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

CESAD-RBT

26 JUL 2016

MEMORANDUM FOR COMMANDER, JACKSONVILLE DISTRICT

SUBJECT: Approval of Review Plan for Preconstruction, Engineering and Design Phase Implementation Documents for S-470 Pump Station and Inflow Works, Caloosahatchee River (C-43) West Basin Storage Reservoir Project, Hendry County, Florida

1. References:

a. Memorandum, CESAJ-EN-Q, 21 June 2016, subject: Approval of Review Plan for Preconstruction, Engineering and Design Phase Implementation Documents for S-470 Pump Station and Inflow Works, Caloosahatchee River (C-43) West Basin Storage Reservoir Project, Hendry County, Florida (Encl).

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

2. The enclosed subject Review Plan (RP) submitted by the Jacksonville District via reference 1.a has been reviewed by this office and is hereby approved in accordance with reference 1.b above.

3. We concur with the determination of the District Chief of Engineering and conclusion in the RP that a Type II Independent External Peer Review (IEPR) is not required on the Design Documentation Report and Plans and Specification for these culverts. The primary basis for our concurrence is that the failure or loss of the structures related to this project will not pose a significant threat to human life.

4. The District should take steps to post the RP 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 RP, such as scope or level of review changes, should they become necessary, will require new written approval from this office.

5. The SAD point of contact is [redacted]

Encl

[redacted]
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

21 June 2016

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

SUBJECT: Approval of Review Plan for S-470 Pump Station and Inflow Works, Caloosahatchee River (C-43) West Basin Storage Reservoir Project, Hendry County, Florida

1. References:

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

b. WRRDA 2014; PL 113-121, 10 Jun 14 (Project Authorization)

2. I hereby request approval of the enclosed Review Plan and concurrence with the conclusion 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 design documentation. The Review Plan complies with applicable policy, provides for technical review, and has been coordinated with the CESAD. It is my understanding that non-substantive changes to this Review Plan, should they become necessary, are authorized by CESAD.

3. 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.

FOR THE COMMANDER:

Chief, Engineering Division

Encl

PROJECT REVIEW PLAN

For

Pump Station S-470 and Inflow Works (Design Package 3) of the Caloosahatchee River (C-43) West Basin Storage Reservoir Project

Hendry County, Florida

P2 Number 114458

MSC Approval Date: Pending

Last Revision Date: None

THE INFORMATION CONTAINED IN THIS REVIEW PLAN IS DISTRIBUTED SOLELY FOR THE PURPOSE OF PREDISSEMINATION PEER REVIEW UNDER APPLICABLE INFORMATION QUALITY GUIDELINES. IT HAS NOT BEEN FORMALLY DISSEMINATED BY THE U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT. IT DOES NOT REPRESENT AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.

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1. PURPOSE AND REQUIREMENTS

a. Purpose

This Review Plan defines the scope and level of review activities for Pump Station S-470 and Inflow Works (Design Package 3) of the Caloosahatchee River (C-43) West Basin Storage Reservoir Project, Hendry County, Florida. The Preloading and Demolition Feature (Design Package 1), Pump Station S-476 (Design Package 2), and Civil Works (Design Package 4) are each covered in separate review plans. Design and construction of Design Packages 1 through 4 of the C-43 project are being performed by the non-federal sponsor, the South Florida Water Management District (SFWMD). Design Packages 1 and 2 are currently under construction. The implementation documents to be reviewed are Plans and Specifications (P&S) and the Design Documentation Report (DDR) prepared by the non-federal sponsor and their consultant. As discussed below, the review activities consist of a Quality Control (QC) effort by the SFWMD and their consultant and a technical review performed by U.S. Army Corps of Engineers (USACE). Also as discussed below, an Independent External Peer Review (IEPR) is not recommended for the design and construction of the Pump Station S-470 design package. Upon approval, this review plan will be included into the Project Management Plan (PMP) as an appendix to the Quality Management Plan (QMP).

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”, 21 July 2006
(3). ER 1165-2-214, “Civil Works Review”, 15 December 2012
(4). Central and Southern Florida Project, Project Management Plan, Caloosahatchee River (C-43) West Storage Basin Reservoir Project, P2 Number 114458

c. Requirements

This review plan was developed in accordance with EC 1165-2-214, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R). The EC provides the procedures for ensuring the quality and credibility of USACE decision, implementation, and operations and maintenance documents and other work products.

d. Review Plan Approval and Updates

The USACE 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. Like the PMP, 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) shall be re-approved by the MSC Commander following the process used for initially approving the plan. The latest Review Plan will be provided to the RMO and home MSC. The latest version of the Review Plan, along with the Commander’s approval memorandum, will be posted on the Jacksonville District’s webpage at: http://www.saj.usace.army.mil/Missions/CivilWorks/ReviewPlans.aspx.

e. Review Management Organization

The Review Management Organization (RMO) for Design Package 3 covered by this Review Plan is SAD. The Risk Management Center (RMC) has agreed with the identification of SAD as the RMO for this effort. The RMO will provide oversight for the reviews performed by USACE on the implementation documents prepared by the non-federal sponsor and will be responsible for the organization and selection and/or approval of the USACE technical review teams.

2. PROJECT INFORMATION AND BACKGROUND

a. Project Location

The Caloosahatchee River (C-43) West Basin Storage Reservoir (CRWBSR) Project is located on approximately 10,480 acres of land in Hendry County, Florida, on the Berry Groves parcel of property under SFWMD ownership. It is situated south of the C-43 canal and east of the S-79 spillway (See Figure 1: Project Location Map).

