



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

20 May 2019

MEMORANDUM FOR COMMANDER, JACKSONVILLE DISTRICT

SUBJECT: Approval of the Review Plan for the Herbert Hoover Dike (HHD), State Road 78, Harney Pond Bridge Armoring Project

1. References:

a. Memorandum, CESAJ-EN-Q, 9 May 2019, subject as above.

b. Engineering Circular (EC) 1165-2-217, Water Resources Policies and Authorities Review Policy for Civil Works, 20 February 2018.

2. The Review Plan (RP) for the design and construction documents for the HHD, State Road 78, Harney Pond Bridge Armoring Project and reference 1.a noted above have been reviewed by South Atlantic Division (SAD). This RP was coordinated with and endorsed by the Risk Management Center (RMC). SAD concurs with the conclusion that a Type II Independent External Peer Review (IEPR) of the subject project is required. The RP is hereby approved in accordance with reference 1.b.

3. SAD concurs with the District's recommendation that outlines the requirements for District Quality Control (DQC), Agency Technical Review (ATR), and Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Review, and the recommendation that a Safety Assurance Review (SAR)/Type II Independent External Peer Review is required. Documents to be reviewed include the final design Plans and Specifications and the Design Documentation Report (DDR).

4. The USACE RMC shall be the Review Management Organization (RMO) for this project.

5. 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.

6. The SAD point of contact is [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

- 9 MAY 2019

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

SUBJECT: Approval of Review Plan for Herbert Hoover Dike, State Road 78, Harney Pond Bridge Armoring Project

1. References.

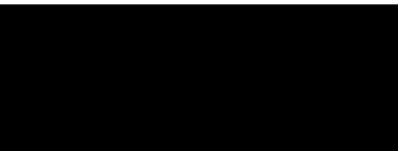
- a. Engineering Circular (EC) 1165-2-217, Civil Works Review, 20 Feb 18.
- b. Water Resources Development Act of 2007, Public Law 110-114, 08 Nov 07

2. I hereby request approval of the enclosed Review Plan for the design and construction phases of the Herbert Hoover Dike, State Road 78, Harney Pond Bridge Armoring Project, 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. The Review Plan complies with applicable policy, provides for Agency Technical Review, and has been coordinated with the CESAD. It is my understanding that non-substantive changes to this Review Plan, should they become necessary, are authorized by CESAD.

3. The district will post the CESAD approved Review Plan to its website and provide a link to the CESAD for its use. Names of Corps/Army employees will be withheld from the posted version, in accordance with guidance.

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

Encl



COL, EN
Commanding



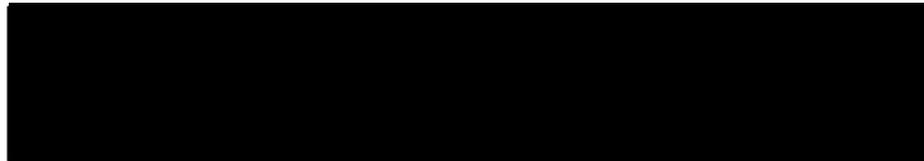
**US Army Corps
of Engineers.**

Prepared by:
**SAJ District
SAD Division**

Herbert Hoover Dike State Road 78 Harney Pond Bridge Armoring Project

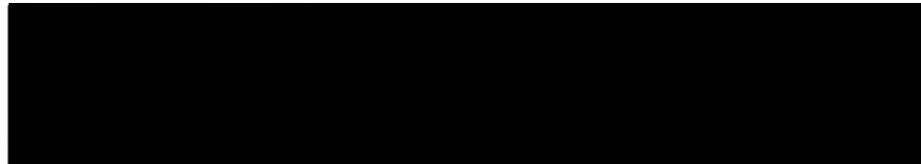
Review Plan

PREPARED
BY:



Engineering Technical Lead
USACE, Jacksonville District

ENDORSED
BY:



Chief, Eastern Division
USACE, Risk Management Center

MSC Approval Date: *Pending*

Last Revision Date: *None*

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Section 1

Introduction

1.1 Purpose

This Review Plan (RP) for the implementation documents of the Herbert Hoover Dike State Road 78 Harney Pond Bridge Armoring Project (P2# 114527) will help ensure a quality-engineering project is developed by the U.S. Army Corps of Engineers (USACE) in accordance with EC 1165-2-217, "Review Policy for Civil Works." As part of the Project Management Plan, this RP establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products and describes the scope of review for the current phase of work. The EC outlines five general levels of review that are further discussed in this RP, including District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review, Safety Assurance Review (SAR), and Policy and Legal Compliance Review. This RP will be provided to the Project Delivery Team (PDT), as well as the DQC, ATR, SAR, and BCOES Teams.

