

### III - CONSTRUCTION SCHEDULE

**3-01 General.** Figure 3-1 shows the schedule for the Prado Dam embankment and outlet works construction. The overall project is scheduled for completion within three years after the start of construction. The construction schedule is subject to modification as necessary based on total project requirements. As mentioned previously, the remaining construction in the lower Santa Ana River (Reach 9) may also be done at the same time that Prado Dam is undergoing modification. Figure 3-2 shows the lower Santa Ana River (Reach 9) construction schedule. Because each project may not necessarily start at the same time, “construction years” shown in both schedules are independent from each other.

**3-02. Prado Dam Construction Schedule.** There will be five stages of construction involved in the Prado Dam modification. These stages are designated Stages 1, 2A, 2B, 2C, and 3. The first four stages will consist of excavation/backfill, construction of the new intake structure, and restoring the dam’s embankment back to the current top of dam elevation of 566 feet, NGVD. During Stage 3, with the new outlet works operational, the entire embankment will be further raised to the new height of 594.4 feet, NGVD. All stages are shown in detail on Plates 3-01 to 3-05. Detailed information concerning project features can be found in the Corps document entitled Design Memorandum No. 1, Phase II GDM on the Santa Ana River Mainstem including Santiago Creek, Volume 2 - Prado Dam, dated August 1988. The following paragraphs provide brief descriptions of each project stage.

**a. Construction Stage 1.** Activities included during this stage are shown in Plate 3-01, and include excavation for the intake structure and outlet conduit (up to station 14+00), outlet channel excavation, construction of the concrete intake structure, construction of the concrete conduit transition (up to station 14+00), and construction of the access road. Prior to commencement of excavation work upstream, a cofferdam will be constructed to provide protection from inundation by reservoir pools in the elevation range between 505 feet, NGVD and 525 feet, NGVD. The cofferdam will remain to

protect the area where construction will take place during construction Stages 1, 2A, and 2B of the new outlet works. The cofferdam will be removed toward the end of Stage 2C, once the outlet gates at the new intake tower have been installed. Excavation for the stilling basin may also occur during Stage 1, or per construction contractor's schedule. Stage 1 construction will require approximately 17 months to complete.

**b. Stages 2A, 2B, and 2C.** Excavation for the new concrete outlet conduits will continue downstream from station 14+00 to station 18+13 (see Plates 3-02 to 3-04). With the construction of the concrete transition conduits and the intake structure complete, the dam's main embankment above the concrete transition conduits (up to STA 14+00) will be reconstructed up to elevation 540 feet, NGVD during Stage 2A. During Stage 2B, the main embankment will be further restored up to elevation 566 feet, NGVD, which is the current top of dam elevation. Construction of the concrete conduit from station 14+00 to station 18+13 will be completed during Stage 2C. The construction of the concrete stilling basin structure may also be done during Stage 2C, or per construction contractor's schedule. Also during Stage 2C, the outlet gates will be completely installed. Following the installation of the outlet gates is the excavation for the upstream approach channel and construction of the intake retaining walls. As mentioned, the cofferdam will be removed after the outlet gates have been installed. Construction of Stages 2A, 2B, and 2C will require approximately 12 months.

**c. Stage 3.** During this stage, the dam's embankment will be constructed up to elevation 594.4 feet, NGVD. Also to be constructed during this stage are the road to the maintenance deck and to the stilling basin, the generator tower, and the tower access bridge. All of the mechanical and electrical equipment for the operation of the new outlet gates will be installed. The existing intake tower will not be removed until the new intake tower is operational. A pilot channel will be excavated to create a new flow path for drainage toward the new outlet works. See Plate 3-05 for details of this stage. Construction in this stage will require approximately 12 months to complete.

**3-03. Lower Santa Ana River Construction Project (Reach 9).** Figure 3-02 outlines the construction schedule for Reach 9 of the Lower Santa Ana River channel. The Reach

9 channel segment extends from the Prado Dam Outlet Channel to the Weir Canyon Road bridge crossing. During the modification of Prado Dam, this final phase of the lower Santa Ana River construction project may also be taking place. If such is the case, releases from Prado Dam will have to be coordinated with the status of the downstream construction, as necessary. Prior to the start of each flood season pre-storm season meetings are conducted between the Corps of Engineers, the Orange County Public Facilities and Resources Department (OCPF&RD), the Orange County Water District (OCWD), the National Weather Service, and any others that are impacted by the operations at Prado Dam. These pre-storm season meetings serve to identify the status of all on-going construction projects upstream and downstream of Prado Dam and to coordinate notification procedures for emergencies. The contractors for Reach 9 must prepare their own contingency plans for emergency evacuation, and coordinate this plan, if necessary, with the Corps (Reservoir Regulation Section).