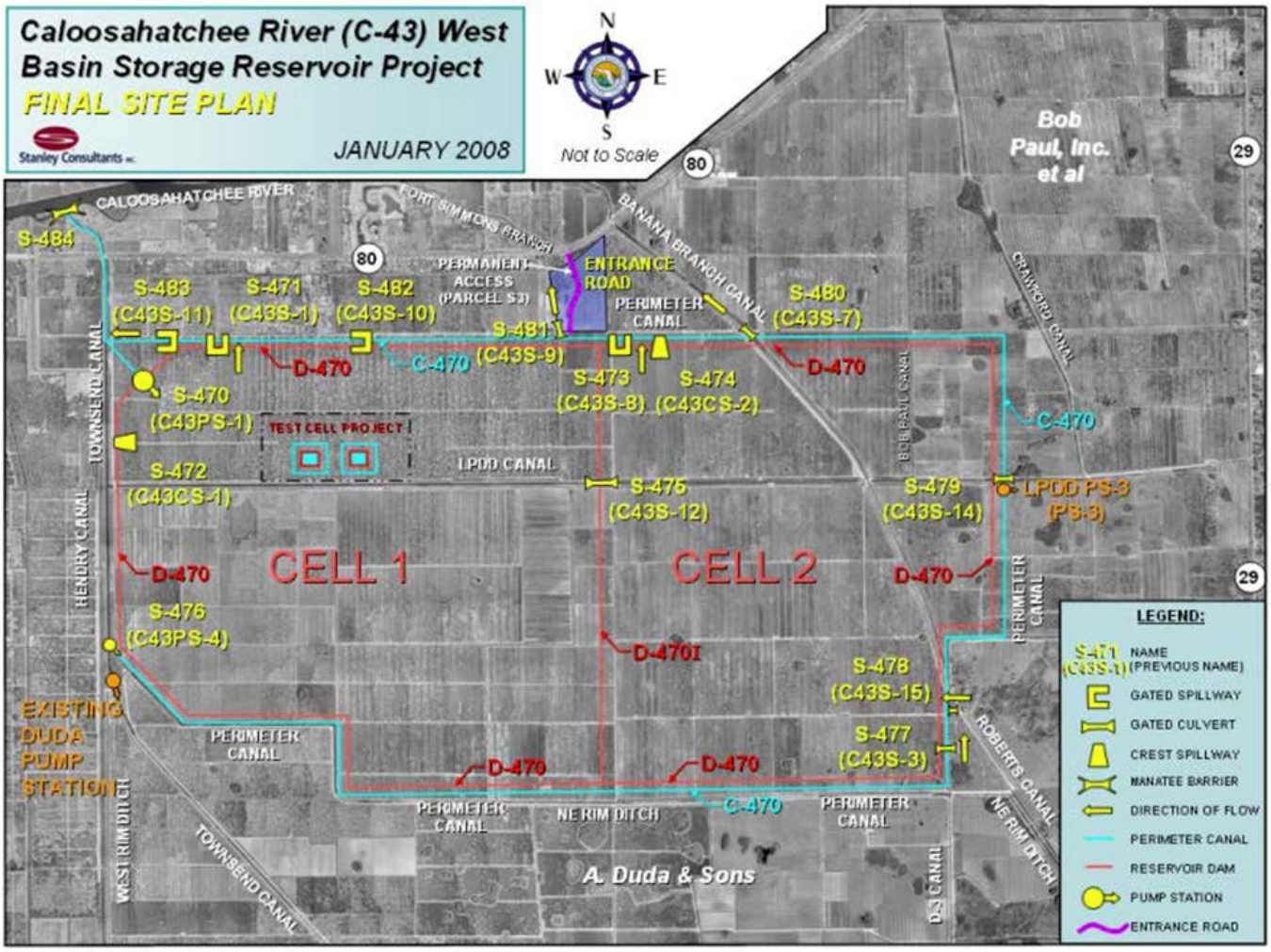

Figure 1: Project Location Map

b. Project Authorization

The Caloosahatchee River (C-43) West Basin Storage Reservoir Project was authorized for construction in the Water Resources Development Act of 2014.

c. Current Project Description

The purpose of the Caloosahatchee River (C-43) West Basin Storage Reservoir Project is to improve the ecological function of the Caloosahatchee Estuary by capturing and storing excess surface water runoff from the Caloosahatchee River (C-43 Canal) basin and excess releases from Lake Okeechobee, and then releasing the stored water to augment inadequate flows during the dry season to the Caloosahatchee Estuary. The Comprehensive Everglades Restoration Plan (CERP) identifies restoration of the Caloosahatchee Estuary as an integral step in achieving system-wide benefits in the south Florida ecosystem.

The C-43 project will construct a dam (D-470) creating a two cell reservoir covering approximately 9,000 acres with a total storage capacity of approximately 170,000 acre-feet. The reservoir will be filled with a 1,500 cubic feet per second (CFS) pump station (S-470) drawing water from the Caloosahatchee River (C-43 Canal) via the Townsend Canal during periods of discharge in the C-43 Canal. The reservoir will be bounded with a perimeter canal providing irrigation water supply and drainage to surrounding land owners who currently have water supply and drainage through pump stations and canals passing through the reservoir footprint. In addition to S-470, Package 3 will include inflow works to the pump station consisting of widening the Townsend Canal widening, the SR-80 Bridge protection features, and the Manatee Barrier. The perimeter canal discharge spillway S-483 is also being included because of its close proximity to the pump station S-470. Package 3 however will not include the pump station discharge pipes and stilling basin, which will be included in the Package 4: Civil Works. While the Manatee Barrier is included as a component of the inflow works, it is currently not included in the design contract. The SFWMD is currently in discussions with the Fish and Wildlife Conservation Commission and the Fish and Wildlife Service on possible alternative operational measures for manatee protection.

d. Project Background

The Caloosahatchee River (C-43) West Basin Storage Reservoir project design was completed to the Final/Ready-to-Advertise design level by Stanley Consultants in 2008 under contract with the SFWMD. The design was subjected to technical reviews following the SFWMD Project Quality Control Plan (Attachment C), which included participation by Jacksonville District Corps of Engineers (CESAJ). Each design submittal was reviewed according to Stanley Consultant's Quality Control Plan accompanied by a signed Quality Certificate of Compliance. Technical Review Briefings were conducted at the Preliminary and Final design phases, where SFWMD Management authorized the design to be advanced to the next phase. Comments, evaluations, and backchecks for these reviews can be provided by SFWMD upon request to the review teams covered by this review plan.