1.2 References

- EC 1165-2-217, Review Policy For Civil Works, 20 February 2018
- ER 1110-1-12, Quality Management, 31 March 2011
- ER 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews, 1 January, 2013 ER 1110-2-1156, Safety of Dams, Policy and Procedure, 31 March 2014
- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999
- ER 10-1-51, Organizations and Function, Roles and Responsibilities – Dam Safety Modification Mandatory Center of Expertise, 29 June 2012
- EM 1110-2-1913 Design, Construction, and Evaluation of Levees, 30 April 2000
- 02611-SAJ EN Quality Control of In-House Products: Civil Works, 4 December 2017
- Project Management Plan (PMP) for Herbert Hoover Dike Project (P2#114527)

1.3 Review Management Organization

The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for this product. Contents of this RP have been coordinated with the RMC and South Atlantic Division (SAD), the Major Subordinate Command (MSC).

Section 2

Project Description

2.1 Project Description

Herbert Hoover Dike (HHD) is an earthen embankment system located along the perimeter of Lake Okeechobee, a large (724 square mile surface area) freshwater lake in south Florida. The lake is located about 30 miles west of the Atlantic Ocean and 60 miles east of the Gulf of Mexico. The lake and surrounding drainage area encompass approximately 5,600 square miles. The dike was constructed primarily to provide local flood protection. Components of the embankment system have been built intermittently since the early 1900's. Federal involvement began in the 1930s with the construction of dikes (for flood protection) along portions of the north and south shores.

In the 1960s, the crest elevations of those dikes were increased and additional embankments were constructed on the northwest and northeast shores. As a result, the HHD system now encircles Lake Okeechobee entirely, except in the vicinity of Fisheating Creek on the western shore. The existing embankments total about 143 miles in length with crest elevations ranging from 32 to 46 feet, National Geodetic Vertical Datum (NGVD). Adjacent land elevations typically range from 10 to 20 feet, NGVD.

This RP will cover the armoring of the landside slope of the HHD at Harney Pond and State Road 78 Bridge. A project location map is included in Figure 1. At this location, the crest of HHD is low, which exceeds the Annual Probability of Failure (APF) guidelines. Elevating the crest is not feasible because reconstruction of the bridge would be required. Therefore, the project will include placing Articulated Concrete Block (ACB) and/or riprap armoring to protect the embankment from failure during a temporary overtopping event. An aerial image of the project site is provided in Figure 2. A proposed typical section of armoring for the project is provided in Figure 3. The hydraulic routing model to evaluate project alternatives was developed using Hydrologic Engineering Center – River Analysis System (HEC-RAS) Version 5.0.6 with two-dimensional (2D) flow areas. The HEC-RAS model combined one-dimensional and two-dimensional (1D/2D) unsteady-flow routing simulations of the 100-year and SPF rainfall runoff events.

