM) shall be responsible for:

- Working with the DM and DL and providing concurrence to the required quality check and review activities.
- Ensuring that DL and staff have access to and are trained or made aware of the Deliverable Quality Matrix and the required checks for each deliverable.
- Developing the Project DQMP, with assistance by the DM when necessary.
- Revising and resubmitting the Project DQMP if necessary, to address review comments.

Discipline Lead (DL) shall be responsible for:

- Working with the DM and DQAM to determine the quality check and review activities for deliverables.
- Documenting the deliverables and the quality checks and reviews in the Deliverable Quality Matrix and updating it as project conditions dictate

5. PROCEDURE

The DM in concert with the DQAM and DL shall review the contract documents and shall identify each formal deliverable required to be submitted to the client. Deliverables shall be identified for each phase of the project and shall be inclusive of client deliverables prepared by KIE as well as subconsultants. Once identified, the DL shall enter the deliverables into the Matrix.

The DM in concert with the DQAM, and DL shall determine the required quality checks and reviews to be completed prior to submittal for each deliverable and shall document the required checks and reviews within the matrix. Required quality checks and reviews, along with qualified resources, may also be determined during work planning sessions in accordance with other KIE SOPs.

The QC Disciplinary Check, Visual Check, and QA Review are mandatory for all deliverables, and Interdisciplinary Review is mandatory for all deliverables involving more than one discipline. Other reviews such as Over the Shoulder Review, Independent Design Check, and Constructability Review shall be applied to deliverables as required by the client and/or based upon complexity and risk.

The DL with input from the DM and DQAM shall enter date upon which quality checks/reviews shall begin and end in order to fulfill the deliverable dates. An adequate time for quality checks/reviews shall be afforded dependent upon the volume and complexity of the deliverable being checked/reviewed. Time afforded for quality checks and reviews shall include time to perform the checking/review activity as well as time to resolve and address comments. Dates should be backed out from the QA Review date such that ample time is provided for completion of the QA Review/certification prior to submittal of the deliverable to the client. See sample timeline for these activities.

For those checks or reviews not required for a deliverable, “N/A" shall be entered into the Matrix.

The Matrix shall be completed prior to Work Plan approval and shall be documented as a quality record.

6. REFERENCES

- Appendix A: DQCP-12-FRM1 Deliverable Quality Matrix
- Appendix B: Example schedule for QC, QA and client reviews

7. QUALITY RECORDS

- Completed Deliverable Quality Matrix Form

Kiewit	Kiewit Infrastructure Engineers		Pg. 1 of 1
	DQCP-12-FRM1- Deliverable Quality Matrix	Rev: 0.1	Rev Date: May 2020

Project: _____ Design Manager: _____

Design Quality Assurance Manager: _____

Sheet: _____ of _____ Date: _____

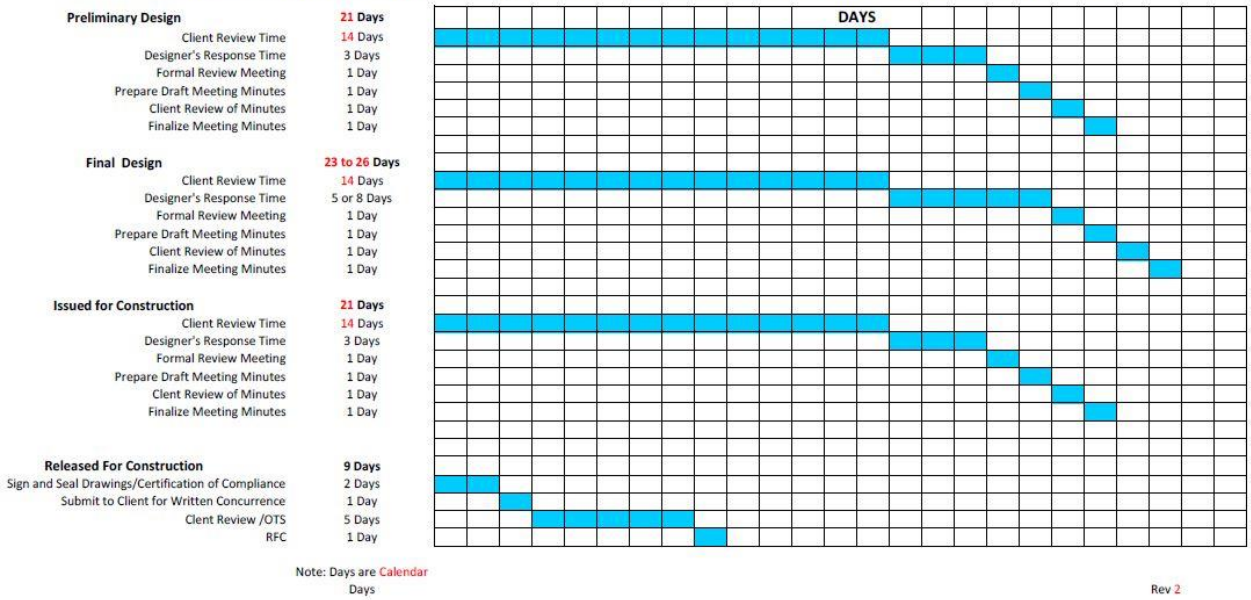
*Items in **Bold** are required for all projects*

Design Package	**Package/Discipline Description**	**Risk Assessment - Date**	**QC Disciplinary Review- Date**	Interdisciplinary Review - Date	Constructability Review - Date	Visual/CADD Check - Date	QC Model Review	**QA Review Date**	Client/Third Party Review - Date	Comment Resolution Meeting - Date	Independent Design Check – Date (if required)	Preliminary Completion Date	Final Completion Date	IFC/RFC Completion Date

Kiewit Infrastructure Engineers 1

APPENDIX A - DQCP-12-FRM1 DELIVERABLE QUALITY MATRIX (EXAMPLE)

PROFESSIONAL SERVICES QUALITY CONTROL REVIEW TIMELINE - FIGURE B-3



APPENDIX B – EXAMPLE SCHEDULE FOR QC, QA AND CLIENT REVIEWS

QUALITY PROGRAM FOR SUBCONSULTANTS

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (KIE DQMP). This procedure will describe how to establish the requirements for quality control of design documents prepared by subconsultants.

2. SCOPE

This procedure applies to technical consultants retained as subconsultants. Subconsultants must implement KIE quality program requirements in their project services.

3. DEFINITIONS

- Not used

4. RESPONSIBILITIES

Subconsultant's Design Manager has the responsibility of ensuring that his/her staff gain familiarity with the KIE's quality program and procedures through continuous liaison with the KIE Design Quality Organization.

KIE Design Manager or Discipline Lead is to work with KIE Engineering Contracts to incorporate client and KIE quality requirements, including training, qualifications and document and records management into the terms of the subcontract.

Design Quality Assurance Manager (DQAM) is responsible for conducting quality training during early stages of the project. The DQMP or PQP/Project DQMP (Project DQMP) and Design Quality Control Procedures (DQCP) are to be distributed to subconsultants. The DQAM is responsible for assessing the subconsultant's understanding of the program through Audits.

5. PROCEDURE

- Subconsultants are to be advised of the intent of this procedure prior to their preparation of their work program and budget.
- The subconsultant is provided with the Project DQMP and required to attend quality indoctrination sessions conducted by the DQAM.
- The subconsultant follows DQMP procedures along with the rest of the design team.
- Subconsultants' compliance with the DQMP is assessed during the design phase of the project and is subject to corrective action when needed.

6. REFERENCES

- None

7. QUALITY RECORDS

- Subcontract
- Training records

CAD AND GRAPHICAL STANDARDS COMPLIANCE CHECK

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020
David Williams	Update title, revise workflow.	1.00	11/13/2020
David Williams	Purpose & Scope clarification, Quality Record definition	2.00	1/10/2022
Andy Kayhanfar	Addition of Stop & Plot	2.01	3/25/2022
Hether Telford	Modify for I-10 Mobile Project	3.00	06/23/2023

APPROVAL FOR THIS PROCEDURE:

Revision 3.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

Assist design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the Design Quality Management Plan (DQMP). This procedure defines roles, responsibilities, and process for conducting a CAD and Graphical Standards Compliance Check of deliverables.

2. SCOPE

This procedure applies to project pursuits, if required to submit design drawings, and to all final/permanent design projects. During subsequent drawing deliverable reviews the Graphical Standards review as outlined herein shall persist in all subsequent review sessions.

The CAD and Graphical Standards Compliance Check process is composed of two activities:

1) The CAD Compliance Review, which is conducted after the CAD Orientation meeting, and prior to the delivery of drawings for Interdisciplinary Review (IDR). The CAD Compliance Review is conducted to ensure the deliverable is being prepared in accordance with the project's CAD standards and to identify project CAD issues; and

2) The Graphical Standards Review, which is conducted at each milestone submittal of a Deliverable. When an IDR is performed, the Graphical Standards Review is conducted by the CAD Manager as part of the Interdisciplinary Review (IDR). Otherwise, when a milestone submittal does not include IDR, the Graphical Standards Review is conducted prior to QA Certification.

3. DEFINITIONS

CAD Standards compliance is compliance of electronic CAD files with the project standards for:

- client or KIE designated workspace or template
- border or title block implementation and annotation
- defined coordinate plane
- file referencing and master container file methodology
- sheet and file naming convention
- corridor modeling methodology
- print configuration
- boneyard utilization, standard cell or block library

Graphical Standards compliance is compliance of the presentation of CAD and PDF files with the project standards for the:

- cover sheet
- border sheet or title block
- schedules and tables
- layers
- line types
- drawing annotation, fonts, text & dimensions
- symbology

- layout and presentation
- legibility and presentation

4. RESPONSIBILITIES

Design Manager (DM), or designee, shall be responsible for:

- Informing discipline design teams of the requirement to deliver sample CAD files for the CAD Compliance Review
- Scheduling an CAD Compliance Review session with the CAD Manager and Discipline Lead Designers

CAD Manager shall be responsible for:

- Project CAD initiation and delivery of the project CAD standards manual
- Orientation of the Discipline CAD Leads
- Conducting the CAD Compliance Review session
- Performing a graphical standards review of the sample sheets
- Documenting findings in the projects' CAD Issues Log and communicating corrective measures and status to the Discipline CAD Leads.
- Participation and signoff of IDR sessions for CAD and graphical standards compliance
- Verification of IDR comment incorporation.

Discipline CAD Lead (DCL) is responsible for the CAD production of the deliverable and:

- Delivering a sample CAD file representing the adoption of the project workspace or template and portraits adherence to the graphical standards of the project
- Attending the CAD Compliance Review session and presenting a sample CAD file, providing feedback on other disciplines sample files
- Incorporating feedback and corrective measures from the CAD Compliance Review session and the CAD Issues Log
- Peer to peer communication with other Discipline CAD Leads, ensuring a common work product and adherence to the project standard
- Logging findings in the CAD Issues Log for resolution

Design Quality Assurance Manager (DQAM) is responsible for:

- Verifying participation of the CAD Manager in the IDR session
- Verifying IDR comment incorporation and signoff on CAD Compliance Form

5. PROCEDURE

5.1 Process Flow

5.2 CAD Orientation

The CAD Manager identifies the CAD platform and implements the appropriate Bentley workspace or Autodesk template for the discipline design teams use. Project specific CAD and technical design information is documented in the project's Digital Engineering Project Execution Plan (PxP) and Digital Engineering Project CAD Manual. The CAD Manager trains the Discipline CAD Leads on the implemented Bentley workspace or Autodesk template, in preparation for the creation of their design files and sheets. The CAD Manager determines production team requirements and the schedule for the Interdisciplinary CAD Compliance Review.

5.3 Stop & Plot: Discipline Sample Sheets

The Discipline CAD Leads will produce a sample of design drawings which represents the adoption of the project workspace or template and portraits the team's adherence to the projects' graphical standards. Each Discipline CAD Lead will deliver their native CAD files and PDFs to a location determined by the project CAD Manager for use in the Interdisciplinary CAD Compliance Review session. The CAD Manager will review the files for discussion during the Interdisciplinary CAD Compliance Review session.

5.4 CAD Compliance Review

The Design Manager, CAD Manager & Discipline CAD Leads shall attend the CAD Compliance Review session. The CAD Manager will facilitate the session and each Discipline CAD Lead shall present sample CAD files and subsequent PDF sheets to the team, sharing issues, challenges or gaps in their completeness or capability. The issues are to be documented in the CAD Issue Log for traceability and prioritization, as well as status through resolution. The CAD Manager will communicate corrections to the Discipline CAD Leads.

5.5 Modify for Adherence

Discipline CAD Leads will incorporate feedback from the review session and subsequent corrective actions identified and resolved in CAD Issue Log.

5.6 Verify

The CAD Manager verifies the Discipline CAD Leads' adherence to the project CAD and Graphical Standards during subsequent CAD Task Force meetings. Additional items may be added to the CAD Issue Log for resolution.

5.7 Interdisciplinary Review

CAD Manager performs a Graphical Standards Review on each milestone submittal of a Deliverable by participating in the IDR sessions. The CAD Manager provides a visual inspection of the design drawings' adherence to the project's CAD and graphical standards.

5.8 Verify IDR Comments

The CAD Manager verifies the IDR comments have been incorporated into the submittal documents.

6. REFERENCES

- DQCP-24 Interdisciplinary Review (IDR)
- Digital Engineering Project Execution Plan (PxP)
- Digital Engineering Project CAD Manual

7. QUALITY RECORDS

- CAD Issue Log
- CAD Manager signoff in DQCP-24 IDR Review Form
- CAD Manager signoff on DQCP-14 FRM1 CAD Compliance Form

OVER THE SHOULDER REVIEW (OTS REVIEW)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.0	06/15/2020
David Williams	Align with DQMP; update references, records	0.01	01/29/2021

APPROVAL FOR THIS PROCEDURE:

Revision 0.01

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (KIE DQMP). The purpose of this procedure is to define the roles, responsibilities and process for facilitating and responding to Over the Shoulder Reviews (OTS Reviews) of project deliverables. OTS Reviews (representing both the design team members and the client/third party representatives) provide an informal opportunity between formal deliverable submittals to confirm that the design, as it progresses, fulfills requirements and expectations relative to design criteria and scope, and to ensure client and/or potentially third-party requirements are being implemented as planned. It also serves to identify and potentially address issues relative to the cost-effectiveness of construction, and to verify the suitability of the design to intended means and methods.

2. SCOPE

This procedure shall apply to all design deliverables, when contractually required, and in other cases when deemed advantageous by the Design Manager and supported by the client/third party, such as in the case of multiple stakeholders are involved. When OTS Reviews are required, they shall be identified in the Deliverable Quality Matrix (Matrix). OTS Review comments shall be documented and provided to the DL to ensure they are addressed in the next submittal, but resolution and verification are not typically documented at this time. The verification of OTS Review comments occurs as part of the Discipline QC Check on the next milestone submittal.

3. DEFINITIONS

Not used

4. RESPONSIBILITIES

Design Manager (DM), or designee, shall be responsible for:

- Understanding contract and scope and how the OTS may impact budgets and change management. Understand and communicate to technical team what comments can be accepted and revisions made and what comments trigger the scope change process.
- Determining the appropriate points in the design development schedule for OTS Reviews, documenting those reviews in the Matrix, and communicating those requirements to the DL and the client and/or third party.
- Working with the client and Discipline Lead to resolve any unresolved OTS Review comments.

OTS Reviewers shall be expected to document their review comments.

Discipline Lead (DL) shall be responsible for:

- Scheduling/facilitating the OTS Review.
- Recording and confirming any OTS Reviewers' comments
- Responding to and resolving OTS Review comments.

- Working with the client and/or third party to understand OTS Review comments.
- Elevating unresolved differences to the DM for resolution.
- Incorporating agreed upon revisions in the next formal deliverable submittal.
- Maintaining records of OTS Reviews.

5. PROCEDURE

In accordance with contract requirements or other advantageous situations, (such as when multiple stakeholders are involved) the DM shall determine the design packages and appropriate points in the design development schedule for OTS Reviews.

- The DM shall document the necessary OTS Reviews in the Matrix, communicate these requirements to the design team, and ensure they are reflected within the project schedule.
- The DL, or designee, shall compile the deliverable package and shall submit it for OTS Review.

OTS Reviewers shall review the deliverable package to ensure client and/or potentially third-party requirements are being implemented as planned. They should also review issues relative to the cost-effectiveness of construction and verify the suitability of the design to intended means and methods. OTS Reviewers and the DL shall document the review comments. Comments shall be detailed enough to facilitate understanding by the DL for resolution.

- OTS Reviewers, or the DL, shall document their review comments on the Comment Resolution Form, or directly on hardcopy CheckPrints and will considered a Quality Record.

The DL shall review all the OTS Reviewers comments. If the DL disagrees with the nature of the OTS Review comment, he or she shall discuss with the OTS Reviewer and come up with an agreed upon solution. If disputes continue, the issue shall be escalated to the DM for resolution.

The DL shall make the necessary revisions within the next formal deliverable submittal to address OTS Review comments. Verification of OTS Review comments shall be performed as part of Discipline QC Check of the next formal deliverable submittal in accordance with DQCP-01, QC Disciplinary Review.

6. REFERENCES

- DQCP-01 QC Disciplinary Review

7. QUALITY RECORDS

- OTS Review Meeting Minutes

QA REVIEW AND CERTIFICATION OF COMPLIANCE

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0	06/15/2020
David Williams	Update to requirements for QRSD and Certificate	0.01	12/14/2020
Hether Telford	Modify for I-10 Mobile Project	1.00	06/23/2023

APPROVAL FOR THIS PROCEDURE:

Revision 1.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). The purpose of this procedure is to define the roles, responsibilities and process for conducting Quality Assurance Reviews (QA Reviews) and Certification of Compliance of project deliverables. The purpose of QA Review is to ensure that the deliverable has been processed in accordance with the DQMP or Project DQMP (however named) and to ensure required checks and reviews have been completed, and comments resolved and verified (including filing of records) prior to submittal of the deliverable to the client.

2. SCOPE

This procedure shall apply to all project deliverables being submitted to a client, inclusive of subconsultant deliverables. Quality check and review activities, in accordance with the Deliverable Quality Matrix, prepared in accordance with the DQMP, shall have been completed, and comments resolved and verified prior to the QA Review. Quality check and review activities shall have been scheduled to allow completion and resolution before QA Review and enough time allotted for an effective QA Review. QA Review shall occur on all deliverables prior to submission to the client.

In Build Work or CES projects, quality records and certification are required for deliverables submitted to the client. In Get Work, the records are required for Issue for Estimate (IFE) submittals. Records of review and certification may use different forms to adjust for client requirements and operational practices. At a minimum, all projects must:

- Record review of project risks
- Confirm quality control reviews (QC Disciplinary Reviews and as needed, Interdisciplinary Review, Constructability, Independent Design, etc.) are completed.
- Record completion by the project Design Quality Assurance Manager (DQAM) and Engineer of Record, Design or Estimate Manager, or other person in responsible control of the work.

3. DEFINITIONS

- **Certification of Compliance --** Prepared by Personnel in Responsible Charge for the DQAM to certify deliverables comply with quality requirements.
- **Design Builder Design Certification –** Prepared by DQAM for the Quality Manager (QM) to certify deliverables comply with quality requirements.

4. RESPONSIBILITIES

Discipline Lead (DL) shall be responsible for:

- Ensuring all other required quality checks and reviews in accordance with the Matrix have been completed.
- Submitting deliverables and quality check and review records to the DQAM for QA Review.

- Responding to and resolving comments made by DQAM.
- Resubmitting revised deliverables or other evidence of conformance with the Project DQMP to the DQAM for verification.

Design Manager (DM) shall be responsible for:

- Ensuring production and required quality check and review activities are completed in accordance with the project schedule and the Matrix.
- Ensuring required quality check and review activities have been completed, and comments resolved and verified prior to submission for QA Review.
- Completing and signing the upper portion of form DQCP-16 FRM1 - Certificate of Compliance.

Design Quality Assurance Manager (DQAM) shall be responsible for:

- Reviewing the Matrix to identify the required quality checks and reviews to have been completed for the deliverable.
- Verifying through review of completed quality check and review records the required quality checks and reviews have been completed.
- Verifying through certification that subconsultant deliverables have been checked and reviewed in accordance with the DQMP.
- Documenting the results of QA Review and providing those results to DM or DL.
- Verifying that nonconformances have been addressed, when necessary.
- Certifying that deliverables have been processed in accordance with the DQMP and that required quality checks and reviews have been performed.
- Maintaining records of QA Review.

Quality Manager (QM) shall be responsible for:

- Verifying the quality assurance review procedures have been followed in accordance with the contract requirements and the DQMP.

5. PROCEDURE

The DM and/or DL shall verify required quality checks and reviews, in accordance with the Deliverable Quality Matrix (Matrix), have been completed prior to submission for QA Review, including deliverables prepared by subconsultants.

- Alternatively, the DM and the DQAM shall agree with the team and reviewers to maintain a record of checks and reviews completed prior to the QA Review. The team may use Bluebeam records, an active Quality Matrix or other tool.
- Modifications to DQCP methods are to be documented in the Project DQMP or instructions to staff, from either the Design Manager or the DQAM.

The DM or DL shall provide the deliverable, along with links to or locations of corresponding quality check and review records to the DQAM for QA Review as shown in the Matrix. The DM or designee shall complete the upper portion of Form DQCP-16 FRM1 and submit to the DQAM.

The DQAM shall review the Matrix to determine that the required quality checks and reviews have been completed for the deliverable.

The DQAM shall verify, through review of required quality checks and review records, required checks and reviews were performed in accordance with the DQMP, all required reviewers participated, and comments from the reviews were resolved.

- The DQAM shall also verify all quality check and review records are in the appropriate file locations.

The DQAM shall document the results of the QA Review and provide the results to the DM or DL.

If there were instances of nonconformance with the DQMP requirements or the Matrix, the DM or DL shall determine the cause of the nonconformance and shall resolve the nonconformance and provide the necessary evidence to the DQAM for verification.

- The DM and DQAM shall determine based upon the nature of the nonconformance and the scope of the remedy if additional quality check or reviews should be repeated prior to resubmittal for QA Review.
- The DQAM shall review evidence to verify resolution of nonconformances.

The DQAM shall sign form DQCP-16 FRM1 indicating the deliverable has been processed in accordance with the DQMP and that required quality checks and reviews have been performed.

Deliverables shall not be submitted to clients without successful completion of the QA Review process. The DQAM shall ensure that all QA Review records are maintained as quality records in accordance with the Project DQMP.

QM shall sign form DQCP-16 FRM2 indicating the deliverable has been processed in accordance with the DQMP and that required quality checks and reviews have been performed.

6. REFERENCES

- None

7. QUALITY RECORDS

- Bluebeam Review Session Record; or
- Checkprint Stamp (on checked drawings, documents and other submittals)
- DQCP-16 FRM1 Certification of Compliance
- DQCP-16 FRM2 Design Builder Design Certification

APPENDIX A – DQCP-16-FRM1: DQCM CERTIFICATION OF COMPLIANCE

KIEWIT MASSMAN TRAYLOR A JOINT VENTURE	I-10 Mobile River Bridge Project		
	DQCP-16 FRM1 DQCM Certification of Compliance	**Rev**: 0	**Rev Date**: June 2023

Submittal: _____

Personnel in Responsible Charge: _____
(Person who will sign, stamp, or seal the document)

1.) Review was completed in accordance with the DQMP.

2.) Comments generated from reviews have been addressed in accordance with the DQMP and are being transmitted for your use. This includes all required forms and checklists.

3.) The electronic design files and calculations necessary to adequately review this submittal are also being transmitted.

_____ _____
Personnel in Responsible Charge **Date**

Design Quality Control Manager (DQCM):

I hereby certify the above stated package has been through the applicable quality control process defined in the DQMP and satisfies the contract requirements.

_____ _____
Design Quality Control Manager **Date**

APPENDIX B – DQCP-16-FRM2: DESIGN BUILDER DESIGN CERTIFICATION

KIEWIT MASSMAN TRAYLOR A JOINT VENTURE	I-10 Mobile River Bridge Project		
	DQCP-16 FRM2 Design Builder Design Certification	**Rev**: 0	**Rev Date**: June 2023

Submittal Name: _____

Certification Date: _____

The undersigned hereby certifies that:

- The Design Builder has performed the quality assurance review procedures described in the Design Quality Plan (DQMP) as they pertain to the Design Submittal identified below and has found that Design-Builder has fulfilled the quality assurance requirements in the Contract Documents and the DQMP.
- The Design Builder has reviewed the Design Submittal identified below in accordance with the Design Submittal substantive review process as set forth in the DQMP and, except as set forth in the attached list of exceptions, the Design Submittal complies with the Contract Documents including the requirements embodied in the Technical Provisions and the standards incorporated by reference in the Contract Documents.
- As of the date of this Certification, and to the best of the Design Builder's knowledge in accordance with its obligations under the Contract Documents all the measures and procedures provided in the Design-Builder's Project Management Plan and the QMP are being followed.

Design Quality Control Manager

_____
Name

_____
Signature

Quality Manager

_____
Name

_____
Signature

DESIGN QUALITY REPORTING - DEVONWAY

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	08/31/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). The procedure defines roles, responsibilities and process by which design quality issues and best practices are identified, addressed and resolved at all phases of the project.

2. SCOPE

This procedure shall apply to all KIE design work. It provides instructions for initiating a Condition Report in DevonWay™ to identify a quality issue for process improvement. A Condition Report is created when a deficiency or improvement in a work product or process is identified and KIE can take corrective and/or preventive action. It is initiated by anyone who identifies the condition and proposes a mitigation approach for the current and future projects. Examples include client feedback or concerns, findings from an investigation or audit (internal or external), or issues identified during construction (i.e. Non-Conformance Reports (NCRs), Notice of Design Change (NDCs) and or Field Design Changes (FDCs)). Additionally, a Condition Report should document lessons learned and identify design best practices.

3. DEFINITIONS

Term	Meaning
Condition	A deficiency in work or deviation from a standard work process.
Condition Report (CR)	A documented event or events that identifies an issue with a process or product in any phase of work (e.g. estimating, engineering, procurement, construction, commissioning, etc.) and facilitates an evaluation of how to mitigate future occurrences.
Finding	An outcome of an audit or assessment that documents nonconformance with criteria and can recommend corrective and preventative actions.
Nonconformance	A System, Structure, Component (SSC) final product characteristic that does not conform to plans and specifications which has not been made compliant prior to turnover to the client or submission for payment.
Quality Issue (QI)	A System, Structure, Component (SSC) final product characteristic that does not conform to plans and specifications but is work in progress and will be made compliant prior to turnover to the client or submission for payment.
Review	An inspection with the goal of ensuring the Quality Management System (QMS) is being implemented effectively to ensure management and client expectations are being met. A Review can consist of:

- Assessment –to assist an operation with recommended Opportunities for Improvement (OFI)

- Audit – focused on compliance to a specific standard (e.g. ISO Manual or Code Standard) Deviations are annotated in Findings.

