Appendix 3C

Construction Assumptions for Water Conveyance Facilities

Project-level environmental review requires specific information about the timing, nature, and physical extent of those activities necessary to construct the water conveyance facilities proposed under the BDCP alternatives. Table 3C-1 provides a list of major construction activities and elements necessary in constructing these features, along with their anticipated timing and any important information or assumptions that further characterize the activity and provide necessary detail in evaluating their potential effects. These assumptions were developed from a number of sources, including conceptual engineering reports, GIS databases, and written and verbal correspondence with DWR technical staff. Areas required for features associated with BDCP alternatives, including ancillary areas for parking, lighting, fencing, etc., were included within GIS databases for the purposes of environmental review.

Table 3C-1 summarizes only major structures and activities. A more detailed breakdown of construction activities and timelines for each component can be found in Table 3C-8 through Table 3C-18 and in Appendix 22B, *Air Quality Assumptions*. Construction schedules for West Alignment alternatives are assumed to be the same as for East Alignment alternatives, except as noted.

Some components of Alternative 5 have different specifications than those in other pipeline/tunnel alignment alternatives; these are provided for each component for which Alternative 5 differs.

Construction components for Alternative 9, Through Delta/Separate Corridors Conveyance, are shown in Table 3C-4, 3C-18 and in Appendix 22B, *Air Quality Assumptions*.

This appendix assumes five intakes would be built under any alternative (except Alternative 9); for alternatives with fewer than five intakes, schedules and data would change accordingly.

Under Alternatives 2A and 2B, a total of five intakes would be constructed and operated. Locations 1–3 and either 4 and 5, or 6 and 7 are being considered. If alternative intake locations 6 and 7 are used, activity timing may be different than that shown in Table 3C-1. See Table 3C-1, North Delta Intakes section.

The Activity Timing column shows the approximate *start* month and year of the first and last activities involved in constructing the component or set of components (e.g., five intakes). Where no time frame is provided, timing is assumed to be included in the total construction period for the main component. Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time nor does the insertion of an estimated time frame preclude the Lead Agencies from modifying the Activity Timing estimated dates or time frames. Tables 3C-8 through 3C-18 show the number of work days anticipated for each construction component. Work days are not necessarily consecutive.

Table 3C-1. Construction Assumptions for Water Conveyance Facilities

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
North Delta Intakes		
• Between one and five intakes would be constructed for Alternatives 1A–8. Sites would be selected from 12 possible on-bank locations on the Sacramento River between Clarksburg and Walnut Grove (between approximate river miles 34 to 44.5). • For Pipeline/Tunnel and East Alignment alternatives, there are seven possible sites on the east bank of the river; Alternatives 2A and 2B could utilize one or two alternate intake sites (Intake 6 or 7). • For West Alignment alternatives there are five possible sites on the west bank of the river. • Intake construction would require from 3.5 to 4.5 years each; total construction time for five intakes would be 5 to 7 years. The intakes would be constructed simultaneously with in-water work, potentially beginning in February (East or West alignments) or March (Pipeline/Tunnel and Modified Pipeline/Tunnel alignments) of Year 2, depending on alignment. Alternatives 3, 4, 5, 7, 8 involve fewer intakes, and construction schedules may change accordingly. • For alternatives with five intakes, it was assumed that construction would start with Intake #1, followed by Intakes #3, #5, #2, and #4. Under alternatives with fewer intakes, this same order was assumed for those intakes that would be constructed. For example, under Alternative 3, construction would begin with Intake #1 followed by Intake #2. • Construction is to be continuous year-round with 5 day work-weeks and 10 hour days, unless noted otherwise. • Intake facilities including pumping plants (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, and 8) average approximately 60 acres per site; intake facilities for Alternative 4 (Modified Pipeline/Tunnel alignment) would average approximately 90 acres per site. • Dimensions of all structures would be the minimum required for the facility to perform its intended function; house all required equipment and storage; and ensure the safety of the facility and all personnel. • For intake construction schedule detail, please see Tables 3C-8 (Pipeline/tunnel alignments) and 3C-17 (East alignments).		

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
Concrete intake structures Intakes 1–5 and related components	**Pipeline/ Tunnel Alignment (P/T)** Intake 1: Mar. Yr. 2–Aug. Yr. 6 Intake 2: Dec. Yr. 2–Sept. Yr. 6 Intake 3: Oct. Yr. 2–Aug. Yr. 6 Intake 4: Jan. Yr. 3–Oct. Yr. 6 Intake 5: Nov. Yr. 2–Aug. Yr. 6 **Modified Pipeline/Tunnel Alignment (MP/T)** Intake 2: Dec. Yr. 2–Sept. Yr. 6 Intake 3: Oct. Yr. 2–Aug. Yr. 6 Intake 5: Nov. Yr. 2–Aug. Yr. 6 **East or West Alignment (East or West)** Intake 1: Feb. Yr. 2–Jun. Yr. 5 Intake 2: Feb. Yr. 3–Nov. Yr. 6 Intake 3: Mar. Yr. 2–Dec. Yr. 5 Intake 4: Apr. Yr. 3–Nov. Yr. 6 Intake 5: May Yr. 2–Jul. Yr. 5 West Alignment (West) Schedules assumed to be same as for East Alignment unless noted.	• Each intake would range from 40 to 60 ft wide and 700 to 2,300 ft long (depending on the alignment and intake location), with the long dimension parallel to the river flow. • Intakes would be approximately 55 ft tall from the river bottom to the top of the structure. • The intakes would rise above the surface of the river water between approximately 20 and 35 ft. • The intake structure would be made of structural concrete. • Intakes would be offset from the levee road by approximately 100–135 ft. • A 3.5 ft concrete guardrail would be constructed around the perimeter of the intakes and along the sides of the access bridges.
Clearing and Grubbing/ Demolition (Alternatives 1A–8)		• Work sites would be cleared to the areas required for earthwork operations as approved. Vegetative material from clearing operations would be chipped, stockpiled, and spread over the topsoil after earthwork operations are completed. • Grubbing would consist of removing objects (e.g., stumps, tap roots, debris, organic material) larger than 2 inches in diameter to a depth of 1 foot below the cleared surface. • Clearing and grubbing work could include areas on the levee and berm, as well as along the low flow bank below the OHWM. Mature vegetation would be removed if it occurs where sheet piles would be installed or if it hampers movement of equipment. • Timing: Assumed 1 day per intake site

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
Construct detour roads		• Dewater • Overexcavate/recompact • Would require 971,500 cubic yards (cy) for import and compact (for five intakes) • See Table 3C-7, *Access and Construction Work Areas*
Construct new perimeter berm; widen levee top		• Widen levee top on landside of levee to realign State Route 160 and/or to provide turnout access for construction and maintenance needs. • Pave with asphalt concrete surface over an aggregate base. • 800 – 2,500 ft. length along existing levee. • 80,000 cy imported fill, 694 cy aggregate base and 680 tons asphalt concrete. • Fill space between old and new perimeter berms to create building pad for pumping plant. • Height from ground surface at landside to crest: 20–45 ft. • Width toe-to-toe: 180–360 ft. • Minimum crest width: 20 ft. • Construct cut-off walls.
Construct and remove sheetpile cofferdam		• Work performed only during the allowed in-river work period of June 1 to October 31, when the potential for fish and aquatic species of concern to be in the vicinity of the in-water construction activities would be at a minimum, unless otherwise authorized by relevant permitting agencies. • Each intake site would require a temporary cofferdam to create a dewatered construction area encompassing the entire intake site. The length of the temporary cofferdam at each intake site would vary depending on the alignment and intake but would range from 740 ft to 2,500 ft for the pipeline/tunnel alignment and modified pipeline/tunnel alignment, and 890 ft to 2,440 ft for the west alignment. • Top of sheet piles to align with approximate top of existing levee crown. • Bottom of sheet piles to be driven to a depth that achieves hydraulic cutoff, for an approximate total length of 145 ft with approximately 100 ft driven below ground. Dimensions of the sheet piles will be revised when additional site-specific geotechnical data becomes available. • Sheet piles would be driven from within the river by cranes mounted on barges and temporary decks. • Installation of steel sheet piles and/or king piles would require both impact and vibratory pile driving, depending on geotechnical conditions at the sites. • From 8 to 12 piles could be installed per day per intake site. Impact-driven piles could require approximately 700 strikes each. Sheet piles would be installed in two phases starting with a vibratory hammer and then switching to impact hammer if refusal were encountered before target depths. Therefore, the number of strikes resulting from this two-phased installation method could be substantially lower. • The in-water area temporarily isolated inside the temporary cofferdam would vary by intake location, but would range from

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
		0.2 to 5 acres. • The distance between the face of the intake and the face of the cofferdam would depend on the foundation design and overall dimensions. It is assumed that the distance between the intake and the cofferdam would be between 10 and 35 ft. • Stone bank protection (or riprap), if present, would be cleared prior to installing sheet piles. • After intake construction is complete the cofferdam would be flooded and removed by underwater divers using torches or plasma cutters to trim the sheet piles at the finished grade/top of structural slab. • A portion of the cofferdam would remain in place to facilitate dewatering as necessary for maintenance and repairs. Depending on the alternative and intake, permanent cofferdams would range in length from 1,220 to 3,360 linear ft, including sheet pile transitions.
Excavation		• Excavate within cofferdam to level of foundation design subgrade. Ground improvement (jet grouting and/or other methods, based on site-specific surface conditions) will be needed beneath the intake, gravity collector pipes, and portions of the pumping plant site. • Affects area enclosed by cofferdam, approximately 0.2–1.9 acres. Remove an approximate depth of 30 to 35 ft of soil, for an excavated volume of 22,600 cy. • An area next to each intake structure would be excavated approximately 750 ft upstream and downstream of the intake structure and approximately 250 ft from the sides of the structure, to facilitate sediment removal during facility operations. • Material excavated for levee foundation improvement would be exported offsite. • Dredging would be required at each of the intake locations on the river bank and in the river channel after the cofferdam is constructed • Projected solid waste from intake excavation (not dredge material) to be disposed of in landfills estimated at 0.1%. • Pipeline/Tunnel alignment: 114 tons. • East alignment: 114 tons • West alignment: 309 tons
Excavate Cell and Retrieval Pit		• Used to support earthwork activities. • Would result in the export of 111,500 cy of RTM (for five intakes). • Would require 57,750 cy to be excavated and hauled to the stockpile (for five intakes).
Foundation Pile Driving		• Intake foundation • Matrix of foundation piles, driven within the area enclosed by the cofferdam. • Between 450 and 800 piles, depending on intake length* • Piles 24 in. diameter, approximately 130 ft long*

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
		• Either cast-in-drilled-hole (CIDH) and/or steel pipe driven piles* • 8 to 12 piles driven per site per day* • Up to an average of 700 strikes each for impact-driven piles • May be done in the dry or in the wet. If done in the dry, conventional construction methods would be used within the cofferdam. If done in the wet, a barge-mounted rig positioned outside of the cofferdam or a deckmounted pile driving rig located on decking over the top of the cofferdam would be required. • Dredging is assumed to be minimal and to be localized along the fence of the intake at each intake site. * Type, dimensions, and number of piles and installation methods subject to change based on future site-specific geotechnical data and engineering design. If CIDH is chosen for foundation, impact pile driving will not be required.
Dewatering	Ongoing	• Dewatering would be used to keep the area within the cofferdam dry during construction. • Dewatering would take place 24 hours a day, 7 days per week throughout intake construction. • Water would be pumped from the cofferdam to tanks on the landside of adjacent levees. • Water pumped from the cofferdams would be treated (settling or removal of sediment) and returned to the river or used for dust control as needed.
Tunneling and Pipe Placement (for installing pipes under the levee)		• Installing gravity collector pipes between intakes and sedimentation basins; and carry water between intakes and intake pumping plants. • Trenchless method or open-cut method would be used to install the pipes. • Bored from within the cofferdam, through the cofferdam face, below the river bed, under the levee and to a retrieval pit at the site of the landside sedimentation basin to allow installation of pipe segments to connect the intake to the sedimentation basin. • Soil cuttings from the tunnel boring machine (TBM) are mixed with conditioners or water to form a plastic soil or slurry muck to provide a positive pressure at the face of the tunnel. • The RTM is removed from the TBM using conveyors or pumps and is transferred to a separation plant to remove the suspended solids from the soil cuttings from the RTM. • The solids may be reused as fill after treatment. • Six, 420 ft long, 12 ft diameter pipes. • 15,876 cy of spoil (including slurry bulking) removed. • Top of tunnel approximately 10 ft from bottom of riverbed. • Approximately 3,000 cy of grout if ground improvement is required.
Cut and Cover Excavation and Pipe Placement		• Cut and cover construction would likely be used for landside pipe placement using long reach backhoes, scrapers and excavators placed on levees or on the landside of the levees. • Pipe installed underground on the landside of the levee and

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
		connected to the sedimentation basin. • Minimum of six 12-ft diameter, 420 ft long pipe; approximately 320 ft of length underground. • Potential 63,000 cy of excavation and 55,000 cy of bedding/backfill
Cast-in-place concrete (CIP)		• To form the base, walls and top deck of the intake structure. • 22,090 cy concrete, 1,700 kips of reinforcing bar.
Riprap		• Import 2,800 cy and place around perimeter of cofferdam/intake foundation for protection and to provide a transition from the river bottom to the intake structure. • Would take place only during the allowed in-river work period of June 1 to October 31. • Place riprap, bedding material, fabric
Cleanup, demobilize	**P/T:** Aug. Yr. 6–Oct. Yr. 6 **MP/T:** Aug. Yr. 6–Oct. Yr. 6 **East or West:** Jun. Yr. 5–Nov. Yr. 6	5 days per intake site
Fish screens		• Vertical stainless steel screen panels with stainless steel wire fabric. • Designed to meet delta smelt criteria of 5 sq ft/cfs, with mesh openings of 1/16 in. • Screen dimensions would vary depending on location, ranging from 10 to 22 ft high and from 915 to 1,935 ft long. • Several traveling brush screen cleaning systems would be installed on each of the long sides on the water side of the intakes, and a traveling gantry crane may be placed on the top deck of the intakes. • Screens also serve to filter large solids from entering the intake, minimizing sedimentation within the conduits and improving pump performance and longevity. • Under the modified pipeline/tunnel alignment, a sediment jetting system would be placed behind the fish screens.
Intake pumping plants (PP) (Alternatives 1A, 2A, 3, 4, 5, 6A, 7, 8) **(Alternatives 1B, 2B, 6B, 1C, 2C, 6C)**	**P/T:** **PP 1:** Sept. Yr. 2–Jul. Yr. 3 **PP 2:** Jan. Yr. 3–Feb. Yr. 5 **PP 3:** Oct. Yr. 2–Oct. Yr. 4 **PP 4:** Jan. Yr. 3–Mar. Yr. 5 **PP 5:** Oct. Yr. 2–Dec. Yr. 4 **MP/T:** **PP 2:** Jan. Yr. 3–Feb. Yr. 5 **PP 3:** Oct. Yr. 2–Oct. Yr. 4 **PP 5:** Oct. Yr. 2–Dec. Yr. 4 **East or West:** **PP 1:** Feb. Yr. 2–Dec. Yr. 3 **PP 2:** Apr. Yr. 2–Oct. Yr. 5 **PP 3:** Mar. Yr. 2–Apr. Yr.	• Houses seven (six plus one spare) 500-cfs pumps; each discharges into a separate 8 ft diameter pipe. • Each intake pumping plant site would be approximately 1,000 ft by 1,000 ft (approximately 23 acres). Under the modified pipeline/tunnel alignment, each pumping plant site would be approximately 1,800 ft by 1,500 ft (approximately 60 acres). • Each plant would be approximately 262 ft long by 98 ft wide. Under the modified pipeline/tunnel alignment, each plant would be approximately 400 ft by 150 ft. • Cast-in-place (CIP) reinforced concrete structure and a superstructure. • Multiple floors would house mechanical and electrical equipment. • The majority of the site would be raised to match the elevation of the adjacent levee, with an approximate raise in grade of 25 ft.

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
	4 **PP 4:** Jun. Yr. 2–January/ Yr. 6 **PP 5:** Apr. Yr. 2–Jun. Yr. 4	• Under East Alignment alternatives, to protect the site and ancillary structures from flooding, the pumping plant, sedimentation basins, and associated solids lagoons would be constructed on engineered fill, with a finished ground level of between 27.9 and 31.2 ft (NAVD88) depending upon the intake pumping plant location. • Primary structural support system of reinforced concrete slabs and walls at and below grade, with steel framing and exterior metal wall and roof panels for the above-grade building.
Clearing and Grubbing		See Clearing and Grubbing/demolition under *Concrete intake structures*, above.
Excavation & Backfill		• Excavation and stockpile or haul to waste. • Place stockpiled material as backfill. • Import and place material. • Each intake pumping plant would require 117,120 cy to be excavated, hauled, stockpiled, and compacted. • Each intake pumping plant would require 442,470 cy to be imported and compacted. • Projected solid waste from pumping plant excavation (not dredge material) to be disposed of in landfills estimated at 0.1% of spoils. • Pipeline/Tunnel alignment: 4,000 tons • East alignment: 3,335 tons • West alignment: 390 tons
Sedimentation Basin		The structural system of the basins would consist of reinforced concrete walls and mat slab foundations supported on piles. Approximately 6 inches of the perimeter and dividing walls would be above the surrounding grade. • Sedimentation basins would be set at depth based on river stage elevations, and at a minimum water depth of 3.5 ft. • Each basin segment would be approximately 120 ft x 40 ft. Assuming an average water depth of 5 ft elevation, and allowing for flood elevation, the basin would be about 55 ft deep. Under the modified pipeline/tunnel alignment, each sedimentation basin channel would be approximately 500 ft x 20 ft, and 23 ft deep. • The bottom of the basins would be at an elevation between -20.9 and -28.0 ft, and the top of the walls of the basin would be at an elevation of +32.2 ft. • Uncovered basin with channels would be open to above, and a potentially 3-rail 3.5 ft tall handrail around the perimeter. • Sedimentation foundation will be supported either on CIDH piles or driven steel pipe piles filled with concrete. About 1,500 to 1,600 piles are expected to support the foundation. Type, dimension and installation method of piles are subject to change based on future site-specific geotechnical data and engineering design. • Sedimentation channels would contain permanent, mechanical solids collection systems, and collected solids would be transferred to solids lagoons.

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
Solids lagoon		• Three uncovered, concrete-lined solids lagoons at each intake pumping plant. • Each lagoon would have a footprint of approximately 86 ft by 165 ft, and would be approximately 10 ft deep. Under the modified pipeline/tunnel alignment, the solids lagoons would be approximately 15 feet deep and would have a bottom width of 200 feet and a bottom length of 400 feet. • Below ground, with the basin lip at the finished grade level.
Pumping Plant Building		The main building above grade footprint would be approximately 100 ft by 320 ft (150 ft by 400 ft for the modified pipeline/tunnel alignment), with an attached motor control room that would be approximately 25 ft by 110 ft (85 ft by 120 ft for the modified pipeline/tunnel alignment). Total height of the above ground structure is about 30 ft. • Place gravel bedding, drive foundation piles, place concrete fill in piles • Deep foundation supporting a common concrete mat. • Anticipated 24 inch concrete-filled pipe pile, with an estimated pile length of 40–45 ft below founding level. For the modified pipeline/tunnel alignment, 42-inch concrete filled pipe piles with estimated lengths of 65–75 ft below founding level are considered at conceptual level. Type, dimensions, and number of piles and installation methods subject to change based on future site-specific geotechnical data and engineering design. • Slab on grade concrete • Concrete walls and roof • Seven, 8 ft diameter discharge pipes to outside; each passing through a concrete flow meter vault to a transition manifold or transition structure.
Dewatering/ Unwatering	Ongoing	Dewatering would be continuous during construction.
Transition Structure (Pipeline/ Tunnel, Modified Pipeline/ Tunnel, and West Alignments)		Transition structures serve to move water between discharge pipes and larger conveyances (pipeline, tunnel or canal). For the modified pipeline/tunnel alignment, a 20-ft diameter discharge header and 20-ft discharge pipe would be the transition structure. • The transition structure footprint would be approximately 70 ft by 210 ft, with the majority of the basin below ground, and concrete roof and walls. • The ground around the basin may be graded to slope to approximately 12 ft to the top of the structure deck with approximately 6 inches of the perimeter walls above the finished grade. • If the surrounding ground is not graded to slope to the structure, the perimeter wall would be approximately 13 ft above grade. • A structural deck would be permanently in place over the transition structure, with a potentially 3-rail handrail 3.5 ft tall around the perimeter. • A gantry crane would be placed on top of the deck with a frame that would be approximately 30 ft tall and 10 ft wide.

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
		• Excavate, haul, stockpile and compact 102,720 cy
Transition Structure (East Alignment)		• The transition structure footprint would be approximately 70 ft by 210 ft, with the majority of the basin below ground, and concrete roof and walls. • The ground around the basin may be graded to slope to approximately 8 ft to the top of the structure deck with approximately 6 inches of the perimeter walls above the finished grade. • If the surrounding ground is not graded to slope to the structure, the perimeter wall would be approximately 9 ft above grade. • A structural deck would be permanently in place over the transition structure, with a potentially 3-rail handrail 3.5 ft tall around the perimeter. • A gantry crane would be placed on top of the deck with a frame that would be approximately 30 ft tall and 10 ft wide. • Excavate, haul, stockpile and compact 198,960 cy
Transition Manifold and Surge Tower at Sites 1 and 2 (Pipeline/ Tunnel and Modified Pipeline/ Tunnel Alignments)		• The transition manifold would consist of a 16 ft diameter pipe manifold and valve vault that connects the seven 8 ft diameter discharge pipes from the pumping plant to two parallel 16 ft diameter pipes that discharge to Tunnel 1. The transition manifold may be different under the modified pipeline/tunnel alignment. • The manifold and the pipes would be underground. • Elevation of the top rim of the surge tower would be approximately 65–70 ft (NAVD88). • Intake to pumping plant manifold would require excavating, hauling, stockpiling and compacting 106,080 cy. • Surge tower structures (pipeline/tunnel, modified pipeline/tunnel and west alignments): • Excavate, haul, stockpile; haul from stockpile and compact 50,265 cy; • Excavate and export 263,895 cy
Surge towers		• Connected to the pumping plant discharge piping • Intake 1: Two, 16 ft diameter, rim at 70 ft NAVD88 • Intake 2: Two, 16 ft diameter, rim at 65 ft NAVD88 • Proposed height of structure will be 10 to 15 ft above the maximum hydraulic surge elevation. • Under the modified pipeline/tunnel alignment, surge towers would be as follows: • Intake 2: One, 100 ft diameter, rim at 105 ft NAVD88 • Intake 3: One, 100 ft diameter, rim at 96 ft NAVD88 • Intake 5: One, 70 ft diameter, rim at 75 ft NAVD88
Substation and Exterior Transformers		Each intake facility would have a 69 kV substation. See *New utility corridors* below; Table 3C-5, *Power Supply and Grid Connection;* and Table 3C-14, *Temporary Power Construction Schedule*
General construction work areas See Table 3C-7,		• The anticipated construction area for each intake pumping plant would range from approximately 60 acres to 150 acres. • Of this, approximately 20 acres would be specific to the area for temporary construction needs (including on-site temporary

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
Access and Construction Work Areas		parking, office trailers, staging, equipment laydown, storage and access road). • During the different phases of construction approximately 2 to 8 acres would be used for staging, temporary parking, office trailers, storage and equipment laydown.
Intake pipelines (Alternatives 1A–8)		• Six 12-ft diameter pipelines to carry water between intakes and intake pumping plants. • Pipes connect intakes to sedimentation basins. • Construction could include microtunneling or open-cut trenching through levee, depending on depth of installation. • RTM from microtunneling would be removed using conveyors or pumps and transferred to a separation plant to remove suspended solids, treated, drained and transported to stockpiles. • Excavated material from open-cut trenching, if of generally good quality, would be used as embedment and backfill material. Excess material would be transported offsite. • If native materials are not suitable as foundation for the trench, suitable materials would be imported to the site. • Excavate, haul, stockpile and compact 552,720 cy. • Excavate and export 382,480 cy.
Excavation and backfill (Alternatives 1A–8)		Total for all intakes • Intake conduits: export 79,380 cy of RTM. • Excavate cell: export 111,500 cy of RTM.
Conveyance pipelines		• Transport water to a point of discharge to the conveyance facility (pipeline/tunnel or canal conveyance, depending on the alternative) • Projected solid waste excavation (not dredge material) from conveyance pipelines to be disposed of in landfills is estimated at 0.1%. • Pipeline/Tunnel alignment: 620 tons • Conveyance pipelines constructed under the modified pipeline/tunnel alignment would be much shorter and therefore, solid waste excavation associated with this alignment would be substantially lower. • East alignment: 284 tons • West alignment: 1,579 tons See tables for each alignment and Tables 3C-11a and 3C-11b for additional details of conveyance pipeline construction.
69 kV substations		• Power would be delivered from the main 69 kV substation at the IPP over 69 kV subtransmission lines strung on wood poles that would terminate at intake substations located adjacent to each intake structure. See *New utility corridors*, below, and Table 3C-5, *Power Supply and Grid Connections*. • Substations at intake pumping plants would have a footprint of approximately 150 x 150 ft. to 350 x 350 ft. • Power poles would be approximately 60 ft tall.
New access roads		See Table 3C-7, *Access and Work Areas.*

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions		
Perimeter berms/ levee modifications		Import and compact 400,000 cy.		
Parking, lighting, fencing (General)		**Parking** • Temporary construction parking facilities are to be located within the pumping plant construction site staging areas. Parking facilities for construction employees may be located on the construction site, within the construction area, or off-site where practicable. • Temporary staging areas for storage, office trailers and equipment parking would be required. As the construction progresses, the on-site construction parking and staging areas may need to be relocated in order to maintain a minimal construction area footprint if required. • Any temporary on-site parking facilities or staging areas would be cleared and grubbed, roughly graded and spread with mixed, graded	Lighting • All artificial outdoor lighting is to be limited to safety and security requirements. • All lighting is to be shielded to direct the light only towards objects requiring illumination. • Lights shall be downcast, cut-off type fixtures with non-glare finishes set at a height that casts low-angle illumination to minimize incidental spillover of light onto adjacent properties, open spaces or backscatter into the nighttime sky. • Lights shall provide good color rendering with natural light qualities with the minimum intensity feasible for security, safety and personnel access. • All outdoor lighting would be high pressure sodium vapor with individual photocells and be designed per the guidelines of the Illuminating	Fencing • Security fencing with access control gates, on perimeter of intake structures and intake pumping plants. • 6 ft or 8 ft chain link with a climbing barrier; more stringent fencing with razor wire may be used around certain facilities. • Additional fencing around the substation and transformer yards may be required. • Masonry walls 6 to 8 ft tall may be used within the facilities.

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions
		gravel and compacted and may be covered with thin asphalt binder mix surfacing. • If at a site soils are soft, expansive or permeable, semi-permanent structures, such as office trailers, may require concrete pads or footings to support them. Engineering Society (IES). • All lights are to be energy conserving and aesthetically pleasing. • Lights would have a timed on/off program or have daylight sensors and be programmed to stay on whether or not personnel are present.
Landscaping/ vegetation (General)		• If possible, the natural environment would be preserved. Re-vegetation plans would be developed for restoration of areas disturbed by project activities. • Landscaping plans may be to enhance facility attractiveness, for the control of dust/mud/wind/unauthorized access, for reducing equipment noise/glare, for screening of unsightly areas from visually sensitive areas. • Planting would use low water-use plants native to the Delta or the local environment, with an organic/natural landscape theme without formal arrangements. • Low maintenance plants and irrigation designs would be chosen. • Planting plans would use native trees, shrubs or grasses and steps would be taken to avoid inducing growth of non-native invasive plant species/California Native Plant Society weedy species. • Planted vegetation would be compatible with density and patterns of existing natural vegetation areas and would be placed in a manner that does not compromise facility safety and access. • Planting would be done within the first year following the completion of the project and a plant establishment plan would be implemented.
New utility corridors	Feb. Yr. 1–Mar. Yr. 3 For additional timing detail, see Table 3C-14	• A new 230 kV transmission line would deliver power to the new north Delta intake facilities. It is assumed that a new substation would be constructed within or adjacent to the providing utility's existing transmission right of way (ROW). Under Alternative 4 (the modified pipeline/tunnel alternative), this line would be 69kV. • Alignment of transmission lines and location of interconnection point would be determined based on selection of a conveyance alignment followed by selection of a power provider. • New overhead 69 kV subtransmission lines from the main 69 kV substation at the IPP would deliver power to intakes by looping into each intake substation.