Following the State of Florida decision to suspend funding for the project in 2008, the design contract was terminated, and the project was shelved. At that time, the final design was completed, and all permits associated with the project had been obtained. The Project Delivery Team continued work to produce the Final Integrated Project Implementation Report (PIR) and Final Environmental Impact Statement (EIS) in March 2010 with the Record of Decision in April 2011. In addition, a Pre-Partnership Credit Agreement was executed in August 2009, which

allowed for the preparation of lands for project purposes, investigations to identify the existence and extent of hazardous substances, clean-up of hazardous materials associated with historic application of fertilizers or pesticides for restoration purposes if necessary, and investigations to determine the presence of cultural or historical resources.

In 2014 following large releases from Lake Okeechobee to the Caloosahatchee Estuary, the SFWMD received funding from the Florida legislature for an “Early Start” project intended to store water in a shallow impoundment on the southwest quadrant of the project site by constructing a berm approximately 10 miles in length along with the S-476 Pump Station. The SFWMD began design efforts in the fall of 2014 and awarded the first construction contract for the berm in January 2015.

Prior to execution of the Early Start berm contract, the Governor issued a statement committing to fully fund the State’s share of the project. The SFWMD withheld execution of the Early Start Berm construction contract and prepared a plan for finalizing the design and proceeding to construction of the C-43 Reservoir project.

With the Florida legislature being the funding source for the project rather than ad valorem revenues, the SFWMD broke the project into smaller phases for release of construction contracts consistent with an annual appropriation. The phasing plan, while sequencing the construction differently than originally planned in 2008, was determined necessary to begin showing progress to encourage continuing legislative appropriations while still targeting an aggressive project completion date. SFWMD elected to break the project into 4 separate bid packages as follows. Package 3 is covered by this review plan, while Packages 1, 2, and 4 are each covered in a separate review plan.

1. Design Package 1: Preloading and Site Demolition

   Design Package 1 includes the preloading of the locations for structures S-470, S-471, S-472, S-473, S-474, S-475, and a segment of the dam D-470 adjacent to the Townsend Canal. Site Demolition associated with Design Package 1 will consist of removal of all above ground agricultural buildings, irrigation system components, and culverts within the project area, as well as demolition of the test cells.

2. Design Package 2: Pump Station S-476

   Design Package 2 will deliver the updated design for irrigation water supply pump station S-476. With the currently planned construction schedule, a recirculation pipeline will be included to allow commissioning, operational testing, and routine exercising of the pumps until the perimeter canal is ready to receive irrigation supply water.

3. Design Package 3: Pump Station S-470 and Inflow Works

   Design Package 3 will include the S-470 pump station, the Townsend Canal widening, State Road 80 bridges protection features, a Manatee Barrier at the confluence of the Townsend Canal with the Caloosahatchee River, and the perimeter canal discharge spillway S-483. However, it will not include the discharge pipes and stilling basin, which will be included in the Package 4: Civil Works.

   Pump Station S-470 was originally designed as a diesel powered pump station. A life cycle analysis recently performed concluded that electric powered pumps will be more cost

effective. Even though minor changes are anticipated to the Inflow Works and Spillway S-483 due to design standards changes since 2008, the first design submittal will be at the Preliminary level since the pump station will be a new design and not an update.

4. Design Package 4: Civil Works

   Design Package 4 will include removal of the preload mounds constructed in Design Package 1, construction of the D-470 Cell 1 Embankment (West Cell), the perimeter canal, perimeter canal control structures, and the discharge pipes and stilling basin for pump station S-470. The Separator Dam between Cells 1 and 2 will be upgraded to the same criteria for dam safety as the perimeter dam.

   SFWMD may construct additional components subject to future Florida state appropriations. These components include construction of the D-470 Cell 2 Embankment (East Cell) and recreational features. These features will be included in Design Package 4. The decision to construct Cell 2 concurrently with Cell 1 or delay to a later date has not yet been made. In the interim, Package 4 will be designed with Cell 2 to be bid as an option.

e. Public Participation

The Jacksonville District Corporate Communications Office continually keeps the affected public informed on Jacksonville District projects and activities. There are no planned activities, public participation meetings or workshops that could generate issues needing provision to review teams. The project review plan will be posted on the Jacksonville District Internet at http://www.saj.usace.army.mil/Missions/CivilWorks/ReviewPlans.aspx. Any comments or questions regarding the review plan will be addressed by the Jacksonville District in coordination with the SFWMD if necessary.

3. QUALITY CONTROL BY NON-FEDERAL SPONSOR

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

4. USACE TECHNICAL REVIEW

a. Scope

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 will be performed by USACE personnel. This review will assist the sponsor in assuring that the work is in accordance with the authorized project and Corps guidance.

USACE shall develop a charge to reviewers to assist the USACE team members in their review by clarifying the scope of the review required. For Design Package 3, review team members may be from CESAJ and will be approved by SAD.

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).

