DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SOUTH ATLANTIC DIVISION
60 FORSYTH STREET SW, ROOM 10M15
ATLANTA GA 30303-8801

CESAD-RBT

MAY - 3 2016

MEMORANDUM FOR COMMANDER, JACKSONVILLE DISTRICT

SUBJECT: Approval of the Review Plan for Section 408 Permission Package for the Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project, Glades County, Florida

1. References:

a. Memorandum, CESAJ-EN-Q, 17 March 2016, subject: CESAJ-EN Approval of Review Plan for the Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project, Glades County, Florida (Encl).

b. EC 1165-2-216, Policy and Procedural Guidance for Processing Request to Alter U.S. Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408, 31 July 2014.

c. EC 1165-2-214, Civil Works Review, 15 December 2012.

2. The enclosed Review Plan for the Section 408 Permission Package for the Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project, prepared by the South Florida Water Management District, reviewed by the Jacksonville District and submitted for approval by reference 1.a, has been reviewed by this office and is approved in accordance with references 1.b and 1.c above.

3. We concur with the conclusion in the Review Plan and the District Chief of Engineering that a Type II Independent External Peer Review (IEPR) is not required on this shallow storage hydrologic enhancement project. The primary basis for our concurrence is that the failure or loss of the features associated with this project do not pose a significant threat to human life.

4. The District should take steps to post the Review Plan to its web site and provide a link to CESAD-RBT. Before posting to the web site, the names of Corps/Army employees should be removed. Subsequent significant changes to this Review Plan, should they become necessary, will require new written approval from this office.

5. The SAD point of contact is [redacted]

C.D.T.

Encl

C. DAVID TURNER
Brigadier General, USA
Commanding

CF:

[redacted]

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Blvd.
JACKSONVILLE, FLORIDA 32207

REPLY TO
ATTENTION OF

CESAJ-EN-Q

17 March 2016

MEMORANDUM FOR Commander, South Atlantic Division (CESAD-RBT)

SUBJECT: Approval of Review Plan for Section 408 Permission Package for the Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project, Glades County, Florida

1. References.

a. EC 1165-2-214, Civil Works Review, 15 Dec 12

b. EC 1165-2-216, Policy and Procedural Guidance for Processing Requests to Alter U.S. Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408, 31 Jul 14

2. CESAJ-EN has reviewed the Review Plan for the Section 408 Permission Package for the Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project (dated March 2016) and concurs that this Review Plan provides for an adequate level of review and complies with the current review policy requirements outlined in EC 1165-2-214 and EC 1165-2-216.

3. This Review Plan was prepared by the South Florida Water Management District (SFWMD), reviewed by Jacksonville District and the South Atlantic Division, and all review comments have been satisfactorily resolved.

4. The design for this project is under development by the SFWMD and their A-E who will perform quality checks on all products they developed. This RP outlines three levels of review: Quality Assurance by SFWMD and Quality Control by their A-E, a Technical Review during the pre-coordination phase, and a Jacksonville District-led Agency Technical Review of the submitted 408 permission package. The Review Plan includes a recommendation that a Type II Independent External Peer Review (IEPR) of the subject project is not required. The recommendation to exclude Type II IEPR is based on the EC 1165-2-214 Risk Informed Decision Process as presented in the Review Plan. Documents to be reviewed include plans, specifications, and a design documentation report.

5. CESAJ-EN endorses this document to be approved by the MSC Commander. Upon approval of the RP, the district will post the CESAD approved Review Plan to its website and provide a link to the CESAD for its use. Names of Corps/Army employees will be withheld from the posted version, in accordance with guidance. It is my understanding that non-substantive changes to this Review Plan, should they become necessary, are authorized by CESAD.

FOR THE COMMANDER:

Encl

PROJECT REVIEW PLAN

For Review of

Section 408 Permission Package

For

Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project

Glades County, Florida

March 2016

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1. PURPOSE AND REQUIREMENTS

a. Purpose

This Review Plan defines the scope and level of review activities for the 33 USC 408 (Section 408) Permission Package to be submitted for the Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project (Project), Glades County, Florida. The Project features include construction of a new 670 acre Flow Equalization Basin (FEB), influent pump station and discharge spreader canal. Design and construction of the Project is being performed by the non-federal sponsor, the South Florida Water Management District (SFWMD) and their design consultant. The documents to be reviewed are Plans and Specifications (P&S), and Design Documentation Report (DDR) prepared by the non-federal sponsor and their consultant. It is not anticipated that the project will create any changes to the existing water control plan/manual. As discussed below, the review activities for these documents consist of a Quality Control (QA) effort by the local sponsor and a Quality Control (QC) by their design consultant, as well as reviews by the U.S. Army Corps of Engineers (USACE) at Intermediate and Final Design. The purpose of the USACE Technical Review on the Intermediate Design is to aid in identifying potential issues with the Section 408 Package. A District-led Agency Technical Review (ATR) will be performed on the Section 408 Package at Final Design to determine if requirements set forth in this EC 1165-2-216 have been met. Also as discussed below, an Independent External Peer Review (IEPR) is not recommended on this Section 408 design and implementation effort.

b. References

(1). ER 1110-2-1150, “Engineering and Design for Civil Works Projects”, 31 August 1999

(2). ER 1110-1-12, “Engineering and Design Quality Management”, 31 March 2011

(3). EC 1165-2-214, “Civil Works Review”, 15 December 2012

(4). EC 1165-2-216, “Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408”, 31 July 2014

(5). SFWMD Everglades Restoration and Capital Projects Engineering Submittal Requirements, 05 November 2009

c. Requirements

This Review Plan was developed in accordance with EC 1165-2-216. The EC provides the policy and procedural guidance for processing requests by private, public, tribal, or other federal entities, to make alterations to, or temporarily or permanently occupy or use, any US Army Corps of Engineers federally authorized civil works project pursuant to Section 408. Proposed alterations must not be injurious to the public interest or affect the USACE project’s ability to meet its authorized purpose.

d. Review Plan Approval and Updates

The South Atlantic Division Commander is responsible for approving this Review Plan. The Commander’s approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review. The Review Plan is a living document and may change as the project progresses. The SFWMD is responsible for keeping the Review Plan up to date. Minor changes to the Review Plan since the last MSC Commander approval are documented in Attachment A. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the

Review Plan, along with the Commander's approval memorandum, will be posted on the Jacksonville District Review Plan webpage. The latest Review Plan will be provided to the RMO and home MSC.

2. PROJECT INFORMATION AND BACKGROUND

a. Project Description

The Lake Hicpochee Shallow Storage and Hydrologic Enhancement Project (Project) will consist of a 670 acre FEB and spreader canal which is approximately 6,500 feet in length. The purpose of the Project is to enhance the hydrology of the presently over-drained lake bed by discharging, in a sheet flow approximation, flows redirected from the C-19 Canal and Structure S-47D.

Lake Hicpochee is located in Townships 42 and 43 South, Range 32 East in Glades County and Hendry County, Florida. Figure 1 depicts the overall project location. The lake was significantly impacted by the channelization of the Caloosahatchee River.

Figure 1: Location Map

The Project is designed to capture a portion of the runoff from the Canal 19 (C-19) Basin upstream of Structure S-47D, temporarily store that captured runoff in a FEB, and deliver the water to the historic lakebed of Lake Hicpochee for hydrologic enhancement. Figure 2 shows an aerial schematic of the project features. A new inflow pump station and a new control structure are required to control the inflow and outflow of water for the FEB. Inflow will be provided by the use of the Inflow Pumping Station (G-725) with a capacity of 150 cfs. Outflow will be provided by gravity flow from the FEB to the Lake Hicpochee Spreader Canal via a fixed crest weir and culvert structure (G-726). The 6,500 feet long Spreader Canal will allow gravity flow to Lake Hicpochee. The principal purposes of the project are to enhance, to the extent practicable, hydration of the historic lake bed and redirect storm water runoff from the C-19 Basin and pass it through the FEB to the historic bed of Lake Hicpochee.

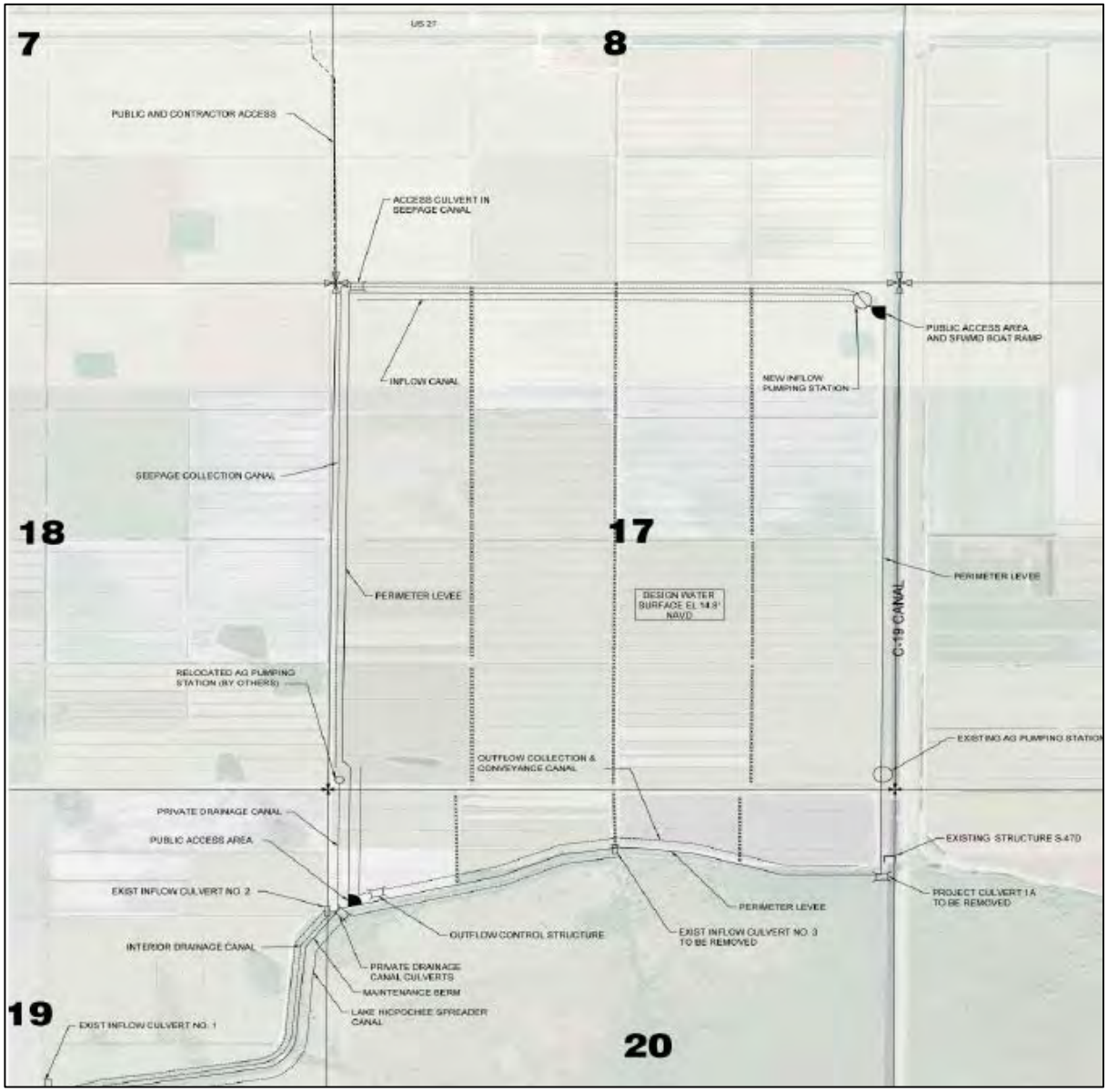

Figure 2: Aerial Map of Project Area

While the operational criteria for the project will change the amount of water released from Lake Okeechobee through C-5A (S-281) and the amount and time of discharges through S-342, S-47B, and S-47D, all of the flows and stages will be within the standard/historical operational range. When the Lake Hicpochee facility has capacity it can moderate the higher flows and stages in the C-19 Canal. When the Lake Hicpochee facility has no capacity,it will be transparent to the existing operation. The existing Water Control Plan (WCP) for the C-19 Basin (C&SF Project Master Water Control Manual Lake Okeechobee and Everglades Agricultural Area - Volume 3 Dated July 1996) already provides the local sponsor operational authority and control to 1) discharge excess water from Nicodemus Slough through the S-342 (N&S), S-47B, and S-47D to the Caloosahatchee River (C-43), 2) adjust the operation ranges in response to wet (e.g. low range) and dry (normal or high range) conditions within the limitation of the structures design limits (e.g. flow rates, MAGO, revetment limits), and 3) discharge water from Lake Okeechobee to the C-19 Basin through C-5A (S-281).

b. Public Participation

SFWMD will coordinate with affected parties regarding impacts of this effort to local activities. The project review plan will be posted on the Jacksonville District Internet. Any comments or questions regarding the review plan will be addressed by the Jacksonville District or the SFWMD.

c. In-Kind-Contributions by Project Sponsor

This project is being conducted entirely by the SFWMD as the Local Sponsor for the Central and Southern Florida (C&SF) System. The work is being performed at no cost to the Federal Government.

d. Cost Engineering Directory of Expertise Review and Certification

The cost related documents associated with this contract do not require external peer review or certification since the design and construction will be performed by the SFWMD. Therefore, no additional review requirements will be executed by the Cost Engineering Directory of Expertise (DX) for the implementation documents addressed by this review plan.

3. QUALITY CONTROL BY NON-FEDERAL SPONSOR

The design will be subjected to quality assurance reviews by the non-federal sponsor and quality control reviews by their consultant as outlined in the SFWMD Quality Assurance Plan (Attachment C), the SFWMD Design and Engineering Review Process (Attachment D the Consultant Quality Control Plan (Attachment E).

4. USACE TECHNICAL REVIEW

a. General

The P&S and DDR produced by the SFWMD and their consultant are not work products of the Corps of Engineers. Therefore, the specific ATR requirements in EC 1165-2-214 do not apply. However, as stated in EC 1165-2-214, the use of and compliance with the EC may be advisable to help expedite an eventual USACE review and approval process. A rigorous technical review commensurate with the risk of the proposed activities has been requested by the SFWMD will be performed by USACE personnel concurrently with the pre-coordination phase of the Section 408 request process. This review will be conducted with funds from SFWMD.

USACE shall develop a charge to reviewers to assist the USACE team members in their review by clarifying the scope of the review required. Since the P&S and DDR are being prepared by SFWMD and their consultant, the USACE review team may be led by and contain members from CESAJ. The review team will be supplemented with outside subject matter experts if necessary.

Initial coordination should also consist of a meeting to discuss the proposed project and inform the requester of any known issues that would impact their Section 408 proposal.

b. Documentation

All comments from the USACE review will be documented in the DrChecks^{sm} model review documentation database. DrChecks^{sm} is a module in the ProjNet^{sm} suite of tools developed and operated at ERDC-CERL (www.projnet.org). SFWMD will provide evaluations to all comments, and USACE staff will be responsible for backchecking and if appropriate close of

all comments. USACE shall prepare a report that consolidates the results of the USACE review and documents that all comments have been closed or identify any open comments. SAD shall receive a copy of the summary report for its information.

5. DISTRICT-LED AGENCY TECHNICAL REVIEW

a. General

For the purposes of Section 408, a District-led ATR is conducted in order to determine if the requirements set forth in EC 1165-2-216 have been met and assists USACE review team members in the formulation and agreement of the determinations described in EC 1165-2-216. The District-led ATR will be conducted after submission of the Section 408 Permission Package by SFWMD. USACE team members conducting the District-Led ATR may be from within CESAJ. If lacking the appropriate expertise, CESAJ may supplement their staff with outside subject matter experts through appropriate communities of practice, centers of expertise, or other offices. Review teams shall be comprised of reviewers with the appropriate independence and expertise to conduct a comprehensive review in a manner commensurate with the complexity of the Section 408 proposal. The District-led ATR team will make the following determinations:

- **Impair the Usefulness of the Project Determination.** The objective of this determination is to ensure that the proposed alteration will not limit the ability of the project to function as authorized and will not compromise or change any authorized project conditions, purposes or outputs. All appropriate technical analyses including geotechnical, structural, hydraulic and hydrologic, real estate, and operations and maintenance requirements, must be conducted and the technical adequacy of the design must be reviewed. If at any time it is concluded that the usefulness of the authorized project will be negatively impacted, any further evaluation under 33 USC 408 should be terminated.

- **Injurious to the Public Interest Determination.** Proposed alterations will be reviewed to determine the probable impacts, including cumulative impacts, on the public interest. Evaluation of the probable impacts that the proposed alteration to the USACE project may have on the public interest requires a careful weighing of all those factors that are relevant in each particular case. The benefits that reasonably may be expected to accrue from the proposal must be compared against its reasonably foreseeable detriments. The decision whether to approve an alteration will be determined by the consideration of whether benefits are commensurate with risks. If the potential detriments are found to outweigh the potential benefits, then it may be determined that the proposed alteration is injurious to the public interest. This determination is not the same as the “contrary to the public interest determination” that is undertaken pursuant to Sections 10/404/103. Factors that may be relevant to the public interest depend upon the type of USACE project being altered and may include, but are not limited to, such things as conservation, economic development, historic properties, cultural resources, environmental impacts, water supply, water quality, flood hazards, floodplains, residual risk, induced damages, navigation, shore erosion or accretion, and recreation. This evaluation should consider information received from the interested parties, including tribes, agencies, and the public.

- **Legal and Policy Compliance Determination**. A determination will be made as to whether the proposal meets all legal and policy requirements. CESAJ Office of Counsel concurrence is required. The compliance determination for any Section 10/404/103

permit decision associated with the proposed alteration is separate from and will not be included in this compliance determination.

As a minimum, this SFWMD project is expected to modify and/or affect the following Federal projects: C-43 Caloosahatchee River, S-78 Ortona Lock and Dam, and S-79 W.P. Franklin Lock and Dam.

b. Documentation

After reviewing the documents included in the Section 408 Permission Package, the review team members shall utilize DrChecks[sm] to capture team member input for the determinations described in EC 1165-2-216. If necessary, a separate DrChecks[sm] review may also be used to consolidate any requests for additional information (RAI) concerning the Section 408 Permission Package. These RAIs will be forwarded to SFWMD for response.

6. SUMMARY OF FINDINGS

Upon completion of the District-led ATR, demonstration of environmental compliance, and receipt of responses to RAIs from SFWMD, USACE will develop a Summary of Findings to summarize the district rationale and conclusions for recommending approval or denial of the 408 request. The Summary of Findings will serve as the basis for the final decision on the approval/disapproval of the proposed alteration. The Summary of Findings will be signed by the Jacksonville District Commander and contain the following, if applicable:

- Summary of rationale and conclusions for recommending approval or denial;
- Written request;
- A physical and functional description of the existing project, including a map;
- Project history and authorization;
- Impact to the usefulness of the USACE project determination;
- Injurious to the public interest determination;
- Policy Compliance certification;
- Certification of Legal Sufficiency from District Office of Counsel;
- Certification by the Chief of the District Real Estate Division that the real estate documentation is adequate;
- A description of any related, ongoing USACE studies (if applicable), including how the proposed alteration may impact those studies;
- Summary of any changes to the O&M manual. If the district has determined that USACE would assume O&M responsibilities as part of its responsibilities for the USACE project, include the rationale and any anticipated increase in USACE O&M costs;
- Summary of any changes to a project partnership agreement (PPA) or local cooperation agreement (if applicable);
- Applicable environmental compliance documentation including but not limited to NEPA documentation, Endangered Species Act (ESA) documentation, and other necessary documentation;
- Finding of No Significant Impact (FONSI) or Record of Decision (ROD) (These will be signed concurrently with the Section 408 decision. If HQUSACE approval is required, these will be draft and will be signed by the Director of Civil Works);
- Summary of the acceptance and use of funds pursuant to Section 214 if applicable;
- Any additional final conclusions or information, including any associated controversial issues.