Construction Element/ Activity	Activity Timing (Start dates)*	Key Construction Information or Assumptions			
		• Main shafts for constructing deep tunnel segments would require 69kV temporary transmission lines. • 12 kV temporary power for construction would be provided at project work sites by local utilities. • Wherever possible, 12 kV line would be constructed on the same poles as the 69 kV subtransmission line.			
		12 kV	**69 kV**	**230 kV**	
Site Prep		• All poles sizes: 100 x 150 ft footprint • Bulldozer and backhoe			
Tower Construction		Bulldozer, small crane, line truck, water truck, dump truck	Bulldozer, Man 222HD, 100T, 210' Boom (C85MA004), line truck, water truck, concrete truck	Bulldozer, Man 555, 150T, 250' Boom (C85MA005), line truck, water truck, concrete truck	
Line Stringing		Small crane, line truck, other equipment	Line crane, line truck, other equipment	Line crane, line truck, Helicopter (MD 500D/E)	
Pole spacing (ft)		125	450	750	
Pole height (ft)		35-45	60	130	
Pad footprint		50' x 50'	100' x 150'	100' x 150'	
Permanent Poles (length)		0	10.73 miles	52.62 miles	
Number of permanent poles		0	125.9	370.45	Total perm. poles: 496.35
Temporary poles (length)		22.47 miles	25.02 miles	0 miles	
Number of temporary poles		338.49	171.13	0	Total temporary poles: 509.62
		Transmission line construction phasing and activities are assumed to be similar for the Proposed Project and all alternatives, but the number of poles and length of lines would vary by individual alternative. Specifications provided in this table reflect estimates for Alternative 1A.			

* Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time. Yr. = Year

1 **Table 3C-2. Construction Assumptions for Water Conveyance Facilities by Alignment**

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
PIPELINE/TUNNEL ALIGNMENT (Alternatives 1A, 2A, 3, 5, 6A, 7, 8) **MODIFIED PIPELINE/TUNNEL ALIGNMENT (Alternative 4)** Chapter 3, *Description of Alternatives*, provides a summary of pipeline/tunnel and modified pipeline/tunnel physical characteristics.		

	Jul. Yr. 2–May Yr. 8
	For additional timing detail, see Tables 3C-11a through 3C-16
		Descriptions specific to the Pipeline/Tunnel Alignment
		The pipeline/tunnel alignment is approximately 45 miles long, divided into nine separate reaches, beginning with Reach 1 between Intake 1 or 2 (depending on the alternative) and the confluence of Tunnel 1 and Intake 1 and 2 pipelines, and proceeding down the proposed alignment in ascending order ending with Reach 9 encompassing Byron Tract Forebay (BTF) and the approaches to the Harvey O. Banks Pumping Plant (Banks) and C. W. “Bill” Jones Pumping Plant (Jones) Pumping Plants. Intakes would be constructed with the corresponding alternatives as follows:
		• Alternative 1A: Intakes 1, 2, 3, 4, and 5
		• Alternative 2A: Intakes 1, 2, and 3; Intakes 4 and 5 or 6 and 7 (five total)
		• Alternative 3: Intakes 1 and 2
		• Alternative 5: Intake 1
		• Alternative 6A: Intakes 1, 2, 3, 4, and 5
		• Alternative 7: Intakes 2, 3, and 5
		• Alternative 8: Intakes 2, 3, and 5
		The intake-specific descriptions below would only apply to those alternatives under which each intake would be constructed.
		• Intake 1, approximately 1.5 miles west of Interstate 5 on the south side of the Sacramento River near Freeport, would divert water from the river and pump it through two 16 ft ID pipelines approximately 1.8 miles south to where Intake 2 pipelines connect to the head of Tunnel 1.
		• Intake 2 would pump water through two 16 ft inside diameter (ID) pipelines approximately 800 ft to the head of Tunnel 1 and its junction with Intake 1 pipelines.
		• Tunnel 1 is a single bore 29-ft ID tunnel approximately 20,000 ft long on the northern end of the project, which discharges water from Intakes 1 and 2 into an intermediate forebay (IF).
		• Intakes 3, 4, and 5 would each convey water directly to the IF through two parallel 16 ft ID pipelines of the following approximate lengths.
		  ○ Intake 3: 19,700 ft.
		  ○ Intake 4: 7,820 ft.
		  ○ Intake 5: 4,150 ft.
		• The IF would provide a hydraulic break before diverted water enters the intermediate pumping plant and longer, common tunnel conveyance that outlets to Byron Tract Forebay.
		• An intermediate pumping plant (IPP) to be constructed at the southern end of the IF would discharge water to Tunnel 2.
		• Tunnel 2 is a dual-bore, 33-ft ID/37-ft ED tunnel approximately 183,000 ft on the longer, southern end of the project that discharges water to a new forebay on Byron Tract.
		  ○ Under Alternative 5, tunnels 1 and 2 would both be 23-ft diameter and

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		Tunnel 2 would be only single-bore. • The new Byron Tract Forebay (BTF) (Alternatives 1A, 2A, 3, 5, 6A, 7, 8) would be constructed adjacent to Clifton Court Forebay (CCF) to balance daily variations in inflow and outflow to Banks and Jones Pumping Plants. See Table 3C-3, *Byron Tract Forebay*. **Descriptions specific to the Modified Pipeline/Tunnel Alignment** The modified pipeline/tunnel alignment is also approximately 45 miles long, divided into seven separate reaches, beginning with Reach 1 between Intake 2 and a junction structure near Intake 3, and proceeding down the proposed alignment in ascending order ending with Reach 8 encompassing the north cell of the expanded Clifton Court Forebay and the approaches to the Harvey O. Banks Pumping Plant (Banks) and C. W. "Bill" Jones Pumping Plant (Jones) Pumping Plants. • Intake 2 would pump water through one 20-foot ID tunnel (Tunnel 1a) approximately 11,350 ft to a junction structure near Intake 3. • Intake 3 would pump water through one 20-foot ID pipeline to a junction structure, which allows the flow from Intakes 2 and 3 to be conveyed to the IF through one 29-foot ID tunnel (Tunnel 1a) approximately 36,200 ft. • Tunnel 1a is a single bore tunnel approximately 46,700 ft long on the northern end of the project, which discharges water from Intakes 2 and 3 into an IF. The segment between Intakes 2 and 3 has an inside diameter of 20 ft and the segment between Intake 3 and the IF has an inside diameter of 29 ft. • Intake 5 would convey water through one 20-foot ID tunnel (Tunnel 1b) approximately 25,100 ft to the IF. • The intermediate forebay would act as a pass through facility with an outlet structure to convey water into each main tunnel bore (Tunnel 2) via a vertical shaft. • Tunnel 2 consists of two 40-foot ID tunnels (dual-bore) stretching approximately 159,000 ft between the intermediate forebay and a culvert siphon leading to the expanded Clifton Court Forebay. **Descriptions applicable to the Pipeline/Tunnel Alignment and Modified Pipeline/Tunnel Alignment** • Each tunnel includes a vertical drop shaft at the tunnel's upstream end, and a vertical rising shaft at the downstream end. • Tunnels would be lined with precast concrete bolted-and-gasketed segments. The tunnel concrete liner would serve as permanent ground support and would be installed immediately behind the Tunnel Boring Machine (TBM), forming a continuous watertight vessel. • Temporary concrete plant would be required to produce tunnel segments (See Table 3C-7, *Temporary Access and Work Areas*). • In alluvial soils with high groundwater pressures, the tunnel would be constructed at depths greater than 60 ft using mechanized closed-face pressurized tunneling machines. • Because of the high groundwater level throughout the proposed tunnel alignment area, extensive dewatering (via dewatering wells at tunnel shaft sites) and groundwater control in the tunneling operation and shaft construction would likely be required. • Each tunnel reach would include at least one launch shaft, intermediate shaft and retrieval shaft per bore, except the tunnel between Intake 2 and

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		Intake 3 under Alternative 4. • One or more 33-ft ID tunnel reaches requiring excavating a 37 ft (diameter) tunnel (May require a larger or smaller diameter if Alternative 4 or Alternative 5, respectively, is selected. See descriptions above for specific information regarding the internal diameter of tunnels under the various alternatives) • RTM disposal shafts or tunnel(s) • Architectural details of above-ground structures are to incorporate materials that blend well with the existing environment and surrounding structures.
Excavation		• Except where crossing under a major waterway, intake conveyance pipelines would be installed via open cut. Excavation would include clearing, grubbing, excavation, storage of excess spoil material and dewatering. • All existing vegetation and trees would be cleared and grubbed along the pipeline easement and disposed of offsite. • Materials to be stockpiled may include: 1. Strippings from various excavations, for possible reuse in landscaping 2. RTM that is slated for reuse after treatment for embankment or fill construction 3. Peat spoils for possible use on agricultural land, or as safety berms on the landside of haul roads, or as toe berms on the landside of embankments (cannot be part of the structural section) 4. Other materials being stockpiled on a temporary basis prior to hauling to permanent stockpile areas • Such materials can be stockpiled in the construction areas of the project for later use. Some stockpiles may be used for material conditioning and potential reuse of the material. • Temporary stockpile areas may also allow for the staging of deliveries (offloading), for equipment/materials storage, and for temporary field offices for construction. • Tunnel conveyances excavation and backfill material: ○ Excavate and haul to stockpile: 591,397 cy ○ Export RTM: 23,581,542 cy (under P/T) ○ Export RTM: 24,352,214 cy (under MP/T) ○ Import and compact: 6,141,800 cy
Tunnel 1	Includes constructing all shafts and removing as needed. **Reach 1 (P/T and MP/T):** Aug. Yr. 2–Nov. Yr. 6 **Reach 2 (P/T and MP/T):** Jul. Yr. 2–Mar. Yr. 7 **Reach 3 (MP/T):** Dec. Yr. 2– Apr. Yr. 8	**Descriptions specific to the Pipeline/Tunnel Alignment** • Connects Intakes 1 and 2 to the IF. • 20,000 ft long. • 1 tunnel bore, 2 shafts. • Inside diameter: 29 ft • Outside diameter: 33 ft ○ Under Alternative 5, tunnel would have an inside diameter of 23 ft and an outside diameter of 27 ft. **Descriptions specific to the Modified Pipeline/Tunnel Alignment** • Tunnel 1a connects Intakes 2 and 3 to the IF, and is 46,700 ft long. Tunnel 1a has one tunnel bore and four shaft locations. Its inside diameter is 20 ft (with an outside diameter of 24 ft) between Intakes 2 and 3 (Reach 1) and

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		29 ft (with an outside diameter of 33 ft) between Intake 3 and the IF (Reach 2). • Tunnel 1b connects Intake 5 to the IF (Reach 3), and is 25,100 ft long. Tunnel 1b has one tunnel bore and three shaft locations. Its inside diameter is 20 ft and its outside diameter is 24 ft.

Tunnel 2	Includes constructing all shafts and removing as needed.
	Reach 3 (P/T): Jul. Yr. 2–May Yr. 7
	Reach 4 (P/T): Jul. Yr. 2–May Yr. 8
	Reach 4 (MP/T): Jul. Yr. 2–May Yr. 7
	Reach 5 (P/T): Oct. Yr. 2–Apr. Yr. 8
	Reach 5 (MP/T): Jul. Yr. 2–May Yr. 8
	Reach 6 (P/T): Oct. Yr. 2–May Yr. 8
	Reach 6 (MP/T): Aug. Yr. 2–Apr. Yr. 8
	Reach 7 (P/T): Dec. Yr. 2–Apr. Yr. 8
	Reach 7 (MP/T): Oct. Yr. 2–May Yr. 8
	Reach 8 (P/T): Oct. Yr. 2–Sept. Yr. 7
		Descriptions specific to the Pipeline/Tunnel Alignment
		• Connects IPP to Byron Tract Forebay.
		• 183,000 ft long.
		• 2 tunnel bores, 13 shaft sites, with one shaft for each bore.
		  ○ Alternative 5 would require only a single tunnel bore connection from the IPP to Byron Tract Forebay.
		• Inside diameter: 33 ft.
		• Outside diameter: 37 ft.
		  ○ Under Alternative 5, the single-bore tunnel would have an inside diameter of 23 ft and an outside diameter of 27 ft.
		Descriptions specific to the Modified Pipeline/Tunnel Alignment
		• Connects IF to the expanded Clifton Court Forebay.
		• 159,000 ft long.
		• 2 tunnel bores, 9 shaft sites, with one shaft for each bore.
		• Inside diameter: 40 ft.
		• Outside diameter: 45 ft.

Boring		• Earth pressure balance (EPB) tunnel boring machines (TBM) and slurry tunneling machines would be used to excavate tunnel spoils.
		• The distance between the two bores of Tunnel 2 would be twice the outside diameter of the tunnels, approximately 150 ft below grade.
		  ○ 74 ft between the two bores for most alternatives.
		  ○ 108 ft between bores under the modified pipeline/tunnel alignment (150 feet centerline to centerline), and approximately 160 ft below grade.
		• In alluvial soils, the tunnel would be constructed at depths greater than 60 ft using mechanized closed-face pressurized tunneling machines.
		• If dense gravels, cobbles, or boulders are encountered in the older alluvium depth, other mining methods may be utilized, such as grouting, jet grouting, use of a slurry tunnel boring machine, or freezing and hand mining.
		• RTM would be transferred to storage areas by conveyor, wheeled haul equipment, or barges.
		• The tunnel invert elevation is assumed to be at 160 ft below msl under the San Joaquin River and Stockton Deep Water Channel to maintain sufficient cover between the tunnel and dredging operations in the shipping channel.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Tunnel shafts Launch (construction) shaft		• To lower the TBMs to their initial working positions and to support their operation, accommodate construction and construction support operations. • For Tunnel 2, approximately 180 ft deep and approximately 120 ft wide. For Tunnel 1, approximately 160 ft deep and approximately 80-100 feet wide. Potential construction methods include overlapping concrete caisson walls, panel walls, jet-grout column walls, secant piles walls, slurry walls, precast sunken caissons, and potentially other technologies. • All shafts to be excavated from preconstructed fills built to required flood protection elevation. • Shaft bottoms would need to be stabilized to resist uplift associated with external hydrostatic pressures, during both excavation and operation. It may be necessary to treat the shaft area continuously from the surface to the bottom of the shaft to control blowouts. • Concrete working slabs capable of withstanding uplift would be required at all shaft locations to provide a stable bottom and a suitable working environment. • Temporary work areas associated with these shafts could range from approximately 10 to 40 acres. • After tunnel construction, shafts would be backfilled around steel or formed concrete pipes. • Shafts for parallel tunnels would be staggered but would be in the same general vicinity.
Intermediate ventilation shafts		• To facilitate tunnel ventilation and tunnel safety. • Placed midway between launch shafts along the tunnel alignment. • For Tunnel 2, approximately 180 ft deep and approximately 90 ft wide. For Tunnel 1, approximately 160 ft deep and approximately 80–100 feet wide. • Potential construction methods include overlapping concrete caisson walls, panel walls, jet-grout column walls, secant piles walls, slurry walls, precast sunken caissons, and potentially other technologies. • All shafts to be excavated from preconstructed fills built to required flood protection elevation. • Shaft bottoms would need to be stabilized to resist uplift associated with external hydrostatic pressures, during both excavation and operation. It may be necessary to treat the shaft area continuously from the surface to the bottom of the shaft to control blowouts. • Concrete working slabs capable of withstanding uplift would be required at all shaft locations to provide a stable bottom and a suitable working environment. • Temporary work areas associated with these shafts could range from approximately 10 to 40 acres. • Shafts for the parallel tunnels would be staggered but would be in the same general vicinity.
TBM Retrieval Shafts		• Located the end of each machine drive to retrieve it at potentially six locations. • For Tunnel 2, approximately 180 ft deep and approximately 90 ft wide. For Tunnel 1, approximately 160 ft deep and approximately 80–100 feet wide.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• Potential construction methods include overlapping concrete caisson walls, panel walls, jet-grout column walls, secant piles walls, slurry walls, precast sunken caissons, and potentially other technologies. • All shafts to be excavated from preconstructed fills built to required flood protection elevation. • Shaft bottoms would need to be stabilized to resist uplift associated with external hydrostatic pressures, during both excavation and operation. It may be necessary to treat the shaft area continuously from the surface to the bottom of the shaft to control blowouts. • Concrete working slabs capable of withstanding uplift would be required at all shaft locations to provide a stable bottom and a suitable working environment. • Temporary work areas associated with these shafts could range from approximately 10 to 40 acres. • Shafts for the parallel tunnels would be staggered but would be in the same general vicinity. • After tunnel construction, shafts would be backfilled around steel or formed concrete pipes.
Surge tower at IPP		• A surge shaft connected to the pumping plant discharge piping is recommended at the IPP. The surge shaft height is proposed to be 10 to 15 ft above the maximum operating hydraulic grade line. • Under the modified pipeline/tunnel alignment, there would be no intermediate pumping plant and no associated surge tower.
RTM storage/ disposal areas		• For additional details of RTM storage, see Table 3C-6**,** *Borrow/Spoils/Reusable Tunnel Muck Storage*; Chapter 3, *Description of Alternatives*; and Appendix 3B, *Environmental Commitments*.
Construction work areas		• Construction work areas may include offices, parking, shop, short-term segment storage, fan line storage, crane, dry houses, settling ponds, daily spoils piles, temporary RTM storage, power supplies, air, water treatment, and other requirements. May also contain space for slurry ponds if slurry wall construction is required. • Work areas for RTM handling and permanent spoils disposal would also be necessary.

Pipelines
Clear and grub/ demolition
Dewatering
Excavate and export
Excavate and haul off excess
Excavate and stockpile
Excavate and haul to stockpile
Place pipe bedding
Place backfill slurry
Install and remove
	Dec. Yr. 6–Jan. Yr. 8
	Schedule includes all piping and related activities other than major conveyance pipes.
		Pipeline Reaches (See Table 3C-13a and 3C-13b for detailed construction schedules)
		Descriptions specific to the Pipeline/Tunnel Alignment
		• Intake 1 to the junction with Intakes 2 and 3 (south side of the Sacramento River):
		  ○ Two parallel, 16-foot-diameter pipelines.
		  ○ Approximate length: 9,300 ft.
		• Intake 2 to the junction with Intake 1:
		  ○ Two parallel, 16-foot-diameter pipelines.
		  ○ Approximate length: 800 ft
		• Intake 3 to the IF:
		  ○ Two parallel, 16-foot-diameter pipelines.
		  ○ Approximate length: 19,700 ft
		• Intake 4 to the IF:
		  ○ Two parallel, 16-foot-diameter pipelines.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
sheet piles Load, haul, compact from stockpile Regrade ROW Place invert concrete Flow meter vault concrete Place wall concrete Flow meter vault concrete Elevated slab Roof falsework		○ Approximate length: 7,820 ft • Intake 5 to the IF: ○ Two parallel, 16-foot-diameter pipelines. ○ Approximate length: 4,150 ft **Descriptions specific to the Modified Pipeline/Tunnel Alignment** • Intake 2 to Tunnel 1a: ○ One 20-foot-diameter pipeline (an extension of the pump discharge header pipelines). ○ Approximate length: 900 ft. • Intake 3 to the junction structure at Tunnel 1a: ○ One 20-foot-diameter pipeline (an extension of the pump discharge header pipelines). ○ Approximate length: 1,200 ft.
Fencing		• Access openings would be provided where acceptable and necessary. • A woven wire fence (4 ft tall topped with barbed wire) or a barbed wire fence (4.5 ft tall) may be used. • More stringent fencing with 8-foot tall chain link fences and/or razor wire may be used. • The fencing requirements would be continuous for all intermediate facilities. • At intermediate facilities, the more stringent of the ROW or facility fencing requirements would be used. If the facility fencing is to be placed directly adjacent to the facilities, both ROW and facility fencing would be used.
Dismantling		• After construction of the tunnels, the launching and retrieval shafts would be backfilled around steel pipes or formed concrete pipes, or would be cast against reusable forms to the required finished diameter and geometry.
INTERMEDIATE FOREBAY (IF) (Alternatives 1A, 2A, 3, 4, 5, 6A, 7, 8) Maintenance roads Dewater forebay Excavation Excavate Remove unsuitable Cut/fill build levees Moisture condition suitable soil Construct drying beds Load and haul to levee Slope finish	Jul. Yr. 2–Mar. Yr. 6	**Descriptions specific to the Pipeline/Tunnel Alignment** Conceptually designed as hydraulically isolated from other Delta waterways. The only source of water would be the Sacramento River via the new pipeline/tunnel conveyance intakes. The only outlets from the intermediate forebay (IF) would be to the tunnels conveying water to BTF via the new IPP and gravity bypass system. • Water in the IF is held temporarily until allowed to flow or be pumped into the tunnel on the south side of the IF through either the gravity by-pass system or the intermediate pumping plant. • 925-acre surface footprint (Alternative 5: 480 acres). • 760-acre water surface area (Alternative 5: 300 acres). • Active storage volume 5,250 af (Alternative 5: 2,100 af). • The IF would be developed by constructing a ring dike to surround the forebay. With the exception of the inlets and the outlet, the ring dike would be constructed of engineered fill. • The water surface area of the IF is approximately 750 acres at elevation 15 ft. • The IF would store water at an elevation more than 6 ft higher than the surrounding land. • The bottom elevation of the IF is proposed to be +0.0 ft except locally at

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Bottom finish Levee top finish Slope protection Place riprap, bedding material, fabric Concrete stilling basin Headwall concrete Gravity bypass system or outlet control structure		the inlet and outlet connections. The incoming tunnel outlet invert would be at elevation -32.2 ft and discharge to a concrete apron, rising at a 20% slope to elevation +0.0 ft. The Intake 4 and 5 pipeline outlet inverts would be within a transition structure at approximately elevation -22.0 ft. • At the south end of the IF, an approach channel, approximately 1,500 ft long and 1,300 ft wide, would connect the IF outlet to the new IPP and the gravity bypass system. The invert of the approach channel would deepen from +0.0 ft to -30.3 ft, matching the depth at the IPP. • The IF connection to the gravity bypass system would be just to the west of the connection to the IPP. The invert of the approach channel would gradually deepen from +0.0 ft to approximately -5.0 ft. Flow to each of the two gravity bypass pipes would be controlled by a radial gate. • An emergency spillway located at the southeast corner of the IF would carry spill flow to a concrete stilling basin within an 11-acre detention basin located between the IF and Snodgrass Slough. • 150-foot-long spillway would be constructed of roller-compacted concrete (RCC) in place of embankment at the southeast corner of the IF. A short segment of additional embankment would be constructed at the south end of the eastern perimeter to enclose the small stilling basin (if present) between the IF and Snodgrass Slough. • Stop logs would be installed at the three pipeline connections and roller gates would be installed at the tunnel connection to hydraulically isolate the Sacramento River from the IF • The planned embankment crest elevation for the IF would be +32.2 feet, which includes considerations for SLR. The toe of the new embankment would be set at 100 feet from the toe of the parallel old UPRR ROW to the east, and 300 feet from the toe of the parallel existing Snodgrass Slough right bank levee to the southwest. Excavation at the toe of the existing embankment and levees may require the use of tied-back sheet piles, dewatering, and other geotechnical precautions to prevent failure of existing embankments and levees. The embankment cross-section would consist of engineered fill placed on suitable foundation material at a 3H:1V slope on both the inboard and outboard sides of the embankment. • The new stilling basin embankments between the IF and Snodgrass Slough would start at the IF with a matching crest elevation of +32.2 feet, then gradually slope down to +6 feet. The crest width would be maintained at 24 feet. As with the IF embankments, these embankments would consist of engineered fill placed on suitable foundation material at a 3H:1V slope on both the inboard and outboard sides of the embankment. The inboard slopes would be armored with riprap from +3.5 to +14.0 feet. The new embankment for the IF would be constructed by excavating the embankment foundations down to suitable material, dewatering, then constructing the embankments of compacted fill to the desired height. • Approximately 6,000,000 cy of earth would be excavated from portions of the IF (including embankment foundation) to provide maximum invert elevation of +0.0 ft. Those portions of the IF already below +0.0 ft would remain at the existing elevation. • Approximately 4,000,000 cy of fill material would be required for the IF embankments

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• The required embankment material would be borrowed from within the limits of the respective forebays. • Dewatering and/or moisture conditioning of the soils would likely be required. **Descriptions specific to the Modified Pipeline/Tunnel Alignment** Conceptually designed as hydraulically isolated from other Delta waterways. The only source of water would be the Sacramento River via the new intakes. The only outlets from the intermediate forebay (IF) would be to the tunnels conveying water to the expanded Clifton Court Forebay via an outlet structure. The intermediate forebay would be designed as a pass-through facility that will not have regulating gates controlling flow to the main tunnels; therefore, no daily operational storage will be provided. • 245-acre surface footprint (including both the intermediate forebay and the overflow containment area). • 41-acre water surface area. • Active storage volume 710 af. • The IF would be developed by constructing a ring dike to surround the forebay. With the exception of the inlets and the outlet, the ring dike would be constructed of engineered fill. • A slurry cutoff trench will be included beneath the embankment to protect the foundation of the embankment from underseepage and piping. A drain is also included at the toe of the outer embankment slope to limit saturated conditions at the ground surface. • The water surface area of the IF is approximately 40 acres at elevation 19 ft. • The operating range would be a depth of +10.0 to +20.0 feet. • The bottom elevation of the IF is proposed to be +0.0 ft except locally at the inlet and outlet connections. The incoming tunnels would transition to vertical shafts that terminate in the inlet structure, which would incorporate bulkhead gates. Flow would then pass through a transition structure that would include roller gates to reduce incoming velocities. • At the south end of the IF, the outlet structure would consist of a concrete structure with a gated overflow weir at elevation +10.0 feet. Flows over the gated weir would discharge to a transition structure directing flow to the vertical outlet shafts. • A 400-foot-wide emergency spillway located on the east side of the IF would carry emergency overflow to a designated adjacent spillway containment area. • The planned embankment crest elevation for the IF would be +32.2 feet, which includes considerations for SLR. The new embankments would be constructed by excavating the embankment foundations down to suitable material and then installing the slurry cutoff wall. After the cutoff wall is completed, the embankments will be constructed of compacted fill to the desired height. Dewatering will be required for excavation operations. • Approximately 1,000,000 to 1,900,000 cy of earth would be excavated from portions of the IF (including embankment foundation) to provide maximum invert elevation of +0.0 ft. • Approximately 500,000 to 700,000 cy of excavation and 900,00 to 1,300,000 cy of fill material would be required for the IF embankments. • The required embankment material would be borrowed from within the

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		limits of the respective forebays to the extent possible or from borrow sites. • Moisture conditioning of the soils would likely be required.
IF transition structures		**Descriptions specific to the Pipeline/Tunnel Alignment** • The pipeline conveyance from Intakes 3, 4, and 5 would discharge to the IF through IF transition structures from each intake. • Above-grade footprints: approximately 90 ft x 135 ft. The majority of the structures would be below ground. • Approximately 2 ft of the perimeter and dividing walls would be above the surrounding grade. • An access platform would be 2 ft above grade for the length of the structure across the forebay entrance. • Walls and access platforms would be concrete. A portion of the IF section in the vicinity of the transition structure would be armored with concrete. • The grade for the structures would be set at the same elevation as the top of the forebay embankment (approximately 30 ft above the existing grade). • Uncovered channels would be open to above. • A 3-rail, 3.5 ft tall handrail would be provided around the perimeter. • A gantry crane may be placed on top of the walls with a frame approximately 30 ft tall and 10 ft wide. • Temporary parking areas during construction would be within the 1 to 5 acre construction staging area for each transition structure. • Parking during operation may be available on forebay maintenance roads adjacent to and around three sides of the facilities, approximately 24 ft wide x 400 ft long
Gravity bypass system Bypass inlet structure Excavate and stockpile Place gravel bedding Drive foundation piles Place concrete fill in piles Bypass slab on grade Wall concrete Roof concrete Roof falsework Load/Haul/Compact/ Stockpile Bypass piping Excavate and export	Dec. Yr. 4–Mar. Yr. 6	**Descriptions specific to the Pipeline/Tunnel Alignment** • Two 26-ft diameter gravity bypass pipelines, configured so they can be isolated to allow for maintenance and inspection. • Controlled by radial gates at the inlet structure. • Each pipeline connects to a 26-ft diameter manifold that transitions into six 11-ft pipelines that pass through a concrete valve vault and connect to either 33-ft diameter bore of Tunnel 2. • The valve vault is an enclosed structure, 33 ft x 230 ft, approximately 30 ft above grade. • The bypass structure is constructed of concrete, adjacent to the intermediate pumping plant. The majority of the structure would be below ground. • Approx. 2 ft of the perimeter and dividing walls and walking platforms would be above the surrounding grade. The grade for the structure is set at the same elevation as the top of the forebay embankment (3C-24approximately 30 ft above the existing grade). • Channels would be open to above. • A handrail, potentially 3-rail, 3.5 ft tall, would be provided around the perimeter. • Radial gates would be provided. • A gantry crane may be placed on top of the walls with a frame that is approximately 30 ft tall and 10 ft wide. • Checkered plate walkways and a staircase would be provided in the valve

