



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

CESAD-RBT

30 October 2018

MEMORANDUM FOR COMMANDER, JACKSONVILLE DISTRICT

SUBJECT: Approval of Review Plan of the Design and Construction Phases of the In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request

1. References:

- a. Memorandum, CESAJ-EN-Q, 23 August 2018, subject as above.
- b. Risk Management Center Endorsement of In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request, Review Plan, Review Plan, 16 August 2018.
- c. Engineering Circular (EC) 1165-2-217, Water Resources Policies and Authorities Review Policy for Civil Works, 20 February 2018.
- d. EC 1165-2-220 Water Resource Policies and Authorities Policy and Procedural Guidance for Processing Request to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408, 10 September 2018.

2. The Review Plan (RP) for the Design and Construction Phases of the in-place abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, reference 1.a, has been reviewed by the South Atlantic Division (SAD) and is hereby approved in accordance with reference 1.c.

3. SAD concurs with the District's RP recommendation that outlines the requirements for the design to be subjected to quality assurance reviews by the requester and quality control reviews by their consultant as outlined in the South Florida Water management District (SFWMD) Quality Assurance and Quality Control Plan, the SFWMD Design and Engineering Review Process, and the Consultant Quality Assurance and Control Plan, reference 1.b. The Jacksonville District led Agency Technical Review (ATR) will be conducted after submission of the Section 408 Permission Package by the SFWMD. The SFWMD will fund, manage and oversee the Safety Assurance Review/Type II Independent External Peer Review which is required due to the risks associated with the project. Documents to be reviewed by the IEPR/Type II include Plans and Specifications and Design Documentation Report.

4. The Risk Management Center (RMC) shall be the Review Management Organization and the proposed alteration is to be presented to the Dam Safety Senior Oversight Group (DSOG).

CESAD-RBT

SUBJECT: Approval of Review Plan of the Design and Construction Phases of the In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request

5. The Summary of Findings shall be developed by the Jacksonville District and endorsed by the District Dam Safety Program Manager, the District Dam Safety Officer, the District Counsel, and other District leadership before it is sent to the District Commander for approval of the proposed alteration.

6. The District should take steps to post the approved RP to its website and provide a link to CESAD-RBT. Before posting to the website, 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.

7. The SAD point of contact is [REDACTED] CESAD-RBT, [REDACTED].

[REDACTED]
Director of Programs



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207-8915

CESAJ-EN-Q

23 AUG 2019

MEMORANDUM FOR Commander, South Atlantic Division (CESAD-RBT), 60 Forsyth Street SW, Room 10M15, Atlanta, GA 30303

SUBJECT: Approval of Review Plan of the Design and Construction Phases of the In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request

1. References.

- a. EC 1165-2-217, Civil Works Review, 20 Feb 18.
- b. Risk Management Center Endorsement of In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request, Review Plan, 16 Aug 18.

2. I hereby request approval of the enclosed Review Plan for the design and construction phases of the In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike 408 Request and concurrence with the conclusion that a Type II Independent External Peer Review (IEPR) of the subject project is required. The recommendation to perform a Type II IEPR is based on the EC 1165-2-217 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 and RMC. 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.

4. If you have any questions regarding the information in this letter, please feel free to contact me or contact [REDACTED], Engineering Review Manager, [REDACTED].

Encl

[REDACTED]
Colonel, EN
Commanding



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
RISK MANAGEMENT CENTER
12596 WEST BAYAUD AVE., SUITE 400
LAKEWOOD, CO 80228

REPLY TO
ATTENTION OF

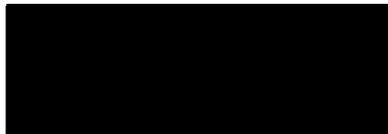
CEIWR-RMC

16 August 2018

MEMORANDUM FOR: Commander, Jacksonville District, ATTN: CESAJ-EN-Q

SUBJECT: Risk Management Center Endorsement, In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request, Review Plan

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for – In-place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike, 408 Request, dated 3 August 2018, and concurs that this RP complies with the current peer review policy requirements outlined in EC 1165-2-217 “Review Policy for Civil Works” and 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”, dated 20 February, 2018 and 31 July 2014 respectively.
2. This review plan was prepared by Jacksonville District, reviewed by the RMC, and all RMC review comments have been satisfactorily resolved. For this project a Type II IEPR (SAR) will be performed.
3. The RMC endorses this document to be approved by the MSC Commander. Upon approval of the RP, please provide a copy of the approved RP, a copy of the MSC Commander's approval memorandum to the RMC Senior Review Manager (rmc.review@usace.army.mil).
4. Thank you for the opportunity to assist in the preparation of this RP. Please coordinate all aspects of the Agency Technical Review and the Independent External Peer Review (as appropriate) efforts defined in the RP. For further information, please contact me at [REDACTED]



Review Manager
Risk Management Center

CF:
CEIWR-RMC ([REDACTED])
CESAD-DQM (Division Quality Manager)

**U.S. Army Corps of Engineers
South Atlantic Division
Jacksonville District**

**Review Plan for
In-place Abandonment of S-135
Bypass Culvert on Herbert Hoover
Dike
Pursuant to 33 USC § 408**

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. IT DOES NOT REPRESENT AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.



Contents

- 1. Introduction 1
 - a. Purpose of Review Plan 1
 - b. Guidance and Policy References 1
 - c. Description and Information..... 1
 - d. Review Management Organization (RMO) Coordination 4
 - e. Decision-Level Determination 4
- 2. Quality Assurance and Quality Control by Requester 6
 - a. Requirements 6
 - b. QA/QC Documentation 6
- 3. Safety Assurance Review by Requester 6
 - a. Requirements 6
 - b. Type I Independent External Peer Review Determination..... 7
 - c. Type II Independent External Peer Review Determination 7
 - d. Products to Undergo SAR 8
 - e. Required SAR Panel Expertise 8
 - f. Completion and Certification of the SAR 8
- 4. Agency Technical Review by District 9
 - a. ATR Requirements..... 9
 - b. Products to Undergo ATR 11
 - c. Required ATR Team Expertise..... 11
 - d. ATR Procedures..... 12
 - e. Documentation of ATR 12
- 5. Summary of Findings 13
- 6. Review Schedule and Cost 14
 - a. Schedule 14
 - b. Cost..... 15
- 7. Public Participation of Review Plan..... 15

ATTACHMENT 1: COMPLETION OF AGENCY TECHNICAL REVIEWA
ATTACHMENT 2: DISTRICT TEAM ROSTERSB
ATTACHMENT 3: ADDITIONAL INFORMATION ON RISK DRIVERS.....C
ATTACHMENT 4: SAR REVIEW PLAN FROM REQUESTER L
ATTACHMENT 5: SFWMD QUALITY ASSURANCE AND QUALITY CONTROL PLAN O
ATTACHMENT 6: SFWMD DESIGN AND ENGINEERING REVIEW PROCESS P
ATTACHMENT 7: CONSULTANT QUALITY CONTROL PLAN Q
ATTACHMENT 8: REVIEW PLAN REVISIONSR

1. Introduction

a. Purpose of Review Plan

This Alteration-Specific Review Plan is intended to ensure quality of the review by the Jacksonville District for the request to alter a US Army Corps of Engineers (USACE) civil works project within the area of responsibility of the Jacksonville District (District). This review plan was prepared in accordance with Engineer Circular (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" and EC 1165-2-217, "Civil Works Review Policy". This review plan provides the review guidelines associated with a specific alteration request pursuant to 33 USC 408 (Section 408).

b. Guidance and Policy References

- EC 1165-2-217, "Civil Works Review Policy", 20 February 2018
- 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
- ER 1110-1-12, "Quality Management", 31 March 2011
- ER 1110-2-1156, "Safety of Dams – Policy and Procedure", 31 March 2014
- ER 1110-1-1807, "Drilling in Earth Embankment Dams and Levees", 31 December 2014
- EM 1110-2-1913, "Design, Construction, and Evaluation of Levees", 30 April 2000
- Memorandum, CECW-CE, 10 November 2017, Subject: SUBJECT: Interim Guidance on Section 408 Decision Level
- SFWMD Everglades Restoration and Capital Projects Engineering Submittal Requirements, 05 November 2009

The products applicable to determination of impacts to the operation and maintenance of the flood risk reduction project will be reviewed against published guidance, including Engineering Regulations, Engineering Circulars, Engineering Manuals, Engineering Technical Letters, Engineering Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda and other formal guidance memoranda issued by HQUSACE.

c. Description and Information

This Review Plan covers Pump Station S-135 located in the Herbert Hoover Dike (HHD) in the northeast quadrant of Lake Okeechobee in Martin County, Florida. Pump Station S-135 was designed in the late 1960's by the U.S. Army Corps of Engineers (USACE) Jacksonville District (SAJ), and construction of the structure was completed in 1970. The structure is currently owned and operated by South Florida Water Management District (SFWMD). The structure is located on the northeast side of Lake Okeechobee in Reach 7, about 15 miles southeast of the town of Okeechobee. See Figure 1 for map of the project area and Figure 2 for S-135 site plan.

The pump station consists of a pumping unit on the landside of Lake Okeechobee and an outlet structure into the lake. The pumping side is a reinforced concrete structure with a concrete block superstructure, and the outlet unit is a U-shaped structure of reinforced concrete sides and bottom. The pumping station is equipped with four 125-cfs pumps, which discharge through four 48-inch steel pipes that pass through the embankment and discharge into the lake through the outlet structure.

Two, 96-inch diameter, gated, corrugated metal pipe (CMP) culverts bypass the pumps on the north side of the structure through the same reinforced concrete intake and discharge structures. The pipes are constructed of bolted steel rounded plates that develop the full 96-inch diameter pipe. The bypass pipes were designed to allow passive discharge from the landside Rim Canal to the lake when head conditions permit. When Lake Okeechobee is at normal levels, the Rim Canal is typically slightly higher in elevation than the lake.

These bypass culverts have very rarely been used throughout their service life. Normal operations at this facility control water in the Rim Canal by use of the pumps, which provide a considerably faster response to the canal and require less time commitment by operations staff to be on site. During elevated flood pools in Lake Okeechobee, the gradient reverses and the lake is higher than the Rim Canal. During extreme flood events, the lake can be as much as 15 feet higher in elevation than the Rim Canal.