When completed, the Reach 9 long-term channel capacity will be increased to 30,000 cfs. Brief descriptions of the scope of the Reach 9 construction are provided in the following paragraphs. Plate 3-06 shows the locations of construction within Reach 9 of the Santa Ana River. References to the left and right side of the channel are based upon looking in the downstream direction.

**a. Upper Highway 91 Embankment.** Immediately downstream of the drop structure and gaging station below Prado Dam, the existing slope of Highway 91 on the left bank of the Santa Ana River is currently unprotected. The Reach 9 construction includes stabilization measures to reinforce the 91 Freeway embankment. The approximately 2,000 feet of bank protection would consist of a 33-inch thick riprap overlay with the top bank elevation varying from 449 feet, NGVD to 454 feet, NGVD, with corresponding toe elevations that vary from 425 feet, NGVD to 430 feet, NGVD.

**b. Green River Housing Estate.** The Green River Housing Estate (GRHE) is just upstream of the Atchison, Topeka and Santa Fe (AT&SF) railroad on the left bank of the Santa Ana River channel. The existing slope has already failed in areas where the

river impinges upon it. The existing riprap is therefore inadequate to handle 30,000 cfs and additional toe-down is needed. The proposed bank stabilization in this reach segment would protect the GRHE upstream of the AT&SF railroad embankment. The proposed revetment varies between a 27-inch thick riprap layer to a 15-inch thick layer of grouted stone. The top of bank protection elevations vary from 439 feet, NGVD to 446 feet, NGVD while the corresponding toe elevations would vary from 402 feet, NGVD to 416 feet, NGVD.

**c. Green River Mobile Home Park.** The Green River Mobile Home Park (GRMPH) is located just downstream of the AT&SF railroad on the left bank of the Santa Ana River channel. As documented in the Phase II GDM, the GRMHP requires approximately 1,600 feet of new levee in order to safely pass the design discharges from the modified Prado Dam outlet works. The proposed levee would extend upstream to the AT&SF railroad abutment and would be armored with a 15-inch thick layer of grouted stone. The top of bank protection elevations will range from 432 feet, NGVD to 437 feet, NGVD, while the toe elevations will vary from 397 feet, NGVD to 401 feet, NGVD.