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Install and remove sheet piles, wales and struts Stage, handle, place pipe Weld pipe (26 ft; 1 in thick) Place backfill slurry Load/Haul/Compact/ Stockpile Flex couplings, air valves		vaults for safe access/ingress. • Excavate and haul to stockpile: 172,016 cy • Excavate and export: 100,862 cy • Haul from stockpile and compact: 120,396 cy
Excavation and backfill		• Excavate, direct haul, and compact: 3,940,000 cy • Excavate and haul to stockpile: 7,518,333 cy • Excavate and export: 1,030,000 cy
Outer structure (Alternative 4)	Jun. Yr. 2–Aug. Yr. 4	**Descriptions specific to the Modified Pipeline/Tunnel Alignment** • Approximate footprint: 90 ft x 160 ft • Wall of facilities will be below site grade with the top of the walls/access decks at the same level as the site grade. • Walls and access platforms will be concrete. • Handrail and gates will be steel. • Control building approximately 20 ft x 20 ft x 20 ft tall • Control building could be framed of timber, CMU, steel or metal studs. Steel may be painted or galvanized.
INTERMEDIATE PUMPING PLANT (IPP) (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 6A, 6B, 6C, 3, 5, 7, 8)	Jun. Yr. 2–Aug. Yr. 4 Includes approach channel, roads, all structures, piping and equipment installation	• One intermediate pumping plant (IPP) would be constructed and operated to sustain water levels in the BTF required for optimal pump operations at both Banks and Jones Pumping Plants when the gravity bypass is not utilized. • Required to overcome head loss (energy loss) due to friction as the water is conveyed along the very flat terrain to the delivery pumping plants in the South Delta. • Location depends on choice of alignment. • **Pipeline/Tunnel Alignment:** At southern end of IF; 10 pumps with capacity of 1,500 cfs each (high head); 6 pumps with 1,500 cfs capacity (low head). (For the purposes of modeling, it was assumed that these parameters would apply to all P/T alternatives; however, fewer pumps and/or pumps with different capacities would likely be constructed under Alternatives 3, 5, 7, and 8) • **East Alignment:** About 3.5 miles south of the point where the alignment crosses the San Joaquin River, within canal footprint on Lower Roberts Island; 15 pumps with capacity of 1,000 cfs per pump; 2 pumps with 500 cfs capacity • **West Alignment:** approximately 1.2 miles east of the Sacramento River Deep Water Ship Channel. at the entrance to the tunnel segment, within canal footprint on Ryer Island; 15 pumps with capacity of 1,000 cfs per pump; 2 pumps with 500 cfs capacity • Structure would be constructed of reinforced concrete and would have multiple floors to house mechanical and electrical equipment.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• The primary structural support system for the pumping plant would consist of reinforced concrete slabs and walls at and below grade, with steel framing and exterior metal wall and roof panels for the above-grade building. • The upper floor (operating level), located at grade level above the flood protection elevation, would be reinforced concrete floor slab that would support the vertically mounted pumps and motors. This level would be enclosed by a steel-framed building that includes a traveling 125-ton bridge crane. • The lower level would be a concrete mat slab wet well that includes reinforced concrete partition walls at each pump to separate and confine the water flow at each pump suction inlet. • Deep foundation piles are anticipated to be necessary to support the heavy dead and operating loads of the building. • Based on a preliminary pile foundation evaluation, 24-inch concrete-filled pipe pile, an estimated pile length of 60 to 65 ft below the founding level of the IPP would be required. • Main building above grade footprint is approximately 140 ft x 870 ft. • Tops of above ground walls approximately 75 ft above grade and the roof peak at 80 ft above grade. Total height of the above-ground structure is approximately equivalent to an 8-story building. • A concrete cantilevered deck over the pumping plant approach from the intermediate forebay would extend approximately 30 ft from the front of the main building and run the length of the building, approximately 740 ft. • A gantry crane would be located on the cantilevered deck. The frame of the gantry crane is approximately 30 ft tall and 20 ft wide. • The grade for the pumping plant and the top of the gantry crane deck would be set at the same elevation as the top of the forebay embankment, approximately 35–40 ft above the existing grade • Flow from the pumps would be discharged into a transition manifold for transfer to the pressurized tunnels.
Clearing/ Grubbing/ Dewatering		Dewatering is expected to be continuous during construction.
Excavation and backfill		Pipeline/Tunnel, East or West Alignment: • Excavate and haul to stockpile: 115,000 cy • Excavate and export: 94,401 cy • Haul from stockpile and compact: 115,000 cy
Pipelines excavation and backfill		Pipeline/Tunnel: IPP to tunnel • Excavate, haul to stockpile, haul from stockpile and compact: 125,168 cy • Excavate and export: 149,700 cy East: IPP to canal transition structure • Excavate and haul to stockpile, haul from stockpile and compact: 13,845 cy • Excavate and export: 120,962 cy West: IPP to tunnel • Excavate and haul to stockpile: 68,931 cy • Haul from stockpile and compact: 34,563 cy

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Approach channel (Pipeline/ Tunnel Alignment)	Aug. Yr. 2–Aug. Yr. 4	• Flow from the IF would be directed to the IPP (outlet control structure under Alternative 4) via an approach channel at the southern side of the forebay. • Flow from the approach channel would be directed to each pump intake through wall openings with isolation gates to allow pump wells to be dewatered for maintenance. • Trash racks would be used upstream of the pumps for pump protection. • Discharge pipes from the 1,500-cfs lower head pumps each would be 132-inch diameter, • Discharge pipes from the 1,500-cfs higher head pumps each would be 144-inch diameter. (Pipe sizes would vary depending on the pump supplier.) • Flow from the pumps would be discharged into a transition manifold for transfer to the pressurized tunnels. • Requires excavation, stockpiling, placing stockpile material, and concrete work. • Excavate and haul to stockpile/haul from stockpile and compact: 11,520 cy; excavate and export: 172,560 cy
Approach channel (East and West Alignments)	Aug. Yr. 1–Oct. Yr. 2	• The conveyance canal upstream of the intermediate pumping plant would expand from the typical canal width (340 ft at invert) to the width of the pumping plant combined pump bays (655 ft), forming a forebay of approximately 500 ft in length. • Flow from the forebay would be directed to each pump intake through wall openings with isolation gates to allow pump wells to be dewatered for maintenance. • Trash racks would be used upstream of the pumps for pump protection. • The discharge pipes from the 500 cfs pumps each would be 96-inch-diameter and the discharge pipes from the 1,000 cfs pumps would each be 132-inch-diameter. • Flow from the pumps would be discharged into a transition structure for transfer to the canal or tunnel. • Requires excavation, stockpiling, placing stockpile material, and concrete work. • Excavate, direct haul and compact 303,200 cy; import and compact 381,280 cy
Transition manifold		• A maximum 33 ft diameter pipe manifold and valve vault that connects the 16 pipes (11 ft and 12 ft diameters) from the IPP to the two 33 ft diameter pipelines. • Manifold and all pipes are underground. • The valve vault is a concrete, enclosed underground structure, with an approximate 6” height of walls/roof above grade, and would have access through a manhole in the roof of the structure.
Weir structure/ Surge towers		Pipeline/Tunnel Alignment • Two, 33-ft diameter (minimum) surge towers. • Elevation approximately 105 ft (NAVD88) at the rim. • Dewatering • Excavate & Export 263,895 cy • Excavate & Stockpile/haul from stockpile and compact: 50,265 cy • Backfill • Place Bedding

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		West Alignment • Two, 33-ft diameter surge towers. • Elevation up to 70 to 80 ft (NAVD88) at the rim, depending on final pump selection and pipe arrangement. East Alignment: N/A • Drive Foundation Piles • Place Concrete Fill In Piles • Invert Concrete • Flow Meter Vault Concrete • Wall Concrete • Flow Meter Vault Concrete
Tunnel outlets to forebays		• Tunnel outlets would be concrete. • The level surface at each of the tunnel outlet sites (into the intermediate forebay and the Byron Tract Forebay) is approximately 160 ft x 140 ft. • The grade for the level surface would be set at the same elevation as the top of the forebay embankment (approximately 20–30 ft above the existing grade). • The majority of the tunnel outlet structures would be below grade/ground. • Gantry cranes for each tunnel, with an approximate 50 ft tall and 50 ft wide frame, and equipment for opening and closing tunnel gates would be set on top of grade. • Control buildings, possibly 20 ft x 20 ft and 20 ft tall, may be located at each tunnel outlet. These may be framed of timber, CMU, steel or metal studs.
Substation and exterior transformers		• A main 230 kV substation and a main 69 kV substation would be constructed adjacent to the intermediate pumping plant (IPP), at the flood protection elevation, and provide power to the IPP, control structures and intake facilities. See *Power Supply and Grid Connections*
General construction work areas		• Anticipated construction area for the IPP is approximately 110 acres. • Of this, approximately 20 acres would be specific to the area for temporary construction needs (including on-site temporary parking, office trailers, staging, equipment laydown and storage). • Under the East and West Alignments, the anticipated construction area for the IPP is approximately 40 acres. • Of this, approximately 15 acres would be specific to the area for temporary construction needs (including onsite temporary parking, office trailers, staging, equipment laydown and storage).
Utilities		• See Table 3C-5. *Power Supply and Grid Connections*
Roads		• See Table 3C-7, *Access and Construction Work Areas*
Fencing		• Security fencing, with access control gates, would be placed along the perimeter of the pumping plant facilities. • A 6-foot chain link fence installed around the pumping plant and enclosing the surge towers and gravity bypass structure. • A substation adjacent to the pumping plant would be fenced with a 6-foot chain link fence with a climbing barrier. More stringent fencing with 8-foot tall chain link fences with climbing barrier and/or razor wire may be used at the pumping plant or substation facilities. • Masonry walls, 6 to 8 ft tall, may be used within the facilities.
Landscaping/		• See Landscaping/vegetation under North Delta Intakes, above.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
vegetation		
Control structures		While the types of control structures used within and among alignments would vary, controls generally affect the hydraulic grade line at low flow rate by creating additional headlosses to allow better pump selection and more efficient operation over the full range of flows, from 500 to 15,000 cfs. The proposed controls include the following. • Approximate footprint of 90 x 100–160 ft. • Walls of the facilities would be below site grade with the top of walls/access decks at the same level as the site grade. • Control structure walls and access platforms would be concrete. • Site grade would be set at the same elevation as the top of the concrete lining that extends 280 ft up- and downstream of the facilities. • The top of the concrete lining is set 29 ft above the structure invert. • A handrail, potentially a 3-rail 3.5 ft tall, would be provided around the perimeter of the access decks. • Radial gates would be installed and a control building, approximately 20 ft x 20 ft and 20 ft tall, would be located at the control structures. • Butterfly valves at Intakes 1 and 2 to start the pumps for operation at low flow or against low downstream water surface elevation (WSE) • Transition structures at Intakes 3, 4 and 5, with a weir crest elevation near 25 ft (the IF maximum WSE). These structures would provide back pressure on the pumps for operation at low flow or against low downstream WSE. • Weir structure on the 33-foot-diameter conveyance pipeline that leads to each of the two 33-foot-diameter tunnels, with a crest elevation near 30 ft (5 ft above the IF maximum WSE). The weirs would provide back pressure on the pumps for startup conditions, when pump operation is required to achieve flows in excess of the capacity of the gravity bypass. • Gravity bypass (one per tunnel) at the IPP, controlled by radial gates at the inlet structure. The gravity bypass system would operate during low flow conditions and when positive gradient is available between the two forebays. Each gravity bypass is sized for a design flow of 3,500 cfs (total capacity 7,000 cfs). • Under the modified pipeline/tunnel alignment, an outlet structure would operate in lieu of the IPP (see *Outlet Structure* under *Intermediate Forebay* features, above)
EAST ALIGNMENT (Alternatives 1B, 2B, 6B) **WEST ALIGNMENT (Alternatives 1C, 2C, 6C)** Chapter 3, *Description of Alternatives*, Tables 3-8 and 3-9 respectively, provide summaries of East Alignment and West Alignment physical characteristics. **No intermediate forebay would be constructed under East and West Alignment alternatives.**		
Canal conveyance	Mar. Yr. 2 For additional timing detail, see Table 3C-17. West Alignment schedule is assumed to be the same as for East Alignment.	• East Alignment would convey water through canals to the new Byron Tract Forebay, from which water would be conveyed via connecting canals to the existing pumping plants serving the State Water Project (SWP) and Central Valley Project (CVP). • West Alignment would convey water through canals, into a tunnel beginning on Ryer Island and terminating east of Oakley, to a southern canal flowing to the new Byron Tract Forebay, from which water would be conveyed via connecting canals to the existing pumping plants serving

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		the State Water Project (SWP) and Central Valley Project (CVP). • East Alignment: 6,610 acres / West Alignment: 4,490 acres • Construction of the canal channel and embankments would proceed in three main phases: • Embankment foundation and channel excavation (approximately 67,000,000 cy) • Embankment construction (approximately 71,000,000 cy) • Spoils placement • Canals may be unlined (earthen) or lined with concrete. • Projected solid waste (not dredge material) excavated to be disposed of in landfill for each alignment is estimated at 0.1% of spoils. • East Alignment: 43,076 tons • West Alignment: 20,194 tons
Canal excavation and backfill (all sections)		East Alignment • Excavate, direct haul and compact: 28,192,036 cy • Excavate and export: 39,487,705 cy • Import and compact: 55,313,593 cy West Alignment • Excavate, direct haul and compact: 38,303,970 cy • Excavate and export: 16,328,401 cy • Import and compact: 33,247,610 cy
Excavation and dewatering		• Excavation of unsaturated soils could be performed using scrapers or excavators loading into large dump trucks. • Excavated materials that are suitable for embankment fill could be hauled and placed directly into areas ready for embankment construction or stockpiled for future use; unusable material would be hauled to spoil disposal areas. • Additional embankment material from off-site borrow locations would be needed. • Organic materials would be removed and replaced with compacted engineered fill, requiring dewatering.
Culvert Siphons	Time to complete depends on width and flow of slough that siphon crosses; expectation is 4 to 5 years to complete all siphons in either alignment. Schedule includes upstream and downstream control structures and transitions. **East Alignment** **Stone Lake Drain:** Dec. Yr. 3–Mar. Yr. 9 **Beaver Slough:** Jun. Yr. 2–Dec. Yr. 5	See Chapter 3, *Description of Alternatives*, Table 3-8 and Table 3-9, for locations and specifications of culvert siphons under East and West Alignments, respectively. • Siphons consisting of (4) 26 x 26 ft box culverts would be constructed where canal crosses waterways or other features. • East Alignment would require 8 siphons; West Alignment would require 9 inverted culvert siphons to convey water under 10 shallow water courses and 1 rail line. Construction activities Upstream and downstream transitions • Dewatering, excavation/grading, place gravel bedding, place invert slab concrete, place wall concrete, backfill Upstream and downstream control structures • Excavation/grading, place gravel bedding, drive foundation piles, place invert slab concrete, place wall concrete, backfill Box culvert section • Overexcavate and recompact, install/remove cutoff, repair levee, dewatering, excavation, drive foundation piles, place gravel bedding, SOG concrete, wall concrete, roof concrete Backfill

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions	
	Hog Slough: Sept. Yr. 2–May Yr. 5 **Sycamore Slough:** Apr. Yr. 3–Sept. Yr. 6 **White Slough:** Mar. Yr. 1–Oct. Yr. 4 **Disappointment Slough:** Jun. Yr. 2–Oct. Yr. 7 **BNSF Railroad:** Aug. Yr. 2–Jan. Yr. 4 **Middle River Slough** Sept. Yr. 2–Jul. Yr. 7 **West Alignment** Schedule not available	• East Alignment: 160 surface acres / West Alignment: 170 surface acres • Would be constructed as large multiple box culvert structures using cofferdams and open cut-and-cover construction methods with conventional CIP concrete structures. • Either a bypass channel or a backup (setback) levee would be used as determined appropriate at each site; both would not be used at any one site. • In-water work would be conducted during June 1–October 31 to the maximum extent possible. Because culverts/siphons need to be placed during low water, i.e., August through November, some in-water work may have to be conducted outside the June 1–October 31 time window.	
Culvert siphon excavation and backfill (all culvert siphons)		East Alignment • Excavate and haul to stockpile: 6,460,311 cy • Haul from stockpile and compact: 5,113,801 cy	West Alignment • Excavate and haul to stockpile 10,429,866 cy • Haul from stockpile and compact: 9,161,197 cy
Slough diversion and bypass channel		• Provides temporary realignment of the slough, diverting water around the siphon construction area so that work can be conducted year-round. • Would remain in place for the duration of the construction of the slough. • Channel would start upstream of the siphon construction area and end at the existing slough downstream of the construction area, using walls of sheetpiles across the slough to transition the water into and out of the bypass channel. • Bypass channel would consist of two parallel berms, which would be removed when siphon is completed. • Berms would be founded on 10-ft depth of overexcavated and recompacted in-situ soil and filled with imported and compacted fill. • Berms would be 25 ft tall above grade; have 3H:1V (Horizontal:Vertical)sloped exterior sides and 1H:1V sloped interior sides; a 20 ft wide level top; and overall width of approximately 120 ft. • The total width of the channel and two berms would vary depending on	

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		the width and flow of the slough being diverted, and the siphon layout. • Sections of levee would be removed and rebuilt after siphon is completed. Removal and rebuilding of the levee sections would be done within a 4-month work window during the low-water season of August 1–November 30.
Sheetpiling/ cofferdams at bypass channels		• Sheetpile walls would cross width of slough upstream and downstream of the siphon construction site, to divert water into and out of the bypass channel and allow siphon to be constructed across the slough channel in one stage. • Sheetpile walls would be constructed of ARBED-type steel sheet piles with the possibility of H king piles and sealing of sheetpile interlocks. • Sheetpiles may be driven from within the water by a barge-mounted crane, or from on top of the adjacent levee. • Top of sheet piles would align with the approximate top of the bypass channel. • 50 ft tall sheet piles would be driven approximately 20 ft below the bottom of the slough. • Linear length of sheetpiles walls would depend on the width of the slough. • Construction/removal within a 4-month work window during the low-water season of August 1–November 30. • Sheetpiles would remain in place for approximately 4 years and be removed at the end of construction.
Backup (setback) levee		• Constructed to allow potential removal of existing levee within the siphon construction area during open cut excavation and to maintain the width of the slough channel when a cofferdam is installed. • Backup levees would be installed when a cofferdam is installed partially across the slough channel and the siphon construction is done in stages. • Would tie in to the existing levee at each end of its length on either side of the construction area. • Founded on 10-ft depth of overexcavated and recompacted in-situ soil and would use import fill. • Backup levee would be 25 ft tall above grade; have 3H:1V sloped exterior sides and 1H:1V sloped interior sides; a 20 ft wide level top; and overall width of approximately 170 ft, depending on siphon layout. • Backup levees would be removed when siphon construction is completed and after the existing levee has been rebuilt.
Sheetpiling/ cofferdams at backup levees		• Encircles siphon work area and provides a dry workspace to allow construction to proceed year-round within the cofferdam. • Used with a backup levee, cofferdam would be built across one-half of the slough at a time and the siphon constructed in two stages, to allow continuous flow through the remaining open portion of the slough. • Sheetpile walls may be constructed in one of two ways: (1) of ARBED-type steel sheet piles with the possibility of H king piles and sealing of sheetpile interlocks; or (2) a series of 50 ft diameter circular sheet pile cells backfilled with compacted granular material. • Sheetpiles may be driven from within the water by a barge-mounted crane, or from on top of the adjacent levee. • Top of sheet piles would align with the approximate top of the backup levee.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• 100 ft long sheetpiles would be driven to a depth below the base of excavation for the siphons, with approximately 70 ft of length driven below the bottom of the slough. • Linear length of sheetpiles walls would depend on the width of the slough. • Using vertical open cut excavation would affect a 250-ft length of the slough; using a 3H:1V cut would affect a 500 ft length of slough. • Construction/removal within a 4-month work window during the low-water season of August 1–November 30 • Each phase of the cofferdam would be in place for approximately 2 years and be removed at the end of construction.
Tunnel siphons (East Alignment Alternatives 1B, 2B, 6B)	Lost Slough/ Mokelumne River Jul. Yr. 2–Mar. Yr. 6 San Joaquin River May Yr. 2–Oct. Yr. 5 Old River May Yr. 2–Feb. Yr. 7	Where canals cross existing water bodies, tunnels would be used as siphons to convey water between canal segments. • Dual bore, 33 ft ID concrete lined with pre-cast bolted-and-gasketed segments • 95 acres (subsurface) • The level surface at each of the tunnel inlet and outlet sites is approximately 150 ft x 480 ft. • The tunnel inlet and outlet transitions would be concrete. • The grade for the tunnel would be set at the same elevation as the top of the canal embankment (Under the East Alignment, approximately 25–40 ft above the existing grade; under the West Alignment, approximately 30 ft above the existing grade). • The majority of the tunnel inlet and outlet structures would be below grade/ground. • Steel gantry cranes for each tunnel (at inlet and outlet), with an approximate 50 ft tall and 50 ft wide frame, and equipment for opening and closing tunnel gates, would be set on top of grade. • Control buildings, possibly 20 ft x 20 ft and 20 ft tall, may be located at each tunnel inlet and outlet. The control building could be framed of timber, CMU, steel or metal studs. • Launching and retrieval shafts (similar to those described above under Pipeline/Tunnel Alignment) would be necessary. Lost Slough/ Mokelumne River tunnel Two parallel, 33-ft ID bores would be required to accommodate the maximum 15,000 cfs flow. • Excavate and haul to stockpile, haul from stockpile and compact 203,465 cy • Export RTM: 499,635 cy • Import and compact: 1,117,477 cy • Length: 7,450 ft (1.4 mi) San Joaquin River tunnel The canal flow would be transferred through a set of inlet control structures into two 33-foot ID tunnels, approximately 150 ft deep, and through outlet structures discharging into the canal. • Excavate and haul to stockpile, haul from stockpile and compact: 242,350 cy • Export RTM: Old River tunnel • Length: 1,920 ft (0.36 mi) • Tunnel bores: 2 • Tunnel shafts: 4 • Finished inside diameter: 33 ft • Excavate and haul to stockpile, haul from stockpile and compact: 106,987 cy • Export RTM: 195,930 cy • Import and compact: 1,078,162 cy • Outlet structures would discharge to

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• Tunnel bores: 2 • Tunnel shafts: 4 • Finished inside diameter: 33 ft 272,234 cy • Import and compact: 982,952 cy • Length: 3,240 ft (0.6 mi) • Tunnel bores: 2 • Tunnel shafts: 4 • Finished inside diameter: 33 ft the new forebay
Tunnel (West Alignment Alternatives 1C, 2C, 6C)	Schedule information not available	West Alignment alternatives include a 17-mile, concrete-lined soft ground tunnel to convey diverted water from the IPP into a new canal leading to the new Byron Tract Forebay. • 75 acres (780 acres permanent subsurface easement) • Excavate and export: 149,226 cy • Export RTM: 10,574,601 cy • Import and compact: 2,844,666 cy • Length: 89,650 ft • Bores: 2 • Inside diameter: 33 ft. • The EPB TBM would bore the tunnel at a minimum of 100 ft below the ground surface. • Intermediate and emergency access shafts would be placed along the length of the tunnel at possibly (15) locations, in addition to any intermediate launch/retrieval shafts at potentially one location. • Intermediate/emergency shafts would be 10 ft diameter with a 2 ft wide curb approximately 1 ft above grade. • Intermediate launch/retrieval shafts would be adjacent to each other and would be at least 200 ft x 100 ft each, with a perimeter concrete slab poured at grade.
Tunnel outlet (West Alignment Alternatives 1C, 2C, 6C)	Schedule information not available	• The level surface at the tunnel outlet site (for the parallel tunnels) is approximately 150 ft x 480 ft. • The grade for the outlet would be at the same elevation as the top of the canal embankment (approximately 30 ft above the existing grade). • The majority of the tunnel outlet structure would be below grade/ground. • Gantry cranes for the tunnel, with an approximately 50 ft tall and 50 ft wide frame, and equipment for opening and closing tunnel gates would be set on top of grade. • Control buildings, possibly 20 ft x 20 ft and 20 ft tall, may be located at the tunnel outlet.
Pipelines	Nov. Yr. 2–Dec. Yr. 4	• From intakes to intake pumping plants, and from pumping plants to canal transition structures.
Pipelines – Canal transition structure	Jul. Yr. 3–May Yr. 5	• Pipelines from canal transition structures to main conveyance
Intermediate pumping plant	Jun. Yr. 1–Jul. Yr. 4	See information and assumptions for intermediate pumping plant under *Pipeline/Tunnel Alignment* • Water would travel in a lined or unlined canal between the intake pumping plants and the IPP, and between the IPP and BTF (East

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		Alignment); or from the IPP through a dual-bore, 33 ft diameter tunnel to another lined or unlined canal leading to BTF (West Alignment). • West Alignment: A tunnel surge tower at IPP would be provided for each of the tunnels exiting from the IPP. Each tower would be approximately 35 ft diameter and approximately 30 ft tall. • No surge towers at the IPP would be required under the East Alignment.
Bridges (East Alignment Alternatives 1B, 2B, 6B) **Bridge Construction** **Roadway Embankment** **Load and haul borrow** **Place embankment**	Apr. Yr. 2–Feb. Yr. 5 **G2 Scribner Road:** May Yr. 3 **G3 Hood-Franklin Road:** Nov. Yr. 3 **G4 Lambert Road:** Jan. Yr. 5 **G5 Dierssen Road:** Sept. Yr. 2 **G6 Twin Cities Road:** Sept. Yr. 3 **G7 West Barber Road:** Jan. Yr. 4 **G8 West Walnut Grove Road:** Feb. Yr. 5 **G9 North Blossom Road:** Aug. Yr. 2 **G10 West Woodbridge Road:** Jan. Yr. 5 **G11 SR12:** Feb. Yr. 2 **G12 North Guard Road:** Jan. Yr. 3 **G13 West Eight Mile Road:** Feb. Yr. 4 **G14 West McDonald Road:** Jan. Yr. 3 **G15 SR4:** Sept. Yr. 2 **G16 West Bacon Island Road:** Jul. Yr. 3 **G17 South Tracy Road:** May Yr. 4 **G 18 Cal Pack Road:** Feb. Yr. 2 **G19 Clifton Court Road:** Apr. Yr. 3	• 19 bridges (2 state highway and 17 local/county/private road bridges) needed to convey existing roads and highways over the canal. • Construction method for bridges over new canals would involve typical materials and bridge/roadway construction techniques. The construction of the bridge structures, and the disturbance it causes, including excavation, pile driving, and stockpiling of materials, would all probably occur within the overall footprint of the proposed canal construction. • Excavate, direct haul and compact: 3,001,687 cy • Excavate and export: 10,621,152 cy • Bridge type is assumed to be CIP or precast concrete superstructures supported on concrete pier walls and abutments, all founded on pile foundations. • *Deep Foundation Construction.* The bridge piers and abutments are anticipated to be founded on driven pile foundations typically installed with diesel hammer pile driving rigs. • The pile caps (footings) are to be constructed below the final canal invert with abutments founded in the levee embankments. Because scour depths in the canal are minimal, footings can be placed relatively shallow. • *Superstructure Type.* It is anticipated that the bridge superstructures, or main load carrying members, would be comprised either of CIP concrete, precast concrete girders or steel girders. The ability to prefabricate members would expedite construction and allow more flexibility in sequencing. • *Placement of Concrete.* While bridge superstructure material may vary, all substructure elements would be comprised of CIP concrete. Because groundwater levels along the alignment are relatively shallow, dewatering may be required to place concrete for pier pile caps (footings). Depending on the depth below groundwater, this can be accomplished through the use of well or sealed cofferdams. • Equipment to be used includes cranes, pile driving hammers, concrete trucks and concrete pumps. Existing roadways would be used for delivering materials, which would be stockpiled within the canal footprint. • Preliminary span lengths are based on a maximum 145 foot length corresponding to a practical limit for transportation of precast girders. • Length and overall footprint of the approach roadway would vary at each bridge location, dictated primarily by the height of the levee relative to the existing roadway.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Bridges (West Alignment Alternatives 1C, 2C, 6C)	Schedule information not available	• Import and compact: 1,183,285 cy • A railroad bridge is proposed to carry the existing track over the canal near the California Aqueduct at the southern end of the water conveyance facilities.
Byron Tract Forebay (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8)		• Byron Tract Forebay (BTF) would be constructed adjacent to CCF to balance daily variations in inflow and outflow to Banks and Jones pumping plants. See Table 3C-3, *Byron Tract Forebay*.
Utilities		• See Table 3C-5. Power Supply and Grid Connections
Control structures		• Siphon and control structures have approximate footprints of 70 ft x 160 ft at siphon inlets, 30 ft x 160 ft at siphon outlets and 90 ft x 160 ft at control structures. • The siphon and control structure walls and access platforms would be concrete. • The walls of the facilities would be below site grade with the top of walls/access decks at the same level as the site grade. • The site grade would be set at the same elevation as the top of the canal concrete lining that extends 280 ft up and downstream of the facilities. • Radial gates would be installed and a control building, approximately 20 ft x 20 ft and 20 ft tall, would be located at the siphon inlets and the control structures. • The gates, in the open position, and the control building may extend above the top of the canal embankment. The remainder of the facilities are likely not to be visible over the top of the embankment. **East Alignment** • At two new sites on the existing approach canals to the Jones and Banks pumping plants, adjacent to the new BTF outlets. • At two potential locations, control structures would provide a means of controlling system operation at intermediate structures, located no farther than 5 miles apart. • 4 barrel, 26-foot-wide rectangular channels with radial gates (15,000 cfs). • 3 barrel, 24-foot-wide rectangular channels with radial gates (9,000 cfs). • Hood Franklin Control Structure, 1,670 foot long • Cal Pack Road inline control gate • The top of the concrete lining is set 29 ft above the canal invert and the canal invert is set 30–55 ft below the top of the embankment, **West Alignment** • At two potential locations, where the canal intersects Central Ave Bridge and Road 159 bridge; at a forebay outlet at the north of the forebay; two new sites on the existing approach canals to the Jones and Banks pumping plants, adjacent to the new BTF outlets. • The canal invert is set 30–45 ft below the top of the embankment, making the site grade 1–15 ft below the top of the canal embankment. • A handrail, potentially 3-rail, 3.5 ft tall, would be provided around the perimeter of the access decks.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		making the site grade 1–25 ft below the top of the canal embankment.
Forebay Outlet 1 Inline **Forebay Outlet 2 Inline** **California Aqueduct Inline** **Delta-Mendota Inline**	Nov. Yr. 4 Jan. Yr. 2 Jan. Yr. 3–May Yr. 4 Jan. Yr. 3–May Yr. 4	**East Alignment for all culvert siphons:** Excavate and haul to stockpile, haul from stockpile and compact: 138,316* cy for each siphon. * this quantity is included in totals for culvert siphon excavation and backfill
New access roads		See Table 3C-7, *Access and Work Areas*
General construction work areas		See Table 3C-7, *Access and Work Areas* • East Alignment: Temporary parking areas would be provided within the construction staging area. Staging areas could be in the range of 15 acres at the inlet and outlet of each of the culvert siphons and control gates.
Rock pile protection		• Rock protection would likely be placed from a barge by a clam shell • Length of permanent bank protection would be 100–2,200 ft. • Area of dredging and channel reshaping would be approximately 2.5–7 acres.
* Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time.		