7. INDEPENDENT EXTERNAL PEER REVIEW

a. General.

EC 1165-2-214 provides implementation guidance for both Sections 2034 and 2035 of the Water Resources Development Act (WRDA) of 2007 (Public Law (P.L.) 110-114). The EC addresses review procedures for both the Planning and the Design and Construction Phases (also referred to in USACE guidance as the Feasibility and the Pre-construction, Engineering and Design Phases). The EC defines the Section 2034 Independent Peer Review, Type I Independent External Peer Review, and the Section 2035 Safety Assurance Review, Type II Independent External Peer Review.

According to EC 1165-2-214, when a non-Federal interest undertakes a study, design, or implementation of a Federal project, or requests permission to alter a Federal project, the non-Federal interest is required to undertake, at its own expense, any IEPR that the Government determines would have been required if the Government were doing the work. The non-Federal interest shall make a risk informed decision on whether to undertake a Type I and/or Type II IEPR and document their proposed reviews in a Review Plan that will be reviewed by the local district and approved by the host MSC Commander. Any IEPR undertaken by a non-Federal Interest shall be submitted as part of the decision package for review by USACE and ultimate action by USACE.

b. Type I Independent External Peer Review Determination.

Per EC 1165-2-214 and EC 1165-2-216, because this Section 408 request is a not planning study, a Type I IEPR is not required.

c. Type II Independent External Peer Review Determination.

This project does not trigger WRDA 2007 Section 2035 factors for Safety Assurance Review (termed Type II IEPR in EC 1165-2-214) and therefore, a review under Section 2035 is not required. The factors in determining whether a review of design and construction activities of a project are necessary as stated under Section 2035 along with the applicability statements for this Review Plan are as follows:

1) Does it include any design (structural, mechanical, hydraulic, etc)?
   Response: Yes, the project includes design of an influent pump station, levees and a discharge control structure with associated civil, mechanical and electrical works.

2) Does it evaluate alternatives?
   Response: No. The alternatives had previously been vetted by the SFWMD and final design features are already determined.

3) Does it include a recommendation?
   Response: No. The projects' features are already determined and are beyond the recommendation phase.

4) Does it have a formal cost estimate?
   Response: Yes. There is a planning level cost estimate based on SFWMD guidelines and DCM-7. However, the total project cost will be paid for with State funds out of the SFWMD's budget and other non-federal sources.

5) Does it have or will it require a NEPA document?

Response: SFWMD permitting staff believes that this project will fall under Categorical Exclusion, however if any additional NEPA documents are required, they will be coordinated with the USACE's Regulatory Branch.

6) Does it impact a structure or feature of a structure whose performance involves potential life safety risks?
Response: No, in the unlikely event of a structure failure, there is a risk of minor economic losses, but negligible risk of threat to human life.

7) What are the consequences of non-performance?
Response: The purpose of the project is to redirect runoff from the C-19 through a FEB, into the historic Lake Hicpochee lake bed and ultimately discharge to the C-43. In the event of non-performance, water from the C-19 will discharge over the S-47D structure and out to the C-43 as it currently does.

8) Does it support a significant investment of public monies?
Response: Yes. The total project cost will be paid for with State funds out of the SFWMD's budget and other non-federal sources.

9) Does it support a budget request?
Response: No Federal funds are being requested, so a budget request out of the Federal budget is not anticipated.

10) Does it change the operation of the project?
Response: Yes. The proposed design utilizes the C-19 western levee as the eastern embankment of this FEB. This project will include a shallow FEB capable of impounding 1,280 ac ft of water with a design water depth of 1.5 ft at a typical water surface elevation 14.8 ft NAVD when discharging. The elevated water levels on the western side of the C-19 western levee is a change in operation from the original intention of this design. Seepage models will be submitted to insure the stability of the levee and all deficiencies noted in the Corps most recent inspection report for this levee will be addressed as part of this project.

11) Does it involve excavation, subsurface investigations (drilling or sampling or both), or placement of soil?
Response: Yes, the project includes dredging for construction of the spreader canal and, excavation for construction of the FEB and associated structures. Excavation and backfill will be constructed consistent with previously approved specifications and traditional construction methods.

12) Does it affect any special features, such as cultural resources, historic properties, survey markers, etc, that should be protected or avoided?
Response: No, there are no special features that will be impacted by this work.

13) Does it involve activities that trigger regulatory permitting such as Section 404 or stormwater/NPDES related actions?
Response: Yes, the project will require Section 404 and NPDES approval.

14) Does it involve activities that could potentially generate hazardous wastes and/or disposal of materials such as lead based paints or asbestos?
Response: No activities are expected to generate or require disposal of hazardous materials.

15) Does it reference use of or reliance on manufacturers' engineers and specifications for items such as prefabricated buildings, playground equipment, etc?
Response: Yes, there are requirements for manufacturers' engineers to be utilized for items to include, but are not limited to, prefabricated control buildings, trash rakes, electrical/control equipment and emergency generator and fuel storage systems . These specifications and requirements are consistent with normal construction and design activities used on previous SFWMD and USACE projects.

16) Does it reference reliance on local authorities for inspection/certification of utility systems like wastewater, stormwater, electrical, etc?
Response: SFWMD is working with Glades County building department officials to obtain the appropriate permits.

17) Is there or is there expected to be any controversy surrounding the Federal action associated with the work product?
Response: No. The work proposed is consistent with other similar projects that have been built by the SFWMD on public lands.

18) The failure of the project would pose a significant threat to human life.
Response: In the unlikely event of a structure failure, there is a risk of minor economic losses, but negligible risk of threat to human life. The FEB will only store 1.5 feet of water and it is surrounded by agricultural lands.

19) The project involves the use of innovative materials or techniques.
Response: This project will utilize methods and procedures used by the Corps of Engineers and the project sponsor on other similar works.

20) The project design lacks redundancy.
Response: The projects do not require the addition of redundant project features or redundancy design considerations.

21) The project has unique construction sequencing or a reduced or overlapping design construction schedule.
Response: This projects construction activities do not have unique sequencing or a reduced or overlapping design.

Based on the discussion above, CESAJ does not recommend a Type II IEPR Safety Assurance Review of the P&S and DDR.

8. MODEL CERTIFICATION AND APPROVAL

The following models were utilized by SFWMD in the design of this project:

- SLOPE/W and SEEP/W (GeoStudio 2007 Suite, Version 7.20, Build 5033): SEEP/W is a two-dimensional finite element program that performs seepage analyses for hydrogeologic models and determines seepage paths, seepage flow rates, phreatic surfaces, pore water pressures, and exit gradients for steady state and transient state seepage problems. SLOPE/W performs a limit-equilibrium analysis using a method-of-slices search routine to look for the critical failure surface, which is the surface with the minimum factor of safety.

- Microsoft Excel: This program was used for a water balance model to predict timing and water availability for filling and draining the FEB and estimating the change in hydroperiod for areas in the lake bed receiving effluent.

This project does not use any engineering models that have not been approved for use by USACE.

9. PROJECT DELIVERY TEAM DISCIPLINES

Discipline/Expertise
Project Manager
Cost Estimation
Procurement
Survey
Civil Site Design
Mechanical Engineering
Electrical Engineering
Structural Engineering
Environmental Engineering
Hydrogeology & Geology
Geotechnical Engineering
Hydraulic & Hydrologic Engineering
Water Mgt (Project Operations Manual)
NEPA Compliance
Real Estate
Field Stations – Operation and Maintenance

10. SCHEDULE AND COST

a. Schedule.

The table below summarizes the schedule of reviews identified in this review plan:

Review Schedule	Start	Finish
SFWMD Intermediate Design Review	**9/10/2015**	**11/9/2015**
SFWMD Intermediate Design Submittal Complete	9/10/2015	9/10/2015
SFWMD QA Review	9/10/2015	9/18/2015
SFWMD Intermediate Design Submittal to USACE	9/21/2015	9/21/2015
Intermediate USACE Technical Review	**9/21/2015**	**11/6/2015**
USACE Review	9/21/2015	10/2/2015
USACE Provides Intermediate Comments	10/2/2015	10/9/2015
SFWMD Provides Responses to Comments	10/12/2015	10/23/2015
USACE Backcheck of Comments	10/26/2015	11/6/2015

Section 408 Permission Submittal Review	**TBD**	**TBD**
USACE Final Technical Review/District-led ATR		
USACE Provides Technical Review Comments		
USACE Provides RAIs from District-led ATR		
SFWMD Provides Responses to Comments & RAIs		
USACE Backcheck of Comments & RAIs		
USACE Preparation of Summary of Findings		
SFWMD submits Corrected Final P&S and DDR		
Routing of Summary of Findings for Approval		
Issuance of 408 Permit Package Determination		

b. Review Cost.

The estimated cost for the USACE intermediate and final technical reviews and the District-led ATR is $60,000.

ATTACHMENT A: APPROVED REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT B: PARTIAL LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms	Defined
AFB	Alternatives Formulation Briefing
ATR	Agency Technical Review
BCOES	Biddability, Constructability, Operability, Environmental, and Sustainability Review
CAP	Continuing Authorities Program
CERCAP	Corps of Engineers Reviewer Certification and Access Program
CY	Cubic Yards
DDR	Design Documentation Report
DQC	District Quality Control
DQCR	Discipline Quality Control Review
EC	Engineering Circular
EA	Environmental Assessment
ER	Engineering Regulation
EA	Environmental Assessment
ERDC-CERL	Engineer Research and Development Center – Construction Engineering Research Laboratory
ESA	Endangered Species Act
ETL	Engineering Technical Lead
FDEP	Florida Department of Environmental Protection
FONSI	Findings of No Significant Impacts
FSCA	Feasibility and Cost Sharing Agreement
FY	Fiscal Year
GRR	General Reevaluation Report
IEPR	Independent External Peer Review
LPP	Locally Preferred Plan
MCX	Mandatory Center of Expertise
MLLW	Mean Low Low Water
MSC	Major Subordinate Command
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
ODMDS	Ocean Dredged Material Disposal Site
OMB	Office of Management and Budget
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
P&S	Plans and Specifications
PED	Preconstruction Engineering and Design
PDT	Project Delivery Team
PM	Project Manager
PMP	Project Management Plan

Acronyms	Defined
PPA	Project Partnering Agreement
PQCR	Product Quality Control Review
QA	Quality Assurance
QCP	Quality Control Plan
QMP	Quality Management Plan
QMS	Quality Management System
RMC	Risk Management Center
RMO	Review Management Organization
RP	Review Plan
RTS	Regional Technical Specialist
SAJ	South Atlantic Jacksonville District Office
SAD	South Atlantic Division Office
SAR	Safety Assurance Review (also referred as Type II IEPR)
SME	Subject Matter Expert
USACE	U.S. Army Corps of Engineers
WRDA	Water Resources and Development Act

ATTACHMENT C: SFWMD PROJECT QUALITY CONTROL PLAN

The SFWMD currently implements a rigorous Design Review process utilizing the DrChecks system to capture all comments from various disciplines and enable proper closure of technical issues. At the beginning of the project planning or design phase, the SFWMD Project Manager will either establish or reconfirm with the SFWMD's Project Development Section what will be the composition of the Design Review Team (DRT) for the project. The DRT may consist of representatives from the SFWMD, USACE, Florida Department of Environmental Protection (FDEP), US Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FFWCC), local agencies and in many cases, independent consultants to supplement SFWMD staff.

As part of the Design Work Orders to outside consultants or in accordance with internal Design Section policy, each deliverable shall be reviewed by the Designer's Quality Control (QC) Officer prior to submittal for the DRT review. The QC officer shall be someone not directly involved in the preparation of the plans and specifications nor the project management responsibilities. The Consultant or SFWMD Project QC officer shall be charged with the responsibility of the Plan's implementation and documentation of current QC activities. The Design Submittal shall include a signed copy of the SFWMD's Quality Certificate of Compliance (see example on next page) with each Deliverable signifying that the internal QC was followed.

For this project, SFWMD will utilize internal staff for design and technical review. SFWMD staff performs review activities associated with electrical, instrumentation and control (I&C), geotechnical, hydraulics, hydrology, HVAC, plumbing, fire, mechanical, and structural disciplines, checking deliverables for compliance with SFWMD engineering guidelines, level of risk associated with the work, and operations and maintenance considerations. Project modeling tasks and deliverables will be reviewed and coordinated by the SFWMD's Project Development Section and the Hydrologic and Environmental Systems Modeling Section. The primary objectives of the DRT are to confirm that:

1. The engineering concepts are valid.
2. The recommended plan is feasible and will be safe and functional.
3. A reasonable opinion of probable construction cost estimate has been developed in accordance with Operation, Maintenance and Construction Engineering Bureau Procedures for Development of Opinions of Construction Costs (see Design Criteria Memorandum 7).
4. The approach to the engineering analysis is sound.
5. The submittal complies with SFWMD engineering submittal requirements.
6. The submittal complies with accepted engineering practice within the SFWMD and applicable Operation, Maintenance and Construction Engineering Bureau Design Criteria Memoranda (DCM) and Comprehensive Everglades Restoration Plan (CERP) Guidance Memoranda (CGM).

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Quality Certificate of Compliance

Project Name	Contract No./Work Order No.	Date
Deliverable Description		

_____ has completed preparation of the above referenced
Consultant Name

deliverable and herein submits it to the South Florida Water Management District (SFWMD) in accordance with the requirements of the referenced Work Order. It has been verified that this submittal includes all required components of the deliverable. Where required components are not submitted, an explanation and schedule for submitting the missing component(s) has been provided. Notice is hereby given that all quality control activities, appropriate to the level of risk and complexity inherent in the Project, have been completed. Compliance with established procedures as documented in the Project's Quality Control Plan submitted to the SFWMD has been verified.

This certification in no way relieves/replaces/changes/impacts/mitigates the contractural requirements to follow the consultant's own Quality Assurance/Quality Control (QA/QC) processes and procedures.

Consultant Quality Manager (Print)	Consultant Quality Manager (Signature)	Date
Consultant Project Manager (Print)	Consultant Project Manager (Signature)	Date

The reviews performed by the DRT shall be based on:

- SFWMD Standards for Construction of Water Resource Facilities – Design Details and Design Guidelines
- SFWMD Major Pumping Station Engineering Guidelines
- Operation, Maintenance and Construction Engineering Bureau Design Criteria Memoranda
- Operation, Maintenance and Construction Engineering Bureau Submittal Requirements
- CERP Guidance Memoranda
- Applicable US Army Corps of Engineers requirements
- Applicable Florida Department of Transportation (FDOT) Standards
- Other Applicable National and Industry Design Codes

The intent of each Technical Review is to identify fatal flaws to the design or items that are in conflict with SFWMD or other applicable standards and guidelines. The DRT members are discouraged from commenting on items that are "designer preference" in nature. The Technical Review shall include an evaluation of the level of completion for the respective submittal according to the Detailed Description of Plan Submittal Requirements (see Operation, Maintenance and Construction Engineering Bureau Submittal Requirements).

Following completion of the Technical Review process, a Technical Review Briefing (TRB) is conducted where the project submittal is summarized to SFWMD Management staff. The SFWMD Project Manager presents the project, including any changes from the previous submittal, results of the Technical Review and how issues were resolved, cost estimate and estimated construction schedule, procurement strategy and planned path forward. Once all reviews TRBs are completed, a Certificate of Technical Review Completion form is prepared and signed by the appropriate parties signifying that the reviews were done appropriate to the level of risk and complexity inherent in the Project. During the Technical Review, compliance with established policy, principles and procedures, utilizing justified and valid assumptions, were verified including a review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; constructability and operability; reasonableness of the results, including whether the product meets the customer's needs; and consistency with law and existing SFWMD and USACE policies. The Certificate includes a statement that the Technical Review was accomplished by an independent team made up of personnel from the SFWMD, USACE, other agencies and/or external consultant staff.

Attachment D: SFWMD Engineering and Construction Design Review Process

This section summarizes the Engineering and Construction review process, review phases, and timeframes for review by the Design Review Team (DRT) which may include participants from a Full Service Engineering Consultant for large project engineering activities. Each project may have one planning and one or more design phases associated with project plan and technical specification development. The Technical Review process begins with the submittal of each planning or design phase deliverable as presented below, including Engineering During Construction.

Establishment of Project Design Technical Review Team

At the beginning of the project planning or design phase, the Project Manager will either establish or reconfirm with the Project Development Section Representative the composition of the Design Review Team (DRT) for the project. The DRT may consist of representatives from the South Florida Water Management District (District), US Army Corps of Engineers (USACE) (member for all USACE projects), Florida Department of Environmental Protection (FDEP), US Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FFWCC), local agencies and in many cases, independent consultants to supplement District staff.

The District has utilized full service consulting firms to provide engineering discipline expertise to augment the District staff review efforts for technical design deliverables. These services are typically specific to the fields of architecture, electrical, instrumentation and control (I&C), geology, geotechnical, hydraulics, hydrology, HVAC, plumbing, fire, mechanical, and structures and involve reviewing the design for conformance to industry standards, checking the calculations, etc. District staff performs review activities associated with checking deliverables for compliance with District engineering guidelines, risk analysis and operations and maintenance considerations. Project modeling tasks and deliverables will be reviewed and coordinated by Project Development and the Hydrologic and Environmental Systems Modeling Section. A modeling request form should be filled out by the Project Manager to request reviews of modeling tasks and these types of deliverables.

The District has established Points of Contact within each Bureau for the various resource areas who provide membership on the Project Design Review Teams. These Points of Contact are able to provide staff members who will represent their Bureau during review of the project deliverables. The Project Development Section Representative will utilize the District Points of Contact to request membership on each Project Design Review Team. Replacement team members will be requested for ineffective team member participation.

The Project Development Section Representative will manage all aspects of the DRT from contract management of auxiliary staff, to logistics involved with delivery of copies of each deliverable to be reviewed, to issue resolution of lingering, unresolved review comments. As services are difficult to actually predict, general budgetary guidelines have been developed based on deliverable type, scale of project, and review time duration for both external ($) and internal (hours) review assistance. This guidance is updated periodically. The Project Manager should utilize these guidelines in development of the project budget to ensure that sufficient funds are available to perform the expected deliverable reviews. Project schedule

should also be discussed with the Project Development Section Representative. The Project Manager is encouraged to schedule the project deliverables as soon as the expected delivery dates are known. The Project Development Section will make every effort to schedule reviews to avoid impacting project schedules. There may be instances, however, when District priorities may require adjustment of review schedules.

The primary objectives of the DRT are to confirm that:

7. The engineering concepts are valid.
8. The recommended plan is feasible and will be safe and functional.
9. A reasonable opinion of probable construction cost estimate has been developed in accordance with Engineering and Construction Bureau *Procedures for Development of Opinions of Construction Costs* (see Design Criteria Memorandum 7).
10. The approach to the engineering analysis is sound.
11. The submittal complies with District engineering submittal requirements.
12. The submittal complies with accepted engineering practice within the District and applicable Engineering and Construction Bureau Design Criteria Memoranda (DCM) and Comprehensive Everglades Restoration Plan (CERP) Guidance Memoranda (CGM).