4. RESPONSIBILITIES

Construction operations (typically Superintendents, Field Engineer) identifies a design quality issue and initiates a Request for Information (RFI), Non-Conformance Assessment (NCA), or FDC related to the Released for Construction (RFC) drawings, calculations and or specifications. These requests should be validated by the Construction Manager, or Project Engineer, and forwarded to Document Control for distribution to the Design Manager (DM), Engineer of Record (EOR) and Engineering Services during Construction (ESDC) Manager, as applicable.

The **ESDC Manager (ESDCM)** reviews the design RFI, FDC, NDC or NCA and seeks to clarify the request with the Originator, coordinating with the DM and DL. ESDCM will ensure the request for information/clarification is correctly classified as RFI, FDC or NDC and the issue is tracked, closed, and documented.

If changes to the RFC drawings, calculations and or specifications are needed, the ESCDM will immediately (within 24 hours of the determination) notify the PM, DM, EOR and DQAM there is a quality issue that needs to be addressed. The ESDCM or designee within 48 hours of this determination will enter this as a Condition Report in Devonway.

Design Manager (DM) is responsible for coordinating the review of a condition or QI within the design team. The DM or designee will review the response to ensure it has been fully and correctly responded to before entering the response into DevonWay™ and resolving with project team. Also, the DM notifies the Design Sponsor, District Manager, Job Sponsor, and District Quality Manager.

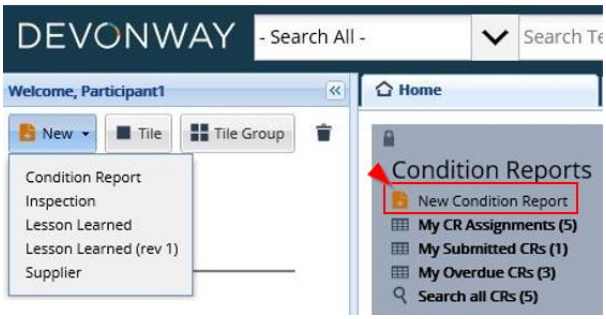
Design Sponsor is responsible for making sure that the Condition Reports (CR) are entered in DevonWay™ within the timeframes noted above and regularly review the CR's, OFI's and ensure that all information is appropriately communicated within the project team and KIE organization.

5. PROCEDURE

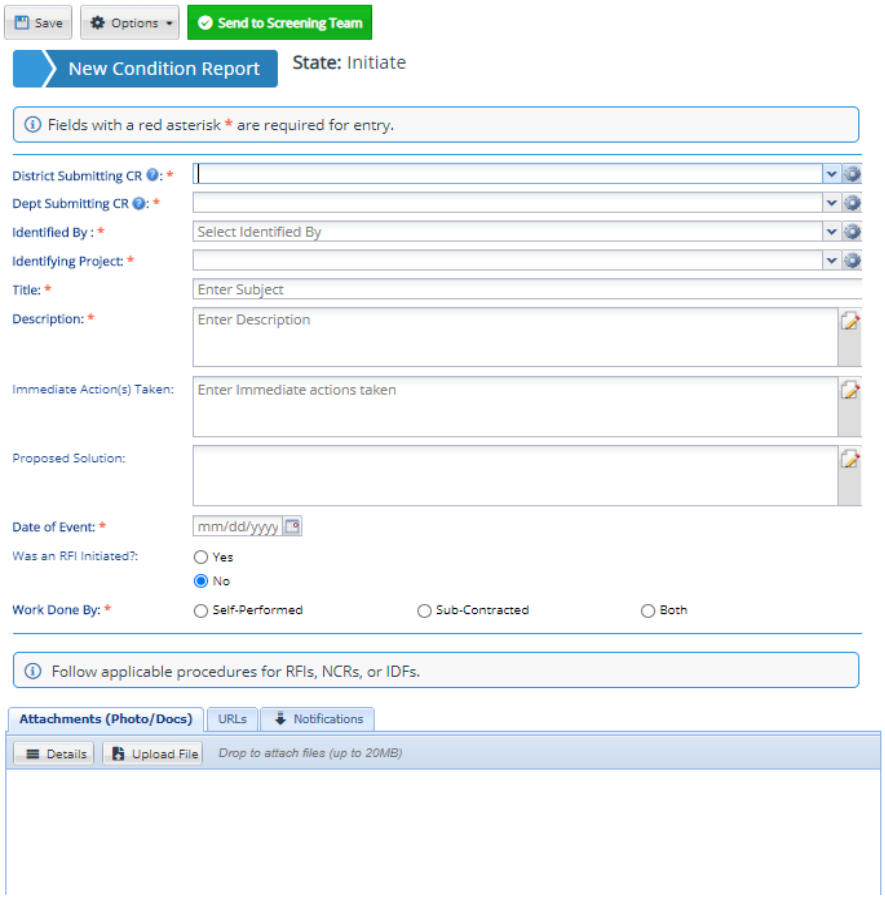
To initiate a Condition Report, navigate to the1 Kiewit Quality SharePoint site using Google Chrome.

1) Click on the icon (button) labeled **DevonWay** to access the dashboard.

2) In the drop-down menu on the left, click on New>Condition Report, or click on New Condition Report on the Condition Reports tile.



3) This will open the New Condition Report Screen.

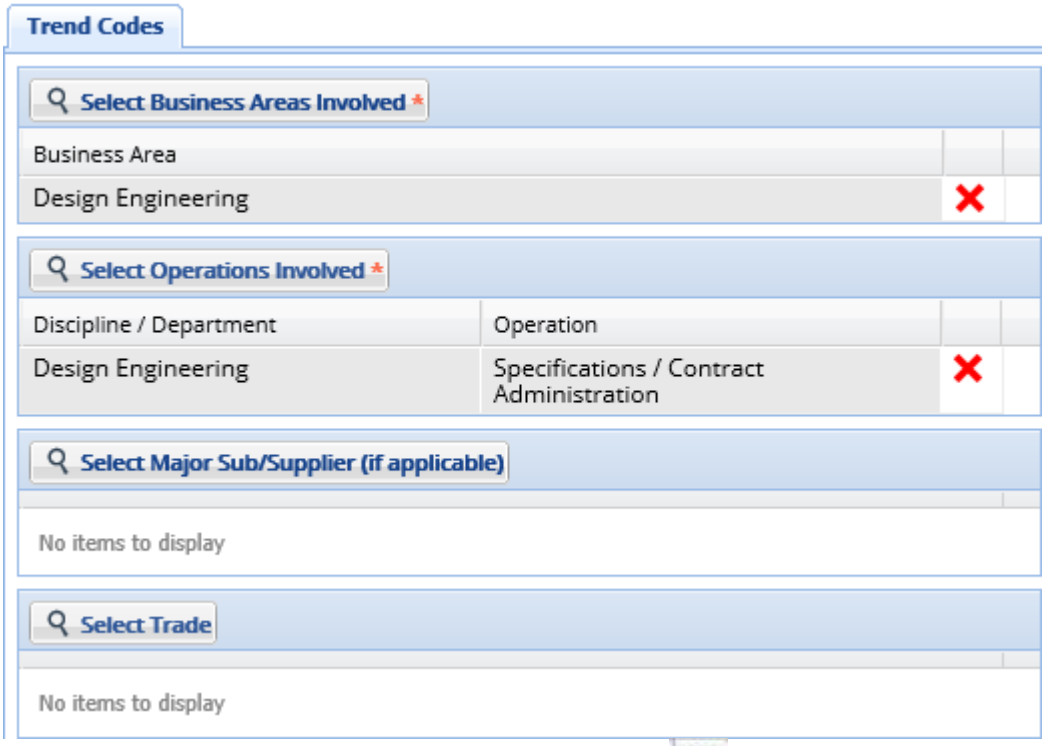


4) All fields with a red asterisk are required to initiate a new condition.
   - **District Submitting CR** – KIE employees will select **Kiewit Infrastructure Engineers (KIE)** from the drop-down menu.
   - **Dept Submitting CR** – The department of the new condition initiator.
   - **Identified By** – Most KIE conditions will be identified by Staff.
   - **Identifying Project** – The project the condition was identified on. If the project name does not appear in the drop-down menu, contact the KIE District Quality Manager.
   - **Title** - Should be concise and descriptive to differentiate the condition from other like conditions, and to enable future searchability.
   - **Description** - Should provide the following (Who, What, When, Where, and How) with enough detail to determine trend codes and for assigning Corrective Actions, if necessary.
     - **Who** – The title of the CR
     - **What** – What was the quality issue identified?
     - **When** – When was the quality issue identified? Provide as much detail as possible such as time of day, day of the week, after a holiday or weekend?
     - **Where** – Where was this issue observed?
     - **How** – How was the issue identified? Site walk, Audit, Review, or Assessment?

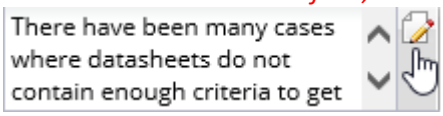
     Immediate Action(s) Taken – Steps taken at the time the condition was observed. Documenting the actions taken at time of the condition observance helps memorialize the event and provide information for developing Corrective Actions, if necessary. In some instances, the actions taken may be enough to remedy the condition and the CR can be closed. Immediate Action may be as simple as coaching the individual who was observed performing adverse behavior, or several actions required to make an area safe after a catastrophic event. Even if immediate action is effective in resolving the condition, a CR entered in the system provides data to monitor trends, develop lessons learned and provide training.
   - **Proposed Solution** – Any relevant Corrective Action that is either in process, planned, or desired, but is not complete at the time of reporting. **IDK** (I don't know) can be entered, if the initiator does not have a proposed solution.
   - **Date of Event** – When the condition occurred or was first observed. This is not to be confused with the date of the report.
   -

5) Click on Upload File to attach any documentation that helps identify and resolve an issue.

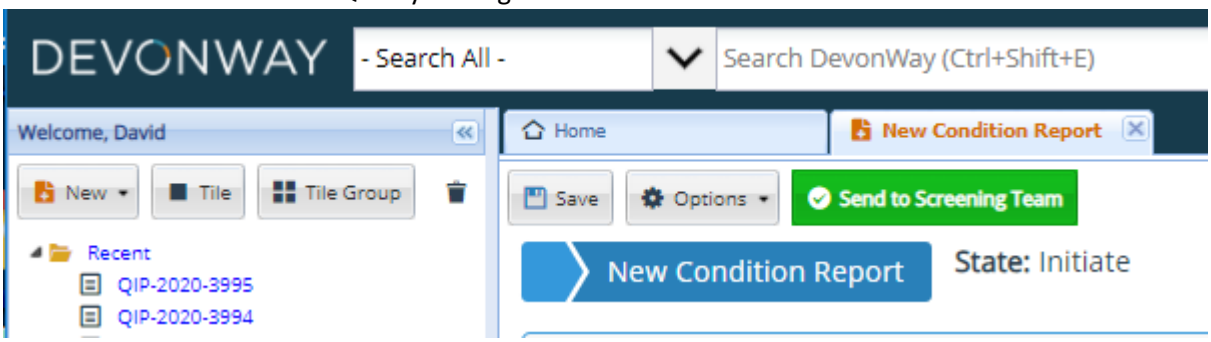
6) Entering Trend Codes helps identify business areas responsible for an issue and its resolution. Multiple codes can be selected for each Trend category, and the initiator should select all that apply under each category.



Note: To view all text in a field, click on the "Note" icon.



7) Once all information is entered the green "Send to Screening Team" is selected to advance the workflow to the KIE District Quality Manager.



Upon receipt of notice of Closure, the Design Manager or Design Quality Assurance Manager for the project shall place a copy in the Project Records.

6. REFERENCES

- KIE Design Quality Management Plan (DQMP) – Sections 9, 10, 11 and 12
- PKS-PRO-SOP-05 Reporting & Control of Quality Issues

7. QUALITY RECORDS

- DevonWay™ System Record
- Report Export for Project Files

CONTROL OF THIRD PARTY SUPPLIED DOCUMENTS

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020

The official controlled digital copy of this Procedure and Approval is the signed Word document held within our KIE Document Control - SOPs SharePoint Library, and is visible to all authorized users. All printed copies, and all electronic copies and versions, except the ones described below, are considered uncontrolled copies which should be used for reference only. KIE Document Control group manages the protected access to said SharePoint library. KIE personnel will have read-only access. All changes/revisions must be submitted to KIE_Document_Control@Kiewit.com.

Please refer to the KIE Document Control - SOPs SharePoint Library for the current controlled revision and approval records.

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). This procedure describes the requirements for controlling client or third party supplied data, equipment and documents to ensure that such items are maintained, are accessible to appropriate project personnel, are updated as necessary and are returned as required.

2. SCOPE

This Procedure is applicable for controlling data, equipment and documents supplied by third parties to the project.

3. DEFINITIONS

- **Third Party** is any party other than the client and a member of the project team.
- **Third Party Supplied Data** is an information provided by the client or other agencies for use on the project. The data can be in the form of a report, study, preliminary design, conceptual ideas, statistical data, references, criteria, etc.
- **Third Party Supplied Documents** are project-related documents prepared by the client or other consultants or agencies to be used on the project. These might include drawings, specifications, reports, environmental documents, drawings of existing facilities, etc. These documents shall be returned to the provider, if requested, upon completion of the work.
- **Third Party Supplied Equipment** is provided by the client or other agencies to be used on the project. The equipment can be in the form of measuring devices, counting devices, tools, computers, software, etc. The equipment shall be returned to the provider, if requested, upon completion of the work.

4. RESPONSIBILITIES

Design Manager (DM) or designee is responsible for ensuring that the requirements of this procedure are met.

5. PROCEDURE

The requirements defined by this procedure apply to documents and equipment received from the client or third party for use on the project. These items are generally furnished to provide background information or guidelines; ensure consistency in testing or measuring; serve as samples or accomplish other specific project-related objectives. Third party materials do not include sub-consultant submittals for design, shop drawings, materials submittals, etc.

Examples of third-party materials may include:

- Utilities
- Survey control
- Jurisdictional Drainage Reports and Studies
- Traffic Modeling

5.1 Receipt

A log shall be maintained of client or third party supplied items on a project specific form. The log may include: a description of the item, the date of its receipt, the date of receipt of modifications to the item, an indication of whether it is to be returned to or retained, including the permission to copy documentation (if applicable), the physical storage location of the item and the date of its return to the client.

5.2 Storage

The selected storage location shall be accessible and provide adequate protection from damage or loss.

5.3 Verification

The DM or Discipline Lead shall verify that the data, documents or equipment are suitable for use on the project and may solicit appropriate technical assistance in making this determination.

5.4 Distribution

The DM or Discipline Lead shall distribute copies or a list of the available data, documents and equipment to the affected task leaders and other project staff, as appropriate, advising of their location, their suitability, and the criteria for using them.

5.5 Return

If requested by the third party or a client, upon completion of the work, the DM or Discipline Lead shall return the third party supplied items. If permission to copy the documents has been received, a copy may be made of the materials before they are returned.

6. REFERENCES

- None

7. QUALITY RECORDS

- Third-party Supplied Information Log or Register

NOTICE OF DESIGN CHANGE (NDC)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020
John Wise	Refine workflow	0.01	04/12/2021

APPROVAL FOR THIS PROCEDURE:

Revision 0.01

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

Assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). To establish the scope, responsibilities, and procedures for processing and communicating Notice of Design Changes (NDC) by the design team.

2. SCOPE

The Notice of Design Change (NDC) procedure applies to any situation which necessitates a change to one or more plan sheets and/or specifications of a package that has been Issued for Construction (IFC) or Released for Construction (RFC). NDCs consist of submitting a notice to the Project that a change to the RFC design document(s) is imminent. NDC may result from an RFI, a change order or a redesign. The NDC provides means of documenting minor changes. Major changes (changes that materially affect the design) shall be closed following formal review and reissuing of design document for construction.

3. RESPONSIBILITIES

Design Manager (DM) is responsible for ensuring adherence to this procedure. They are responsible for directly communicating the proposed change to the Construction Manager (CM), Construction QA Manager (CQAM) and ESDC Manager and processing the initial notice of an NDC through the Project's EDMS (i.e.: InEight Document) to identified recipients in the NDC workflow. The DM and appropriate design staff will be responsible for making the design change in accordance with the construction schedule. Design changes will undergo quality control reviews like the original design.

ESDC Manager (ESDCM) is responsible to coordinate with DM, CM, and Construction QA Manager in support of notification of NDCs and processing of the design changes. ESDCM shall notify the responsible Project Engineer immediately of any NDCs, evaluate impact of the NDC, and confirm the review process and schedule for reissuing of the design documents. The ESDCM shall facilitate review of NDCs with the client and with representatives of outside agencies, should the scope of the NDC impact construction element under their jurisdiction. ESDCM shall assure RFC plans are updated in the document register and mobile plans promptly with both pending and final changes.

Design Quality Assurance Manager (DQAM) ensures quality control and quality assurance is performed and documented. If the NDC is the result of an error or omission, the DQAM will initiate corrective action in accordance with **DQCP-38 Corrective and Preventive Action**.

Discipline Lead (DL) or designee makes the design change to the drawing, including the coordination, and preparation. The DL will sign off the NDC. The NDC will be approved by the Design Manager or their designee.

4. PROCEDURE

- Step 00 – Designer Initiation - A DL or designer identifies the need for an NDC. If a designer identifies the need for a change, the appropriate DL must concur the change is

required. DM reviews the change, and the DL or designee completes the Notice of Design Change Form (Appendix B) in the Project EDMS and attaches marked up plans with hold clouds and redlines as appropriate. Additionally, DM or DL shall immediately contact and communicate the change to the CM, CQAM and ESDCM.

- Step 01 – ESDCM Review – The Notice of Design Change Form, denoting when revised drawings or specifications will be available, is transmitted to the ESDCM, CM and Project Engineer.

  The ESDCM reviews the NDC for further distribution as required. Upon receipt of the NDC notification, the CM or Project Engineer will inform the ESDCM and DM whether a constructability review will be required. The ESDCM informs the Client of the changes and determines whether a Final Design submittal is required.

- Step 02 – Document Register/Mobile Plan update - ESDCM or Document Control Coordinator will replace or markup the respective RFC drawings in Mobile Plans with the changes from the NDC and notify the Project team. Care shall be taken to delineate areas *Not for Construction* pending resolution of the NDC and to link the markup to the NDC form in TeamBinder. Additionally, the NDC form shall be linked to the respective drawings in the document register.

- Step 03 – Complete Design Change - The design is progressed, with changes identified in the document and the source of the revision identified in the revision block, and a check print is created and checked per applicable procedures. Outstanding changes associated with the documents, such as previous field design changes, will be incorporated into the document revision when the drawing is revised and reissued.

- Step 04 – Project Review - The DM may authorize a shortened version of the review/comment process with concurrence of the DQAM. The revision is distributed for an Interdisciplinary Design Review and/or Constructability Review, as determined by the DM, ESDCM and the Construction Manager, and a comment resolution meeting is held, if needed.

  - Check prints, Comment Resolution forms, and any other needed materials are given to the DQAM for a QA Review and certification. When QC documentation is in conformance to the DQMP, the DQAM will complete the certification process.

  - The design changes shall be approved by the responsible DL or Engineer of Record (EOR) of the original design or by a licensed professional engineer of appropriate experience if the original responsible EOR is no longer available. All changes to designs, drawings, specifications, calculations, and reports shall be signed and dated by a licensed professional engineer (signed and sealed) for IFC. The DL will update the design documents within the NDC document control form for RFC.

- Step 05 – Transmit Design Revision to Client - ESDCM or the Document Control Coordinator will transmit revised documents to the client for review and comment, unless not required by contract.
- Step 06 – Client Review - Client will review the revised documents and, when satisfied all comments are incorporated, will issue concurrence with the NDC document.
- Step 07 – NDC Close-Out – ESDCM Reviews Clients response and either advances it for Close-Out and distribution or returns to Step 03.
- Step 08 – Update Mobile Plans and Closeout. ESDCM shall ensure prompt, same-day communication of the approved change to QM, CM, and key staff. ESDCM, with the Document Control Coordinator, shall update the RFC document register, mobile plans and distribute.

IDENTIFICATION OF CHANGES

- **Drawings**: Revisions will be identified with a revision cloud and symbol. The symbol will conform to the specified CADD standards. If a drawing is subsequently revised, the previous revision cloud and symbol will be removed unless required to remain by the agency having jurisdiction. The revision block will be completed for each revision with the source of the change (i.e., NDC#) in the “description” box.
- **Documents, Reports, Specifications:** Changes to report documents will be shown in track changes to facilitate identification. Additions will be underlined, and deletions should be shown in deletion “balloons” in the right-hand margin. This maintains the document’s pagination and is easier for the reader to identify the changes. A “clean” version of the document will also be created using “show final” from the pull-down menu in the “Tracking” menu in the “Review” tab. Both the track changes and clean document will be submitted. The revision history table for the document may also be used to identify specific locations of the change.
- Changes to RFC Specifications will also be shown in track changes and with a vertical line adjacent to the changed text for QC purposes. The clean version signed and sealed by the EOR will only display the vertical line adjacent to the revised text. A revision history table will be provided and updated as required.
- **Calculations:** The revision history table for the document will be used to identify specific locations of the change.

PROCESS NOTES

- DM, DL, ESDCM should populate and train for proper set-up and input of the fields on the NDC form within the EDMS.
- When utilizing the EDMS for submitting an NDC, it is crucial to fill out the system’s form as completely as possible to accurately track the lifecycle of the item for management of all NDCs, and for management reporting.

- Link the affected documents within InEight Document / Document Register to the NDC form.
- When completing the EDMS form, initiator shall include, at minimum, the following information:
  - Subject – providing a short/concise description
  - Message – providing a detailed description and proposed solution
  - Discipline
  - Area
  - Priority
  - Drawing Sheets Affected
  - Drawing Package Number Affected
  - Response Due/Needed By
  - Attach all relevant files needed to review and assess the NDC

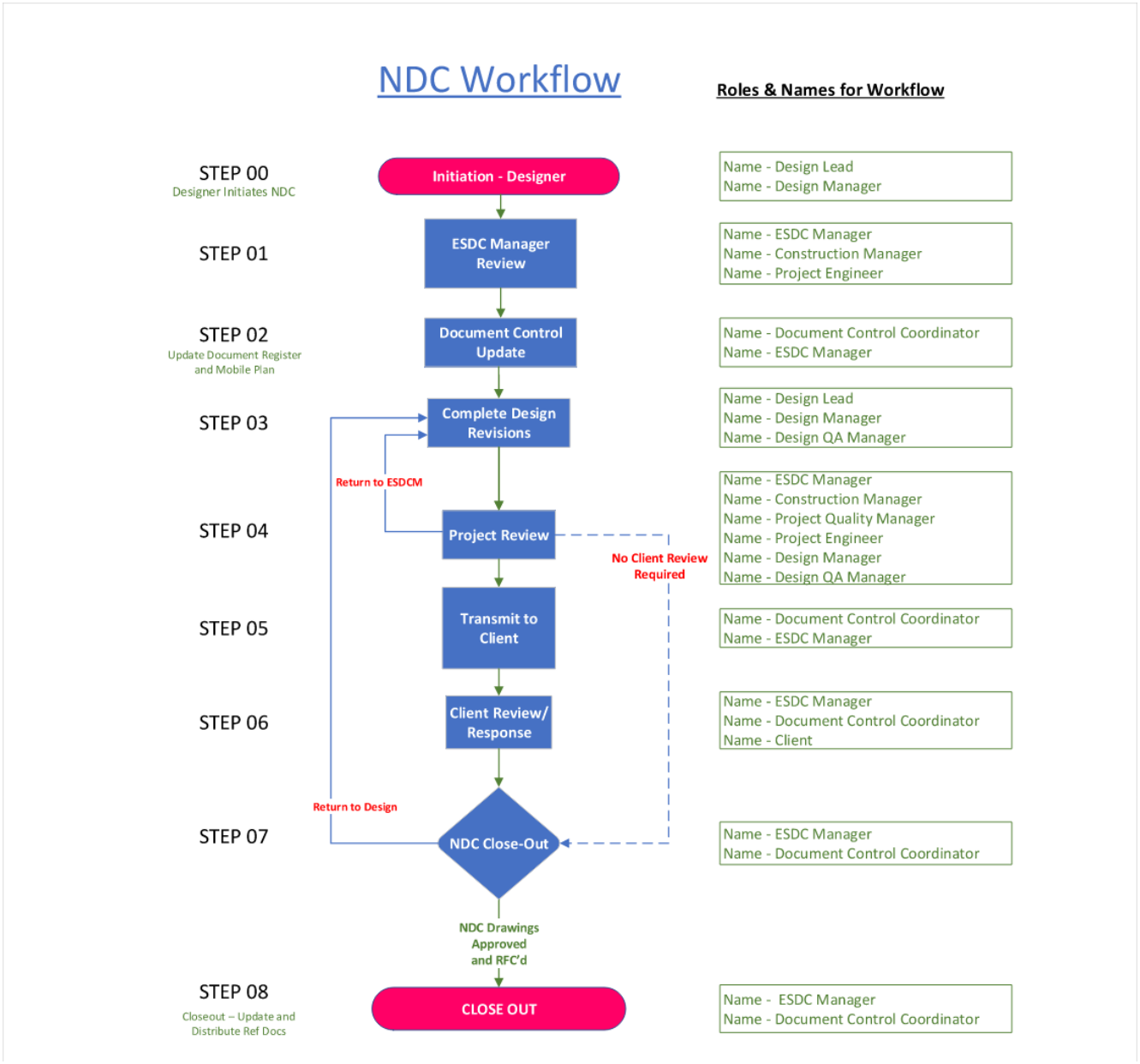
5. REFERENCES

- Appendix A - NDC Workflow
- Appendix B – Notice of Design Change Form (example)
- DQCP-21 Request for Information (RFI)
- DQCP-38 Corrective and Preventive Action

6. QUALITY RECORDS

- Completed NDC
- Check prints and quality review records
- Certification of Compliance

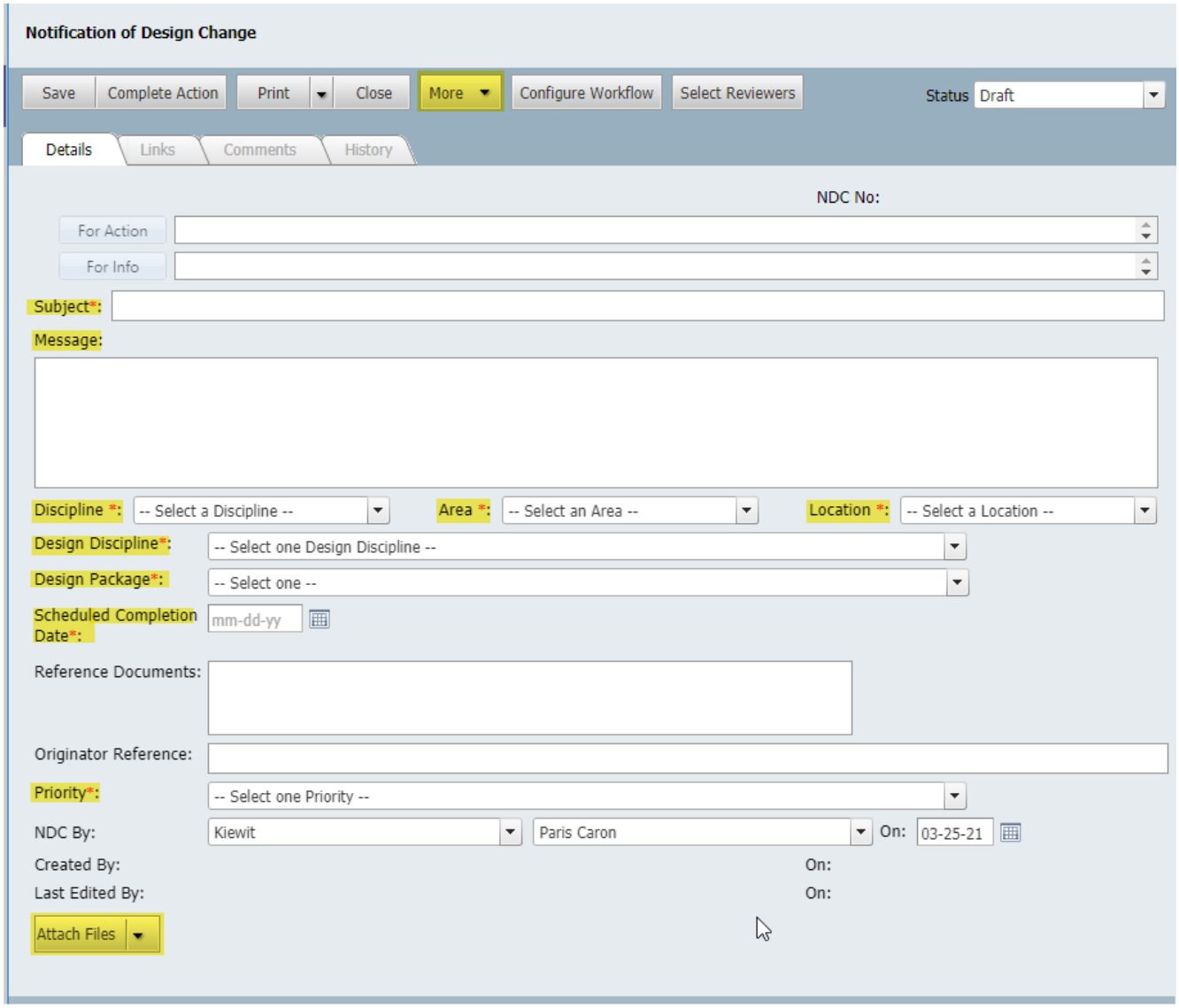
APPENDIX A – NDC WORKFLOW CHART



APPENDIX B – NOTICE OF DESIGN CHANGE FORM (EXAMPLE)

EDMS (*InEight Document*) NDC Form Screenshot

All fields highlighted yellow **must** be filled out when submitting a Notice of Design Change form:



FIELD DESIGN CHANGE (FDC)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020
John Wise	Refine workflow	0.01	04/12/2021

The official controlled digital copy of this Procedure and Approval is the signed Word document held within our KIE Document Control - SOPs SharePoint Library, and is visible to all authorized users. All printed copies, and all electronic copies and versions, except the ones described below, are considered uncontrolled copies which should be used for reference only. KIE Document Control group manages the protected access to said SharePoint library. KIE personnel will have read-only access. All changes/revisions must be submitted to KIE_Document_Control@Kiewit.com.