Table 3C-3. Byron Tract Forebay/Expanded Clifton Court Forebay

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Byron Tract Forebay (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8) • For Pipeline/Tunnel and East Alignments, BTF would be constructed on the southeast side of Clifton Court Forebay. For west alignments, it would be on the northwest side of CCF. • Construction may require short shut downs of the existing conveyance system to the Banks and Jones Pumping Plants, to add new control structures to the existing pumping plant approach canals and when BTF is connected to the existing canals. • Water in CCF and Old River would be controlled to prevent blowout of the embankments due to seepage.		
Primary maintenance road **Dewatering** **Excavate and haul off unsuitable** **Cut/fill-build levees** **Export suitable** **Slope protection** **Place riprap, bedding material, fabric**	P/T: Feb. Yr. 1 – Mar. Yr. 4 East: Jun. Yr. 2 – May Yr. 6 West Alignment schedules assumed to be the same as East.	• The Pipeline/Tunnel conveyance would deliver water near the northeast corner of BTF. The inlet is planned to be controlled by roller gates to isolate the tunnel during dewatering and tunnel maintenance. • The bottom elevation of BTF would be -10.0 ft except locally at the inlet and outlet connections. The tunnel outlet invert would be at EL -45.6 ft. Similar to other tunnel outlet discharges, the tunnel would discharge to a concrete apron, rising at a 20% slope to EL -10.0 ft, meeting the BTF invert elevation. • A new section of canal, approximately 2,000 ft long and situated between CCF and UPRR, would connect BTF to the existing approach canal to the Banks Pumping Plant. A 50-foot-wide buffer separates the toe of the approach canal embankment to the centerline of UPRR. • The new approach canal would deepen from -10.0 ft to -27.9 ft, matching the depth at the existing approach canal to the Banks Pumping Plant. A radial gate control structure would be installed at the upstream end of this new approach canal to hydraulically isolate the existing SWP facilities from BTF. The nominal capacity of this canal would be 10,300 cfs. The connection to the existing approach canal would be at an angle of 60 degrees. • The forebay would be connected to the existing approach canal to the Jones Pumping Plant by breaching a section of the existing canal's embankment adjacent to BTF. The invert of this canal would be at EL -17.4 ft to match the invert of the existing Jones Pumping Plant approach canal at the connection point. A radial gate control structure would be installed at this connection to hydraulically isolate the existing CVP facilities from BTF. This canal would have a capacity of 4,600 cfs matching the capacity of the Jones Pumping Plant. • To provide the ability to isolate BTF from CCF, a new gate structure would be constructed in the existing approach canal downstream of the Skinner Facility. • To provide the ability to isolate BTF from Old River, a new gate structure would be constructed in the existing approach canal to the Jones Pumping Plant just upstream of the connection from BTF. • The planned embankment crest elevation for BTF and approach canals would be +24.5 ft, which includes considerations for SLR. This protection level would gradually lower at an approximately 10% slope to where the forebay approach canal meets the embankment elevation of the existing approach canal to either the Banks or Jones Pumping Plant. The toe of the new embankment would be set at 50 ft from the toe of the parallel existing embankment or levee. Excavation at the toe of the existing embankment and levees may require the use of tied-back sheet piles, dewatering, and other geotechnical precautions to prevent failures of existing embankments and levees.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• The embankment cross-section would consist of engineered fill placed on suitable foundation material at a 3H:1V slope on both the inboard and outboard sides of the embankment. The embankment crest would be 20 ft wide to provide road access consistent with existing embankment design. In addition, 28-foot-wide maintenance roads would be provided on the inboard slopes of the new approach canal, joining the roads at the existing approach canal to the Banks Pumping Plant. The forebay side of the new embankment would also be armored with riprap from +0.0 ft (just below the minimum design WSE of +0.5 ft) to +13.5 ft (the top WSE of +9.5 ft plus an additional 4 ft to account for transient waves). • Under the Pipeline/Tunnel Alignment, BTF permanent footprint would be 840 acres, with 600-acre water surface area, and storage volume of 4,300 af. (Under Alternative 5, Byron Tract Forebay would be 300 acres, with a 200-acre water surface area, and a storage volume of 1,433 af.) • Under the East Alignment, the BTF permanent footprint would be 860 acres, with a 600-acre water surface area, and a storage volume of 4,300 af. • Under the West Canal Alignment, BTF would be 780 acres, with a 600-acre water surface area, and a storage volume of 4,300 af. • Byron Tract would be excavated to provide an invert of -10.0 ft over the entire basin (including embankment foundation) requiring the removal of 14,000,000 cy of material, total. • Dewatering would be required for excavation operations. Most of this material is expected to be unsuitable for use in embankment construction and would require disposal • To the extent possible, spoils would be placed in the area between the existing CCF embankments and new forebay embankments, which are offset by 50 ft toe-to-toe. This area would require temporary storage of disposal materials until the new forebay embankment is constructed. • Approximately 30% of the excavated material below the peat layer may be suitable for use as embankment, and would be used in construction of the BTF embankment. • The new embankments for the BTF would be constructed by excavating the embankment foundations down to suitable material, dewatering, then constructing the embankments of compacted fill to the desired height. • Approximately 3,000,000 cy of fill would be required for the BTF embankments. • The required embankment material would be borrowed from within the limits of the respective forebays. • Dewatering and/or moisture conditioning of the soils would likely be required.
Connections to CVP and SWP Systems		• An approximately 2,000 ft long canal would be constructed to connect the Byron Tract Forebay with the Banks Pumping Plant, with a series of radial gates to isolate facilities. • Another series of radial gates constructed in an opening in the embankment of the Byron Tract Forebay would allow for the control of water flow between the forebay and the approach canal to the Jones Pumping Plant. • The canal would be formed by earth embankments constructed of compacted engineered fill where the canal water surface elevation is generally above existing ground.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• The crests of the embankments would be wide enough to allow for 2 maintenance vehicles traveling in opposite directions to pass each other. • The canal would be designed with 2 ft of concrete-lined freeboard plus 2 ft of unlined freeboard on the water side. • Waterside embankments could include wind and wave erosion control, such as concrete lining, riprap, or lining with articulated concrete mat.
Excavation		• Canal construction would include use of scrapers, excavators, and/or draglines. • Organic and peat soils deemed unsuitable for support of the canal embankments (up to 25 ft deep in some areas), would be removed and disposed of offsite. This full-depth removal could be limited to the area of the embankment foundations. • Liquefiable soils would need to be removed or stabilized as part of the excavation for the canal embankments. Pipeline/Tunnel Alignment • 840 acres, southeast side of Clifton Court Forebay • Excavate, direct haul, and compact: 3,001,687 cy • Excavate and export: 10,621,152 cy East Alignment • 860 acres, southeast side of Clifton Court Forebay, north of the town of Holt West Alignment • 780 acres, northwest side of Clifton Court Forebay • Excavate, direct haul and compact: 4,458,535 cy • Excavate and export: 7,698,075 cy • Import and compact: 634,126 cy
Seepage Control		• Installation of a slurry cutoff wall through the canal embankments would be necessary to control seepage. • Control efforts could include the use of a drainage ditch parallel to the canal, and the installation of pressure relief wells along the drainage ditch to collect subsurface water and direct it into the parallel drainage ditch. • Open channel, gravity flow, and concrete flumes (overchutes) that pass runoff over the canals could be used where canals are built into a hillside. • Overchutes would require piers similar to bridges to support the structure and would span the width of the canals. • Corrugated metal pipe and steel pipe could be used to convey stormwater runoff from adjacent lands over the canals. • A 5 ft deep drainage ditch would be constructed along both sides of the canal where the ground slopes towards a canal on both sides. These ditches would connect to the existing drainage system. • Drainage water could be routed under a canal in a culvert, over a canal in an overchute, or to a collection basin for conveyance to surface waters by gravity or a pump station.
Roads		• Roads on each side of the embankments would provide maintenance access and access to areas intercepted by the canal. • See Table 3C-7, *Access and Work Areas*

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Expanded Clifton Court Forebay (Alternative 4) • For the modified pipeline/tunnel alignment, the existing Clifton Court Forebay (CCF) would be dredged and the forebay would be expanded to the southeast. A new embankment would be constructed to divide CCF into a northern cell (NCCF) and a southern cell (SCCF) of the forebay. In addition, a new embankment would be constructed within the existing CCF embankment (except for the southern embankment where it will be removed) and the area southeast of CCF. SCCF includes the existing southern portion of CCF and the area southeast of CCF. • Additionally, three culvert siphons would be constructed to convey water into the northern cell, between the northern cell and new approach canals to Banks and Jones Pumping Plants, and under Byron Highway and the Southern Pacific Railroad, connecting the new approach canal to the Banks Pumping Plant with the existing approach canal downstream of Skinner Fish Facility. • Construction may require short shut downs of the existing conveyance system to the Banks and Jones Pumping Plants, to add new control structures to the existing pumping plant approach canals and when new approach canals are connected to the existing canals. Water in CCF and Old River would be controlled to prevent blowout of the embankments due to seepage.		
Clearing and Grubbing Dewatering Sheetpile Cell Excavation Embankment Remove Sheetpiles Area Restoration Demobilization	**MP/T:** Feb. Yr. 1–Dec. Yr. 9	• The modified pipeline/tunnel alignment would deliver water near the northwest corner of CCF. Incoming tunnels would transition into a culvert siphon that would run under Italian Slough and rise into vertical shafts into the NCCF inlet structure, which would consist of multi-gated bays providing independent isolation of the vertical shaft of each tunnel. The inlet is planned to be controlled by roller gates to isolate the tunnel during dewatering and tunnel maintenance. • A siphon structure would be situated underneath the existing CCF outlet to a new approach canal. The inlet to the siphon would be located at the southwest corner of NCCF and would daylight to the transition structure of the new approach canal system south of SCCF. • The area designated for the NCCF would be dredged to provide a bottom elevation -5.0 ft except locally at the inlet and outlet connections. The portion of SCCF that lies within the extent of the existing CCF would be dredged to an elevation of approximately -10.0 ft, which would be the bottom elevation of SCCF. Together, approximately 8 million cy of dredged material is expected to be removed from NCCF and SCCF. • The water surface area for NCCF would be approximately 1,220 acres (at an elevation of 7.5 ft), with a normal operating range resulting in approximately 6,070 af of active storage availability. The water surface area for SCCF would be approximately 1,413 acres, with a normal operating range resulting in approximately 26,000 af of active storage availability. • A new section of approach canals, approximately 7,000 ft long, would connect NCCF to the existing approach canal to the Banks Pumping Plant. • The new approach canal would deepen from the forebay bottom elevation to match the depth at the existing approach canal to the Banks Pumping Plant. Two segments of this new canal would be connected by a third siphon, running under Byron Highway and the Southern Pacific Railroad. A radial gate control structure would be installed at the downstream end of this new approach canal to hydraulically isolate the existing SWP facilities from NCCF. • NCCF will also be connected to the existing approach canal to the Jones Pumping Plant by the new section of canal system. A branch off of the new canal section will connect to the existing Jones Pumping Plant approach canal. The invert of this canal would match the invert of the existing Jones Pumping

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		Plant approach canal at the connection point. A radial gate control structure would be installed at the downstream end of the new canal to hydraulically isolate the existing CVP facilities from NCCF. This branch of the new canal would have a capacity of 4,600 cfs matching the capacity of the Jones Pumping Plant. • An emergency spillway located on the east side of NCCF will carry emergency overflow to the Old River. • Additional control structures would be installed within the existing approach canals to provide the ability to isolate NCCF from the Banks approach channel upstream of the Skinner Facility and to isolate NCCF from Old River upstream of the approach canal to the Jones Pumping Plant. The pumping plants themselves can also be isolated from the approach canals. • NCCF and SCCF would be developed by constructing an embankment within the existing CCF embankment and by constructing a divider embankment through the middle of the existing CCF. • The planned embankment crest elevation for the expanded NCCF, SCCF, divider embankment, and approach canals would be +24.5 ft, which includes considerations for SLR. The toe of the new embankment would be set at 25 feet from the toe of the parallel existing embankment or levee. Excavation at the toe of the existing embankment and levees may require the use of tied-back sheet piles, dewatering, and other geotechnical precautions to prevent failures of existing embankments and levees. • The embankment cross-section would consist of engineered fill placed on suitable foundation material at a 4H:1V slope on both the inboard and outboard sides of the embankment. The embankment crest would be 32 ft wide, which consists of a 24-foot-wide, two-way maintenance access road with 4-foot shoulders on each side. In addition, maintenance roads would be provided at the new approach canal, joining the roads at the existing approach canal to the Banks Pumping Plant. • The existing CCF inlet structure would be modified to meet the new embankment elevation and would consist of a reinforced concrete structure with multi-gated bays. • The inside of the new embankment would include riprap slope protection. The riprap would be placed over an appropriate filter layer and would extend from the toe of the embankment to the crest. • New embankments would be constructed by excavating the embankment down to suitable material, dewatering, and installing the slurry cutoff wall. Approximately 9.3 million cy of fill would be required for the modified CCF embankments, which includes the divider embankment separating the NCCF from the SCCF, approach canal embankments, spillway pad, and siphon outlet pad. The required embankment material would be borrowed from within the limits of the respective forebays to the extent feasible, or from borrow sites. • Dewatering and/or moisture conditioning of the soils would likely be required.
Culvert Siphons	**MP/T:** Jun. Yr. 3–Jan. Yr. 9	• The Italian Slough siphon would include 2 box culverts, each of which would be about 30 ft wide by 30 ft high. The length of this siphon would be approximately 1,600 ft. • The South CCF outlet siphon would include 4 box culverts, each of which would be 26 ft wide and 26.5 to 38.5 high. This siphon would include 4 radial gates and would be approximately 1,800 ft long.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• The Byron Highway/Southern Pacific Railroad siphon would include 4 box culverts, each of which would be 26 ft wide and 26.5 to 38.5 high. This siphon would include 4 radial gates and would be approximately 1,300 ft long. • The culvert siphons would be constructed as large multiple-box culvert structures using cofferdams, shoring, and open cut-and-cover construction methods with conventional CIP concrete structures. Cofferdams would be used at Italian Slough and SCCF Outlet siphons, while shoring would be used at the Byron Highway/Southern Pacific Railroad siphon. Once the cofferdam or shoring were in place, cut-and-cover construction methods would be done within the enclosed space. • For Italian Slough, it is assumed that there is a four-month window in the low-water season (August 1 to November 30) for driving steel sheeting to construct a cofferdam, or performing any work activities in the water. Once the cofferdam is completed and the enclosure is in place, work would continue inside the cofferdam for the remainder of the year. It is also assumed that no work can be done on or near the levees during the high water seasons. • It is envisioned that the culvert siphons at Italian Slough and SCCF Outlet would have to be constructed in two phases. In the first phase, a temporary cofferdam would be installed approximately halfway along the length of the siphon. Half of the total length of the culvert siphon would then be constructed. During the second phase, the cofferdam would be re-installed across the other half of the siphon, and the remainder of the structure would be constructed and backfilled.

* Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time. Yr. = Year

Table 3C-4. Head of Old River Barrier

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Head of Old River Barrier (Alternatives 2A, 2B, 2C, 4) • Operable barrier (fish control gate) and boat lock would be located at the divergence of the head of Old River and the San Joaquin River, to prevent migrating and outmigrating salmon from entering Old River from the San Joaquin River. • Other components: fish passage (fishway); control building to house emergency generator, control panels for the control gates, circuit breakers; storage area for operation and maintenance equipment; boat lock operator's building; communications antenna • Gate would have an permanent storage area of 180 ft x 60 ft and operator parking. • Fencing and gates would control access to the structure. • Access road would be improved with 2 miles of private access road, minimum 16 ft wide with gravel surface, beginning at the end of Undine Road and running east to the San Joaquin River levee, then south and west along the levee to the gate site. • A construction staging area of approximately 10,000 square feet would be located on the south side of Old River just outside the levee roads. • A sheetpile retaining wall would be installed in the levee where the gate would be constructed. • Complete gate would require approximately 1,500 cy of concrete. • Approximately 11,000 square feet (450 linear feet) of riprap would be used as slope protection on levees near the gate and on the channel bottom. • Fine materials such as sand would be placed adjacent to the riprap to create a smooth slope from channel bottom to the gate sill.		
Fish control gate	Alternatives 2A, 4: Phase 1 Jan. Yr. 7 Phase 2 Nov. Yr. 7 Phase 3 Dec. Yr. 8 Alternatives 2B, 2C: Phase 1 Jan. Yr. 9 Phase 2 Nov. Yr. 9 Phase 3 Dec. Yr. 10	• Approximately 210 ft long x 30 ft wide, top elevation 15 ft (NJAVD 88). • Seven bottom-hinged gates approximately 125 ft long. Fishway • Vertical slot, self-regulating, with four sets of baffles. • To be designed according to NOAA Fisheries and USFWS guidelines for species including salmon, steelhead, and green sturgeon. • Approximately 40 ft long x 10 ft wide. • Constructed of reinforced concrete. • Stoplogs would be used to close the fishway in spring when not in use to protect it from damage. Operable barrier Two potential gate construction methods. • *Cofferdam:* Creates a dewatered construction area for ease of access and egress. Construction would take place in two phases and in-water work could continue through winter. ○ Phase 1: Construct cofferdam in half the channel, dewater, and construct gates on the dewatered channel bottom and adjacent levee. Remove or cut off cofferdam at required invert depth. Construct cofferdam in second half of the channel. ○ Phase 2: Construct gate in the other half of the channel using same methods, remove or cut off cofferdam, and incorporate into the final gate layout. Construct equipment storage area and remaining fixtures. ○ Cofferdam construction would begin in August and last approximately 35 days. ○ Construction activities in the cofferdam project area would last until

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		approximately early November, and could continue through winter. • *In-the-wet:* Allows the river to flow unimpeded and eliminates the time, material, and cost of constructing a cofferdam. No cofferdam or dewatering, no levee relocation. ○ The channel invert would be excavated to grade using a sealed clamshell excavator working off the levee or from a barge. ○ H-piles would be placed in the channel. ○ Gravel and tremie concrete would be placed for the foundation within the confines of the H-piles. ○ Reinforced concrete structures would then either be floated in or cast in place using prefabricated forms to be placed on top of the gravel, tremie concrete, and H-piles. ○ Divers would complete the final connections between the concrete structures and the piles. ○ All in-water work would occur between August 1 and November 30 to minimize effects on delta smelt and juvenile salmonids. ○ Construction of other components would take place from a barge or from the levee crown and would occur throughout the year.
Boat lock		• 20 ft wide x 70 ft long • Would be constructed using sheetpiles and include two bottom-hinged gates on each end measuring 20 feet wide and 10 feet high. • The invert of the lock would be at elevation –8.0 feet msl, and the top of the lock wall would be at elevation 15 feet.

* Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time. Yr. = Year

Table 3C-5. Alternative 9, Through Delta/Separate Corridors Conveyance

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
THROUGH DELTA/SEPARATE CORRIDORS CONVEYANCE (Alternative 9) • No major new water conveyance corridors would be built under Alternative 9. Water would be conveyed through existing channels and rely on existing levees. • Two water supply corridors and two fish movement corridors would be utilized. • Operable barriers would isolate fish movement corridors and estuary habitat from water conveyance corridors. • It is assumed that dredged material would be disposed of in upland disposal sites and that 0.5% may need to be disposed of in landfill. Approximately 0.1% of spoil that is not dredge material may also need to be disposed of in a landfill. • Total approximate tonnage of solid waste: Landfill disposal 22,901 tons / Upland disposal 201,549 tons. • Upland disposal means that the spoil may not be in contact with surface water, that runoff from the spoil may not enter a surface water body, and/or the spoil may not be placed where soluble metals or other contaminants can leach to groundwater. • Possible specialized disposal for dredged material: 1,008 tons. • Chapter 3, *Description of Alternatives*, Table 3-14, provides a summary of Alternative 9 physical characteristics		
Screened intakes (without pumping plants)		• Two Sacramento River locations, one at the Delta Cross Channel (DCC) entrance, and one at Georgiana Slough • 7,500 cfs diversion capacity at each intake • 2,800 ft long x 15 ft high, fish screens with 1/16 in openings • Would divert water into existing channels • No sedimentation basins or solids lagoons • Each to be constructed in two phases
Delta Cross Channel	First phase: Jul. Yr. 4 Second phase: May Yr. 6	• 2,800-foot-long fish screen intake on Sacramento River, 7,500 cfs capacity. • Possible new replacement intake control structure with gates. Boat access at this location would be eliminated and provided at Georgiana Slough or Meadows Slough. • Landfill disposal: approximately 81 tons
Georgiana Slough	First phase: Jan. Yr. 1 Second phase: Oct. Yr. 2	• 2,800-foot-long fish screen intake on the Sacramento River, 7,500 cfs capacity. • New intake control structure with gates on Slough with a flood flow capacity of 20,600 cfs. • Would require relocating a levee and associated road • Would entail constructing a boat lock and channel to allow continued passage between the slough and Sacramento River. Boat channel landfill disposal: approximately 181 tons • Fish screen intake facility landfill disposal: approximately 580 tons
Diversion pumping plants		• Provide dilution flow into existing channels. • Pumping plant sites include a dewatering sump and discharge piping, flow meter vaults, outfall piping, an electrical and control building, an access road, and transformer. • On San Joaquin River at head of Old River • Three pumps plus one spare at each, 83 cfs capacity per pump / Total 250 cfs capacity per pumping plant • Include automatic self-cleaning trash racks • Sluice gates between intake and pumps • No sedimentation basins or solids lagoons • Constructed on engineered fill