Technical Review Documents

The type of documents intended to be reviewed under the Technical Review process includes but is not limited to the following:

- Feasibility Study
- Reconnaissance Study
- Conceptual Design Study
- Project Implementation Report (PIR)
- Geotechnical Report
- Hydraulic and Hydrologic Report
- Water Budget Report
- Survey
- Design Documentation Report (DDR)
- Preliminary Design
- Intermediate Design
- Final Design
- Corrected Final Design (Issued for Bid)
- Technical Memorandum
- Opinion of Probable Construction Cost (OPCC)
- Construction Schedule
- Project Operations Manual (POM)
- Water Control Plan (WCP)
- Operation, Maintenance, Repair, Rehabilitation and Replacement (OMRR&R) Manual
- Monitoring Plan
- Permit Supporting Documentation
- Response to Construction Submittal

For federal projects that the SFWMD is designing, it is especially important to have the USACE – Jacksonville District participate in the technical review of the design deliverables in order to provide feedback on the following:

- Technical design is in conformance with federal guidelines (e.g. Engineering Manuals, Engineering Regulations, etc.)
- The project is in accordance with the Project Implementation Report (PIR)
- Obvious areas that may not qualify for work-in-kind crediting are identified

Prior to submittal of a project deliverable to Project Development, the Project Manager is requested to complete the Technical Review Release form. By completing the Review Release form, the Project Manager certifies that the project deliverable meets the task requirements, is complete, has the correct number of copies, is in the correct format, identifies the Documentum location of stored project files, identifies the project charge codes, includes the designers quality assurance/quality certification form, explains any unusual circumstances, and is ready to be sent to the DRT.

Technical Review Summary

The reviews performed by the DRT shall be based on:

- District Standards for Construction of Water Resource Facilities – Design Details and Design Guidelines
- District Major Pumping Station Engineering Guidelines
- Engineering and Construction Bureau Design Criteria Memoranda
- Engineering and Construction Bureau Submittal Requirements
- CERP Guidance Memoranda
- Applicable US Army Corps of Engineers requirements
- Applicable Florida Department of Transportation (FDOT) Standards
- Other Applicable National and Industry Design Codes

The intent of each Technical Review is to identify fatal flaws to the design or items that are in conflict with District or other applicable standards and guidelines. The DRT members are discouraged from commenting on items that are “designer preference” in nature. The Technical Review shall include an evaluation of the level of completion for the respective submittal according to the Detailed Description of Plan Submittal Requirements (see Engineering and Construction Bureau Submittal Requirements). The comment and response forum for each Technical Review shall be through the Design Review and Checking System (DrChecks). DrChecks is available through PROJect extraNet (ProjNet) which is a web based service that allows the secure exchange of design and construction information among authorized business partners in the context of specific business processes. Comments from the Technical Reviews shall be made available to other review teams, including the USACE Technical Review teams and the Independent External Peer Review (IEPR) teams.

Technical Review Process

In general, the Design Engineer will submit a deliverable to the District. The District will send copies of the deliverable to the DRT as well as a link to the District’s Documentum database site where the information can be found electronically. Depending on the deliverable, the DRT will have either ten (10) or fifteen (15) business days from the time the link is transmitted to perform the review. The Project Manager and Design Engineer will have ten (10) or fifteen

(15) business days to respond to the comments in DrChecks. The DRT shall backcheck the responses and assist the District in resolving non-concurred issues within another ten (10) business days. The DRT shall adhere to the review and backcheck times given for each deliverable. In the event of extenuating circumstances, the DRT shall notify the District Project Development Section Representative for resolution.

The District will provide all DRT members with a 3-month look ahead schedule each month to assist the DRT with planning of staff availability. This schedule is a continuously changing document. As such, it is intended as a guide only and the DRT members should be prepared for any last minute changes that may arise due to circumstances beyond the District's control.

As each deliverable is submitted by the Design Engineer, the District will have a predetermined time to review the submittal and provide comments back to the Design Team using the DrChecks review tool. The DRT shall participate in the reviews and assist the District as needed. The DRT may be required to perform, but not be limited to, the following general functions:

- Attend meetings with the District and Design Engineer to review the Project and establish criteria
- Perform a technical review of the project plans, technical specifications, reports and calculations by senior level engineering staff with the appropriate experience in the fields required for the project
- Review and become familiar with District Standards, including updates, and other applicable design standards

The DRT is responsible for obtaining updates of, and keeping current with the following documents:

- District Standards for Construction of Water Resource Facilities – Design Details and Design Guidelines (latest edition, including updates),
- District Major Pumping Station Engineering Guidelines (latest edition, including updates),
- Engineering and Construction Bureau Design Criteria Memoranda (latest edition, including updates),
- Engineering and Construction Bureau Submittal Requirements (latest edition, including updates),
- CERP Guidance Memorandums (latest edition, including updates), and
- Other guidelines and standards as applicable.

DDR Technical Review

Following submittal of the DDR by the Design Engineer, the District will provide the DRT with electronic and hard copies of the DDR as agreed upon by each member. The District will also provide a link to the Documentum site containing the DDR. The DRT shall provide review comments in DrChecks on the DDR within ten (10) business days following receipt of the Documentum link. The review of the DDR shall look for and identify conflicts with design standards or fatal flaws, if any, to the approach, calculations, evaluations, conceptual plans, and any other design information provided in the DDR. Typically, the review performed by the Consultant DRT will not include the Opinion of Probable Construction Costs (OPCC), operations plan, modeling, or survey. These items will typically be reviewed by District members of the DRT.

Development of the Basis of Design Report will generally consist of the following activities:

1. Site Investigations.
2. Design Criteria Development.
3. Hydrology and Hydraulic Analysis.
4. Project Layout and Evaluation of Options.
5. Project Feature Design Development.
6. Opinion of Probable Construction Cost Based on Conceptual Designs.
7. Engineering Analyses to Support Designs.

A more detailed description of the DDR requirements for the Design Engineer can be found in the Engineering and Construction Bureau Submittal Requirements.

Once the comment period is closed, the Design Engineer will have ten (10) business days to respond to the comments generated by the DRT. During this time, the DRT shall be available to answer any questions from the Design Engineer regarding the comments and work closely with the District to resolve outstanding issues. At the completion of the ten (10) day response period, the DRT members shall backcheck the responses provided by the Design Engineer in DrChecks. If the Design Engineer properly addressed the comment, the DRT member shall close the comment. If the comment was not properly addressed, the DRT member shall work with the Design Engineer through the District Project Manager to resolve the issue within ten (10) business days. The District reserves the right to close a comment on behalf of the DRT if the comment is not closed in a timely fashion. Upon closure of all comments, the Project Manager shall conduct a Technical Review Briefing for District Management to discuss the Project Features, issues resolved during the review and path forward.

Following the end of the backcheck period, the Consultant DRT Manager shall submit to the District within five (5) business days a brief summary of the main issues encountered and resulting resolution.

Preliminary Design Technical Review

Following submittal of the Preliminary Design by the Design Engineer, the District will provide the DRT with electronic and hard copies of the Preliminary Design Report as agreed upon by each member. The Preliminary Design Report will typically include a narrative, design calculations, plans, list of proposed specifications, opinion of construction costs and construction schedule for the Project and related work prepared by the Design Engineer and submitted to the District for review. The District will also provide a link to the Documentum site containing the Preliminary Design Report. The DRT shall provide review comments in DrChecks on the Preliminary Design Report within ten (10) business days following receipt of the Documentum link. The review of the Preliminary Design Report shall look for and identify conflicts with design standards or fatal flaws, if any, to the approach, calculations, evaluations, conceptual plans, and any other design information provided in the Preliminary Design Report. Typically, the review performed by the Consultant DRT will not include the Opinion of Probable Construction Costs (OPCC), operations plan, modeling, or survey. These items will typically be reviewed by District members of the DRT. The DRT shall not comment on items that are “designer preference” in nature.

The Preliminary Design will generally consist of the following activities:

1. Supplemental Site Investigations

2. Finalize Modeling
3. Preparation of Project Layout and Features
4. Preliminary Design of Project Features
5. Preliminary Design Calculations
6. Develop Draft Project Operations Manual (POM)
7. Preparation of Preliminary Plans
8. Preparation of Technical Specification Outline
9. Updated Opinion of Probable Construction Cost
10. Updated Construction Schedule
11. Updated Engineering Report to reflect Preliminary Design

A more detailed description of the Preliminary Design Report requirements for the Design Engineer can be found in the Engineering and Construction Bureau Submittal Requirements. The response and backcheck process will follow the same procedures as identified in the DDR Technical Review above. Additionally, the Design Engineer will receive from the District five (5) business days after the comment period has closed a set of consolidated, red line marked up Plans and Specifications as applicable compiled by the Project Development Quality Control Engineer. Each plan sheet with mark ups is stamped with lines to identify the comment initiator and date of comment. The stamp also includes lines to be filled out by the Design Engineer with corrections by. These supplemental mark ups will be returned by the Design Engineer with the next submittal with indications of how each mark up was addressed (changes highlighted in yellow and exceptions to the comments noted in another ink color other than red). As part of the next deliverable review, the Quality Control Engineer will revisit the previous submittal's mark ups and the corrections made or notes provided by the design engineer. Once the drawing is checked, the Quality Control Engineer or his delegate will initial and date the checked by line of the stamp area. Upon closure of all comments, the Project Manager shall conduct a Technical Review Briefing for District Management to discuss the Project Features, issues resolved during the review and path forward.

Following the end of the backcheck period, the Consultant DRT Manager shall submit to the District within five (5) business days a brief summary of the main issues encountered and resulting resolution.

Intermediate Design Technical Review

Following submittal of the Intermediate Design by the Design Engineer, the District will provide the DRT with electronic and hard copies of the Intermediate Design Report as agreed upon by each member. The Intermediate Design Report will include a narrative, design calculations, plans, list of proposed specifications, opinion of construction costs and construction schedule for the project and related work prepared by the Design Engineer and submitted to the District for review. The District will also provide a link to the Documentum site containing the Intermediate Design Report. The DRT shall provide review comments in Dr Checks on the Intermediate Design Report within fifteen (15) business days following receipt of the Documentum link. The review of the Intermediate Design Report shall look for and identify conflicts with design standards or fatal flaws, if any, to the approach, calculations, evaluations, conceptual plans, and any other design information provided in the Intermediate Design Report. Typically, the review performed by the Consultant DRT will not include the Opinion of Probable Construction Costs (OPCC), operations plan, modeling, or survey. These items will typically be reviewed by District members of the DRT. The DRT shall not comment on items that are "designer preference" in nature.

The Intermediate Design Plans and Specifications shall generally consist of the following activities:

1. Finalize Site Investigations
2. Finalize Project Layout and Features
3. Detailed Design of Project Features
4. Updated Draft Project Operations Manual
5. Draft Geotechnical and Hydro-meteorologic Monitoring Plan Template
6. Summary of DCM Compliance and Results
7. Preparation of Plans and Specifications for Bidding/Construction
8. Updated Opinion of Probable Construction Cost
9. Updated Construction Schedule
10. Design Calculations (civil, electrical, mechanical, structural)
11. Updated Engineering Report to reflect Intermediate Design

A more detailed description of the Intermediate Design Report requirements for the Design Engineer can be found in the Engineering and Construction Bureau Submittal Requirements. The response and backcheck process will follow the same procedures as identified in the DDR Technical Review above except the time allowed for both providing comments and responding to comments is fifteen (15) business days. Additionally, the Design Engineer will receive from the District five (5) business days after the comment period has closed a set of consolidated, red line marked up Plans and Specifications from the Project Development Quality Control Engineer as described previously in the Preliminary Design Phase. These mark ups will be returned by the Design Engineer during the backcheck period with indications of how each mark up was addressed.

Following the end of the backcheck period, the Consultant DRT Manager shall submit to the District within five (5) business days a brief summary of the main issues encountered and resulting resolution.

Final Design Technical Review

Following submittal of the Final Design by the Design Engineer, the District will provide the DRT with electronic and hard copies of the Final Design Report as agreed upon by each member. The Final Design Report will include a narrative, design calculations, plans, list of proposed specifications, opinion of construction costs and construction schedule for the Project and related work prepared by the Design Engineer and submitted to the District for review. The District will also provide a link to the Documentum site containing the Final Design Report. The DRT shall provide review comments on the Final Design Report within fifteen (15) business days following receipt of the Documentum link. The review of the Final Design Report shall look for and identify conflicts with design standards or fatal flaws, if any, to the approach, calculations, evaluations, conceptual plans, and any other design information provided in the Final Design Report. Typically the review performed by the Consultant DRT will not include the Opinion of Probable Construction Costs (OPCC), operations plan, modeling, or survey. These items will typically be reviewed by District members of the DRT. The DRT shall not comment on items that are “designer preference” in nature.

The Final Plans and Specifications shall generally consist of the following activities:

1. Final Design of Project Features
2. Updated Engineering report to reflect Final Design

3. Completed Draft Project Operating Manual
4. Final Geotechnical and Hydro-meteorologic Monitoring Plan Template
5. Final Design Calculations
6. Final Plans and Specifications for Bidding/Construction, subject to Technical Review comments
7. Final Opinion of Probable Construction Cost
8. Final Construction Schedule

A more detailed description of the Final Design Report requirements for the Design Engineer can be found in the Engineering and Construction Bureau Submittal Requirements. The response and backcheck process will follow the same procedures as identified in the DDR Technical Review above except the time allowed for both providing comments and responding to comments is fifteen (15) business days. Additionally, the Design Engineer will receive from the District five (5) business days after the comment period has closed a set of consolidated red line marked up Plans and Specifications from the Project Development Quality Control Engineer as described previously in the Intermediate Design Phase. These mark ups will be returned by the Design Engineer during the backcheck period with indications of how each mark up was addressed. Upon closure of all comments, the Project Manager shall conduct a Technical Review Briefing for District Management to discuss the Project Features, issues resolved during the review and path forward.

Following the end of the backcheck period, the Consultant DRT Manager shall submit a brief summary to the District within five (5) business days of the main issues encountered and resulting resolution.

Corrected Final Design Technical Review

Prior to submittal of the Corrected Final Design Report, the Design Engineer will submit complete sets of plans and technical specifications for review by the DRT. The District may hold a review workshop to verify that the Corrected Final Plans and Technical Specifications have been properly addressed based on the Final comments. The review workshop may be one day or multiple days depending on the size of the project and volume of the deliverables. Two or three key members of the Consultant DRT team (i.e. Structural, Geotechnical, and/or Site/Civil) shall attend the final review workshop. Following the workshop and resolution of all outstanding issues, the Consultant DRT Manager shall submit to the District within five (5) business days a brief statement that all comments have been addressed.

Miscellaneous Deliverables Technical Review

Following submittal of any other deliverables by the Design Engineer as identified in the Technical Review Documents section above and not already addressed, the District will provide the DRT with electronic and hardcopies of the deliverable. The deliverable may include a narrative, design calculations, plans, list of proposed specifications, opinion of construction costs and construction schedule, study findings, recommendations, modeling results or other engineering related data for the Project and related work prepared by the Design Engineer and submitted to the District for review. The District will also provide a link to the Documentum site containing the deliverable. The DRT shall provide review comments on the deliverable within ten (10) business days following receipt of the Documentum link. The review of the deliverable shall look for and identify conflicts with design standards, applicable codes, standard practice, or fatal flaws, if any, to the approach, findings,

calculations, evaluations, conceptual plans, and any other information provided in the deliverable. The DRT shall not comment on items that are “designer preference” in nature.

The response and backcheck process will follow the same procedures as identified in the DDR Technical Review above.

Following the end of the backcheck period, the Consultant DRT Manager shall submit a brief summary to the District within five (5) business days of the main issues encountered and resulting resolution.

Continuity of Design Review Team Members

It is imperative that there be continuity in all of the Design Review Team members for both Consultant and District DRT members. Once assigned to a project, the same Design Review Team shall be utilized throughout the length of the project. If there needs to be a change in the staff involved, the District Point of Contact for that resource area or Consultant DRT Manager shall contact the District Project Development Section Representative for resolution.

Conclusion of Design Phase and Transfer to Procurement and Construction

At the conclusion of the Design Phase for the Project, one last Technical Review Briefing will be held. The Project Development Section Representative will prepare and sign the Completion of and the Certification of Independent Technical Review forms and provide them to the Project Manager for inclusion in the project file.

Comments

1. The "pre-408 design" and "pre-coordination" labels appears to be inappropriate, unnecessary, and a potential source of confusion. Suggest deleting or revising using plain language, e.g. "pre-application work product review".

2. A list of the Federal projects that will be modified or may be adversely affected by the proposed water storage facility should be listed.

3. The documents indicated for review are "Plans and Specifications (P&S) and Design Documentation Report (DDR)". Will Federal project Water Control Manuals or other reports require updates, and therefore subject to review? If so, they should be listed.

4. The funding source (I assume the applicant) for this review should be indicated.

From EC 1165-2-216:

(1) Step 1: Pre-Coordination. Early coordination between USACE, the requester and/or non-federal sponsor, if applicable, is strongly recommended because it will aid in identifying potential issues, focusing efforts, minimizing costs, and protecting sensitive information. Districts shall ensure requesters are provided a hardcopy or electronic copy of this EC.

(2) Step 2: Written Request. The purpose of this step is to document the initiation of the Section 408 process. Information from this step will be used by the district to determine documentation and approval requirements.
(a) All requests for Section 408 permission must be submitted in writing to the District Commander of the appropriate USACE district office having jurisdiction over the USACE project that would be impacted by the alteration. Each district has the flexibility to determine the format in which this written request is submitted; however,
(b) The written request must include:

i. a complete description of the proposed alteration including necessary drawings, sketches, maps, and plans that are sufficient for the district to make a preliminary determination as to the location, purpose and need, anticipated construction schedule, and level of technical documentation needed to inform its evaluation. Detailed engineering plans and specifications are not required at Step 2, but could be submitted at the same time if available;
ii. a written statement regarding whether the requester is also pursuing authorization pursuant to Sections 10/404/103 and, if so, the date or anticipated date of application/preconstruction notification submittal;
iii. information regarding whether credit under Section 221of the Flood Control Act of 1970, as amended, or other law or whether approval under Section 204(f) of WRDA 1986 is being or will be sought;
iv. a written statement of whether the requester will require the use of federally-owned real property or property owned by the non-federal sponsor; and,
v. a written statement from the non-federal sponsor endorsing the proposed alternation, if applicable.

Appendix E: Consultant Quality Control Plan

Quality Control Manual

Date	Description	Approved By
2007-08-22	GENERAL REVISION	[redacted]
2010-09-01	UPDATED AND REORGANIZED	[redacted]
2015-01-01	UPDATED Q5 REVIEW POLICY AND LOGO	[redacted]

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Table of Contents

10.1 INTRODUCTION

10.1.1 Purpose

This document describes the Burns &McDonnell Quality Control System.

10.1.2 General Company Information

Burns & McDonnell is a full-service engineering, architecture, construction, environmental and consulting solutions firm, providing services in major market sectors such as energy, infrastructure, process, industrial, foods and pharmaceuticals, electric transmission and distribution, environmental, and others. The company operates out of the headquarters in Kansas City, MO, and regional office and jobsite locations located throughout the world.

10.2 QUALITY PROGRAM

10.2.1 Quality Policy

Our quality policy is to provide services to our clients that meet or exceed all contractual and regulatory requirements, and with an additional focus on internal and external customer expectations. All Burns & McDonnell employee-owners and contractors are expected to perform their responsibilities in accordance with applicable quality requirements, and to strive for customer satisfaction and continuous improvement. Quality, integrity, and personal accountability are core values at Burns & McDonnell.

The effective implementation of the QC Program supports the quality policy and also serves to potentially reduce rework expenses and increase the consistency of our services.

10.2.2 Quality Program Documents

10.2.2.1 Quality Control Manual:

The Quality Control Manual (this document) provides requirements and guidance with regard to the content and implementation of the Burns & McDonnell Quality Control Program. All employee-owners should become knowledgeable of the content of the Quality Control Manual as it applies to their areas of responsibility.

The manual is available to all personnel on the Company intranet as Chapter 10 of the Company Policies and Procedures Manual.