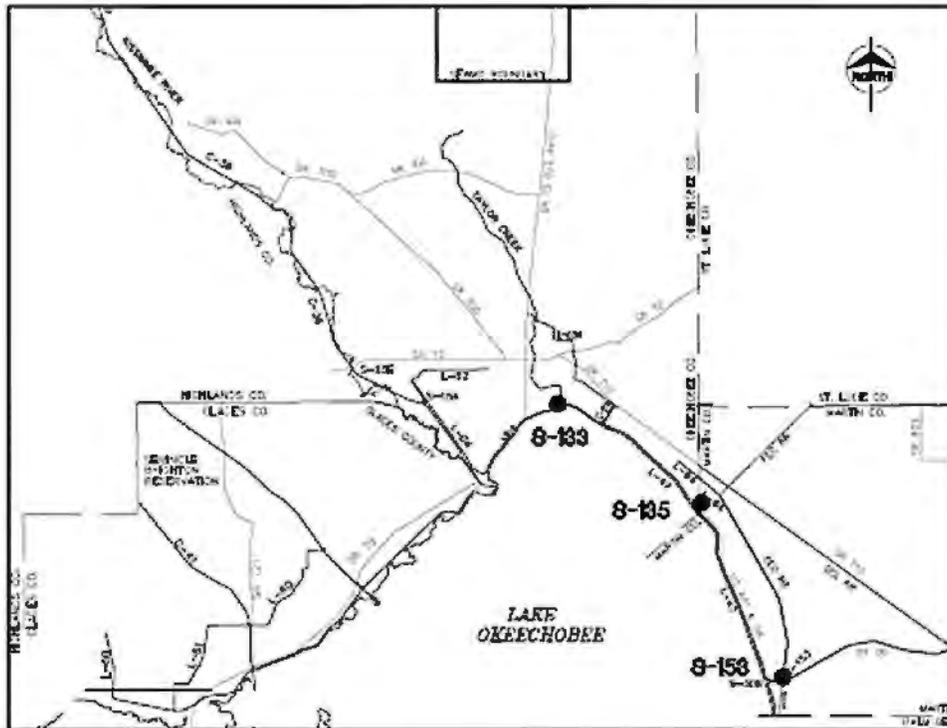


Figure 1: Map of Project Area

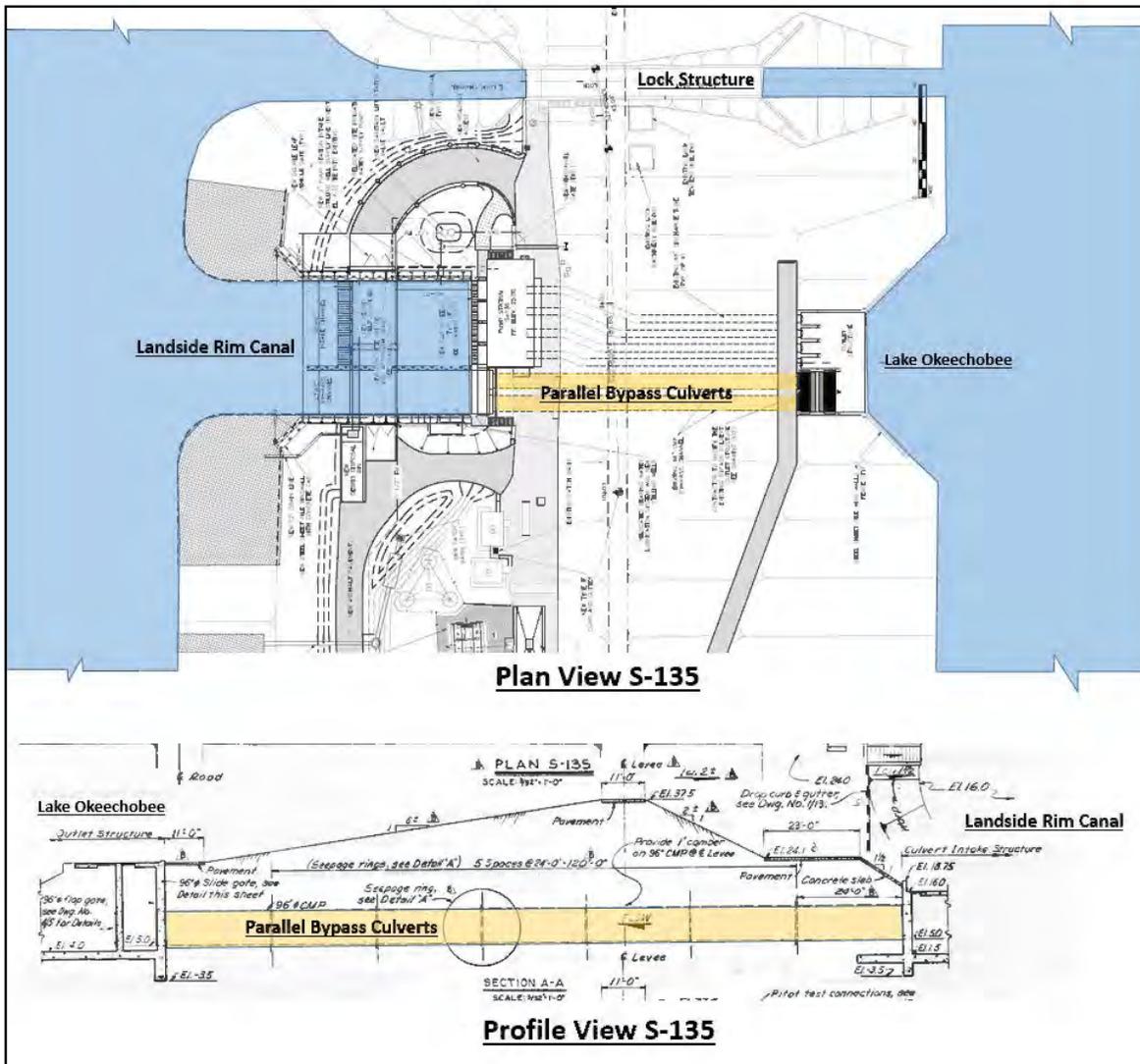


Figure 2: S-135 Site Plan (note plan and profile views from the as-builts are reversed, with Lake Okeechobee presented on opposite sides)

Recent inspections of the bypass culverts at S-135 revealed that the culverts are in an active state of failure. These culvert pipes have deteriorated to a failed condition with open joints and voids that have allowed erosion of soil from around the pipes. See Attachment 3 for additional information on the existing condition of the bypass culverts.

The general scope of this project is an in-place abandonment design that would limit potential impacts to the existing S-135 Pump Station which is a critical flood control structure that maintains the Rim Canal at a safe elevation. The project will also require relocation and temporary service for utilities and fuel systems that service the pump station, as necessary. The proposed scope includes low pressure grouting of any annular space between the 96-inch pipes and the HHD embankment. Grouting will be performed from inside the culvert structure.

HHD is homogeneous embankment with no designed core or filter zones that could be damaged by grouting. Construction methods in this reach of HHD generally consisted of

bulk placement of fill by dragline in the 1960's, with no systematic compaction efforts used during fill placement. Therefore, grouting in the embankment is not expected to cause any new failure modes or do any harm to the existing embankment.

A design consultant has been engaged by the SFWMD to conduct a complete investigation and analysis of the existing conditions in and around the culverts. The design consultant will perform visual and acoustic inspection and use backscatter computed tomography, which allows imaging to produce quantifiable data on the extent of voids surrounding the culvert exterior. This will allow for a target grouting program that has higher likelihood of filling any voids around the pipe.

Upon completion of a low pressure grouting program, the culverts will be backfilled and abandoned in place. Although backfill methods have not been completely determined, abandonment methods will include some use of stable grouts to ensure that negligible void space remains at the top of the pipe (between the top of pipe and top of backfill).

Lastly, a sand filter will be constructed on the landside of the pipes to filter any seepage along the exterior of the conduits. Although gradients are often into the lake at this structure during normal pool in Lake Okeechobee, only extreme loading in the lake will produce gradients of sufficient magnitude to initiate a backward erosion piping failure mode. Therefore, filters are only proposed on the landside of the structure.

Following the abandonment and associated construction activities, the HHD embankment will be repaired/restored to the current lines and grades and the paved access at the top of the Dike and access to the pump station will be replaced or restored as needed.

d. Review Management Organization (RMO) Coordination

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for the peer review effort described in this Review Plan is the USACE Risk Management Center (RMC).

e. Decision-Level Determination

Per the Interim Guidance on Section 408 Decision Level and EC 1165-2-216, Policy and Procedural Guidance for Processing Request to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408, seven questions must be addressed to determine required review and decision level.

1) HQUSACE Review and Decision

If the answer to any of the following questions is "yes", and the District and Division recommend approval of the alterations, then the Section 408 request requires HQUSACE level review and decision.

i. Does the proposed alteration change how the USACE project will meet its authorized purpose?

No. The purpose of the culverts is to allow discharges from Lake Okeechobee (lakeside) to L-49 canal (landside) for agricultural usage. Throughout the service life, the non-federal sponsor found that opening the adjacent lock provides a more efficient way of conveying water for agricultural purposes. Therefore, the culverts are considered obsolete and abandoning them does not change the intent of the Federal project.

ii. Does the proposed alteration preclude or negatively impact alternatives for a current General Investigation (GI) or other study?

No. The proposed alteration does not preclude or negatively impact alternatives for a current GI or other study.

iii. Is the proposed alteration for installation of hydropower facilities?

No. The proposed alteration is not for the installation of hydropower facilities.

iv. Is there a desire for USACE to assume operations and maintenance responsibilities of the proposed navigation alteration pursuant to Section 204(f) of Water Resources Development Act (WRDA) of 1986?

No. This project is not a navigation alteration.

Because the answers to the above four questions is “no”, the Section 408 request does not require HQUSACE level review and decision.

2) Division Review and Decision

If the decision level does not fall to HQUSACE, then the next 3 questions will determine if the approval is at the Division or District level. If the answer to any of the following questions is “yes” and the District has recommended approval of the alterations, then the Section 408 request requires Division level review and decision.

i. Does the proposed alteration require a Type II IEPR, reference EC 1165-2-217?

Yes. As discussed in Section 3.a. of the review plan, it has been determined that a Type II IEPR, SAR, is required.

ii. Is the non-federal sponsor for a USACE project proposing to undertake the alteration as in-kind contributions eligible for credit under Section 221 of Flood Control Act of 1970, as amended?

No.

iii. Proposed alterations that could be approved by the District Commander, but the Division Commander established a regional process that requires certain district Section 408 decisions to be made by that Division Commander.

No. South Atlantic Division has not established a regional process for certain district Section 408 Decisions.

3) Final Decision Level Recommendation

Jacksonville District is recommending Division Approval Level for this Section 408 request because the proposed project requires a Type II Independent External Peer Review. Jacksonville District will not present this 408 request to the DSOG to receive concurrence, but the solution will be included in the final Post Implementation Evaluation (PIE) for the HHD project and the final PIE will be presented to DSOG for concurrence.

2. Quality Assurance and Quality Control by Requester

a. Requirements

Quality Assurance and Quality Control (QA/QC) is the review of basic science and engineering work products focused on fulfilling the project quality requirements. The design will be subjected to quality assurance reviews by the requester and quality control reviews by their consultant as outlined in the SFWMD Quality Assurance and Quality Control Plan (Attachment 5), the SFWMD Design and Engineering Review Process (Attachment 6), and the Consultant Quality Assurance and Control Plan (Attachment 7).

b. QA/QC Documentation

The requester shall provide USACE with documentation regarding the quality control/quality assurance procedures followed in the development of the project design. This documentation should be in the form of a report that identifies:

- 1) Purpose and scope of the review.
- 2) Description of the review team and a short statement on their qualifications.
- 3) Summary of the review performed during design.
- 4) Major changes made during the review and any future lessons learned resulting from those changes.
- 5) All internal QC comments and resolutions.
- 6) Supplemental studies or analyses performed during the design, e.g. geotechnical report.

3. Safety Assurance Review by Requester

a. Requirements

A Safety Assurance Review (SAR), also known as a Type II IEPR, shall be conducted on design and construction activities for flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life.

EC 1165-2-217 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, during the Planning Phase, and the Section 2035 Safety Assurance Review, Type II Independent External Peer Review, during the design and construction phases.

According to EC 1165-2-217, 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.

External panels will review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. The charges to the SAR panels complement the ATR process and do not duplicate it. A SAR is to be provided by an A/E firm contracted by the requestor or arranged with another government agency to manage external to USACE. For a SAR, the selection of the review panel members will use the National Academy of Science (NAS) Policy which sets the standard for "independence" in the review process. The Requester's Design of Record AE cannot procure the experts. A site visit will be scheduled for the SAR Team.

b. Type I Independent External Peer Review Determination

Per EC 1165-2-217 and EC 1165-2-216, because this Section 408 request is not a planning study, a Type I IEPR is not required.

c. Type II Independent External Peer Review Determination

A risk-informed decision was made as to whether IEPR is appropriate based on the factors to consider for conducting a Type II IEPR/SAR that are outlined in EC 1165-2-217. A risk informed decision was made that this project does pose a significant threat to human life (public safety) since it involves grouting the two existing 96-inch bypass culverts. The applicability statements for this Review Plan are as follows:

- 1) The failure of the project would pose a significant threat to human life.
Yes. Failure to properly grout both by-pass culverts and its envelope would allow the Herbert Hoover Dike to continue to unravel, which could lead to the dike failure. This failure would therefore threaten many human lives during a major storm.
- 2) The project involves the use of innovative materials or techniques.
No. This project will utilize methods and procedures used by the Corps of Engineers and the project sponsor on other similar works.
- 3) The project design lacks redundancy.

The project does not require the addition of redundant project features or redundancy in design considerations.

- 4) The project has unique construction sequencing or a reduced or overlapping design construction schedule.

No. This project's construction activities do not have unique sequencing or a reduced or overlapping design schedule.