The USACE Review Team shall prepare a report that consolidates the results of the USACE technical review and documents that all comments have been closed. In order to perform the required technical oversight, the RMO shall certify the summary report.

c. USACE Review Disciplines

The technical disciplines and the level of experience required for USACE review team members will vary for each of the design packages. The table and paragraphs below provide the required disciplines and associated experience for Design Package 3. For continuity, the same USACE review team members should be used throughout the review process if possible.

Discipline	Package 3 Experience
Team Leader	10
Civil	7
Structural	7
Mechanical	7
Electrical	7
Hydrogeology and Geology	7
Hydrology and Hydraulics	7
Geotechnical	7
NEPA Compliance	7
Cost Engineer	7

Team Leader. The Team Leader must have experience with the Dam Safety Program. ATR Team Leader can also serve as one of the review disciplines. Professional engineer registration is a requirement for the ATR leader.

Civil Engineering. The team member should be a registered professional engineer and experienced with civil/site work projects to include embankments, roads and highways, relocations, paving and drainage.

Structural Engineering. The team member shall be a registered professional engineer with experience in structural design of flood risk management project features such as pump stations, conveyance culverts, and spillways. Experience with the Dam Safety Program is required.

Mechanical Engineering. The team member shall be registered professional engineer experienced in design of flood risk management project features such as pump stations, related systems, components and instrumentation and control.

Electrical Engineering. The team member shall be registered professional engineer experienced in design of flood risk management project features such as pump stations, related systems, components and instrumentation and control.

Hydrogeology and Geology. The team member will review subsurface geologic data and interpretations to support embankment and foundation design and integrity. The team member also will review hydrogeologic data and interpretations to support hydrologic and seepage modeling, and an evaluation of characteristics of the surficial aquifer at the site. The team member should possess Professional Geologist certification. Profession experience, especially focused in South Florida applications is required. Experience with the Dam Safety Program is required.

Hydrology and Hydraulics. One to three team members will be required to review the hydraulic design, hydrologic-hydraulic modeling, and wind/wave analyses. The team member(s) shall be registered professional engineers with experience in conducting and evaluating hydrologic and hydraulic analyses for flood risk management projects. Experience with flood routing methodologies in reservoirs and channels, seepage flow processes, hydrologic-hydraulic modeling, surface water-groundwater interaction modeling, wind/wave analysis, and performance of risk assessments is required. Knowledge on hydrologic and hydraulic analyses in terms of water quantity and quality in a water resources system is expected. Experience with the Dam Safety Program is required.

Geotechnical Engineering. The team member shall be a registered professional engineer experienced in geotechnical engineering including geotechnical evaluation of flood risk management structures. Experience needs to encompass static and dynamic slope stability evaluation; evaluation of the seepage through earthen embankments and under seepage through the foundation of the flood risk management structures, including dams, levee embankments, floodwalls, closure structures and other pertinent features; and settlement evaluations. Experience with the Dam Safety Program is required.

NEPA Compliance. The team member shall be experienced in NEPA compliance activities and preparation of Environmental Assessments and Environmental Impact Statements for complex civil/site work projects.

Cost Engineer. The team reviewer shall be a senior level Cost Engineer with experience in projects relating design of flood risk management project features, such as pump stations, conveyance culverts, and spillways.

5. 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). Sections 2034 and 2035 call for peer review procedures for both the Planning and the Design and Construction (PED) phases. The EC terms 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.

b. Type I Independent External Peer Review Determination

Type I IEPR is generally for decision documents. No decision documents or other applicable Section 2034 products are addressed by this Review Plan. Therefore, Type I IEPR is not applicable to the implementation documents addressed by this Review Plan.

c. Type II Independent External Peer Review Determination

The project features included in Design Package 3 do not trigger the WRDA 2014 Section 2035 factors for Safety Assurance Review (termed Type II IEPR in EC 1165-2-214). Therefore, a review under Section 2035 is not warranted for Design Package 3. The factors in determining whether a Type II IEPR review of design and construction activities of a project is necessary are based on the EC 1165-2-214 Type II IEPR Risk Informed Decision Process. The following EC 1165-2-214 risk decision criteria are followed by a statement that forms the basis for the Type II IEPR determination for Design Package 3.

1. The Federal action is justified by life safety or the failure of the project would pose a significant threat to human life.

Package 3 for the design and construction of Pump Station S-470, the Townsend Canal Widening, State Road 80 bridge protection features, the Manatee Barrier and Perimeter Canal Spillway S-483 are all peripheral to the Dam and do not directly present a life safety risk if these project features are lost or fail.

2. The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods o
r models, or presents conclusions that are likely to change prevailing practices.

Pump Station S-470 and Spillway S-483 are standard type of facilities designed and constructed by the SFWMD using common methods. There are no novel methods, complex challenges, or precedent setting components likely to change prevailing practices.

3. The project design lacks redundancy, resiliency, and robustness.

Pump Station S-470 and Spillway S-483 are standard types of facilities designed and constructed by the SFWMD with an anticipated life of approximately 50 years. They are based upon standards that have been coordinated with USACE and developed over years of experience through the structures maintenance program to provide the resiliency and robustness required of the south Florida environment. Data communication with both structures for Supervisory Control and Data Acquisition (SCADA) will be via dual path to ensure redundancy for all conditions.

4. The project has unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

Construction schedule does not have unique sequencing, and activities are not reduced or overlapped. The construction delivery method for this project is the typical design, bid, build process that has been used successfully by the Corps of Engineers and SFWMD on similar projects.

Based on the discussion above, the Jacksonville District Chief of Engineering, as the Engineer-In-Responsible-Charge, does not recommend a Type II IEPR Safety Assurance Review of the P&S and DDR for Package 3: S-470 and Inflow Works.