10.2.2.2 Report Preparation Guide:

The Report Preparation Guide provides requirements and guidance for maintaining the overall quality of reports, to give reports a uniform "Burns & McDonnell look", and to streamline report

production. Another goal is to increase the value of our reports to our Client by effectively communicating the results of our studies in a way that enhances the acceptance and credibility of our reports.

This Guide is to be used for all reports that are produced for a Client, unless the Client dictates different standards or formats. "Letter" reports for Clients are also covered by this Guide. Reports or memoranda produced for use within the Company are considered to be outside the scope of this Guide, though many of the principles discussed apply to these documents as well.

The types of reports subject to this Guide are generally bound reports and include, but are not limited to, the following:

Master plan reports	Siting studies
Preliminary design reports	Feasibility studies
Utility rate studies	Economic studies
Environmental assessments	Engineering reports
Waste management work plans	

This manual is available to all personnel on the Company intranet as Chapter 13 of the Company Policies and Procedures Manual.

10.2.2.3 Design Standards Manual:

The Design Standards Manual contains policies and standards to be used by all personnel in the preparation of design documents. It is intended as an instructional aid for beginning drafters, engineers, and architects, and a reference for experienced personnel.

These standards are to be used on all projects unless otherwise required by the Client and approved by the GP/RO Quality Manager. Since a set of contract drawings usually represents detailing efforts from several disciplines and departments, and sometimes from more than one Global Practice or Regional Office, adherence to standards is essential for uniformity and quality.

This manual is available to all personnel on the Company intranet as Chapter 12 of the Policies and Procedures Manual.

10.2.2.4 Construction Documents and Specifications Manual:

The purpose of this manual is to aid architects and engineers in the preparation of project Contract Documents. Contract Documents are defined as all of the written and graphic

documents prepared or assembled by the engineer/architect for communicating the design and administration of the construction contract. They include the following categories, each of which is discussed in detail throughout this manual:

- Bidding Requirements
- Contract Forms
- Conditions of the Contract
- Specifications
- Drawings
- Addenda
- Contract Modifications

The construction documents and specifications described in this manual apply to various types of project delivery provided by Burns and McDonnell. Some of these include:

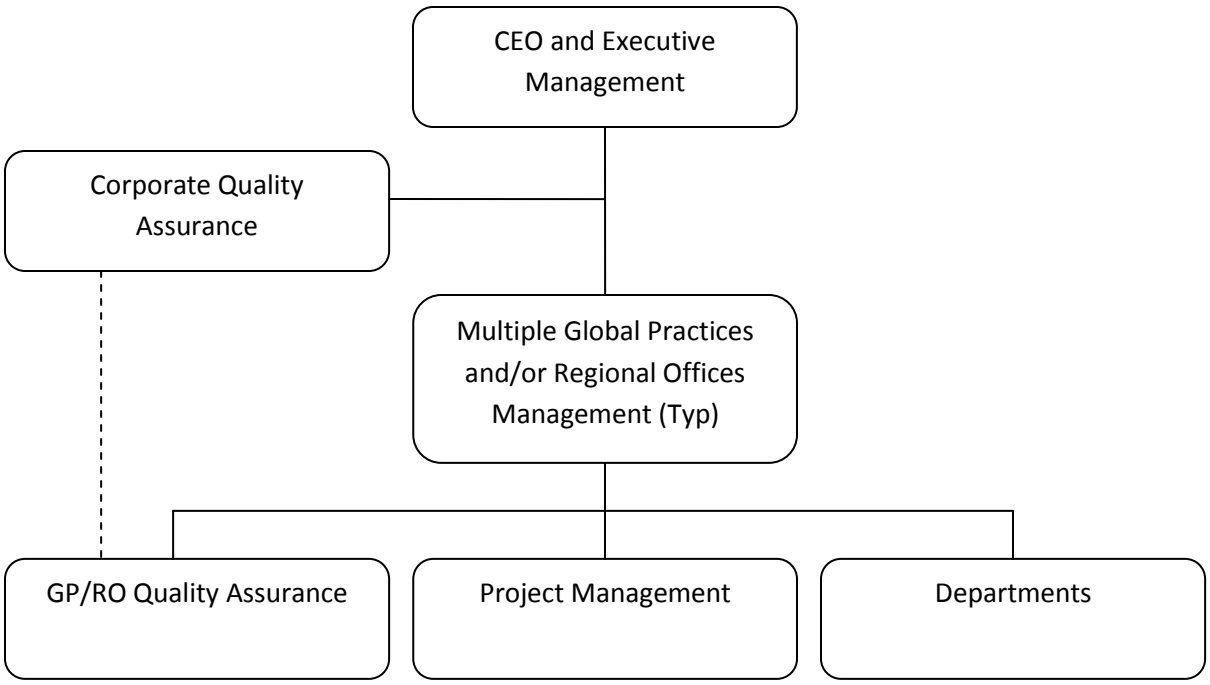
- Design-Bid-Construct
- Design-Build
- Construction Management
- Consortium or Contractor Client

General guidelines for quality control reviews to be performed on construction documents and specifications are discussed in this manual.

This manual is available to all personnel on the Company intranet as Chapter 14 of the Policies and Procedures Manual.

10.2.3 Organizational Structure

Burns & McDonnell is comprised of multiple Global Practices (business units) that operate out of multiple offices, with the headquarters located in Kansas City, MO. The general QC organizational structure for the corporation is represented in the following diagram.



10.2.4 Roles and Responsibilities

The following are typical roles and responsibilities for various Burns & McDonnell organizations, personnel, and positions with regard to activities effecting quality.

Chief Executive Officer (CEO)

The CEO is the senior executive in charge of making policy decisions related to the quality of services performed by or on behalf of Burns & McDonnell. The CEO defines the overall quality policy and promotes a culture of conformance to requirements, customer satisfaction, and continuous improvement. The CEO appoints the Director of Quality Assurance to coordinate development, implementation, and maintenance of the QC Program.

Director of Quality Assurance

The Director of Quality Assurance is responsible for developing and maintaining the QC Program and associated training materials, verifying implementation of the QC Manual and supporting documents through project performance assessments and other activities, and facilitating continuous improvement activities. The Director of Quality Assurance reports to executive management.

Global Practice (GP) and Regional Office (RO) Management

GP/RO management is responsible for the quality of services produced by or on behalf of the global practice or regional office. GP/RO management promotes the development of quality processes and procedures specific to the GP/RO to supplement the QC Program. GP/RO management is responsible for

the implementation of the QC Program within the GP or RO. GP/RO management appoints the GP/RO Quality Manager.

Global Practice (GP) Quality Manager

The GP Quality Manager is appointed by the GP Manager as the person who is responsible for monitoring the implementation of the QC Program within the GP and overseeing the development of specific GP level processes and procedures, as needed. The GP Quality Manager also consults with project managers and department managers in assigning the proper personnel to projects.

The Regional Office (RO) Quality Manager

The RO Quality Manager is appointed by the RO Manager as the person who is responsible for monitoring the implementation of the QC Program within the regional office and overseeing the development of specific RO level processes and procedures, as needed. The RO Quality Manager also consults with project managers and department managers in assigning the proper personnel to projects, and assisting GP Quality Managers with keeping abreast of quality issues encounter in the regional offices that are specific to their GP.

Department Management

Department Managers are responsible for developing trained and qualified personnel to be assigned to projects. The manager of each department is responsible to see that their personnel are aware of the organizational quality objectives of which their activities may support. Department Managers are also responsible for creating and maintaining procedures for use by their department when necessary in order to supplement existing corporate or GP/RO procedures.

Project Management

Project Management is responsible for the quality of services performed by Burns & McDonnell on company projects, including services performed by company employees, or by sub-consultants, suppliers, and subcontractors. Project Management may include various titles such as Project Director, Program Manager, Project Manager, Engineering Manager, Procurement Manager, Construction Manager, Site Manager, etc.

10.2.5 Standard of Care

Nothing in this Manual is intended to raise or alter the legal standard of care for Burns & McDonnell or any of its employees in the performance of professional services, and nothing in this Manual shall be interpreted to the contrary.

10.3 PROJECT QA/QC – REPORT AND STUDY TYPE PROJECTS

10.3.1 General

The term report, as used in the quality control procedures provided in this section, is intended to include any document that communicates the results of a study or is a deliverable under a project agreement with a client, other than those representing detailed engineering design or specifications. This includes, but is not limited to, sectional reports, letter reports, bound documents, permit applications, and planning documents. These quality control procedures should be followed for every non-design project resulting in deliverables to a client, unless exception is obtained previously from the GP or RO Quality Control Manager for the global practice or regional office owning the project.

10.3.2 Organization and Responsibilities

10.3.2.1 Project Team

PMs have primary responsibility for the quality of studies and associated reports and for ensuring that those reports are developed following the guidelines contained in this Report Preparation Guide as closely as possible. The PM for each report project is also responsible for ensuring that the quality review procedures described in this section are followed. Sufficient time should be provided in the schedule for each project to allow for completion of required quality reviews after the project is initiated, once preliminary results and findings are determined, and prior to the issuance of the report.

Each individual involved in development of reports should be familiar with these quality review requirements. Only through the combined efforts of all individuals assigned to the project can a quality report be provided within time and budget constraints.

All individuals having input into the report development process should realize their results and work products may be presented at public forums (such as city council meetings), submitted to governmental agencies for action, or otherwise made available to the public for scrutiny. Therefore, reports should be accurate and professional in appearance, and should provide conclusions and recommendations in a clear and easily understood manner.

10.3.2.2 Quality Review Team

The independent quality review team for the project should be identified at the beginning of a project. The Quality Control Manager for the global practice or regional office owning the project assigns the Quality Review Manager and the other members of the quality review team, with the concurrence of the corresponding Global Practice Manager or Regional Office Manager, and the

PM. The quality review team may be one individual or several, depending on the nature, size, and duration of the project, as well as the number of disciplines involved. If only one individual is assigned to complete the quality review on a project, that person is considered the Quality Review Manager for the project. The individual(s) assigned as quality reviewer(s) for the project should be familiar with the type of work for which review is required. However, those assigned as quality reviewers should be independent of the project team; that is, they should have no responsibilities on the project other than conducting the quality reviews. The quality reviewers should be informed of the overall objectives of the project, as well as the schedule and budget for the quality review process.

Consideration should be given to including the client coordinator or an individual having had a longstanding relationship with the client as part of the quality review team.

10.3.3 Q Reviews

10.3.3.1 Summary

The first quality review is the Q-1R review, documented on Form TS-C-12, Preliminary Review, which should be completed before substantial work has been performed on the project. The Q-2R review is documented on Form TS-C-13, Intermediate Review, and should occur after the initial analysis has been completed and preliminary results and/or conclusions have been developed. The Q-3R review should be performed after the completion of the initial draft report, but prior to the printing of the report for submission to the client. The Q-3R review is documented on Form TS-C-14, Final Review. Prior to requesting the Q-3R review, the PM should have read the complete report and had any appropriate revisions and/or corrections made. A report submitted for Q-3R review should be complete, i.e., missing no components (including the cover letter, Table of Contents, and Executive Summary). The PM should not request that the Q-3R review be performed until the report is ready to be submitted to the client. Note that it is not necessary that all Yes/No questions on the three Q-(X)R review forms be answered positively. It is possible that, at the time the quality review is performed, certain items may not have been completed. However, explanations should be provided for all negative answers. In addition, each form provides a section for quality reviewer comments, with an adjacent area for the PM to respond to those comments. The Comments area should be used by the quality reviewer to note any concerns or issues arising from the quality review that are not covered by the questions on the form. Verification by the quality reviewer that all comments were satisfactorily addressed is required.

The Q-(X)R forms may be completed electronically or on paper; however, if done electronically, a hard copy should be printed for signatures and filing in the project file. Electronic templates and printable files for the three Q-(X)R forms are located on the Burns & McDonnell Intranet. Links to the electronic templates are provided in the description of each review below.

10.3.3.2 Q-1R Review

The purpose of the Q-1R review is to confirm that the project administration, e.g. agreement, scope, budget, schedule, and project set-up, has been finalized, and the PM has communicated this information to the project staff and quality review team. It is extremely important at the beginning of the project that the key parties involved in the project understand the client's requirements and the issues being analyzed. The Q-1R review also validates the availability of data and the planned approach to the work. The need for assistance from subcontractors, CAD, and the Legal Department is verified. Because the Q-1R review is a project-level review, only one Q-1R review is required for each project, whether there is one deliverable/report, multiple deliverables/reports, or no deliverables (projects that are pure consulting). The Q-1R review should be used to confirm that Q-2R and Q-3R reviews are not required for pure consulting projects. The basis for this conclusion should be documented on the Q-1R form.

The Q-1R review should be performed after the agreement has been executed and the initial kickoff meeting has been held with the project staff. Consideration of quality requirements for a project only at the end often causes significant amounts of rework and results in budget and schedule overruns. Signs of potential problems that could develop in the project may be detected earlier in the project during a Q-1R review. In cases in which a project kick-off meeting is held with the client, it may be beneficial to conduct the Q-1R review after that meeting.

The PM is responsible for providing the necessary information to the Quality Review Manager for the Q-1R review.

The Q-1R form (TS-C-12) is to be completed by the Quality Review Manager assigned to the project. The Q-1R form includes a checklist and space for specific comments and responses covering the various aspects of the Q-1R review. The first page of the Q-1R form defines general project information and includes a list of questions pertaining to the report. These questions address the project scope, budget, schedule, approach, quality control, and administration. The Quality Review Manager should indicate an answer for each question and provide brief comments, as appropriate. The second page (and additional pages, if needed) provides for specific

comments from the Quality Review Manager and responses from the PM. Both the Quality Review Manager and the PM should sign the Q-1R form after its completion.

10.3.3.3 Q-2R Review

The Q-2R review is intended to be an evaluation of the project to date. The Q-2R review should take place when the analysis is complete, but prior to the development of the first draft of the report. A quality review session should be held with the PM at this time to discuss issues such as the scope of work, adequacy of the data collected to date, the methods of analysis being used, and the proposed outline for the report. Completion of the Q-2R review is to check that the methods being used and the data collected are appropriate to produce valid analyses and results that are consistent with the client's objectives. As part of the Q-2R review, the quality reviewer may check key calculations, evaluate major assumptions for reasonableness, test results against common rules of thumb, and complete other types of reviews.

A separate Q-2R review should be completed by each of the disciplines required in the study. For example, forms may be completed by designers, financial analysts, and environmental disciplines to check that the study has met scope requirements of the project. These quality reviews may require interviews with the project staff in order to assess the project efforts.

The PM is responsible for providing the necessary information to the Quality Review Manager for the Q-2R review.

The Q-2R form (TS-C-13) is to be completed by the Quality Review Manager assigned to the project or other quality reviewer(s) designated by the Quality Review Manager. This form includes a checklist and space for specific comments and responses covering the various aspects of the Q-2R review. The first page defines general project information and includes a list of questions pertaining to the project and deliverables. These questions address the project scope, budget, schedule, approach, quality control, and report format. The quality reviewer should indicate an answer for each question and provide brief comments, as appropriate. The second page (and additional pages, if needed) provides for specific comments from the quality reviewer and responses from the PM. Any comments documented by the quality reviewer should be resolved by the PM prior to proceeding with the project and the preparation of the report. The completed Q-2R form(s) should be collected and reviewed by the Quality Review Manager. Both the Quality Review Manager and the PM should sign each Q-2R form after it is completed.

10.3.3.4 Q-3R Review

The Q-3R review is the final quality review necessary before a draft report is ready to be printed for submission to a client. This quality review provides three functions. The first function is to check that all of the components of the report are included, such as the fly sheet, the cover letter, and the Table of Contents. The second function is to check that the document is well written and has been checked for grammar and spelling. The final function of the Q-3R review is to check that the contents of the report satisfy the client's objectives and are an accurate reflection of the study and the conclusions and recommendations that Burns & McDonnell has developed. Generally, all members of the quality review team participate in the Q-3R review.

The PM is responsible for providing the necessary information to the Quality Review Manager for the Q-3R review.

The Q-3R form (TS-C-14) is to be completed by the Quality Review Manager assigned to the project or other quality reviewer(s) designated by the Quality Review Manager. This form includes a checklist and space for specific comments and responses covering the various aspects of the Q-3R review. The first page defines general project information and includes a list of questions pertaining to the project deliverables. These questions address the report content, format, writing quality and style, and conformance to the client's requirements. The quality reviewer should indicate an answer for each question.

The second page (and additional pages, if needed) provides for specific comments from the quality reviewer and responses from the PM. These comments may pertain to the questions from the first page, or to other specific aspects of the report. Columns are provided for the reviewer to indicate the report page number and paragraph to which each comment relates. The significant comments provided by the quality reviewer should be documented on the Q-3R form. Minor comments, such as spelling, punctuation, and formatting, may be noted only on the review copy of the report. If an individual reviewer is only charged with reviewing a certain chapter or chapters, or only portions that relate to a particular discipline, the reviewer should only complete the additional comments page and not the first page of the form. The Quality Review Manager or the reviewer completing the front page of the form should collect the individual review comment forms, refer to them in completing the form, and attach them as part of the complete review form.

The second page of the Q-3R form also contains three signature blocks, one to authorize the use and reproduction of required professional seals, one to document the completion of the final review, and the other to release the report for printing and delivery to the client. In the first block

(within Item 6), signatures should be obtained for all individuals whose professional seals will be applied and reproduced in the report. If no professional seal is required, justification should be provided.

The completed Q-3R form is signed by the reviewer in the second block indicating that the report has been initially reviewed and the comments have been documented. The report author and/or PM should indicate on the comments portion of the form the resolution for each comment listed and review those resolutions with the quality reviewer. The quality reviewer should sign the form again to indicate that all comments have been adequately addressed. The Q-3R form should be signed by the Quality Review Manager, if different than the quality reviewer.

The last signature block requires that the form be signed by the PM and either the global practice/regional office manager or the Quality Control Manager for the global practice or regional office owning the project.

The completion of the Q-3R review is performed prior to the report being certified (sealed) and/or printed, or otherwise issued to parties external to Burns & McDonnell. For any reports to be printed by the Reprographics Department, a copy of the completed, signed Q-3R form should be provided to the Reprographics Department as authorization for printing the report.

In the event that material revisions are made to the report that has previously undergone a Q-3R review and been issued in draft form, another Q-3R review should be performed. Items considered to be material revisions include changes to analysis presented; expansion of the scope of the analysis and report; additions, deletions, re-writes of sections of text, and similar items. An additional Q-3R review is necessary to determine that the effects the revisions may have throughout the report have been addressed.

10.3.4 Registered Professional Seal

Most state laws require the application of a registered professional seal on reports prepared by or under the supervision of a registered professional, for which that professional expertise is required. A report that requires specific professional expertise and/or provides conclusions or recommendations based on professional judgment, Burns & McDonnell policy is that such reports be sealed when required by applicable laws, by an appropriate registered professional, regardless of client preference. A professional seal certifies that the investigation, analysis, conclusions, and recommendations included within the report have been accomplished using the recognized standard of care required of the professional responsible. It is the responsibility of the PM to determine the professional seal requirements and to include the appropriate registered professionals from the applicable state at the beginning of a project. Requirements

for professional seals on reports should be considered during the Q-1R review and documented on the Q-1R form. Summaries of sealing requirement and contact information for engineer licensing authorities in the 50 states are contained in Chapter 11 of the Burns & McDonnell Corporate Policies and Procedures Manual, Professional Registration Guidelines and Summaries."

