

Amended Application for New License **Major Project – Existing Dam**

Exhibit F **General Design Drawings**

Security Level: Public

Yuba River Development Project
FERC Project No. 2246



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None.

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EXHIBIT F

GENERAL DESIGN DRAWINGS

1.0 Introduction

The Yuba County Water Agency (YCWA or Licensee) has prepared this Exhibit F, report on Design Drawings, as part of its Amended Application for New License Major Project – Existing Dam - (Amended FLA)¹ from the Federal Energy Regulatory Commission (FERC) for the Yuba River Development Project (Project), FERC Project No. 2246. This exhibit is prepared in conformance with Title 18 of the Code of Federal Regulations (C.F.R.), Subchapter B (Regulations under the Federal Power Act), Part 5 (Integrated Licensing Process). In particular, this report conforms to the regulations in 18 C.F.R. Section (§) 5.18(a)(5)(iii), which requires in part that an application include an Exhibit F, General Design Drawings, in conformance with 18 C.F.R. § 4.51(g) and 4.39. Section 4.41(g) pertains to design drawings and Section 4.39 provides specifications for maps and drawings. As reference, these two sections state:

18 C.F.R. §4.41(g): Exhibit F consists of general design drawings of the principal project works described under paragraph (b) of this section (Exhibit A) and supporting information used as the basis of design. If the Exhibit F submitted with the application is preliminary in nature, applicant must so state in the application. The drawings must conform to the specifications of § 4.39.

- (1) The drawings must show all major project structures in sufficient detail to provide a full understanding of the project, including:
 - (i) Plans (overhead view);
 - (ii) Elevations (front view);
 - (iii) Profiles (side view); and
 - (iv) Sections.
- (2) The applicant may submit preliminary design drawings with the application. The final Exhibit F may be submitted during or after the license process and must show the precise plans and specifications for proposed structures. If the project is licensed on the basis of preliminary designs, the applicant must submit the final Exhibit F for Commission approval prior to the commencement of any construction of the project.
- (3) Supporting design report. The applicant must furnish, at a minimum, the following supporting information to demonstrate that existing and proposed structures are safe and adequate to fulfill their stated functions, and must submit such information in a separate report at the time the application is filed. The report must include:
 - (i) An assessment of the suitability of the site and the reservoir rim stability based on geological and subsurface investigations, including investigations of soils and rock borings and tests for the evaluation of all foundations and construction materials sufficient to determine the location and type of dam structures suitable for the dam site;
 - (ii) Copies of all boring logs, geology reports and laboratory tests reports;
 - (iii) An identification of all borrow areas and quarry sites and an estimate of required quantities and suitable construction material;

¹ YCWA filed with FERC an Application for a New License Major Project – Existing Dam – (Final License Application, or FLA) for the Project on April 27, 2014.

- (iv) Stability and stress analyses for all major structures and critical abutment slopes under all probable loading conditions, including seismic and hydrostatic forces induced by water loads up to the Probable Maximum Flood as appropriate; and
 - (v) The basis for determination of seismic loading and the Spillway Design Flood in sufficient detail to permit independent staff evaluation.
- (4) The applicant must submit two copies of the supporting design report described in paragraph (g)(3) of this section at the time preliminary and final design drawings are submitted to the Commission for review. If the report contains preliminary drawings, it must be designated a “Preliminary Supporting Exhibit Report.”

18 C.F.R. §4.39: Specifications for maps and drawings. All required maps and drawings must conform to the following specifications, except as otherwise prescribed in this chapter:

- (a) Each original map or drawing must consist of a print on silver or gelatin 35mm microfilm mounted on Type D (3 1/4” by 7 3/8”) aperture cards. Full-sized prints of maps and drawings must be on sheets no smaller than 24 by 36 inches and no larger than 28 by 40 inches. A space five inches high by seven inches wide must be provided in the lower right hand corner of each sheet. The upper half of this space must bear the title, numerical and graphical scale, and other pertinent information concerning the map or drawing. The lower half of the space must be left clear. Exhibit G drawings must be stamped by a Registered Land Surveyor. If the drawing size specified in this paragraph limits the scale of structural drawings (exhibit F drawings) described in paragraph (c) of this Section, a smaller scale may be used for those drawings. Potential applicants or licensees may be required to file maps or drawings in electronic format as directed by the Commission.
- (b) Each map must have a scale in full-sized prints no smaller than one inch equals 0.5 miles for transmission lines, roads, and similar linear features and no smaller than one inch equals 1,000 feet for other project features, including the project boundary. Where maps at this scale do not show sufficient detail, large scale maps may be required. Each map must show:
 - (1) True and magnetic meridians;
 - (2) State, county, and town lines; and
 - (3) Boundaries of public lands and reservations of the United States [see 16 U.S.C. 796 (1) and (2)], if any. If a public land survey is available, the maps must show all lines of that survey crossing the project area and all official subdivisions of sections for the public lands and reservations, including lots and irregular tracts, as designated on the official plats of survey that may be obtained from the Bureau of Land Management, Washington, D.C., or examined in the local land survey office; to the extent that a public land survey is not available for public lands and reservations of the United States, the maps must show the protractors of townships and section lines, which, if possible, must be those recognized by the Federal agency administering those lands.
- (c) Drawings depicting details of project structures must have a scale in full-sized prints no smaller than:
 - (1) One inch equals 50 feet for plans, elevations, and profiles; and
 - (2) One inch equals 10 feet for sections.
- (d) Each map or drawing must be drawn and lettered to be legible when it is reduced to a print that is 11 inches on its shorter side. Following notification to the applicant that the application has been accepted for filing [see §4.31(c)], prints reduced to that size must be bound in each copy of the application which is required to be submitted to the Commission or provided to any person, agency, or other entity.
- (e) The maps and drawings showing project location information and details of project structures must be filed in accordance with the Commission’s instructions on submission of Critical Energy Infrastructure Information in §§388.112 and 388.113 of subchapter X of this chapter.

Besides this introductory material, this Exhibit F includes four sections. Section 2.0 provides a list of all design drawings needed to show all major Project structures in sufficient detail to provide a full understanding of the Project. These include Plan, elevation and section profiles.

Section 3.0 addresses the use of the YCWA’s Part 12 Independent Safety Inspection Reports to meet the requirements for a Supporting Design Report for existing Project facilities. Section 4.0 provides information regarding the attachment to this Exhibit F.

See Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations, Exhibit C for construction history and construction schedule, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and YCWA’s proposed resource management measures. Project maps are included in Exhibit G. Exhibit H contains a detailed description of the need for the electricity provided by the Project, the availability of electrical energy alternatives, and other miscellaneous information.

All elevation data in this Exhibit are in National Geodetic Vertical Datum of 1929 (NGVD29), unless otherwise specified.

2.0 General Design Drawings

General design drawings for YCWA’s Project, as described in Exhibit A to this Amended FLA, are provided in the Exhibit drawings listed in Table 2.0-1. YCWA considers these design drawings to be final and prepared in conformance to 18 C.F.R. § 4.39. These drawings provide Plan, elevation, profiles and sections in accordance with the requirements of 18 C.F.R. § 4.41(g), and were developed primarily from FERC-approved Exhibit L drawings, which depict the as-built principal Project works. For ease of reference, YCWA lists the design drawings by their current exhibit number, and the proposed new Exhibit F denotations.

Table 2.0-1. List of Exhibit F general design drawings for the Yuba River Development Project.

| YCWA’s Proposed Exhibit F Drawing Number in New License | YCWA’s Proposed Exhibit F Drawing Name | Exhibits F and L Drawing Number in Existing License | Date of FERC Order Approving Exhibits F or L Drawings | Exhibits F and L FERC- Assigned Drawing Number |
|--|--|--|--|---|
| 1 | New Colgate Development - New Bullards Bar Dam - General Plan | L-14 | 9/16/1996 | 2246-94 |
| 2 | New Colgate Development - New Bullards Bar Dam - Spillway Plan, Profile and Rating Curve | L-16 | 9/16/1996 | 2246-96 |
| 3 | New Colgate Project - New Bullards Bar Dam – Site Plan and Profile | F-2 | 9/16/1996 | 2246-144 |
| 4 | New Colgate Development - New Bullards Bar Dam - Layout and Geometric Data | L-15 | 9/16/1996 | 2246-95 |
| 5 | New Colgate Development - New Bullards Bar Dam – Right Thrust Block Details | L-17 | 9/16/1996 | 2246-112 |
| 6 | New Colgate Development - New Bullards Bar Dam – Left Thrust Block Details | L-38 | 9/16/1996 | 2246-113 |
| 7 | New Bullards Minimum Flow Development - Minimum Flow Powerhouse - Penstock, Profile, and Details | F-4 | 9/16/1996 | 2246-146 |