6. POLICY AND LEGAL COMPLIANCE

These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. Quality Control Reviews augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

7. ENGINEERING MODELS UTILIZED

Design Package 3 will not utilize engineering models for design. The design is based upon field work to include geotechnical and civil survey.

8. SCHEDULE AND BUDGET

Each design package is being prepared on a different timeline and will therefore be reviewed separate of the other design packages. This review plan is for the review of Design Package 3: S-470 and Inflow Works.

a. Project Review Milestones

Package 3: S-470 and Inflow Works

Activity	Start	Finish
Carollo Engineers Quality Control Complete		
Preliminary Plans and Specifications		
SFWMD Quality Control Review	6/23/16	7/12/16
USACE Technical Review	6/23/16	7/12/16
Evaluate Comments	7/12/16	7/26/16
Backcheck/Close/Incorporate Comments	7/26/16	8/9/16
SFWMD Technical Review Briefing (TRB)	8/10/16	8/10/16
Intermediate Plans and Specifications		
SFWMD Quality Control Review	10/6/16	10/31/16
USACE Technical Review	10/6/16	10/31/16
Evaluate Comments	10/31/16	11/22/16
Backcheck/Close/Incorporate Comments	11/22/16	12/8/16
Final Plans and Specifications Submittal		
SFWMD Quality Control Review	2/17/17	3/14/17
USACE Technical Review	2/17/17	3/14/17
Evaluate Comments	3/14/17	4/4/17
Backcheck/Close/Incorporate Comments	4/4/17	4/18/17
SFWMD Technical Review Briefing (TRB)	4/19/17	4/19/17
Final Quality Control Review by SFWMD	4/20/17	5/26/17

b. USACE Review Cost

Funds will be budgeted to execute the reviews as outlined above. For the USACE Technical Review of the preliminary, intermediate, and final design phases of Design Package 3, it is envisioned that each reviewer will be afforded 40 hours for each review. The estimated cost range for these reviews is estimated to be between $50,000 and $60,000 per review.

ATTACHMENT A

APPROVED REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT B

ACRONYMS AND ABBREVIATIONS

Acronyms	Defined
ATR	Agency Technical Review
BCOES	Biddability, Constructability, Operability, Environmental, and Sustainability
C&SF	Central and Southern Florida
CERP	Comprehensive Everglades Restoration Project
CESAJ	US Army Corps of Engineers, Jacksonville District
CESAJ-EN	US Army Corps of Engineers, Jacksonville District, Engineering Division
CGM	Comprehensive Everglades Restoration Plan Guidance Memoranda
DCM	Design Criteria Memoranda
DQC	District Quality Control
DRT	Design Review Team
EIS	Environmental Impact Statement
EC	Engineering Circular
EN QMS	Engineering Division Quality Management System
ER	Engineering Regulation
ERDC-CERL	US Army Engineer Research and Development Center – Construction Engineering Research Laboratory
ETL	Engineering Technical Lead
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FFWCC	Florida Fish and Wildlife Conservation Commission
FY	Fiscal Year
GAC	Gulf American Corporation
IEPR	Independent External Peer Review
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
PE	Professional Engineer
PED	Preconstruction Engineering and Design
PIR	Project Implementation Report
PL	Public Law
PM	Project Manager
QC	Quality Control
RMO	Review Management Organization
RTS	Regional Technical Specialists
SAD	South Atlantic Division

Acronyms	Defined
SAR	Safety Assurance Review (also referred as Type II IEPR)
SFWMD	South Florida Water Management District
SME	Subject Matter Experts
TRB	Technical Review Briefing
USACE	United States Army Corps of Engineers
WRDA	Water Resources 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 Management 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 Management 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 Management Section Representative. The Project Manager is encouraged to schedule the project deliverables as soon as the expected delivery dates are known. The Project Management 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:

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 Engineering and Construction 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 District engineering submittal requirements.
6. 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 Management, 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 Management 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 ten (10) 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 ten (10) 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 markup 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.

Design Review Workshops

Due to the accelerated nature of the design review schedule, it is anticipated that the District will organize and conduct a design review workshop(s) with the Review Team (including SFWMD and USACE) and the design consultant in order to expedite reviews as well as to expedite comment responses. These reviews will be schedule as necessary by the District Project Manager as the design of the project progresses.

ATTACHMENT E: CAROLLO ENGINEERS QUALITY CONTROL PLAN

C-43 West Basin Storage Reservoir Design Update

CORRECTED FINAL/READY TO ADVERTISE DESIGN

Work Order No. 4600003016 R1-WO07

PUMP STATION S-470 DESIGN

QUALITY MANAGEMENT PLAN

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pw://Carollo/Documents/Client/FL/SFWMD/QMP

C-43 West Basin Storage Reservoir Design Update

CORRECTED FINAL/READY TO ADVERTISE DESIGN

Work Order No. 4600003016 R1-WO07

PS S-470 DESIGN

QUALITY MANAGEMENT PLAN

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C-43 West Basin Storage Reservoir Design Update