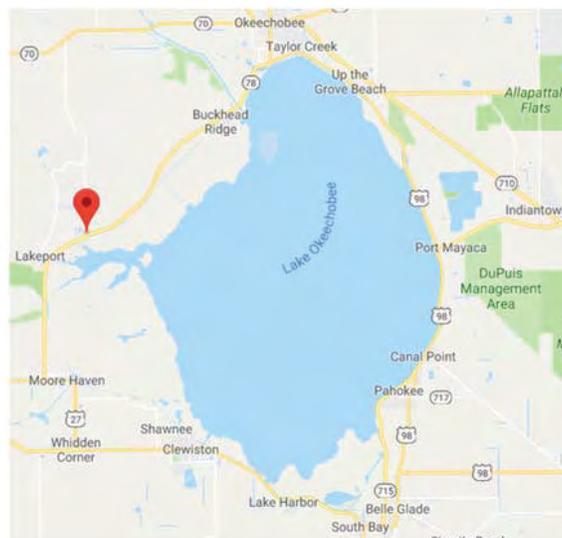


Figure 1: Project location map



Figure 2: Aerial image of project site

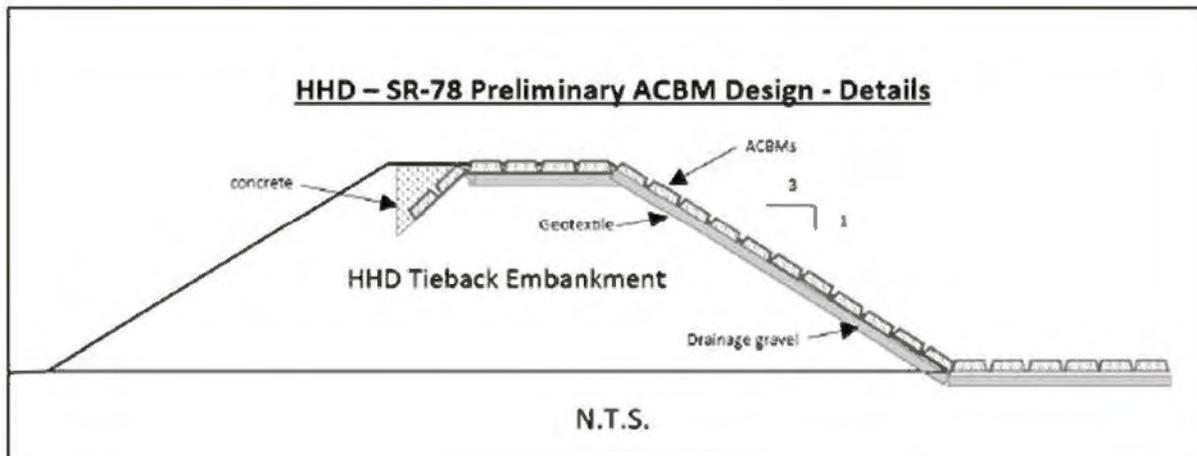


Figure 3: Typical Section of Armoring

Section 3

District Quality Control

3.1 Requirements

All implementation documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo a DQC. A DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. DQC will be performed on the Plans and Specifications (P&S) and the Design Documentation Report (DDR) in accordance with the Jacksonville District Engineering Division Quality Management System (EN QMS). The EN QMS defines DQC as the sum of two reviews, Discipline Quality Check and Review (DQCR) and Product Quality Control Review (PQCR).

3.2 Documentation

DQCRs occur during the design development process and are carried out as a routine management practice by each discipline. Checklists are utilized by each discipline to facilitate the review and to document the DQCR review comments. Certification of the DQCR is signed by the Branch Chiefs certifying that the DQCR on all design analyses and products have been completed in accordance with the EN QMS process prior to release from the Branch.

The PQCR shall ensure consistency and effective coordination across all disciplines, and shall assure the overall coherence and integrity of the products. Review comments and responses for this review will be documented in DrChecksSM. The PQCR shall be QC certified by the Engineering Technical Lead (ETL), all applicable Section and Branch Chiefs, and the Division Chief. This PQCR certification signifies that all DQCR Certifications are complete, as well as the PQCR.

3.3 DQC Schedule and Estimated Cost

Although DQC is always seamless, the following milestone reviews are scheduled in Table 1. The cost for the DQC is approximately \$20,000.

Project Phase/Submittal	Review Start Date	Review End Date
DQCR Final Design	8 February 2019	28 February 2019
PQCR Final Design	1 March 2019	12 April 2019

Table 1: DQC Schedule

Section 4

Agency Technical Review

4.1 Requirements

All implementation documents (including supporting data, analyses, reports, environmental compliance documents, water control manuals, etc.) shall undergo ATR in accordance EC 1165-2-217. ATR will occur seamlessly, including early involvement of the ATR team for validation of key design decisions, and at the scheduled milestones as shown in Section 4.6. A site visit will not be scheduled for the ATR Team. Additional data required by the ATR team will be gathered by PDT members during plan in hand visits or by USACE HHD Construction personnel. The information will be reviewed and disseminated to the ATR team by the PDT.

4.2 Documentation of ATR

Documentation of ATR will occur using the requirements of EC 1165-2-217. This includes the four-part comment structure and the use of DrChecksSM.

4.3 Products to Undergo ATR

Products that will undergo ATR include the P&S and DDR prepared for the Final Design Phase, including all supporting analyses and documentation.