Please refer to the KIE Document Control - SOPs SharePoint Library for the current controlled revision and approval records.

APPROVAL FOR THIS PROCEDURE:

Revision 0.01

David G. Williams, KIE District Quality Manager

(Name / Title)

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1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). To establish the scope, responsibilities, procedures, and forms for the processing and communicating Field Design Changes (FDCs) during construction as requested by the Construction Manager, to address situations discovered after the design package has been Released for Construction.

2. SCOPE

Construction contracts, especially design-build contracts, often require field design changes to the original design of the Project. Changes in site conditions, improvements to the original design, and preferred construction method/material proposals from the contractor are often viable reasons why the original design could require modification. The nature of a design-build method of project delivery requires an efficient method of processing and communicating field design changes during construction.

An FDC is not used to resolve design errors or conflicts, nor to resolve non-conforming work. FDCs occur after design and prior to construction. FDCs for constructability must be cost effective and achieve an anticipated net savings when analyzed against construction cost and schedule impacts for all disciplines, including the cost of design to make the change and the time to seek client and stakeholder approval.

It is best practice to limit FDCs. Often, optimizing one element of the work will increase cost of other elements, and the process to design the change and gain client approval produces unforeseen schedule delays. Design may be able to complete the FDC in days, but often client and third-party approvals may take weeks. The impact of the design change must be fully understood and approved by construction management before design proceeds with the change. A cost and schedule impact analysis should be completed. Thorough and timely constructability reviews during design development typically result in fewer FDCs during construction.

FDCs are typically initiated by construction staff. EDMS (electronic document management system) (i.e., TeamBinder aka InEight Document) Field Design Change forms will be issued to document and process field design changes. The FDC form is necessary to inform the Design Manager (DM), the client, construction personnel, the Quality Manager, and Quality team members, of authorized field changes and to help track field changes. Pending FDCs shall be linked to affected design documents in the RFC document register and in the RFC mobile plan set. The initiator and ESDCM are responsible to communicate the pending change to affected staff and client personnel.

Some clients may allow an expedited process for “Minor” FDCs. “Minor” FDCs are changes that do not impact other elements of the design and can be redlined on the RFC plans without revising and reissuing the design. The Design Manager or designee (Discipline Lead or ESDC Manager) will determine whether the proposed change is to be classified a “Minor” or “Major” field design change. The classification may require client concurrence.

The FDC process is not applicable to the addition, deletion, or modification to the work stipulated by change order. An NDC should be used to address such changes to the scope of work.

3. DEFINITIONS

Minor FDCs:

Judged minor by the contractor and routed to the ESDCM and DM for concurrence. If the DM does not concur, the FDC will be addressed as a major FDC. Examples are:

- Routine alignment revision and/or length adjustment of a buried conduit or utility to suit field conditions.
- Small adjustment of expansion or contraction joint locations with the intent of improved coordination between design features, such as structural walls, concrete pavement, equipment/signal (system) standards and supports, etc.
- Small adjustment in location or length of any feature to improve constructability, installation, or compatibility where there is no effect on feature performance.
- Corrections to plan dimensions or notes.
- Clarifying and/or improving construction details.
- Providing specific input on items addressed in design drawings with general notes such as "match existing " or "transition to fit".
- Adjusting reinforcing steel to avoid conflicts, relieve congestion, or resolve clearance problems, but only when it can be clearly demonstrated without significant calculation the design is not compromised.

FDCs that address alternate methods or sequence of construction which will produce the same result as the design shown on the plans shall be considered a minor change.

Approved Minor FDC changes shall be shown on EDMS Mobile Plans and the as-built drawings.

Major FDCs:

FDCs, in the opinion of the DM, related to the strength, serviceability, durability, code or a policy compliance of the finished permanent work shall be considered a major change. Major changes shall be incorporated into the design drawings, provided to the client for review and approval, if requested, prior to construction. Major FDCs require a change to design calculations and full application of design QC/QA check and assurance procedures. Major FDCs may be defined in contract documents. Major FDCs must be approved by Project Manager and Design Manager.

Examples of major FDCs include:

- Revision of a standard design feature or specific project design element to the mainline alignment, crossroads and significant detours, including structural section and change in access control.

- Modification of major structures where more than minor calculations are required. Such modification typically requires considerable calculation, may include an associated Independent Design Check (IDC) and results in changes to the design drawings.
- Changes in the character of work or site conditions requiring design drawings to be revised, reviewed, approved, and re-released.
- Changes greater than can be accomplished through as-built redlining.
- Changes that affect prior replies to the client comments.
- Changes that may affect other discipline designs.
- Changes that affect environmental design criteria or certifications.

4. RESPONSIBILITIES

Construction Engineer initiates FDC using the FDC form in InEight Document and marking the FDC as "pending" on the RFC plans set. The affected design plan sheets in the document register should be linked to the FDC form. FDCs should be thoroughly vetted by the Construction Manager or Project Engineer, prior to distribution to the DM and ESDC Manager.

ESDC Manager (ESDCM) is responsible to coordinate the FDC evaluation and response with the appropriate design and construction discipline managers and staff. ESDCM coordinates with the DM and CM and facilitates construction operation reviews, including the cost/impact analysis and client's review. The ESDCM shall ensure the FDC is promptly communicated to construction, quality, and client.

Design Manager (DM) is responsible for responding to all FDC requests. The Design Manager will determine whether the proposed change is to be classified a "Minor" or "Major" field design change. The DM will facilitate the review of all FDCs according to the requirements of the Project DQMP.

Construction Manager (CM), or their designee, is responsible for controlling the construction activities once the FDC has been documented to avoid further work activities that may require removal or rework because of the FDC disposition. The Construction Manager will keep the Project Manager, the Design Manager, and the client apprised of the impacts to ongoing construction operations because of the anticipated design change. The Construction Manager shall notify field QC personnel of the Field Design Change. Field QC personnel shall monitor the work elements impacted by the Field Design Change and report on observed activities.

Design Discipline Lead (DL) is responsible for providing and coordinating the technical support required to evaluate and respond to major field-generated design change proposals. The Responsible Engineer shall approve, sign and seal drawing changes related to Major FDCs prior to construction of the impacted element.

5. PROCEDURE

- **Step 00 – Initiation.** Construction Engineer (Field Engineer, Superintendent or Project Engineer) initiates the FDC, communicating the proposed change and basis of FDC with notes and redlines. The InEight Document FDC form will identify the reason for the change, the revisions made, the specifications and plan sheets modified, as applicable. For Major FDCs, a cost estimate of construction savings and impacts addressing all disciplines is required. Submit the FDC request only through InEight Document, linking affected plans within the document register to the FDC form. **The change must be immediately noted (with clouding or highlight) within the RFC mobile plan set as "Pending."** Provide all required information on the submittal form. Initiating FDCs by email is not acceptable.
- **Step 01 – Kiewit Operations Review.** Construction discipline leads and management review the proposed FDC and cost/impact analysis and make go/no-go decision whether to proceed with the FDC. The FDC may be returned to initiator or rejected.
- **Step 02 – Design Review.** The scope of the FDC will be thoroughly analyzed by the ESDCM and DM to confirm the circumstances described in the FDC. The DM will enlist additional information from field personnel as necessary to clearly define the scope and detail of the revisions required, as well as to identify the schedule for FDC resolution. The DM will classify the FDC as either "Minor" or "Major" and gain concurrence from the ESDCM, DL, and CM. The DM will also provide clarifications on required QC activities for minor FDCs.
- **Step 03 – Implement Design Change.** DM assigns DL to complete the design change, considering the following:
    - If a Minor FDC, the changes will be marked-up on the plans and attached to the FDC form to be added to the RFC mobile plan set and linked to the document register.
    - If the change is a Major FDC, the ESDCM will inquire with the client whether a formal design submittal and review is required, and design documents will be revised accordingly.
    - Plan and specification revisions classified as Major may be subject to an Interdisciplinary Design Review (IDR) and Independent Design Check (IDC) like the original design. A Constructability Review (CR) will be performed, if required, by the Construction Manager. The IDR and CR may be performed concurrently with checking the revised design.
    - For Major FDC's, the DL will initiate the design development process and cause required QC activities to be performed.
    - The design changes shall be reviewed by the responsible DL or EOR of the original design or by a licensed professional engineer of appropriate experience

(Responsible Engineer) if the original responsible EOR is no longer available. All changes to designs, drawings, specifications, calculations, and reports shall be signed and dated by a licensed professional engineer (signed and sealed). The Responsible Engineer may reject or request revisions to the proposed FDC when the proposed change does not meet project requirements or negatively impacts the integrity of the design.

  - The DQAM will review the QC Documentation for all Major FDCs and issue formal certification.

- **Step 04 – Operations Review.** Construction Operations performs a review of the completed FDC, confirming that the cost/schedule impact analysis is still valid and provides clear direction to ESDCM. ESDCM instructs document control coordinator to either close out as "Dropped" or advance to Step 05.
- **Step 05 – Transmit to Client.** For a Major FDC, Document Control Coordinator sends the FDC as a design submittal to client for review and comment.
- **Step 06 – Client Review.** The client reviews the revised documents, provides comments, and when satisfied all comments are resolved and incorporated, issues concurrence.
- **Step 07 – FDC Close-Out –** ESDCM Reviews Clients response and either advances it for Close-Out and distribution or returns to Step 03.
- **Step 08 – Update Mobile Plans and Closeout.** ESDCM shall ensure prompt, same-day communication of the approved change to QM, CM, and key staff and, with the Document Control Coordinator, shall update the RFC document register, mobile plans and distribute.

6. PROCESS NOTES

- **Identification of Changes**
  - **Drawings**: Revisions will be identified with a revision cloud and symbol. The symbol will conform to the agency having jurisdiction CADD standards. If a drawing is subsequently revised, the previous revision cloud and symbol will be removed unless required to remain by the agency having jurisdiction. The revision block will be completed for each revision with the source of the change (i.e., FDC#) in the "description" box.
  - **Reports, documents, specifications**: Changes to report documents will be shown in track changes to facilitate identification. Additions will be underlined, and deletions should be shown in deletion "balloons" in the right-hand margin. This maintains the document's pagination and is easier for the reader to identify the changes. A "clean" version of the document will also be created using "show final" from the pull-down menu in the "Tracking" menu in the "Review" tab. Both the track changes and clean document will be submitted. The revision history table for the document may also be used to identify specific locations of the change.

- Changes to RFC Specifications will also be shown in track changes and with a vertical line adjacent to the changed text for QC purposes. The clean version signed and sealed by the EOR will only display the vertical line adjacent to the revised text. A revision history table will be provided and updated as required.
- **Calculations**: The revision history table for the document will be used to identify specific locations of the change.

- **EDMS Form Input**
  - Project team should populate and train for proper set up and input of the fields on the FDC form. When utilizing InEight Document, it is crucial to fill out the system's form as completely as possible to accurately track the lifecycle of the item for management of all FDCs, and for management reporting.
  - When filling out the EDMS form, initiator shall include, at minimum, the following information:
    - Subject - providing a concise description
    - Message – providing a detailed description and Proposed Solution
    - Discipline
    - Area
    - Priority
    - Drawing Sheets Affected - Link the affected documents within InEight Document / Document Register to the FDC form.
    - Drawing Package Number Affected
    - Response Due/Needed By
    - Attach all relevant files needed to review and assess the FDC

7. REFERENCES

- Exhibit A - FDC Workflow
- Exhibit B - EDMS (InEight Document) FDC Form

8. QUALITY RECORDS

- Completed EDMS (InEight Document) FDC Form

EXHIBIT A – FDC WORKFLOW EXAMPLE

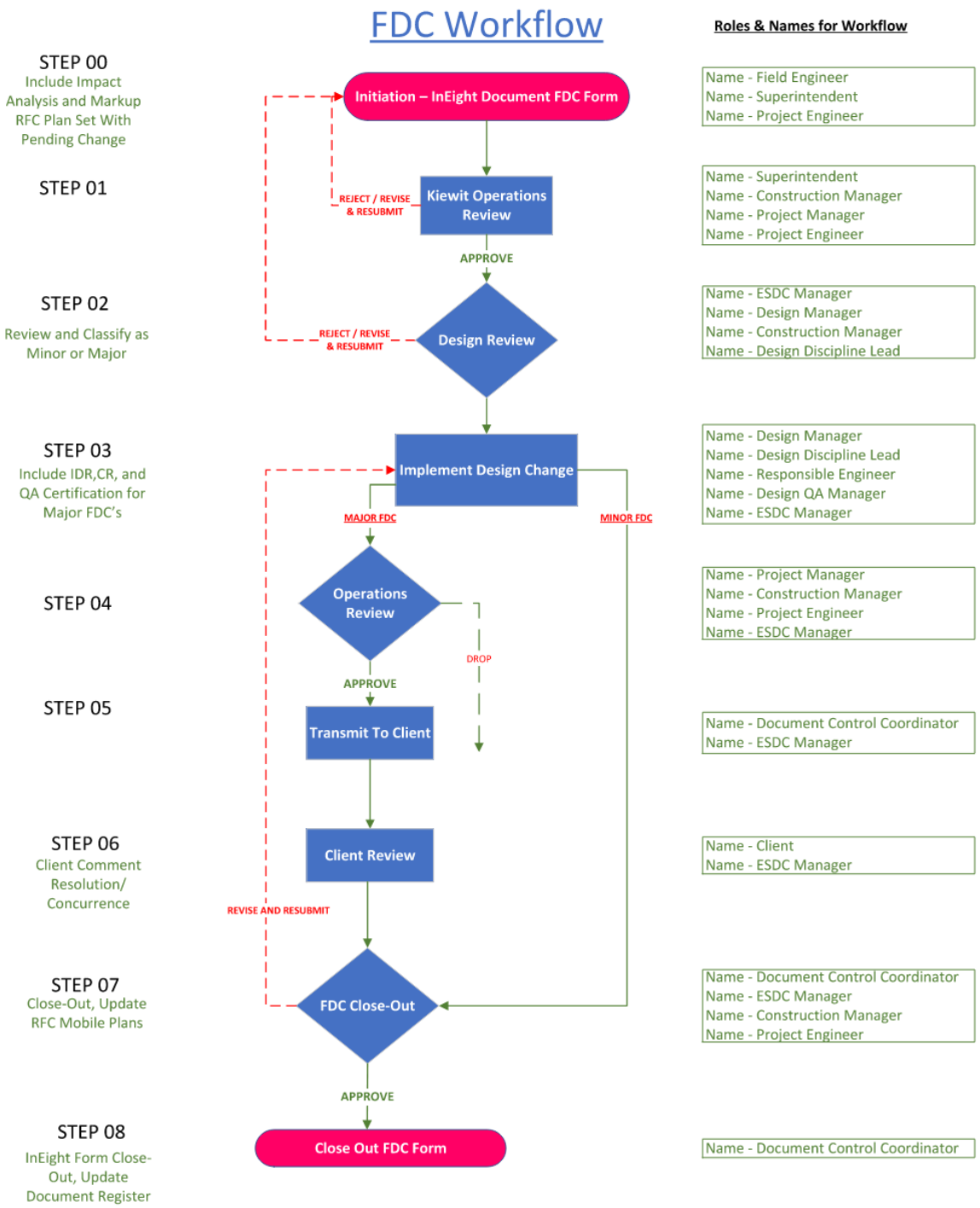
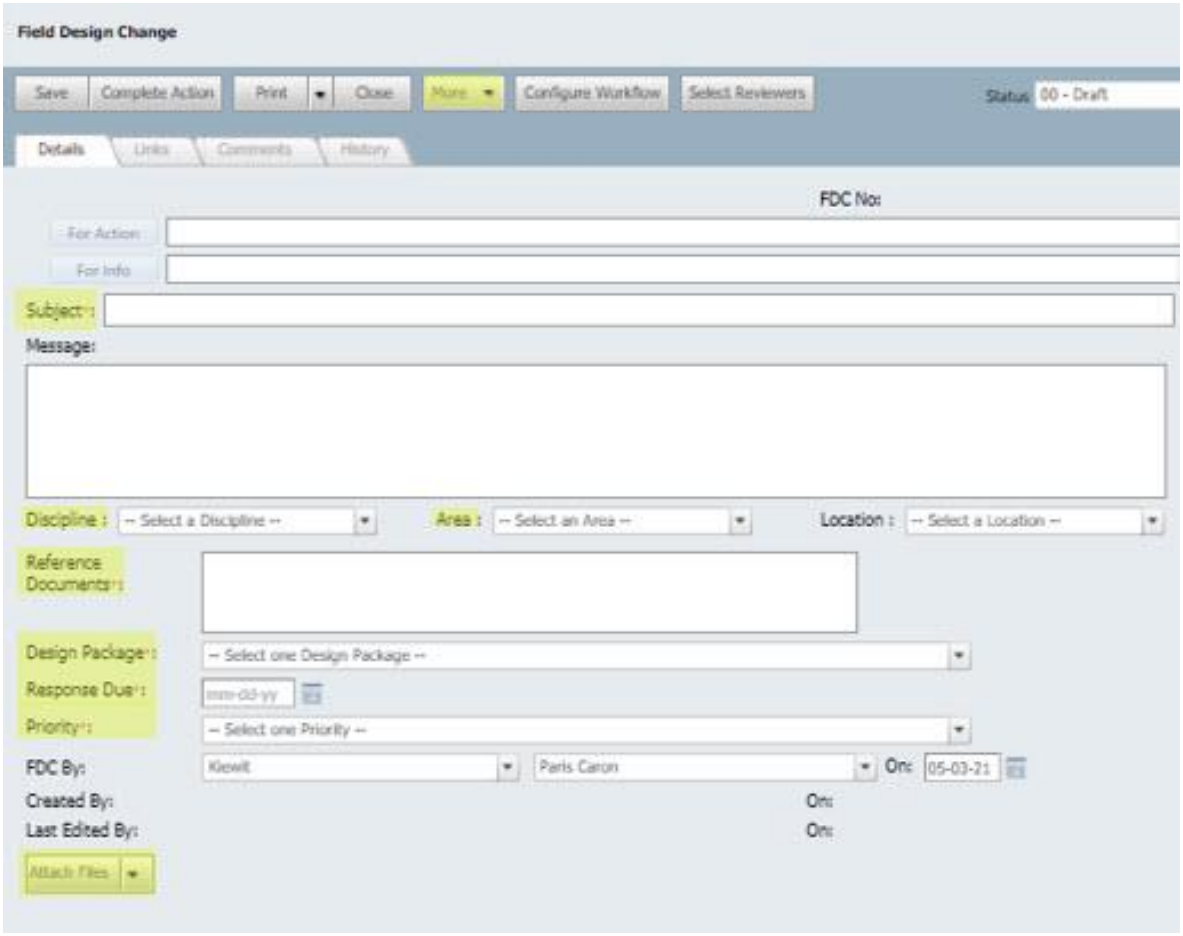
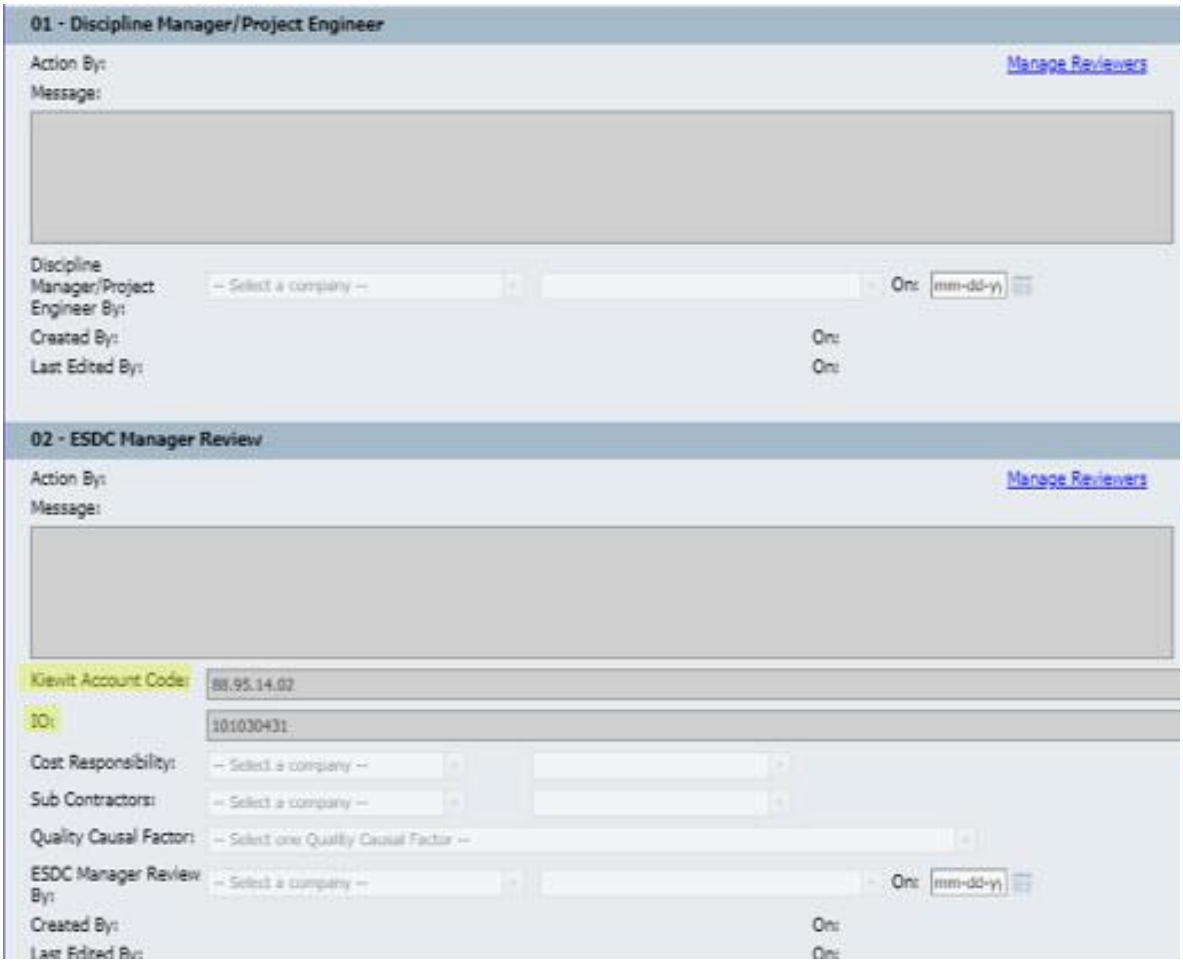


EXHIBIT B – EDMS (INEIGHT DOCUMENT) FDC SCREENSHOT EXAMPLES

Fields highlighted yellow must be filled out when submitting a Field Design Change form:





REQUEST FOR INFORMATION (RFI)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To define the process for the creation, review, and control of a Request for Information (RFI). To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP).

2. SCOPE

This procedure applies to RFIs to the Designer on the Project. RFIs are requests for an interpretation or clarification of the plans or specifications. RFIs will be tracked to resolution and may result in a Notice of Design Change (NDC) if design documents need to be reissued, determined by the Design Manager (DM) or Responsible Engineer. Clarifications or interpretations of the plans or specifications are typically included in the Basic Design Service scope.

An RFI where originator proposes a change to the design will use Field Design Change (FDC) process. The Designer's response to an RFI shall be tracked in Project's electronic document management system (EDMS) and redlines added to Project's mobile plans. InEight Document is Kiewit's preferred EDMS.

3. RESPONSIBILITIES

Document Control Manager must maintain records of all RFIs and process them through the channels set up for the Project using Engineering Services During Construction (ESDC) workflows. Document Control Manager will track, log, report and provide training to design staff as necessary for their direct input into the EDMS.