CORRECTED FINAL/READY TO ADVERTISE DESIGN

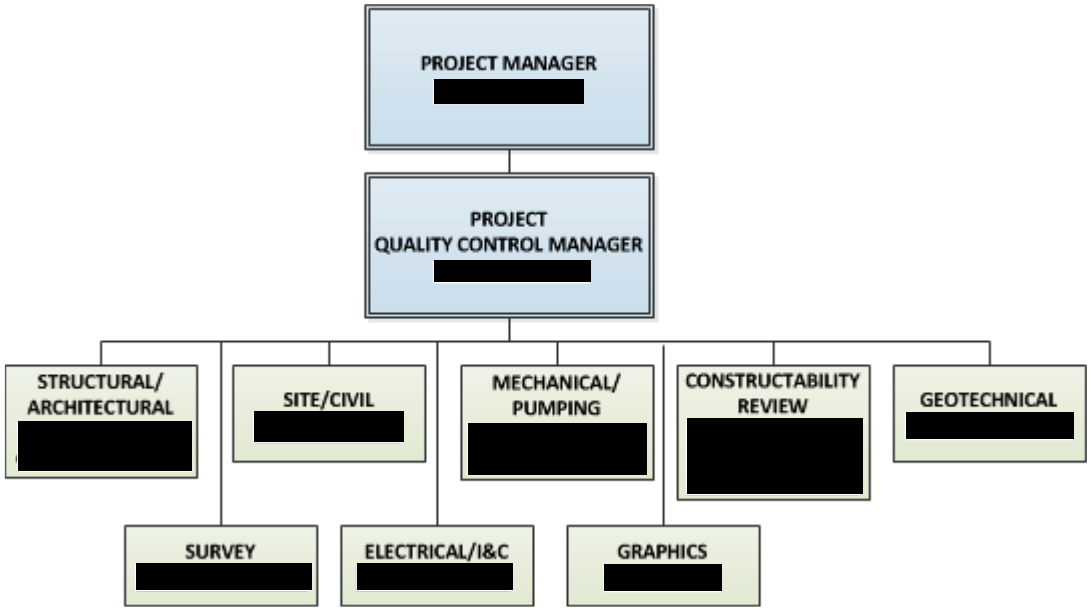
Work Order No. 4600003016 R1-WO07

PUMP STATION S-470 DESIGN UPDATE ANALYSIS AND INTERMEDIATE DESIGN

QUALITY MANAGEMENT PLAN

The Carollo Team has an unwavering commitment to producing work products that are of consistently high quality, and meet or exceed the expectations of the South Florida Water Management District (SFWMD) and other stakeholders. Quality Management (QM) is the systematic approach used to ensure that quality goals are met in each area of a project, including quality control. Quality control is the application of procedures and checks to identify and resolve errors and deficiencies in a product.

The purpose of this plan is to facilitate the preparation of accurate and complete high quality drawings, specifications, calculations, and related documents furnished as part of this scope of work by establishing and implementing procedures, responsibilities, and relationships for members of the Project Team. The Project Team has responsibility for the accuracy and completeness of the contract documents prepared for this project and shall check all materials accordingly. Team members shall take responsibility for items they are qualified to handle and refer to the next higher level those items which exceed their qualifications or for which higher level review is required. The Project Consultant Quality Control Manager is [redacted]. In this role [redacted] is responsible to see that all QM work has taken place before issuing any work packages for District Review. The following organizational chart identifies the Quality Management Team.



1.0 QUALITY MANAGEMENT APPROACH

Quality is an integral component of the work required to complete the project. QM is based on the following approach:

- Identification of the key components that are necessary to prepare a quality product, including procedures, specifications, standards, and acceptance criteria.
- Development and maintenance of the key QM components identified above.
- Creating products using the key QM components.
- Confirming compliance of the key components using checklists that identify the acceptance criteria.
- Providing a formal method of improving the process when deficiencies are found.

QM is invaluable in ensuring a quality product, improving stakeholder satisfaction, and improving efficiency by reducing rework. A QM program develops and evolves over time by determining the cause of quality deficiencies and correcting the cause so mistakes are not repeated. An integral part of an effective QM program is the training and development of personal with the ability to think and act creatively to anticipate problems and find solutions.

1.1 Computations

1.1.1 Scope

Neat, systematic, and complete calculations shall be checked for each project task. Special attention shall be given to documenting design references, sketches, and notes. Procedures and guidelines for preparing, checking and approving computations, including manually-produced calculations, calculation aid programs, spreadsheets, database and programmed applications are described as follows.

1.1.2 Procedures

1.1.2.1 Preparation

- Complete the heading information including Preparer's Name and Date, Project Number, Subject, and "Sheet-of-Number." Computer-generated computational printouts shall also include the application program name and version, filenames, file locations (i.e. diskette ID and path name), and spaces for Project No., Page No., Preparer, Checker and Approver names, and dates.

- Computer application programs:
  - Computer programs when appropriate are recommended for use.
  - Other computer programs must have Project Manager approval, and require additional checking and verification.
- Provide complete references including sources of data, methods used in computations, design aids and standards when used, and computer programs when used.
- When a formula is first used in a computation, write out complete formula and identify all parameters and units. If formula is reduced or modified for subsequent use, show development of reduced or modified form. Spreadsheets and calculation aid programs must meet this requirement.
- Identify all input data and source.
- Indicate final answers or results actually used by underlining or boxing. When alternative results are shown, place the word “USE” or “USED” adjacent to the results actually used. For computations involving several design conditions, provide final summary tabulation of results of the computation.
- Unusual or complex computations require three separate individuals, qualified to exercise independent judgment, for the preparation, checking and approval functions. Other computations may be prepared, checked and approved by members qualified to exercise independent judgment for the work, where the preparation/approval functions or the checking/approval functions are by the same individual, as indicated by separate signatures for both functions. Preparer's signature may be computer generated; others are handwritten on record copy of computation.
- Deleted computations, that are to be retained, shall be marked “SUPERSEDED,” with void date, and shall reference the revised computation.

1.1.2.2 Checking

- Check for accuracy and applicability of fundamental data, assumptions, and methods.
- Check for completeness of computations.
- Check input data for computer programs and for spreadsheet programs which have been independently checked.
- Check all data (input and output) for computer programs and for spreadsheet programs which have not been independently checked.
- Check for reasonableness of results.