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• On Middle River upstream of Victoria Canal • Includes small intake structures without fish screens
San Joaquin at Old River	Dec. Yr. 1	• Final ground level of approximately 25 ft.
Middle River	Feb. Yr. 3	• Final ground level of approximately 15 ft.
Operable barriers		Operable barriers are included in the Through Delta/Separate Corridors Alternative to minimize fish movement into the Separate Water Supply Corridors; reduce flood potential downstream in DCC and allow floodwaters to continue to pass down Georgiana Slough; and improve water quality. • Barriers used for inlet flow control; fish isolation; irrigation level control; flood control; and boat passage • Type I (Obermeyer gate, full waterway width; used in depths less than 20 ft • Type II (Selected from radial, miter, or wicket gates, full waterway width; used where depths exceed 20 ft) • Type III (Obermeyer gate boat lock with rock wall; used only where gates are required for recreational boat passage and flood neutrality is not an issue) • Each barrier location includes a 15 ft wide by 53 ft long control building. • At barriers with boat locks, the control building would include an operations room on a second floor. • Requires dredging several hundred ft upstream and downstream of gate structures. • Riprap would be installed in dredged areas to control erosion. • Majority of dredge material would be disposed of in upland disposal site; approximately 0.5% may go to offsite landfill. • Type II barriers would be constructed during summer low-flow periods, in two stages. A closed steel sheet pile cofferdam would be constructed across part of the waterway and the enclosed area dewatered for construction of the first half of the barrier. It would then be removed and a new one installed for construction of the second section. • Additional temporary cofferdams upstream and downstream may be required for deeper gate bays. • Type II barrier structures would include reinforced concrete walls, piers, and foundation mats. • Foundation piles would be driven 60–80 ft below foundation level, assuming a 60-ton bearing capacity. • A barge-mounted crane would install rock walls for Type III barriers; these may require a prepared foundation, depending on site conditions.
Mokelumne River System	Jul. Yr. 2 Apr. Yr. 1	• Mokelumne River near Lost Slough: Type I; control gate with boat lock • Meadows Slough near Sacramento River: Type II; flood gate.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
	Oct. Yr. 3	• Solid waste upland disposal (dredging): 16,200 tons • Snodgrass Slough north of Delta Cross Channel: Type I; tidal gate with boat lock
Sacramento River system	Jun. Yr. 1	• Delta Cross Channel: Type II • Georgiana Slough: Type II • Three Mile Slough: Type III. Solid waste upland disposal (dredging): 40,500 tons
South of San Joaquin River	Jul. Yr. 1 Sept. Yr. 2 Apr. Yr. 5 Nov. Yr. 5 Oct. Yr. 5 Feb. Yr. 5 Feb. Yr. 4 Feb. Yr. 3	• San Joaquin River at head of Old River: Type I; flood gate. Solid waste upland disposal (dredging): 9,720 tons • Middle River south of Victoria Canal: Type I; tidal gate. Solid waste upland disposal (dredging): 9,720 tons • Victoria Canal/North Canal: Type III; barrier with boat lock • Woodward Canal/North Victoria Canal: Type III; barrier with boat lock. Solid waste upland disposal (dredging):11,991 tons • Railroad Cut: Type III; barrier with boat lock. Solid waste upland disposal (dredging): 12,4810 tons • Connection Slough: Type III; barrier with boat lock. Solid waste upland disposal (dredging): 19,310 tons • Franks Tract: Type III; barrier with boat lock. Solid waste upland disposal (dredging): 45,375 tons • Fisherman's Cut: Type III; barrier with boat lock. Solid waste upland disposal (dredging): 17,919
Temporary work areas		• Up to 15 acres near each barrier for materials storage, fabrication of concrete forms or gate panels, stockpiles, office trailers, shops and construction equipment maintenance. • See Table 3C-7, *Access and Work Areas*
Channel enlargement		
Victoria Canal dredging	Feb. Yr. 1	• Dredging with side slope of 3H:1V to the average elevation of -25 ft to provide design flow capacity of 15,000 cfs. • Approximate dredging length: 20,000 ft. • Area will increase by approximately 8,100 sq ft. • Solid waste upland disposal: 18,334 tons • Landfill disposal: 9,558 tons
Victoria Canal set back levees	Jul. Yr. 1	• Construct setback levees on south side of Victoria Canal to accommodate the expanded and dredged canal.
Middle River dredging	Jun. Yr. 4	• Dredging with side slope of 3H:1V to the average elevation of -25 ft to provide design flow capacity of 15,000 cfs. • Approximate dredging length: 38,000 ft. • Area will increase by: • Approximately 4,700 sq ft between Mildred Island and Railroad Cut • Approximately 4,300 sq ft between Railroad Cut and Woodward Canal • Approximately 3,200 sq ft Between Woodward Canal and Victoria Canal • Landfill disposal: 9,720 tons
River's End Marina Diversion	Apr. Yr. 3	• Re-channeling to allow access for River's End Marina to Old River. • Approximate dredging length: 1,000 ft. • Install cofferdam or sheet pile wall during construction to prevent flooding.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		• Earthwork required to construct a new access channel and levees. • Landfill disposal: 28 tons
Culvert siphons		
Victoria Canal under Old River	Feb. Yr. 2	• Provides isolation for the San Joaquin Separate Water Supply Corridor under Old River. 15,000 cfs capacity. • Approximately 1,200 ft long • Install cofferdams or sheet pile walls, during construction to prevent flooding. • Construct new reinforced concrete and steel inverted siphon.
Victoria Canal under West Canal	Sept. Yr. 3	• Provides isolation for the South Delta Separate Water Supply Corridor under West Canal. 15,000 cfs capacity. • Approximately 600 ft long • Install cofferdams or sheet pile walls, during construction to prevent flooding. • Construct new reinforced concrete and steel inverted siphon.
Canals and channels		Approximately 1.5 miles combined length of new canals across Coney Island and for CCF intertie with Tracy Fish Collection Facility (Tracy Fish Facility) and Central Valley Project.
Coney Island Canal	Aug. Yr. 1	• 4,000 ft long, crossing Coney Island connecting enlarged and realigned Victoria Canal to CCF, with culvert siphons conveying water under existing West Canal and Old River. • 15,000 cfs capacity. • Landfill disposal (export unsuitable): 993 tons
Clifton Court Forebay intertie canal	Jan. Yr. 5	• 4,000 ft long, connecting CCF to Tracy Fish Facility at DMC intake • Install cofferdams or sheet pile walls at CCF and the approach canal to the Jones Pumping Plant, during construction to prevent flooding. • Earthwork required to construct a new Intertie Canal. • Construct a concrete and steel control gate structure. • Export unsuitable to landfill disposal: 1,728 tons • Excavate and export to landfill disposal: 33 tons
Control gate in DMC approach	Jan. Yr. 4	
Bridges		
Meadow Slough channel connection with Sacramento River		• A bridge would be required to span the gap in the River Road created by the proposed channel connecting the Meadow Slough to Sacramento River.
Mokelumne River channel connection with Lost Slough		• A bridge would be required to span the gap in the levee road created by the proposed channel connecting the Mokelumne River to Lost Slough.
Intertie channel at CCF perimeter road bridge	Sept. Yr. 3	• Proposed Intertie Canal would interrupt this perimeter roadway requiring a bridge.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Intertie channel at Herdlyn Road Bridge	Jan. Yr. 4	• Proposed Intertie Canal would interrupt Herdlyn Road and require a bridge.
Siphon to Clifton Court Forebay	In development	• Requires dredging along Middle River from Mildred Island to Victoria Canal, and along Victoria Canal • Gravity flow into Clifton Court Forebay
Fixed barriers		• In development
New access roads		• Access roads would be maintained along landside levee toe or along levee crest. • See Table 3C-7, *Access and Work Areas*
New utility corridors Temporary Power SMAQMD (12 kv) Temporary Power SJVAPCD (12 kv) Temporary Power BAAQMD (12 kv)	Jan. Yr. 1–Jun. Yr. 1 See Table 3C-18 for additional detail	• Electric power would be required for intakes, pumping plants, operable barriers, boat locks, and gate controls at the intakes and culvert siphons for the Through Delta/Separate Corridors alternative. • The electrical power for each of the various facilities would come from the local utility distribution system. • Where temporary construction power is needed, appropriate temporary facilities would be installed, used during construction, and then removed.
New levee sections Victoria Canal terminal realignment near Old River To the south and to the east of the Tracy Fish Control facility, near River's End Marina	Jul. 1	• Approximately 0.4 miles of new levee would be constructed for Victoria Canal realignment; and approximately 0.7 mile near River's End Marina to protect the new channel fill area as well as the new channels connecting River's End. • Marina to Grant Line Canal. • Construct a 4,000 ft segment of new levee at Old River, isolating Old River from Tracy Fish Facility and connecting CCF to the Tracy Fish Facility. • Majority (99.5%) of dredged material to be disposed of in upland disposal sites; remaining 0.5% may go to an offsite landfill. • Spoils would be disposed of in designated project spoil areas; 0.1% may be disposed of in offsite landfills. • New levees to be constructed around pumping plants and operating equipment for operable barriers. • Levee shape, slope and dimensions similar to those for intake facilities; but height would match that of existing levees in the Delta, between approximately 10 and 15 ft, with corresponding base width of approximately 80 to 260 ft. • Compacted soils would be imported to the site. • Riprap for waterside armoring. • New agricultural channels would need to be constructed where levees cross.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Clifton Court Forebay modifications		• The Through Delta/Separate Corridors Alignment proposes modifying CCF by closing the existing inlet gate structure at the southeast corner and routing Victoria Canal directly into the forebay, isolating Victoria Canal from Old River and isolating Old River from the CVP. • A new Intertie Canal would connect the CVP to CCF. The existing SWP (Skinner) and CVP (Tracy) fish collection facilities would continue in operation in to screen any fish remaining in CCF. • Construction would include installing cofferdams, or sheet pile walls; earthwork for channel enlargement and levees; earthwork for new canal construction; construct concrete or earth embankment for new outlet structure at CCF. • Dredging in CCF near the outlet to support flow capacity of the canal.
Realign Victoria Canal		• Victoria Canal would be realigned starting at approximately 2,000 ft before the confluence with the Old River and redirected approximately 15 to 20 degrees to the south to accommodate an inverted siphon crossing under Old River. • The realigned segment of Victoria Canal would include earthen channel and embankment construction. (See entry at *Canals and channels*)
Clifton Court Forebay intertie canal		• See entry under Canals and channels
Reroute access to River's End Marina and Old River		• Access to River's End Marina would be re-channelized to the south of Hammer Island. • An area between the Tracy Fish Collection Facility and Fabian Tract would be filled and new levees constructed to protect the new channel. Old River would be re-channeled into the west end of the Fabian Tract, east of the existing channel.
* Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time. Yr. = Year		

1 **Table 3C-6. Power Supply and Grid Connections**

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Power supply and grid connections	P/T: Feb. Yr. 1–Mar. Yr. 3 MP/T: Feb. Yr. 1–Feb. Yr. 2 East and West: Jun. Yr. 1–Aug. Yr. 6	• The electrical power for all facilities would be delivered through a 230 kV transmission line, owned by either the utility or the project, which interconnects with a local utility at a new (P/T, MP/T, and East Alignments) or existing (West Alignment) utility substation assumed to be constructed within or adjacent to the utility's existing transmission ROW. For the P/T, East, and West alignments, the 230 kV main substation and a 69 kV main substation would be constructed next to the intermediate pumping plant (IPP), at the flood protection elevation. For the MP/T alignment, the main substation would be constructed southeast of Intake 5. • At the main 230 kV substation, the electrical power would be transformed from 230 kV to 69 kV and delivered to the adjacent main 69 kV substation. • From there, power would be delivered directly to the adjacent IPP (for P/T, East, and West alignments) and over 69 kV subtransmission lines to control structures and 69 kV substations located adjacent to each intake structure. • At the main 69 kV substation and at each intake substation, electrical power would be transformed from 69 kV to the voltage needed for the pumps and auxiliary equipment at the adjacent structures. • Construction generally includes three phases: site preparation, tower/pole construction, and line stringing. These phases would include the use of the following types of equipment: bulldozer, backhoe, crane, line truck, water truck, dump truck, Man 222HD, concrete truck, Man 555 150T, helicopter (MD 500D/E), and other equipment. • New transmission lines would generally follow conveyance alignments and be constructed within the project ROW. • Construction of 230 kV and 69 kV lines would require a corridor width of 100 ft, and 100 ft on one side and 50 ft on the other side at each tower pole. • Construction would also require an area of 350 ft along the corridor at conductor pulling locations at every 2 miles of line or turns greater than 15 degrees. • Construction of separate 12 kV lines would require a corridor of 25 to 40 ft, with 25 ft in each direction at each pole. • Construction would also require 200 ft along the corridor and a 50-ft wide area at conductor pulling locations at every 2 miles of line or turns greater than 15 degrees. • The work area for a pole-mounted 12 kV/480 volt transformer would only be that normally used by a utility to service the pole (about 20 ft by 30 ft adjacent to the pole). • The work area for a pad-mounted transformer would be approximately 20 ft by 30 ft adjacent to the pad. • Transmission lines from the 69 kV substation would be strung on wood power poles approximately 40 ft tall. • The modified pipeline/tunnel alignment includes one segment of 34.5 kV subtransmission lines. It was assumed that construction of poles and lines for this segment would be similar to the specifications provided for the 69 kV lines, above.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions			
		Intermediate pumping plant substation footprint Intake pumping plant 69 kV substation footprint	Pipeline/tunnel and modified pipeline/tunnel alignments 230 kV: 260 x 44 ft 69 kV: 270 x 310 ft Approx. 270 x 270 ft. At the main 69 kV substation and at each of the intake substations, electrical power would be transformed from 69 kV to the voltage needed for the pumps and auxiliary equipment at the adjacent structures.	East Alignment 270 x 360 ft Approx. 270 x 270 ft. The new overhead 69 kV subtransmission lines would follow the canal alignment (within the project ROW), looping into each of the terminate at intake substations located adjacent to each of the other intake structures. At the main 69 kV substation and at each of the intake substations, electrical power is transformed from 69 kV to the voltage needed for the pumps and auxiliary equipment at the adjacent structures. To supply power for communications, monitoring, and control of the gates at the tunnel and siphon entrances along the canal, 12 kV distribution lines are extended south from the main 69 kV substation, and north and south from the intermediate pumping plant substation. Wherever possible, this 12 kV line is constructed on the same poles as the 69 kV subtransmission line.	West Alignment 360 x 700 ft combined Approx. 270 x 270 ft. The new overhead 69 kV subtransmission line would follow the canal ROW north and east to an intake substation adjacent to the southern-most intake structure. The 69 kV line would then follow the canal north, looping into to each of the other intake substations and terminating at the northern-most intake substation. At the main 69 kV substation and each of the intake substations, electrical power would be transformed from 69 kV to the voltage needed for the pumps and auxiliary equipment at the adjacent structures. Power for control of the gates at the tunnel and siphon entrances on the northern portion of the canal would be supplied from 12 kV distribution lines extending north along the canal from the IPP, and west along the canal from the southern-most intake substation. Wherever possible, this 12 kV line would be constructed on the same poles as the 69 kV subtransmission line. If power is needed for gate control along the south canal portion of this alignment, it would be served by the local utility from a local distribution line.

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1 **Table 3C-7. Borrow, Spoils and Reusable Tunnel Material Storage**

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
BORROW/SPOILS/RESUABLE TUNNEL MATERIAL (RTM) STORAGE • Final locations for storage of spoils, RTM, and dredged material would be selected based on the guidelines presented in Appendix 3B, *Environmental Commitments*. • Conventional earthmoving equipment, such as bulldozers and graders, would be used to place the spoil. Some spoil, with the exception of RTM, may be placed on the landside toes of canal embankments and/or setback levees. • This may require temporary placement of the soil in borrow pits or temporary spoil laydown areas pending completion of embankment or levee construction. Borrow pits created for this project would be the preferred spoil location. • In the event that limited dewatering is required to excavate a borrow pit, construction shall be timed to allow placement of spoil in the borrow excavation to prevent the creation of new wetlands, if appropriate.		
Pipeline/ Tunnel Alignment (Alternatives 1A, 2A, 3, 4, 5, 6A, 7, 8)		• A total of approximately 1,595 acres would be allocated to RTM storage for the pipeline/tunnel. • Designated RTM storage areas would range in size from approximately 100 to 570 acres. • The estimated volume of RTM to be disposed from the tunnels and shafts is approximately 25,000,000 cy. • RTM that may be have potential for re-use, such as levee reinforcement, embankment or fill construction, would be stockpiled. The process for testing and reuse of this material is described further in Chapter 3 and Appendix 3B. • A berm of compacted imported soil would be built around the perimeter of the RTM storage area to ensure containment. Berm would conform to U.S. Army Corps of Engineers guidelines for levee design and construction. • It was assumed that RTM would be stacked to a depth of 10 ft. • Maximum capacity of RTM storage ponds would be less than 50 af. • RTM areas may be subdivided by a grid of interior earthen berms in RTM ponds for dewatering. • Dewatering would involve evaporation and a drainage blanket of 2 ft-thick pea gravel or similar material placed over an impervious liner. • Leachate would drain from ponds to a leachate collection system, then pumped to leachate ponds for possible additional treatment. • Transfer of RTM solids to disposal areas may be handled by conveyor, wheeled haul equipment, or barges, at the contractor's discretion. • The invert of RTM ponds would be a minimum of 5 ft above seasonal high groundwater table • An impervious liner would be placed on the invert and along interior slopes of berms, to prevent groundwater contamination. • RTM would not be compacted. • Spoil placed in disposal areas would be placed in 12-inch lifts, with nominal compaction. • A total of approximately 1,220 acres would be allocated to borrow acquisition and/or spoil deposition. • The maximum height for placement of spoil is expected to be 12 ft above preconstruction grade and have side slopes of 5H:1V or flatter. • After final grading of spoil is complete, the area would be restored based on site-specific conditions following project restoration guidelines.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
Modified Pipeline/ Tunnel Alignment (Alternative 4)		• A total of approximately 3,500 acres would be allocated to RTM storage and dredged material for the modified pipeline/tunnel alignment. • Designated RTM storage areas would range in size from approximately 25 to 1,060 acres. • The estimated volume of RTM to be disposed from the tunnels and shafts is approximately 24,350,000 cy. • RTM that may be have potential for re-use, such as levee reinforcement, embankment or fill construction, would be stockpiled. The process for testing and reuse of this material is described further in Chapter 3 and Appendix 3B. • A berm of compacted imported soil would be built around the perimeter of the RTM storage area to ensure containment. Berm would conform to U.S. Army Corps of Engineers guidelines for levee design and construction. • It was assumed that RTM would be stacked to a depth of 6 ft (10 ft for the areas for the storage of RTM and dredged material near CCF). During future stages of engineering, it may be determined that it is preferable to store RTM at a height of 10 feet, as was assumed for alternatives under the pipeline/tunnel alignment. Using this assumption, approximately 1,800 acres would be required for the storage of RTM and dredged material under the modified pipeline/tunnel alignment. • Maximum capacity of RTM storage ponds would be less than 50 af. • RTM areas may be subdivided by a grid of interior earthen berms in RTM ponds for dewatering. • Dewatering would involve evaporation and a drainage blanket of 2 ft-thick pea gravel or similar material placed over an impervious liner. • Leachate would drain from ponds to a leachate collection system, then pumped to leachate ponds for possible additional treatment. • Transfer of RTM solids to disposal areas may be handled by conveyor, wheeled haul equipment, or barges, at the contractor's discretion. Two conveyors were assumed to be used under this alignment: one going east from the intermediate forebay and stretching approximately 3,000 ft to an RTM area and another stretching approximately 18,600 ft from a main construction shaft on northern Staten Island to an RTM area on southern Staten Island. • Where feasible, the invert of RTM ponds would be a minimum of 5 ft above seasonal high groundwater table. • An impervious liner would be placed on the invert and along interior slopes of berms, to prevent groundwater contamination. • RTM would not be compacted. • Spoil placed in disposal areas would be placed in 12-inch lifts, with nominal compaction. • A total of approximately 200 acres would be allocated to borrow acquisition and/or spoil deposition independent from areas allocated for other project features, such as the SCCF and RTM storage areas (for example, the expanded area for CCF and RTM areas may be used as borrow sites prior to being used for other project purposes). • The maximum height for placement of spoil is expected to be 6 ft above preconstruction grade (10 ft above preconstruction grade for sites adjacent to CCF),and have side slopes of 5H:1V or flatter. • After final grading of spoil is complete, the area would be restored based on site-specific conditions following project restoration guidelines.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
East Alignment (Alternatives 1B, 2B, 6B)	Mar. Yr. 2– Dec. Yr. 4	• A total of approximately 440 acres would be allocated to RTM storage. The East Alignment can be divided into four distinct reaches for the purpose of identifying spoil areas. • For the northern reach, extending from the Pierson Tract to the Mokelumne River, it is anticipated that construction would consist of nearly balanced cut and fill. Minimal amounts of spoil would be generated and there is adequate room to dispose of spoils along the landside toe of the eastern canal embankment. • The north-central reach extends from the Mokelumne River south to White Slough. Minimal amounts of spoil would be generated and there is adequate room to dispose of spoils along the landside toe of the eastern canal embankment. • The south-central reach extends from White Slough to the San Joaquin River. A substantial quantity of spoil material would likely be generated during construction of this reach. Disposal of this soil material can be in areas immediately adjacent to the canal embankments, in addition to being placed on the landside toe of the canal embankments. Spoil would consist of organic soils, which would be placed on top of in situ organic soils; • The southern reach extends from the San Joaquin River to the CCF. A substantial quantity of spoil material would likely be generated during construction of this reach. Disposal of this soil material can be in areas immediately adjacent to the canal embankments, in addition to being placed on the landside toe of the canal embankments. Spoil would consist of organic soils, which would be placed on top of in situ organic soils. • If borrow material is sourced from one of the large contiguous borrow areas outside the project area, all spoil material may be disposed of in the off-site borrow area. • A total of approximately 10,830 acres would be allocated to borrow acquisition and/or spoil deposition.
West Alignment (Alternatives 1C, 2C, 6C)	Schedule assumed to be the same as East alignments	• A total of approximately 920 acres would be allocated to RTM storage. • RTM would not be compacted. The ICF West Option can be divided into three distinct reaches for the purpose of identifying borrow and spoil areas. • The northern segment (Reaches 1 through 4) extends from the Lisbon District in the north to the tunnel portal near Cache Slough. It is anticipated that construction of this portion would consist of nearly balanced cut and fill. Amounts of spoil would be generated and disposed of along the landside toe of the eastern canal embankment. Spoil material generated should not be placed along the landside toe of the canal embankment in the area between the canal and the Sacramento Deep Water Ship Channel. • Along the tunnel reach, substantial quantities of RTM would be generated during tunnel construction. When extracted, this material would contain fine-grained soil mixed with biodegradable polymers and have the consistency of a thick paste. Over time, the moisture content of the material would decrease and the polymers would break down, leaving workable soil as the end product. This process may take several years to complete, but farming of this material would accelerate the process. • Temporary spoil laydown areas near the tunnel and shaft portals may be used to store and possibly treat this material. Once treatment is complete, the spoil

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		material, if suitable, can be spread over local agricultural land. If not suitable for this application, the spoil can be disposed of along the landside toe of canal embankments of both the north and south segments of the West Alignment and in borrow pits along the southern segment of the alignment. • Spoil generated during construction of the southern segment may be disposed of in borrow pits and along the landside toe of the canal embankment. • If borrow material is sourced from one of the large contiguous borrow areas outside the project area, all spoil material may be disposed of in the offsite borrow area. • Spoil placed in disposal areas would be placed in 12-inch lifts, with nominal compaction. • The maximum height for placement of spoil is expected to be 12 ft above preconstruction grade and have side slopes of 5H:1V or flatter. • After final grading of spoil is complete, the area would be restored based on site-specific conditions following project restoration guidelines. • A total of approximately 6,770 acres would be allocated to borrow acquisition and/or spoil deposition.
Through Delta/ Separate Corridors (Alternative 9)		• A total of approximately 2,050 acres would be allocated to borrow acquisition and/or spoil deposition.

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Table 3C-8. Access and Construction Work Areas

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions	
General construction work areas		Work areas during construction may include areas for construction equipment and worker parking, field offices, a warehouse, maintenance shops, equipment and materials laydown and storage, RTM spoils areas, and stockpiles. Materials to be stockpiled may include: • Strippings from various excavations for possible reuse in landscaping. • RTM that is slated for reuse after treatment for embankment or fill construction. RTM areas may be temporary or permanent. • Peat spoils for possible use on agricultural land, as safety berms on the landside of haul roads, or as toe berms on the landside of embankments (cannot be part of the structural section). • Other materials being stockpiled on a temporary basis prior to hauling to permanent stockpile areas. • Borrow and spoils areas may be temporary or permanent.	Other temporary work areas not specified at left include those associated with the construction of canals, control structures, forebays, intakes, levees, operable barriers, pipelines, pumping plants, safe haven zones, siphons, and tunnels. Areas would also be dedicated to temporary transmission lines. Alternatives using the East and West alignments would also include Railroad Work Areas and the Through Delta/Separate Corridors alignment would include a work area for channel enlargement activities. The modified pipeline/tunnel alignment includes an area for forebay dredging (approximately 2,030 acres). The physical extent of these areas would vary by conveyance alignment and by number of intake facilities constructed. • Pipeline/Tunnel Alignment: between 670 (Alternative 5) and 1,750 acres (Alternative 2A with Intakes 6 and 7). • Modified Pipeline/Tunnel Alignment: approximately 3,470 acres. • East Alignment: between 2,120 (Alternatives 1B and 6B) and 2,680 acres (Alternative 2B with Intakes 6 and 7). • West Alignment approximately 3,190 acres. • Through Delta/Separate Corridors: approximately 1,370 acres.
Roads		• Wet weather (asphalt paved) • Dry weather roads (minimum 12 inch thick gravel or asphalt paved) for construction activities restricted to dry season • Dust abatement would be addressed in all construction areas at all times. • All-weather roads (asphalt paved) would be required for year-round construction at all facilities, including concrete and steel structures, tunnel portals, tunnel shafts, pumping plants and intakes,	The physical extent of these areas (includes Bridge Work Areas, Highway Work Areas, Road Work Areas, and Temporary Access Road Work Areas) would depend on the conveyance alignment. Additionally, some road work areas are subsumed within the construction footprints associated with other features (i.e., Intakes, Safe Haven Work Areas, etc.). Pipeline/Tunnel Alignment: • Approximately 10 acres. • From launching/retrieving shafts to

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions	
		and for access to delivery areas and permanent RTM spoil piles. • Permanent paved access road is anticipated along the conveyance pipeline for the canal primary and secondary access road. • Asphalt-paved wet weather temporary access road to provide construction access to the conveyance pipe construction between the canal and the intake facility. • Asphalt-paved temporary access ramps to connect existing public and private roads to construction sites would be constructed to connect to the existing roadways at the existing grade. • Asphalt-paved permanent access ramps would be constructed to the elevated roadways at the final grades. • Heavy construction equipment, such as diesel-powered dozers, excavators, rollers, dump trucks, fuel trucks, and water trucks would be used during excavation, grading, and construction of access/haul roads.	public road. • From each ventilation shaft to public road. • Access roads between shafts. Modified Pipeline/Tunnel Alignment: • Approximately 65 acres. • Around intake work areas. • From public roads to shaft locations or safe haven areas. • From barge unloading facilities to shaft locations. • From launching shafts to RTM areas. East Alignment: • Approximately 270 acres. • From intake pumping plants to the Sacramento River levee • 24 ft wide • Excavated alluvial mineral soils may be used, additional material may have to be imported onsite West Alignment: • Approximately 350 acres. • Connecting the facilities between the intake conveyance pipelines and the proposed Byron Tract Forebay, except the tunnel section from south of State Route 220 to north of Contra Costa Canal. Through Delta/Separate Corridors: • Approximately 100 acres.
Detour roads	**P/T:** Apr. Yr. 2–Feb. Yr. 3 **East:** Apr. Yr. 2–May Yr. 3	• *Intakes:* Detour roads needed for all intakes, for traffic circulation around the work areas. It is expected that earthen ramps would be required to realign the roadways from levee crown to landside ground elevation. • Roadway detours would likely be needed around each intake's construction zone (including intake pumping plant construction area) to provide site security and safety.	• It is expected that earthen ramps would be required to realign the roadways from levee crown to landside ground elevation. • Import and compact 971,500 cy • Under the modified pipeline/tunnel alignment, Byron Highway would need to be temporarily rerouted in order to construct the siphon connecting the new approach canal with an existing approach canal.
Temporary and new access/haul roads	See Tables 3C-8 to 3C-18 for schedule detail	Temporary • Access roads would be constructed from each intake pumping plant to the Sacramento River levee. • 24-foot-wide	Permanent • Intake site perimeter access road (approximately 24 ft wide x 2,500 ft long). • Intermediate pumping plant

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions	
		• Excavated alluvial mineral soils may be used, though additional material may have to be imported onsite.	(during operation): The canal primary access road is proposed to be 24 ft wide paved with asphaltic concrete and the secondary access road is proposed to be 20 ft wide with a 12 ft wide gravel section.
Parking		• See Table 3C-1	
Temporary barge unloading facility construction and removal	To the extent possible, all in-water construction activities would occur between June 1 and October 31	• May be located at each of the five intake structure worksites, tunnel worksites, and culvert siphon worksites, to be used for the delivery and removal of construction materials and equipment. • Barges would be required to use existing barge landings where possible and maintain minimum waterway width greater than 100 ft (assuming maximum barge width of 50 ft). • Under the modified pipeline/tunnel alignment, it is assumed that barge activities would take place on levees using a ramp barge in conjunction with a crane/excavator barge or a crane or excavator positioned on or near the levee. • The physical extent of these areas would depend on the conveyance alignment: • Pipeline/Tunnel Alignment: approximately 180 acres. • Modified Pipeline/Tunnel Alignment: approximately 40 acres. • East Alignment: approximately 30 acres. • West Alignment: approximately 70 acres. • Through Delta/Separate Corridors: approximately 70 acres. • Approximately 300 ft by 50 ft, pile-supported dock to provide construction access and construction equipment to portal sites. • 24 inch steel piles placed approximately every 25 ft under the dock for a total of 36 piles. • Impact pile driving may take up to	• Potential locations depend on the alternative. • SR 160 west of Walnut Grove (Alternatives 1A, 2A, 3, 5, 6A, 7, and 8) • Venice Island (Alternatives 1A, 2A, 3, 5, 6A, 7, and 8) • Bacon Island (Alternatives 1A, 2A, 3, 4, 5, 6A, 7, 8, and 9) • Woodward Island (Alternatives 1A, 2A, 3, 5, 6A, 7, and 8. Two barge facilities would be constructed at this location under Alternative 9) • Victoria Island (Alternatives 1A, 2A, 3, 4, 5, 6A, 7, 8, and 9) • Tyler Island (Alternatives 1A, 2A, 3, 5, 6A, 7, and 8) • Hog Island (Alternatives 1B, 2B, and 6B) • Ryer Island (Alternatives 1C, 2C, and 6C) • Brannan Island (Alternatives 1C, 2C, and 6C) • Byron Tract on Italian Slough (Alternative 4) • Bouldin Island on San Joaquin River (Alternative 4) • Staten Island on South Mokelumne River (Alternative 4) • Webb Tract (two barge facilities would be constructed on Webb Tract under Alternative 9—one at the northwest corner, and one on the eastern side) • Upper Jones Tract (Alternative 9) • Floating docks approximately 250 ft by 50 ft may be utilized in two locations, and would not require permanent piles.