Design Manager (DM) is responsible for coordinating the review of the RFI within the design team. The DM or designee will review the RFI response to ensure the RFI has been fully and correctly responded to before entering the response into the EDMS system.

Discipline Lead (DL) completes the RFI review as expeditiously as possible. The DL, or Responsible Engineer, will determine if the RFI requires design documents to be reissued and an NDC initiated.

Originator creates the RFI. The Originator can be the Construction Contractor, Construction Manager, Designer, Field Engineer, Supplier, or the Client.

The **ESDC Manager (ESDCM)** reviews the RFI and seeks to clarify the request with the Originator, coordinating with the DM and DL. ESDCM will ensure the request for information is correctly classified as RFI, FDC or NDC and that the RFI is tracked, closed, and documented in mobile plans.

4. PROCEDURE

Step 00 – Initiation. Originator creates completes the RFI form in EDMS.

Step 01 – Construction Review. Contractor reviews the RFI and confirms question is clear and direct, and all required information is supplied within the request and not likely to result in an FDC.

Step 02 – ESDCM Review. The ESDCM ensures the RFI is transmitted through EDMS for logging and distribution to the Discipline Lead and other design staff as necessary. Document Control keeps the internal RFI log updated with the status of the RFI through each step of the review/response cycle.

Step 03 – Design Review. DM, or ESDCM, can indicate the appropriate reviewers for each RFI, or Document Control can forward the RFI to the designated DL as indicated on the RFI (i.e. Structures, Drainage, etc.).

Once the RFI is received for review, the DL shall review the RFI for the following:

- Is there sufficient detail provided in the original design?
- Can the RFI be resolved by a written clarification?
- Is the design ambiguous?
- Is there an engineering error?
- Is construction staff requesting a deviation from the original specified materials?
- Is additional engineering required?
- Is an Interdisciplinary Design Review required?
- Is a Constructability Review required?

If the RFI identifies a need for additional design details or a revised design, a NDC and a revision of the design drawings should be issued that provides clear direction to the contractor as to how the design needs to be modified.

Once the required DLs have reviewed the RFI, a written response is prepared on the RFI form along with any supporting information such as design clarifications that show where the existing information can be found on the existing design documents, supporting vendor information, NDCs or revised design drawings. At a minimum the response shall include any required design clarifications, and approval or disapproval of material substitution requests.

The ESDCM and DM review the RFI response for the following:

- Cost and Schedule impacts
- Completeness of response
- Additional engineering required

Upon approval the DM or DL transmits the RFI through EDMS for finalization and update of the RFI Log

Step 0**5 Update Mobile Plans, Closeout.** Document Control updates the mobile plans with the details and response and closes out RFI in EDMS.

5.1 Process Notes

- Document Control maintains the EDMS and the form module containing the RFI as received and tracked, and all pertinent documentation generated during the review process, including the response.
- The ESDCM and DM ensure that adequate and timely responses are provided to the team.
- The work necessary to redesign to accommodate new field conditions should not be undertaken without correcting the classification of the request and reviewing with ESDCM and Project Quality Manager. Any construction quality issues, or proposed changes to the IFC documents shall be reprocessed through the appropriate NCA or FDC EDMS form to ensure appropriate Project notifications.
- Project team should populate and train for proper set up and input of the fields on the RFI form. For example, “Area” should be set up as a drop down of the defined project areas for each project.
- When utilizing EDMS for submitting a RFI, it is crucial to fill out the system’s form as completely as possible in order to accurately track the lifecycle of the item for management of all RFIs, and for management reporting.
- When filling out the EDMS form, initiator shall include, at minimum, the following information:
    - Subject - providing a short description [should include basic Subject naming convention]
    - Message – providing a detailed description
    - Proposed Solution
    - Discipline
    - Area
    - Priority
    - Drawing Reference / Sheets Affected
    - Related RFI No(s)
    - Response Required By

5. REFERENCES

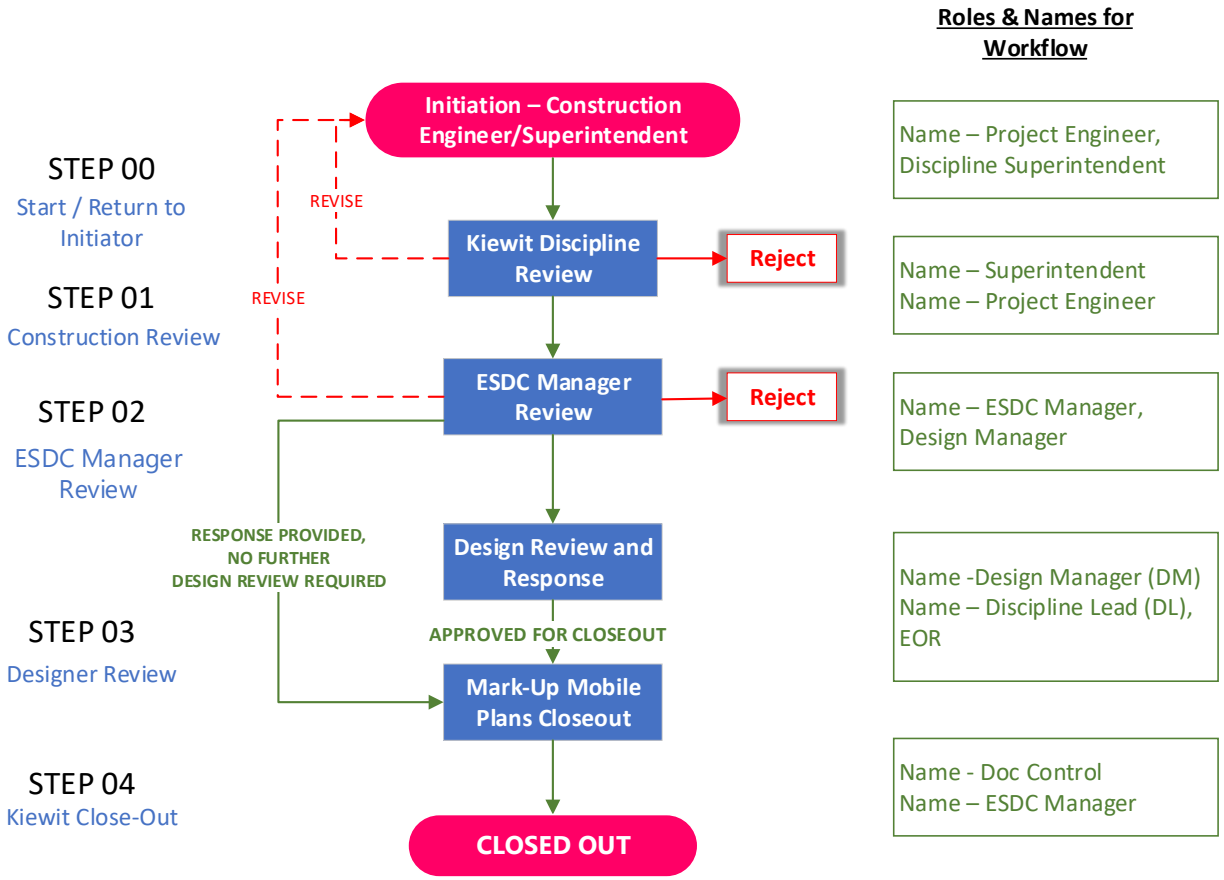
- Appendix A - RFI Workflow
- Appendix B - Teambinder (Ineight Document) RFI Form

6. QUALITY RECORDS

- RFI
- RFI Log

APPENDIX A – RFI WORKFLOW

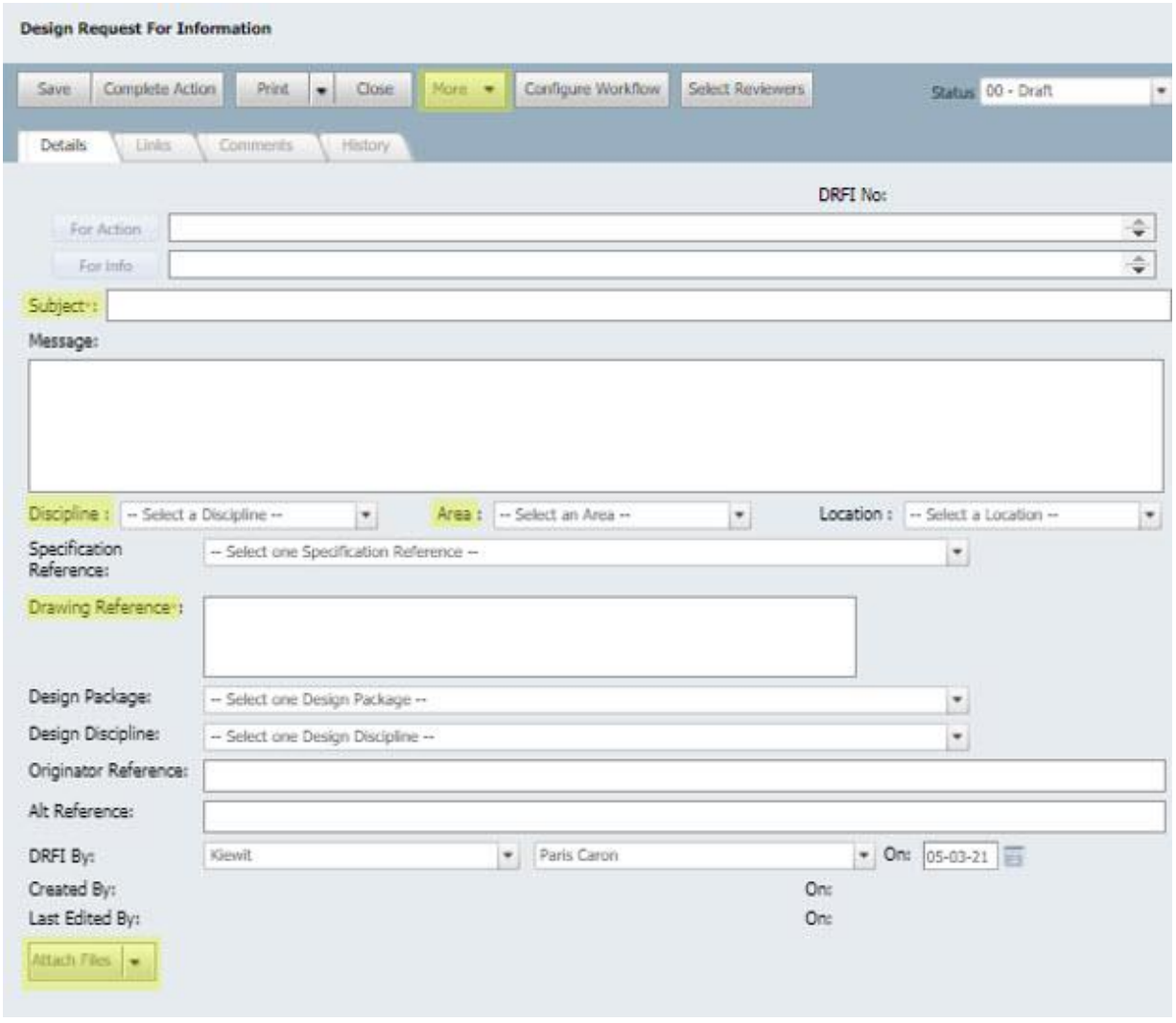
Design RFI Workflow

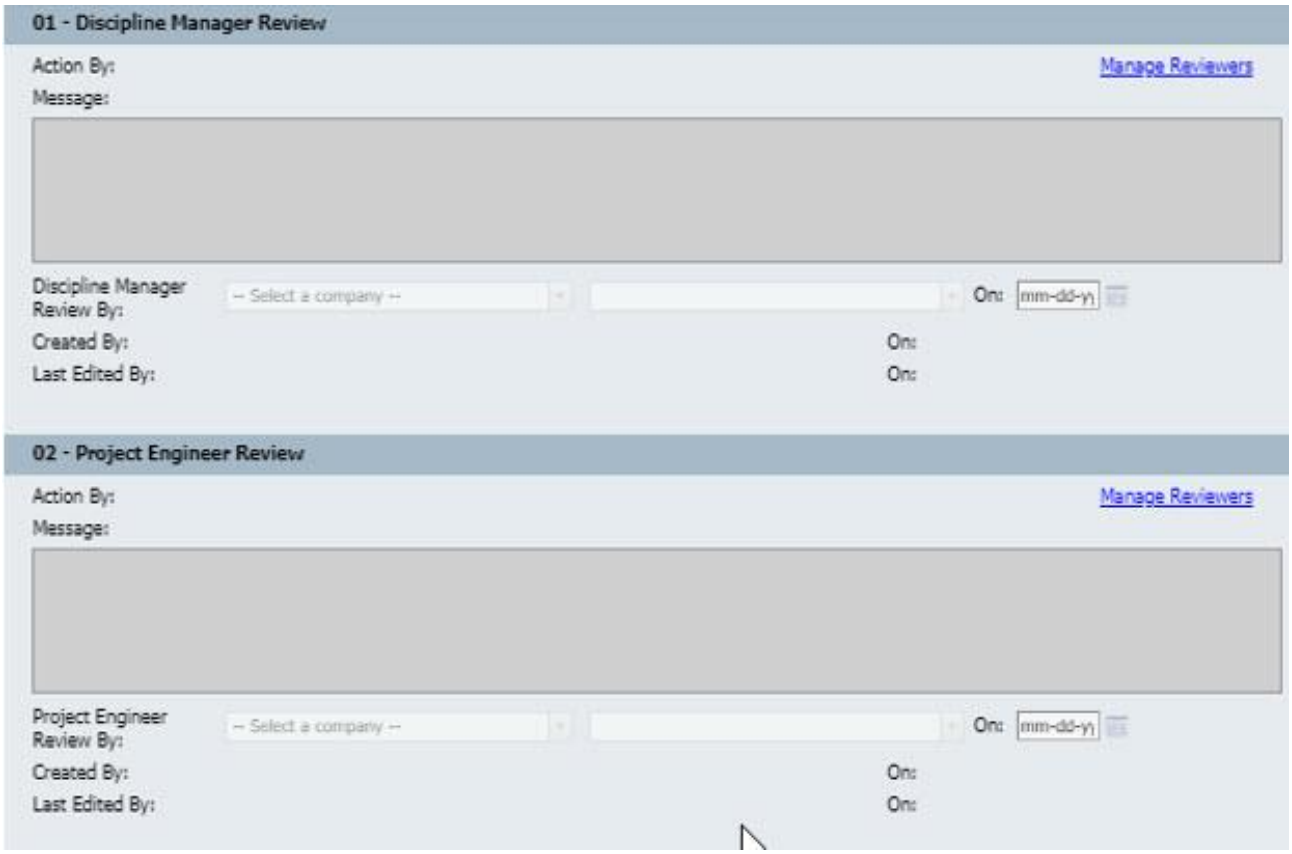


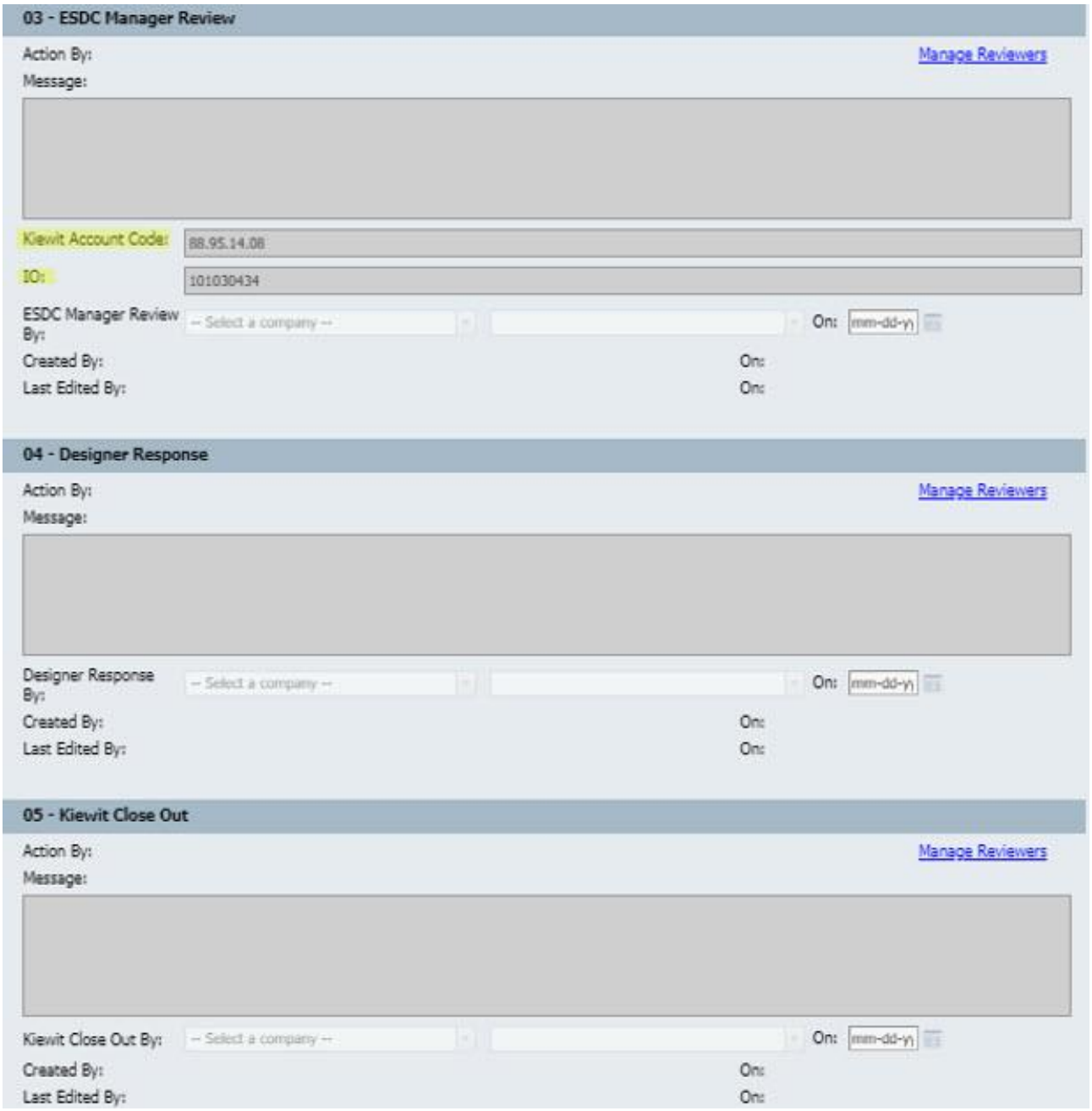
NOTE: Based on Resolution of RFI Response, one of the following Actions Should Happen:

APPENDIX B – TEAMBINDER (INEIGHT DOCUMENT) RFI FORM

The screenshot below is the standard RFI TeamBinder form. The highlighted fields are the minimum information which Originator should include when submitting a RFI; however, the more information provided, the better for the reviewer/responder. Please note, not all steps included for the RFI review process are reflected in the screenshot below.







ENVIRONMENTAL COMPLIANCE

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.0	06/15/2020
David Williams	Align with DQMP; update references, records	0.01	01/29/2021

The official controlled digital copy of this Procedure and Approval is the signed Word document held within our KIE Document Control - SOPs SharePoint Library, and is visible to all authorized users. All printed copies, and all electronic copies and versions, except the ones described below, are considered uncontrolled copies which should be used for reference only. KIE Document Control group manages the protected access to said SharePoint library. KIE personnel will have read-only access. All changes/revisions must be submitted to KIE_Document_Control@Kiewit.com.

Please refer to the KIE Document Control - SOPs SharePoint Library for the current controlled revision and approval records.

APPROVAL FOR THIS PROCEDURE:

Revision 0.01

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). To provide a procedure for the design team to verify environmental compliance of design drawings and documents with the Final National Environmental Policy Act (NEPA) Environmental clearance report such as Categorical Exclusion (CAT-EX), Environmental Assessment (EA) or Environmental Impact Statement (EIS) or when applicable, analogous State environmental policy documents.

2. SCOPE

This procedure shall apply to all KIE design projects and design deliverables where verification of environmental compliance is applicable.

3. DEFINITIONS

- Not used

4. RESPONSIBILITIES

Design Manager (DM), or designee, shall be responsible for overall implementation of this procedure including requesting that Environmental Compliance Design Reviews occur prior to the Final Design submittal. **Design Quality Assurance Manager** (DQAM) shall be responsible for working with the DM and Discipline Leads and providing concurrence to the required quality check and review activities.

Discipline Leads (DLs) shall be responsible for working with the DM and DQAM to determine the required quality check and review activities for deliverables and documenting the deliverables and the required quality checks and reviews within the Deliverable Quality Matrix and updating this matrix as project conditions dictate.

Environmental Compliance Manager (ECM) shall be responsible for reviewing the approved final environmental document to make sure the design team is compliant with all environmental commitments and preparing the environmental commitments checklist to be used by the design team in reviewing the plans and specifications for conformance to the environmental commitments.

5. PROCEDURE

The ECM in concert with the DM and Discipline Leads shall review the approved environmental document and prepare a checklist that shows the environmental commitments the design team needs to incorporate into the design plans and specifications in order to be compliant.

Prior to the applicable milestone submittal, the ECM will check the design documents provided by the Discipline Lead for compliance using the checklist tailored to the specific design submittal or package. Compliance will be tracked using this checklist. The Discipline Lead will cause changes to the design documents for all items not in compliance with the requirements. The changes will be checked in accordance with DQCP-01 QC Disciplinary Review.

6. REFERENCES

- DQCP-01 QC Disciplinary Review

7. QUALITY RECORDS

- Project Specific Checklist(s), developed by ECM and,
- Bluebeam Review Session Record; or
- Final document markups; or
- Checkprint Stamp

INTERDISCIPLINARY REVIEW (IDR)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020
David Williams	Incorporate Submittal Package Manager, Bluebeam Work Instruction	1.00	03/28/2022

APPROVAL FOR THIS PROCEDURE:

Revision 1.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). The purpose of this procedure is to establish the sequence and responsibilities for the design package reviews. This procedure provides the requirements and methods to implement an Interdisciplinary Review (IDR). This review occurs upon completion of the QC Disciplinary Review, where more than one Discipline is involved in the submittal. and prior to the submittal. This procedure applies to all design packages that are submitted to the client. Reviewers shall examine the documents for interferences, consistency, completeness, and fullness.

2. SCOPE

This procedure shall apply to all project deliverables prior to submission to the client. Deliverable packages shall not be submitted for IDR until the QC Disciplinary Review and Independent Design Check (if required) have been completed, comments resolved, and verified.

3. DEFINITIONS

Not used

4. RESPONSIBILITIES

Design Manager (DM). The DM assigns reviews and ensures each Engineer of Record (EOR) who will sign and seal the work has addressed the potential for conflicts between the discipline deliverables. The EOR, if not the Design Manager, must positively affirm the interdisciplinary review has been completed before signing the work.

Submittal Package Manager. Coordinates the production of the package and interdisciplinary and constructability reviews prior to release to the next stage of the work.

Interdisciplinary Reviewers: The Design Manager (DM) and Discipline Leads will assemble the IDR package of documents and will either distribute the package to the group or convene the group of Interdisciplinary Reviewers to participate in the review process. Reviewers are responsible to ensure compatibility between disciplines, completeness and suitability of design, adherence to requirements and sound engineering practice, and interferences or potential problems with design or construction are identified. The DM or designee are responsible for notifying the Discipline Leads and the Design Quality Assurance Manager (DQAM) a submittal is ready for review.

In addition to reviewing the submittal, it is also the responsibility of the Interdisciplinary Reviewer to review other comments that have been made by the various disciplines with respect to their own discipline and to look for possible conflicts or impacts from the comments made.

Design Quality Assurance Manager (DQAM): The DQAM is responsible for monitoring the process to ensure each discipline reviews the submittal.

5. PROCEDURE

5.1 Process Flow

5.2 Procedure

The DM prepares the Deliverable Quality Matrix (DQCP-12 Quality Planning) to identify deliverables and required reviews and shares with the project team.

The DM is responsible for notifying the discipline leads and the DQAM a submittal is ready for review. Each discipline will review the submittal and complete the form signifying that each discipline has reviewed the submittal for coordination with their respective disciplines.

The Submittal Package Manager shall initiate a Bluebeam Studio session with all documents for review. Interdisciplinary Reviewers will comment directly in each document. A final review meeting may be held to discuss all comments and resolve discrepancies. Any additional comments made during the meeting will be documented in the session indicating the commenter name when applicable.

When the review timeline is up, the Submittal Package Manager will review the IDR comments to confirm reviews are complete.

The Design Manager or EOR will review the comments generated. If comments require redesign, the design must follow the review process prior to submittal to the DQAM. If the revisions do not require redesign of major components, the submittal may be forwarded to the DQAM for final review.

Once the process is complete and the corrections have been made, the final submittal and the comment record are provided to the DQAM for verification the quality processes have been followed, prior to submitting to the client.

The EOR should give as much advance notice as possible of the scheduled submittal so that the reviewers can adequately review the submittal in accordance with the Quality Deliverable Matrix.

Record of the review may be a PDF version of the session, a review stamp, comment records or signed version of an IDR Form.

6. REFERENCES

- DQCP-12 Quality Planning
- WI -24/25 IDR/CR Using Bluebeam Studio Session

7. QUALITY RECORDS

- Bluebeam Review Session Record; or
- Checkprint Stamp, or
- Comment Records, or
- Interdisciplinary Review (IDR) Form

CONSTRUCTABILITY REVIEW (CR)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.0	06/15/2020
David Williams	Align with DQMP; update references, records	0.01	01/29/2021
David Williams	Incorporate Submittal Package Manager, Bluebeam Work Instruction, delete Form	1.00	03/28/2022

APPROVAL FOR THIS PROCEDURE:

Revision 1.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (KIE DQMP). This procedure establishes the sequence and responsibilities for the Constructability Review (CR) of documents prior to submittals. Constructability Reviews will be performed for all submittals except for the IFC/RFC design package submittals.

2. SCOPE

The CR will be performed, by construction staff for all design stages. The CR is applied to a design drawing or specifications to coordinate and review construction issues and their impact on the design details. The Construction Leads or Construction Managers review the document regarding adequacy of information, tolerances, site access and restrictions, economics of design and materials, availability of materials, construction equipment and required labor, survey verification, consistency with design objectives and environmental mitigation, maintainability features, interferences, conflicts between construction disciplines, completeness, and prudent construction practices. Review comments will be recorded on the Constructability Review Comment (CRC) form or via Bluebeam Revu sessions.

3. DEFINITIONS

Not used

4. RESPONSIBILITIES

Design Manager (DM). The DM (or delegate) coordinates the reviews and ensures Constructability Reviewer or Reviewers are identified and invited to participate. The DM assigns the setup of the Bluebeam Studio Session.

Submittal Package Manager. Coordinates the production of the package and interdisciplinary and constructability reviews prior to release to the next stage of the work.

The **Discipline Lead** (DL) is responsible for assembling and forwarding the document to the lead initiating Bluebeam sessions., The DL reviews applicable comments, records comment resolution and final disposition, and ensures changes are incorporated or addressed in the design document.