- Preparer “back-checks” corrections and changes, and reconciles differences between original and corrected computations.
- Complete the check of computations prior to release.
- Checker places handwritten signature and date on record copy of computation.

1.1.2.3 Quality Control Manager

- Quality Control Manager is responsible for determining that checking procedures have been followed, and verifies that points listed under "checking" above are satisfied.
- Quality Control Manager makes critical examination of quality of work and methods used.
- Quality Control Manager documents compliance with procedures.

1.1.2.4 Indexing and Binding

- Index and bind the originals of all computations upon completion of the project. The Discipline Lead is responsible for proper processing and filing.
- Use covers for binding sets of computations; make appropriate entries as to project number, project description, client name, location of the project, and type of computation on bound volume cover.
- Save computations to a pdf.

1.1.3 Guidelines

Use of standard forms, calculation sheets or macros prepared is encouraged.

Prepare and maintain neat, well-organized computations to facilitate checking and approval.

Computations should be prepared, checked and approved so they are suitable for reproduction.

Evidence of step-by-step checking and approval should be used. The following colors are suggested:

- Checking: Red
- Approving: Blue

1.2 Drawings

1.2.1 Scope

Procedures and guidelines for checking, approving, and signing drawings are described as follows.

1.2.2 Procedures

Assignments of responsibility for checking shall be made by each Discipline Lead early-on in organizing the work tasks of the project. The drawing checker may be the designer if the technical input is checked by someone else. If the technical input is not checked by someone else, the design and drawing checking functions are assigned to two individuals to provide an independent check.

1.2.3 Definitions

- Work Print: A print made in the developmental stages of a drawing. It is to be used to develop, expand, and coordinate the design. Work prints do not form the basis for a complete drawing check.
- Check Print: A print on which a complete, detailed, and final check of every line and figure is made.

1.2.4 Work Print Procedures

- Work prints are identified and numbered in consecutive order by the Graphics Lead using the appropriate work print symbol.
- When a work print is initiated, the Graphics Lead initials and enters the work print number and date and examines the drawing for adherence to graphics standards. The work print is then forwarded to the designer.
- The designer reviews the drawing and places appropriate comments, changes and/or additions on the current work print. After the review is completed, the designer initials and enters the date on the “Comments By” line. The work print is returned to the Graphics Lead who sends it to the appropriate Graphics Technician.
- The Graphics Technician makes the changes/additions and initials and enters the date on the next “Drafted By” line.
- If the drawing has significant changes/additions, a new work print is made at this point and the work print cycle is repeated.
- When, in the opinion of the designer, the drawing is substantially complete, a check print is initiated.

1.2.5 Check Print Procedures

- When a check print is initiated, a duplicate print (not a check print) is forwarded to the appropriate Discipline Approver for review and comment. These comments are then forwarded to the Discipline Lead for consideration and incorporation into the check print as appropriate.

- Check prints are identified using the appropriate check print symbol.
- When the check print is initiated, the Graphics Lead initials and enters the check print number and date; examines the drawing for adherence to graphics standards and makes appropriate notations. The check print is then forwarded to the checker.
- The checker checks the drawing for technical and dimensional accuracy, for clarity and for adherence to applicable standards, using light blue to highlight items which are correct. The checker initials and enters the date on the "Checked By" line. The check print is returned to the Graphics Lead who sends it to the appropriate Graphics Technician.
- The Graphics Technician makes the changes/additions and initials and enters the date on the “Drafted By” line.
- If the drawing has significant changes or additions, a new check print is made and the check print cycle is repeated. If changes or additions are minor, the “back checking” may be performed from the original or from a computer screen. After the “back checking” is completed, the checker initials and enters the date on the “Back Checked By” line.
- At the conclusion of the check print procedure, there should be check prints on which all items are highlighted to indicate that a complete check has been performed. All Discipline Approver comments should be resolved at this point.
- Check prints for a revision shall utilize the same check print procedure.

1.2.6 Disposition of Work Prints and Check Prints

Work prints and check prints are to be placed together in order. The Graphics Lead maintains the prints until the drawings are approved, signed, copies distributed, and the contract is awarded or the report is accepted. Final disposition is then determined by the Project Manager.

1.2.7 Guidelines

Different colors shall be used in the work print/check print process to facilitate review. The following colors are suggested:

- Green: Used by the Graphics Lead to indicate changes or additions required.
- Light Blue: Used by the checker to highlight those portions of the drawing which are correct and complete.
- Red: Used by the checker to indicate those changes/additions required.
- Dark Blue or Black: Used by the Graphics Technician to indicate that changes/additions have been drafted and to make notations to the checker. Information that is removed or moved must be noted. Each change or addition to a drawing is circled on the print as it is completed.

- Brown: Used by the Discipline Approver to indicate those changes/additions required.

1.2.8 Approval and Signature Procedures

Assignments of responsibility for approvals and signatures shall be made at the time the project team organization is established for the project.

1.2.9 Definitions

- Designed: The member who developed the design to meet project requirements.
- Drawn: The Graphics Technician who created the drawing.
- Checked: The member who checked the drawing using the previously-described check print procedures.
- Technical Approval: The Discipline Approver approves the design for technical adequacy, making an independent review to determine that drawing information is coordinated, clear, and accurate.
- Overall Project Approval: The Project Quality Control Manager approves the overall content and quality of the information provided on the drawings; assumes responsibility for interdisciplinary coordination and that SFWMD and project requirements are met; makes an independent review of the work, and obtains assistance from others as necessary to confirm this approval.
- Additional Approvals: Additional approving members may be assigned to satisfy all project requirements. Such additional approvers in no way relieve the responsibilities of those performing the normal functions listed in the preceding paragraphs.