Based on the discussion above, the District Chief of Engineering, as the Engineer-In-Responsible-Charge, recommends a Type II IEPR Safety Assurance Review of the P&S and DDR. SFWMD will fund, manage, and oversee the SAR.

d. Products to Undergo SAR

The SAR Team will review the design plans, DDR, and any other relevant design documents submitted by the requester during the preliminary design phase. A SAR of the construction activities will also be performed.

e. Required SAR Panel Expertise

The following provides an estimate of the SAR panel members and the types of expertise that should be represented on the review panel. All panel members shall be recognized experts in their field and have specialized experience pertaining to the work being performed on this project. In addition all panel members should have an advanced degree and be professionally registered.

Geotechnical Engineering: The team member should be a registered professional engineer and have 10 or more years of experience in geotechnical engineering with special expertise in grouting within an embankment dam, seepage barriers, earthen levees or embankment impoundments. Experience needs to include geotechnical evaluation of flood risk management structures such as static and dynamic slope stability evaluation, acoustic testing, evaluation of the seepage through earthen embankment dams and under seepage through the foundation of the flood risk management structures including dams, levee embankments, floodwalls, closure structures, and other pertinent features.

Construction Engineering. The team member should be a registered professional and have 10 or more years of experience in construction engineering or engineering design. Experience needs to be relevant to flood risk management project features such as water control structures, conveyance culverts, spillways, embankment dams, seepage barriers, and cutoff walls. Experience is also needed specifically in the construction of soil bentonite cutoff walls.

f. Completion and Certification of the SAR

The SAR will be managed by an AE firm which meets the criteria set forth in EC 1165-2-217. DrChecks review software may be used to document the SAR comments and aid in the preparation of the Review Report but is not required.

Comments should address the adequacy and acceptability of the engineering, models, and analyses used. SAR comments should generally include the same four key parts as described for ATR comments in Section 4.

The SAR panel will prepare a Review Report that will accompany the decision package provided by SFWMD for review by USACE and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

This Review Report, including reviewer comments and a recommendation letter, will be provided to SAJ and the RMC as soon as they become available. A suggested report outline is an introduction, the composition of the review team, a summary of the review during design, a summary of the review during construction, any lessons learned in both the process and/or design and construction, and appendices for conflict of disclosure forms, for comments to include any appendices for supporting analyses and assessments of the adequacy and acceptability of the methods, models, and analyses used.

Written responses to the SAR Review Report will be prepared to explain the agreement or disagreement with the views expressed in the report, the actions undertaken or to be undertaken in response to the report, and the reasons those actions are believed to satisfy the key concerns stated in the report (if applicable). These comment responses will be provided to SAJ and the RMC for review and concurrence. The requestor will prepare responses except that issue resolution will be a dual responsibility between the requestor and USACE, with USACE having the final authority.

The revised SAR Review Report will be provided to SAJ and the RMC with the USACE responses and all other materials related to the review. SAJ will submit the final SAR Review Report to SAD for approval. After the SAD Commander's approval, SAJ will make the report and responses available to the public on the District's website located at <http://www.saj.usace.army.mil/Missions/Civil-Works/Review-Plans>.

4. Agency Technical Review by District

a. ATR Requirements

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:

- 1) 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.
- 2) 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.
- 3) 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.

At a minimum, this SFWMD project is expected to modify and/or affect the following Federal projects: Herbert Hoover Dike and S-135 Pump Station.

b. Products to Undergo ATR

The ATR Team will review the Plans, Specifications, DDR, and any other relevant design documents submitted by the requester.

c. Required ATR Team Expertise

The District-led Agency Technical Review Team is comprised of reviewers with the appropriate independence and expertise to conduct a comprehensive review in a manner commensurate with the type of proposed alteration described in this review plan. The ATR Team will be comprised of members from the Jacksonville District and the Dam Safety Production Center (DSPC).

The team expertise required for the ATR is listed below:

ATR Lead: The ATR team lead is a senior engineer or geologist with extensive experience in reviewing Section 408 alteration requests and conducting ATRs. The ATR lead has the necessary skills and experience to lead a team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline.

Geotechnical Engineer: The Geotechnical Engineering team member should be a registered professional with experience in the field of geotechnical engineering, analysis, design, and construction of embankment dams and levees. The team member should have knowledge and experience in the forensic investigation, acoustic testing, and evaluation of seepage and piping, settlement, slope stability, and deformations problems associated with embankments constructed on weathered and jointed rock and alluvial soils. The team member should have experience in the design and construction of seepage barriers or cutoff walls. The team member should have experience in failure mode analysis, risk assessment of embankment dams, and evaluating risk reduction measures for dam safety assurance projects.

Structural Engineer: The senior-level team member should be proficient in performing stability analysis and finite element analysis and have experience with dam safety projects.

Construction Engineer: Reviewer should be a senior level, professionally registered engineer with extensive experience in the engineering construction field with particular emphasis on dam safety projects and grouting.

Real Estate: The Real Estate Reviewer is charged with reviewing the design documents, decision documents, and other supporting technical analysis deemed required.

Regulatory: The Regulatory Reviewer is charged with reviewing the Environmental Impact Statement and other supporting technical analysis deemed required.

Counsel: The Legal Reviewer is charged with reviewing all documents prepared in compliance with the National Environmental Policy Act (Environmental Impact Statement and Record of Decision), including all supporting technical and environmental analyses deemed necessary.

Environmental Planning: The Environmental Planning Reviewer is charged with reviewing the Biological Assessment, Environmental Impact Statement, and other supporting technical analysis.

The SAJ Dam Safety Program Manager and SAJ 408 Coordinator may also participate on the ATR Team if needed.

d. ATR Procedures

Reviews will be conducted in a fashion which promotes dialogue regarding the quality and adequacy of the required documentation. The ATR team will review the documents provided. DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process.

The four key parts of a review comment will normally include:

- 1) The review concern – identify the deficiency or incorrect application of policy, guidance, or procedures.
- 2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed.
- 3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the district’s ability to make a decision as to whether to approve or deny the Section 408 request.
- 4) The probable specific action needed to resolve the concern – identify the action(s) that the requester must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation must include the text of each ATR concern, a brief summary of the pertinent points in any discussion, including any vertical coordination, and the agreed upon resolution.

e. Documentation of ATR

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- 1) Identify the document(s) reviewed and the purpose of the review;
- 2) Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewers;
- 3) Include the charge to the reviewers;
- 4) Describe the nature of their review and their findings and conclusions;
- 5) Identify and summarize each unresolved issue (if any); and

- 6) Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR lead will prepare a completion of ATR and Certification of ATR. It will certify that the issues raised by the ATR team have been resolved (or elevated to the vertical team). The completion and certification should be completed based on the work reviewed to date for the project. A Sample Completion of ATR and Certification of ATR are included in Attachment 1.

The ATR team members will determine whether the proposed alteration would impair the usefulness of the federal project, be injurious to the public interest, or meets legal and policy requirements. ATR team members will provide their comments to the District Section 408 Coordinator, who will use the comments to determine if the proposed alteration can be approved in accordance with EC 1165-2-216. Conflicts in addressing ATR comments will be elevated to the functional chief and SAD for resolution if necessary.

After reviewing the documents included in the Section 408 Permission Package, the review team members shall utilize DrCheckssm to capture team member input for the determinations described in EC 1165-2-216. If necessary, a separate DrCheckssm 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.

5. Summary of Findings

Upon review of the Type II IEPR/SAR Report, completion of the District-Led ATR, demonstration of environmental compliance, and receipt of responses to RAIs from SFWMD, the District Section 408 Coordinator will compile 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 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 217 if applicable;
- Any additional final conclusions or information, including any associated controversial issues.

The Summary of Findings shall be in accordance with Step 5 from EC 1165-2-216 (with an appendix of ATR Comments and Resolution). The Summary of Findings shall be endorsed by the District Dam Safety Program Manager, the District Dam Safety Officer, the District Counsel, and other District leadership before it is sent to the District Commander for approval of proposed alteration.

6. Review Schedule and Cost

a. Schedule

The preliminary review schedule is provided in the table below. The schedule will be updated with appropriate milestones for reviews during construction when they are received from the requester.

<u>Review Schedule</u>	<u>Start</u>	<u>Finish</u>
SFWMD Preliminary Design/Review	06/26/2017	12/14/2018
SFWMD Preliminary Design Submittal Complete	06/26/2017	10/26/2018
SFWMD QA Review	10/29/2018	11/23/2018

SFWMD Preliminary Design Submittal to USACE	12/14/2018	12/14/2018
SAR / Type II IEPR	10/27/2018	12/14/2018
AE Firm Review	10/27/2018	12/03/2018
AE Firm issue Review Report	12/03/2018	12/13/2018
SWFMD Submittal to USACE	12/14/2018	12/14/2018
Preliminary USACE Review/Pre-coordination	12/17/2018	03/26/2019
USACE Review	12/17/2018	01/29/2019
USACE Provides Preliminary Comments	01/30/2019	01/30/2019
SFWMD Provides Responses to Comments	01/31/2019	02/25/2019
USACE Backcheck of Comments	02/26/2019	03/26/2019
SFWMD Final Design/Review	08/19/2019	02/10/2020
SFWMD Final Design Submittal Complete	08/19/2019	12/06/2019
SFWMD QA Review	12/09/2019	02/07/2020
SFWMD Section 408 Permission Submittal	02/10/2020	02/10/2020
Section 408 Permission Submittal Review	02/10/2020	06/19/2020
USACE Final District-Led ATR	02/10/2020	03/06/2020
USACE Provides RAIs from District-Led ATR	03/09/2020	03/09/2020
SFWMD Provides Responses to RAIs	03/09/2020	03/20/2020
USACE Backcheck of RAIs	03/23/2020	04/17/2020
USACE Preparation of Summary of Findings	04/17/2020	05/08/2020
Routing of Summary of Findings for Approval	05/11/2020	06/18/2020
SFWMD Submits Corrected Final P&S and DDR	06/01/2020	06/01/2020
Issuance of 408 Permit Package Determination	06/19/2020	06/19/2020

b. Cost

A separate funding agreement between USACE and SFWMD will document the cost of USACE performing both the preliminary and final design reviews, as well as the Section 408 Permission Submittal review. SFWMD will execute a separate work order for an A-E to conduct the SAR. The cost of the SAR will be the responsibility of the SFWMD.

7. Public Participation of Review Plan

As required by EC 1165-2-217, the approved Review Plan will be posted on the District public website at the following address:

<http://www.saj.usace.army.mil/Missions/Civil-Works/Review-Plans/>

The public will have 30 days to provide comments on the documents. After all comments have been submitted, the comments will be provided to the technical reviewers. This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. This engagement will ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the federal government.

ATTACHMENT 1: COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the In-Place Abandonment of S-135 Bypass Culvert on Herbert Hoover Dike. The ATR was conducted as defined in the Alteration-Specific Review Plan to comply with the requirements of EC 1165-2-216. During the ATR, compliance with established policy principles and procedures and legal requirements was verified. This included the determination whether the proposed alteration would impair the usefulness of the federal project or was injurious to the public interest. All comments resulting from the ATR have been resolved.