Application of a professional seal to the report should adhere to the requirements of the laws of the appropriate state. The professional seal requirements of various professions in many states can be very specific, similar to those for professional engineers in Missouri:

> *"(B) On multiple-page specifications, estimates, reports and other documents or instruments, not considered to be plans, the registered professional engineer, when more than one (1) sheet is bound together in one (1) volume, may sign, seal and date only the title or index sheet, providing that the signed sheet clearly identifies all of the other sheets comprising the bound volume, and provided further that any of the other sheets which were prepared by, or under the immediate personal supervision of another registered professional engineer be signed, sealed and dated as provided for, by the other registered professional engineer and any additions, deletions or other revisions shall not be made unless signed, sealed and dated by the registered professional engineer who made the revisions or under whose immediate personal supervision the revisions were made."*
>
> *(4CSR 30-3.030 Registrant's Seal - Professional Engineer Rules of Missouri Board of Architects, Professional Engineers and Professional Land Surveyors)*

Conversely, the seal requirements in other states may be less specific, such as those for professional engineers in Kansas:

> *"(b) Each original drawing, document, technical report, legal description, record, and paper prepared by or under the direct supervision of the licensee in the licensee's professional capacity shall be stamped with the licensee's seal, unless the project is exempt from the requirements for licensure pursuant to K.S.A. 74-7031, K.S.A. 74-7032, K.S.A. 74-7033, or K.S.A. 74-7034, and amendments thereto.*
>
> *After the licensee's seal has been applied to the original or record copy, the licensee shall place the licensee's handwritten signature and date across the seal. Computer-generated or other facsimile signatures and dates shall not be acceptable."*
>
> *(Statutes and Rules and Regulations of the Kansas State Board of Technical Professions, Article 6. Professional Practice Paragraph 66-6-1. Seal.)*

It is imperative that a registered professional, preparing to seal a report, review in detail the latest revision of the state rules and regulations governing the application of the seal. Although the previous examples cover engineering and architectural practice, similar rules and regulations apply to professional geologists, environmental scientists, industrial hygienists, and other regulated professionals.

To accomplish the requirements of the rules for states similar to and including Missouri, an Index and

Certification page should be inserted immediately ahead of the Table of Contents of the report. This page should contain the description of the project as a heading, followed by a consecutive list of the major report chapter numbers and headings. This can usually be accomplished on a single page, still leaving room for the seal (for certification) at the bottom.

10.4 PROJECT QA/QC – DESIGN AND CONSTRUCTION TYPE PROJECTS

10.4.1 General

Design projects include traditional design-bid projects as well as design-build, EPC, extension of client staffing, owners-engineer, etc. Global practice / regional office management and project management are responsible for adapting the standard QC procedures specified in this section to suit the needs of individual project types.

10.4.2 Project Organization

Project level quality activities are performed by the project team and an independent quality review team, as described below.

10.4.2.1 Project Team

10.4.2.1.1 General

- Because the execution of most projects requires the efforts of multiple individuals, and because many people may be working on a project simultaneously over an extended period of time, we use a team approach for accomplishing the work, with a Project Manager as team leader. The team approach provides a degree of continuity, awareness of the status of a project, and a formal mechanism for exchange of information and coordination among team members, whether they are in-house or outside.

10.4.2.1.2 Management Considerations:

- A Project Manager and project discipline personnel representing each applicable design discipline constitute the design team. The design team of a single discipline project might consist of a single person.
- It is likely that an individual may simultaneously perform in more than one function or on more than one design team.
- It is the responsibility of the Global Practice or Regional Office Manager, the Quality Control Manager, the Project Manager, and Department Managers to determine that proper assignments have been made to accomplish each required activity for each project.

10.4.2.1.3 Team Selection:

- Identify key services to be provided on a project and select team members who are experienced and qualified in those particular areas.
- Inexperienced personnel should be carefully assigned and work only under supervision of experienced personnel.

10.4.2.1.4 Team Composition (Typical for Large Project):

- Project Manager.
  - Responsible to the Client and the Company for the successful execution of the project. Has authority and responsibility for the project throughout the duration of the contract. Assigned by the Global Practice or Regional Office Management.
  - Capable and experienced person with authority to speak for the Company in dealing with the Client and to direct and expedite the work.
  - Should be involved early in the negotiations and the development of scope of services with the Client.
  - Responsible for developing the written Project Program.
  - Participates in establishing the total time requirements for project completion.
  - Fully aware of the Client's objectives and must satisfy the Client's goals.
  - Reports to Global Practice or Regional Office Management.
  - Organizes the work on the project.

- Confers with Geotechnical Department to determine subsurface information needs.
- Determines the skills required.
- Participates in the selection of project design and detailing staff.
- Schedules the project through the office, including scheduling the Conceptual Design Review (Q1), the Preliminary Design Review (Q2), the Specifications Department Review (Q5) and the Quality Review Department Review (Q6).
- Responsible for recommending outside consultants or other subcontractors.
- Responsible for coordinating and scheduling outside consultants.
- Monitors the progress of the project to determine percent complete, versus money spent, versus design budget.
- Responsible for completing the project on time.
- Responsible for adhering to project budget for both design and construction phases.
- Receives all information coming into the office on a project and disseminates it to in-house design team and outside consultants.

- Project Architect or Project Discipline Engineer.
  - Responsible for design work on a project for a specific discipline.
  - Responsible to Department Manager for discipline expertise and the Project Manager for project-related matters.
  - Establishes the design parameters together with the Project Manager and appropriate consultants (geotechnical, fire protection, landscape, and others) in compliance with the written Project Program.
  - Responsible for quality control for the design function in his/her discipline.
  - Provides guidance to other members of that design discipline.
  - Knows the capabilities of the design team in order to obtain specialized help when needed.
  - Responsible for drafting for his/her discipline.
  - Assures that the office design policies, procedures, and standards are followed.
  - Responsible for adherence to applicable codes.

- Responsible for the preparation of the technical specifications.
- Submits original (non-standard) specification drafts for Q5 Review.
- Responsible for the execution and scheduling of the Q3 and Q4 Reviews and documentation.
- Responsible for processing of submittals for his/her discipline.
- Analyzes and responds to alternate designs.
- Responsible for keeping the discipline work on schedule.
- Establishes the manpower requirements for his/her discipline.
- Should remain with the project throughout its time in the office unless reassigned.
- Responsible for completing project on time and within budget.
- Responsible for coordinating his/her discipline's work with other disciplines.

- Design Staff.
  - Responsible to the Project Architect or Discipline Engineer.
  - Implements design approach and criteria with Project Architect or Discipline Engineer as defined in the written Project Program.
  - Follows established standards, procedures, policies, and applicable codes.
  - Requests assistance from Project Architect or Discipline Engineer when needed.
  - Supervises assigned detailers and drafters.
  - Performs Q3 Review of specifications, drawings, and design notes representing the design when the drawings are complete.
  - Performs Q4 Review of designs by others when assigned to do so.
  - Maintains design notes in proper format and legible so that the Q4 Review of design may be accomplished with a minimum of consultation.
  - Performs all duties carefully, in a conscientious manner so as to reduce the number of errors to a minimum.
- Detailing Staff.

- Responsible to Project Architect or Discipline Engineer and the appropriate discipline design staff.
- Translates design notes to drawings in accordance with the intentions of the designer.
- Follows Company drafting standards unless others have been established for the project in the Project Program.
- Performs all duties carefully, in a conscientious manner so as to keep the number of errors to a minimum.

10.4.2.1.5 Project Quality Review Team

- An independent Quality Review Team is established for each project to perform Q1, Q2, and Q4 reviews, as appropriate.
- The Global Practice or Regional Office Quality Control Manager consults with Global Practice / Regional Office Management for selecting the Review Manager for the project and with Department Managers for discipline Review Team members
- Review Team must be selected from discipline personnel not involved in project.
- Qualifications, experience, and expertise of Review Team should be equivalent to that of Design Team.
- The Review Team shall consist of an independent Review Manager and Discipline Review Team personnel from those departments with major involvements in the work.
- Where possible, the Review Team members will provide services to the project from the start to completion.
- The Quality Review Team may solicit assistance from technical specialists and consultants in completing the above review activities.

10.4.3 Project Plan

A written Project Plan should be initiated immediately following the agreement with the Client. A written Project Plan should be prepared for every design project regardless of its size. This document contains the project requirements and will form the basis for all design work performed and should be approved by the Client during the Conceptual Design Phase and again during the Preliminary Design Phase. Changes in project scope and other important changes should be approved as they occur.

The responsibility of developing the written Project Plan rests with the Project Manager. The written plan must establish the design parameters for all architectural and engineering disciplines and reflect the Client's project criteria as well.

10.4.3.1 Content

The written Project Plan should ultimately address the following topics as appropriate:

- Client Aims and Concepts
  - Define the function of the project.
  - Provide characteristics of the equipment used.
  - Indicate anticipated future expansion.
  - Set out other items resolved with the client that would affect the project.
- Cost Limitations
  - Set total project limitations with the client.
  - Cost limitations for the various segments of the project should be developed, e.g., site work, architectural, structural, mechanical, electrical, and process.
- Space Requirements
  - Identify each individual function with its associated space requirements.
  - Designate all functional groupings or separations.
  - Describe each space giving occupancy load, ceiling height or head room, access points, crane loads, lighting and electrical requirements, and mechanical requirements.
- Functional Description and Requirements
  - List construction materials and finishes.
  - Describe all site improvements.
  - Describe all structural, mechanical, and electrical requirements.
- Site Data
  - Review boundary and topographical survey.
  - Request and review known available subsurface information.
  - Determine location and size of existing utilities.

  - Determine zoning restrictions.
  - Study access and traffic data.
  - Investigate history of drainage features.

- Master Plan and Expansion, including a drawing showing the location of the proposed facility on the site and showing all planned future improvements and possibilities for expansion if the information is available.
- Code Restrictions
  - List all applicable codes.
  - List all restrictive code requirements that will affect the project.
- Time Restrictions
  - Establish a project time schedule listing dates for:
    - Phase I - Conceptual Design Phase.
    - Phase II - Preliminary Design Phase.
    - Phase III - Final Design Phase.
    - Phase IV - Bid Period.
    - Phase V - Construction Period.
    - Start-up Assistance (if required).
  - List lead time required for major items requiring long delivery periods.
  - Consider potential time delays due to reviewing authorities.
- Drawings and Specifications Requirements
  - Establish drawing sheet size (use Company standard, if possible).
  - Establish title block and revision block requirements (use Company standard, if possible).
  - Select CAD system (use Company standard, if possible).
  - Establish whether Company standard specifications and drafting standards or Client established standards will be used.

- Establish whether subsurface borings and limited laboratory test data will be included on drawings contrary to Company policy (often required by government Clients).

- Bidding and Contract Procedures
  - Determine contractor selection procedure (negotiated contract, competitive bid, or direct selection) and whether the project be awarded as a single or multiple contract. Refer to Appendix B, Section IIB - Qualifying Bidders.
  - Determine Client imposed alternates or requirements.
  - Determine Company responsibilities at contract award.

10.4.3.2 Administration

- Distribution of Project Plan
  - Establish a written distribution list with the name and position of each team member, including internal technical departments and outside consultants.
  - Include the Client or Client representative on the distribution list.
- Changes or Revisions
  - Any change which deviates from the formal written Project Plan will be issued and distributed as an addendum to the program. Changes to drawings prior to bid should receive an alphabet letter identifier, as opposed to changes after bid which receive a number identifier. (See Drafting Standards Manual.)
  - If changes are excessive, the entire program will be reviewed.
  - Clearly indicate to Client the impact of requested changes.
- Project Plan Coordination
  - Responsibility for strict adherence to the plan must be acknowledged at all levels including outside consultants.
  - Each discipline and in-house or outside consultant must be responsible for its own activities.
  - At each distribution of plan information, ample time will be given for a thorough review and acknowledgement by all disciplines prior to completion of the project phase.

  - A thorough check of the written Project Plan will be accomplished at the completion of Phases I and II and confirmed with the Client.
- Inform Client of record retention policy.
- Establish Client and Company contacts for project communications.

10.4.4 Typical Design and Construction Project Phases

10.4.4.1 General

Each project should be divided into the following phases of development with sufficient review after each phase to assure that Client goals and functional and technical requirements have been met.

- Phase I – Conceptual Design
- Phase II – Preliminary Design
- Phase III – Final Design
- Phase IV – Procurement
- Phase V - Construction

10.4.4.2 Phase I – Conceptual Design

Tasks prior to starting Conceptual Design Phase:

- Assign Project Design Team.
- Review project scope and Client's requirements.
- Review design budget and time schedule for Conceptual Design Phase.
- Determine manpower requirements for Conceptual Design Phase.

The purpose of the "Conceptual Design" effort is to establish the Client requirements for the project and to define these requirements so that the Client, the Project Design Team, and the Project Review Team clearly understand the scope and limitation of the services.

Main design requirements for the Conceptual Design Phase are as follows:

- Prepare Initial Development of Written Project Plan
  - Should be prepared by Project Manager with the Project Architect or Discipline Engineers after conferring with Client and with all applicable disciplines.

- The written Project Plan should establish design parameters and restraints for all disciplines.
- The initial development would primarily be written text and concept sketches and would culminate with the Client review.

- Prepare Schematic Layouts
  - Drawings and/or sketches (minimum to define concept).
    - Site Plan.
    - Floor Plans.
    - Typical Sections.
    - Elevations.
    - Schematic diagrams of mechanical and electrical systems.
  - General project description.
  - Systems concepts (usually written descriptions of architectural, structural, mechanical, electrical, environmental, process, and geotechnical; may include design criteria and code restrictions; equipment literature, and similar items).
  - Renderings and/or models if desired.
  - Photographs (site, access, and related items).
- Prepare Probable Project Cost Opinion, if Required
  - Generally "rough" cost opinion: compare with similar past projects or consult with Estimating Department.
  - Include allowances for following applicable items:
    - Building costs.
    - Site improvement costs.
    - Utilities.
    - Furnishings.
    - Equipment.
    - Landscaping.

- Surveys.
- Geotechnical subsurface investigation.
- Environmental audits or geohydrological investigations.
- Architectural and engineering fees.
- Outside consulting fees.
- Interest during construction (when required).
- Insurance.
- Quality assurance testing costs during construction.
- Field representatives.
- Escalation factors.

- Hold In-House Reviews of Phase I - Conceptual Design; Activity Q1 (Include Consultants)
- Hold Client Reviews
  - Have Project Manager and/or Design Team conduct presentation of conceptual design to Client.
  - Review design solution and cost opinion in relation to original Client goals.
  - Secure Client approval in writing before proceeding further with project.

10.4.4.3 Phase II – Preliminary Design

The Preliminary Design Phase is the "Design Freeze" effort to research and develop the Conceptual Design to the point of proving compatibility of all systems incorporated in the project. Tasks prior to starting Preliminary Design Phase:

- Project Design Team and Review Team should be the same team as for Conceptual Design Phase.
- Revise Conceptual Design to include Client's comments and/or additional requirements.
- Distribute and review corrected Conceptual Design with Project Design Team.
- Review design budget and time schedule for Preliminary Design Phase.
- Determine manpower requirements for Preliminary Design Phase.

Main requirements of the Preliminary Design are as follows:

- Prepare Further Development of Written Project Plan.
  - This would include further development of the written Project Plan beyond that included in Phase I - Conceptual Design.
  - Should be prepared by Project Manager with the Project Architect or Discipline Engineers after conferring with Client and with all applicable disciplines.
  - The Project Program should establish design parameters and restraints for all disciplines including process, system, and physical design concepts.
- Prepare Preliminary Design Drawings
  - These drawings shall include building and site general arrangement drawings.
  - Draw to proper scale (same scale as intended for contract drawings).
  - These drawings and the physical design concepts and sketches discussed below will define the following:
    - Site Plans:
      - General topography; floor elevations.
      - Parking and paving; access to roadways.
      - Utilities.
      - Landscaping; fencing.
      - Exterior lighting.
    - Floor Plans:
      - General arrangement.
      - Control dimensions; column spacing.
      - Wall thicknesses; doors; windows.
      - Identification of spaces.
      - Identification of fixtures and equipment.
      - Details of special areas.
      - Furniture layouts.

        - Define areas to receive ventilation, heating, and air conditioning.
    - Elevations.
    - Sections:
        - Transverse and longitudinal; show floor locations, ceiling heights, structural depths.
        - Typical sections and details, large scale, to satisfy major design conditions of each discipline (make maximum use of freehand sketches).
    - Finish Schedules.
    - Single-line mechanical layouts, showing equipment size and location; plumbing, and related features.
    - Electrical, signal, communications outlets.

- Prepare Process and System Design Diagrams and Descriptions
    - This primarily pertains to process, mechanical, controls, and electrical systems.
    - The preliminary design includes but is not limited to the development of process, P&IDs, and electrical one-line sketches (or drawings) and descriptions as needed to allow Phase III-Final Design to proceed.
- Development of Physical Design Concepts and Sketches
    - This pertains to development of physical arrangements and design concepts for the individual buildings, structures, and other facilities for the project.
    - The preliminary design includes preparation of written design criteria and sketches defining the physical concepts.
- Geotechnical subsurface and foundation design criteria should be established at this time.
- Development of project standard contractual-legal ("Front End") documents and Division 1 Specifications
    - Project "Front End" documents and Division 1 standard specifications to be used in the various contracts in this project should be given a Q5 Review during this phase of the project.

- This would pertain to both "Front End" documents and Division 1 standard specifications prepared by the Company or by others for the project.
- The purposes of the review of documents prepared by others would be to verify that the documents provide the Company with appropriate liability protection and interface with technical specifications prepared by the Company. (Refer to the Construction Documents and Specifications Manual for additional discussion).

- Prepare Outline Technical Specifications
  - Describe major systems, equipment, and materials.
  - Each discipline must substantiate system design with preliminary backup analysis and/or description of components.
  - List materials, methods, and quality by specification division.
- Verify Design Criteria with Applicable Agencies
  - Establish single-point coordination for all legal and code compliance activities among all disciplines.
  - Each discipline must confirm, in writing, compliance with jurisdictional codes.
    - Building codes (national, state, city, governmental agencies, and other jurisdictions).
    - Fire code requirements.
    - Utility regulations.
    - Environmental and hazardous material regulations.
    - Federal Regulations.
  - Contact utility companies and public authorities on services, and secure written approval for service connections.
- Prepare Probable Construction Cost Opinion
  - Each discipline submits opinion of cost for its portion of the project. Assistance shall be obtained from the Estimating Department were needed or appropriate.
  - The Project Team and the Review Team shall review the assembled estimates and check against Preliminary Design Documents for accuracy and completeness.

- Hold In-House Review of Phase II - Preliminary Design; Activity Q2
- Hold Client Reviews
  - Project Manager and/or Design Team conduct presentations of preliminary design documents to Client; include outside consultants as necessary.
  - Review all project systems, physical concepts, and site and building arrangements.
  - Review probable construction costs opinion of components and total project cost.
  - Secure Client's approval in writing of Phase II and authorization to proceed with Phase III.

10.4.4.4 Phase III – Final Design

The Final Design Phase is the design effort to prepare final contract drawings and specifications necessary to advertise for bids and/or construct the project. Final documents should evolve smoothly from the information provided in the preliminary design documents and any pre-purchased equipment drawings. Tasks prior to starting final design phase include:

- Project Design Team should be same team as for Preliminary Design Phase.
- Revise preliminary design documents to include Client's comments and/or additional requirements.
- Distribute and review corrected preliminary design documents with Project Design Team.
- Review design budget and time schedule for Contract Documents.
- Determine manpower requirements for Final Design Phase.

Main requirements of Final Design are as follows:

- Prepare Contract Drawings
  - Plan layout of sheets for necessary details before beginning.
  - Convey precise information in a concise way.
  - Use standard format and presentation for all disciplines.
  - Explain all symbols and abbreviations clearly.
  - Provide index of drawings on cover sheet or on the drawing immediately following the cover sheet.