4.4 Required Team Expertise and Requirements

ATR teams will be established in accordance with EC 1165-2-217. The following disciplines will be required for ATR of this project:

ATR Team Lead. The ATR Team Lead shall be a professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The ATR Team Lead shall have 10 or more years of experience with Civil Works Projects and have performed ATR Team Lead duties on complex civil works projects. The ATR Team Lead can also serve as one of the review disciplines.

Hydrology and Hydraulics (H&H). The H&H team member shall be a registered professional with 10 or more years of experience in conducting and evaluating hydrologic and hydraulic analyses for flood risk management projects. Experience with HEC and ERDC 2D hydraulic modeling is required. Experience with USACE Dam Safety Program is required.

Geotechnical. The Geotechnical team member shall be a registered professional engineer and have 10 or more years of experience in geotechnical engineering. Team member shall be experienced in dam and/or levee design, post-construction evaluation, and rehabilitation. Experience shall include geotechnical evaluation of flood risk management structures. Experience shall encompass design and selection of appropriate bridge and stream bank erosion and scour countermeasures, including alternatives to conventional riprap and filter design such as articulated concrete block mattresses (ACBM). Experience with USACE Dam Safety Program is required.

Civil. The Civil team member shall be a registered professional engineer and have 10 or more years of experience in the design, layout, and construction of flood control structures including dams. The Civil

team member shall have demonstrated knowledge regarding hydraulic structures, erosion control, earthwork, and concrete placement. Experience with USACE Dam Safety Program is desired.

Construction. The Construction team member shall have 10 or more years of experience in the construction of flood control structures including dams.

4.5 Statement of Technical Review Report

At the conclusion of each ATR effort, the ATR team will prepare a Statement of Technical Review Report with a completion and certification memo. The report will be prepared in accordance with EC 1165-2-217 and will follow the most recent template developed by the RMC.

4.6 ATR Schedule and Estimated Cost

Although ATR is always seamless, the preliminary ATR milestone schedule is listed in Table 2. The cost for the ATR is approximately \$35,000.

Project Phase/Submittal	Review Start Date	Review End Date	Site Visit
ATR Final Design	15 April 2019	19 June 2019	N/A

Table 2: ATR Schedule

Section 5 Safety Assurance Review

5.1 Requirements

A SAR, also known as a Type II Independent External Peer Review (IEPR), may be required for implementation documents and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. A risk-informed decision, as described in EC 1165-2-217, is made as to whether a SAR is appropriate. SARs are managed outside the USACE and shall consider the adequacy, appropriateness, and acceptability of the design and construction activities, assuring public health safety and welfare. A site visit will be required by the SAR team during the design and construction phases.

5.2 Decision on SAR

The District Chief of Engineering has made a risk-informed decision that this project poses a significant threat to human life (public safety) in the event of dam failure. Therefore, a SAR will be performed.

5.3 Products to Undergo SAR

Products that will undergo SAR include the P&S and DDR prepared during the Final Design Phase, as well as construction documents at the mid-point of construction.

5.4 Required SAR Panel Expertise

SAR panels will be established in accordance with EC 1165-2-217. Panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. The selection of SAR review panel members will be selected using the National Academy of Science (NAS) Policy, which sets the standard for “independence” in the review process.

The following disciplines will be required for SAR of this project:

SAR Team Lead. The SAR Team Lead shall have 15 or more years of experience with Civil Works Projects and have performed SAR Team Lead duties on complex civil works projects. The SAR Team Lead can also serve as one of the review disciplines.

Hydrology and Hydraulics. The H&H Independent Expert shall be a registered professional from academia, a public agency, or an Architect-Engineer or consulting firm with 15 or more years of experience in hydraulic engineering with an emphasis on dams. The H&H Independent Expert must have demonstrated knowledge and experience with computer numerical modeling (HEC and ERDC software) and the application of data from physical model testing (journals, research, etc) to the design of scour protection, and in the ability to coordinate, interpret, and explain computed results with other engineering disciplines, particularly structural engineers, geotechnical engineers, and geologists. The H&H Independent Expert shall be familiar with USACE application of risk and uncertainty analyses in studies as found in USACE Regulation ER 1110-2-1156 and have a familiarity with standard USACE hydrologic and hydraulic computer models used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations. Experience with the USACE Dam Safety Program, Federal Dam Safety Programs, and participation in related professional societies is required.