Table 2.0-1. (continued)

| YCWA's Proposed Exhibit F Drawing Number in New License | YCWA's Proposed Exhibit F Drawing Name | Exhibits F and L Drawing Number in Existing License | Date of FERC Order Approving Exhibits F or L Drawings | Exhibits F and L FERC- Assigned Drawing Number |
|---|--|---|---|--|
| 8 | New Bullards Minimum Flow Development - Minimum Flow Powerhouse - General Plan | F-3 | 9/16/1996 | 2246-145 |
| 9 | New Bullards Minimum Flow Development - Minimum Flow Powerhouse - Plan and Details | F-5 | 9/16/1996 | 2246-147 |
| 10 | New Bullards Minimum Flow Development - Minimum Flow Powerhouse – Cross Section | F-6 | 9/16/1996 | 2246-148 |
| 11 | New Colgate Development - Log Cabin Dam and Camptonville Tunnel - General Arrangement | L-20 | 9/16/1996 | 2246-97 |
| 12 | New Colgate Development - Camptonville Tunnel - Plan, Profile, and Sections | L-21 | 9/16/1996 | 2246-98 |
| 13 | New Colgate Development - Our House Dam and Lohman Ridge Tunnel - General Arrangement | L-22 | 9/16/1996 | 2246-99 |
| 14 | New Colgate Development - Lohman Ridge Tunnel - Plan, Profile, and Sections | L-23 | 9/16/1996 | 2246-100 |
| 15 | New Colgate Development - New Colgate Power Tunnel - Intake Sections and Elevations (Proposed addition to set) | -- | -- | -- |
| 16 | New Colgate Development - New Colgate Power Tunnel - Plan, Profile, and Sections | L-24 | 9/16/1996 | 2246-155 |
| 17 | New Colgate Development - New Colgate Powerhouse - Site Plan, Generator Deck El. 598.0 | L-35 | 9/16/1996 | 2246-110 |
| 18 | New Colgate Development - New Colgate Powerhouse - General Arrangement, Generator Deck El. 598.0 | L-39 | 9/16/1996 | 2246-114 |
| 19 | New Colgate Development - New Colgate Powerhouse - General Arrangement, Generator Deck El. 577.5 | L-25 | 9/16/1996 | 2246-102 |
| 20 | New Colgate Development - New Colgate Powerhouse - General Arrangement, Generator Deck El. 560.5 | L-26 | 9/16/1996 | 2246-103 |
| 21 | New Colgate Development - New Colgate Powerhouse - Cross Section (Sheet 1 of 2) | L-41 | 9/16/1996 | 2246-116 |
| 22 | New Colgate Development - New Colgate Powerhouse - Cross Section (Sheet 2 of 2) | L-36 | 9/16/1996 | 2246-111 |
| 23 | Narrows 2 Development - Narrows 2 Intake Tunnel and Powerhouse - Site Plan | L-27 | 9/16/1996 | 2246-104 |
| 24 | Narrows 2 Development - Narrows 2 Intake Tunnel and Powerhouse - Profile, Sections, and Steel Liner | L-29 | 9/16/1996 | 2246-106 |
| 25 | Narrows 2 Development - Narrows 2 Full Flow Bypass - Site Plan | L-43 | 11/22/2005 | 2246-157 |
| 26 | Narrows 2 Development - Narrows 2 Turbine Shutoff Valve - General Arrangement | L-44 | 11/22/2005 | 2246-158 |
| 27 | Narrows 2 Development - Narrows 2 Bypass Valve Structure - Equipment Arrangement (Sheet 1 of 2) | L-45 | 11/22/2005 | 2246-159 |
| 28 | Narrows 2 Development - Narrows 2 Bypass Valve Structure - Equipment Arrangement (Sheet 2 of 2) | L-46 | 11/22/2005 | 2246-160 |
| 29 | Narrows 2 Development - Narrows 2 Powerhouse - Site Plan Roof Deck (El. 348) & Generator Floor (El. 324) | L-31 | 9/16/1996 | 2246-108 |