SIGNATURE

Name
ATR Team Leader
Office Symbol/Company

Date

SIGNATURE

Name
District Section 408 Coordinator
Office Symbol

Date

SIGNATURE

Name
Director
CEIWR-RMC

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: Describe the major technical concerns and their resolution. As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE

Name
Chief, Engineering Division (home district)
Office Symbol

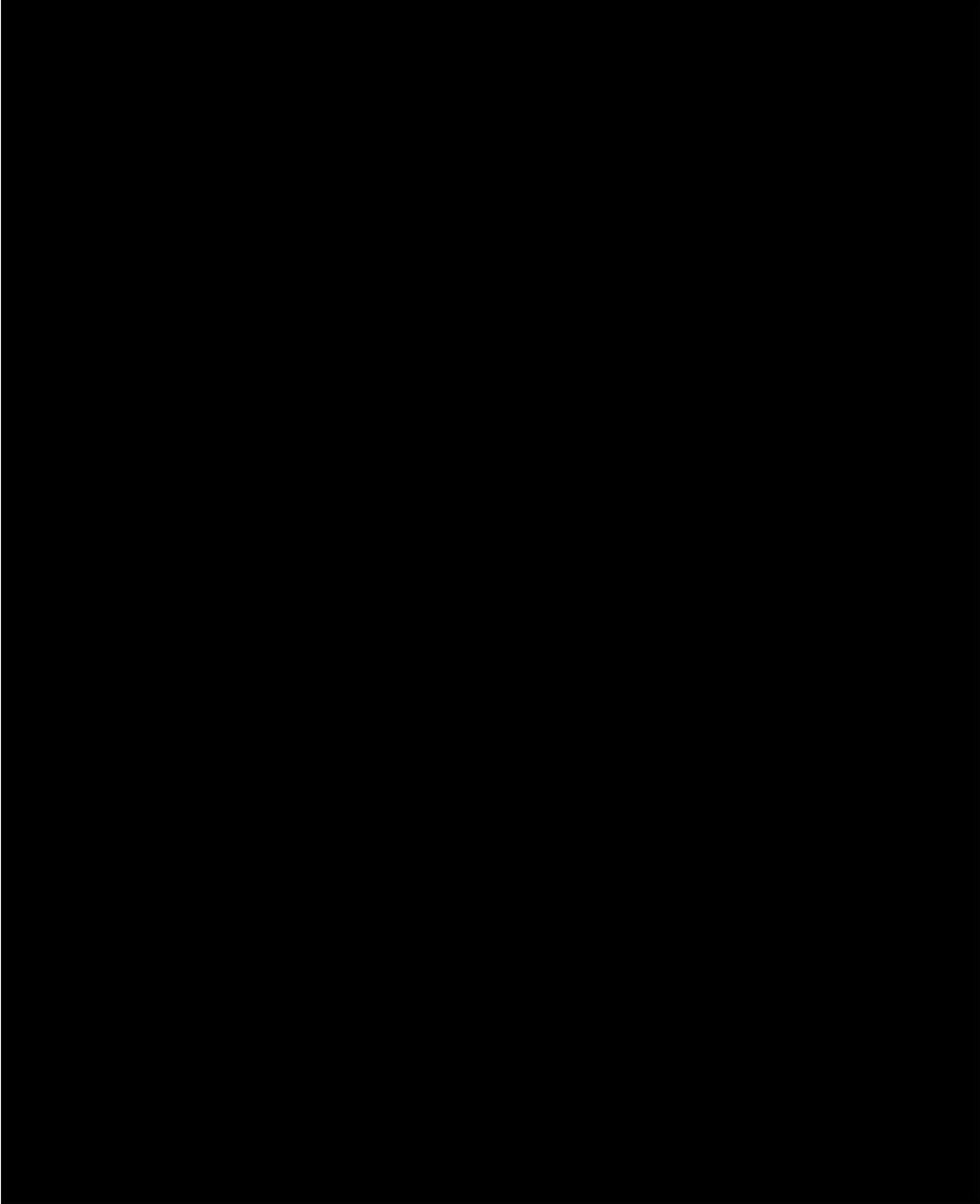
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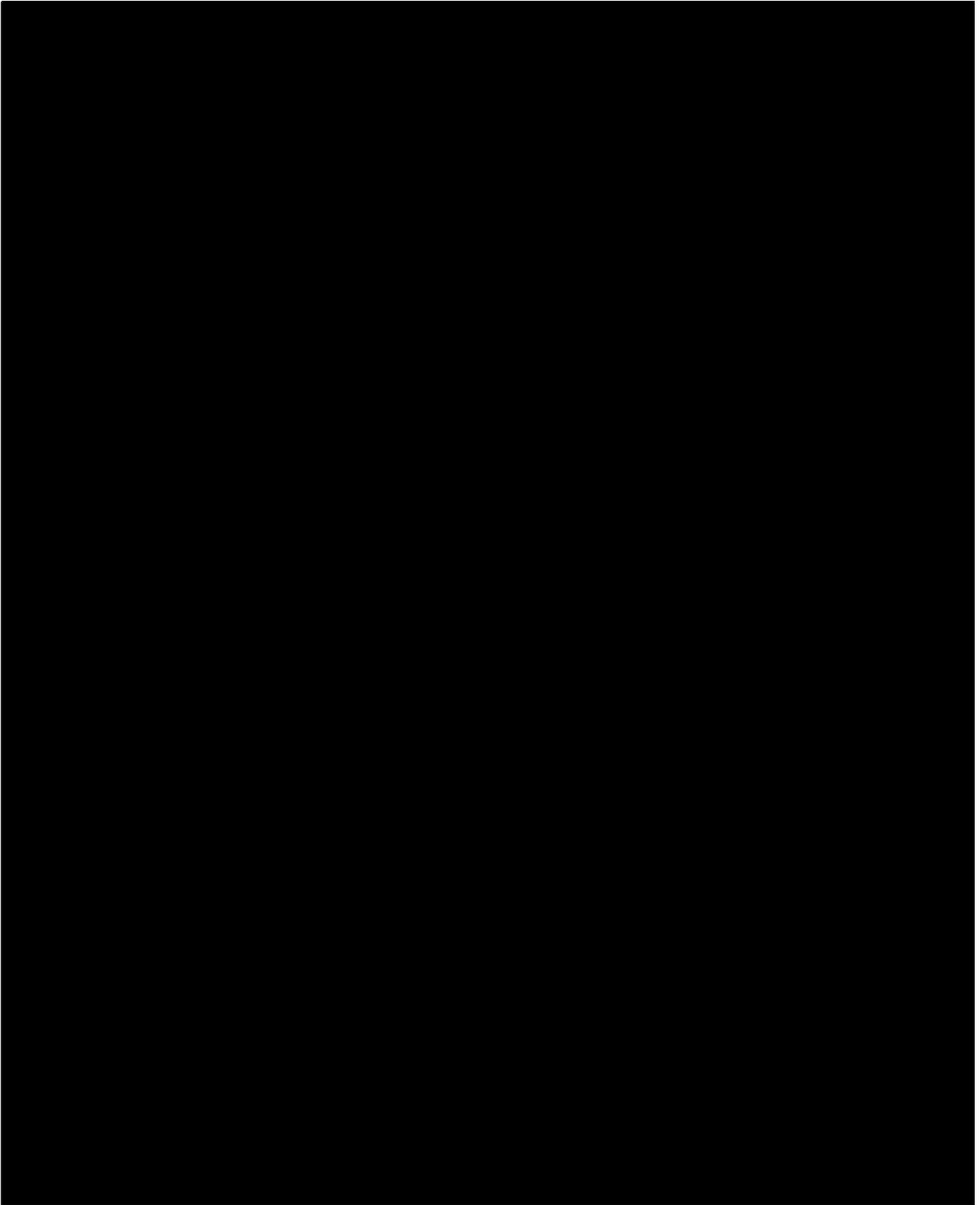
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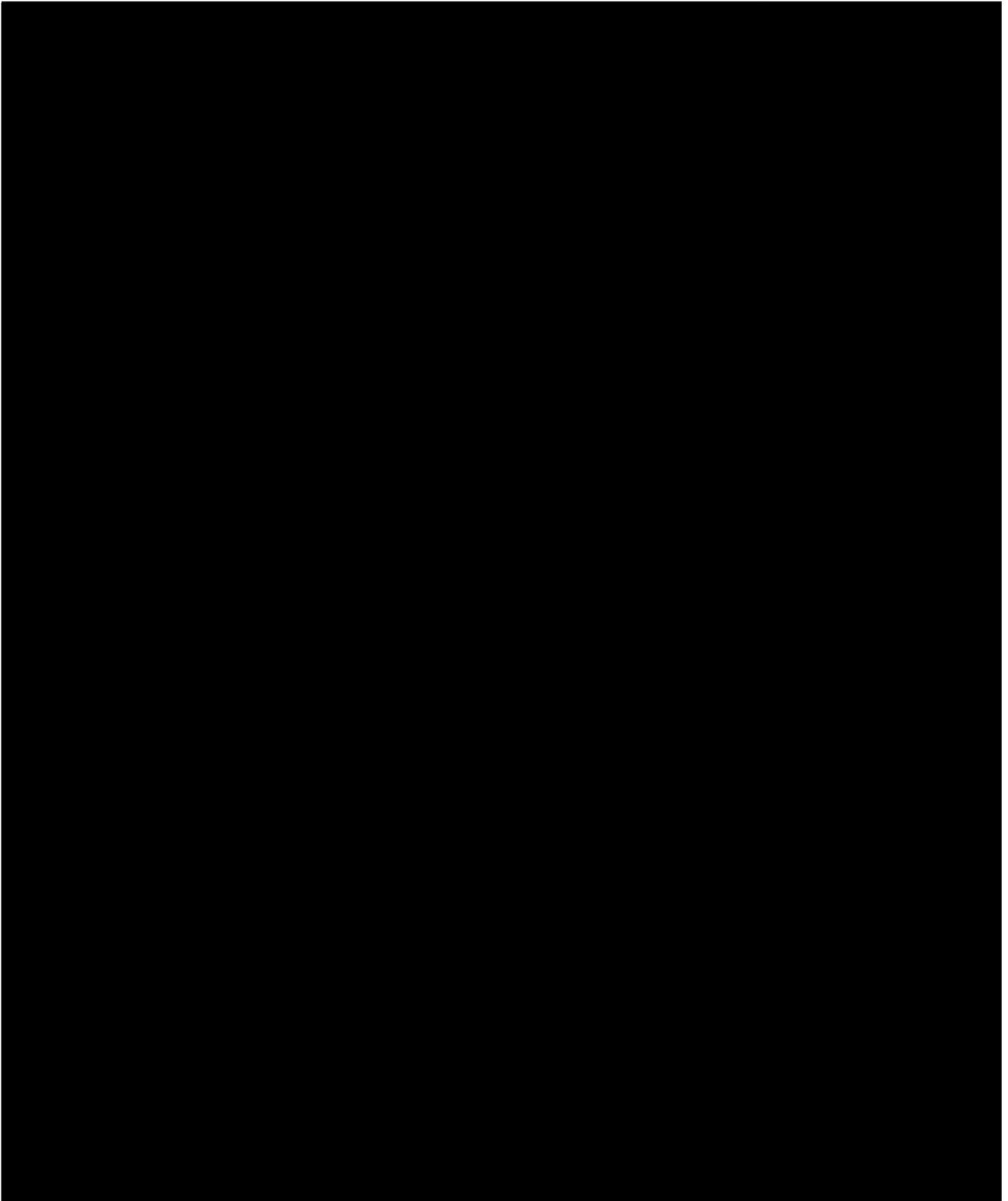
Name
Dam or Levee Safety Officer² (home district)
Office Symbol