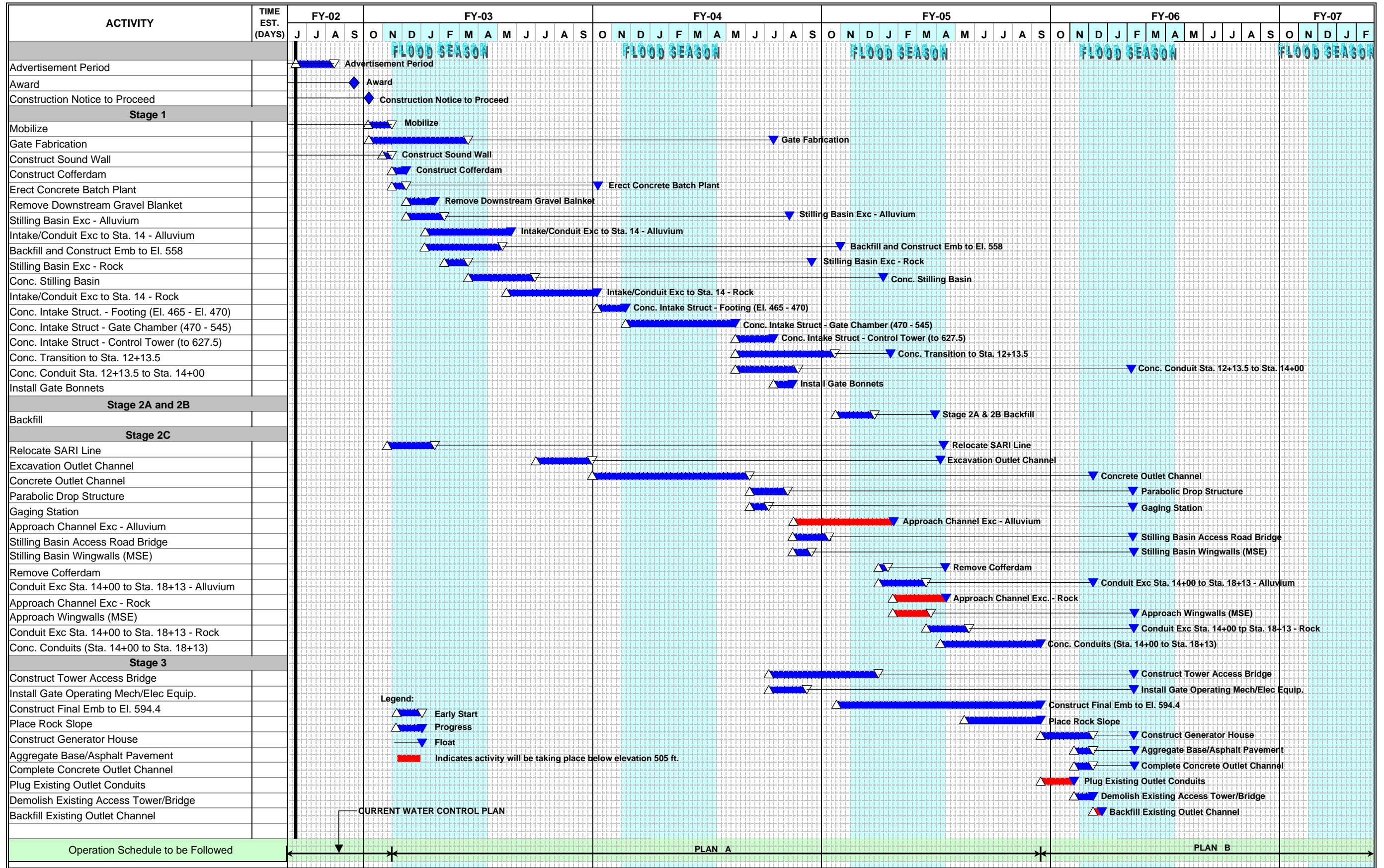
**d. Green River Golf Course.** The existing channel through the Green River Golf Course includes a concrete lined low flow channel. In order to protect the 91 freeway from flood discharges, Caltrans improved the left bank of the channel with soil-cement protection with a toe depth of 5 feet. This improvement, however, was found to be inadequate for increased release rates which would result from the modification of Prado Dam outlet works. The proposed improvements would provide an increased toe depth to 20 feet along approximately 5,500 feet with a 15-inch grouted riprap revetment.

**e. Lower Highway 91 Embankment.** Caltrans has improved the left bank of a segment of Reach 9 located between Gypsum Canyon Road and Weir Canyon Road with an existing soil-cement lining that extends approximately 5 feet below the surface in order to protect Highway 91 from flood discharges. Past storm flows have damaged the bank protection in this area, and low flows are currently impinging on the bank. Under the Santa Ana River project, this improvement will be replaced by a bank protection

ranging from a 21-inch thick riprap layer to a 25-inch thick grouted stone layer to a depth of 10 feet extending approximately 1,900 feet. The top of the new bank protection would range from elevation 360 feet, NGVD to elevation 365 feet, NGVD. The toe elevations would range from 330 feet, NGVD to 338 feet, NGVD.

f. **Car Wash and Strip Mall Protection**. North of Weir Canyon Road, there is a mini-mall on top of a bluff approximately 50 feet above the riverbed. The low flow channel of the Santa Ana River is currently impinging on the bank in this area and there is evidence of two active slope-failure slides as well as a 6-inch settlement of the building closest to the cliff. Under the lower Santa Ana River project, bank protection consisting of a 550-foot length of grouted stone revetment will be provided in this area. The top of the bank protection would vary from elevation 335 to 344 feet, NGVD. Toe elevations range from 313 to 316 feet, NGVD, which is approximately 5 feet below the channel thalweg.