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions
		an average of 700 strikes per pile, depending on hammer type and subsurface conditions. • A pier would be built within the worksite footprint of the intake or tunnel and removed at the end of construction. • Facility would be in use during the entire construction period at each location, 5 to 6 years. • Barges could be used for pile-driving rigs and barge-mounted cranes, suction dredging equipment, and microtunnel drives from the in-river cofferdam, transporting RTM, crushed rock and aggregate, pipeline sections, etc., post-construction underwater debris removal, and other activities. • Access roads to construction work areas would be necessary.
Concrete plants and precast segment plants		• Due to the large amount of concrete required for construction and the schedule demands of the program, it is anticipated that the contractor(s) would set up their own concrete plant at the job sites. Concrete plants are likely to range from 2 to 40 acres. • While it is anticipated that precast tunnel segments would be purchased and transported from existing plants, it is possible that one or more temporary plants would be constructed. If constructed, these would be located adjacent to concrete plants. • It is likely that each precast segment plant would require approximately 10 acres for offices, concrete plant, materials storage, and casting facilities. • Additional acreage for segment storage would be needed at the precast segment plant site, and could run several times the space required for the plant. • The segments can be transported by barge, rail, or truck where these modes of transport are available; however, it is most likely that trucking of segments would be required. **Pipeline/Tunnel Alignment** • Five concrete plant plants in the southern part of Sacramento County. Size of this batching plant could be from 5 to 10 acres. • Up to six precast segment plants: Two in the southern part of Sacramento County, one in the **East Alignment** • Four concrete plant in the southern part of Sacramento County and another plant in the northern part of San Joaquin County. Size of these batching plants could be from 5 to 10 acres. • One precast segment plant in the **West Alignment** • Approximately five concrete plants: Two in the southern part of Yolo County, one in the northern part of Solano County and another in the southern part of San Joaquin County. Size of these batching plants could be from 5 to 10 acres. • Approximately three

Construction Element/ Activity	Activity Timing* (Start dates)	Key Construction Information or Assumptions		
		northern part of San Joaquin County, two in the middle part of San Joaquin County, and another in the southern part of San Joaquin County. **Modified Pipeline/ Tunnel Alignment** • Four concrete batch plants: one within the work area identified for Intake 2, one within the work area identified for Intake 5, one near Twin Cities Road and Interstate 5, and one between Byron Highway and Italian Slough.	southern part of San Joaquin County to produce tunnel segments and supply concrete for other planned structures.	precast segment plants: One in the southern part of Sacramento County, one in the southern part of Solano County and another plant in the northern part of Contra Costa County to produce tunnel segments and supply concrete for other planned structures.
Fuel stations		Would be constructed adjacent to concrete plants and occupy approximately 2 acres.		
* Activity Timing provides an estimate for planning purposes only, and should not be considered certain at this time. Yr. = Year				

Detailed Construction Tables

The following detailed construction tables are identical to those in Appendix 22B and are reproduced here for the reader's convenience. They have been re-numbered for this appendix.

The "Days" column represents total work days, which are not necessarily consecutive.

Table 3C-9. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Intakes Construction Schedule

	Intake 1			Intake 2			Intake 3			Intake 4			Intake 5		
Phase	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days
Clear & Grub/Demolition	March	Year 2	1.00	December	Year 2	1.00	October	Year 2	1.00	January	Year 3	1.00	November	Year 2	1.00
Construct Detour Road															
Dewater	April	Year 2	6.00	January	Year 3	6.00	November	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00
Overexc/Recompact	April	Year 2	6.00	January	Year 3	6.00	November	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00
Import/Place Fill	April	Year 2	6.00	January	Year 3	6.00	November	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00
Base & Paving	April	Year 2	6.00	January	Year 3	6.00	November	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00
Stripe & Sign	April	Year 2	1.00	January	Year 3	1.00	November	Year 2	1.00	February	Year 3	1.00	December	Year 2	1.00
Const B/U Levee/Widen Levee Top Access															
Dewater	April	Year 2	6.00	January	Year 53	6.00	November	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00
Overexc/Recompact	April	Year 2	6.00	January	Year 3	6.00	November	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00
Import & Place Fill	May	Year 2	6.00	February	Year 3	6.00	December	Year 2	6.00	March	Year 3	6.00	January	Year 3	6.00
Asphalt Concrete F/Road	June	Year 2	6.00	March	Year 3	6.00	January	Year 3	6.00	April	Year 3	6.00	February	Year 3	6.00
Stripe & Sign	June	Year 2	1.00	March	Year 3	1.00	January	Year 3	1.00	April	Year 3	1.00	February	Year 3	1.00
Construct Sheetpile Cofferdam[1]															
Install & Remove Sheet Piles															
Drive Sheet Piles, PZ40	June	Year 3	50.67	August	Year 3	50.67	May	Year 3	50.67	September	Year 3	50.67	July	Year 3	50.67
Cutoff & Remove Sheetpiles	July	Year 3	12.67	September	Year 3	12.67	June	Year 3	12.67	October	Year 3	12.67	August	Year 3	12.67
Install & Remove Wales & Struts															
Install Wales & Struts	June	Year 3	5.42	August	Year 3	5.42	May	Year 3	5.42	September	Year 3	5.42	July	Year 3	5.42
Cutoff & Remove Sheetpiles	June	Year 3	1.45	August	Year 3	1.45	May	Year 3	1.45	September	Year 3	1.45	July	Year 3	1.45
Excavate Cell															
Clamshell Excavation	May	Year 4	37.17	August	Year 4	37.17	June	Year 4	37.17	August	Year 4	37.17	June	Year 4	37.17
Unload Barge & Export	June	Year 4	14.30	September	Year 4	14.30	July	Year 4	14.30	September	Year 4	14.30	July	Year 4	14.30
Drive Foundation Piles															
Provide Piles															
Purchase Piles, 24" X 90'	June	Year 4	16.88	August	Year 4	16.88	June	Year 4	16.88	September	Year 4	16.88	July	Year 4	16.88
Weld Bottom Closure & Joint	June	Year 4	33.75	August	Year 4	33.75	June	Year 4	33.75	September	Year 4	33.75	July	Year 4	33.75
Drive Piles															
Drive Foundation Piles	July	Year 4	45.00	September	Year 4	45.00	July	Year 4	45.00	October	Year 4	45.00	August	Year 4	45.00
Place Tremie Plug															
Unwater Cell	September	Year 4	2.00	October	Year 4	2.00	August	Year 4	2.00	November	Year 4	2.00	September	Year 4	2.00
Place Concrete	September	Year 4	6.18	October	Year 4	6.18	August	Year 4	6.18	November	Year 4	6.18	September	Year 4	6.18
Microtunnel Intake Conduits															
Set Pipe forms & Bulkhead	October	Year 4	15.00	January	Year 5	15.00	December	Year 4	15.00	January	Year 5	15.00	November	Year 4	15.00
Equip Intake for Jacking	November	Year 4	7.00	February	Year 5	7.00	January	Year 5	7.00	February	Year 5	7.00	December	Year 4	7.00
Set TBM & Jacking Frame	December	Year 4	36.00	March	Year 5	36.00	February	Year 5	36.00	March	Year 5	36.00	January	Year 5	36.00

[1] It is assumed that all in-water construction activities will occur between June 1 and October 31.

	Intake 1			Intake 2			Intake 3			Intake 4			Intake 5		
Phase	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days
Jack Pipe Inplace	April	Year 5	120.00	July	Year 5	120.00	August	Year 5	120.00	September	Year 5	120.00	May	Year 5	120.00
Remove TBM & Haul to Pier	April	Year 5	15.00	July	Year 5	15.00	August	Year 5	15.00	September	Year 5	15.00	May	Year 5	15.00
Grouting															
Pump Anular Grout	May	Year 5	24.00	August	Year 5	24.00	September	Year 5	24.00	October	Year 5	24.00	June	Year 5	24.00
Clean Pipe	June	Year 5	12.00	August	Year 5	12.00	September	Year 5	12.00	October	Year 5	12.00	July	Year 5	12.00
Muck Disposal															
Muck Disposal	June	Year 5	82.00	September	Year 5	82.00	October	Year 5	82.00	November	Year 5	82.00	August	Year 5	82.00
Place Concrete Hopper															
Place Concrete															
Plant & Operations	April	Year 5	101.28	May	Year 5	101.28	April	Year 5	101.28	June	Year 5	101.28	April	Year 5	101.28
Placing Crew	April	Year 5	57.78	May	Year 5	57.78	April	Year 5	57.78	June	Year 5	57.78	April	Year 5	57.78
Point & Patch	May	Year 5	6.16	June	Year 5	6.16	May	Year 5	6.16	July	Year 5	6.16	May	Year 5	6.16
Treat CJ	June	Year 5	59.88	July	Year 5	59.88	June	Year 5	59.88	August	Year 5	59.88	June	Year 5	59.88
Cure & Cleanup	July	Year 5	16.90	August	Year 5	16.90	July	Year 5	16.90	September	Year 5	16.90	July	Year 5	16.90
Formwork	July	Year 5	92.18	August	Year 5	92.18	July	Year 5	92.18	September	Year 5	92.18	July	Year 5	92.18
Construct Walls & Deck															
Outside Walls Concrete															
Plant & Operations	June	Year 5	15.45	August	Year 5	15.45	July	Year 5	15.45	September	Year 5	15.45	July	Year 5	15.45
Placing Crew	June	Year 5	7.05	August	Year 5	7.05	July	Year 5	7.05	September	Year 5	7.05	July	Year 5	7.05
Point & Patch	June	Year 5	28.38	August	Year 5	28.38	July	Year 5	28.38	September	Year 5	28.38	July	Year 5	28.38
Treat CJ	July	Year 5	7.89	August	Year 5	7.89	August	Year 5	7.89	October	Year 5	7.89	August	Year 5	7.89
Cure & Cleanup	July	Year 5	33.12	August	Year 5	33.12	August	Year 5	33.12	October	Year 5	33.12	August	Year 5	33.12
Formwork	August	Year 5	132.38	October	Year 5	132.38	September	Year 5	132.38	November	Year 5	132.38	September	Year 5	132.38
Falsework Up/Down For Roof	January	Year 6	42.25	March	Year 6	42.25	February	Year 6	42.25	April	Year 6	42.25	February	Year 6	42.25
Slab Concrete															
Plant & Operations	June	Year 5	4.27	August	Year 5	4.27	July	Year 5	4.27	September	Year 5	4.27	July	Year 5	4.27
Placing Crew	June	Year 5	1.30	August	Year 5	1.30	July	Year 5	1.30	September	Year 5	1.30	July	Year 5	1.30
Finish	June	Year 5	5.84	August	Year 5	5.84	July	Year 5	5.84	September	Year 5	5.84	July	Year 5	5.84
Point & Patch	June	Year 5	7.15	August	Year 5	7.15	July	Year 5	7.15	September	Year 5	7.15	July	Year 5	7.15
Treat CJ	June	Year 5	1.27	August	Year 5	1.27	July	Year 5	1.27	September	Year 5	1.27	July	Year 5	1.27
Cure & Cleanup	June	Year 5	6.95	August	Year 5	6.95	July	Year 5	6.95	September	Year 5	6.95	July	Year 5	6.95
Formwork	June	Year 5	37.25	August	Year 5	37.25	July	Year 5	37.25	September	Year 5	37.25	July	Year 5	37.25
Bridge	October	Year 5	60.00	November	Year 5	60.00	October	Year 5	60.00	January	Year 5	60.00	November	Year 5	60.00
Rip Rap															
Place Rip Rap	June	Year 6	5.83	August	Year 86	5.83	June	Year 6	5.83	September	Year 6	5.83	July	Year 6	5.83
Place Bedding Material	June	Year 6	1.25	August	Year 6	1.25	June	Year 6	1.25	September	Year 6	1.25	July	Year 6	1.25
Place Fabric	June	Year 6	2.83	August	Year 6	2.83	June	Year 6	2.83	September	Year 6	2.83	July	Year 6	2.83
Barge Unloading Facility															
Construct Barge Unloading Facility	October	Year 5	21.00	November	Year 5	21.00	October	Year 5	21.00	January	Year 5	21.00	November	Year 5	21.00
Remove Barge Unloading Facility	August	Year 6	21.00	September	Year 6	21.00	August	Year 6	21.00	October	Year 6	21.00	August	Year 6	21.00
Cleanup, Demobe	August	Year 68	5.00	September	Year 6	5.00	August	Year 6	5.00	October	Year 6	5.00	August	Year 6	5.00

Table 3C-10. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Pumping Plants Construction Schedule

	Pumping Plant 1			Pumping Plant 2			Pumping Plant 3			Pumping Plant 4			Pumping Plant 5		
Phase	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days
Clearing/Grubbing															
Clearing/Grubbing	September	Year 2	5.00	January	Year 3	5.00	October	Year 2	5.00	January	Year 3	5.00	October	Year 2	5.00
Dewatering	September	Year 4	434.00	January	Year 3	434.00	October	Year 2	434.00	January	Year 3	434.00	October	Year 2	434.00
Excavation & Backfill															
Excavation & Haul to Waste	October	Year 2	82.53	January	Year 3	82.53	November	Year 2	82.53	February	Year 3	82.53	November	Year 2	82.53
Excavation & Stockpile	February	Year 4	44.37	April	Year 4	44.37	March	Year 4	44.37	June	Year 4	44.37	February	Year 4	44.37
Place Stockpiled Material as Backfill	February	Year 4	28.26	April	Year 4	28.26	March	Year 4	28.26	June	Year 4	28.26	February	Year 4	28.26
Import & Place Material	February	Year 4	190.14	April	Year 4	190.14	March	Year 4	190.14	June	Year 4	190.14	February	Year 4	190.14
Sedimentation Basin															
Place Gavel Bedding	August	Year 2	5.20	January	Year 3	5.20	November	Year 2	5.20	February	Year 3	5.20	November	Year 2	5.20
Drive Foundation Piles	December	Year 2	118.00	March	Year 3	118.00	February	Year 3	118.00	March	Year 3	118.00	February	Year 3	118.00
Place Concrete Fill in Piles	April	Year 3	42.46	October	Year 3	42.46	March	Year 3	42.46	October	Year 3	42.46	September	Year 3	42.46
Sedimentation SOG & Solids Lagoons															
Plant & Operations	April	Year 3	66.41	October	Year 3	66.41	March	Year 3	66.41	October	Year 3	66.41	September	Year 3	66.41
Placing Crews	April	Year 3	26.20	October	Year 3	26.20	March	Year 3	26.20	October	Year 3	26.20	September	Year 3	26.20
Point & Patch	April	Year 3	5.97	October	Year 3	5.97	March	Year 3	5.97	October	Year 3	5.97	September	Year 3	5.97
Treat CJ	May	Year 3	10.75	November	Year 3	10.75	April	Year 3	10.75	November	Year 3	10.75	October	Year 3	10.75
Cure & Cleanup	May	Year 3	115.00	November	Year 3	115.00	April	Year 3	115.00	November	Year 3	115.00	October	Year 3	115.00
Formwork	August	Year 3	37.37	February	Year 4	37.37	July	Year 3	37.37	February	Year 4	37.37	January	Year 4	37.37
Sedimentation Wall Concrete															
Plant & Operations	January	Year 4	140.00	May	Year 4	140.00	March	Year 4	140.00	May	Year 4	140.00	April	Year 4	140.00
Placing Crews	January	Year 4	27.41	May	Year 4	27.41	March	Year 4	27.41	May	Year 4	27.41	April	Year 4	27.41
Finish	January	Year 4	1.68	May	Year 4	1.68	March	Year 4	1.68	May	Year 4	1.68	April	Year 4	1.68
Point & Patch	February	Year 4	72.31	June	Year 4	72.31	April	Year 4	72.31	June	Year 4	72.31	May	Year 4	72.31
Treat CJ	April	Year 4	4.85	August	Year 4	4.85	June	Year 4	4.85	August	Year 4	4.85	July	Year 4	4.85
Cure & Cleanup	April	Year 64	451.95	August	Year 4	451.95	June	Year 4	451.95	August	Year 4	451.95	July	Year 4	451.95
Sedimentation Basin Roof Concrete															
Placing Crews	June	Year 4	2.23	November	Year 4	2.23	September	Year 4	2.23	December	Year 4	2.23	October	Year 4	2.23
Finish	June	Year 4	1.40	November	Year 4	1.40	September	Year 4	1.40	December	Year 4	1.40	October	Year 4	1.40
Point & Patch	June	Year 4	2.31	November	Year 4	2.31	September	Year 4	2.31	December	Year 4	2.31	October	Year 4	2.31
Cure & Cleanup	June	Year 4	12.00	November	Year 4	12.00	September	Year 4	12.00	December	Year 4	12.00	October	Year 4	12.00
Formwork	June	Year 4	14.42	November	Year 4	14.42	September	Year 4	14.42	December	Year 4	14.42	October	Year 4	14.42
Roof Falsework	July	Year 4	46.68	December	Year 4	46.68	October	Year 4	46.68	January	Year 4	46.68	November	Year 4	46.68
Hanging & Baffle Wall Concrete															
Plant & Operations	January	Year 4	9.05	May	Year 4	9.05	March	Year 4	9.05	May	Year 4	9.05	April	Year 4	9.05
Finish	January	Year 4	0.47	May	Year 4	0.47	March	Year 4	0.47	May	Year 4	0.47	April	Year 4	0.47
Point & Patch	January	Year 4	14.88	May	Year 4	14.88	March	Year 4	14.88	May	Year 4	14.88	April	Year 4	14.88
Treat CJ	January	Year 4	1.60	May	Year 4	1.60	March	Year 4	1.60	May	Year 4	1.60	April	Year 4	1.60
Cure & Cleanup	January	Year 4	20.78	May	Year 4	20.78	March	Year 4	20.78	May	Year 4	20.78	April	Year 4	20.78
Formwork	February	Year 4	93.00	June	Year 4	93.00	April	Year 4	93.00	June	Year 4	93.00	May	Year 4	93.00
Hanging Wall Falsework	May	Year 4	0.58	September	Year 4	0.58	July	Year 4	0.58	September	Year 4	0.58	August	Year 4	0.58
Pump House															
Place Gravel Bedding	September	Year 2	2.18	January	Year 3	2.18	November	Year 2	2.18	February	Year 3	2.18	December	Year 2	2.18

Phase	Pumping Plant 1			Pumping Plant 2			Pumping Plant 3			Pumping Plant 4			Pumping Plant 5		
	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days	Start Month	Start Year	Days
Drive Foundation Piles	December	Year 2	71.33	March	Year 3	71.33	February	Year 3	71.33	April	Year 3	71.33	February	Year 3	71.33
Place Concrete Fill on Piles	March	Year 3	25.65	May	Year 3	25.65	June	Year 3	25.65	July	Year 3	25.65	June	Year 3	25.65
Slab On Grade Concrete															
Plant & Operations	March	Year 3	50.00	May	Year 3	50.00	June	Year 3	50.00	July	Year 3	50.00	June	Year 3	50.00
Placing Crews	March	Year 3	20.19	May	Year 3	20.19	June	Year 3	20.19	July	Year 3	20.19	June	Year 3	20.19
Finish	March	Year 3	15.40	May	Year 3	15.40	June	Year 3	15.40	July	Year 3	15.40	June	Year 3	15.40
Point & Patch	April	Year 3	0.85	June	Year 3	0.85	July	Year 3	0.85	August	Year 3	0.85	July	Year 3	0.85
Treat CJ	April	Year 3	6.77	June	Year 3	6.77	July	Year 3	6.77	August	Year 3	6.77	July	Year 3	6.77
Cure & Cleanup	April	Year 3	28.70	June	Year 3	28.70	July	Year 3	28.70	August	Year 5	28.70	July	Year 5	28.70
Formwork	May	Year 3	5.29	July	Year 3	5.29	August	Year 3	5.29	September	Year 5	5.29	August	Year 5	5.29
Pump House Wall Concrete															
Plant & Operations	June	Year 3	100.00	September	Year 3	100.00	August	Year 3	100.00	October	Year 3	100.00	September	Year 3	100.00
Placing Crews	June	Year 3	32.96	September	Year 3	32.96	August	Year 3	32.96	October	Year 3	32.96	September	Year 3	32.96
Finish	July	Year 3	3.45	October	Year 3	3.45	September	Year 3	3.45	November	Year 3	3.45	October	Year 3	3.45
Point & Patch	July	Year 3	80.32	October	Year 3	80.32	September	Year 3	80.32	November	Year 3	80.32	October	Year 3	80.32
Treat CJ	September	Year 3	6.77	December	Year 3	6.77	November	Year 3	6.77	January	Year 4	6.77	December	Year 3	6.77
Cure & Cleanup	September	Year 3	113.99	December	Year 3	113.99	November	Year 3	113.99	January	Year 4	113.99	December	Year 3	113.99
Formwork	January	Year 4	502.02	April	Year 4	502.02	March	Year 4	502.02	May	Year 4	502.02	April	Year 4	502.02
Pump House Roof Concrete															
Plant & Operations	November	Year 3	15.48	February	Year 4	15.48	December	Year 3	15.48	February	Year 4	15.48	January	Year 4	15.48
Placing Crews	November	Year 3	11.64	February	Year 4	11.64	December	Year 3	11.64	February	Year 4	11.64	January	Year 4	11.64
Finish	November	Year 3	15.68	February	Year 4	15.68	December	Year 3	15.68	February	Year 4	15.68	January	Year 4	15.68
Point & Patch	November	Year 3	19.29	February	Year 4	19.29	December	Year 3	19.29	February	Year 4	19.29	January	Year 4	19.29
Cure & Cleanup	December	Year 3	50.17	March	Year 4	50.17	January	Year 4	50.17	March	Year 4	50.17	February	Year 4	50.17
Formwork	February	Year 4	120.59	May	Year 4	120.59	March	Year 4	120.59	May	Year 4	120.59	April	Year 4	120.59
Roof Falsework	June	Year 4	46.68	September	Year 4	46.68	July	Year 4	46.68	September	Year 4	46.68	August	Year 4	46.68
Flow Meter Vaults															
Flow Meter Vault Concrete	July	Year 6	23.71	January	Year 5	23.71	October	Year 4	23.71	January	Year 7	23.71	December	Year 4	23.71
Ultra-Sonic Flow Meters	July	Year 4	14.00	January	Year 5	14.00	October	Year 4	14.00	January	Year 5	14.00	December	Year 4	14.00
Butterfly Valves															
Electrical Actuated BFV(96")	January	Year 4	35.00	February	Year 5	35.00	February	Year 4	35.00	March	Year 5	35.00	February	Year 4	35.00
Hydraulic Actuated BFV(96")	January	Year 4	35.00	February	Year 5	35.00	February	Year 4	35.00	March	Year 5	35.00	February	Year 4	35.00
Piping To Outside															
Discharge Piping (8' Dia)	January	Year 4	56.00	February	Year 5	56.00	February	Year 4	56.00	March	Year 5	56.00	February	Year 4	56.00
Installation of Pumps, Valves & Fittings	January	Year 4	240.00	February	Year 5	240.00	February	Year 4	240.00	March	Year 5	240.00	February	Year 4	240.00
Flex Couplings	January	Year 4	14.00	February	Year 5	14.00	February	Year 4	14.00	March	Year 5	14.00	February	Year 4	14.00
Air Valves	January	Year 4	7.00	February	Year 5	7.00	February	Year 4	7.00	March	Year 5	7.00	February	Year 4	7.00

Table 3C-11. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Intermediate Pumping Plant Construction Schedule

Phase	Intermediate Pumping Plant		
	Start Month	Start Year	Days
Clearing/Grubbing/Dewatering			
Clearing & Grubbing	June	Year 2	2.00
Dewatering	June	Year 2	493.00
SWPPP	June	Year 2	5.00
PP Excavation & Backfill			
Excavate & Waste	August	Year 2	84.72
Excavation & Stockpile	August	Year 2	76.25
Place Stockpiled Material As Backfill	November	Year 2	334.45
Forebay From New North Canal			
Forebay From New North Canal - Excavation & Stockpile	August	Year 2	263.64
Forebay From New North Canal - Place Stockpiled Material As Backfill	January	Year 3	34.38
Forebay Concrete			
Forebay From New North Canal Plant & Operations	July	Year 3	57.80
Forebay From New North Canal Placing Crews	July	Year 3	19.05
Forebay From New North Canal Finish	August	Year 3	3.45
Forebay From New North Canal Point & Patch	August	Year 3	15.68
Forebay From New North Canal Treat CJ	August	Year 3	0.30
Forebay From New North Canal Cure & Cleanup	August	Year 3	145.66
Forebay From New North Canal Formwork	August	Year 4	97.98
Pump House			
Place Gravel Bedding	August	Year 2	5.38
Drive Foundation Piles	February	Year 3	591.33
Place Concrete Fill on Piles	July	Year 3	212.89
Slab On Grade Concrete			
Plant & Operations	July	Year 3	77.72
Placing Crews	July	Year 3	31.31
Finish	August	Year 3	43.70
Point & Patch	September	Year 3	4.28
Treat CJ	September	Year 3	3.28
Cure & Cleanup	September	Year 3	80.41
Formwork	September	Year 3	26.75
Volute Concrete			
Plant & Operations	January	Year 4	68.71
Placing Crews	January	Year 4	15.10
Finish	January	Year 4	6.72
Point & Patch	January	Year 4	0.00
Cure & Cleanup	January	Year 4	6.88
Formwork	February	Year 4	0.00

Phase	Intermediate Pumping Plant		
	Start Month	Start Year	Days
Pump House Wall Concrete			
Plant & Operations	September	Year 3	211.22
Point & Patch	September	Year 3	296.55
Cure & Cleanup	January	Year 4	408.96
Formwork	January	Year 3	500.00
Pump House Elevated Slab Concrete			
Plant & Operations	April	Year 4	101.68
Placing Crews	April	Year 4	18.89
Finish	April	Year 4	34.60
Point & Patch	May	Year 4	2.31
Cure & Cleanup	May	Year 4	58.37
Formwork	May	Year 4	14.46
Roof Falsework	June	Year 4	136.60
Haul Road			
Overexc & Recompact 40' Widex 5' Deep	May	Year 4	8.00
Remove Base Rock	May	Year 4	4.00
Piping			
11' Dia Piping	June	Year 4	48.00
12' Dia Piping	June	Year 4	48.00
Flex Couplings	June	Year 4	80.00
Air Valve	June	Year 4	16.00
Install All Piping, Fittings & Valves	June	Year 4	16.00
Butterfly Valves			
11' Hydraulically Activated BFV	July	Year 4	50.00
8' Electrically Activated BFV	July	Year 4	30.00
Flow Meter Vaults			
Flow Meter Vaults, 16'x16'x20' Deep	July	Year 4	218.84
Ultra Sonic Flow Meters	July	Year 4	12.00

Table 3C-12. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Pipeline Construction Schedule

Phases																			
Pipeline A				Pipeline B				Pipeline C				Pipeline D				Surge Tower Base			
	Start Month	Start Year	Days		Start Month	Start Year	Days		Start Month	Start Year	Days		Start Month	Start Year	Days		Start Month	Start Year	Days
Clear & Grub/ Demolition	December	Year 6	8.00	Dewatering	May	Year 7	176.00	Dewatering	May	Year 7	176.00	Excavate & Export	May	Year 7	16.24	Drive Foundation Piles	April	Year 4	62.17
Dewatering For Conduits				Excavate & Export	June	Year 7	5.52	Place Bedding	May	Year 7	0.50	Excavate & Stockpile	May	Year 7	30.14	Place Concrete Fill In Lpiles	June	Year 4	23.31
Used Deep Wells	December	Year 6	14.50	Excavate & Stockpile	June	Year 7	5.52	Place Invert Concrete				Backfill	December	Year 7	44.20				
Sumps & Pumps	December	Year 6	14.50	Backfill	January	Year 8	3.80	Flow Meter Vault Concrete	September	Year 7	29.38	8 inch pipe							
Excavate & Haul Off Excess				Install & Remove Sheet Piles	June	Year 7	18.50	Place Wall Concrete				Stage & Handle 8' Pipe	June	Year 7	1.00				
Export 1 Mile	December	Year 6	106.25	Stage & Handle Pipe	June	Year 7	0.58	Flow Meter Vault Con	September	Year 7	38.21	Place Bedding	April	Year 7	0.76				
Excavate & Stockpile For Reuse As BF				Place Pipe	June	Year 7	25.00	Elevated Slab				Place Pipe	June	Year 7	13.60				
Excavate & Haul-Stockpile	December	Year 6	153.53	Weld Pipe	June	Year 7	25.00	Flow Meter Vault Concrete	January	Year 8	8.50	Weld Pipe	Nov	Year 7	11.00				
Pipe Procurement				Place Slurry Backfill	January	Year 8	37.59	Roof Falsework				Place Sand Backfill	December	Year 7	2.00				
Stage & Handle Pipe	December	Year 6	11.20	Weld Manifold Tie-Ins, 23'	Nov	Year 7	2.00	Roof Falsework	January	Year 10	4.62	16 inch pipe							
Place Pipe Bedding				Weld Small Tie-Ins, 8'	Nov	Year 7	5.00					Stage & Handle 16' Pipe	June	Year 7	1.16				
Place Bedding	December	Year 6	67.20	Weld Dished Heads, 23'	Nov	Year 7	5.00					Place Bedding	April	Year 7	9.33				
Set & Weld Pipe												Place Pipe. 16'	June	Year 7	46.56				
Place Pipe	December	Year 6	466.67									Weld Pipe	Nov	Year 7	201.25				
Weld Pipe	December	Year 6	466.67									Place Sand Backfill	December	Year 7	22.59				
Place Backfill Slurry												8' Electric Butterfly Valves	December	Year 7	20.00				
Place Sand In Pipe Zone	December	Year 6	164.50									Flex Couplings	December	Year 7	4.00				
Load, Haul, Compact BF From Stockpile	December	Year 6	230.30									Weld Manifold Tie-Ins	December	Year 7	0.04				
Regrade ROW												Weld Small Tie-Ins, 8'	December	Year 7	19.75				
Restore Area-Grade To Drain	March	Year 7	6.00									Weld Dished Heads, 16'	December	Year 7	17.50				
Air & Vacuum Release												16' Pipe Fittings	December	Year 7	105.00				
Air & Vacuum Release	March	Year 7	10.00																