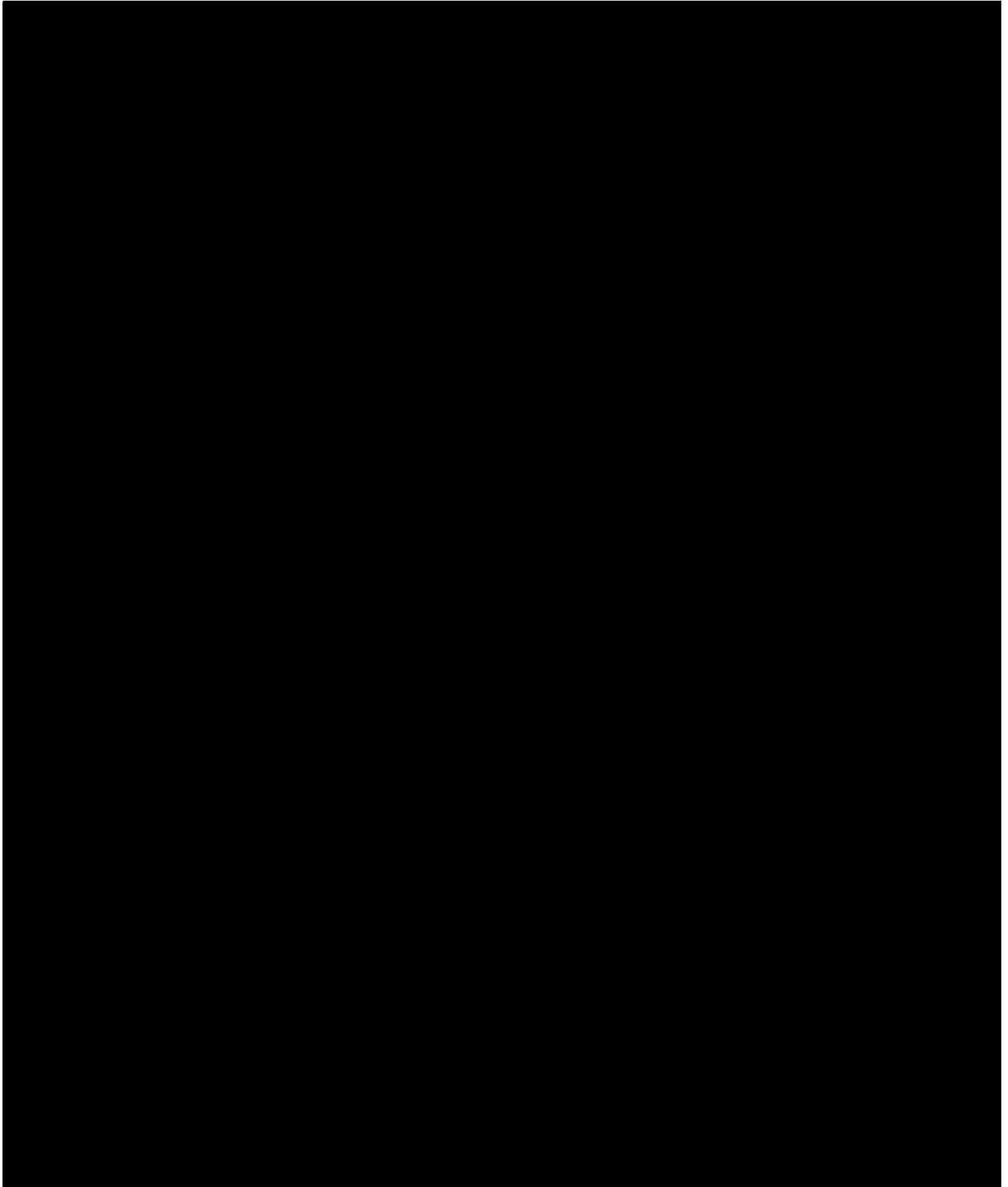
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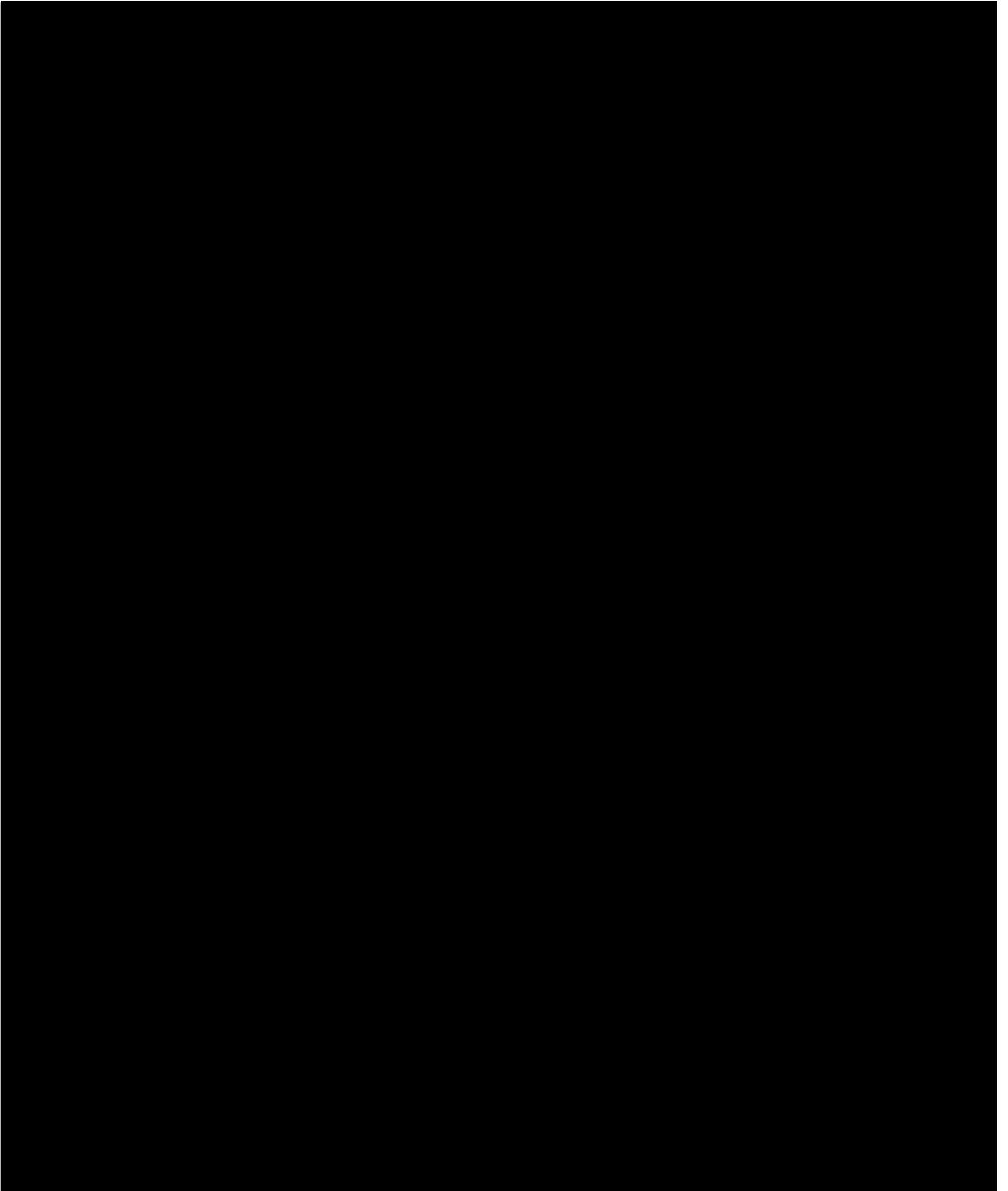
¹ Only needed if some portion of the ATR was contracted
² Only needed if different from the Chief, Engineering Division.