Constructability Reviewers assigned are responsible for completing the review of the design package. Constructability Reviewers attend comment resolution meetings, as necessary, to resolve comments.

Design Quality Assurance Manager (DQAM): The DQAM is responsible for monitoring the process to ensure each discipline reviews the submittal.

5. PROCEDURE

5.1 Process Flow

5.2 Initiation of the Review

The DL prepares the document, ensures that the drawings, tables and calculations have been checked (i.e. QC Disciplinary Review completed) in accordance with applicable procedures and creates the Review Print.,

5.3 Review

Reviews will be performed in a Bluebeam Studio Session. The Submittal Package Manager will open a Bluebeam session and notify Constructability Reviewers. Construction staff will join Bluebeam studio session and provide comments directly on the design document. If a Constructability Reviewer does not have any comments, he/she indicates “NO COMMENTS” next to his/her name on the Review Print stamp to document the review. Bluebeam will also generate a comment form similar to the Constructability Review Comment Form for additional reference. The Bluebeam comment form may be appended to the end of the Bluebeam PDF. When CR is complete, the review session will be closed to constructability reviewers.

5.4 Comment Disposition and Response

The DL provide an initial disposition and response to each comment in the session. When complete, the DL will schedule a Comment Resolution Meeting (CRM) and notify the Construction Manager and Constructability Reviewers once initial dispositions and responses have been prepared.

5.5 CRM to Resolve Comments

The Design Manager, DL and the Constructability Reviewers attend the CRM. At the meeting, all review comments are discussed to resolve any disagreement or conflict.

5.6 Incorporating Comments in Design

The DL or designee supervises the updating of the design documents before the next scheduled submission. The updated documents are sent through the normal checking procedures per the DQMP.

In case of disagreement or conflict between the reviewers and Discipline Lead, the Design Manager is consulted. All electronically transmitted design document check and review prints must be archived for a DQAM QA Review.

6. REFERENCES

- DQCP-01, QC Disciplinary Review
- WI -24/25 IDR/CR Using Bluebeam Studio Session

7. QUALITY RECORDS

- Bluebeam Review Session Record; or
- Checkprint Stamp

DATA COLLECTION AND FIELD INVESTIGATION

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

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1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). Field Investigations are used to collect data for direct inputs into design calculations, drawings or details or to use as the basis of design assumptions in preparation of engineering documents for confirming the design as presented meets specified codes or project requirements for; dimensions, volumes, load carrying capacity or otherwise verifying the design will meet the intent presented when constructed.

2. SCOPE

This procedure shall apply to all KIE design projects and design deliverables where data collection and filed investigations are necessary or per the contract requirements. It is important to, in a consistent manner, perform field investigations for collection of data to be used as a basis of design and/or design assumptions. This procedure details the methods in which the Design Manager (DM) and/or Discipline Lead define the goals of the field investigations and the work to be completed and the accuracies of that work.

3. DEFINITIONS

Field Investigation Plan: Includes statement of the objectives of the investigation and addresses personnel assignments, team composition, safety, work hours, emergency and daily contacts, site access procedures, equipment requirements, schedule, training, quality control measures and investigation procedures, including data formats and recording media, as applicable. May also be called “Work Plan”.

4. RESPONSIBILITIES

Discipline Lead: The Discipline Lead identified by the DM is responsible for ensuring that the requirements of this procedure are met. A Discipline Lead is a licensed professional engineer in the specific area or discipline of work. The Discipline Lead communicates the desired data goals for the field investigation to those in the field.

5. PROCEDURE

5.1 Data Collection

Data collection is performed by obtaining appropriate source materials, contacting identified sources and soliciting input, and reviewing and assessing the data when received for its suitability to the project and its completeness for project needs.

5.2 Field Investigation Plan

If the project scope of work includes a defined task for field investigation, prior to initiating the field investigation a Field Investigation Plan or Work Plan is prepared.

The quality control section of the plan defines the roles and responsibilities of the investigation team members and describes the methods that will be used to verify the information being collected.

The Field Investigation Plan is provided to all members of the investigation team. Training or a pre-activity meeting is provided to review the responsibilities of each team member, the investigation procedures to be implemented, the records to be maintained and any safety issues related to the field activities. Team leaders are responsible for ensuring that all team members receive the materials necessary for them to understand their responsibilities.

The Discipline Lead oversees the field activities, evaluates the effectiveness of the investigations relative to the project requirements and prepares a summary of the investigation findings. The Discipline Lead plans for and ensures data collected is verified, accurate and suitable for the intended use.

For a discipline where a field investigation is not a defined scope activity, and for a discipline where a follow-up field visit is required after the completion of the initial investigation, the investigator informs the Discipline Leader of the findings, and prepares an investigation memorandum. The memorandum describes the purpose of the visit, summarizes the information obtained and attaches field notes prepared during the trip.

6. REFERENCES

None Applicable

7. QUALITY RECORDS

Field Notes, Logs, Photos, Data Sheets, etc.

CORRECTIVE AND PREVENTIVE ACTION

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

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1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). This procedure establishes a process for implementing corrective and preventive action.

2. SCOPE

This procedure is used for resolution of all design related Corrective and Preventive Actions. The Design Corrective and Preventive Action Process (DCPAP) is an investigative process used to determine the root cause of problems or potential problems identified by the Audit Observations.

In all projects nonconformances will occur. It is the manner in which these nonconformance's are managed and used to promote continual improvement that help define the project. Through a goal of continued improvement supported by a robust QC and QA process the goal is to implement more preventative actions then corrective actions. Regardless of the numerical result of each, the ability of the team to apply corrective and preventative actions in a timely manner will promote confidence in the overall system.

3. DEFINITIONS

- Correction – Action to eliminate a detected nonconformity.
- Corrective action – Action to eliminate the cause of a detected nonconformity.
- Preventive action – Action to eliminate the cause of a potential nonconformity.

4. RESPONSIBILITIES

The KIE District Quality Manager (DQM) is responsible for designating the DCAP assignee, for assuring that all DCAPs have been completed and for ensuring that the Corrective and Preventive Action is effective. The DQM is responsible for approving and implementing the Corrective and Preventive Action Plan.

The DCAP assignee is responsible for conducting the investigation to determine the root cause, to define the Corrective or Preventive Action Plan and to assist in determining its effectiveness. The use of DevonWay™ will be used to log and track the quality issues.

5. PROCEDURE

5.1 Preventive Action

Preventive actions will be implemented whenever a process is perceived to not be functioning properly or the Discipline Lead or KIE Design Quality Assurance Manager (DQAM) identify an element that may require special attention due to its critical nature, dependence by many disciplines or other reasons.

These may be detailed work plans, the use of special inspections or test plans, special meetings or other means to ensure the element receives the necessary attention.

5.2 Corrective Action

1. The DCAP can be initiated by any designer or DQAM. A DCAP results from:
   - Significant or repetitive non-conformances
   - Internal and external audit findings
   - Management Review of the Quality System
2. The DQAM performs an analysis and evaluates the DCAP and determines the severity, priority and impact to the client and the project.
3. The DQAM assigns a control number to the DCAP and identifies who is best suited as DCAP Assignee.
4. The DCAP Assignee is responsible for determining the root cause, developing the Corrective or Preventive Action Plan and determining the implementation time schedule. The Corrective or Preventive Action Plan should address any immediate needs that may be required to limit damage or liability associated with the DCAP. In order to complete this assignment, the DCAP Assignee:
   - Collects data and/or samples as appropriate
   - Documents results of the root cause analysis
   - Identifies action needed to avoid and prevent future incidents
   - Identifies any needed system changes
   - Determines the expected results
   - Determines timing and responsibilities for implementation

NOTE: Root cause for Preventive Action is identified through analysis of work operations, processes, internal or external audits, client input (complaints or other feedback), statistics related to processes, and product and quality records.

5. The DCAP Assignee submits the suggested Corrective or Preventive Action Plan to the DQAM for review and submittal to the appropriate Discipline Lead or Design Manager (DM) for implementation.
6. Once accepted, the appropriate Discipline Lead or DM ensures that the Corrective or Preventive Action Plan is implemented.
7. The DQAM and assignee are responsible for verifying the effectiveness of the Corrective or Preventive Action. Once verified through collection of documented objective evidence, it is noted on the DCAP and the DCAP is closed. The DQAM submits a copy of the DCAP to the DQM, DM, Originator and client.
8. The DQM will review the DCAP documentation, determine its relevance to other departments or sections, and issue copies to those departments where appropriate. The

DQAM summarizes all Corrective and Preventive Actions and submits the summary to the senior management team for the management review. Devonway will be used to track all DCAPs.

6. REFERENCES

- PKS-PRO-SOP-06 Cause Analysis & Corrective Action
- PKS-PRO-SOP-05 Reporting & Control of Quality Issues

7. QUALITY RECORDS

- Devonway Corrective Action Reports

CLIENT / THIRD PARTY REVIEW

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0.0	06/15/2020
David Williams	Integrated Comment Resolution tools and dashboard.	1.00	12/15/20
Lance Lawrence	Address comments from end user implementation	1.01	03/05/2021
Ben Constable/ Lisa Kachel	Revised process to include Document Control Manager	2.00	03/18/2022

APPROVAL FOR THIS PROCEDURE:

Revision 2.00

David G. Williams, KIE District Quality Manager

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1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). Upon submittal of project deliverables to clients/third parties, this procedure defines roles, responsibilities, and processes for receiving comments on deliverables and responding to, resolving, and verifying the comments.

2. SCOPE

This procedure works in conjunction with the project specific Document Management Plan, and shall apply to client/third-party comment resolution on all submittals of design deliverables as specified in the contract and defined in the Project Deliverable Quality Matrix (DQCP-12). This procedure is optional for collaborative (i.e. over the shoulder) reviews when comments provided are not contractually binding.

3. DEFINITIONS

- Client – may include owners, owner representative or person or entity engaged by the client to review the design work. Clients may also be internal to Kiewit, when working across Districts or Operating Groups, and warrant the use of this procedure.
- Third Party – any other stakeholder included in the review process. Could include regulatory, funding, public or partner stakeholders. The project team must verify the contractual relationship or basis for the comments and the requirements to respond or address them.
- Document Management Plan – describes processes, responsibilities, applications, forms and workflows specific to the project organization, deliverables, client requirements and schedules to control and record transfer of information within the project team and between the team and the client and stakeholders. Mention of the Document Management Plan in this procedure is to the project specific plan.
- Comment Resolution Hub –Smartsheet reports and worksheets to collect, track and report on comments received.
- InEight Document™ (Teambinder™) – platform to submit deliverables to the client and receive comments (if any).
- Comment Response Form (CRF) Smartsheet™ – File with a specific structure for collating and classifying and reporting client comments, responses, and disposition.
- Bluebeam Studio™ - collaborative, cloud-based platform to collect and display comments on posted PDF files.

4. RESPONSIBILITIES

Document Control Manager (DCM)

- Establish processes and configure tools for submitting design deliverables for Client/Third Party review.
- Provide training to the overall workflow for Owner/Third Party comment review process.

- Receiving the design deliverable from the design team.
- Uploading the design deliverable to the project's electronic document management system (EDMS), e.g., InEight Document/TeamBinder, as designated within the Document Management Plan.
- Transmitting the design deliverable as defined in the project specific Document Management Plan.
- Obtaining owner/ third party comments per the process laid out in the project Document Management Plan.
- Maintaining records of client/third party comment resolution.
- Record verification per the package owner, that the comment has been addressed in the Comment Resolution Hub.

Design Manager:

- Approving the formal submittal of a deliverable to the client/third party in accordance with contract requirements.
- Determining, in concert with the Document Control Manager and DQAM, the format for performing Client/Third-Party reviews and obtaining comments.
- Coordinating with client/third-party to assist understanding the nature of comments.
- With the Submittal Package Manager, facilitate Comment Resolution Meetings with the design leads, and the client/third-party to negotiate, further explain, and discuss proposed resolutions.

Design Quality Assurance Manager (DQAM):

- Working with the Design Manager to determine quality checks and reviews required prior to submission of revised deliverables.
- Ensuring Client/Third-Party reviewers are familiar with the format chosen and working with the Document Control Manager to provide training.

Submittal Package Manager[1]:

- Reviewing comments and providing responses or delegating comments for response to each client/third-party comment.
- Participating in Comment Resolution Meeting with client/third party.
- Revising deliverables in accordance with agreed upon/approved resolutions.
- Verifying client/third-party comments have been addressed in accordance with the agreed upon/approved resolution.

[1] Projects may have different terms for the role, for example -- Design Lead, Deputy Design Manager, Responsible Design Package Engineer, Package Team Leader, Design Package Lead.

5. PROCEDURE

5.1 Setup & Training

Prior to submission of a deliverable for which the Prime Contract requires/allows for Client/Third Party Review, the Document Control Manager shall:

- Establish review protocols (aligning with the remainder of this procedure);
- Host training for Reviewers.
- Ensure protocols established with the Reviewers will generate the necessary information exhibited in the Comment Resolution Hub; and
- Coordinate with the appropriate entities for use of the Comment Resolution Hub and associated Power BI Dashboard.

5.2 Submittal and Initiation of Review

The Submittal Package Manager:

- Develops or collates the document, ensures drawings, tables and calculations have been quality checked and certified in accordance with applicable procedures.
- The Document Control Manager: Submits the formal deliverable to the client/third-party in accordance with the Document Management Plan.

5.3 Review and Comment

The client/third-party will review and provide comments on submitted deliverable(s). If the client/third party does not mandate the use of their own comment resolution form, the Kiewit team shall provide a suitable form that contains fields for response, resolution, and verification of comments. The Document Management Plan describes the specific process.

If Reviewers have no comments, a record will be retained in project files.

5.4 Comment Classification and Comment Response

The DCM shall receive the client comments through a process described in the Document Management Plan and upload client comments into the Comment Resolution Hub,

The Submittal Package Manager shall be notified by the Document Control Manager new comments have been provided and are in the Comment Resolution Hub.

The Submittal Package Manager reviews the comments, providing disposition, classification and categorization. Comments shall be categorized as:

- **Editorial**: Typographical errors, presentation issues, conflicting information, etc.
- **Technical**: Applicable to the contractual requirements or technical specifications of the project.
- **Preferential**: Though beyond the contractual requirements, a revision the reviewer would prefer. An example of a preferential comment is requesting stainless steel guardrail when the contract states galvanized would be acceptable.

- **Question**: Seeking clarity or further information.

"Comment Ranking" is a categorization of the significance of the comment. Sorting by this category will assist the team to ensure the team attacks the most significant comments to not delay the package or project. When ranking a comment, no regard should be paid to whether the issue is compensable as a change order, but rather simply the impact to the project. The categories are:

1) Minor Condition – engineering can address with less than 100 hours and less than $10,000, no impact to vendors or construction; schedule impact less than 2 weeks.
2) Moderate Condition – engineering hours to address will exceed 100 hours; will require vendor or construction rework; estimate cost impact $10, 000 to $100,000; schedule delay less than 2 weeks.
3) Major Condition – engineering hours exceed 100 hours; estimate cost impact exceeds $100,000; schedule delay greater than 2 weeks, design element issue is a substantial safety concern.

The above classifications are default criteria and may be adjusted for each project. Adjustments may be made to align with contract or client requirements or made proportional to the project scope, schedule and budget. Project specific criteria are determined by the Design Manager with input from Leads and the DQAM. The criteria posted on the Comment Resolution Hub dashboard. The Submittal Package Manager will provide a disposition with the comment and propose a resolution through a comment response. The Document Management Plan specifies disposition codes. In absence of client mandated response disposition codes, dispositions may be:

C - Concur with Reviewer Comment

D - Disagree with Reviewer Comment

DIS - Clarification / Further Discussion Required

E - Escalate to Management

S - Concur -–to be Addressed in Successive Submittal (Deferred)[2]

Response codes and resolution to be recorded in the Comment Resolution Hub.

It will be important to refer to contract requirements and approved design criteria when reviewing client/third party comments to identify any potential contract changes, which would

[2] This code shall be reserved only when the action required will not be completed for the next iteration of the design documents that the reviewers will receive. Comments may also be deferred pending additional data actions or decisions by others. If selecting this code, an explanation of why action is being deferred should be included in the Design-Builder Response. Special attention should be paid to these comments, so they are not forgotten. All efforts should be made to minimize deferred action.

then be handled via a potential change order, developed in accordance with the Project Management Plan.

5.5 Comment Resolution Meeting (CRM)

The Design Manager or Submittal Package Manager will schedule a comment resolution meeting with the client/third party when all comments have been addressed with initial responses and dispositions.

The Design Manager, Submittal Package Manager, design leads, and the client/third party reviewers will the attend the Comment Resolution Meeting. At the Comment Resolution Meeting, all comments are discussed to resolve any disagreement or conflict.

5.6 Obtaining Acceptance of Comment Resolution

In this step (which may be completed during the CRM, if the reviewer wishes) the client/third party reviewer(s) accept or reject the design-builder responses, along with any comment response modifications made during a CRM and any deferred action to successive submittals. Obtaining this disposition from the reviewer at this stage allows for further discussion and clarification (if needed) which greatly increases the likelihood that the client's comment along with the design-builder's response are completely understood and compatible. Such understanding prevents wasted effort when incorporating comment resolutions into the design.

If resolution cannot be obtained following a Comment Resolution Meeting, escalation measures should be taken and documented.

5.7 Incorporating Comment Resolution in the Design

The Submittal Package Manager ensures the updated design documents incorporate accepted resolutions prior to the next scheduled submission, with the exception of deferred action comments/resolutions. The verifier will review to ensure that the agreed action has been completed. The updated documents are then sent through the normal quality check procedures per the Project DQMP.

5.8 Closing Comments

The DQAM will include the completed records from the Comment Resolution Hub as a submittal document with the updated design submission. The client/third party designee will review the updated design documents and indicate their satisfaction with the comment response and action taken to address each comment by designating it as "Closed." If a comment was not adequately addressed, it will be designated as "Unresolved." If it was previously agreed that the action will be addressed in a future submittal, the designation "Deferred" should be used. Only those comments that received a Response Code of "S – Concur - to be Addressed in Successive Submittal" may have Deferred as "Reviewer Status." In the future, upon receiving the "successive submittal" that shows the action complete, the reviewer will change the Reviewer Status to "Closed."

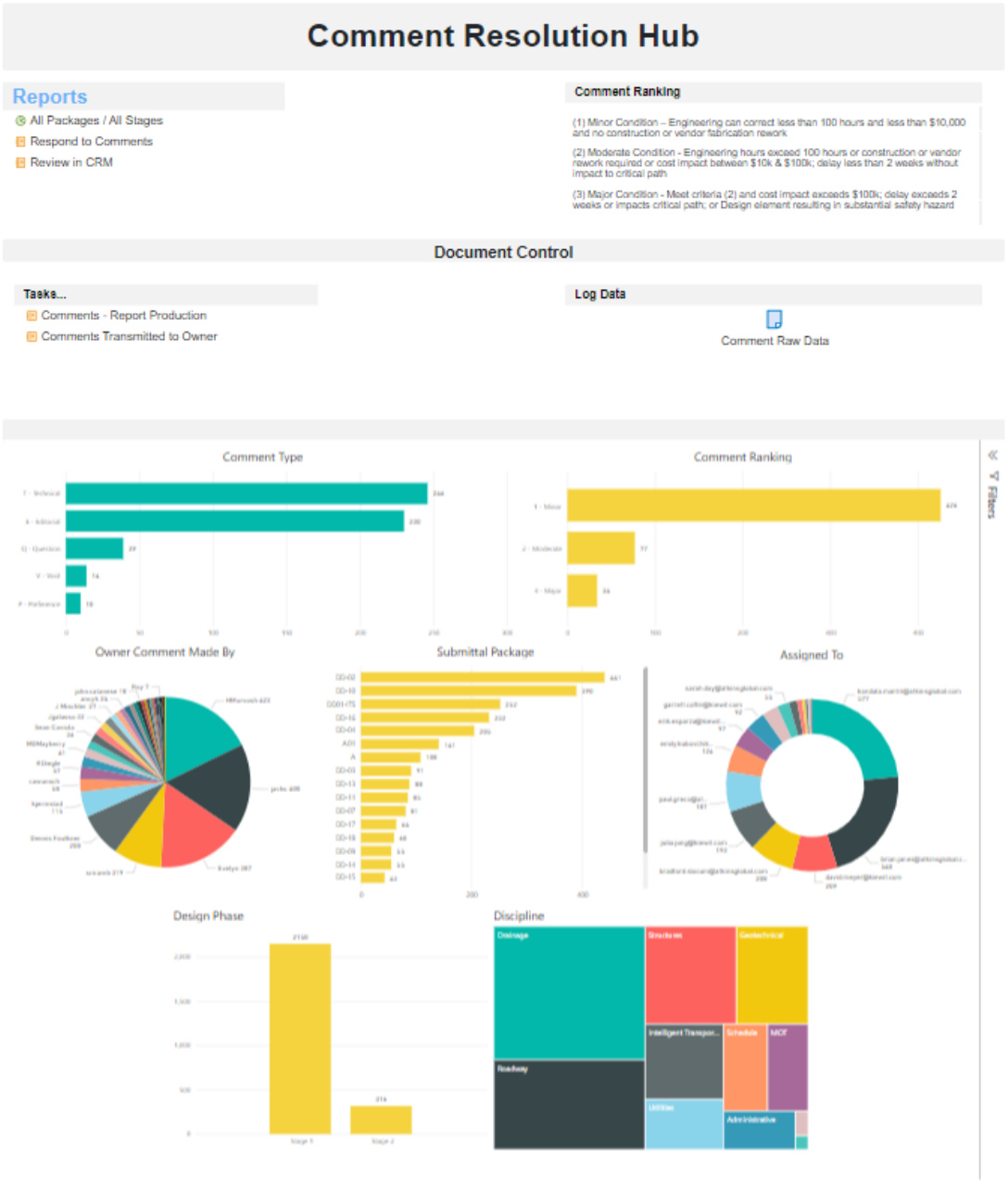
6. REFERENCES

- DQCP-12 Quality Planning

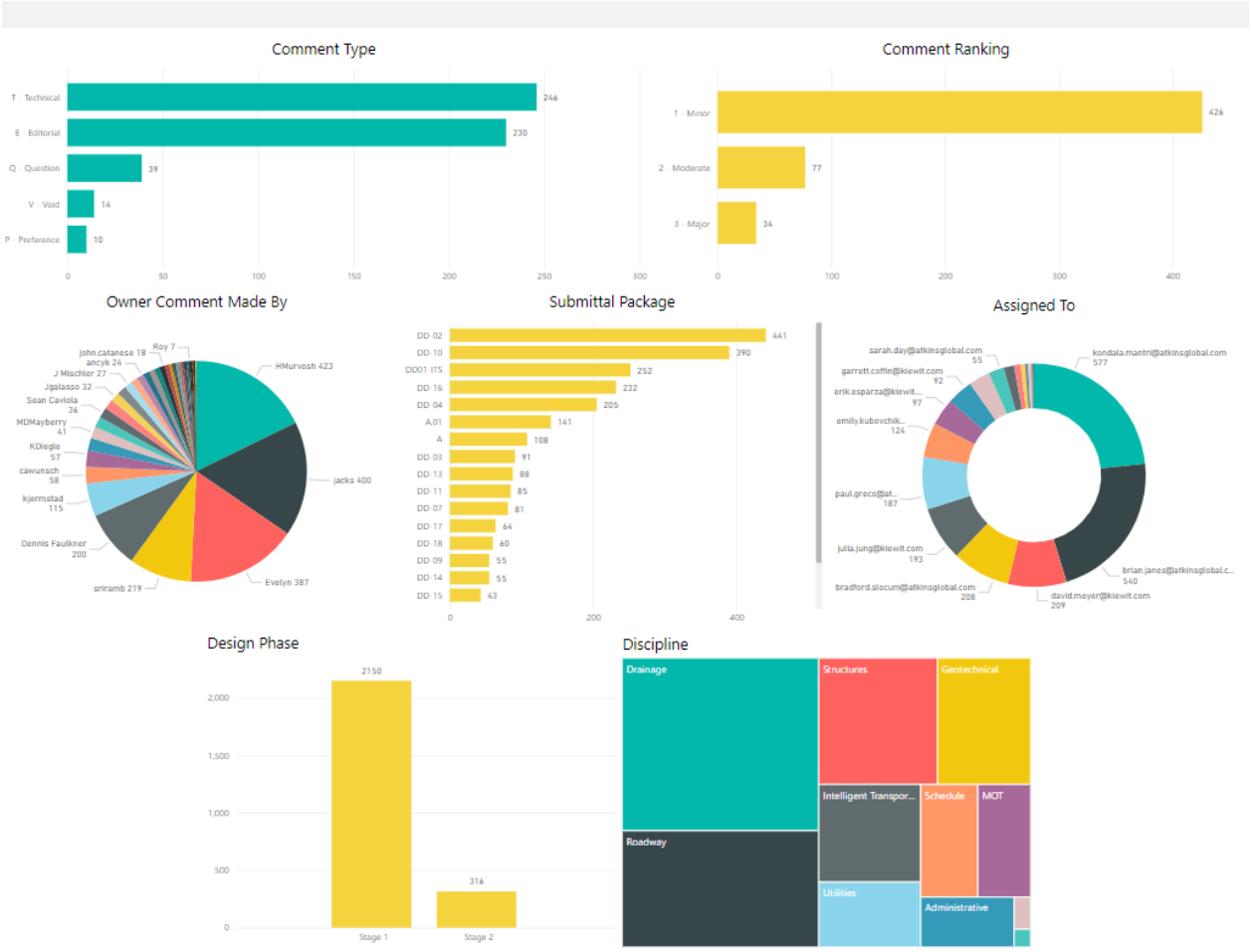
7. QUALITY RECORDS

- Submittals provided for review
- Comment Resolution Hub

APPENDIX A -- COMMENT RESOLUTION HUB



APPENDIX B -- EXAMPLE COMMENT RESOLUTION DASHBOARD



QC MODEL REVIEW

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Andy Kayhanfar	Initial Release	0.00	04/06/2020
Moura Aziz	Removed Section 5.5 Interdisciplinary Review & MQRSD, Not in use.	1.0	06/20/2023

APPROVAL FOR THIS PROCEDURE:

Revision 1.0 Approved

Approved: *David G. Williams, PE/DQM* Date Approved: 06/20/2023

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). The purpose of this procedure is to define the roles, responsibilities and process for the detailed disciplinary QC model review. The purpose of this disciplinary QC model review is to ensure all discipline models are dimensionally accurate and meet the projects design requirements/criteria (i.e. the technical provisions and the Basis of Design document), convey the right level of detail to meet the model uses as outlined in the projects' Digital Engineering Project Execution Plan (PxP) and appropriately reflect design changes incorporated prior to key project milestones.

2. SCOPE

This procedure shall apply to the discipline QC Model Review of all project deliverables prior to the project milestones defined herein. This procedure applies to the discipline QC of the estimate design, construction or client model deliverable. All deliverables, regardless of milestone or phase, shall undergo QC Model Review disciplinary review/check with checks being commensurate with the level of detail available for the milestone or phase of the deliverable being checked. While this procedure does not formally apply to interim or working drafts, it is important to note that interim day to day QC checking is essential throughout the design process to maintain project schedules and avoid rework.