- Coordinate carefully all references to drawings of other disciplines.
- Check and coordinate all drawings individually and between the disciplines.

- Develop Contract Requirements
  - Determine bidding requirements, forms, and general conditions.
  - Determine supplementary conditions.
  - Obtain requirements for insurance and bonds from the Client. CAUTION: Do not offer insurance and bonding advice. Such advice should be obtained from the Client's insurance consultant.
  - Prepare technical specifications.
    - Have each discipline prepare specification sections relating to its activity.
    - Coordinate specifications with drawings.
  - Use Company standard construction documents and specifications where possible.
  - Assist Client's counsel in selection and review of contract agreements, if required.
  - Define alternates where applicable.
  - Define cash allowances and unit prices where applicable.
  - Define Client's requirements for occupancy; phased occupancy.
  - Define all Client-furnished equipment or other items.
  - Define schedule for delivery and responsibility for installation of Client-furnished equipment.
  - Prepare construction testing quality assurance program requirements and budgets.
  - Prepare Subsurface Information Document.
- Prepare Probable Construction Cost Opinions if Required.
  - Submit final drawings and specifications to the Estimating Department for a detailed opinion of costs of the project if required.
- File Contract Documents with Applicable Authorities
  - Building Department.
  - Fire Marshal (local and state).

- Department of Health.
- Department of Education.
- Environmental Agencies.
- Others as required.

- Quality Review of Final Design
  - Perform Q3 Quality Review of Design Notes, Drawings and Specifications by Design Team.
  - Perform Q4 Quality Review of Design Notes, Drawings, and Specifications by Project Review Team.
  - Perform Q6 Quality Review of Design and Construction Contract Packages.
- Quality Review of Revisions to Final Design
  - Revised drawings and documents to be issued during the bidding phase by addendum or during the construction phase must receive additional Q3, Q4, and Q6 reviews and have the appropriate QC forms completed for record.

10.4.4.5 Phase IV - Procurement

- Determine Contractor and Subcontractor Qualifications
  - Prior to start of bidding period, if possible.
  - Capability to be bonded.
  - Performance of other work.
  - Financial ability.
  - Capability to perform the work of the size and complexity of the project to be bid.
  - Refer to Appendix B: Bidder Qualification Policy
- Company Policy Regarding the Selection and Approval of Bidders (When Open Bidding is Not Required).
  - It is our policy on projects where we have the responsibility for selecting or approving bidders to select or approve only those bidders, that, in our opinion, are qualified through background, experience on particular type of work, performance, adequacy of facilities, equipment and staff, know-how, and financial strength to complete the

contract on time and provide the owner with an acceptable product. Bidders should be selected or approved for each project after they have submitted satisfactory qualification data for that project and which have been substantially verified by the Company as being factual. A bidder that is not considered qualified on one project may be considered qualified for another project because of difference in size, type and complexity of project. Only the Global Practice or Regional Office Manager, Director of Design, or a Director of the Global Practice or Regional Office having responsibility for the project being bid may designate a supplier or contractor as an unacceptable bidder.

- In some cases, the Client may select bidders, participate in bidder selection, or retain veto power over our selection of bidders and, thus, assume some or all of the responsibility for bidder selection or approval. When a Client selects or approves a bidder we believe is not qualified, we should advise the Client in writing of our evaluation and recommend that the bidder not be permitted to bid.
- As a Company or as individual employees, we shall not maintain any form of listing of suppliers or contractors that are either acceptable or unacceptable. While we may maintain informal lists of suppliers or contractors (including experience background) that are interested in being considered for bidding our projects, we should not classify them on this list as being either acceptable or unacceptable.

- Establish Basis for Bid Evaluations
  - If bidders have been prequalified, the basis becomes one of examining each bid to see that it is responsive.
  - Bid documents should say how additive and deductive alternates are to be considered and in what order so that the method of determining the low bidder is clear.
- Distribute Bid Documents
  - Bid documents are to be issued by the Bid Documents Controller or Project Team member assigned to control Bid Document issues, unless issued directly by Client.
  - Subsurface data is not a part of Bid Documents or Contract Documents.
- Hold Pre-bid Conference If Desirable
  - Require all general contractors (primary bidders) to attend.

  - Hold early enough in bid period to allow for issuing addenda after conference.
  - Opens lines of communications.
  - Removes uncertainties of unusual or special conditions.
  - Opportunity for bidders to ask questions.
  - Help ascertain that bidders have visited the site.
  - Limit discussion of geotechnical subjects to test data. Do not make subsurface implications or interpretations.
  - Write minutes including the list of attendees and account of topics covered. Send copy of minutes to each attendee and place copy in project files.

- Prepare and Issue Addenda as Necessary
  - Provide an individual to coordinate responses to equipment vendor and contractor inquiries.
  - Modifies and becomes part of Contract Documents.
  - Must be sent to all prospective bidders by Company Bid Document Controller or Project Team member assigned to control issuing of Bid Documents or addenda as described in Appendix B.
  - Must be signed by bidder and delivered with bid.
- Receive, Tabulate, and Analyze Bids
  - Accept and open only bids submitted on time and in compliance with the Instructions to Bidders unless the documents permit the Owner (Client) to waive irregularities in bids at its discretion.
  - Prepare a Bid Tabulation sheet listing each bidder and the prices listed in its proposal so that a ready comparison may be made.
  - Analyze bids, including alternates, and include comparisons of construction time in the analysis, when appropriate.
- Evaluate Bids with Client
  - Make recommendation for award of one bid or rejection of all bids.

- If low bid is rejected, develop detailed documentation of rationale for action and avoid statements which may be interpreted as libelous.

- Notify Unsuccessful Bidders
  - Provide each with a Bid Tabulation sheet, with Client approval.
  - Thank them for their interest and participation.
- Assist Client in Award and Execution of Contract
  - Notify successful bidder (contractor) of award of contract unless Client is to do this.
  - Provide successful bidder (contractor) unbound copies of the Contract Documents for completion.
  - After reviewing the documents completed by the contractor, bind the copies and forward to Client for completion.

10.4.5 Q Reviews

10.4.5.1 Q1 Review – Project Scope and Definition

- Q1 reviews are performed by the independent Project Quality Review Team on each design project typically at the conclusion of the Phase I Conceptual Design phase or initial project planning stage.
- The purpose of the Q1 Review is to determine that the Client's requirements for the contemplated project will be met and that the requirements are defined so the Client, Project Manager, Department Manager(s), and Project Design Team clearly understand the scope and limitation of the services. These reviews should include the completed portions of the Project Plan (Work Plan or Design Criteria), schematic diagrams, planning, project organization, scope of services, budgeting, scheduling, and permit application requirements. The Q1 Review is not intended to include detailed technical aspects of the project.
- The Q1 review may consist of a single comprehensive review or several targeted reviews, based on the scope and timing of the project.
- The Q1 review is to include those items specified on form TS-C-3. Also, form TS-C-18 may be used to record the results of multiple targeted reviews.

10.4.5.2 Q2 Review – Design Basis and Preliminary Information

- Q2 reviews are performed by the independent Project Quality Review Team on each design project typically during or at the end of Phase II – Preliminary Design.
- The purpose of the Q2 Review is to determine that the various technical systems of all disciplines which have been developed to implement the Client's requirements are appropriate and compatible and that each individual system is represented by sufficient technical concepts, layout, criteria, and detail so final Contract Documents may be developed from the preliminary design with minimum supervision. Since the review of the various systems may not be done concurrently, a schedule of planned dates for each of them is necessary. The Q2 Review must be performed prior to submittal of the preliminary design documents for Client review.
- The Q2 review may consist of a single comprehensive review or multiple system by system reviews on larger projects.
- The Q2 will include a review of those items specified on form TS-C-4. Also, form TS-C-19 may be used to record the results of multiple system by system reviews.

10.4.5.3 Q3 Review – Design Documents and Deliverables

- Q3 Review is a 100% quality control check of design notes, drawings, specifications, and other design documents that is performed by the design team. This review is completed prior to releasing documents for use by others, or for subsequent Q4, Q5, or Q6 quality control reviews.
- For large design teams, the detailer preparing the design drawings and the Design Architect or Engineer cross-check each other's work relative to the dimensions, coordinates, and graphic information defined on the drawings. The detailer's checking of the drawings shall be completed prior to the checking being performed by the Design Architect or Engineer.
- Multi-Discipline drawings and specifications should be reviewed by appropriate design team personnel from the affected disciplines.
- The detailer's checking shall include but not be limited to the following:
  - Checking of prints of the various drawings to verify accuracy, completeness, clarity, and conformance with intent.

- Verification of non-design items that have been defined to the detailer through the Design Engineer's/Architect's notes and/or sketches. Preferably, this shall be completed prior to the information being shown on the drawings. This shall include dimensions, coordinates, elevations, graphic information taken from shop drawings, and other non-design information that can be verified.
- Verification that details have been properly identified, plan views are referenced with a North arrow, and drawing scales have been shown.
- Ballooning (or clouding) of revisions to the contract drawings.

- The Design Architect or Engineer is to perform a complete and thorough check of everything indicated on the drawings. This shall include (but not be limited to) verification of conformance with the design (as defined by the design notes), checking of all dimensions, checking for conformance with vendor supplied information and project requirements, and checking of details for completeness and accuracy. In many cases, this should include a complete "yellow out" of the drawings. Completion of the Q3 Review form indicates that the Design Architect or Engineer has completed this process and that any required corrections have been made.
- Q3 reviews are performed on all design notes, drawings, and specifications issued for bid and all issuances after that point.
- The Design Architect or Engineer is responsible for documenting the Q3 review on form TS-C-5. Global practices and project teams may use alternate versions of this form in order to capture additional information that is relative to their projects.

10.4.5.4 Q4 Review (Independent) – Design Documents and Deliverables

- Q4 Review is a quality control check of design notes, drawings, specifications, and other design documents that is performed by persons who are not responsible for the work being reviewed. This review is completed after Q3 review but prior to releasing documents for bid or construction, or for subsequent Q6 quality control review.
- The Q4 Review is generally performed by an independent Project Quality Review Team member of the appropriate discipline, or other independent personnel assigned by a Department Manager (and monitored by the Discipline Review Team member). Sufficient checking of the design notes, drawings, and specifications should be performed to satisfy the reviewer of the appropriateness of the methodology, completeness, and

accuracy. Additional considerations relative to the depth of checking would include the experience of the designer, complexity of the item, and risk associated with failure of the item. Major design parameters and criteria (including but not limited to subsurface and foundation design criteria) shall be verified through consultation with the Project Design Team and other Review Team members as needed.

- When design notes are prepared, the reviewer shall check the calculations in the notes and/or make independent calculations to satisfy him/her that the design is appropriate and adequate.
- The more significant comments on the design notes should be noted by the reviewer on the Q4 Review form with resolution noted by the designer. Minor comments can be indicated on photo copies of the notes. After appropriate corrections have been made to the notes, the individual pages of the design notes shall be initialed by the reviewer ("checked by").
- The Q4 drawing check will include making a general drawing review for content, accuracy, and conformance with the design intent. Assuming this indicates good quality and a thorough Q3 Review, the reviewer shall generally check all items on the drawings, but shall weigh his/her efforts toward the major items which would be expensive (or difficult) to correct. It is recommended that the reviewer "yellow out" specific items on the drawings that are checked in detail. The more significant comments on the drawings should be noted on the Q4 Review Form by the reviewer, with resolution noted by the designer. After appropriate corrections have been made to the drawings and the Q4 Review is fully completed, the reviewer shall manually place the reviewer's initials in the "checked by" block of the drawings.
- Completion and sign-off of the Q4 Review form indicates that the reviewer and the Design Architect or Engineer has completed this process and that any required corrections have been made. As noted above, the more significant reviewer comments should be noted on the Q4 Review form. Further, the Design Architect or Engineer should provide written responses to the comments on the Q4 Review form and discuss the resolution of the comments with the reviewer as needed. If required, the Department Manager should work with the reviewer and designer to resolve the comments. Minor comments and/or clarification of the reviewer's comments can be indicated on photo copies of the design notes, drawings, prints, and photo copies of the specification pages. When this is done, it should be so noted on the Q4 Review form, and the response should

indicate that these minor comments have been resolved. After the review has been completed and the Q4 Review forms have been signed, copies of design notes, drawings, and specifications that were used for this Q4 Review should not be retained for permanent project records. The completed Q4 Review form documents that this review was completed.

- After the comments have been satisfactorily resolved and appropriate revisions have been made, the Q4 Review Form TS-C-6 will be signed by the reviewer and the designer. The completed form without the attachments shall be distributed as noted on the form. Global practices and project teams may use alternate versions of this form in order to capture additional information that is relative to their projects.

10.4.5.5 Q5 Review – Procurement and Contracting Terms & Conditions

- Q5 Review is performed to verify that project based contractual / legal documents (to be used for purchase orders, contracts, and subcontracts) are appropriate. This includes:
    - Conformance to company and/or client standards.
    - Inclusion of contractual flow-downs from the prime contract between the company and our client.
    - Potentially a Legal Department review of significant changes to company standards.
- Within the Burns & McDonnell vernacular, project based "purchase orders" are typically issued for equipment and materials, and "subcontracts" are issued for construction services. "Contracts" may be issued for equipment, materials, or construction services. Examples of contractual / legal documents include terms and conditions, bid forms and requirements, bonding requirements, etc.
- Project managers are responsible for performing the Q5 Review or assigning other qualified personnel to perform this review. If the project manager delegates the review to others, the project manager is still responsible for verifying that the review is completed effectively and in a timely manner.
- Q5 reviews should be completed as early in the project as possible, typically at the Q2 stage, in order to finalize base documents prior to using them to prepare purchase orders, contracts, or subcontracts on the project. A second Q5 review is not necessarily required if the base contractual / legal documents are revised for a particular purchase order, contract, or subcontract. These revised documents, however, should be flagged for supplemental verification during Q6 review of the complete bid package.
- For some projects, the contractual / legal documents may be prepared by the client and either provided to Burns & McDonnell (to be incorporated into purchase order, contract, or subcontract packages) or not provided to Burns & McDonnell but added to the package a later time by the client. When this is the case, project managers are

encouraged to perform a Q5 Review of the client generated contractual / legal documents in order to verify coordination with the Burns & McDonnell-prepared drawings and specifications.

- Q5 Reviews must be documented by completing the Q5 form.

10.4.5.6 Q6 Review – Design and Construction Contract Packages

- Q6 Review is a quality control check of completed design or construction packages which typically include commercial front-ends, scope documents, technical specifications, drawings, data sheets, line lists, etc.
- Q6 reviews are performed to verify that the design or construction package contains the appropriate information to allow a contractor to effectively bid or execute the work. This includes checking the following:
  - The design or construction package is complete and comprehensive.
  - Quantities and design information is sufficient.
  - Coordination and interfaces between individual documents in the package are correct.
- Q6 review is not a 100% quality control check of the individual documents within the design or construction package. The design team is responsible for performing the 100% Q3 quality control check which is supplemented by the independent Q4 review. To this end, these reviews (i.e. Q3 and Q4) should be completed and documents revised accordingly prior to submitting the package for Q6. Also, the package, as a whole, should have been reviewed from a multi-discipline perspective by a lead person on the project prior to submitting for Q6.
- Q6 reviews are performed by the Corporate Quality Review group or by other persons designated and approved by a Global Practice or Regional Office Quality Manager.
- The Q6 review is completed prior to releasing the design or construction package to a client or others for bid, or as an alternate, prior to releasing a subcontract package for construction on a Design-Build project. Subsequent revisions to the design or construction package, or documents contained in the package, may be submitted for Q6 review at the discretion of the project team.
- Project Managers are responsible for ensuring that design and construction packages are submitted for Q6 review in a timely manner. The Project Manager should check that the

documents are adequately complete before submitting packages for Q6 review. Sufficient time should be allotted for completion of the review.

- Upon completion, the Q6 reviewer will return the review comments to the Project Manager with a TS-C-7 form. Global practices and project teams may use alternate versions of this form in order to capture additional information that is relative to their projects. The Project Manager will then provide a response to all Q6 comments, to be written beside the comments on the review documents, indicating if the change was made or why it was not. This includes comments made on the drawings, specifications, or in the remarks section of the Q6 Review form. The check set is then to be returned within 10 working days of receipt by the Project Manager to the Q6 reviewer for final evaluation and retention.

10.4.5.7 Scheduling the Reviews

- It is the responsibility of the Project Manager to include sufficient time in the project schedule to complete all required quality control reviews. The Review Team Manager and the Project Manager will work together to schedule the Conceptual Design Reviews (Q1), Preliminary Design Reviews (Q2), and the Final Design Reviews (Q4).
- To facilitate these reviews, the Review Team Manager and the Project Manager shall prepare an overall planning schedule. This schedule should define the various general and individual contract reviews to be completed. The overall quality review plan should be incorporated into the overall project schedule. In addition, the schedule for individual Q1 and Q2 Reviews should be indicated on the Q1 and Q2 Review - Project Summary forms.
- The initial overall planning schedules for quality reviews should be prepared and distributed during the Pre-Design phase of the project. Thereafter, it should be updated as appropriate. Copies are to be provided to the Quality Manager, the Design Team Project Engineers, and the Project Review Team.

10.4.5.8 Verification of Completion

Project Managers are responsible for verifying that all required Q reviews were adequately performed prior to issuing any documents to clients or for use by suppliers and contractors.

10.4.6 Design Q Review Summary Table

Type of Review	Scope of QC Review	Person(s) Responsible for Selecting QC Review Team or QC Reviewer	Person(s) Initiating QC Review	Person(s) Responsible for Submitting QC Report	Person(s) Responsible for Monitoring QC Activity
Q1	Review of Conceptual Design Prior to Submittal to Client	GP/RO Quality Control Manager or Department Manager(s)	Project Manager	Leader of Project Review Team	GP/RO Quality Control Manager or Department Manager(s)
Q2	Review of Preliminary Design Prior to Submittal to Client	GP/RO Quality Control Manager or Department Manager(s)	Project Manager	Leader of Project Review Team	GP/RO Quality Control Manager or Department Manager(s)
Q3	Review of Design Notes, Drawings and Specs by Designers	Project Discipline Engineer or Architect	Lead Architect or Discipline Engineer	Design Architect or Engineer	Project Manager/ Department Manager(s)
Q4	Final Technical Review of Design Notes, Drawings and Specs	GP/RO Quality Control Manager or Department Manager(s)	Project Manager/ Lead Architect or Discipline Engineer	Assigned Architect or Discipline Engineers	Discipline Review Team Member/ Project Manager/ Dept. Manager(s)
Q5	Review of Non-Standard Commercial Front-End Documents for Contracts, Subcontracts, and PO	Corporate Specifications Department	Project Manager/ Lead Architect or Discipline Engineer	Manager of Specifications Department	Lead Architect or Discipline Engineer
Q6	Review of Complete Design or Construction Package	Corporate Quality Review Dept. or GP Quality Manager	Project Manager	Manager of Quality Review Department or GP Quality Manager	Project Manager

10.4.7 Requirements for Typical Design Documents

10.4.7.1 Calculations

- Know the design capability of the Design Architect or Engineer making calculations.
- Review Team Members will check design criteria for completeness and accuracy before design begins.
- Obtain approval of basic design system through the Q2 Review and Client review before starting detailed calculations.
- Use standard design procedures and format as guide, if available. See appropriate Department Managers for these.
- Establish format requirements for calculations.
  - Make calculations neat and legible.
  - List all design assumptions.
  - List all formulae and define symbols.
  - Group calculations for various portions of project.
  - Number all pages in proper order.
  - Provide index for quick reference.
  - Check in detail any special, intricate, or unusual designs.