Table 2.0-1. (continued)

| YCWA's Proposed Exhibit F Drawing Number in New License | YCWA's Proposed Exhibit F Drawing Name | Exhibits F and L Drawing Number in Existing License | Date of FERC Order Approving Exhibits F or L Drawings | Exhibits F and L FERC-Assigned Drawing Number |
|---|--|---|---|---|
| 30 | Narrows 2 Development - Narrows 2 Powerhouse - Site Plan Turbine Floor (El. 304) & Distributor (El. 292) | L-32 | 9/16/1996 | 2246-109 |
| 31 | Narrows 2 Development - Narrows 2 Powerhouse - Cross Section (Sheet 1 Of 2) | L-40 | 9/16/1996 | 2246-115 |
| 32 | Narrows 2 Development - Narrows 2 Powerhouse - Cross Section (Sheet 2 Of 2) | L-30 | 9/16/1996 | 2246-107 |
| -- | New Bullards Bar Dam – Site Plan - Title Sheet for As-Built Drawings not appropriate for Exhibit F. Proposed for removal from set | F-1 | 9/16/1996 | 2246-149 |
| -- | Narrows 2 Development - Narrows 2 Intake Tunnel and Powerhouse - Site Plan (Sheet 2 of 2) – No project structures shown. Proposed for removal from set | L-28 | 9/16/1996 | 2246-105 |
| -- | Narrows 2 Development - Narrows 2 Full Flow Bypass - Site Plan Option A - Not selected, proposed for removal from set | L-42 | 11/22/2005 | 2246-156 |
| -- | New Bullards Bar Dam – Turbine Building - Not constructed, proposed for removal from set | F-2 | 9/16/1996 | 2246-150 |
| -- | Not Issued by FERC, or Issued and Later Deleted by FERC | L-18 | -- | -- |
| -- | Not Issued by FERC, or Issued and Later Deleted by FERC | L-19 | -- | -- |
| -- | Not Issued by FERC, or Issued and Later Deleted by FERC | L-33 | -- | -- |
| -- | Not Issued by FERC, or Issued and Later Deleted by FERC | L-34 | -- | -- |
| -- | Not issued or deleted by FERC | L-37 | -- | -- |

3.0 Supporting Design Report for Existing Facilities

Sections 4.41(g)(2) require that an applicant file with FERC two copies of a Supporting Design Report when the applicant files a license application. The purpose of the Supporting Design Report is to demonstrate “...that existing and proposed structures are safe and adequate to fulfill their stated functions...” YCWA’s recent Part 12 Independent Dam Safety Inspection Reports fulfill the requirements of the regulations for filing a Supporting Design Report for existing Project facilities as part of the application for new license. All of the Project’s Independent Dam Safety Inspection Reports are on file with FERC.

YCWA anticipates that it will take the following actions during design of the new Auxiliary Flood Control Outlet to ensure safe and reliable construction and operation:

- YCWA’s design team will coordinate closely with DSOD and FERC through all design stages and during construction. Coordination will begin early in the design to develop a common understanding of design requirements, design milestones, project schedule, and establish key points of contact. The design team will coordinate frequently during design both formally at key check points (e.g., geologic investigation plan and 30%, 60%, 90%

design submittals), and informally as needed to communicate progress, solicit input, and address issues and concerns.