Geotechnical. The Geotechnical Independent Expert should be a registered professional engineer from academia, a public agency, or an Architect-Engineer or consulting firm with 15 years of experience in the field of geotechnical engineering. Experience needs to include geotechnical evaluation of flood risk management structures. Experience needs to encompass: static and dynamic slope stability evaluation; evaluation of the seepage through embankments and under seepage through the foundation of flood risk management structures, including earthen dams; evaluation of grout curtains and cutoff walls, embankments, outlet works, filters and drainage features, and other pertinent dam features; engineering, design and construction of dam excavations and treatments; and settlement evaluations. Experience with USACE Dam Safety Program is required. Experience with Federal Dam Safety Programs and participation in related professional societies is required.

5.5 Documentation of SAR

Documentation of SAR will be prepared in accordance with EC 1165-2-217.

5.6 Scope, Schedule, and Estimated Cost of SAR's

The design and construction phase SARs will be performed in accordance with EC 1165-2-217 and as shown in Table 3. SARs during construction are currently being conducted for the individual task orders associated with the HHD Cutoff Wall contract, as well as on an annual basis for the HHD Culverts contracts. The construction phase SAR for the HHD State Road 78 Harney Pond Bridge Armoring Project will be conducted concurrently with one of the SARs for the HHD Culverts and Cutoff Wall contracts.

The estimated cost for the SARs of this project are in the range of \$80,000 to \$100,000. This estimate will be refined when the Scope of Work for the SAR task orders are completed.

Milestone Reviews	Geotech	H&H	Site Visit Duration (days)	Review Start Date	Review End Date
Final Design	X	X	1	15 April 2019	19 June 2019
Midpoint of Construction	X		1	TBD – Concurrent with Construction Phase SAR of the HHD Cutoff Wall and Culvert Contracts	

Table 3: SAR Schedule with Required Reviewers and Site Visit Duration

Section 6

BCOES Reviews

The value of a BCOES review is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. Biddability, constructability, operability, environmental, and sustainability requirements must be emphasized throughout the planning and design processes for all programs and projects, including during planning and design. This will help to ensure that the government's contract requirements are clear, executable, and readily understandable by private sector bidders or proposers. It will also help ensure that the construction may be done efficiently and in an environmentally sound manner and that the construction activities and projects are sufficiently sustainable. Effective BCOES reviews of design and contract documents will reduce risks of cost and time growth, unnecessary changes and claims, as well as support safe, efficient, sustainable operations and maintenance by the facility users and maintenance organization after construction is complete. A BCOES Review will be conducted on the project. Requirements and further details are stipulated in ER 1110-1-12, ER 415-1-11, and SAJ EN QMS 02611.

Section 7

Public Posting of Review Plan

As required by EC 1165-2-217, the approved RP will be posted on the District public website (<https://www.saj.usace.army.mil/Missions/Civil-Works/Review-Plans/>). 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 RP are necessary.

Section 8

Review Plan Approval and Updates

The MSC Commander, or delegated official, is responsible for approving this RP. The Commander's approval reflects vertical team input (involving the District, MSC, and RMC) as to the appropriate scope, level of review, and endorsement by the RMC. The RP is a living document and should be updated in accordance with 1165-2-217. All changes made to the approved RP will be documented in Attachment 1, Table 6, Attachment 2RP Revisions. The latest version of the RP, along with the Commander's approval memorandum, will be posted on the District's webpage and linked to the HQUSACE webpage. The approved RP should be provided to the RMO.

Section 9

Engineering Models

The use of certified, validated, or agency approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, BCOES, policy and legal review, and SAR. Where such approvals have not been completed, appropriate independent checks of critical calculations will be performed and documented. The following engineering models, software, and tools are anticipated to be used:

MODEL
Bentley Microstation V8i, Bentley Systems Inc, 2010
Bentley InRoads Microstation V8i, Bentley Systems, Inc.
HEC-UNET v4.0, USACE Hydraulic Engineering Center
HEC-HMS v4.2.1
HEC-RAS v.5.0.6
HES-ResSim v.3.1
HY-8
AdH
SMS v.10.1
GIS (ESRI ArcMap)
STWAVE Full Plane (Version 5.0)
STWAVE Half Plane (Version 4.0)
ACES (Version 4.03)
Bretschneider
Compaq Visual Fortran (Professional Edition 6.1.0)
SEEP/W, GeoStudio 2012 Version 8.0.9.6484
SLOPE/W, GeoStudio 2012 Version 8.0.9.6484
STAADPro v8.0
Ram Element Version 10.7