1.2.10 Plotting

The Graphics Technician shall exercise care in plotting computer generated drawings for final signatures and approvals, making certain that appropriate CADD level schemes, reference files, etc., are incorporated in the final plots.

1.2.11 Drawing Signature Procedures

- All written signatures and typed names shall consist of the signer's initial(s) and full last name.
- Preliminary Issue of Drawing: Typed names are to be indicated for the members who have done the designing, graphics work and drawing checking. The date blank in the signature block is not completed. The drawing is identified PRELIMINARY ISSUE FOR REVIEW – NOT FOR CONSTRUCTION with the issue date noted.

- Final Issue of Drawing: Typed names are to be indicated for the members who have done the designing, graphics work and drawing checking. The date blocks should be completed.

- Drawing Revisions: The drawing revision block contains four spaces; date; drawn; revision no. and revision description. All blocks shall be completed for each revision. Revision numbers shall also appear on the plans near the revision to assist the viewer in locating the revision.

1.3 Reports

1.3.1 Scope

Report projects include condition assessments, asset management reports, master plans, facility plans, O&M manuals, permitting reports, routing studies, preliminary design reports, project memos, research reports, rate studies, technical memos, and feasibility studies.

1.3.2 Procedures

- Report projects should have a detailed outline created before beginning the writing and content development. An independent review of the outline should be made by a senior engineer identified for this purpose. Review and approval of the outline by the Client is included.

- Project team should review planning ideas, modeling results, and documents for accuracy and coordination with contract requirements.

- Where a design concept is included in the report, the design concept should be reviewed during the report development by a senior engineer with specific expertise in the area.

- Word processing standards and CAD standards for figures should be used for all reports.

- Drafts for the narratives, tables, and figures of the report should be reviewed by an independent engineer for content correctness and conformance to quality standards before being delivered.

1.4 Project Manuals

1.4.1 Scope

The Project Manual is a collection of the contract documents, “front-End-Documents” and technical specifications. Guide specifications prepared by the SFWMD shall be edited for this project.

Procedures and guidelines for preparing, checking and approving Project Manuals (specifications) are described as follows.

1.4.2 Definitions

"Front-End Documents" include bidding information and requirements, contract and bond forms, contract conditions, and general requirements (CSI Division 1).

"Technical Specifications" (CSI Divisions 2 through 16) define the qualitative requirements for systems, products, materials, and workmanship upon which the construction contract is based.

A "Project Manual" includes Front End Documents and Technical Specifications. The Project Manual accompanies the drawings, the combination of which provides all items required to complete construction of the project or a phase of the project.

"Drawings" are graphic documents which illustrate the work to be performed and dimensional relationships among the various components of the project.

1.4.3 Preparation

1.4.3.1 Discipline Leads

Determine technical project requirements, coordinate work with other Project Team members, consult with Client (via Project Manager) as appropriate; are responsible for preparing Technical Specifications and for coordinating Technical Specifications and Front End Documents with Project Manager and SFWMD.

1.4.3.2 Specifications Specialist or Designee

Consults with Project Manager and assists with preparing Documents. Provides copies of Technical Specification sections from District standard specification library, previous projects or industry guide specifications to be used as rough drafts for Project Manuals. Provides nontechnical help to preparers; reviews and edits Project Manuals and addenda for format and consistency with current policies. Assembles Project Manuals for issue to SFWMD.

1.4.4 Procedures

- The preparer selects the applicable Guide Technical Specifications from SFWMD-furnished Technical Specifications.
- The preparer selects the applicable Guide Front-End Documents from SFWMD-furnished Front-End Documents.
- The preparer edits Technical specifications and Front-End Documents to suit specific project requirements. If the preparer is not the Discipline Lead, the Technical Specifications are forwarded to Discipline Lead for review.
- The Discipline Lead forwards the edited Technical Specifications to the project Discipline Approver for checking and approval. If the Discipline Approver prepared the specifications, a Specifications Checker is assigned.

- The edited Front-End Documents and edited and approved Technical Specifications are released to the Specifications Specialist or Designee for processing and inclusion in the Project Manual.
- The edited and approved Project Manual is forwarded to the Project Manager for overall project coordination.

1.4.5 Guidelines

- To facilitate review, different colors should be used in the editing and checking of Project Manuals. Use bright color pen or pencil. Avoid the use of lead pencils or black pens.
- When editing Guide Specifications, clearly indicate which text is to be struck out and which text is being added. Avoid pasting over or obscuring original text. Use labeled inserts if required to add blocks of text.

1.4.6 Approval and Signature Procedures

The following approvals are required in the preparation of Project Manuals. Signatures indicate these approvals have been properly performed to meet contract requirements for the project.

1.4.6.1 Technical Approval

The Discipline Approver is responsible for technical adequacy of the specified work, and performs review to determine that the Technical Specifications and the related drawings are coordinated; when appropriate, obtains assistance from others.

1.4.6.2 Overall Project Approval

The Quality Control Manager is responsible for the overall content and quality of the information provided in the Project Manual and drawings and for interdisciplinary coordination, makes an independent review of the work, and obtains assistance from others as necessary to confirm this approval. Overall project approval signifies that SFWMD and project requirements are met.

1.4.6.3 Additional Approvals

Additional approving members may be assigned, if necessary. Such additional approvers do not relieve the responsibilities of those performing the normal functions listed in the preceding paragraphs.

1.4.7 Filing and Disposition

Printing originals and corresponding markup shall be filed by Specifications Specialist or Designee until the Project is bid and under construction. File copy of Project Manual issued for bidding is routed to Project Team members, who initial and date the file copy which is then filed.