- A Board of Senior Consultants (BOSC) will be convened to provide YCWA with periodic independent reviews of engineering design and construction progress. The BOSC will be made up of senior technical experts independent of the design team with expertise in the key technical disciplines related to the new Auxiliary Flood Control Outlet (e.g., hydraulics, structural, geologic/tunneling and constructability). Periodic BOSC meetings will be established coincident with the key design submittals and during construction.
- During detailed design, a scaled hydraulic model of the Auxiliary Flood Control Outlet structure will be constructed at a hydraulic laboratory to confirm or refine the outlet geometry and identify areas of potential concerns (e.g., potential cavitation). The hydraulic model will allow for testing of the complete structure, including intake, transition, tunnel, and outlet structures. The model test will allow the design team to examine the hydraulic flow regime, allow for adjusting the intake and transition geometry, tunnel, and outlet, including air demand and transient conditions. The model test will offer assurances that the new Lower Outlet will perform as designed.
- The feasibility design of the Auxiliary Flood Control Outlet was based on a preliminary geotechnical/geologic investigation that included a review of available geological and geotechnical information, a geological reconnaissance and mapping of the outlet works alignment, drilling of five geologic borings along the alignment, laboratory testing of selected rock core samples, and review of available seismicity data and reports and selection of seismic design criteria for the preliminary design. Additional geologic/geotechnical investigations will be conducted to support detailed design. YCWA's 2003 feasibility report identified the following additional investigations to be performed:
 - About six oriented test borings and excavation of about five test pits in the area of the approach channel and intake structure and additional joint mapping of exposed rock faces. Packer testing would be conducted in the new borings at the intake and outlet structures to help define the groutability of the rock and the corresponding consolidation grouting requirements.
 - Installation of piezometers in the test borings in the area of the proposed cofferdam and intake structure, to monitor groundwater changes relative to changes in reservoir levels and allow estimation of the permeability of the rock fill and/or residual soil and the extent of the saturation front in the bedrock.
 - Up to five additional angled and vertical core borings with packer testing along the tunnel alignment, to assist in subsurface characterization along the tunnel and within the area of the broad shear zones believed to cross the alignment.
 - Two additional core borings and two to three test pits in the area of the outlet structure. These explorations will assist in evaluating the thickness and characteristics

- of residual soil and weathered rock in the area of the proposed outlet portal and energy dissipation structure.
- Laboratory testing of soil and rock samples to aid in the evaluation of slope stability for the excavations and in the design of retaining walls and slope support features.
 - A seismic refraction survey along the tunnel alignment and at the intake and outlet structures to supplement the subsurface characterization between borings. Results of the seismic refraction survey also will be used to assess the rippability of rock in areas to be excavated.
- The preliminary design for the Auxiliary Flood Control Outlet structure includes a flip bucket energy dissipator that would discharge the flow over the rock slope extending down to the North Yuba River. This design is similar to the existing spillway flip bucket energy dissipator, which has operated well almost 50 years. The proposed Auxiliary Flood Control Outlet is adjacent to the existing spillway, and preliminary geologic mapping indicated that the rock condition below the proposed outlet is similar to the slope below the existing spillway. During detailed design additional detailed geologic mapping will be performed on the slope below the flip bucket to confirm conditions. Additional slope protection measures would be included in the design if needed.
 - Geo-structural models will be developed to evaluate the potential interaction between the proposed tunnel and the left thrust block of the dam. The potential effect, if any, of the outlet tunnel excavation on thrust block behavior will be evaluated. Conversely, the effect, if any, of thrust block loading on the stress distribution in the rock mass around the tunnel also will be evaluated and the corresponding requirements for tunnel lining design will be assessed.
 - A Quality Control Inspection Program (QCIP) will be developed to assure quality and compliance with the construction drawings, specifications and environmental and regulatory requirements during construction. The QCIP will be reviewed and approved by DSOD, FERC, and the BOSC.

YCWA would implement similar procedures for the new Tailwater Depression System at New Colgate Powerhouse, the modified fish release outlets at Our House and Log Cabin diversion dams, and the new intake gate at Lohman Ridge Diversion Tunnel Intake to ensure safe and reliable construction and operation of these new facilities.

4.0 Literature Cited

None.

5.0 List of Attachments

Exhibit F, Design Drawings, and the single-line electrical diagram, which are Critical Energy Infrastructure Information (CEII), are included in Volume VI of YCWA's April 2014 FLA. The

drawings are not refiled here, but included by reference. They can be found on FERC's eLibrary at Accession # 20140428-5074.

In accordance with Section 5.30 and 4.32(k) of FERC's regulations, and in light of heightened national security concerns, YCWA requests that the general design drawings included in Attachment F-1 be treated by FERC as CEII under Section 388.112 of FERC's regulations, and not be released to the public. The drawings satisfy the definition of CEII in § 388.112(c) of FERC's regulations because they contain detailed design information about existing critical infrastructure that relates details about the generation and transmission of electrical energy, and could be useful to a person planning an attack on critical infrastructure. Moreover, such information is exempt from disclosure under the freedom of Information Act 5 U.S.C. Section 552, and does not simply give the general location of the critical infrastructure.