Table 4: Models and Status

Section 10

Review Plan Points of Contact

Title	Organization	Phone
Review Manager	CESAJ-EN-Q	[REDACTED]
Senior Reviewer	CEIWR-RMC	[REDACTED]
Quality Manager	CESAD-RBT	[REDACTED]

Table 5: RP POC's

ATTACHMENT 1

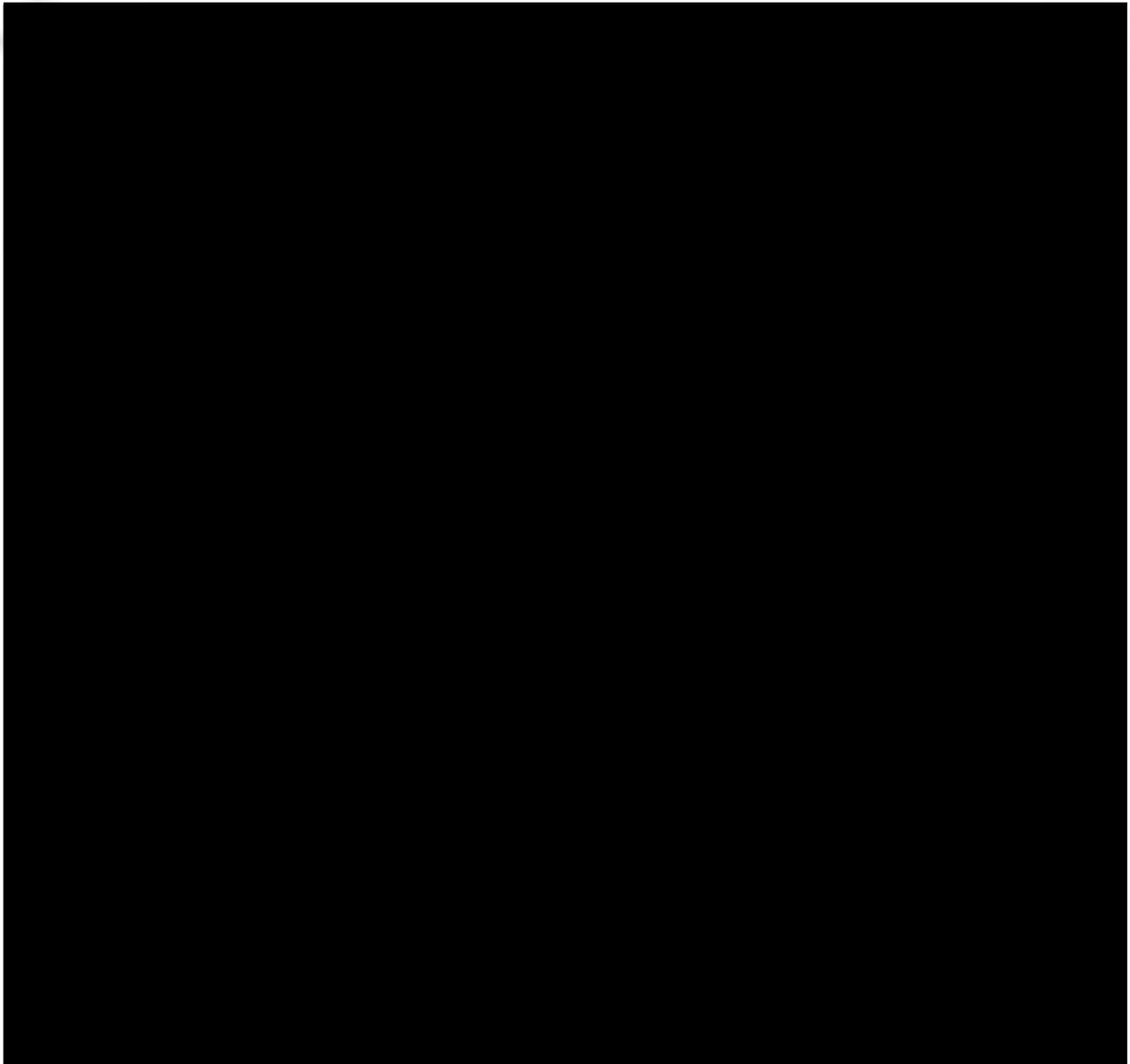
Review Plan Revisions

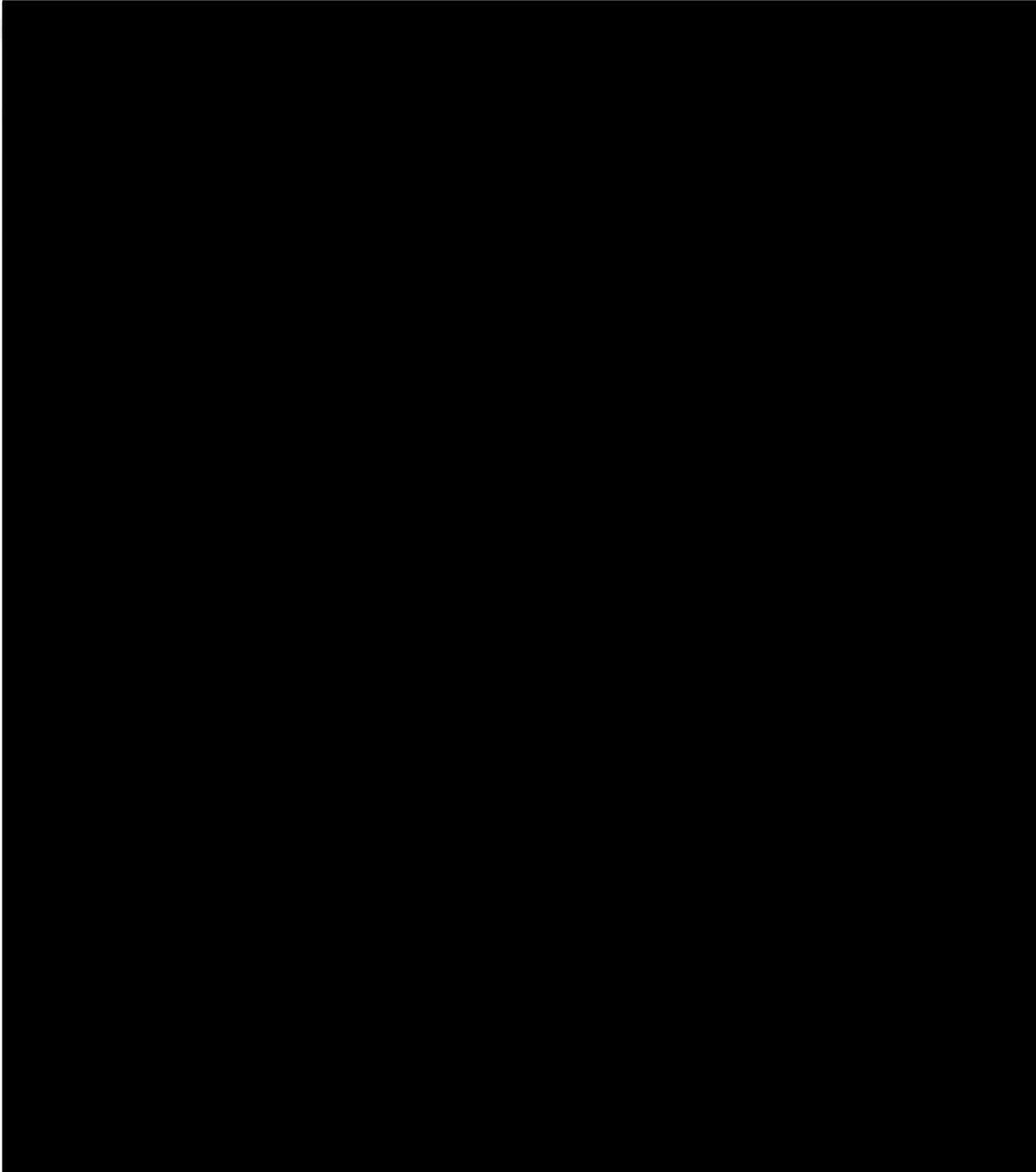
Revision Date	Description of Change	Page/Paragraph Number

Table 6: RP Revisions

ATTACHMENT 2







ATTACHMENT 3