3. DEFINITIONS

- Model – each discipline participating in the estimate or design may have one or many models contributing to the definition of "the Model"

4. RESPONSIBILITIES

Discipline Modeler – The primary author of a disciplines model(s) who has the responsibility for accuracy and adequacy. The Discipline Modeler is responsible for initiation of the QC model review process and the completion of their respective Model Quality checklist(s) including their acknowledgement of their own self check. The Discipline Modeler will be responsible for the resolution of feedback recorded in the Model Issues Log.

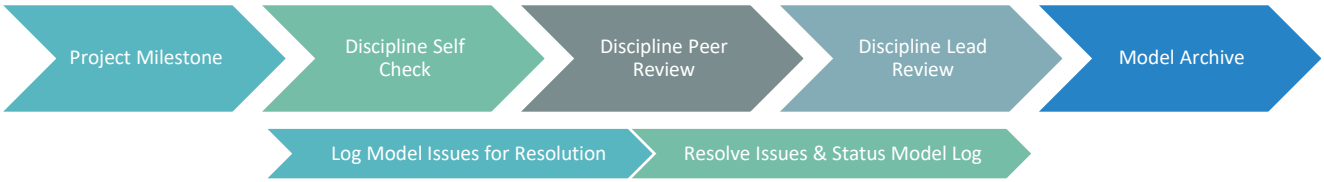
Discipline Peer Reviewer – An in-discipline peer to the Discipline Modeler who is qualified to perform a peer review of a discipline's model(s). The peer reviewer is not a model author of the content being reviewed and is the same position level or higher than the Discipline Modeler who authored the work. The Discipline Peer Reviewer will also be the validator of incorporated feedback recorded in the Model Issues Log.

Discipline Lead (or Task Lead) Reviewer – The discipline Engineer of Record (EOR) who has the responsibility for the discipline's scope of work and the model. The Discipline Lead Reviewer is responsible for assuring the Discipline Modeler has executed the quality plan as described in this document. The Discipline Lead Reviewer is responsible for reviewing the documentation of the project quality plan including discipline specific checklists authored by the Discipline Modeler and Discipline Peer Reviewer. The Discipline Lead Reviewer will also participate in approval of

the Model Quality Review Summary Document (MQRSD) during the project interdisciplinary model review session.

Digital Design Coordinator – Is responsible for the facilitation and documentation of the QC Model Review procedure outlined in this document. The Digital Design Coordinator will identify QC milestones to be communicated via the projects' Digital Engineering PxP. The Digital Design Coordinator will initiate and manage the Model Issues Log to ensure feedback is collected, assigned and statused through resolution. The Digital Design Coordinator will facilitate the interdisciplinary model review (with the Discipline Leads) utilizing the federated models to review the status of the discipline documentation, the model issue log and gather approval from each discipline lead for the execution of the MQRSD.

5. PROCEDURE



5.1 Project Milestones

- Get Work – during the course of a project pursuit/estimate, the QC Model Review process and documentation will be executed twice. First in preparation for the ***Initial Quantity Meeting*** and second in preparation for the ***Final Quantity Meeting***.
- Build Work – during the course of an awarded design project, the QC Model Review process and documentation will be executed as prerequisite to delivering each major milestone deliverable to the client. The infrastructure market sector commonly refers to these milestones as the ***Preliminary, Final, Issued for Construction (IFC) and Release for Construction (RFC)*** submittals. Regardless if a model is part of the submittal criteria or not, the QC Model Review process shall be executed to ensure continuity between the 3D digital design data, the 2D design drawings and the design intent.

- Depending on the size, complexity or duration of the project, additional QC Model Review check points may be desired, however the definitions outlined above will serve as the minimum criteria.

- The Digital Design Coordinator will work with the Discipline Lead Reviewers to determine the final QC Model Review milestones and schedule for the project. The Digital Design Coordinator will then append these milestones to the Digital Engineering Project Execution Plan for all discipline design teams, both internal and external to the Kiewit company.

5.2 Discipline Self Check

- Using the appropriate discipline specific checklist, the Discipline Modeler performs a complete and thorough review of their own content to check for errors and omissions in the following categories:
  - Dimensional accuracy
  - Level of detail required for model use case
  - Data information associated with model elements
  - Incorporation of all design and construction changes
- The Discipline Modeler shall initiate the use of the discipline specific checklist, by indicating Yes, No or N/A for each line item, providing an explanation for any line items marked as No. Upon completion of the discipline self-check the Discipline Model will apply a digital signature to the checklist signifying completion of the self-check and readiness for Discipline Peer Review.
- The Discipline Modeler shall log the finding of their self-check review in the Model Issue Log for resolution upon the completion of their self-check.
- The Discipline Modeler shall remain available to assist the Discipline Peer Reviewer to incorporate findings or issues into the model files, discuss the approach to the modeling, as well as answer questions brought forward by the Discipline Peer Reviewer. The intent of the Discipline Peer Review is to get a fresh set of eyes on the model and therefor the Discipline Modeler must be careful to not interfere with the effectiveness of the Peer Review.

5.3 Discipline Peer Review

- The Discipline Peer Reviewer performs a complete and thorough review of model content after the self-check is completed, using the same model discipline specific checklist and applicable categories as the self-check. Upon stratification with each applicable category the Discipline Peer Reviewer shall digitally initial each corresponding box on the checklist.
- The Discipline Peer Reviewer shall log the finding of their peer review in the Model Issue Log for resolution upon the completion of their peer review.
- The Discipline Peer Reviewer may choose to use the native model authoring platform and/or various alternate applications to evaluate the quality of the model.
- Upon completion of the peer review, the Discipline Peer Reviewer will apply a digital signature to the checklist signifying completion of the peer review and readiness for Discipline Lead Review.
- The Discipline Modeler and Discipline Peer Review shall remain available to the Discipline Lead Review to facilitate a model walk as the primary means for the lead review, ensuring the Discipline Lead Reviewer has all the information and background they need to assess the quality and completeness of the model.

5.4 Discipline Lead Review

- The Discipline Lead Reviewer verifies completion of all self-checks and peer reviews in accordance with this quality management procedure. The Discipline Lead Reviewer may choose to independently spot check of the discipline model(s) or request a model walk review of each discipline modeling team. The Discipline Modeler and Discipline Peer Reviewer must attend this session and are likely the facilitators of the session.
- Upon stratification with each applicable category the Discipline Lead Reviewer shall digitally initial each corresponding box on the checklist.
- The Discipline Lead Reviewer will review the Model Issues Log, potentially adding additional issues identified during the lead review, but ultimately accessing the issues to ensure these items have been incorporated into the model and subsequently the drawings for the submittal.
- Upon completion of the lead review, the Discipline Lead Reviewer will apply a digital signature to the checklist signifying completion of the lead review and readiness for Interdisciplinary Review.
- The Discipline Lead Reviewer will submit their completed checklist(s) to the Digital Design Coordinator.

5.5 Model Archive

- It is the responsibility of the Discipline Modeler in cooperation with the Digital Design Coordinator to identify a location and secure an archive of each discipline model which has completed the QC Model Review procedure and therefore representative of the design at each major milestone.

5.6 Log Model Issues for Resolution

- Model issues identified throughout the course of executing the Discipline Self Check, Discipline Peer Review, Discipline Lead Review and Interdisciplinary Review shall be logged into a single Model Issues Log for the project. Minimum information to be recorded (per issue) includes, but is not limited to, the issue:
    - Priority – “must have, should have, nice to have” resolved for the project milestone
    - Description of Model Issue – brief description of the issue
    - Discipline – which discipline is the issue related to
    - Project milestone – targeted project milestone when issue was first identified
    - Identified By – who logged the issue
    - Status – Open, Closed, Deferred

5.7 Resolve Issues & Status Model Log

- Model issue resolution is an iterative and collaborative process and should be a high priority topic of discussion during regular project specific, discipline meeting.
- The Model Issue Log is intended to be a real-time look at the status of outstanding model issues on the project. At any phase of the checking procedure outlined herein (and in an effort not to impede delivery schedules) once an issue is logged, the Discipline Lead Modeler or their designate modelers are authorized to begin the resolution of the issue. However, the intent of

the Model Issue Log is not to replace effective communication and therefore, professional judgment must be applied to ensure the issue is understood by the modelers and resolved appropriately.

- The **Discipline Lead Modeler** is responsible for ensuring the logged issue has been resolved in the native digital file and Model Issue Log is updated regularly by modifying or appending:
  - Status – Open, Closed, Deferred
  - Modelers Comments - comments about the resolution
  - Resolved By - modelers name who address the comment
  - Closed Date - date the issue has been closed out
- The **Discipline Peer Reviewer** is responsible reviewing the logged model issue and validating each issue has been resolved in the native digital file. Upon satisfaction of each model issue, the Discipline Peer Reviewer shall update the model issue log:
  - Validation Status – Resolved, Requires Additional Work, Deferred
  - Validated By - name of Discipline Peer Reviewer
- The **Discipline Lead Reviewer** is responsible for the overarching close out of identified model issues as well as the approval for the decision to defer identified model issues.
- The **Digital Design Coordinator** is responsible for the distribution of the Model Issues Log to all discipline teams and the review of the Model Issues Log during the Interdisciplinary review and prior to the execution of the MRQSD.

6. REFERENCES

1. KIE Design Quality Management Plan (DQMP)
2. The project's **KIE Digital Engineering Project Execution Plan (PxP)**
   - SECTION H: QUALITY CONTROL
     - QUALITY CONTROL CHECKS
     - QUALITY CONTROL RESOURCES

7. QUALITY RECORDS

Model Specific Checklists

NON- CONFORMANCE ASSESSMENT (NCA)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
John Wise	Initial Release	0.00	06/15/2020

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy, found on the Corporate Quality Site, and the KIE Design Quality Management Plan (DQMP). The purpose of this SOP is to outline the process for a design assessment of constructed permanent works to resolve quality issues and non-conformances of the Project or product.

2. SCOPE

This procedure applies to completed work that does not conform to Released for Construction (RFC) plans or specifications where the quality issue requires Client, designer, and/or jurisdictional authority acceptance to Use As-Is or Repair to an Acceptable Standard. A Non-Conformance Report (NCR) will be issued by construction operations, with support of project quality management, in accordance with the project Quality Management Plan (QMP).

If the resolution of the NCR is not Remove and Replace, the Non-conformance Assessment (NCA) shall be initiated through the Project's EDMS workflow and completed promptly for construction and client acceptance. The NCA is a design process and may be closed once acceptance is reached by the parties. The separate NCR process is only closed once the work has been removed and replaced or repaired in accordance with the NCA. Design QC and QA procedures for final design are applicable to the NCA process.

3. RESPONSIBILITIES

Project Quality Manager – The Quality Manager manages the Quality issue and NCR process and will initiate an NCA where construction operations desire acceptable resolution to the NCR other than "remove and replace". The Project Quality Manager will enter relevant information and a proposed resolution to the NCR on the Project EDMS Non-Conformance Assessment (NCA) Form for design review. NCAs must be entered into the Electronic Document Management System (EDMS) and the ESDC manager, or Project Quality Manager, will close them once the NCA is completed and accepted by the Project Manager and Client.

Design Manager – The Design Manager, with the ESDC Manager and Design Lead (responsible engineer), will perform an initial review of the quality issue and develop alternative solutions consistent with the contract specifications. The Design Manager will assign a responsible engineer to complete the assessment. Design Manager coordinates with the Project Manager and ESDC Manager and reviews the assessment and plans the quality control and quality assurance. If the disposition is Leave As-Is or Repair, then design QC and QA procedures are required similar to final design requirements. A Constructability Review or Independent Design Review may be required.

Design Lead – The Design Lead is the responsible engineer, or Engineer of Record (EOR), or Discipline Lead assigned to complete the assessment and is responsible to ensure the DQMP and its procedures are adhered to. The designer will provide enough instruction to explain the proposed fix or disposition. The NCA disposition provided by the EOR may be one of the following:

- Remove and Replace

- Repair to an Acceptable Standard
- Leave As-Is

ESDC Manager – The ESDC Manager shall support the Project Quality Manager and Construction Manager in an initial review of the quality issue and brainstorm possible solutions with the Design Manager to determine whether the NCA should be initiated. Cost and schedule impact to all operations should be considered, understanding that the Client's review and approval may add days or weeks to the assessment and that we can't construct on top of the non-conforming work. Too often, in a best effort to salvage work that has quality issues, we have lost time from our schedule and still remove and replace the work. The team needs to weigh the cost of schedule, our reputation and client concerns, against the remove and replacement cost.

Project Manager – The Project Manager shall review the design assessment and determine course of action prior to Client's review.

Document Controller – The Document Controller is responsible to ensure that the NCA Form and the corresponding data in the Kiewit Quality Systems are complete and current and appropriately distributed.

Client – As required by the prime contract, the Client will review disposition for final acceptance.

4. PROCEDURE

Step 00 – Initiation

An NCR is issued by inspection authority or contractor self-reporting per the Project Quality Control Plan (PQCP). Project team uses the QMS (Kietrac/DevonWay or Owner provided system) to determine initial remediation plan. If remove and replace is determined in the QMS then NCA is not required. All other dispositions require the Quality Manager or construction engineer to fill out the NCA form within EDMS and submit for initial design review.

Step 01 – Initial Design Review

- Design Manager, or designee, completes an initial review of the non-conformance and coordinates with ESDC Manager and assigns to Design Lead.
- ESDC Manager reviews with the Construction Manager the costs to evaluate and potential solutions before proceeding with NCA.

Step 02 – Designer Response

- Design Lead reviews and prepares assessment concerning the NCR and provides enough information for submission to the owner to comply with specifications and the design.
- Design Manager reviews the assessment and verifies the level of QC/QA required. The response typically provides the following dispositions:
  - Remove / Replace;
  - Repair to Acceptable Standard; or
  - Use-As-Is / Acceptable

Step 03 – Project Review

ESDC Manager, Construction Quality Manager, and Construction Manager review Designer's response and determine whether to proceed with the proposed design repair, if recommended, or default to Remove/Replace. The recommendation is submitted to the client for review and response.

Step 04 – Client Review

Client reviews the design assessment and may Accept, Reject or provide comments to be resolved prior to Acceptance.

Step 05 – Update RFC Documents

If Client Accepts, the Designer completes design quality process and provides the revised IFC documents to ESDC Manager and Document Controller to update Mobile Plans and distribute accordingly.

Step 06 – NCA Closeout

The non-conformance design assessment process is closed-out.

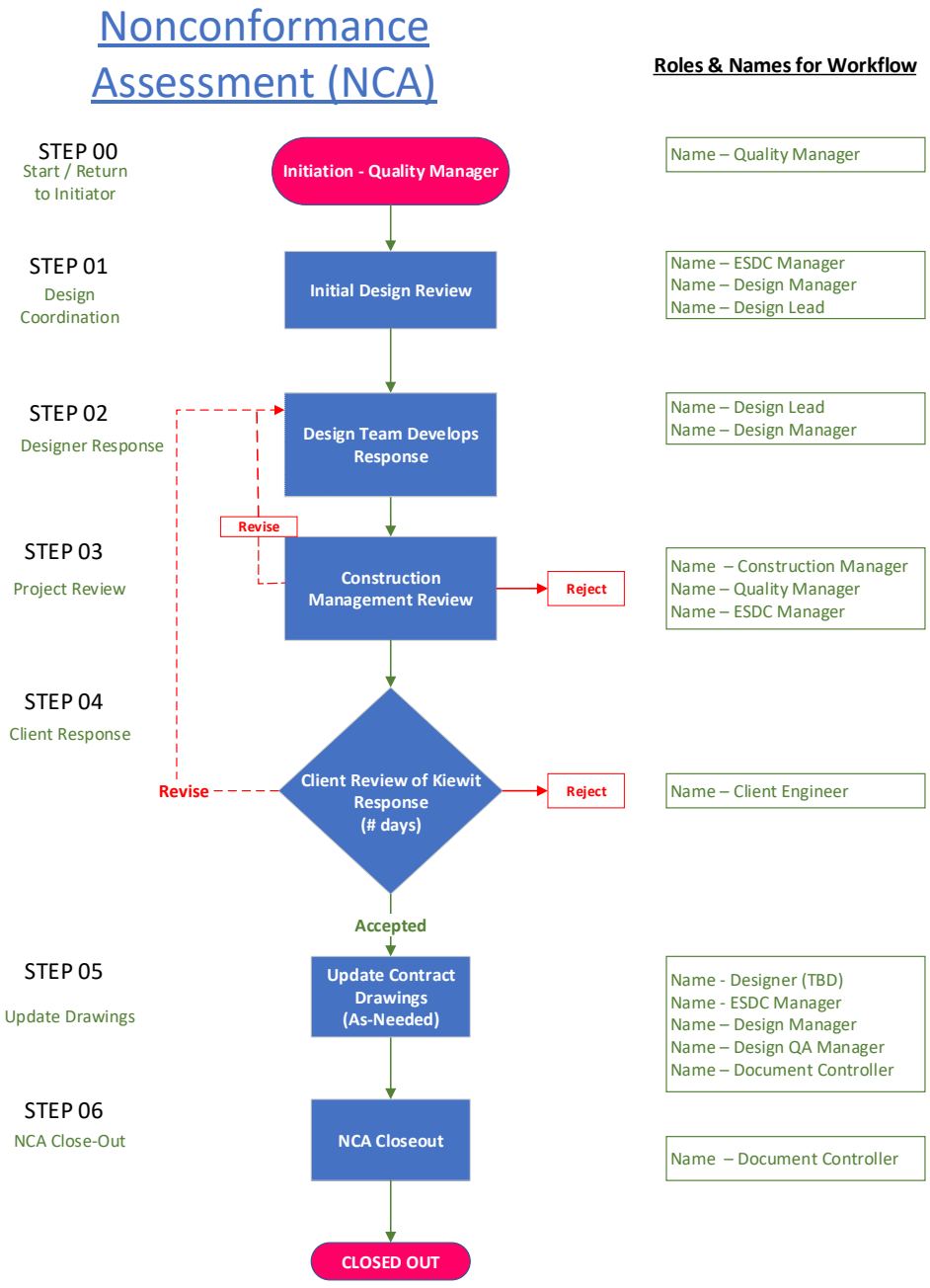
Process Notes

- The NCR process stays open within Kiewit's QMS until the quality issue is resolved in the field, by demonstration of conformance or by corrective action, and the work is accepted by Client. Project management shall ensure that the necessary disposition has been satisfactorily completed prior to signing off the NCR. They shall also ensure that stakeholders from the project team, as required, accepts the completed work prior to closing the NCR.
- Project team should populate and train for proper set-up and input of the fields on the NCR form within the EDMS. For example, area should be set up as a drop down of the defined project areas for each project.
- When utilizing the EDMS for submitting an NCR, it is crucial to fill out the system's form as completely as possible in order to accurately track the lifecycle of the item for management of all NCRs, and for management reporting.
- When filling out the EDMS form, initiator shall include, at minimum, the following information:
  - Subject – providing a short/concise description
  - Message – providing a detailed description and proposed solution
  - Discipline
  - Area
  - Incident Location
  - Reference Documentation
  - Attach all relevant files needed to review and assess the NCR

5. REFERENCES

- Appendix A – Non-Conformance Assessment Workflow
- Appendix B – Non-Conformance Report - EDMS (TeamBinder) Form

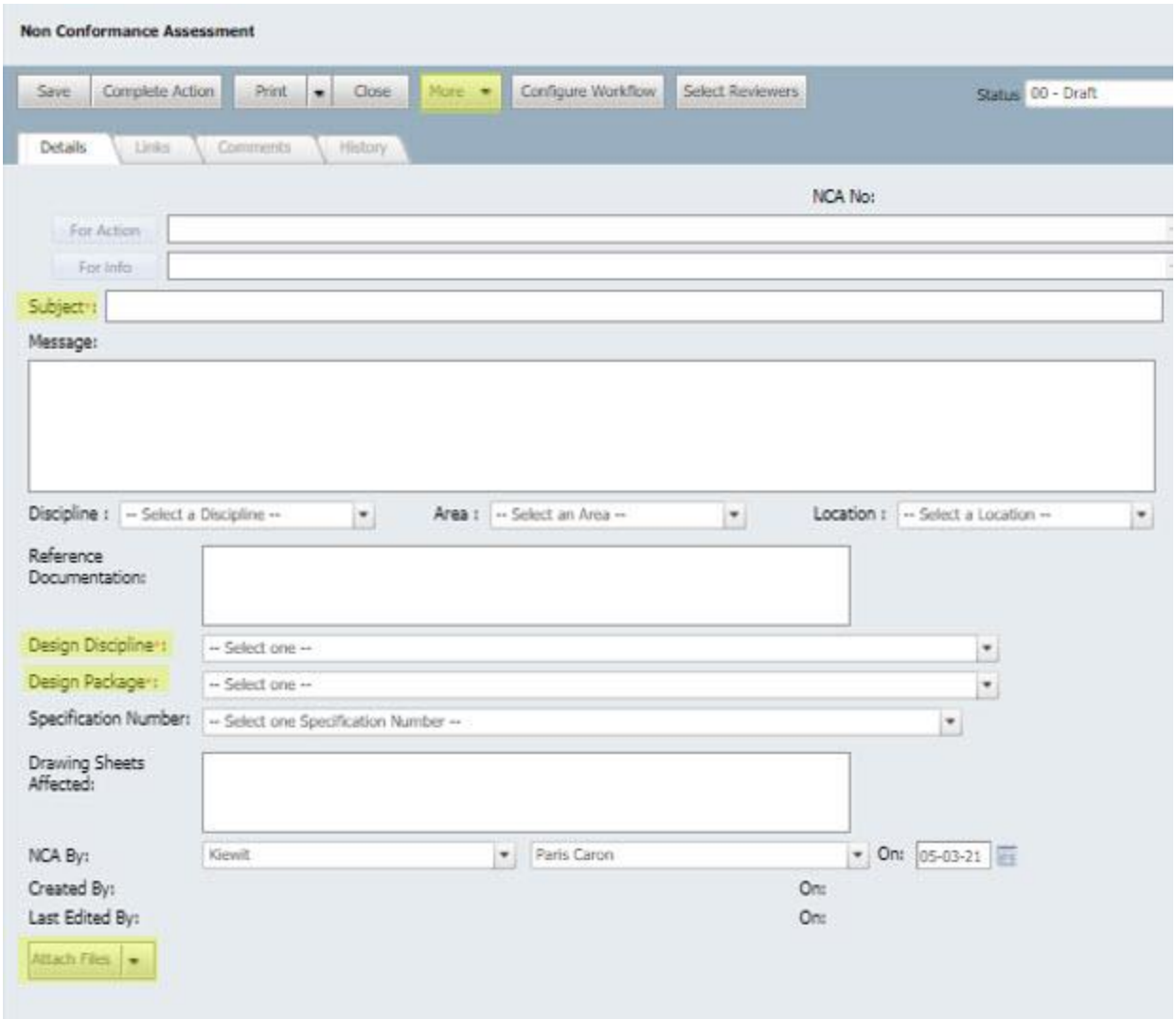
APPENDIX A – NCA WORKFLOW

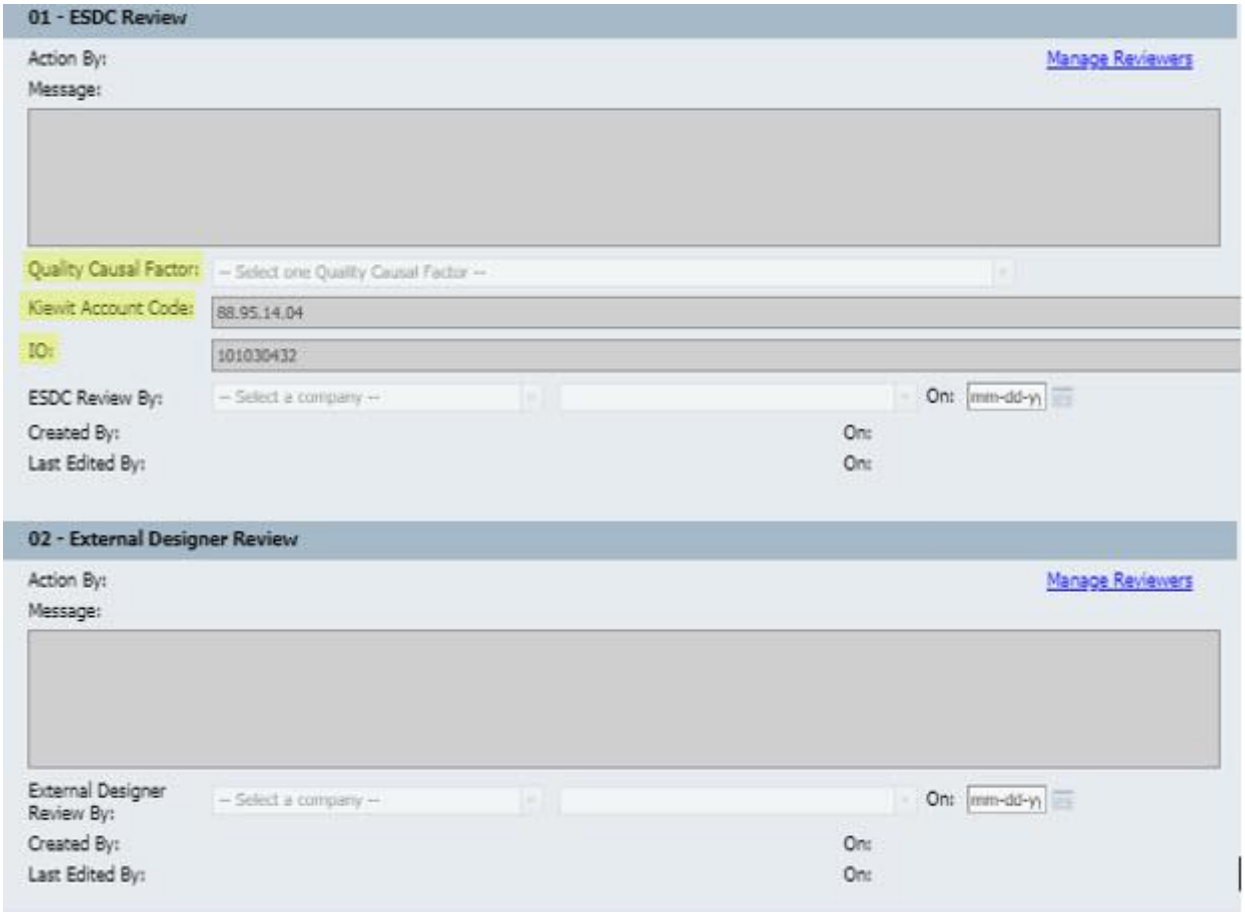


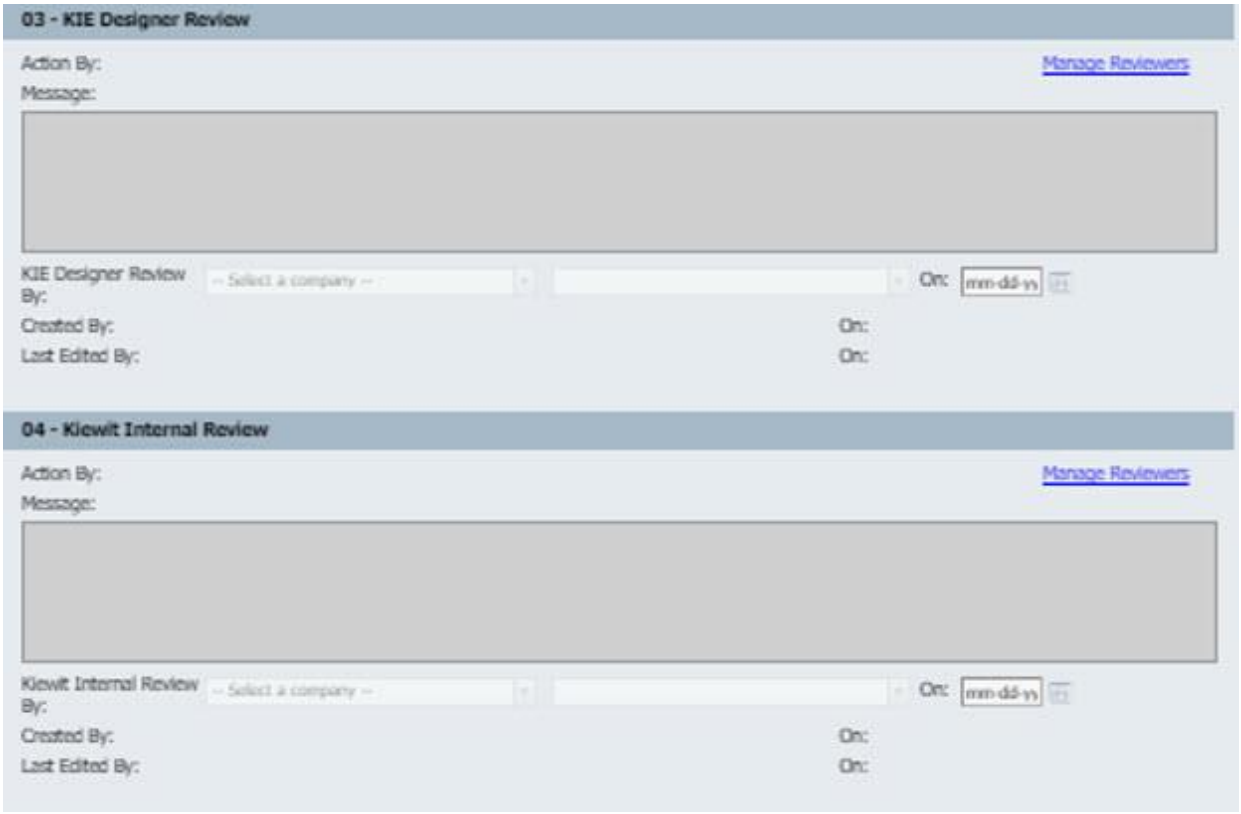
Note: Closing out the NCA does not close the NCR. Project management shall ensure that the necessary disposition has been satisfactorily completed prior to signing off the NCR. They shall also ensure that stakeholders from the project team, as required, accepts the completed work prior to closing the NCR.