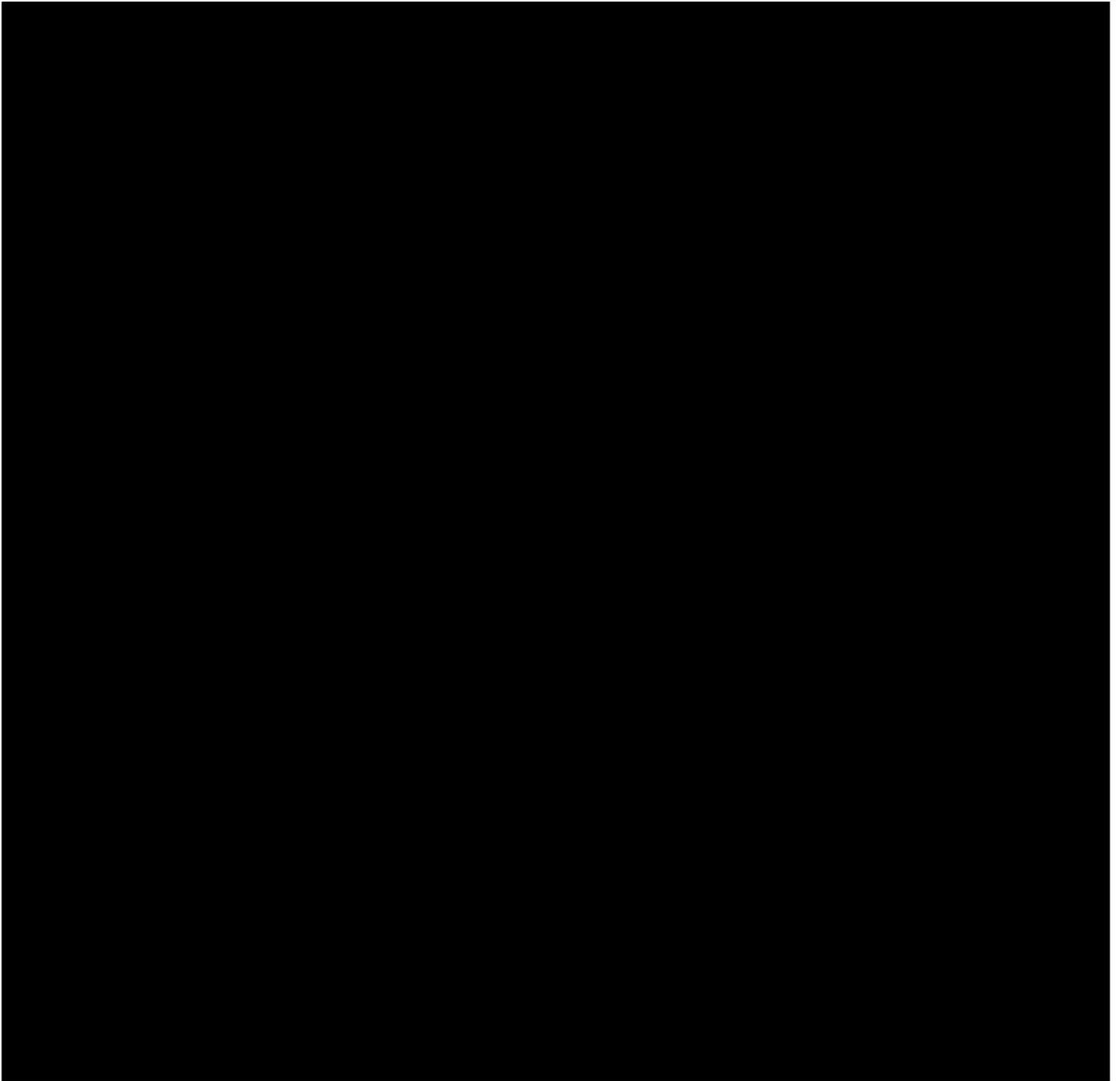


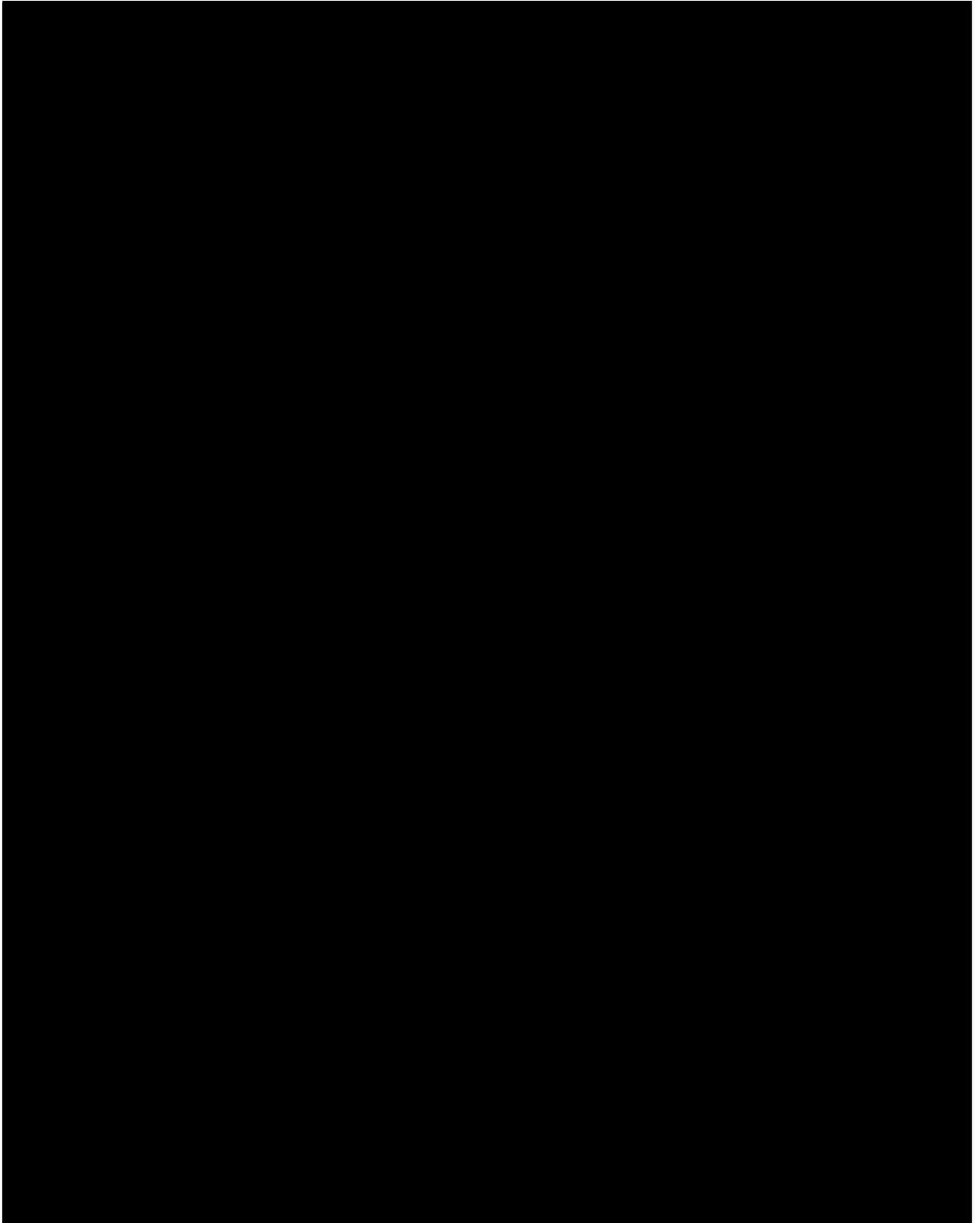


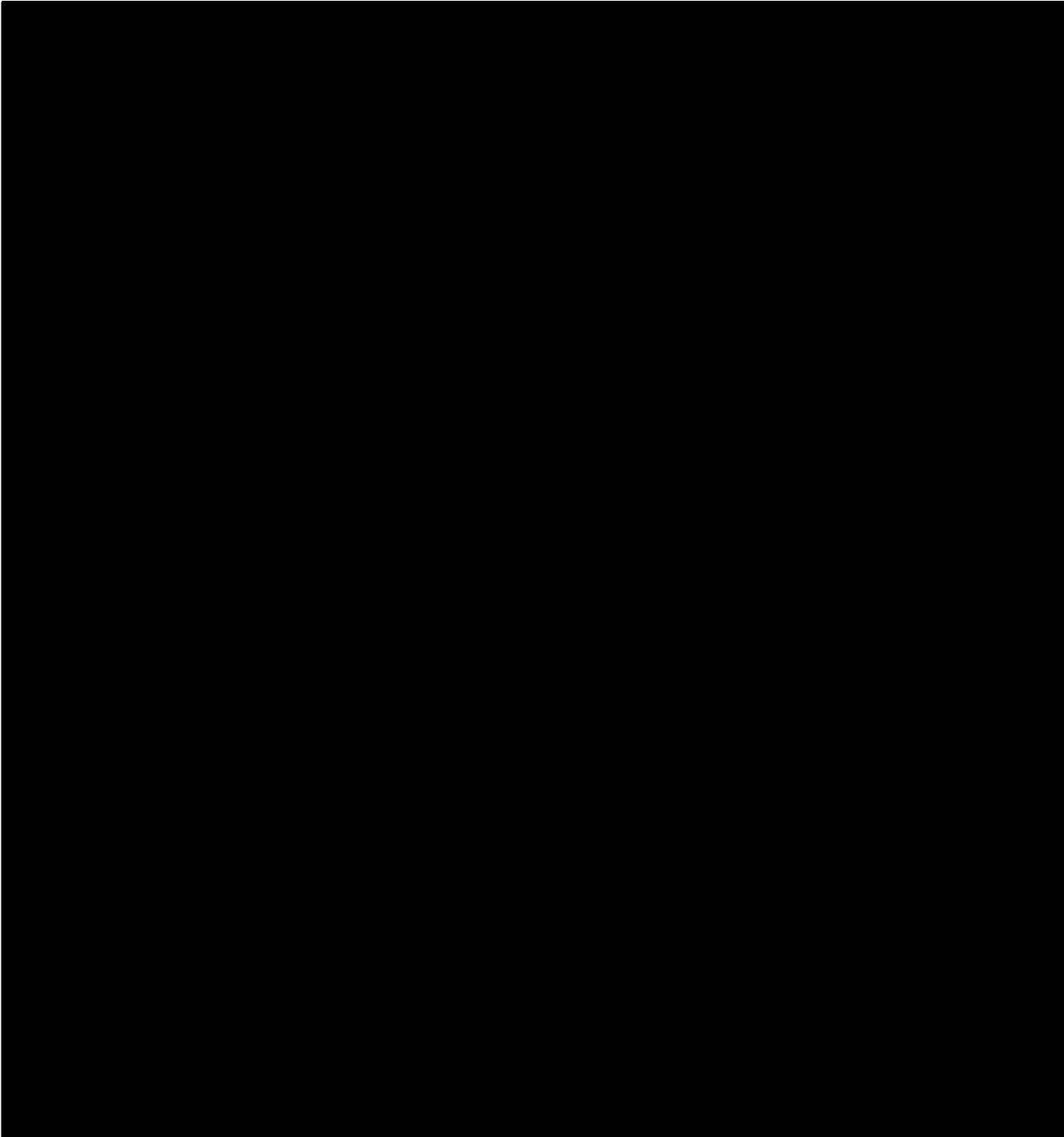




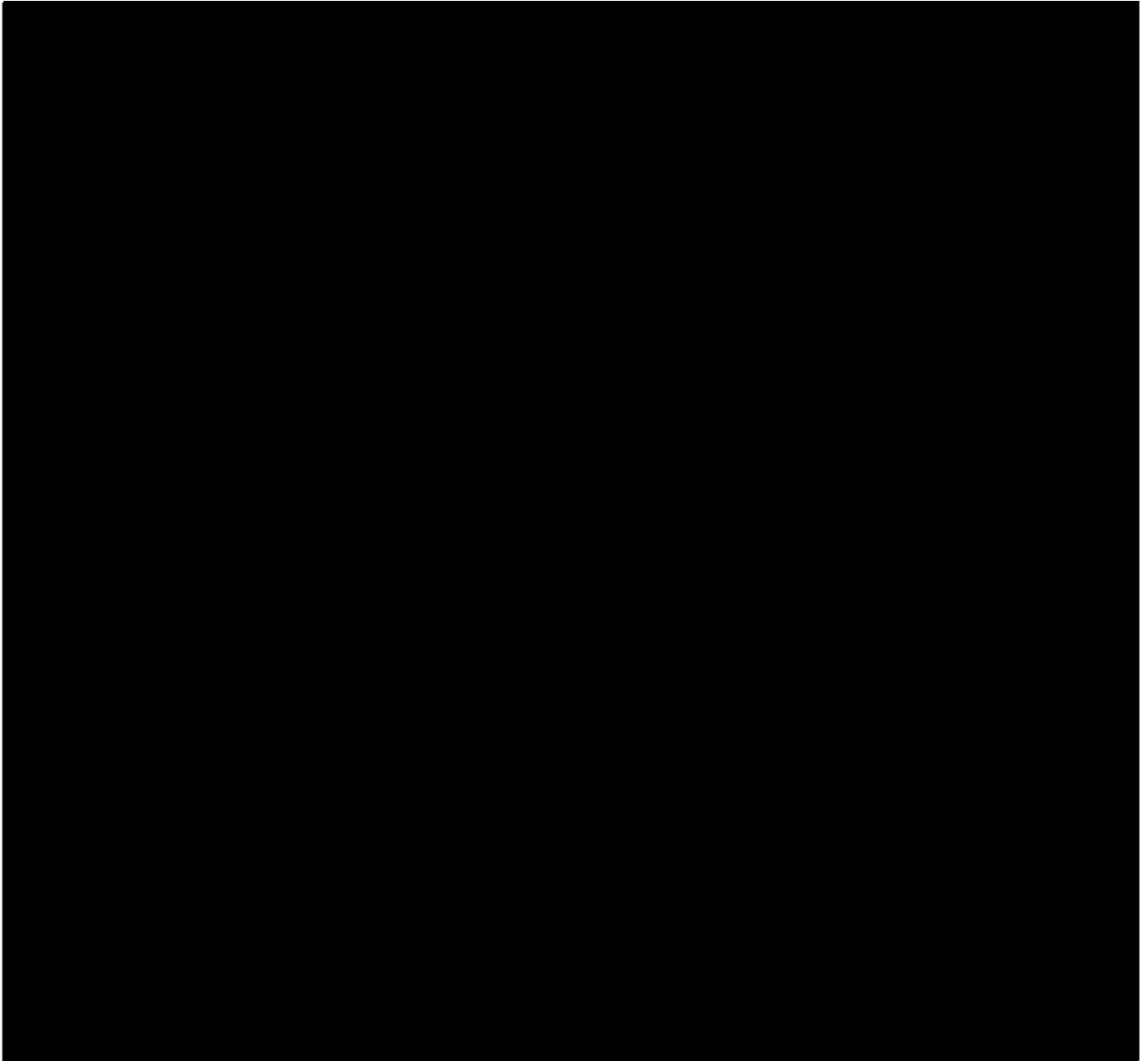












ATTACHMENT 4: SAR REVIEW PLAN FROM REQUESTER

1. Introduction

a. Purpose of Review Plan

The purpose of this document is to satisfy the Safety Assurance Review (SAR) requirements for the S-135 project as required by Section 2035 of the Water Resource Development Act (WRDA) of 2007 as described in the U.S. Army Corps of Engineers' (USACE) Engineers Circular 1165-2-217, *Civil Works Review Policy*. This document outlines how the SAR will be performed and identifies the Independent Panel of Experts (IPE) charged with executing the SAR.

b. Purpose of the SAR

The SAR is a strategic-level review that should inform USACE on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. As a strategic-level review, the SAR should not duplicate the Agency Technical Review, as described in USACE Engineering Regulation 1110-2-12, performed by USACE, which ensures the proper application of established criteria, regulations, laws, codes, principles, and professional practices.

c. Independent Panel of Experts

The SAR will be performed by independent experts selected from individuals who are distinguished experts in civil engineering, geotechnical engineering, hydraulic engineering, and other appropriate disciplines. Independent, in this instance, means that the persons selected to review the design are not involved in the original design, have no conflict of interest, and have no bias for or against the project.

The IPE identified for the project is comprised of the following individuals.

Discipline	Name	Description of Credentials
Geotechnical Engineering	TBD	TBD
Construction Engineering	TBD	TBD

d. SAR Guidance and Charge

The IPE shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable and inform the design team on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring

public health, safety, and welfare. The SAR should focus on assumptions, data, methods, and models.

The IPE will not present a final judgment on whether a project should be constructed or whether a particular plan should be implemented. Further, the IPE should avoid findings that become “directives” in that they call for modifications or additional studies, or suggest new conclusions and recommendations. In such circumstances, the IPE may have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review later in the project.

The IPE should bring important issues to the attention of SFWMD, including highlighting areas of disagreement and controversies that may need resolution. However, the SAR should not be expected to resolve fundamental disagreements and controversies.

The Charge provides guidance to the IPE on the objectives of the SAR. The overarching Charge to the IPE for the project is to address the following questions:

1. Are the models used to assess hazards appropriate?
2. Are the assumptions made for the hazards appropriate?
3. Are the quality and quantity of the surveys, investigations, and engineering for the concept design in accordance with Engineering Regulation 1110-2-1150 sufficient to support the models and assumptions made for determining the hazards?
4. Does the analysis adequately address the uncertainty, given the consequences associated with the potential for loss of life associated with this type of project?
5. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interphases between structures, materials, members, and project phases?
6. From a public safety perspective, is the proposed alternative reasonable and appropriate, or are there other alternatives that should be considered?
7. Assess the recommended alternatives from the perspective of systems. Consider hydrologic and hydraulic effects throughout a watershed over time and the potential effects of climate change.
8. Do the assumptions made during design remain valid through construction as additional knowledge is gained?
9. For operation and maintenance (O&M) manuals, do the requirements adequately maintain the conditions assumed during design and validated during construction; will project monitoring adequately reveal any deviations from assumptions made regarding performance; and is project monitoring sufficient to evaluate change in project effectiveness?