Table 3C-13. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Pipeline Construction Schedule

Phases

Pipeline E

	Start Month	Start Year	Days
Valve Box Structure			
Dewatering	February	Year 5	283.00
Place Bedding	February	Year 5	5.69
Flow Meter Vault Concrete	February	Year 5	294.92
Place Wall Concrete	April	Year 6	149.63
Elevated Slab Concrete	April	Year 6	31.46
Roof Falsework	January	Year 6	15.31
Drive Foundation Piles	June	Year 5	62.17
Place Concrete Fill In Piles	July	Year 5	23.31
Pipelines			
Excavate & Export	February	Year 5	10.33
Excavate & Stockpile	February	Year 5	12.61
Backfill	March	Year 5	18.50
Stage & Handle Pipe	February	Year 5	1.85
Place Bedding	March	Year 5	6.93
Place Pipe	February	Year 5	46.32
Weld Pipe	March	Year 5	92.00
Place Sand Backfill	June	Year 5	9.67
16 inch pipe			
Stage & Handle 16' Pipe	February	Year 5	1.00
Place Bedding	March	Year 5	0.40
Place Pipe. 16'	February	Year 5	8.64
Weld Pipe, 16'	March	Year 5	25.88
Place Sand Backfill	March	Year 5	1.60
23 inch pipe			
Stage & Handle 23' Pipe	February	Year 5	2.00
Place Pipe, 23'	February	Year 5	22.96
Weld Pipe, 23'	February	Year 5	146.63
Place Backfill Slurry	June	Year 5	122.14
Manifold Tie-Ins, 11'	April	Year 5	24.00
Manifold Tie-Ins, 23'	April	Year 5	4.00
Dished Heads, 16'	April	Year 5	4.00
Dished Heads, 23'	April	Year 5	4.00
Electric Butterfly Valves, 11'	April	Year 5	60.00
Flex Couplings	April	Year 5	12.00

Pipeline F

	Start Month	Start Year	Days
Dewatering	October	Year 3	121.00
Excavate & Stockpile	September	Year 3	13.72
Backfill	February	Year 4	34.30
Place Bedding	October	Year 3	17.00
SOG Concrete			
Flow Meter Vault Concrete	January	Year 4	582.25
Wall Concrete		Year 4	
Flow Meter Vault Concrete	May	Year 4	480.00
Roof Falsework		Year 4	
Roof Falsework	March	Year 4	45.10
Place Roof Concrete		Year 4	
Flow Meter Vault Concrete	March	Year 4	45.10

Pipeline G

	Start Month	Start Year	Days
Dewatering	October	Year 2	121.00
Excavate & Export	September	Year 2	21.59
Excavate & Stockpile	September	Year 2	29.00
Backfill	March	Year 3	58.00
Place Bedding	October	Year 2	4.00
Drive Foundation Piles	November	Year 2	46.00
Place Concrete Fill In Piles	December	Year 2	46.00
Invert Concrete			
Flow Meter Vault Concrete	January	Year 3	426.25
Wall Concrete			
Flow Meter Vault Concrete	January	Year 3	201.67
Rip Rap			
Place Riprap	October	Year 2	6.00
Place Bedding	October	Year 2	6.00
Place Fabric	October	Year 2	6.00

Pipeline H

	Start Month	Start Year	Days
Valve Box Structure			
Place Bedding	May	Year 7	3.00
SOG Concrete			
Flow Meter Vault Concrete	July	Year 7	10.13
Wall Concrete			
Flow Meter Vault Concrete	August	Year 7	20.04
Place Roof Concrete			
Flow Meter Vault Concrete	January	Year 8	2.08
Roof Falsework	January	Year 8	1.54
Drive Foundation Piles	June	Year 7	4.33
Pipelines			
Excavate & Export	May	Year 7	6.62
Excavate & Stockpile	May	Year 7	11.97
Backfill	January	Year 8	17.56
Stage & Handle Pipe	October	Year 7	1.00
Place Bedding	May	Year 7	3.77
Place Pipe	October	Year 7	9.20
Weld Pipe	October	Year 7	20.00
Place Sand Backfill	January	Year 8	5.26
12 inch pipe			
Stage & Handle 12' Pipe	October	Year 7	1.00
Place Bedding	May	Year 7	1.74
Place Pipe. 12'	October	Year 7	10.00
Weld Pipe, 12'	October	Year 7	21.25
Place Sand Backfill	January	Year 8	2.56
16 inch pipe			
Stage & Handle 16' Pipe	October	Year 7	1.00
Place Bedding	May	Year 7	7.92
Place Pipe. 16'	October	Year 7	7.92
Weld Pipe, 16'	October	Year 7	35.00
Place Sand Backfill	January	Year 8	1.46
22 inch pipe			
Stage & Handle 22' Pipe	October	Year 7	1.00
Place Bedding	May	Year 7	1.00
Place Pipe. 22'	October	Year 7	3.68
Weld Pipe, 22'	October	Year 7	25.50
Place Sand Backfill	January	Year 8	0.85
Install & Remove Sheet Piles	June	Year 7	110.22
Install & Remove Wales & Struts	October	Year 7	79.50
Manifold Tie-Ins, 11'	October	Year 7	6.00
Manifold Tie-Ins, 12'	October	Year 7	10.00
Manifold Tie-Ins, 33'	October	Year 7	6.00
Dished Heads, 16'	October	Year 7	4.00
11' Welds	October	Year 7	4.00
11' X 16' Increaser	October	Year 7	4.00
16' Welds	October	Year 7	26.25
16' X 22' Increaser	October	Year 7	12.00
22' Welds	October	Year 7	50.00
22' X 33' Increaser	October	Year 7	16.00
33' Welds	October	Year 7	36.00
11 Degree Bends, 33' Diameter	October	Year 7	20.00
Electric Butterfly Valves, 11'	October	Year 7	5.00
Flex Couplings	October	Year 7	1.00

Surge Tower/Weir Structure

	Start Month	Start Year	Days
Dewatering	April	Year 5	60.00
Excavate & Export	April	Year 5	18.85
Excavate & Stockpile	April	Year 5	10.05
Backfill	April	Year 5	12.57
Place Bedding	May	Year 5	3.00
Drive Foundation Piles	May	Year 5	40.83
Place Concrete Fill In Piles	June	Year 5	12.25
Invert Concrete			
Flow Meter Vault Concrete	July	Year 5	484.76
Wall Concrete			
Flow Meter Vault Concrete	May	Year 6	205.96

Table 3C-14. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Tunnel Construction Schedule

Tunnel

REACH #1	Start Month	Start Year	Days
Launch Shaft			
Excavate and Support Shaft	August	Year 2	16.00
Invert work slab	October	Year 2	1.33
Shaft Rebar	December	Year 2	5.33
Shaft invert pour	December	Year 2	1.33
Form Shaft Walls	January	Year 3	4.33
Place Shaft Walls	January	Year 3	1.33
Set & Weld Steel pipe Liner	January	Year 3	4.67
Concrete Backfill Pipe	January	Year 3	2.67
Controlled Density Fill	April	Year 3	3.67
Intermediate Shaft			
Form & Place Shaft Collar	January	Year 3	1.33
Excavate and build tunnel / shaft collar	February	Year 3	3.00
Install ladder / Vent & Cover	January	Year 3	0.67
Backfill Shaft	January	Year 3	2.67
Retrieval Shaft			
Excavate Retrieval Shafts	September	Year 3	8.00
Invert prep	October	Year 3	0.67
Invert Rebar	October	Year 4	0.67
Place invert slab	February	Year 4	0.33
Clean Shaft Invert	February	Year 4	0.33
Elbow & Riser Forms	February	Year 4	8.67
Elbow & Riser Rebar	February	Year 4	9.33
Place Elbow & Riser concrete	February	Year 4	2.33
Controlled Density Fill	February	Year 4	2.67
Muck Disposal Shafts			
Load & Haul excavated materials	February	Year 3	55.00
23' ID Tunnel 115+00 => 267+00 *			
Set Up For Tunnel Excavation	October	Year 4	6.00
TBM & Vertical Conv. Assy.	October	Year 4	76.00
Mine 26' Tunnel	December	Year 4	390.33
Tunnel Mining Surface Support	February	Year 5	503.00
Sunday Maint.	September	Year 6	10.67
Remove TBM @ Launch Shaft	September	Year 6	1.67
Grout	September	Year 6	38.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	December	Year 6	33.00
Final Lining over TBM Skin	September	Year 6	3.00
Equip Op Cost 24/7	July	Year 6	611.00
Muck Disposal Tunnel			
Muck Disposal	November	Year 6	136.67

REACH #2	Start Month	Start Year	Days
Launch Shaft			
Excavate and Support Shaft	July	Year 2	30.00
Invert work slab	October	Year 2	2.67
Shaft Invert & Wall Rebar	November	Year 2	7.33
Place invert slab	November	Year 2	1.00
Form Shaft Walls	November	Year 4	6.00
Place Shaft Walls	November	Year 2	2.00
Clean Shaft Invert	November	Year 2	1.00
Shaft Tunnel Invert Pour	November	Year 2	0.67
Tunnel & Riser Rebar	November	Year 2	6.00
Tunnel & Riser Forms	November	Year 2	9.67
Place tunnel & Riser concrete	January	Year 3	1.67
Controlled Density Fill	February	Year 3	14.00
Intermediate Shaft			
Form & Place Shaft Collar	November	Year 3	1.33
Excavate and build tunnel / shaft collar	October	Year 3	3.00
Install ladder / Vent & Cover	November	Year 3	0.67
Backfill Shaft	November	Year 3	2.67
Retrieval Shaft			
Excavate Retrieval Shafts	January	Year 4	8.00
Invert prep	February	Year 4	0.67
Invert Rebar	February	Year 4	0.67
Place invert slab	May	Year 4	0.33
Clean Shaft Invert	May	Year 4	0.33
Elbow & Riser Forms	May	Year 4	8.67
Elbow & Riser Rebar	May	Year 4	9.33
Place Elbow & Riser concrete	May	Year 4	2.33
Controlled Density Fill	May	Year 4	2.67
Muck Disposal Shafts			
Load & Haul excavated materials	June	Year 4	161.33
33 ft Tunnel			
Set Up For Tunnel Excavation	December	Year 3	6.00
TBM & Vertical Conv. Assy.	December	Year 3	76.00
Mine 37' Tunnel	March	Year 4	787.00
Tunnel Mining Surface Support	April	Year 4	959.33
Sunday Maint.	October	Year 6	21.67
Remove TBM @ Retrieval Shaft	November	Year 6	8.67
Grout Leakage	October	Year 6	65.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	November	Year 6	52.00
Equip Op Cost 24/7	December	Year 3	1093.00
Launch Shaft			
Muck Disposal	March	Year 7	262.33

REACH #3	Start Month	Start Year	Days
Launch Shaft A			
Excavate and Support Shaft	July	Year 2	30.00
Invert work slab	October	Year 2	2.67
Shaft Invert & Wall Rebar	December	Year 2	7.33
Place invert slab	December	Year 2	1.00
Form Shaft Walls	January	Year 3	6.00
Place Shaft Walls	January	Year 3	2.00
Clean Shaft Invert	January	Year 3	1.00
Shaft Tunnel Invert Pour	January	Year 3	0.67
Tunnel & Riser Rebar	January	Year 3	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	January	Year 3	1.67
Controlled Density Fill	February	Year 3	14.00
Launch Shaft B			
Excavate and Support Shaft	July	Year 2	30.00
Invert work slab	October	Year 2	2.67
Shaft Invert & Wall Rebar	January	Year 3	7.33
Place Invert Slab	January	Year 3	1.00
Form Shaft Walls	January	Year 3	6.00
Place Shaft Walls	January	Year 3	2.00
Clean Shaft Invert	January	Year 3	1.00
Shaft Tunnel Invert Pour	January	Year 3	0.67
Tunnel & Riser Rebar	January	Year 3	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	February	Year 3	1.67
Controlled Density Fill	March	Year 3	14.00
Intermediate Shaft A			
Form & Place Shaft Collar	November	Year 5	1.33
Excavate and build tunnel / shaft collar	October	Year 3	3.00
Install ladder / Vent & Cover	November	Year 3	0.67
Backfill Shaft	November	Year 3	2.67
Intermediate Shaft B			
Form & Place Shaft Collar	November	Year 3	1.33
Excavate and build tunnel / shaft collar	October	Year 3	6.67
Tunnel / Shaft Collar	November	Year 3	3.00
Install ladder / Vent & Cover	November	Year 3	0.67
Backfill	November	Year 3	2.67
Retrieving Shaft A			
Excavate Retrieval Shafts	March	Year 4	8.00
Invert prep	April	Year 4	0.67
Invert Rebar	April	Year 4	0.67
Place invert slab	July	Year 4	0.33
Clean Shaft Invert	July	Year 4	0.33

REACH #4	Start Month	Start Year	Days
Launch Shaft A			
Excavate and Support Shaft	July	Year 2	30.00
Invert work slab	September	Year 2	2.67
Shaft Invert & Wall Rebar	November	Year 2	7.33
Place invert slab	November	Year 2	1.00
Form Shaft Walls	November	Year 2	6.00
Place Shaft Walls	November	Year 2	2.00
Clean Shaft Invert	November	Year 2	1.00
Shaft Tunnel Invert	November	Year 2	0.67
Tunnel & Riser Rebar	November	Year 2	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	February	Year 3	1.67
Controlled Density Fill	March	Year 3	14.00
Launch Shaft B			
Excavate and Support Shaft	July	Year 2	30.00
Invert work slab	November	Year 2	2.67
Shaft Invert & Wall Rebar	January	Year 3	7.33
Place invert slab	January	Year 3	1.00
Form Shaft Walls	January	Year 3	6.00
Place Shaft Walls	January	Year 3	2.00
Clean Shaft Invert	January	Year 3	1.00
Shaft Tunnel Invert Pour	January	Year 3	0.67
Tunnel & Riser Rebar	January	Year 3	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	March	Year 3	1.67
Controlled Density Fill	May	Year 3	14.00
Intermediate Shaft A			
Form & Place Shaft Collar	December	Year 3	1.33
Excavate and build tunnel / shaft collar	December	Year 3	3.00
Install ladder / Vent & Cover	December	Year 3	0.67
Backfill Shaft	December	Year 3	2.67
Intermediate Shaft B			
Form & Place Shaft Collar	November	Year 3	1.33
Excavate and build tunnel / shaft collar	November	Year 3	3.00
Install ladder / Vent & Cover	November	Year 3	0.67
Backfill	December	Year 3	2.67
Retrieving Shaft A			
Excavate Retrieval Shafts	May	Year 4	8.00
Invert prep	June	Year 4	0.67
Invert Rebar	June	Year 4	0.67
Place invert slab	September	Year 4	0.33
Clean Shaft Invert	September	Year 4	1.00
Elbow & Riser Forms	September	Year 4	1.46

Tunnel

REACH #1

	Start Month	Start Year	Days

REACH #2

	Start Month	Start Year	Days

REACH #3

	Start Month	Start Year	Days
Elbow & Riser Forms	July	Year 4	8.67
Elbow & Riser Rebar	July	Year 4	9.33
Place Elbow & Riser concrete	July	Year 4	2.33
Controlled Density Fill	July	Year 4	2.67
Retrieving Shaft B			
Excavate Retrieval Shafts	May	Year 4	8.00
Invert prep	May	Year 4	0.67
Invert Rebar	May	Year 4	0.67
Place invert slab	September	Year 4	0.33
Clean Shaft Invert	September	Year 4	0.33
Elbow & Riser Forms	September	Year 4	8.67
Elbow & Riser Rebar	September	Year 4	9.33
Place Elbow & Riser concrete	September	Year 4	2.33
Controlled Density Fill	September	Year 4	2.67
Muck Disposal Shafts			
Load & Haul excavated materials	October	Year 4	322.67
33 ft Tunnel A Reach #3		Year 4	
Set Up For Tunnel Excavation	January	Year 4	6.00
Mine 37' Tunnel	March	Year 4	799.00
Tunnel Mining Surface Support	May	Year 4	966.00
Sunday Maint	September	Year 6	22.00
TBM Removal @ Retrieval Shaft	October	Year 6	8.67
Grout Leakage	October	Year 6	66.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	October	Year 6	52.00
Equip Op Cost 24/7	January	Year 4	1130.33
33 ft Tunnel B reach #3			
Set Up For Tunnel Excavation	February	Year 4	6.00
TBM & Vertical Conv. Assy.	February	Year 4	83.00
Mine 37' Tunnel	March	Year 4	799.00
Tunnel Mining Surface Support	July	Year 4	966.00
Sunday Maint	January	Year 7	22.00
TBM Removal @ Retrieval Shaft	January	Year 7	8.67
Grout Leakage	April	Year 7	66.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	January	Year 7	52.00
Equip Op Cost 24/7	February	Year 4	1130.33
Muck Disposal Tunnels			
Muck Disposal	May	Year 7	266.33

REACH #4

	Start Month	Start Year	Days
Elbow & Riser Rebar	September	Year 4	4.00
Place Elbow & Riser concrete	September	Year 4	1.00
Controlled Density Fill	September	Year 4	5.52
Retrieving Shaft B			
Excavate Retrieval Shafts	May	Year 4	8.00
Invert prep	June	Year 4	0.67
Invert Rebar	June	Year 4	0.67
Place invert slab	September	Year 4	0.33
Clean Shaft Invert	September	Year 4	1.00
Elbow & Riser Forms	September	Year 4	0.67
Elbow & Riser Rebar	September	Year 4	1.46
Place Elbow & Riser concrete	September	Year 4	4.00
Controlled Density Fill	September	Year 4	1.00
Muck Disposal Shafts		Year 4	
Load & Haul excavated materials	July	Year 4	244.33
33 ft Tunnel A Reach #4		Year 4	
Set Up For Tunnel Excavation	July	Year 4	6.00
TBM & Vertical Conv. Assy.	April	Year 4	83.00
Mine 37' Tunnel	July	Year 4	1056.00
Tunnel Mining Surface Support	July	Year 4	1274.00
Sunday Maint	November	Year 7	29.33
TBM Removal @ Retrieval Shaft	February	Year 8	2.00
Grout Leakage	November	Year 7	87.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	February	Year 8	70.00
Equip Op Cost 24/7	April	Year 4	1452.33
33 ft Tunnel B Reach #4			
Set Up For Tunnel Excavation	August	Year 4	6.00
TBM & Vertical Conv. Assy.	August	Year 4	83.00
Mine 37' Tunnel	November	Year 4	1056.00
Tunnel Mining Surface Support	December	Year 4	1274.00
Sunday Maint	March	Year 8	29.33
TBM Removal @ Retrieval Shaft	May	Year 8	2.00
Grout Leakage	March	Year 8	87.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	May	Year 8	70.00
Equip Op Cost 24/7	August	Year 4	1452.33
Muck Disposal Tunnels			
Muck Disposal	March	Year 4	342.00

*(For the purposes of this cost estimate, a 23' ID tunnel was assumed. However, updated engineering documents specify that this tunnel would be built with an internal diameter of 29 feet, as noted in Table 3C-2.)

1 **Table 3C-15. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Tunnel Construction Schedule**

Tunnel

REACH #5

	Start Month	Start Year	Days
Launch Shaft A			
Excavate and Support Shaft	October	Year 2	30.00
Invert work slab	January	Year 3	2.67
Shaft Invert & Wall Rebar	January	Year 3	7.33
Place invert slab	January	Year 3	1.00
Form Shaft Walls	January	Year 3	6.00
Place Shaft Walls	January	Year 3	2.00
Clean Shaft Invert	January	Year 3	1.00
Shaft Tunnel Invert Pour	January	Year 3	0.67
Tunnel & Riser Rebar	January	Year 3	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	March	Year 3	1.67
Controlled Density Fill	April	Year 3	14.00
Launch Shaft B			
Excavate and Support Shaft	August	Year 2	30.00
Invert work slab	November	Year 2	2.67
Shaft Invert & Wall Rebar	February	Year 3	7.33
Place invert slab	February	Year 3	1.00
Form Shaft Walls	February	Year 3	6.00
Place Shaft Walls	February	Year 3	2.00
Clean Shaft Invert	February	Year 3	1.00
Tunnel & Riser Rebar	February	Year 3	6.00
Tunnel & Riser Forms	February	Year 3	9.67
Place tunnel & Riser concrete	April	Year 3	1.67
Controlled Density Fill	June	Year 3	14.00
Intermediate Shaft A			
Form & Place Shaft Collar	January	Year 4	1.33
Excavate and build tunnel / shaft collar	December	Year 3	3.00
Install ladder / Vent & Cover	January	Year 4	0.67
Backfill Shaft	January	Year 4	2.67
Intermediate Shaft B			
Form & Place Shaft Collar	March	Year 4	1.33
Excavate and build tunnel / shaft collar	February	Year 4	3.00
Install ladder / Vent & Cover	March	Year 4	0.67
Backfill Shaft	March	Year 4	2.67
Retrieval Shaft A			
Excavate Retrieval Shafts	August	Year 4	8.00
Invert prep	June	Year 4	0.67
Invert Rebar	June	Year 4	0.67
Place invert slab	September	Year 4	0.33
Clean Shaft Invert	September	Year 4	1.00
Tunnel Rebar	September	Year 4	1.46
Tunnel Forms	September	Year 4	4.00

REACH #6

	Start Month	Start Year	Days
Launch Shaft A			
Excavate and Support Shaft	December	Year 2	30.00
Invert work slab	October	Year 2	2.67
Shaft Invert & Wall Rebar	January	Year 3	7.33
Place invert slab	January	Year 3	1.00
Form Shaft Walls	January	Year 3	6.00
Place Shaft Walls	January	Year 3	2.00
Clean Shaft Invert	January	Year 3	1.00
Shaft Tunnel Invert Pour	January	Year 3	0.67
Tunnel & Riser Rebar	January	Year 3	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	March	Year 3	1.67
Controlled Density Fill	April	Year 3	14.00
Launch Shaft B			
Excavate and Support Shaft	February	Year 3	30.00
Invert work slab	December	Year 2	2.67
Shaft Invert & Wall Rebar	February	Year 3	7.33
Place invert slab	February	Year 3	1.00
Form Shaft Walls	February	Year 3	6.00
Place Shaft Walls	February	Year 3	2.00
Clean Shaft Invert	February	Year 3	1.00
Shaft Tunnel Invert Pour	February	Year 3	0.67
Tunnel & Riser Rebar	February	Year 3	6.00
Tunnel & Riser Forms	February	Year 3	9.67
Place tunnel & Riser concrete	April	Year 3	1.67
Controlled Density Fill	June	Year 3	14.00
Intermediate Shaft A			
Form & Place Shaft Collar	December	Year 3	1.33
Excavate and build tunnel / shaft collar	November	Year 3	3.00
Install ladder / Vent & Cover	December	Year 3	0.67
Backfill Shaft	December	Year 3	2.67
Intermediate Shaft B			
Form & Place Shaft Collar	March	Year 4	1.33
Excavate and build tunnel / shaft collar	February	Year 4	3.00
Install ladder / Vent & Cover	March	Year 4	0.67
Backfill Shaft	March	Year 4	2.67
Retrieval Shaft A			
Excavate Retrieval Shafts	April	Year 4	1.67
Invert prep	May	Year 4	5.00
Invert Rebar	May	Year 4	5.00
Place invert slab	May	Year 4	8.00
Clean Shaft Invert	May	Year 4	8.00
Tunnel Forms	May	Year 4	8.00

REACH #7

	Start Month	Start Year	Days
Launch Shaft A			
Excavate and Support Shaft	February	Year 3	30.00
Invert work slab	December	Year 2	2.67
Shaft Invert & Wall Rebar	February	Year 3	7.33
Place invert slab	February	Year 3	1.00
Form Shaft Walls	February	Year 3	6.00
Place Shaft Walls	February	Year 3	2.00
Clean Shaft Invert	February	Year 3	1.00
Shaft Tunnel Invert Pour	February	Year 3	0.67
Tunnel & Riser Rebar	February	Year 3	6.00
Tunnel & Riser Forms	February	Year 3	9.67
Place tunnel & Riser concrete	February	Year 3	1.67
Controlled Density Fill/Backfill	April	Year 3	14.00
Launch Shaft B			
Excavate and Support Shaft	February	Year 3	30.00
Invert work slab	December	Year 2	2.67
Shaft Invert & Wall Rebar	February	Year 3	7.33
Place invert slab	February	Year 3	1.00
Form Shaft Walls	February	Year 3	6.00
Place Shaft Walls	February	Year 3	2.00
Clean Shaft Invert	February	Year 3	1.00
Shaft Tunnel Invert Pour	February	Year 3	0.67
Tunnel & Riser Rebar	February	Year 3	6.00
Tunnel & Riser Forms	February	Year 3	9.67
Place tunnel & Riser concrete	April	Year 3	1.67
Controlled Density Fill	May	Year 3	14.00
Intermediate Shaft A			
Form & Place Shaft Collar	December	Year 3	1.33
Excavate and build tunnel / shaft collar	November	Year 3	3.00
Install ladder / Vent & Cover	December	Year 3	0.67
Backfill Shaft	January	Year 4	2.67
Intermediate Shaft B			
Form & Place Shaft Collar	February	Year 4	1.33
Excavate and build tunnel / shaft collar	January	Year 4	3.00
Install ladder / Vent & Cover	February	Year 4	0.67
Backfill Shaft	February	Year 4	2.67
Retrieval Shaft A			
Excavate Retrieval Shafts	September	Year 2	1.67
Invert prep	October	Year 2	5.00
Invert Rebar	October	Year 2	5.00
Place invert slab	January	Year 3	8.00
Clean Shaft Invert	January	Year 3	8.00
Tunnel Forms	January	Year 3	8.00

REACH #8

	Start Month	Start Year	Days
Launch Shaft A			
Excavate and Support Shaft	January	Year 3	30.00
Invert work slab	October	Year 2	2.67
Shaft Invert & Wall Rebar	January	Year 3	7.33
Place invert slab	January	Year 3	1.00
Form Shaft Walls	January	Year 3	6.00
Place Shaft Walls	January	Year 3	2.00
Clean Shaft Invert	January	Year 3	1.00
Shaft Tunnel Invert Pour	January	Year 3	0.67
Tunnel & Riser Rebar	January	Year 3	6.00
Tunnel & Riser Forms	January	Year 3	9.67
Place tunnel & Riser concrete	March	Year 3	1.67
Controlled Density Fill	May	Year 3	14.00
Launch Shaft B			
Excavate and Support Shaft	February	Year 3	30.00
Invert work slab	November	Year 2	2.67
Shaft Invert & Wall Rebar	February	Year 3	7.33
Place invert slab	February	Year 3	1.00
Form Shaft Walls	February	Year 3	6.00
Place Shaft Walls	February	Year 3	2.00
Clean Shaft Invert	February	Year 3	1.00
Shaft Tunnel Invert Pour	February	Year 3	0.67
Tunnel & Riser Rebar	February	Year 3	6.00
Tunnel & Riser Forms	February	Year 3	9.67
Place tunnel & Riser concrete	April	Year 3	1.67
Controlled Density Fill	May	Year 3	14.00
Intermediate Shaft A			
Form & Place Shaft Collar	December	Year 3	1.33
Excavate and build tunnel / shaft collar	December	Year 3	3.00
Install ladder / Vent & Cover	December	Year 3	0.67
Backfill Shaft	December	Year 4	2.67
Intermediate Shaft B			
Form & Place Shaft Collar	February	Year 4	1.33
Excavate and build tunnel / shaft collar	February	Year 4	3.00
Install ladder / Vent & Cover	February	Year 4	0.67
Backfill Shaft	February	Year 4	2.67
Retrieval Shaft A			
Excavate Retrieval Shafts	July	Year 4	8.00
Invert prep	May	Year 4	0.67
Invert Rebar	May	Year 4	0.67
Place invert slab	August	Year 4	0.33
Clean Shaft Invert	August	Year 4	0.33
Elbow & Riser Forms	August	Year 4	8.67