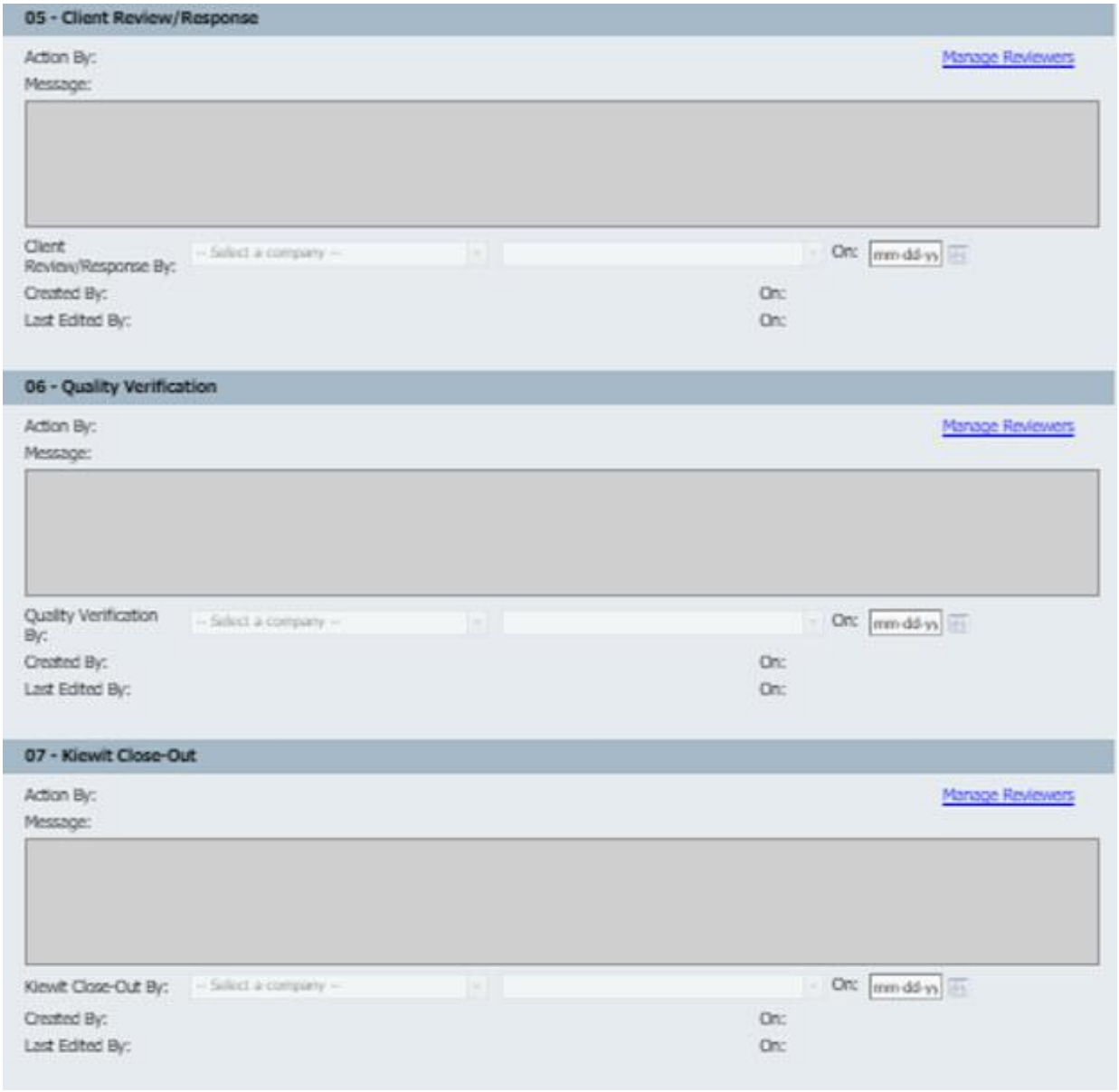
APPENDIX B – NON-CONFORMANCE REPORT - EDMS (TEAMBINDER) FORM

All fields highlighted yellow **must** be filled out when submitting a Non-Conformance Report form:









DESIGN REVIEW OF CONSTRUCTION SHOP DRAWINGS AND SUBMITTALS

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
David Williams	Initial Release	0	05/10/2021
Kathleen Ehlke	Updated DQCP-39 references to WI-01	0.01	07/21/2022
Kathleen Ehlke	Updated Shop Drawing Stamp to include numbers that correspond to InEight Teambinder	0.02	12/19/2022

APPROVAL FOR THIS PROCEDURE:

Revision 0.01

David G. Williams, KIE District Quality Manager

(Name / Title)

DESIGN REVIEW OF CONSTRUCTION SHOP DRAWINGS AND SUBMITTALS

Table of Contents

1. PURPOSE

To assist design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). This procedure defines roles, responsibilities, and process for design review of construction shop drawings and submittals.

2. SCOPE

This procedure shall apply where drawings or specifications require review by the Design team to confirm construction materials and prefabricated elements conform to the IFC design. This procedure also applies when design review is a requirement of the contract.

Shop drawings review shall be planned by the Construction Project Engineers and Engineering Services During Construction Manager (ESDCM). All design submittals shall be pre-reviewed by the Construction Field Engineers. If the submittal does not require review by the Design team but is required by the prime contract, the submittal is reviewed by the Construction team for compliance to the specifications, then forwarded to the Client for review and approval.

3. DEFINITIONS

- Shop Drawings – plans for an engineered component produced by the supplier, contractor, manufacturer, subcontractor, consultants, or fabricator. Shop drawings are typically required for prefabricated components and include information for the engineer to compare to the specifications and drawings. The shop drawing should address the appearance, performance, and prescriptive descriptions in the specifications and construction drawings. The shop drawing often is more detailed than the information shown in the construction documents to give the engineer the opportunity to review the fabricator's version of the product, prior to fabrication. Shop drawings may also include assembly and installation procedures. Design submittals may include: shop drawings, permanent material data, samples, product data, work plans, and related temporary construction designs.
- EDMS – Electronic Document Management System. The Kiewit standard is InEight Document. Depending on client or Project specifications, the platform may be different.

4. RESPONSIBILITIES

Engineer managing Supplier (Supplier Manager): Coordinates with Supplier to plan, schedule and prepare Shop Drawing or other Design Submittal. Supplier Manager provides shop drawing schedule to ESDCM monthly. Supplier Manager initiates all reviews using EDMS form module.

Engineering Services During Construction Manager (ESDCM): Plans the Project Shop Drawing Review Process, delegates receipt, logging, review and follow-up to qualified staff. ESDCM monitors the process to minimize resubmittals.

Supplier can also be subcontractor or fabricator, responsible to provide shop drawings with sufficient detail to confirm details that the item will meet the construction specifications or drawings.

Design Manager (DM), or designee, is responsible for assigning staff and scheduling checks and reviews. The DM is supported by Discipline Leads. The Design Manager or the Discipline Leads

(if not in the role of the Checker) monitor the drawing review comments to ensure consistency and conformance with the Scope.

Design Leads (DL): perform or assign the review to a qualified reviewer.

Design Quality Assurance Managers (DQAM): oversees and assesses the processes for conformance to the DQMP and project specific plans and documents.

5. PROCEDURE

5.1 Planning

During the construction planning period, design and construction teams, coordinating as required with the Client, determine parameters for shop drawing review, including assignment of roles. Depending on complexity and risk of the overall project, or where applicable, specific design elements, the ESCDM will determine if the Shop Drawing Reviews should be subject to quality control by a second reviewer.

Contracts and supplier agreements shall specify the schedule or lead times for shop drawing submittals, with time for review by the EOR. The agreements shall be coordinated with the Design team.

The ESCDM shall confirm the Shop Drawing Stamp verbiage is consistent with the supplier agreement as well as requirements in the client contract.

5.2 Reviewer(s)

The ESDCM and the Design Manager evaluate the planned Shop Drawing Submittals and determine the reviewers appropriate to each supplier. Reviewers must be qualified by experience, training and registration to compare shop drawings to RFC drawings. If required by contract or risk posed by the element, the review may need to be performed or supervised by a PE in the discipline.

5.3 Shop Drawing Log/Register

The construction team shall establish a document management platform(s) to receive shop drawings submitted by suppliers. A work or process flow shall be established in the project EDMS upon receipt of submittals, the Document Manager logs the submittal and routes to the planned reviewer or reviewers.

The Document Manager inputs the following information on the InEight Document Shop Drawing Form:

- Subject
- Message regarding any specific requests for the submittal review or to provide additional information
- Discipline
- Area
- Location
- The specification section that references the need for the shop drawing submittal.

- The Due Date for the review
- The Priority Level of the submittal
- Reference Documents
- Notation the submittal is a safety critical item, if identified on the "Certifiable Items List"
- Additional reference number as required

The form is automatically populated with the Shop Drawing Number and recorded in the Shop Drawing Log. If the Shop Drawing is a resubmittal, the Shop Drawing number will have a revision number suffix added to the end (ie: 1234.01, 1234.02, etc).

5.4 Drawing Review

Either during construction planning or upon receipt of shop drawings, the ESDCM determines if the submittal is an engineered component and requires input from the Design Team or a non-engineered component and does not require Design Team review. If the Shop Drawing requires Design Team review:

5.4.1 The ESDCM applies Shop Drawing Review stamp to the shop drawing and attaches the Shop Drawing to the workflow.

5.4.2 The ESDCM identifies the appropriate DL to receive and review the Shop Drawing and enters the Discipline into the Shop Drawing form. The InEight Shop Drawing Review workflow transmits the Shop Drawing form to the DL. Note: If qualified, the ESDCM may perform the Shop Drawing review.

5.4.3 If multiple reviewers are required for a single Shop Drawing, the ESDCM will input additional DLs into the Shop Drawing workflow, and place additional Shop Drawing stamps on the Shop Drawing submittal. Additional reviewers will review the Shop Drawing in sequence, not simultaneously.

5.4.4 The DL or their designee reviews the Shop Drawing using standard check print colors per DQCP-01, QC Disciplinary Review (yellow highlight to indicate correct information, red to indicate changes, and blue to indicate comments).

5.4.5 The DL completes the Shop Drawing Stamp indicating an Action Code of:

- Reviewed – No Exceptions
- Reviewed – Make Corrections as Noted
- Revise and Resubmit
- Rejected – See Remarks

5.4.6 The DL selects the Action Code in the InEight Shop Drawing form that corresponds to the Action Code placed on the Shop Drawing Stamp. The DL transmits the reviewed Shop Drawing through the InEight Shop Drawing workflow back to the ESDCM.

5.4.7 If multiple reviewers reviewed the Shop Drawing, the ESDCM will review the resultant Action Codes, and select the most stringent Action Code as the single Action Code for the Shop Drawing submittal.

5.4.8 The ESDCM performs a completeness review and sends the completed review to Document Control.

- If the Shop Drawing Action code is "Reviewed – No Exceptions Noted", Document Control will transmit the Shop Drawing submittal to the Client (as required) for review and approval.
- If the Shop Drawing Action is "Reviewed – Make Corrections Noted", the Shop Drawing is returned to the supplier. The supplier will make the required revisions and return the corrected Shop Drawing submittal to the ESDCM. The ESDCM will transmit the corrected Shop Drawing to the DL via the InEight workflow for their verification of the corrections.
- If required, after the DL verifies the corrections, Document Control will transmit the Shop Drawing submittal to the Client for their review and approval.

Shop drawing reviews may be done on hard copy, electronic versions or in a Bluebeam Studio Session. Reviewers shall use the conventions in **DQCP-01, QC Disciplinary Review** for drawing markups, following instructions for the Checker. Bluebeam Studio Sessions, in accordance with **WI-01 Conducting QC Disciplinary Check Using BB Studio Session** may be used.

Upon completion of the review, the Design Lead or Responsible Engineer signs the stamp.

5.5 Verification

If the Shop Drawing Action is "Revise and Resubmit" or "Rejected", the Shop Drawing is returned to the supplier. ESDCM shall schedule a meeting to review the design remarks with the supplier, as required. The supplier will make the required revisions and return the corrected Shop Drawing submittal to the ESDCM. The Shop Drawing review process is repeated for the corrected Shop Drawing submittal. The Shop Drawing number will have a revision number suffix added to the end (ie: 1234.01, 1234.02, etc).

5.6 Client Review

The reviewed and accepted Shop Drawing is transmitted through InEight Document by Document Manager to the Client for their review as required. Client's review may require comment resolution and resubmittal of the Shop Drawing. Once accepted by the Client the Shop Drawings are released for construction following project quality management plan procedures.

5.7 Records

Submittals, markups and revision instructions will be logged and retained in project files. The intent is to provide a transparent progression from submittal to final acceptance.

If the check was completed using Bluebeam Studio Session, the Originator shall generate a QC Disciplinary Review Summary Log as a PDF, showing comments, status as evidence of backcheck, update and verification.

If the check was completed using hardcopy, the Originator shall ensure copies of check prints with completed check print stamps, comment responses, supporting calculations, etc. are retained in the project records.

If the check was completed using Track Changes, a PDF print, with track changes visible and comments, will be retained in the project files.

6. REFERENCES

- DQCP-01 QC Disciplinary Review
- WI-01 Conducting QC Disciplinary Check Using BB Studio Session

7. QUALITY RECORDS

- Document markups~~;~~
- Bluebeam Review Session Record (if used)

APPENDIX A – SHOP DRAWING STAMP

Shop Drawing / Submittal Review

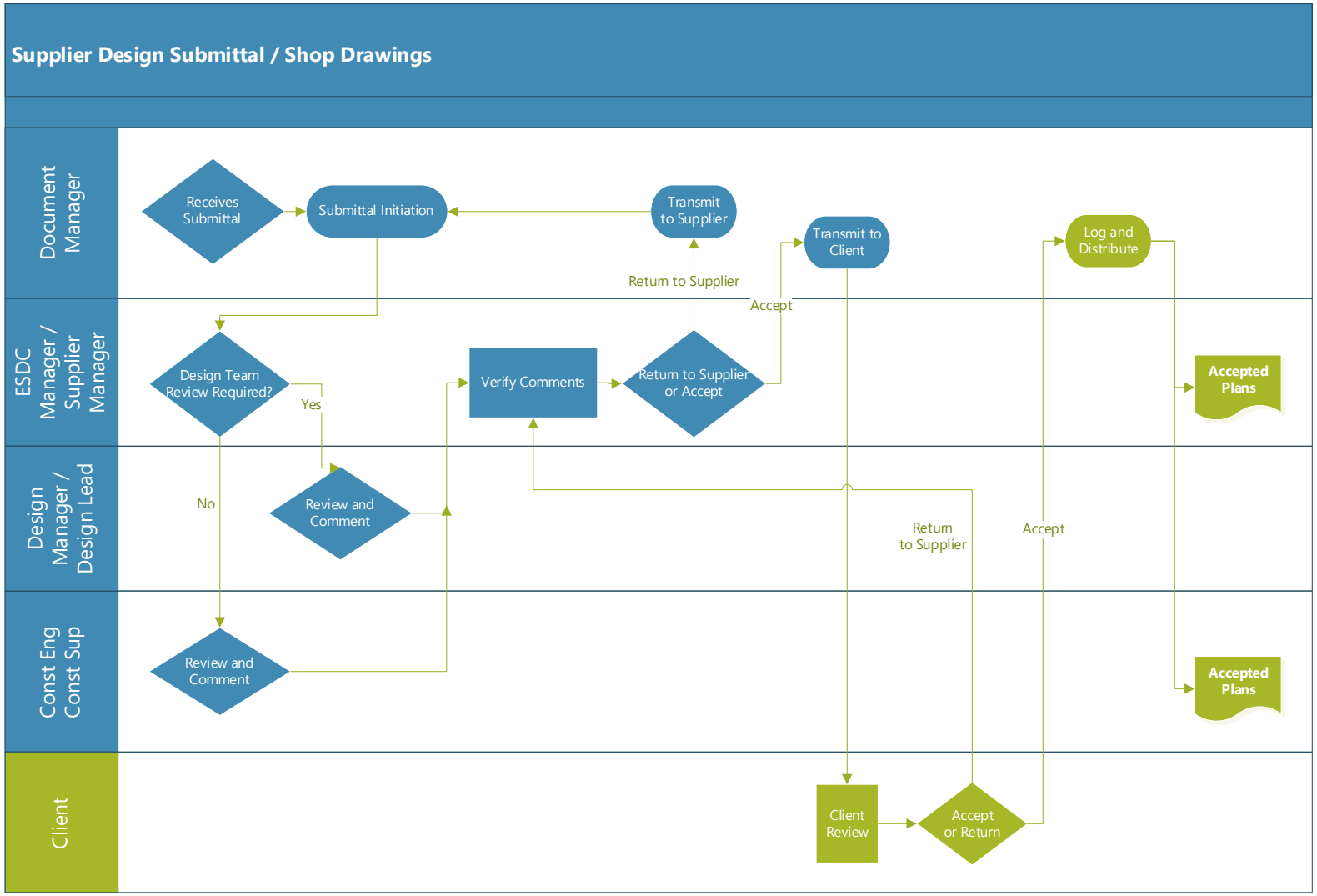
- ❑ 1 Reviewed – No Exceptions
- ❑ 2 Reviewed – Make Corrections as Noted
- ❑ 3 Revise and Resubmit
- ❑ 4 Rejected – See Remarks

Submittal has been reviewed for general conformance with design concept and contract documents only. Corrections or comments made during this review do not relieve vendor from compliance with requirements of the drawings and specifications. Vendor is responsible for confirming and completing all quantities and dimensions and performing work in a safe and satisfactory manner. This review neither extends nor alters any contractual language.