In addition to the above, a specific Charge may be developed by SFWMD prior to each SAR milestone.

e. Milestones and Schedule

A SAR will be conducted at the preliminary design and at the midpoint of construction. In advance of each SAR, SFWMD will provide a specific Charge appropriate for the specific milestone. The SAR may take different forms, but for most milestones, SFWMD will host a meeting(s) for the purposes of presenting information and discussing the IPE's response to the Charge. In addition to the IPE, representatives from USACE and RMO will be invited to participate. Following the design phase, SFWMD will seek input from the IPE to resolve issues and address other potential concerns that may arise during construction. Summaries from construction meetings and other pertinent construction documentation will be provided to the IPE. Significant issues will generate a formal SAR. Additional SAR(s) may be conducted during design and construction as determined by the IPE and SFWMD.

f. Reporting and Documentation

At the conclusion of the SAR, the IPE will prepare a SAR Report. The SAR Report will summarize the review, respond to the Charge, document all comments in DrChecks or a format similar to DrChecks, and identify topics that lack consensus among the IPE. Comments in the SAR Report may not be attributable to any single IPE member.

ATTACHMENT 5: SFWMD QUALITY ASSURANCE AND QUALITY CONTROL PLAN

The Consultant shall follow the Consultant's Quality Assurance/Quality Control Plan (QA/QC) for the Project. A copy of the Consultant's QA/QC Plan shall be submitted to the District at the first Progress Review Meeting. The QA/QC Plan shall identify the QA/QC officer for the Project and provide the qualifications of the officer to perform the required QA/QC reviews. The QA/QC officer shall be someone not directly involved in the preparation of the plans and specifications nor the project management responsibilities. The Consultant Project QA/QC officer shall be charged with the responsibility of the Plan's implementation and documentation of current QA/QC activities. An update on all QA/QC activities shall be reported in the Monthly Status Reports. All work performed by the Consultant design team members, including sub-consultants, on the Tasks for this Work Order shall be in accordance with this QA/QC Plan.

All engineering submittals, including memoranda, reports and studies, shall undergo quality management reviews in accordance with the Consultant's documented QA/QC processes for the Project. The purpose of the QC review is to verify that the resulting design meets acceptable practice and that the documents have been properly coordinated to the satisfaction of the District. The QC reviewer shall inform the Project team of any exception or proposed improvement that may be noted. QC reviews shall be provided for all engineering submittals. The QC reviews shall be conducted prior to submittal to allow time for incorporation of any recommended revisions.

A signed *Quality Certificate of Compliance*, as required by the *Everglades Restoration & Capital Projects Engineering Submittal Requirements*, shall be submitted for each engineering deliverable that confirms that the Consultant has performed all internal QA/QC activities in accordance with their documented QA/QC Plan and that the contents of the submittal are complete and meet the requirements as stated in the Statement of Work for this Work Order. The Consultant shall complete the *Certificate* with the required information specific to the deliverable being submitted. Where any components of a particular submittal are not complete, an explanation and schedule for submitting the missing components shall be provided. Where District technical comments have been received by the Consultant on a previous engineering submittal, a copy of the Consultant's responses that address the comments shall be provided as part of the subsequent submittal to the District.

**ATTACHMENT 6: SFWMD DESIGN AND ENGINEERING REVIEW
PROCESS**

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.

ATTACHMENT 7: CONSULTANT QUALITY CONTROL PLAN

QUALITY CONTROL & ASSURANCE PLAN

FOR

S-135 By-Pass Culvert Abandonment and Dike Repairs

Martin County, Florida

RJ Behar Project Number 17045

June 2017

**Prepared for:
South Florida Water Management District
West Palm Beach, Florida**



R.J.Behar & Company, Inc.
Engineers • Planners

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TABLE OF CONTENTS

1.0	GENERAL PROJECT QUALITY CONTROL PROCESS	1
1.1	GOAL	1
1.2	OVERVIEW	1
2.0	QUALITY PRODUCTION PROCEDURES	3
2.1	Quality Production.....	3
	▪ Engineering Items.....	3
2.2	Project Staffing List.....	4
2.3	Participant Responsibilities.....	4
3.0	SUBMITTAL AND MILESTONE REVIEW PROCEDURES	5
3.1	Review of Submittals.....	5
	▪ Standard Review Procedure.....	5
4.0	PROJECT COORDINATION PROCEDURES	6
4.1	Project Coordination Reviews and Meetings.....	6
4.2	Sub-consultant Quality Control.....	6
5.0	QUALITY ASSURANCE REVIEW PROCEDURES	7
5.1	Quality Assurance Review and Compliance Certification.....	7
6.0	RECORDS RETENTION	8
7.0	STANDARD REVIEW PROCEDURES	9
	▪ Completion.....	9
	▪ Checking.....	9
	▪ Concurrence.....	10
	▪ Incorporation.....	10
	▪ Verification.....	10
7.1	Computer Generated Calculations Review procedures.....	11
	▪ Program Verification.....	11
	▪ Input and Output Checking.....	11
7.2	Quantities and Cost Estimates Review procedures.....	12

	▪ Quantities.....	12
7.3	Text, Permit Applications, Specifications and Technical Special Provisions Review procedures.....	12
7.4	Studies and Reports.....	13

Appendix

- Certificate of Compliance
- Amec Foster Wheeler Site Specific Health and Safety Plan

1.0 GENERAL PROJECT QUALITY CONTROL PROCESS

This document describes the Project Quality Control Plan that R. J. Behar & Company, Inc. (RJ Behar) will follow to insure that all engineering and environmental elements (plans and documents) developed as a result of the **S-135 By-Pass Culvert Abandonment and Dike Repairs** Project proposed improvements conform to District standards and criteria. The project documentation prepared by R. J. Behar will comply with applicable District manuals and guidelines, as well as related state and federal laws, executive orders, and regulations.

1.1 GOAL

Work Order 4600003087-W05 requires the Consultant to follow the Consultant's Quality Assurance/Quality Control (QA/QC) Plan for the Project. A copy of the Consultant's QA/QC Plan shall be submitted to the District at the first Progress Review Meeting. The QA/QC Plan shall identify the QA/QC officer for the Project and provide the qualifications of the officer to perform the required QA/QC reviews. The QA/QC officer shall be someone not directly involved in the preparation of the plans and specifications nor the project management responsibilities. The Consultant Project QA/QC officer shall be charged with the responsibility of the Plan's implementation and documentation of current QA/QC activities. An update on all QA/QC activities shall be reported in the Monthly Status Reports. All work performed by the Consultant design team members, including sub-consultants, on the Tasks for this Work Order shall be in accordance with this QA/QC Plan. **The purpose of the QC review is to verify that the resulting design meets acceptable practice and that the documents have been properly coordinated to the satisfaction of the District.** In addition to this requirement, R. J. Behar will also satisfy the general legal requirements that require all professionals to exercise "due diligence" in the preparation of work. "Due diligence" commonly refers to the standard of care established by the practices, processes, and procedures used by the majority of the practicing professionals in a specific area of service.

1.2 OVERVIEW

Production quality is achieved through the careful development of the work and the continuous checking, concurrence (back-checking), and verification of changes on all work and documents during their preparation and review. Designated project team personnel normally include qualified Responsible Professionals (RP) and the associated project staff to produce the work and Quality Reviewers (QR) with equivalent professional qualifications to review and confirm that the work is accurate and complete. As a minimum, checking will be required for each document before it is used for further development or before a required phase submittal. The standard review procedure will be used for all checking and reviews to

document the process.

A thorough review of the work by the RP to check all aspects of the design and presentation, and a review by the PM to check the work for inclusion of District requirements and review comments, must be accomplished before each submittal review.

The production and review of projects is based on the premise that two qualified individuals agree on the methodology, correctness, accuracy, and completeness of the work product before it, or any other related document which is based on it, is released for use. To accomplish this, a submittal review is performed prior to every submittal. The following is a general description of the project setup, production, and review procedures that will be followed:

- The Project Manager is the Quality Control Officer (QCO) for the project and is responsible for preparing the Project Quality Control Plan and the Project Work Plan.
- The Project Work Plan and the Project Quality Control Plan designate the RPs and the QRs for the production and review of each project work element, task, and deliverable.
- The Project Manager conducts a kick-off meeting with appropriate members of the project team before any production begins. The Project Work Plan, the Project Quality Control Plan, and the project instructions are presented by the Project Manager and discussed.
- As production proceeds, RPs and their supporting staffs produce the work. RPs regularly check the work during production.
- The QRs perform the submittal reviews in accordance with the procedures described herein. However, the ultimate responsibility for quality rests with the RPs.
- Before a deliverable is released to the District or others, the Quality Assurance Officer (QAO) performs the quality assurance review and quality control verification. The verification determines whether or not required production and review quality control or peer review procedures have been used and that the work produced conforms to the appropriate standards. If complete, the QAO initials the QC check-set and signs the Certificate of Compliance.
- The review documentation, which is developed during the production and review of the work, is to be retained in the project files for Quality Assurance (QA) Review and audit purposes and to demonstrate that the Project Quality Control Plan requirements have been met.

- A signed Quality Certificate of Compliance, as required by the *Everglades Restoration & Capital Projects Engineering Submittal Requirements*, shall be submitted for each engineering deliverable that confirms that the Consultant has performed all internal QA/QC activities in accordance with their documented QA/QC Plan and that the contents of the submittal are complete and meet the requirements as stated in the Statement of Work for this Work Order.

2.0 QUALITY PRODUCTION PROCEDURES

2.1 QUALITY PRODUCTION

Quality work is the result of careful, properly sequenced production, and continuous RP checking of each work element for completion and correctness. This process also includes the concurrence of the designated QR on concepts and presentation of each work element. The RPs and the supporting engineers, designers, and technicians working under their direct supervision will originate the designs, plans, and reports using thorough, quality-oriented production and review methods for the development, completion, and checking of the work. The RPs will undertake detailed reviews for accuracy, errors, and omissions prior to substantial completion and before each phase submittal review. The RPs will perform the review and the verification functions at this stage. The Project Manager and the RPs are to continuously monitor and coordinate all aspects of the project and check the work for compliance with DISTRICT standards and inclusion of DISTRICT review comments and recommendations.

The deliverable documents that will be prepared for the S-135 By-Pass Culvert Abandonment and Dike Repairs Project includes the following:

Engineering Items

- Drilling Plan
- Preliminary Design Submittal
 - Conceptual Plans
 - Preliminary List of Technical Specifications
 - Preliminary Design Development Report
 - Preliminary Construction Schedule
 - Preliminary Opinion of Probable Costs
- Technical Review Responses (Preliminary Design Submittal)
- Final Design Documentation Report Submittal
 - Revised Conceptual Plans
 - Revised List of Technical Specifications
 - Final Design Documentation Report

- Revised Construction Schedule
- Revised Preliminary Opinion of Probable Costs

2.2 PROJECT STAFFING LIST

The project team dedicated to the production and review of all project elements, tasks, and deliverables is shown in the project-staffing list (see Table 1). The Project Manager will revise the project staffing list as needed and secure the approval of the District Project Manager for any changes in key project team personnel during the production and review of the project.

TABLE 1 (Quality Control)		
DELIVERABLE	RESPONSIBLE PROFESSIONAL (RP)	QUALITY REVIEWER (QR)
Drilling Plan		
Geotechnical Report		
Design Report		
Conceptual Plans		
Construction Schedule		
Opinion of Probable Costs		

2.3 PARTICIPANT RESPONSIBILITIES

The responsibilities of the participants in the production of quality work and the quality control process are defined as follows:

- **Project Manager (PM)**

[REDACTED]

[REDACTED] will undertake the day-to-day project management effort, including planning, training, and coordination. [REDACTED] will be responsible to the DISTRICT’s Project Manager to coordinate that proper work planning and technical resources are applied to the project, schedules are met, and quality control procedures are followed. [REDACTED] will be responsible for monitoring the quality control process during production and review. [REDACTED] will assign the project professional and technical support staff to follow established District standards and regulations.

- **Quality Assurance Manager (QAM)**

[REDACTED]

[REDACTED] will function as quality assurance manager for this project. [REDACTED] will be responsible for

verifying that the design complies with quality control and quality assurance procedures and will supervise all quality reviews undertaken by other personnel. [REDACTED] will be responsible for overall quality assurance verification, including the required Certificate of Compliance sign-offs.

- **Quality Reviewer**

[REDACTED]

[REDACTED] will be responsible for QC reviews of the list of technical specifications, Preliminary Design Report, Preliminary Construction Schedule, Preliminary Construction Estimate of Cost and Conceptual Plans.