10.4.7.2 Design Notes

- General
  - The Project Manager assumes responsibility for the accuracy and adequacy of the work product for the project and, thus, for documentation of the work by means of design notes used in production.
  - The Department Manager assumes responsibility for the review of the organization and content of the design notes produced by the department's staff.
  - The individual designer is responsible for the preparation, organization, and proper identification of personal design notes prepared for production of the work product.
- Preparation

- All notes should be prepared on standard forms with prepared heading format. The heading information should be completed on each page of the notes. All note pages shall be one-sided.
- Notes should be completely legible and easily reproducible. Print style lettering is preferred to cursive lettering.
- Heading information should clearly define the major and sub-elements represented by the design. The discipline responsible for the design should also be indicated.
- Calculations should be in clear sequence so they can be easily checked. Show all work or assumptions. Include copies of reference and computer generated tables, graphs, and text used in the calculations. A hard copy of all computer data bases used in design calculations should be included in the documentation for the project.
- Have notes reviewed by the Department Manager (organization and content) and assigned Q4 reviewer as soon as possible, while the information is still fresh to the designer. No notes shall be marked as final until they are reviewed.

- Review
  - Design notes will be reviewed by the designer during the Q3 Quality Review of Design Notes, Drawings, and Specifications by the Project Design Team. Designers will document Q3 Review on Form TS-C-5.
  - Design notes will also be reviewed by the Project Review Team during Q4 Review of Design Notes, Drawings, and Specifications. Each discipline's Review Team Member will document the review on Form TS-C-6.
  - Initial Q4 Review revisions shall be marked on a copy of the design notes.
  - If the designer concurs with the revision, the change will be added to the original design notes and be initialed by the reviewer and designer.
  - If the designer does not concur with the revision, the conflict will be resolved with the reviewer.
  - The Department Manager will arbitrate conflicts until concurrence is obtained.
  - Only revised original design notes should be retained for documentation. Any notes that are replaced should be marked void in red ink and be retained with the design notes.

- The reviewer shall sign the block titled "Checked By" on each page of the original design notes.

- Documentation
  - At the completion or termination of a project, the individual discipline designers will organize, index, and submit their design notes to the Project Manager for filing for record.
  - The Project Manager will assemble design notes from all disciplines involved on the project, organize, index, and send the notes to the Records Department for microfilming, filing, and storage. Design and report notes will be retained for five years from project completion, and then microfilmed. Originals will be destroyed after five years.

10.4.7.3 Drawings

- Burns & McDonnell Drawings:
  - Designer will perform a detailed check of all dimensions and notes on drawings.
  - Designer will check to see that design notes have been correctly interpreted and necessary details shown on drawings.
  - Designer will review all drawings to verify that sections and details are labeled correctly.
  - Project Architect or Discipline Engineer will coordinate drawings with other disciplines' drawings for workability and conformity.
  - Discipline Detailing Coordinator will review all drawings for conforming to Company or special drafting standards, including the project CAD procedures.
  - Discipline Department Manager and applicable consultants will review all drawings for general check.
  - Use standard General Notes as a guide to avoid omitting necessary criteria.

- Specific Requirements for Structural Steel Design:
  - Company Designed Structures

    When our project responsibility includes the preparation of structural steel drawings, we will assume responsibility and authority for all aspects of the structural steel

design, including all connections. For complex steel structures (such as trusses), we may specify in the contract specifications that the fabricator have a licensed professional engineer design the connections and seal the drawings. In all cases, whether the connection was designed by the Company or the fabricator, we must review and approve shop drawings prepared by the fabricator for compliance with the strength and stiffness requirements of the design.

- Structures Designed by Others

  When steel design is performed by the Contractor in supplying specified equipment, components or systems, we should specify that the design be accomplished and the drawings sealed by a licensed professional engineer who will assume full authority and responsibility for this work. Our shop drawing review should be limited to conformance with overall project requirements. We should not ordinarily ask for or review the design notes of the Contractor's professional engineers.

- Erection of Steel

  When the Contractor's erection methods require special design (e.g., falsework, shoring, temporary structures, and the like), the Contract Documents should specify that the erector have a qualified engineer perform these services. Our review of this work should be limited to its effect on the integrity of the permanent structure.

- Use of Drawings Prepared by Others as a Burns & McDonnell Contract Drawing:

  Sometimes a drawing developed by others is used as the basis for preparation of a Burns & McDonnell contract drawing. In all cases, the drawing must be marked to indicate the work being designed and added by Burns & McDonnell, and the seal of the Burns & McDonnell professional in responsible charge of the work shall be added as appropriate.

  Two optional procedures for using drawings prepared by others are specified in the Company Design Standards Manual. The two procedures are summarized as follows:

  - Preferred option: The drawing prepared by others is reproduced onto a border sheet with the Burns & McDonnell title block; the original border and title block are retained on the drawing. Revisions are clearly defined by enclosing our revisions with a “cloud” and including a standard revision triangle within the “cloud.” Space between the Burns & McDonnell drawing border and the original border shall be used to indicate how Burns & McDonnell’s revisions are shown on the original drawing.

The lower right corner shall contain the Burns & McDonnell "responsibility stamp" and seal of the Burns & McDonnell professional in charge.

- Less desirable option: Same as preferred option except drawing by others is not reproduced on a Burns & McDonnell border and title block.

10.4.7.4 Specifications

- Start specifications early in design; do not wait until end of design phase.
- Do not specify untried or untested materials without reasonable research.
- Use the Project Information Request form (Appendix B, Section I.C.) to document investigation of products or material.
- Use current Company standard specifications unless otherwise required by the Client.
  - Edit master copies for each particular project.
  - Do not use specifications from similar or past projects unless approved by the Global Practice or Regional Office Quality Control Director.
  - Be familiar with any specification included by reference. It will carry as much weight as any other part.
- Do not insert a manufacturer's specification that is not understood by the designer, or one that is strictly proprietary and will prohibit competitive bids.
- Project Discipline Architect or Engineer will prepare technical sections for his or her portion of project.
- Project Review Team Architect or Discipline Engineer (or designate) will perform a Q4 Review of completed technical specifications. In addition, technical specifications that are not prepared from Company standards will receive a Q5 Review by the Specifications Department.
- Project Manager will coordinate compilation of specifications and prepare contractual-legal portion and Division 1.
- Evaluate carefully all contractor-requested substitutions for acceptability. Insist the contractor submit necessary information using the Product Evaluation Questionnaire form, and in accordance with the conditions of the contract. Maintain completed forms in project files.

10.4.7.5 Design and Construction Contract Packages

- General
  - The Contract Documents set forth the contractual-legal requirements and the technical requirements for equipment, materials, and workmanship in order to ensure quality of the finished product or project. For construction projects, the drawings and technical specifications complement each other. Where drawings show the form of construction, technical specifications establish its quality and form the basis for judging whether quality of proposed items conform to the intent. To ensure consistency, duplication of information on drawings and in specifications should be avoided. Care must be exercised to ensure that all necessary requirements are set forth in the appropriate document and properly coordinated.
  - Standard documents have been developed which are to be used for all projects unless otherwise required by the Client. These documents include bidding requirements, Contract forms, contract conditions, and specifications. The standards are established and updated in conformance with the latest recommendations of professional associations concerned with accuracy and minimizing the exposure to liability in Contract Documents.
  - Other Contract Documents are contract drawings, addenda, and modifications. Addenda are changes and clarifications of the Contract Documents that are issued during the bidding period, while modifications such as change orders are issued after award of contract. These become a part of the Contract Documents when the contract or change order is executed.
  - Bid Documents are defined as those which enable bidders to prepare their bids. Contract Documents are defined as those which the successful bidder (contractor) follows in performance of the contract. The following documents are usually bound together in single or multiple volumes termed the "Project Manual":
    - Invitation to Bid
    - Instructions to Bidders
    - Bid Form
    - Bid Bond
    - Agreement

- Performance Bond
- Labor and Material Payment Bond
- General Conditions
- Supplementary General Conditions (if any)
- Labor-related Regulations
- Specifications

- Company Standards
  - Standard specifications developed for Company use promote uniformity and efficiency in preparation. The Company standard specifications for general building construction conform to the Construction Specifications Institute (CSI) system formats which are widely followed in the construction industry.
  - The Company Construction Documents and Specifications Manual provides guidance for the preparation of the specifications. A current listing of all standard specifications stored on the CWP system is available from the Company intranet or from the Specifications Department.
  - The Company standard guide specifications are to be used insofar as possible. The standards are stored in the computer and are accessed and edited using the computer word processing system. Copies of the standards are available from the Company intranet or from the Specifications Department for mark-up. When the standard has been marked up, it should be checked by the architect or discipline engineer responsible for the contract, reviewed by the Specifications Department (optional), and submitted to Central Word Processing.
  - Commonly used government agency guide specifications can be obtained from agency websites on the internet. CWP operators are trained in the special word processing software "SPECS INTACT" used for government agency guide specification editing.
  - The Company has prepared standard specifications for specialty construction items such as piling, drilled shafts, sheeting and shoring, dewatering, and tunneling which, due to the site specific nature of subsurface conditions at each project, are coordinated and maintained in-house by the Geotechnical Department. If such a specification is to

be prepared for the project, contact the geotechnical discipline engineer for its preparation and review.

- If there is no standard specification to fit the need, the writer should contact the Specifications Department regarding availability of some other standard. If none is available, the writer must develop a new specification which must be written in the CSI format. In developing or editing specifications, it is important that language be carefully worded to prevent misinterpretation, conflicts, or unwanted liability incurred. Specifications are legal contract documents. Assistance in format and writing is available from the Specifications Department.
- Outdated standard specifications or those prepared for another project must not be marked up for a new contract, unless permission is obtained from the GP/RO Quality Control Director (see paragraph 10.2.6.4 Specifications).

- Contractual-Legal Requirements
  - General
    - These documents (Invitation to Bid through General Conditions) define detailed requirements for execution and performance of the contract and establish the responsibilities and limitations of parties involved in the project.
    - Because these standards have been developed over the years by organizations representing consultants with the goal of the documents being legally correct while minimizing exposure to unwarranted liability, it is essential that contractual-legal documents issued by the Company conform to the standards insofar as possible. Some Clients, both governmental and private, have their own standards which must be used. Where funds administered by Rural Utilities Service (RUS) or the Environmental Protection Agency (EPA), for example, are involved in the project, their requirements must be met. However, such required documents should be modified or supplemented to make them conform as nearly as possible to the Company standards while being acceptable to the Client or agency. Modified or supplemented documents should be referred to the manager of the Specifications Department for review. The manager of the Specifications Department will obtain input and assistance from the Legal Department as needed.

- Because the documents are subject to continual updating, it is imperative that the most recent version of standards be used.
- Construction Insurance Requirements
  - Special attention should be given to setting up insurance requirements in the contractual-legal documents and reviewing insurance policies and certificates for conformance. The Company must not be exposed to the liability which might result from improper handling of insurance matters.
  - When the Company prepares the construction contract using its own standards, it is essential that there be specific Client approval of the insurance requirements. Standard contract language must be sent to the Client to obtain approval of forms of coverage and to establish the limits of coverage desired. Suggested wording for the cover letter is as follows:
- "Enclosed are our standard construction insurance provisions which have been used on other projects similar to this one. Please have these reviewed by your insurance advisor to determine if they are acceptable for this project and indicate the amount of coverage you desire."
  - All insurance policies and/or certificates of insurance, submitted by contractors, should be transmitted to the Client for approval. Suggested wording for the cover letter is as follows:
- "Enclosed are the insurance certificates (policies), received from XYZ Company for Contract No. XXX. Please have these reviewed by your insurance advisor and notify us if they are acceptable."

- Industry Codes and Standards

  Many technical and industrial organizations have developed codes and standards which are well recognized and may be incorporated into the specifications by reference. A listing of such standards organizations is included in the Construction Documents and Specifications Manual. Reference to such a code or standard will be considered as applying to the most recent revision unless otherwise specified; therefore, date of standards should not be included unless required by specific need or by Client requirement.

- Subsurface Information

Subsurface Data are not a part of the Bid or Contract Documents and are to be issued separately upon request of the bidder, in accordance with policy outlined in Appendix B.

- Company Construction Documents and Specifications Manual
  - The Company Construction Documents and Specifications Manual provides detailed guidance for the preparation and organization of Contract Documents, including the contractual-legal requirements, specifications, and drawings. It also includes sample specifications and addenda.
  - Related topics are also discussed to give a background on the intent of contract documents, liability involved, relation of drawings to specifications, computer word processing system, printing and distribution, and specifications revision procedure.
- Specifying New Products
  - When considering the specifying of new products or products with which you are not familiar, the Company is responsible to the Client to conduct a proper investigation into the suitability of the product for its intended use.
  - Document your investigation by using the Company's Product Information Request Form (Form TS-S-4) and keep it in the project files.
  - Obtain the Client's concurrence with use of the product.
  - Refer to Appendix B, Section I.C. - Qualifying Manufacturer's Products.
- Substitutions for Specified Equipment and Material
  - It sometimes becomes necessary during the course of a project to consider substitutes for specified equipment or material, perhaps through the unavailability of a specified item or the desire of the contractor.
  - Substitutions should be considered only when they are in the best interests of the Client.
  - Substitute equipment and material must be investigated unless you are thoroughly familiar with them.
  - Document your investigation by having the contractor submit our Product Evaluation Questionnaire (Form TS-S-3). Additional guidance is included in the Division 1 guide specifications on this subject.

- Provide submittals to all affected.
- Obtain Client concurrence to the use of the substitute material or equipment.
- Refer to Appendix B, Section I.C. - Qualifying Manufacturers Products.

- Submittals
  - Project Architect, Discipline Engineer, or designated designer will accomplish submittal check.
  - Submittals will be checked for compliance with design intent, information in the Contract Documents, and regulatory requirements.
  - Verify that contractor has checked submittals of subcontractors prior to our check; if not, return drawings to contractor without approval and require resubmission.
  - Do not hold submittals in office for checking any longer than necessary. Comply with time limitations in specifications or conditions of the contract.
  - Submittals will be processed in accordance with the Company Contractor Submittal Processing Procedures policy (Refer to Appendix B), or in accordance with the requirements of an automated electronic submittal processing system such as the Oracle "Document Locator" software.

- Use of Reference Drawings with Contract Documents
  - Reference drawings are sometimes issued to contractors to supplement information shown on the contract drawings. These drawings furnish information to the prospective bidders which might in some way affect the work required by the Contract Documents, and additionally, in some cases, show work required by the Contract Documents.
  - Reference drawings originate from multiple sources: Client's "As Constructed" drawings, utility company or Client's drawings showing location of facilities, submittal drawings received for previous contracts, and Company drawings prepared for previous contracts.
  - Our standard General Conditions of the Construction Contract define reference drawings as follows: "Drawings not specifically prepared for this Contract, but which contain information pertinent to the Work." Contract drawings are defined as: "Drawings and other data designated as Contract Drawings, prepared by the Engineer

for this Contract which show the character and scope of the Work to be performed and are referred to in the Contract Documents."

- Company policy for issuing reference drawings with our Contract Documents is as follows:
  - Reference drawings are not contract drawings and, therefore, should specifically not be included under "DEFINITIONS - CONTRACT DOCUMENTS" listed in the General Conditions. They are to be listed by number, revision number, and title in DIVISION 1 - GENERAL REQUIREMENTS, SECTION 01110 - SUMMARY OF WORK under the heading "REFERENCE DRAWINGS" immediately following the listing of "CONTRACT DRAWINGS." Each reference drawing should be clearly labeled as a reference drawing.
  - Reference drawings may be either bound in the same set with the contract drawings or bound separately if necessary. If reference drawings are bound separately, make sure the Contractor receives them along with the Contract Documents. Both the specification listings and the drawings title sheet listings of drawings should maintain a distinction between contract and reference drawings.
  - If the drawing was not produced by the Company, do not reproduce it as a reference drawing on a sheet bearing a Burns & McDonnell title block and do not use the professional registration seal of a Burns & McDonnell Engineer or Architect.
  - In certain instances, reference drawings may indicate some work which needs to be accomplished by the Contractor. This work should be made part of the contract by appropriate reference within either the contract specifications or contract drawings.
  - On some projects, Company drawings have been used which detail work that must be accomplished by several different contracts. These are drawings which may be used in a given contract as either a contract or reference drawing. Refer to the Company Drafting Standards Manual, Section 8 - "Multiple Contract Drawings."
  - If at any time during the progress of the work, we become aware of errors in the reference drawings, we should notify the Contractor of the discrepancies in writing.

- All work on a contract drawing must be accomplished by the Contractor unless otherwise provided for by the Contract Documents, while the opposite is true for a reference drawing; i.e., no work shown on a reference drawing must be done by the Contractor unless specifically included by reference into Company-prepared drawings used for more than one contract. In the case of whether the drawing will be used for more than one contract, the Project Manager or delegate must make the decision as to whether the drawing will be used as a contract or reference drawing for each contract and then make the appropriate modifications to the Contract Documents.

10.4.7.6 Budget and Schedules

During design, make periodic checks against project budget and time schedule. Frequency depends on size and complexity of project, but should occur at least monthly.

10.4.7.7 Outside Consultants or Subcontractors

During design, make regular periodic checks to assure coordination between work of outside consultants or subcontractors and in-house design team.

10.4.8 Tools and Resources

10.4.8.1 General

Construction drawings are the graphic representation of the construction project. They show identification and types of materials, geometric relationships, sizes, and extent of construction components. There are many different ways to prepare drawings; however, there are compelling reasons for the Company to standardize drafting procedures, standards, and details to the maximum extent possible:

- To give drawings the appearance of having been produced by the Company rather than a collection of individuals.
- The use of standards reduces drafting errors.
- The use of standards reduces drafting and checking man-hours.
- Standards are most often established after field use and thus are usually sound, tested, efficient, and economical methods of construction.
- Standards are established and periodically reviewed and revised by our most experienced architects, engineers, resident project representatives, and detailers.

Therefore, Company Drafting Standards will be used on all projects unless our Client insists on the use of its own standards. Bear in mind that when we use other standards, it will cost more to produce the drawings because of increased drafting hours and increased checking hours.

10.4.8.2 Company Standards

Our standards are published in the Drafting Standards Manual available on the Company intranet to each architect, engineer, detailer, and drafter. The manual is Chapter 12 of the Company Policies and Procedures.

10.4.8.3 Standard CAD Details

Many standard details are stored in the computer for use. See the respective department Detailing Coordinator for those available. The use of stored standards reduces drafting and checking labor-hours, and in most instances improves the quality of the drawings. Refer to the Drafting Standards Manual for further information and guidance.

10.4.8.4 Computer Programs

- The Project Manager assumes responsibility for the accuracy and adequacy of the work product for the project and, thus, for any computer programs used in production.
- The Department Manager assumes responsibility for the accuracy and adequacy for any computer programs used by his/her Department.

10.4.9 Registered Professional Seal

- Sealing of Contract Documents by a Registered Architect or Professional Engineer.
  - Documents will be sealed in compliance with the laws, rules, and regulations of the state or governmental entity having jurisdiction over the project.
  - No final Bid or Contract Documents should be sealed without complete documentation of the Q3, Q4, Q5, and Q6 reviews.
  - Contract Documents which are not final, but are required by a governmental agency to bear a seal or certification shall be certified or sealed as required by that agency, and shall also be stamped to show their current status such as “PRELIMINARY-NOT FOR CONSTRUCTION” or “FOR APPROVAL.” The following note shall be placed adjacent to the stamped word(s):

"These documents are for review only and are intended to convey the current status of the information represented. The registrant's professional seal does not certify that the documents are in their final form or are approved by the Owner."