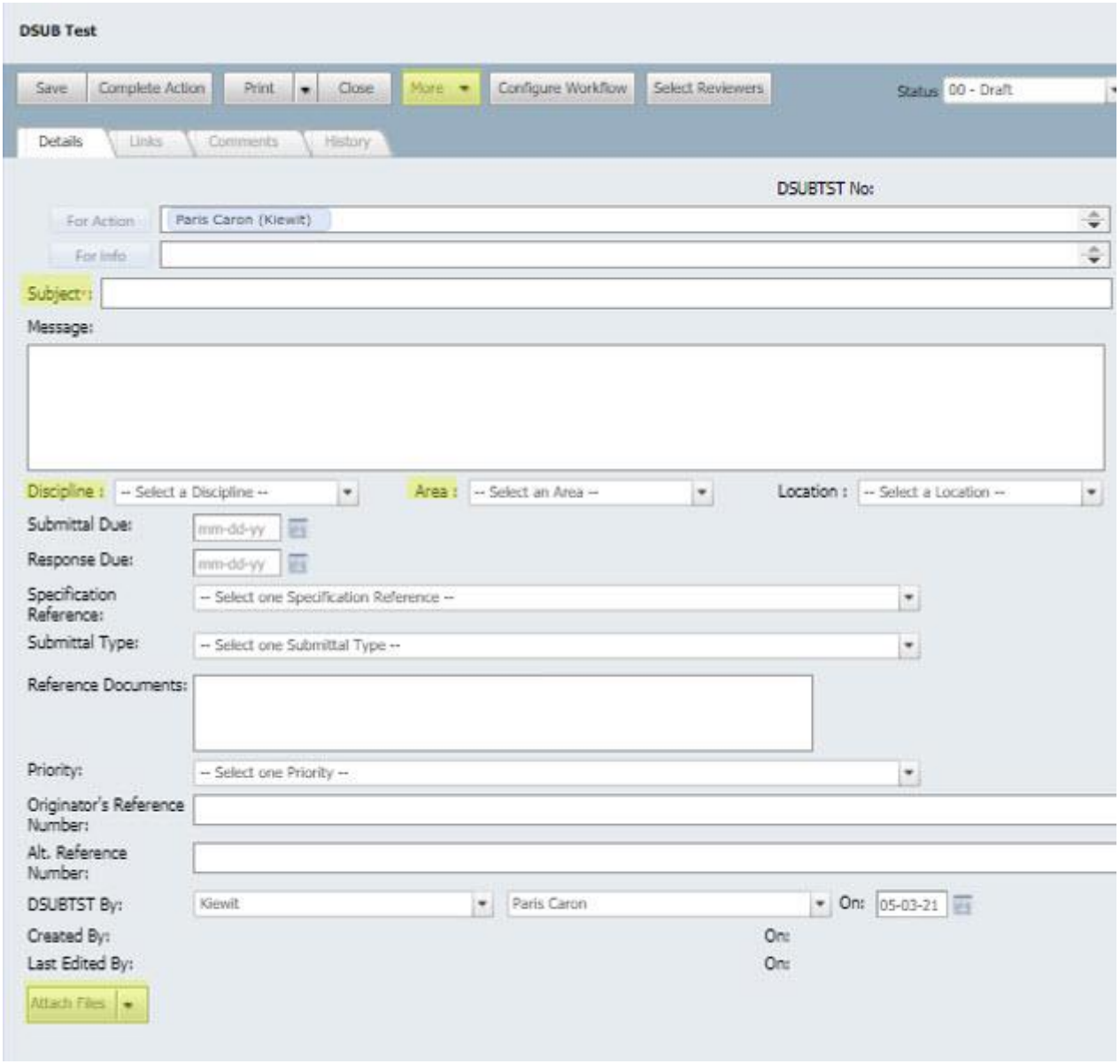
By: _____ Date: _____

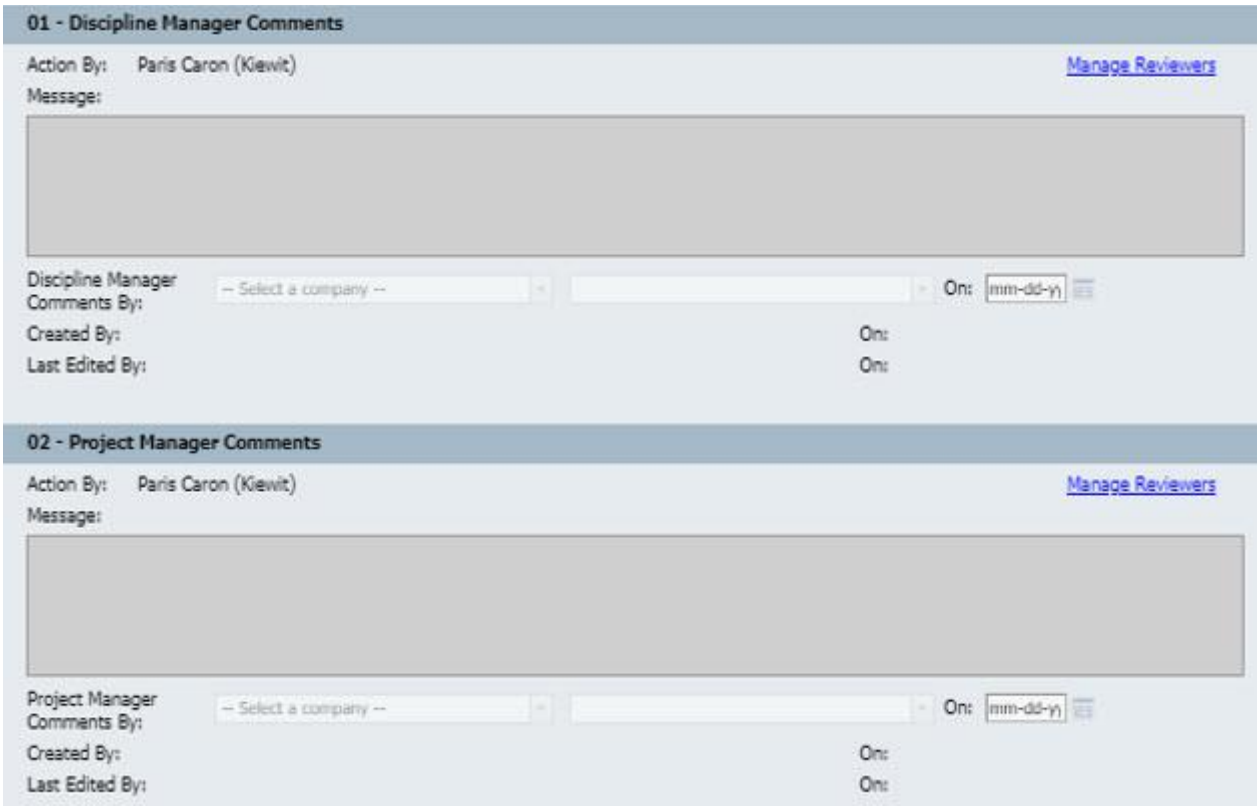
Standard – Rev 0.00

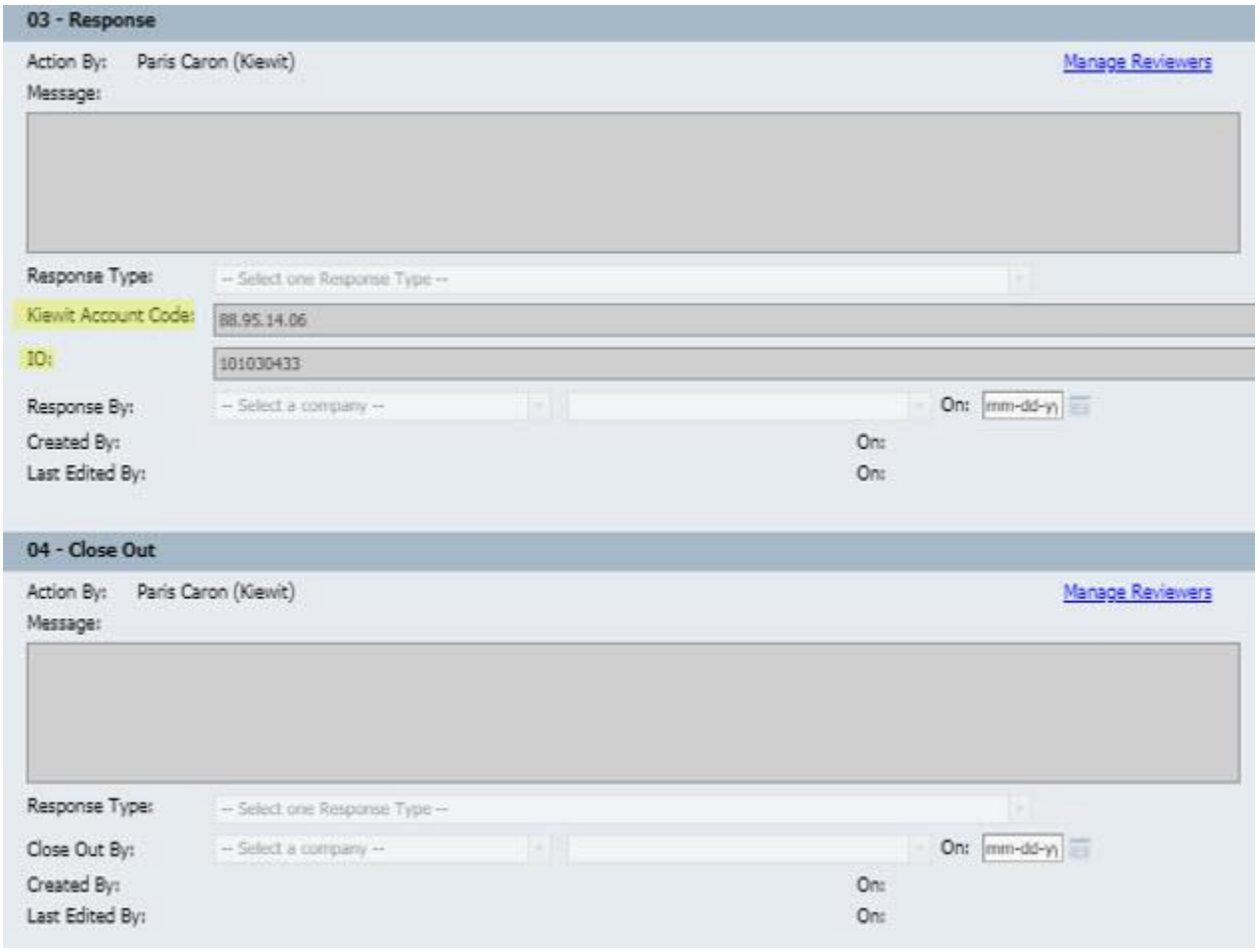
APPENDIX B – WORKFLOW



APPENDIX C – INEIGHT DOCUMENT SHOP DRAWING SUBMITTAL FORM







QC EXISTING SURFACE REVIEW

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Andy Kayhanfar	Initial Release	0.00	09/03/2021

APPROVAL FOR THIS PROCEDURE:

Revision 0.00

David G. Williams, KIE District Quality Manager

(Name / Title)

Table of Contents

1. PURPOSE

To assist the design teams in adhering to the Kiewit Quality Policy (Corporate Quality Site) and the KIE Design Quality Management Plan (DQMP). This procedure defines roles, responsibilities, and process for the validation of an existing surface prior to use. The purpose of the QC Existing Surface Review is to consistently evaluate the digital parameters of the surface file to ensure alignment with the project's criteria prior to promoting the surface for use. In the infrastructure market sector one of the top-quality risks is incorrect information being leveraged as the basis of a project. Geo coordinate location is the responsibility of everyone on the project.

2. SCOPE

The procedure is for an existing surface provided by others (client or third party) and to be used as the "basis of a project." The basis of a project can refer to the basis of design for a pursuit or final design project, the basis of a quantity takeoff and/or the basis of construction for the purposes of survey layout, quantity tracking or machine control.

3. DEFINITIONS

- Existing Surface:
  - is a digital representation of the existing terrain of the project
  - is referred to as a Triangular Irregular Network (.TIN)
  - is referred to as a Digital Terrain Model (.DTM)
  - is frequently exchanged via LandXML (.XML) format
  - may be created or available through various methods
    - public domain
    - client or partner provided
    - field data collection, mobile & aerial LiDAR, photogrammetry

  The Existing Surface is a source data or file to which subsequent manipulation is applied by the design team. There may be more than one Existing Surface in the project. Once corrections or changes are applied, including merging of files, it becomes the Current Surface.

- Current Surface:

  While there may be many versions of existing surfaces on a project, at any given time there can only be one current surface utilized simultaneously by all members of the project team. The current surface may be subdivided into segments, by the Existing Conditions team, to align with the objectives of the project and/or to ensure effective utilization of the surface file(s) in a CAD production environment.

4. RESPONSIBILITIES

Originator – receives or obtains the existing surface data, post files to the appropriate locations, creates the surface file from the data and performs a self-check. The Originator is responsible for informing the Reviewer when the files are ready.

Checker – is a member of the KIE DES Digital Engineering team who is not the Originator of an internally generated surface. The Checker is likely the project's Survey Coordinator or Digital Delivery Lead. The Checker has primary responsibility for the execution of the QC Existing Surface Review checklist. Examples of a Checker may be a senior roadway designer or a discipline design lead, a project survey manager, a 3rd party professional land surveyor or another survey coordinator or digital delivery lead who is not the Originator of the surface for QC.

DES Department Management Team – department managers within the KIE DES Department. Managers of the team include United States and/or Canada design and represent discipline design teams: Roadway, Drainage, Structures & Digital Engineering. The Team has the final decision on which surface shall be used as the basis for design.

5. PROCEDURE

5.1 Existing Surface Created or Received

Design and construction projects require an existing surface to be utilized as the basis for design. At KIE we are sometimes required to generate a surface to be used as this basis but are more often the recipient of this existing surface information. Far too often existing surfaces are incorporated into a project's CAD production environment and assumed to be in proper working condition because the information was provided by a client, a 3rd party consultant or a professional land surveyor. In many cases this is where a quality issue lies, as the client assumes no responsibly for the information provided and others providing the information don't always make the proper assumptions about the configuration of the projects coordinate system, working units, projection factors, etc. Furthermore, even if their assumptions are the same, there are frequently errors made within the CAD files whereas the intent of the project assumptions are not properly setup (examples being no coordinate system assigned, extra or missing zeros in projections, etc.). The Existing Conditions Workflow (Appendix A) serves as a guide to potentially available existing surfaces at various phase of an infrastructure design-build project and is provided for reference. It is the responsibility of the Recipient or Author of an existing surface to initiate the QC Existing Surface Review procedure by notifying the project Reviewer of the available information for QC.

Given the integrated nature of Kiewit's Infrastructure Design and Construction operation, it is imperative that all surface information and CAD files are geolocated (i.e., in the real world) accurately. A common mistake is to assume, because the CAD files appear to line up they are properly located. In many cases these files may be relative to each other, however not appropriately tied to the real world which could result in significant quality issues for the company during construction.

5.2 Exploration and Validation

Upon notification from the **Originator** of an existing surface, the **Checker** is responsible for evaluating the content in preparation to execute the QC Existing Surface Review procedure. This step requires the **Checker** to become familiar with the project's location and scope, available existing surfaces information, state and local parameters and alternate sources of information which could be used as a baseline for comparison.

5.3 Promote as the Current Surface

The decision to promote an existing surface to be used as the basis for design can be a straightforward decision for small projects with limited inputs of existing information. Contrary to this, larger projects may come with a significant amount of information, from multiple sources and the decision of what existing surface shall be used as the basis of design can be quite challenging. The **DES Department Management team** has the final decision on which surface shall be used as the basis for design ensuring all discipline design teams and members are in alignment.

5.4 QC Existing Surface Review Checklist

Following the decision to make an existing surface the current surface, the **Checker** is responsible for the execution of the Existing Surface QC Review Checklist (Appendix B). The record shall be stored on ProjectWise within the 60 Quality/20 Survey folder in accordance with the KIE Design Content Management (DCM) Standards, for the design and quality team's reference. As a project evolves, new existing surface information may become available whereas this process must be repeated each time the decision is made to promote an existing surface to the current surface for a pursuit, design and/or construction project. Each time the process is executed, and new checklist should be generated and retained. The QC Existing Surface Review Checklist is intended to be completed in close proximity to the decision to promote an existing surface to be the current surface, but must be completed no later than the first milestone deliverable identified in DQCP-41 QC Model Review.

5.5 Internal or External Correction

Pending the findings of the QC Existing Surface Review Checklist, the need may arise to make a correction to an existing surface file to ensure the current surface is an accurate basis for the project. Depending on the adjustment or correction required, and further dependent on the source of the information provided, the team shall collaborate to determine the resolution required for the situation and who should handle the correction. In either case, the **Checker** shall document the findings and resolution in the Additional Comments section of the Existing Surface QC Review Checklist. A current surface should be accompanied by one QC Existing Surface Review Checklist, which is to be updated as corrections are made to the existing surface before becoming the current surface.

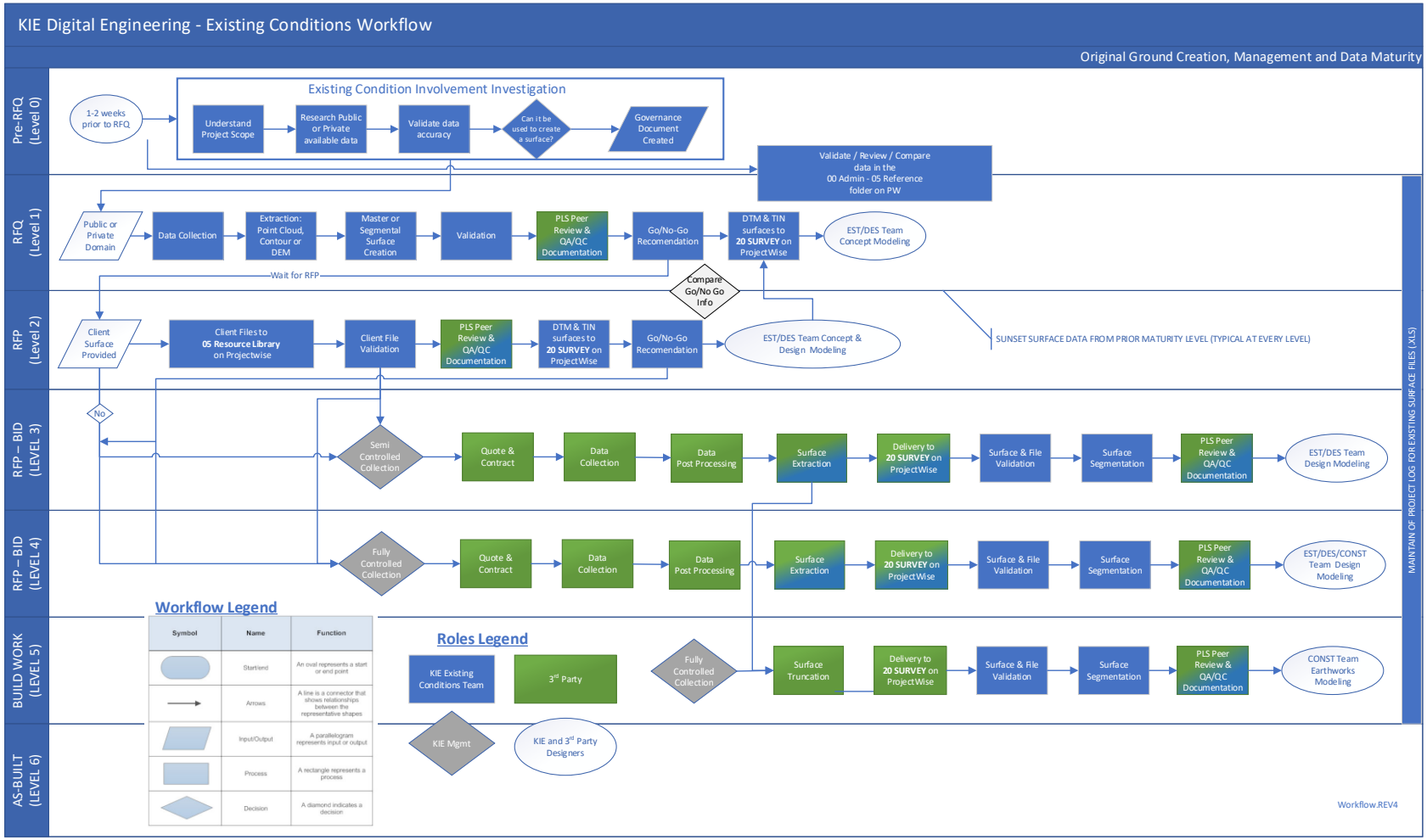
6. REFERENCES

- KIE Design Content Management (DCM) Standards
- DQCP-41 QC Model Review
- The Project's **KIE Digital Engineering Project Execution Plan (PxP)**
  - SECTION H-: QUALITY CONTROL
    - QUALITY CONTROL CHECKS
    - QUALITY CONTROL RESOURCES

7. QUALITY RECORDS

- Existing Surface QC Review Checklist

APPENDIX A – EXISTING CONDITIONS WORKFLOW



APPENDIX B – EXISTING SURFACE REVIEW CHECKLIST

EXISTING SURFACE REVIEW CHECKLIST

Project Name:	Job #:
Surface File Name:	Date:

ORGIN OF THE SURFACE (select one):

Public data – USGS, client database, etc.	☐
Client provided surface – pre-RFP, RFP or at Award	☐
KIE managed data collection via 3rd party	☐
3rd party data collection by others	☐

MEASUREMENT & COORDINATE SYSTEM:

Coordinate System	
Grid Adjustment Factor	
Horizontal Units of Measure	
Vertical Units of Measure	
Horizontal Datum	
Vertical Datum	

SURFACE DOCUMENTATION	Yes	No	N/A	Unk	Checker
1. Governance documentation completed	☐	☐	☐	☐	
2. Professional Land Surveyor (PLS) validation completed	☐	☐	☐	☐	
3. Documentation located on in 20 SURVEY/50 SURFACES/Doc	☐	☐	☐	☐	
4. Surface file located on in 20 SURVEY/50 SURFACES	☐	☐	☐	☐	
SURFACE FILE PARAMETERS					
5. The following surface file setting and characteristics have been checked					
5.1. State plane coordinate system	☐	☐	☐	☐	
5.2. Units of measure	☐	☐	☐	☐	
5.3. Validated as US Survey Foot or US International Foot	☐	☐	☐	☐	
5.4. File contains a geocoordinate	☐	☐	☐	☐	
5.5. File is in grid coordinates	☐	☐	☐	☐	
5.6. File is in ground coordinates	☐	☐	☐	☐	
5.7. File contains triangles	☐	☐	☐	☐	
5.8. File contains feature lines	☐	☐	☐	☐	
5.9. Check for "holes" in the surface, missing information	☐	☐	☐	☐	
5.10. Check for "spikes" in the surface, points at zero	☐	☐	☐	☐	
5.11. Merged multiple surfaces are free of obvious defects	☐	☐	☐	☐	
INTERDISCIPLINARY COORDINATION					
6. Model(s) and design elements are consistent with the projects'					
6.1. Roadway geometry – existing or available geometry checked for alignment when referenced into the project's CAD environment	☐	☐	☐	☐	

Explain any "no" responses and any additional comments:					
Checker:			Completion Date:		

RECORD DRAWINGS (AS-BUILTS)

REVISION HISTORY

AUTHOR	*REVISED SECTION/PARAGRAPH*	*REV*	*RELEASED*
Hether Telford	Initial Release I-10 Mobile Project	0.0	06/23/2023

APPROVAL FOR THIS PROCEDURE:

Revision _0.0__ Approved

Approved: _*David G. Williams, PE/DQM*_____ Date Approved: 06/23/2023
(Name / Title)

Table of Contents

1. PURPOSE

This procedure describes process for maintaining Record Drawings and the submittal of the final Record Documents package to ALDOT.

2. SCOPE

This procedure applies to the Record Documents package prepared and submitted to ALDOT in accordance with the contract.

3. DEFINITIONS

- **Record Documents:** means an organized, complete set of Project documents that accurately reflect the actual condition of the constructed Work, consisting of the Record Drawings, supporting calculations, and details, including all plans, studies, and reports that are prepared, signed, and sealed by a Licensed Professional Engineer and delivered to ALDOT after Substantial Completion of the Project.
- **Record Drawings**: ("as-built plans") means the Released for Construction Documents that are updated to reflect the as-constructed project, with documented changes made during construction that accurately reflect the actual condition of the constructed Work, signed and sealed by a Licensed Professional Engineer.

4. RESPONSIBILITIES

Design Manager (DM), assisted by the DLs, is responsible for compiling the Final Design Submittal documents, including plans, reports, studies, specifications, and QC documentation, and providing to Document Control.

Discipline Leads (DL) or designees are responsible for assuring that required checks and reviews for their discipline are performed in accordance with the DQMP. The DLs are responsible for assuring that all documents required for the Record Document package Submittal are compiled and provided to Document Control.

Design Quality Control Manager (DQCM) is responsible for reviewing the QC documentation and Final Design Submittal for compliance with the DQMP. The DQCM, in collaboration with Document Control, will provide ALDOT and DQCM with quality records and clean copy of the Final Design Submittal package.

Independent Quality Manager (IQF) is responsible for performing quality audits and providing certification of Final Deliverables prior to submittal to ALDOT.

Document Control Manager is responsible for assuring that all documents required for the Record Documents submittal are entered into InEight Document and submitted to ALDOT.

Independent Quality Manager (IQM) manager is a person, independent of KMT who, on the title sheet of the final plans, provides, signs, and seals a statement that the Record Drawings accurately depict the Work that has been constructed in accordance with the RFC Documents.

ESDCM is the engineering services during construction manager responsible to document redline as-built conditions.

5. PROCESS

A complete set of Record Documents forms one of the requirements for ALDOT to issue a Certificate of Final Acceptance. Record Documents shall be completed by following the steps described below

5.1 Redline Markups

Record Drawings will be updated with as-built conditions upon completion of construction of the applicable portion of the Work, as defined in the Design Submittal Packaging Plan. The ESDCM is responsible for documenting redline as-built conditions quarterly.

5.2 Utility Markup and Reports

Record Drawings shall show the location of all Abandoned Utilities and shall show and label all other Utilities, including Utility Adjustments, located within the Project ROW or impacted by the Project.

Reports documenting the location of the as-built alignments, profiles, structure locations, utilities, and survey control monuments will also be produced. These reports shall include descriptive statements for the survey methods used to determine the as-built location of the feature being surveyed, including:

- A listing of all primary and secondary control coordinate values, original computations, and other records, including GPS observations and analysis made by DB Contractor
- Copies of all survey control network measurements, computations, unadjusted and adjusted coordinates, and evaluation values
- Survey records and survey reports

5.3 3D Design

Record Drawings shall include a complete 3D design model of the final constructed Project that is representative of the Released for Construction Documents and any approved changes Discipline Lead Reviewer has all the information and background they need to assess the quality and completeness of the model.

5.4 IQFM Certification

The IQF shall include on the title sheet of the final plans a statement signed and sealed by the IQF Manager that the Record Drawings accurately depict the Work constructed in accordance with the RFC Documents.

5.5 Contents and Organization

The contents of the Record Documents will be organized by segment and discipline to include Record Drawings, supporting calculations, and details, etc. KMT will submit to ALDOT a complete set of

Record Documents in hard copy and native electronic format for the portion of the Project actually opened to traffic.

6. RECORDS

- Record Documents
- IQF Certification

7. ATTACHMENTS

Not Used

APPENDIX C – QUALITY FORMS

DQCP FORMS	Revision	Date
DQCP-14 FRM1 CAD Compliance Form	0	June 2023
DQCP-16 FRM1 DQCM Certification of Compliance	0	June 2023
DQCP-16 FRM2 Design Builder Design Certification	0	June 2023
DQCP-24 FRM1 IDR/CR Signoff Form	0	June 2023
DQCP-24 FRM2 IDR/CR Deferred Comment form	0	June 2023

Submittal: _____

CAD Manager:

Electronic files have been checked and verified to be compliant with the Project CAD requirements and DQCP-14 CAD and Graphical Standards Compliance Check. Any comments have been closed.

_____ _____

CAD Manager **Date**

Comments:

No.	Comment	Response	Disposition	Checker Approved
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				

Comment Disposition Legend: **C** = Complied with comment; **R** = Complied with agreed upon revisions; **D** = Deleted

Submittal: _____

Personnel in Responsible Charge: _____
(Person who will sign, stamp, or seal the document)

1.) Review was completed in accordance with the DQMP.

2.) Comments generated from reviews have been addressed in accordance with the DQMP and are being transmitted for your use. This includes all required forms and checklists.

3.) The electronic design files and calculations necessary to adequately review this submittal are also being transmitted.

_____ _____
Personnel in Responsible Charge **Date**

Design Quality Control Manager (DQCM):

I hereby certify the above stated package has been through the applicable quality control process defined in the DQMP and satisfies the contract requirements.

_____ _____
Design Quality Control Manager **Date**

Submittal Name: _____

Certification Date: _____

The undersigned hereby certifies that:

- The Design Builder has performed the quality assurance review procedures described in the Design Quality Plan (DQMP) as they pertain to the Design Submittal identified below and has found that Design-Builder has fulfilled the quality assurance requirements in the Contract Documents and the DQMP.
- The Design Builder has reviewed the Design Submittal identified below in accordance with the Design Submittal substantive review process as set forth in the DQMP and, except as set forth in the attached list of exceptions, the Design Submittal complies with the Contract Documents including the requirements embodied in the Technical Provisions and the standards incorporated by reference in the Contract Documents.
- As of the date of this Certification, and to the best of the Design Builder's knowledge in accordance with its obligations under the Contract Documents all the measures and procedures provided in the Design-Builder's Project Management Plan and the QMP are being followed.

Design Quality Control Manager

_____

Name

_____

Signature

Quality Manager

_____

Name

_____

Signature

KIEWIT MASSMAN TRAYLOR A JOINT VENTURE	**I-10 Mobile River Bridge Project**		
	DQCP-24 & DQCP-25 FRM1– IDR/CR Signoff Form	**Rev**: 0	**Rev Date**: June 2023

Submittal: _____

Personnel in Responsible Charge: _____
(person (s) who will sign, stamp, or seal the document)

QC Reviewers, please:

1. Make comments in the form of redlines directly on the document in accordance with the DQMP.
2. Complete your interdisciplinary or constructability review in accordance with the Project Schedule.
3. Review compatibility of the plan(s), report(s), and/or document(s) with respect to your own discipline.
4. Verify your discipline is not proposing anything that could adversely impact the design presented in the submittal.
5. Sign this form acknowledging you are finished with your Interdisciplinary Review.

I understand that by signing this form, I am acknowledging that the above referenced plan(s), report(s), and/or document(s) in as far as the particular discipline that I represent has been reviewed and impacts to my discipline have been noted. **N/A = Discipline Not Applicable**

Interdisciplinary Reviewers		**N/A**	**Constructability Reviewers**		**N/A**
_____ CAD IDR Reviewer	_____ Date	❑	_____ MDC CR Reviewer	_____ Date	❑
_____ Drainage IDR Reviewer	_____ Date	❑	_____ Drainage CR Reviewer	_____ Date	❑
_____ Environmental IDR Reviewer	_____ Date	❑	_____ Environmental CR Reviewer	_____ Date	❑
_____ Geotech IDR Reviewer	_____ Date	❑	_____ Geotech CR Reviewer	_____ Date	❑
_____ Illumination IDR Reviewer	_____ Date	❑	_____ Illumination CR Reviewer	_____ Date	❑
_____ Traffic Control IDR Reviewer	_____ Date	❑	_____ Traffic Control CR Reviewer	_____ Date	❑
_____ Pavement IDR Reviewer	_____ Date	❑	_____ Pavement CR Reviewer	_____ Date	❑
_____ Traffic IDR Reviewer	_____ Date	❑	_____ Traffic CR Reviewer	_____ Date	❑
_____ Structures IDR Reviewer	_____ Date	❑	_____ Structures CR Reviewer	_____ Date	❑
_____ Utilities IDR Reviewer	_____ Date	❑	_____ Utilities CR Reviewer	_____ Date	❑
_____ Survey IDR Reviewer	_____ Date	❑	_____ Survey CR Reviewer	_____ Date	❑
_____ Roadway IDR Reviewer	_____ Date	❑	_____ Roadway CR Reviewer	_____ Date	❑
_____ ITS IDR Reviewer	_____ Date	❑	_____ ITS CR Reviewer	_____ Date	❑
_____ Walls IDR Reviewer	_____ Date	❑	_____ Walls CR Reviewer	_____ Date	❑

Mobile River Bridge Project Rev: 0 Rev Date: June 2023

DQCP-25 FRM1 – IDR/CR Deferred Comment Form

Note: Columns with an asterik " ***** " to be completed at next Milestone.

Design Package Title: Page No: 1

Submittal Milestone: ☐ 60% ☐ Final ☐ RFC Date:

KMT - Construction				KMT - Design		
Line Item No.	**Sheet No.**	**Comment**	**Reviewer**	**Disposition**	**Response Comment / Resolution***	**Comment Incorp. ***