3.0 SUBMITTAL AND MILESTONE REVIEW PROCEDURES

3.1 REVIEW OF SUBMITTALS

Prior to each submittal or project milestone date and in addition to the production checking described in Section 2.0, the designated QRs will perform a thorough final review of each project element to check all work for completeness, errors and omissions, and to confirm that any revisions or adjustments to the project documents are complete and correct. This thorough quality control review by the QRs is to confirm that all aspects of the design and presentation, including constructibility are acceptable. The QRs will use the standard review procedure, which is a check and balance process that includes QR review (checking), concurrence (back-checking), incorporation, and verification (rechecking) of all production work and documents during their preparation. The standard review procedure is summarized below and is described more fully in a later section of this document. Deliverables will be checked for presentation suitability and readability in full and half size formats, as appropriate.

Standard Review Procedure

The standard (color coded) review procedure described in a later section of this document will be used to record the production and review of all submittals and supporting materials. This procedure will provide a check and balance arrangement between the RPs and the QRs that requires:

- RPs to indicate that they have completed production checking.
- QRs to check all work before each submittal or milestone date.
- RPs to concur with all comments and revisions (back-checking).
- RPs to insure the incorporation of all agreed revisions.

- QRs to verify the incorporation of all agreed changes.
- Participants in the production and review process to sign and date the quality control checklist in the appropriate blanks (or sign-off and date the print) to signify the completeness and accuracy of their part of the effort.
- Project Manager will retain check sets for QA and audit reviews.
- QRs to verify the proper incorporation of all agreed changes.
- Principal In Charge to sign the Quality Certificate of Compliance

4.0 PROJECT COORDINATION PROCEDURES

4.1 PROJECT COORDINATION REVIEWS AND MEETINGS

The Project Manager and the RPs are responsible for reviewing all documents for correctness and for coordination between disciplines. The Project Manager and RPs will initial and date the checklist for discipline coordination.

Regular coordination meetings will be held. The project coordination items will be discussed at bi-monthly or weekly meetings, as necessary, to achieve complete project coordination.

4.2 SUBCONSULTANT QUALITY CONTROL

The Project Manager will furnish sub-consultants with a copy of the project quality control plan. The sub-consultants will be directed to follow the approved procedures, document their quality control activities, and make their documentation available for a compliance audit.

Sub-consultants will use the project quality control plan processes and procedures, including the Certificate of Compliance and the quality control checklists (See Appendix), for each element of their work to certify that both production and review quality control was performed in accordance with the approved project quality control plan. All quality control activities shall be documented, filed, and retained as provided herein.

In addition, the Project Manager will conduct periodic quality assurance reviews of sub-consultants' work to check for adherence to the project quality control plan.

5.0 QUALITY ASSURANCE REVIEW PROCEDURES

5.1 QUALITY ASSURANCE REVIEW AND COMPLIANCE CERTIFICATION

At each phase submittal or project milestone before a deliverable is released to the DISTRICT or others, the QAM will perform a QA review of all work elements and deliverables. The review will determine whether or not the required quality control procedures have been followed and that both the production and review quality control processes were performed according to the project quality control plan. The QAM will document the quality assurance review by initialing all QA/QC Review stamps, submittal check sets, and review documents and executing the Certificate of Compliance form. The Certificate of Compliance is included in the Appendix.

The project RP assembles all production and review checking documents, including initialed quality control stamps and a copy of all deliverables for the final quality assurance review. Finished documents should also be included in the quality assurance reviews.

The Consultant's responsible Quality Assurance Manager:

- Reviews the submittal quality control
- Completes and signs the QA/QC Review Completion Stamp for each element
- Prepares and signs the Certificate of Compliance to certify that all quality control procedures have been completed in accordance with the approved project quality control plan.

6.0 RECORDS RETENTION

The Project Manager will retain all project production and review checking documents, check sets, and copies of all deliverables, including plans. We will retain these in an orderly manner, ready for examination, to demonstrate that quality standards have been met throughout the development of the project. As a minimum, the submittal check sets, any supplemental review check sets, and check sets of all other deliverables including studies and reports, will be retained in the project files until the end of the project phase. The required checking documents will then be archived for the life of the facility.

7.0 STANDARD REVIEW PROCEDURES

COMPLETION

After the RP has completed the production checking, the final revisions have been completed, and the document is deemed ready for QC review, the RP signs or initials the document or plan as directed by the Project Manager.

CHECKING

The QR (checker) reviews the plan or the document for technical adequacy, conformance to any applicable standards, form and format, and performs specific accuracy checks required for that type of document. Checking activity is recorded directly on the plans or document. The QR's color is **red** only.

The Quality Reviewer (checker):

- Determines that the plan or document conforms to good engineering or environmental judgment and practice and that it is suitable and adequate to accomplish the required function. The QR does not, in order to satisfy personal preference, revise a document that is already adequate to meet project requirements.
- Marks in red on the plan or document to denote corrections, additions, or deletions deemed necessary. **Red** should not be used to note comments or instructions. These colors are reserved for the checking process. Comments or instructions should be written in black (pencil).
- Resolves significant differences with the RP. If necessary, the QR refers any issue to the Project Manager or QA for final resolution before continuing the checking activity. The plan or document must reflect resolution of these differences by means of a **green** check mark, affixed by the RP next to the QR's red comments.

CONCURRENCE

The Responsible Professional is responsible for reviewing the QR's marks on the check print and personally making or supervising the update of the document original. The back-check color is green.

The Responsible Professional (back-checker):

- If in agreement that the original should be changed, the RP should place a checkmark next to comment. The RP adds, in green, any additional changes not picked up by the QR. A comment not check marked by the RP, shall not be considered as a comment for incorporation.
- Consults with the QR if not in agreement with some of the red marked changes or if additional changes are necessary. Resolves differences with the QR, or if necessary, refers issues to the Project Manager or QAO, in that order, for final resolution before completing the back-checking. Every red marked change made by the QR should have a green check next to it (by the RP/backchecker) or a brief explanation (in green) as to why it was not incorporated.

INCORPORATION

- The RP updates the document original when practical, or has the document original or CADD file updated under his supervision to include the agreed upon changes. If the updating is done by a CADD technician or drafter, this individual will highlight in yellow on the check print, each item as the change is made on the originals. The RP/ back-checker should verify that such updating of the plans was correctly done.
- If the changes in the document are so extensive that it is difficult to follow them on the original check print, the RP/back-checker must, upon completion of updating the original, make a new check print for the use of the QR/verifier. The new check print will be labeled #2, stamped "REVISED", and placed on top of check print #1. All plans or documents will then be sent to the QR/verifier.

VERIFICATION

Verifying Original Documents

The Quality Reviewer (or designee), acting as the verifier, shall be given the opportunity by the RP to review the completed changes to verify that the updated document conforms with agreed comments made. The QR reviewer shall notify the QAO that they have been given the opportunity to review the documents

and the verification process is complete.

7.1 COMPUTER GENERATED CALCULATIONS REVIEW PROCEDURES

Only CONSULTANT verified computer programs shall be used for final design. The Standard Review Procedure shall follow the procedure described above for Hand Calculations. RPs and QRs shall check all input data. The output results will be spot checked for compliance with allowable stresses, member capacities, plotted results, etc.

Program Verification

Prior to use for final design, computer programs used for design and analysis shall be verified by an experienced individual in the discipline for which the program was developed. Input data from a previously solved problem that produced a correct solution shall be used to verify the correctness of the new computer program. The program documentation shall be reviewed and any clarifications needed shall be written into the margins of the documentation. The QR must be knowledgeable about the Program's capabilities and limitations as well as the technical subject to which the program is applied. The Responsible Professional confirms the output and function of the program by one of the following procedures on a case-by-case basis:

- Performing a computer run of data from previous solutions, which has been thoroughly checked. Note: The data used may need to come from the calculations rather than the drawings in order to minimize errors due to rounding.
- Perform hand calculations to verify the output.
- Multiple function computer spreadsheets must be verified for each formula change.

Input and Output Checking

Checking of program input, output and function shall be accomplished by one of the following procedures on a case-by-case basis.

- The program was appropriate and properly utilized.
- All input was checked, correct, accurate and in the format required by the program.
- The output meets the test of reasonableness, and the expected results were produced based on sufficient number of spot checks.

The RP and the QR shall initial and date the check-set and the documentation as having been checked. The RP and the QR shall initial and date the input and output sheets, and the Quality Control Checklist.

7.2 QUANTITIES AND COST ESTIMATES REVIEW PROCEDURES

Quantities

Quantity computations and quantity computation booklets shall be subject to the same review procedures as are the hand and computer calculations, as applicable. All quantities shall be compiled on appropriate computation sheets in a well-organized manner and kept in a notebook to be submitted along with plans as required by the DISTRICT.

7.3 TEXT, PERMIT APPLICATIONS, SPECIFICATIONS AND TECHNICAL SPECIAL PROVISIONS REVIEW PROCEDURES

The RP shall develop an outline for the required report, text, permit applications, specifications and/or technical special provisions. The RP will develop each section of the document utilizing the standards where applicable. Once typed, the RP will revise and back-check the draft using the Standard Review Procedure. Once satisfied, the RP will initial the Quality Control Checklist, and then deliver the final draft to the designated QR.

The assigned QR will review and comment on the draft using the Standard Review Procedures. The check will be made against the design drawings and project scope for accuracy and completeness. The QR will also check the work from a technical writer's perspective, and will mark comments thereon, initial and date the set. The QR will also initial the Quality Control Checklist prior to returning the documents to the RP.

The RP will back-check the review draft for concurrence and will revise the draft, as required. The RP will prepare the document for final typing and will proofread it once complete. Final documents revisions will be verified in the same manner as in the computer calculations review procedures.

Permit application drawings shall be subject to the same procedures as drawings. The checklist used will be that issued by the permitting agency. If required, the Project Manager will arrange for a Peer Review of sensitive documents.

7.4 STUDIES AND REPORTS

Studies and reports have special quality control requirements. The QRs will conduct the QC reviews on the basis of their specialized professional experience and knowledge of the subject. They will ensure that the methods, procedures, assumptions, theories, conclusions, and recommendations presented in the reports are based on sound engineering and environmental judgment. As a minimum, all reviews will address the appropriate study elements and will be in compliance with all District manuals and guidelines.

The reviews of reports and studies will rely on the QR's experience in performing and producing similar studies and reports on previous projects for the District. In addition, a technical writer will review the reports for sentence structure, grammar, and overall presentation clarity.

The QR and others involved in the checking process will use the standard review procedure described in Section 7.0 and complete the applicable QC stamps to fully document the quality control process prior to each submittal.

After completion of the production process, the RP will submit the study and report to the QR for the submittal review. The Project Manager will be responsible for submitting the report to the DISTRICT or other review agencies and for the retention of all files, supporting documents, calculations, drawings, graphics, and referenced material.

The QR will perform the review of each engineering/environmental report element by using a representative to ensure that all pertinent items have been addressed.

The QR will complete the review for each technical report element and establish that:

- The study scope and objectives have been established and achieved.
- The appropriate technical criteria have been used.
- The study approach is satisfactory and follows established methodology.
- Appropriate data has been acquired, referenced, and retained.
- Methods and procedures used for calculations and analyses were appropriate.
- Assumptions are reasonable and clearly defined in accordance with established principles.
- Theories are applicable and are properly supported by back-up data.

- Conclusions are reasonable and based on sound professional engineering judgment.
- The report format and presentation are appropriate and consistent with established guidelines.
- The text is grammatically correct and has been checked according to the project quality control plan.
- Calculations, if required, have been checked according to the project quality control plan.
- Graphics have been checked according to the project quality control plan.
- The QR's comments are properly recorded, addressed, and verified on the checking document.
- The RPs and the QRs have resolved any problems revealed by the review and have signed the quality control checklist and quality control tracking stamp appropriately.
- Changes to the work have been properly reviewed and re-certified

ATTACHMENT 8: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
11/19/19	Updated RMO Coordination Section	Page 4, Par 1.d
11/19/19	Updated Final Decision Level Recommendation	Page 6, Par 1.e.3
12/03/19	Updated Review Schedule and Cost	Page 14, Par 6.a