- A registrants' seal is to be applied to reproducible documents in original form only, except for those states which do not allow this practice.
- Electronic (CAD) or any other reproduction of a professional seal is allowed by some but not all governmental entities or state licensing boards. If required for the project and allowed by the state, the Company will provide electronic sealing of documents as approved by the Global Practice or Regional Office Quality Control Manager. The recommended approach includes appropriate electronic safeguards which negate the seal if unauthorized changes are made to sealed documents.
- Documents revised during bidding, construction, or for conformance to construction records should bear the original registrant's seal in its original format.
  - Should the documents be unsealed or the original registrant no longer is able to seal the documents, they shall be sealed by the registrant having responsible charge of the revisions represented by the documents. In addition the following note shall be added near the new registrant's seal:

    "This document was originally sealed and certified by (name), registration no. (XXXXX), on (date) . The registrant of this newly applied seal, dated (date), assumes responsibility for changes as indicated by Revision No. (XX)."
  - Design changes made via the use of interim documents such as Engineering Change Notices may need to be sealed if the original document was sealed. This typically only applies if the interim document is issued for construction.
  - All certifications or wording required by the rules and regulations of the state professional licensing board or agency involved, shall also be added to the document(s).

10.4.10 Document Control

10.4.10.1 Project Quality Control File

Creation of the Project QC File is the responsibility of the Project Manager. It is recommended that separate project QC files be maintained for the project and for individual contracts as appropriate. Signed originals

of all required forms and documentation should be filed together for various distributions of documents. The Project QC File will ultimately be filed in Records to be microfilmed.

10.4.10.2 Signing of Project Documents

10.4.10.2.1 General

Letters, memoranda, and other formal project documents are legal documents prepared in the course of providing services pursuant to our professional services agreement with the Client. It is Company policy that originals of all formal letters to parties outside the Company be signed by the author, and memoranda or other project documents be initialed or signed by the author. All documents should be dated on the day of issue.

With increasing use of electronic means of communication, the simple act of authenticating documents by signature has taken on added dimensions. To save time, documents are often forwarded as attachments to email to the intended receiver as well as to copied parties. All too often, these electronic attachments are not followed up with hard copy sent by mail or delivery service.

Accordingly, it is Company policy that originators of documents sent to parties outside the Company as email attachments shall perform the following:

- Place an electronic signature on the original document.
- Convert all signed email attachments to *PDF files prior to sending.

10.4.10.2.2 Electronic Signatures and Initials

Electronic signatures are obtained by electronically scanning the actual signature specimen, thereby converting it to a graphic object that can be imported into a letter (i.e., Word file) or other project document (i.e., native program file). The graphic is inserted similar to a picture, and can be resized as necessary to fit in the standard letter signature space. Thereafter, the file should be converted to a *PDF file as noted below.

Individual electronic signatures should be closely safeguarded by the person represented by the signature, with the same or greater precautions as are attached to computer passwords. Because of access vulnerability of personal computer hard drives, it is the prescribed practice to keep the signature file in the individual's personal area of the Global Practice or Regional Office server, which can be accessed only by the individual.

10.4.10.2.3 Preparation of *PDF Files

Documents can be converted to a *PDF file format using the Adobe *PDF writer on individual work station PCs. MS Word can be set up so that a file can be converted and saved as a *PDF by clicking on a *PDF icon while in Word. The *PDF format renders the document file unchangeable by receiving parties. Although writers are advised to type in the date on every document, the *PDF will assure that the issue date remains unchanged, particularly if the automated date feature of the word processing software is active when the document is prepared. Although it is convenient, the automated date feature is not recommended for preparing project letters and memoranda since the date automatically changes with subsequent opening.

As described in the Construction Documents and Specifications Manual, it is Company policy that all Bid or Contract Document packages (project manuals and drawings) or Company guide specifications sent electronically to parties outside the Company be converted to *PDF format prior to sending. This is to assure that only the Company maintains the original, controlling all changes to be made. The policy is only excepted if our professional services agreement with the Client specifically requires delivery of native electronic files of our work products.

10.4.10.3 Project Correspondence Policy

10.4.10.3.1 General

As a primary form of contact between the Company and the Client or with other firms, the appearance, organization, and neatness of letters, transmittals, memoranda, and other documents project an image of the Company to others. Therefore, all written correspondence on a project shall be formatted in the approved style on the appropriate templates available directly through Microsoft Word.

All correspondence (letters, memoranda including meeting notes, fax memoranda, telephone call memoranda, transmittal letters or memoranda, and other documentation) shall be referenced in the subject line as follows or as specifically defined by the Project Manager:

Project No. <xxxx>, Contract <No. > <Title> <Filing Code>

<Contractor's Job No.>(optional)

A chart of filing codes shall be used by the writer (or recipient) to classify all correspondence (including E-mail) for filing. The standard filing codes established by the Global Practice or Regional Office should be followed. An example of a possible filing code listing is included

herein. At the start of the project, the Project Manager shall define the file indexing and coding to be used for project paper and electronic files.

Electronic templates for letters, memoranda, telephone call memoranda, Fax memoranda, transmittal letters, quality control forms, and certain other general office forms are available directly through Microsoft Word. These forms may also be opened for previewing and printing from the Quality Program web page on the Burns & McDonnell intranet.

Letters, memoranda, and transmittal letters should include the signature. Where such correspondence is to be distributed in paper format, the signature should be hand-written on the original and additional copies reproduced from the original. When such correspondence is to be distributed electronically as an attachment to an E-mail, the computer file containing the correspondence should be in PDF format versus Word or other native format and should include the signature as described in the preceding section.
Paper media shall be used for agreements or other documents that bear professional seals or original handwritten signatures.

10.4.10.3.2 Project E-Mail Management

E-mails and attachments between the Company and the Client, subcontractors, suppliers, contractors, and others shall be filed in paper project files or electronically in project specific subdirectories, eventually to be archived with all other project correspondence. E-mail determined by the writer to be significant shall be properly file-coded and forwarded to the project assistant for filing, either in electronic files or printed out for hard copy files

As an alternative to paper files, an E-mail address (mailbox) can be set up by the Company's E-Mail Support Group and maintained by the project assistant or other designee. The mailbox can be set up with general project and contract folders indexed and coded as outlined below, with separate folders for general project files and for each construction or equipment contract.

Folders can typically be created as "shared folders" accessible to the Project Manager and other Project Team members within the Company. Project E-mail access rights are established to permit "Read Only" or "Read and Write" by designated Project Team members. Normally, the Project Manager, project assistant, and possibly the discipline leads are given full "Read and Write" rights.

The Microsoft Outlook feature "Rules" available under the "Tools" menu should be used to assist with automated filing of project E-mails into the various general project (GF) and contract folders (CF). E-mail rules can be established that take into account the project, contract number, and

filing code in the subject line of each E-mail, in order that mail can be moved into the appropriate folder. For example, rules could be established so that "File: 20016 - CF-102-PCO" in the subject line would result in the E-mail being filed in the project 20016 folder "Construction and Equipment Contract Files - Contract 102 -- Potential Change Orders." If the E-mails are copied to a project E-mail address, the subject line does not need to include the project number. If no valid general or contract filing code is found in the subject line, the E-mail will typically be moved into a general project folder.

The originator of outgoing E-mails is responsible for putting in necessary file information in subject lines and copying the E-mail to the appropriate project E-mail address.

Likewise, the recipient of incoming E-mails is responsible for dragging and dropping the E-mail in the appropriate shared folder or forwarding to the project mailbox, if the project mailbox was not copied by the originator. A file code must be included.

All attachments to E-mails leaving the Company shall be Portable Document Format (*PDF) files, so that they cannot be changed by the recipient, particularly in the case of formal project correspondence. Letters and other formal documents that are attached to E-mails shall be in PDF format and have electronic or handwritten signatures. See discussion above.

The Company's Information Technology (IT) group procedures will be used for network / E-mail backup, with full backups for both E-mail and network servers each weekend by IT and incremental backups every day. At project completion, the project mailbox will be archived or sent to Records with paper files for storage and microfilming.

E-mail is purged from individual personal computers every few months. Project mailboxes are not so purged. Therefore, it is important that individuals receiving project E-mail be certain it is copied or forwarded to the project mailbox, adding the appropriate file code as necessary.

10.4.10.3.3 Correspondence File Indexing and Coding

Files are set up for each project according to the standard established by the Global Practice or Regional Office and project specific standards established by the Project Manager. An example of a document file code index is as follows. Not every project will use all of these codes, requiring the corresponding folders to be set up.

10.4.10.4 Records Retention

10.4.10.4.1 Project Completion

Records retention periods must have a common starting date - a point in time from which they commence to run.

For purposes of records retention and disposition, a project will be considered "complete" when substantially all record information has been filed and microfilmed, the Company has been paid in full, and the project is "closed" in Accounting. An exception will be made whenever there is a potential lawsuit. Upon settlement of claims, the Project Manager and Global Practice/Regional Office Manager will establish a "completion date" which can be the same date as defined above.

10.4.10.4.2 Communicating Retention Policies To Client

Occasionally, Client requirements, court orders, consent decrees, or other situations establish document retention policies. Any retention period beyond our own should be assumed, and document storage space provided, by the Client.

It will be the responsibility of the Project Manager to inform the Client of our records retention and disposition policies. These policies should be confirmed to the Client by inclusion in the "Project Program."

10.4.10.4.3 Filing Information In Records

Those desiring to file information in the Records Department must complete a Filing Information Form AS-R-8 so material can be identified, indexed, and recovered when needed. Provide a complete description of the material to be filed on this form. If the description is incomplete, it will be returned to the sender for additional information.

10.4.10.4.4 Technical Submittals

Record copies of technical submittals shall be retained five years from the project completion date and then microfilmed. However, void and extra drawings shall be destroyed upon project completion. Once the technical submittals have been microfilmed, the Project Manager should send the original technical submittals to the Client.

10.4.10.4.5 Quality Records and Q Forms

Original forms in the Project QC files will be sent with other project files to Records upon project completion for retention for 5 years, then microfilming.

10.4.10.4.6 Correspondence

Correspondence files shall be retained five years from project completion date, then microfilmed. Originals will be destroyed after five years. This shall include contract and general correspondence, daily (weekly, etc.) construction reports, engineers' estimates, change orders, laboratory tests, and letters of transmittal on projects where we check submittals and provide resident project representation.

10.4.10.4.7 Original Drawings

Original drawings that Conform to Construction Records shall be sent to the Micrographics Department for processing. After Client-required copies have been made, drawings will be microfilmed as follows:

- Drawings will be microfilmed on 35 mm negative film and left in roll form. (These shall be indexed by Micrographics.)
- One duplicate security roll.

Microfilm shall be retained indefinitely. Aperture cards shall be available for reference on a viewer in Micrographics. Micrographics can make 18" x 24" prints for further reference.

If requested by the Client, a duplicate roll or a set of aperture cards can be made. Micrographics can also make duplicate 18" x 24" prints.

After original drawings have been microfilmed, they shall be sent to the Client.

10.4.10.4.8 "As Bid" Contract Documents

Once Contract Documents have been made available for bidding or construction purposes, a set of the original bid drawings, specifications, addenda, and revised drawings shall be sent to Micrographics to be microfilmed. Originals will be destroyed after they are microfilmed. The microfilm of "as-bid" drawings and specifications shall be retained indefinitely.

10.4.10.4.9 CAD Drawing File Archives:

CAD drawing files will be archived by Computer Resources to 8mm tape upon written request. Two sets of tapes will be made. One set will be stored on site by Computer Resources for 20 years. The second set of tapes will be placed in off-site storage for a time period of 20 years.

10.4.10.4.10 Design and Report Notes

Design and report notes shall be filed in Records upon project completion. The designer must index all design and report notes before they will be accepted for filing.

Design and report notes shall be retained five years from project completion date, then microfilmed. Originals will be destroyed after five years.

10.4.10.4.11 Project Manual

The "record" signed, conformed (or approved copies in the case of government projects) copies of the project manual shall be retained by the Records Department for five years. The record envelope copy shall be microfilmed. The original will be destroyed after five years.

Initial or check copies shall be destroyed when "record" signed, conformed, or approved copies are received. Supplemental approval copies from a State Board of Health, RUS, etc. shall be retained only until project completion.

10.4.10.4.12 Reports

The record copy of a report will be filed in the Records Department and be retained indefinitely.

10.4.10.4.13 Report Negatives and Manuscript Originals

Report manuscript hard-copy originals shall be destroyed by the Project Manager when the report is accepted by the Client.

10.4.10.4.14 Operations and Maintenance Manuals

The record copy of each O&M manual written or compiled by Burns & McDonnell (as opposed to having been submitted by the Contractor) shall be retained five years from project completion, then microfilmed. The original manual will be destroyed after five years.

10.4.10.4.15 Subsurface Information

The Geotechnical Department shall maintain a separate file on subsurface data. This file will contain subsurface investigations, test piling, turbine levels, and pile driving records, etc. Subsurface information will be retained indefinitely.

A copy of the Subsurface Information Document shall be retained for five years and then microfilmed. The original will be destroyed after five years.

10.4.10.4.16 United States Geological Survey Maps

U.S.G.S. maps will be ordered and maintained by the Central Library. Return clean or unused copies to the Library for storage and reissue.

10.4.10.4.17 Record And Void Record Rack Sets

The Project Manager will destroy record rack sets when (a) original drawings have been revised to Conforming to Construction Records, (b) microfilm and copies have been made, and (c) construction contracts have all been paid and closed out.

10.4.10.4.18 Field Sets

The Project Manager will destroy field sets when original drawings have been revised to Conform to Construction Records.

10.4.10.4.19 Field Survey Notes and Diaries

These shall be filed in the Records Department with the design notes, be microfilmed, and then be retained five years. Originals will be destroyed after five years.

10.4.10.4.20 Construction Photographs

Records shall retain construction photographs required by the contract specifications for five years after project completion. Photos shall then be sent to Publications for selection of photos for Company archives.

10.4.10.4.21 Aerial Photographs and Maps

When original drawings are sent to the Client, aerial photographs and maps will also be sent. For continuing Clients, the Project Manager may wish to retain the items for convenience with the Client's consent.

10.4.10.4.22 Miscellaneous Records

The Records Department can be expected only to retain information of definite reference value. Do not use it as a dumping ground for odds and ends that you do not know what to do with. Take time to really evaluate each item before adding to the files.

Miscellaneous envelope files will be microfilmed and then be retained by Records for five years. Originals will be destroyed after five years.

10.4.10.4.23 Q6 Contract Document Review Sets

The Quality Review Department shall maintain a separate storage file for Q6 Contract Document review sets. The Q6 review sets will be destroyed after one year.

10.5 EVALUATION AND IMPROVEMENT

10.5.1 Quality Audits

10.5.1.1 General

The Burns & McDonnell Quality Departments perform random quality audits to verify that production activities in the various Global Practices and Regional Offices are conducted in accordance with the requirements of the Company's Policies and Procedures Manual, as related to quality of the work. The goal of these audits is to strengthen the Quality Program by determining degree of implementation, verification of conformance and exceptions, and formulating positive recommendations for action items necessary for improvements.

The Burns & McDonnell operating unit is notified of the audit approximately one month in advance, to permit adequate preparation and coordination. An audit team is named, normally consisting of the Director of Quality Assurance, the Global Practice or Regional Office Quality Manager, and one or more auditors. Items provided to the operating unit in advance include:

- A standard "Audit Checklist"
- A listing of open, active projects, sorted by project managers, and annotated to show specific projects of interest
- Memoranda to individual project managers with project questionnaires pertaining to annotated design and/or report projects for which they are responsible, and requested project documentation for audit

The audit proceeds with an inter-mix of discussions on the "Audit Checklist," and individual meetings with project managers to review specific project records (primarily Quality Control review documentation). Typical work products prepared by the Global Practice or Regional Office are reviewed for quality of preparation, and project administrative procedures and documentation are also reviewed for conformance with Company standards.

10.5.1.2 Audit Checklist:

The standard "Audit Checklist" is broken down into six parts that address general conformance with the Quality Program and the four related manuals pertaining to production of drawings, specifications, reports, and other work products:

- Quality Program implementation and monitoring, including aspects of quality assurance and quality control
- Project production and conformance to the "Quality Control Manual"
- Report production and conformance to the "Report Preparation Guide"
- Drawing production and conformance to the "Drafting Standards Manual"
- Project manual production and conformance to the "Construction Documents and Specifications Manual"
- Coordination and other needs within/among the World Headquarters and/or Regional Offices

Within the "Audit Checklist, " additional items of interest are requested for the auditors' examination, such as sample reports, drawing sets and project manuals, design notes, and other items.

To accompany the responses to the "Audit Checklist," the following general Global Practice/Regional Office items are also examined and discussed during the audit:

- Current "Review Team Log"
- Current chart of "Quality Improvement Initiatives"
- Current "Goals and Action Plan" as part of the Quality Improvement Program
- Global Practice/Regional Office organization chart and/or listing of Department Managers, Project Managers, Section heads, CAD Coordinator(s), Computer Administrator, and other key staff.
- Typical project document filing structure (including locations for QC documentation)

A summary of the "Audit Checklist" is shown on a subsequent page.

10.5.1.3 Project Manager Interviews

A list of active Global Practice or Regional Office projects for which individual project managers are responsible is provided to each selected project manager prior to individual meetings with the audit team. The project listing is obtained from the Management Information System (MIS) current as of the last day of the month preceding the audit. Projects of audit interest are annotated on the lists. Project managers are instructed to complete the applicable questionnaire (design or report project) and bring to the audit interview the project file(s) containing pertinent quality review documentation for each of the annotated projects.

Copies of the design project and the report project audit questionnaires are included on subsequent pages.

If the schedule does not permit interviews with all project managers designated, the records and questionnaires for annotated projects are left for separate audit team examination. If the schedule permits, records for additional GP/RO projects not annotated may be reviewed by the audit team.

The general emphasis on project files is the review of quality review documentation. Items of interest to be evaluated include:

- Completeness of documentation, content of individual forms, and organization within files. For example, have all appropriate reviews been completed and documented?
- For design projects, review of files to verify whether the files and review forms are grouped and organized. Is it easy to find the quality review documentation? Is documentation well defined and complete for a given document distribution?
- For report projects, review files to verify that the quality review forms have been properly completed and can be easily located in the project files.

10.5.1.4 Report of Audit and Action Items

After the audit is completed, an out-briefing by the audit team is made to the Global Practice or Regional Office Manager and the Quality Manager to summarize discussions and review preliminary observations. A formal written report of audit is prepared that typically identifies good practices observed and defines specific items that require follow-on corrective action or improvement. The Global Practice or Regional Office management is required to respond to the audit findings and define actions required, approaches, responsible parties, and schedules for completion.

10.6 FORMS

Form No.	Title	
TS-C-3	Q1 Review (Project Summary) – Review of Design Studies, Pre-Design, and Phase I Conceptual Design	
TS-C-4	Q2 Review (Project Summary) – Review of Phase II Preliminary Design	
TS-C-5	Q3 Review – Designer's Review of Design Notes, Drawings, and Specifications	
TS-C-6	Q4 Review – Review of Design Notes, Drawings, and Specifications	
TS-C-7	Q6 Review – Review of Design and Construction Contracts	
TS-C-8	Quality Review Team Assignments for Design Projects	
TS-C-10	Order and Authorization for Application of Professional Seal to Contract Docs	
TS-C-11	Q5 Review – Review of Contractual-Legal Documents and Specifications	
TS-C-12	Q-1R Preliminary Review - Quality Review of Planning for Reports and Studies	
TS-C-13	Q-2R Intermediate Review - Quality Review for Reports and Studies	
TS-C-14	Q-3R Final Review - Quality Review for Reports and Studies	
TS-C-17	Verification of Completion / Release for Use Form	
TS-C-18	Q1 Review (Individual Work Items) – Review of Design Studies, Pre-Design, and Phase I Conceptual Design	
TS-C-19	Q2 Review (Individual Work Items) – Review of Phase II Preliminary Design	