**FIGURE 3-1. PRADO DAM EMBANKMENT AND OUTLET WORKS CONSTRUCTION SCHEDULE**

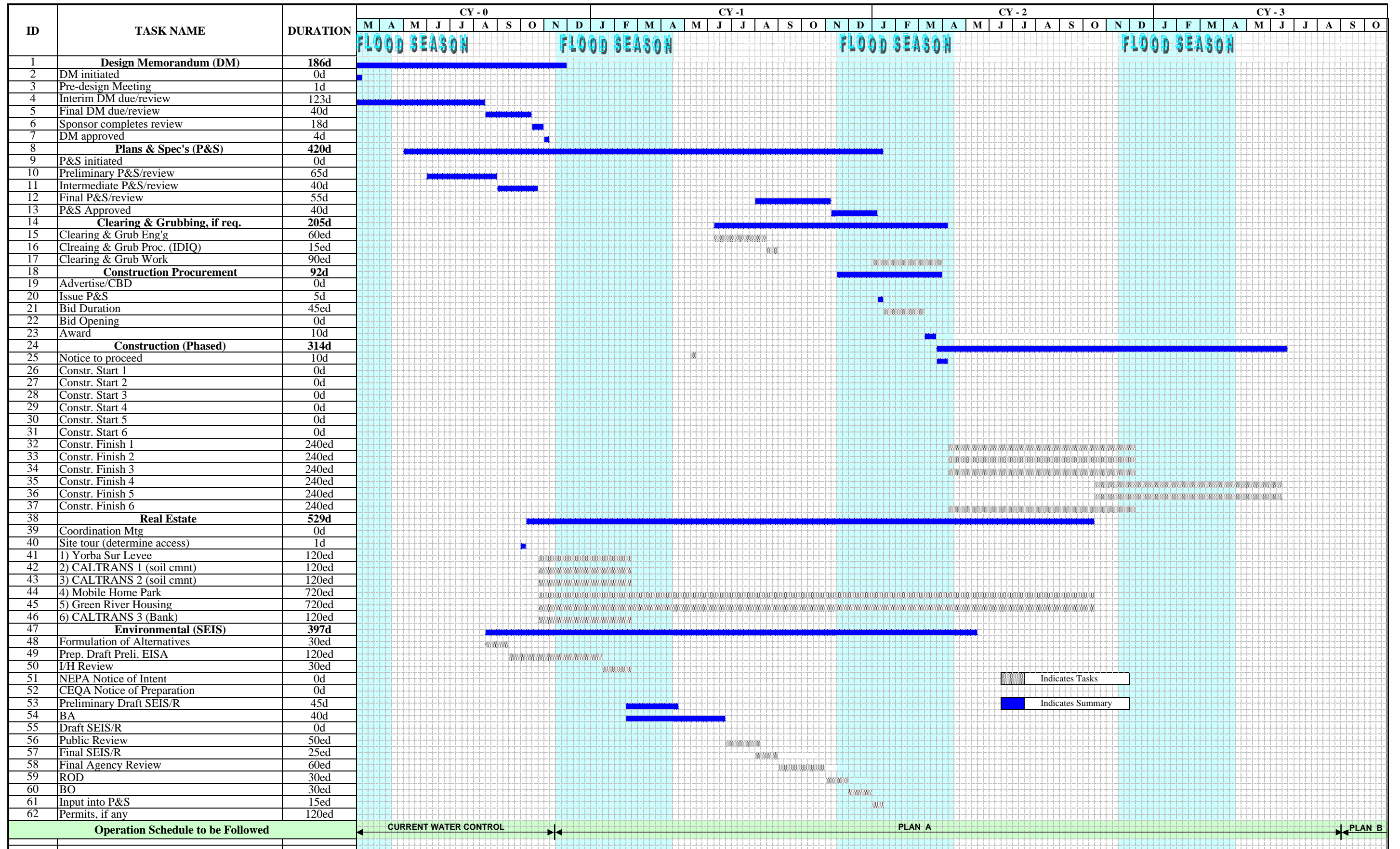


Notes:

1. During the construction period when "PLAN A" will be followed, operation of the dam will be performed by using the existing outlet works and the height of the dam's embankment limited by the height of the coffer dam (El 525 ft).
2. During the construction period when "PLAN B" will be followed, operation of the dam will be performed by using the new outlet works and the dam's embankment restored back up to elevation 566 ft.
3. Construction years shown in this figure are independent from construction years shown on Figure 3-2.

**FIGURE 3-1**

FIGURE 3-2. LOWER SANTA ANA RIVER (REACH 9)  
CONSTRUCTION SCHEDULE



Note: Construction years shown on this figure are independent from the construction years shown on Figure 3-1.

FIGURE 3-2