Tunnel

REACH #5

	Start Month	Start Year	Days
Place tunnel concrete	September	Year 4	1.00
Controlled Density Fill	September	Year 4	5.52
Retrieval Shaft B			
Excavate Retrieval Shafts	September	Year 4	8.00
Invert prep	July	Year 4	0.67
Invert Rebar	July	Year 4	0.67
Place invert slab	October	Year 4	0.33
Clean Shaft Invert	October	Year 4	1.00
Shaft Tunnel Invert Pour	October	Year 4	0.67
Tunnel & Riser Rebar	October	Year 4	1.46
Tunnel Forms	October	Year 4	4.00
Place tunnel concrete	October	Year 4	1.00
Controlled Density Fill	October	Year 4	5.52
Muck Disposal Shafts			
Load & Haul excavated materials	November	Year 4	199.33
33 ft Tunnel A Reach #5			
Set Up For Tunnel Excavation	February	Year 4	6.00
TBM & Vertical Conv. Assy.	February	Year 4	76.00
Mine 37' Tunnel	April	Year 4	981.00
Tunnel Mining Surface Support	June	Year 4	1192.00
Sunday Maint	September	Year 7	27.00
TBM Removal @ Retrieval Shaft	September	Year 7	8.67
Grout Leakage	August	Year 7	83.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	September	Year 7	68.00
Final Lining over TBM Skin	September	Year 7	4.00
Equip Op Cost 24/7	February	Year 4	1500.00
33 ft Tunnel B Reach #5			
Set Up For Tunnel Excavation	May	Year 4	6.00
TBM & Vertical Conv. Assy.	May	Year 4	76.00
Mine 37' Tunnel	July	Year 4	981.00
Tunnel Mining Surface Support	September	Year 4	1192.00
Sunday Maint	November	Year 7	27.33
TBM Removal @ Retrieval Shaft	January	Year 8	8.67
Grout Leakage	November	Year 7	83.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	January	Year 8	68.00
Final Lining over TBM Skin	January	Year 8	4.00
Equip Op Cost 24/7	May	Year 4	1500.00
Muck Disposal Tunnels			
Muck Disposal	April	Year 8	327.00

REACH #6

	Start Month	Start Year	Days
Tunnel Rebar	May	Year 4	8.00
Place tunnel concrete	May	Year 4	8.00
Controlled Density Fill	August	Year 4	8.00
Retrieval Shaft B			
Excavate Retrieval Shafts	June	Year 4	1.67
Invert prep	August	Year 4	5.00
Invert Rebar	August	Year 4	5.00
Place invert slab	November	Year 4	8.00
Clean Shaft Invert	November	Year 4	8.00
Tunnel Forms	November	Year 4	8.00
Tunnel Rebar	November	Year 4	8.00
Place tunnel concrete	November	Year 4	8.00
Controlled Density Fill	November	Year 5	8.00
Muck Disposal Shafts			
Load & Haul excavated materials	November	Year 4	244.33
33 ft Tunnel A Reach #6			
Set Up For Tunnel Excavation	May	Year 4	6.00
TBM & Vertical Conv. Assy.	May	Year 4	76.00
Mine 37' Tunnel	July	Year 4	966.00
Tunnel Mining Surface Support	September	Year 4	1177.00
Sunday Maint	September	Year 7	26.67
TBM Removal @ Retrieval Shaft	November	Year 7	8.67
Grout Leakage	September	Year 7	83.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	November	Year 7	68.00
Equip Op Cost 24/7	May	Year 4	1373.06
33 ft Tunnel B Reach #6			
Set Up For Tunnel Excavation	August	Year 4	6.00
TBM & Vertical Conv. Assy.	August	Year 4	76.00
Mine 37' Tunnel	October	Year 4	966.00
Tunnel Mining Surface Support	December	Year 4	1177.00
Sunday Maint	January	Year 8	26.67
TBM Removal @ Retrieval Shaft	January	Year 8	8.67
Grout Leakage	January	Year 8	83.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	January	Year 8	68.00
Equip Op Cost 24/7	August	Year 4	1373.00
Muck Disposal Tunnels			
Muck Disposal	May	Year 8	322.00

REACH #7

	Start Month	Start Year	Days
Tunnel Rebar	January	Year 3	8.00
Place tunnel concrete	January	Year 3	8.00
Controlled Density Fill	January	Year 3	8.00
Retrieval Shaft B			
Excavate Retrieval Shafts	August	Year 2	1.67
Invert prep	September	Year 2	5.00
Invert Rebar	September	Year 2	5.00
Place invert slab	January	Year 3	8.00
Clean Shaft Invert	January	Year 3	8.00
Tunnel Forms	January	Year 3	8.00
Tunnel Rebar	January	Year 3	8.00
Place tunnel concrete	January	Year 3	8.00
Controlled Density Fill	January	Year 3	8.00
Muck Disposal Shafts			
Load & Haul excavated materials	February	Year 3	244.33
33 ft Tunnel A Reach #7			
Set Up For Tunnel Excavation	February	Year 4	6.00
TBM & Vertical Conv. Assy.	February	Year 4	76.00
Mine 37' Tunnel	April	Year 4	950.00
Tunnel Mining Surface Support	June	Year 4	1156.00
Sunday Maint	May	Year 7	26.33
TBM Removal @ Retrieval Shaft	August	Year 7	2.00
Grout Leakage	May	Year 7	78.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	August	Year 7	62.00
Final Lining over TBM Skin	July	Year 7	4.00
Equip Op Cost 24/7	February	Year 4	1348.33
33 ft Tunnel B Reach #7			
Set Up For Tunnel Excavation	July	Year 4	6.00
TBM & Vertical Conv. Assy.	July	Year 4	76.00
Mine 37' Tunnel	October	Year 4	950.00
Tunnel Mining Surface Support	December	Year 4	1156.00
Sunday Maint	December	Year 7	26.33
TBM Removal @ Retrieval Shaft	February	Year 8	2.00
Grout Leakage	December	Year 7	78.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	February	Year 8	66.93
Final Lining over TBM Skin	April	Year 8	4.00
Equip Op Cost 24/7	July	Year 4	1348.33
Muck Disposal Tunnels			
Muck Disposal	April	Year 8	316.67

REACH #8

	Start Month	Start Year	Days
Elbow & Riser Rebar	August	Year 4	9.33
Place Elbow & Riser concrete	August	Year 6	2.33
Controlled Density Fill	August	Year 4	2.67
Retrieval Shaft B			
Excavate Retrieval Shafts	August	Year 4	8.00
Invert prep	June	Year 4	0.67
Invert Rebar	June	Year 4	0.67
Place invert slab	October	Year 4	0.33
Clean Shaft Invert	October	Year 4	0.33
Elbow & Riser Forms	October	Year 4	8.67
Elbow & Riser Rebar	October	Year 4	9.33
Place Elbow & Riser concrete	October	Year 4	2.33
Controlled Density Fill	October	Year 4	2.67
Muck Disposal Shafts			
Load & Haul excavated materials	November	Year 4	153.33
33 ft Tunnel A Reach #8			
Set Up For Tunnel Excavation	August	Year 4	6.00
TBM & Vertical Conv. Assy.	August	Year 4	76.00
Mine 37' Tunnel	September	Year 4	754.00
Tunnel Mining Surface Support	December	Year 4	918.33
Sunday Maint	May	Year 7	21.00
TBM Removal @ Retrieval Shaft	June	Year 7	8.67
Grout Leakage	May	Year 7	62.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	June	Year 7	49.00
Equip Op Cost 24/7	August	Year 4	1069.06
33 ft Tunnel B Reach #8			
Set Up For Tunnel Excavation	November	Year 4	6.00
TBM & Vertical Conv. Assy.	November	Year 4	76.00
Mine 37' Tunnel	January	Year 5	754.00
Tunnel Mining Surface Support	March	Year 5	918.33
Sunday Maint	August	Year 7	21.00
TBM Removal @ Retrieval Shaft	September	Year 7	8.67
Grout Leakage	August	Year 7	62.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	September	Year 7	49.00
Equip Op Cost 24/7	November	Year 4	356.33
Muck Disposal Tunnels			
Muck Disposal	November	Year 4	251.30

Table 3C-16. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Temporary Power Construction Schedule

Utilities	Start Month	Start Year	Days
Temporary Power SMAQMD (12 kV)	February	Year 1	92.00
Temporary Power SMAQMD (69 kV)	February	Year 1	302.00
Temporary Power SJVAPCD (12 kV)	November	Year 1	123.00
Temporary Power SJVAPCD (69 kV)	November	Year 1	193.00
Temporary Power BAAQMD (12 kV)	February	Year 2	22.00
Temporary Power BAAQMD (69 kV)	February	Year 2	92.00
Permanent Power SMAQMD (69 kV)	September	Year 1	30.00
Permanent Power SMAQMD (230 kV)	September	Year 1	894.00
Permanent Power SJVAPCD (230 kV)	March	Year 3	1,700.00
Permanent Power BAAQMD (230 kV)	May	Year 2	1,266.00

1 **Table 3C-17. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Forebay Construction Schedule**

Forebays	Start Month	Start Year	Days
Intermediate Forebay			
Dewater Forebay Excavation			
Excavate Trenches	July	Year 2	748.13
Operate Pumps	July	Year 2	466.67
Pump Install & Maintain	July	Year 2	748.13
Construct/Remove Sedimentation Ponds	June	Year 2	80.00
Remove Unsuitable			
Excavate, Haul Off Unsuitable	July	Year 2	160.94
Excavate, Stockpile A	July	Year 2	526.23
Excavate, Stockpile B	July	Year 2	1052.45
Cut/Fill - Build Levees			
Cut/Fill - Build Levees	December	Year 2	56.67
Cut/Fill - Inside Forebay	December	Year 2	600.00
Moisture Condition Suitable Soil			
Construct Drying Beds	December	Year 2	13.33
Load And Haul To Levee	December	Year 2	171.43
Slope Finish	July	Year 4	78.84
Bottom Finish	July	Year 4	201.28
Levee Top Finish	July	Year 4	20.44
Slope Protection			
Place Rip Rap	July	Year 2	437.35
Place Bedding Material	July	Year 2	31.25
Place Fabric	July	Year 2	211.46
SWPPP	July	Year 2	300.00
Maintenance Roads			
Asphalt Concrete	February	Year 1	7.00
Spillway			
Concrete Stilling Basin			
Stilling Basin Concrete	May	Year 3	87.50
Headwall Concrete			
Headwall Concrete	May	Year 3	12.50
Bridge Replaces Microtunnel	May	Year 3	60.00
Bypass			
Bypass Inlet Structure			
Excavate and Stockpile	December	Year 4	6.53
Place Gravel Bedding	December	Year 4	0.32
Drive Foundation Piles	January	Year 5	38.83
Place Concrete Fill In Piles	February	Year 5	14.56
Bypass Slab On Grade			
Bypass SOG	February	Year 5	185.83
Wall Concrete			
Bypass Wall Concrete	March	Year 5	345.96

Forebays	Start Month	Start Year	Days
Place Roof Concrete			
Roof Concrete	June	Year 5	26.67
Roof Falsework			
Roof Falsework	June	Year 5	11.42
Load/Haul/Compact Backfill from Stockpile	July	Year 5	9.58
Bypass Piping			
Excavate and Export	November	Year 5	12.35
Install and Remove Sheet Piles	November	Year 5	28.88
Install and Remove Wales and Struts	November	Year 5	21.00
Stage and Handle Pipe	December	Year 5	1.21
Place Pipe (26")	December	Year 5	50.40
Weld Pipe (26' – 1" Thick)	January	Year 6	50.40
Place Backfill Slurry	February	Year 6	47.88
Load/Haul/Compact Backfill from Stockpile	March	Year 6	4.91
Flex Couplings	March	Year 6	12.00
Air Valves	March	Year 6	12.00
Byron Tract Forebay (Clifton Court)			
Dewatering			
Excavate Trenches	February	Year 4	641.25
Operate Pumps	February	Year 4	400.00
Pump Install & Maintain	February	Year 4	300.00
Construct/Remove Sedimentation Ponds	February	Year 4	66.67
Remove Unsuitable-Export			
Excavate & Haul Off Unsuitable	February	Year 4	1,063.85
Cut/Fill-Build Levees			
Scraper Cut/Fill	March	Year 4	396.93
Slope Finish	March	Year 4	86.00
Bottom Finish	March	Year 4	147.35
Levee Top Finish	March	Year 4	21.39
Export Suitable			
Load & Haul	February	Year 4	593.02
Slope Protection			
Place Rip Rap	January	Year 4	315.58
Place Bedding Material	January	Year 4	26.53
Place Fabric	January	Year 4	167.13
SWPPP	January	Year 4	500.00
Primary Maintenance Road			
Asphalt Concrete	February	Year 1	7.00

Table 3C-18. Alternatives 1A, 2A, and 6A (Pipeline/Tunnel Alignment) Control Structures Construction Schedule

Control Structures	Start Month	Start Year	Days
Forebay Outlet 1 Inline Control Structure			
Upstream and Downstream Transitions			
Excavation/Grading	December	Year 4	16.16
Place Gravel Bedding	December	Year 4	0.77
Excavate To Export	December	Year 4	90.96
Place Invert Slab Concrete			
Plant & Operations	December	Year 4	15.00
Placing Crews	December	Year 4	13.55
Finish	December	Year 4	62.07
Point & Patch	February	Year 5	4.58
Treat CJ	February	Year 5	6.22
Cure & Cleanup	February	Year 5	98.44
Formwork	May	Year 5	17.60
Place Wall Concrete			
Plant & Operations	December	Year 4	30.00
Placing Crews	December	Year 4	19.64
Point & Patch	December	Year 4	4.58
Cure & Cleanup	January	Year 5	3.66
Formwork	January	Year 5	132.11
Backfill	January	Year 5	10.00
Upstream and Downstream Control Structures			
Excavation/Grading	February	Year 9	1.58
Place Gravel Bedding	February	Year 9	0.18
Drive Foundation Piles	February	Year 9	18.33
Place Invert Slab Concrete			
Placing Crews	February	Year 9	4.54
Finish	February	Year 9	0.52
Point & Patch	February	Year 9	0.94
Treat CJ	February	Year 9	1.13
Cure & Cleanup	February	Year 9	2.73
Formwork	February	Year 9	5.89
Place Wall Concrete			
Placing Crews	February	Year 9	7.18
Point & Patch	February	Year 9	10.56
Cure & Cleanup	February	Year 9	13.73
Formwork	March	Year 9	65.99
Backfill	May	Year 9	10.00

Control Structures	Start Month	Start Year	Days
Forebay Outlet 2 Inline Control Structure			
Upstream and Downstream Transitions			
Excavation/Grading	February	Year 4	24.67
Place Gravel Bedding	February	Year 4	0.91
Excavate To Export	February	Year 4	90.96
Place Invert Slab Concrete			
Plant & Operations	February	Year 4	15.00
Placing Crews	February	Year 4	13.55
Finish	February	Year 4	62.07
Point & Patch	April	Year 4	4.58
Treat CJ	April	Year 4	6.22
Cure & Cleanup	April	Year 4	98.44
Formwork	July	Year 4	17.60
Place Wall Concrete			
Plant & Operations	July	Year 4	30.00
Placing Crews	July	Year 4	19.64
Point & Patch	July	Year 4	4.58
Cure & Cleanup	July	Year 4	3.66
Formwork	July	Year 4	132.11
Backfill	November	Year 4	47.46
Upstream and Downstream Control Structures			
Install / Remove Sheetpile Cutoff In River	February	Year 9	195.00
Excavation/Grading	February	Year 9	2.42
Place Gravel Bedding	February	Year 9	0.08
Drive Foundation Piles	February	Year 9	18.33
Place Invert Slab Concrete			
Placing Crews	February	Year 9	4.54
Finish	February	Year 9	0.52
Point & Patch	February	Year 9	0.94
Treat CJ	February	Year 9	1.13
Cure & Cleanup	February	Year 9	2.73
Formwork	February	Year 9	5.89
Place Wall Concrete			
Placing Crews	February	Year 9	7.18
Point & Patch	February	Year 9	10.56
Cure & Cleanup	February	Year 9	13.73
Formwork	February	Year 9	65.99
Backfill	April	Year 9	10.00
California Aqueduct Inline Control Structure			
Upstream and Downstream Transitions			
Dewatering	February	Year 9	121.00
Excavation/Grading	February	Year 9	24.67

Control Structures	Start Month	Start Year	Days
Place Gravel Bedding	February	Year 9	0.91
Place Invert Slab Concrete			
Plant & Operations	February	Year 9	15.00
Placing Crews	February	Year 9	13.55
Finish	February	Year 9	62.07
Point & Patch	March	Year 9	4.58
Treat CJ	March	Year 9	6.22
Cure & Cleanup	March	Year 9	98.44
Formwork	June	Year 9	17.60
Place Wall Concrete			
Plant & Operations	June	Year 9	30.00
Placing Crews	June	Year 9	19.64
Point & Patch	June	Year 9	4.58
Cure & Cleanup	June	Year 9	3.66
Formwork	July	Year 9	132.11
Backfill	November	Year 9	47.46
Upstream and Downstream Control Structures			
Install / Remove Sheetpile Cutoff In River	February	Year 9	195.00
Excavation/Grading	August	Year 9	2.42
Place Gravel Bedding	August	Year 9	0.08
Drive Foundation Piles	August	Year 9	18.33
Place Invert Slab Concrete			
Plant & Operations	August	Year 9	1.68
Placing Crews	August	Year 9	4.54
Finish	August	Year 9	0.52
Point & Patch	August	Year 9	0.94
Treat CJ	August	Year 9	1.13
Cure & Cleanup	August	Year 9	2.73
Formwork	August	Year 9	5.89
Place Wall Concrete			
Plant & Operations	August	Year 9	1.61
Placing Crews	August	Year 9	7.18
Point & Patch	August	Year 9	10.56
Cure & Cleanup	August	Year 9	13.73
Formwork	September	Year 9	65.99
Backfill Shaft	November	Year 9	10.00
Delta Mendota Inline Control Structure			
Upstream and Downstream Transitions			
Dewatering	February	Year 9	121.00
Excavation/Grading	February	Year 9	2.42
Place Gravel Bedding	February	Year 9	0.91
Place Invert Slab Concrete			

Control Structures	Start Month	Start Year	Days
Plant & Operations	February	Year 9	15.00
Placing Crews	February	Year 9	13.55
Finish	February	Year 9	62.07
Point & Patch	April	Year 9	4.58
Treat CJ	April	Year 9	6.22
Cure & Cleanup	April	Year 9	98.44
Formwork	July	Year 9	17.60
Place Wall Concrete			
Plant & Operations	July	Year 9	15.00
Placing Crews	July	Year 9	19.64
Point & Patch	July	Year 9	4.58
Cure & Cleanup	July	Year 9	3.66
Formwork	July	Year 9	132.11
Backfill Shaft	September	Year 9	101.29
Upstream and Downstream Control Structures			
Install / Remove Sheetpile Cutoff In River	February	Year 9	195.00
Excavation/Grading	August	Year 9	2.42
Place Gravel Bedding	August	Year 9	0.08
Drive Foundation Piles	August	Year 9	18.33
Place Invert Slab Concrete			
Plant & Operations	August	Year 9	1.68
Placing Crews	August	Year 9	4.52
Finish	August	Year 9	0.52
Point & Patch	August	Year 9	0.94
Treat CJ	August	Year 9	1.12
Cure & Cleanup	August	Year 9	2.75
Formwork	August	Year 9	5.86
Place Wall Concrete			
Plant & Operations	August	Year 9	1.61
Placing Crews	August	Year 9	7.18
Point & Patch	August	Year 9	10.56
Cure & Cleanup	August	Year 9	13.73
Formwork	September	Year 9	65.99
Backfill	November	Year 9	10.00
Head of Old River Barrier *			
Phase 1	January	Year 7	290
Phase 2	November	Year 7	390
Phase 3	December	Year 8	120
* Barrier only included for Alternatives 2A and 4			

1 **Table 3C-19. Alternatives 1B, 2B, and 6B (East Alignment) Construction Schedule**

Phase	Start Month	Start Year	Days
Intake 1			
Clear & Grub/Demolition	February	Year 2	1.00
Construct Detour Road			
Dewater	April	Year 2	6.00
Overexc/Recompact	April	Year 2	6.00
Import/Place Fill	April	Year 2	6.00
Base & Paving	April	Year 2	6.00
Stripe & Sign	April	Year 2	1.00
Const B/U Levee/Widen Levee Top Access			
Dewater	April	Year 2	6.00
Overexc/Recompact	April	Year 2	6.00
Import & Place Fill	April	Year 2	6.00
Asphalt Concrete F/Road	April	Year 2	6.00
Stripe & Sign	April	Year 2	1.00
Construct Sheetpile Cofferdam[2]			
Install & Remove Sheet Piles			
Drive Sheet Piles, PZ40	November	Year 2	50.67
Cutoff & Remove Sheetpiles	December	Year 2	12.67
Install & Remove Wales & Struts			
Install Wales & Struts	February	Year 4	5.42
Cutoff & Remove Sheetpiles	February	Year 4	1.45
Excavate Cell			
Clamshell Excavation	September	Year 3	37.17
Unload Barge & Export	October	Year 3	14.30
Drive Foundation Piles			
Provide Piles			
Purchase Piles, 24" X 90'	November	Year 3	16.88
Weld Bottom Closure & Joint	November	Year 3	33.75
Drive Piles			
Drive Foundation Piles	December	Year 3	45.00
Place Tremie Plug			
Unwater Cell	January	Year 4	2.00
Place Concrete	January	Year 4	6.18
Microtunnel Intake Conduits			
Set Pipe forms & Bulkhead	February	Year 4	15.00
Equip Intake for Jacking	March	Year 4	7.00
Set TBM & Jacking Frame	April	Year 4	36.00
Jack Pipe inplace	August	Year 4	120.00
Remove TBM & Haul to Pier	August	Year 4	15.00
Grouting			
Pump Anular Grout	September	Year 4	24.00
Clean Pipe	October	Year 4	12.00
Muck Disposal			
Muck Disposal	November	Year 4	82.00
Place Concrete Hopper			
Place Concrete			
Plant & Operations	July	Year 4	101.28
Placing Crew	July	Year 4	57.78

[2] It is assumed that all in-water construction activities will occur between June 1 and October 31.

Phase	Start Month	Start Year	Days
Point & Patch	August	Year 4	6.16
Treat CJ	September	Year 4	59.88
Cure & Cleanup	October	Year 4	16.90
Formwork	October	Year 4	92.18
Construct Walls & Deck			
Outside Walls Concrete			
Plant & Operations	October	Year 4	15.45
Placing Crew	October	Year 4	7.05
Point & Patch	October	Year 4	28.38
Treat CJ	November	Year 4	7.89
Cure & Cleanup	November	Year 4	33.12
Formwork	December	Year 4	132.38
Falsework Up/Down For Roof	August	Year 5	42.25
Slab Concrete			
Plant & Operations	January	Year 5	4.27
Placing Crew	January	Year 5	1.30
Finish	January	Year 5	5.84
Point & Patch	January	Year 5	7.15
Treat CJ	January	Year 5	1.27
Cure & Cleanup	January	Year 5	6.95
Formwork	January	Year 5	37.25
Bridge	February	Year 5	60.00
Rip Rap			
Place Rip Rap	February	Year 2	5.83
Place Bedding Material	February	Year 2	1.25
Place Fabric	February	Year 2	2.83
Barge Unloading Facility			
Construct Barge Unloading Facility	January	Year 4	21.00
Remove Barge Unloading Facility	October	Year 5	21.00
Cleanup, Demobe	June	Year 5	5.00
Intake 2			
Clear & Grub/Demolition	February	Year 3	1.00
Construct Detour Road			
Dewater	March	Year 3	6.00
Overexc/Recompact	March	Year 3	6.00
Import/Place Fill	March	Year 3	6.00
Base & Paving	March	Year 3	6.00
Stripe & Sign	March	Year 3	1.00
Const B/U Levee/Widen Levee Top Access			
Dewater	March	Year 3	6.00
Overexc/Recompact	March	Year 3	6.00
Import & Place Fill	April	Year 3	6.00
Asphalt Concrete F/Road	May	Year 3	6.00
Stripe & Sign	May	Year 3	1.00
Construct Sheetpile Cofferdam[3]			
Install & Remove Sheet Piles			
Drive Sheet Piles, PZ40	September	Year 3	50.67
Cutoff & Remove Sheetpiles	October	Year 3	12.67
Install & Remove Wales & Struts			

[3] It is assumed that all in-water construction activities will occur between June 1 and October 31.

Phase	Start Month	Start Year	Days
Install Wales & Struts	December	Year 4	5.42
Cutoff & Remove Sheetpiles	December	Year 4	1.45
Excavate Cell			
Clamshell Excavation	September	Year 4	37.17
Unload Barge & Export	October	Year 4	14.30
Drive Foundation Piles			
Provide Piles			
Purchase Piles, 24" X 90'	November	Year 4	16.88
Weld Bottom Closure & Joint	November	Year 4	33.75
Drive Piles			
Drive Foundation Piles	December	Year 4	45.00
Place Tremie Plug			
Unwater Cell	January	Year 5	2.00
Place Concrete	January	Year 5	6.18
Microtunnel Intake Conduits			
Set Pipe forms & Bulkhead	March	Year 5	15.00
Equip Intake for Jacking	April	Year 5	7.00
Set TBM & Jacking Frame	May	Year 5	36.00
Jack Pipe inplace	September	Year 5	120.00
Remove TBM & Haul to Pier	September	Year 5	15.00
Grouting			
Pump Anular Grout	October	Year 5	24.00
Clean Pipe	November	Year 5	12.00
Muck Disposal			
Muck Disposal	December	Year 5	82.00
Place Concrete Hopper			
Place Concrete			
Plant & Operations	July	Year 5	101.28
Placing Crew	July	Year 5	57.78
Point & Patch	August	Year 5	6.16
Treat CJ	September	Year 5	59.88
Cure & Cleanup	October	Year 5	16.90
Formwork	October	Year 5	92.18
Construct Walls & Deck			
Outside Walls Concrete			
Plant & Operations	October	Year 5	15.45
Placing Crew	October	Year 5	7.05
Point & Patch	October	Year 5	28.38
Treat CJ	November	Year 5	7.89
Cure & Cleanup	November	Year 5	33.12
Formwork	December	Year 5	132.38
Falsework Up/Down For Roof	August	Year 6	42.25
Slab Concrete			
Plant & Operations	January	Year 6	4.27
Placing Crew	January	Year 6	1.30
Finish	January	Year 6	5.84
Point & Patch	January	Year 6	7.15
Treat CJ	January	Year 6	1.27
Cure & Cleanup	January	Year 6	6.95
Formwork	January	Year 6	37.25
Bridge	February	Year 6	60.00

Phase	Start Month	Start Year	Days
Rip Rap			
Place Rip Rap	February	Year 3	5.83
Place Bedding Material	February	Year 3	1.25
Place Fabric	February	Year 3	2.83
Barge Unloading Facility			
Construct Barge Unloading Facility	January	Year 5	21.00
Remove Barge Unloading Facility	November	Year 6	21.00
Cleanup, Demobe	November	Year 6	5.00
Intake 3			
Clear & Grub/Demolition	March	Year 2	1.00
Construct Detour Road			
Dewater	April	Year 2	6.00
Overexc/Recompact	December	Year 2	6.00
Import/Place Fill	December	Year 2	6.00
Base & Paving	December	Year 2	6.00
Stripe & Sign	December	Year 2	1.00
Const B/U Levee/Widen Levee Top Access			
Dewater	March	Year 3	6.00
Overexc/Recompact	March	Year 3	6.00
Import & Place Fill	April	Year 3	6.00
Asphalt Concrete F/Road	May	Year 3	6.00
Stripe & Sign	May	Year 3	1.00
Construct Sheetpile Cofferdam[4]			
Install & Remove Sheet Piles			
Drive Sheet Piles, PZ40	June	Year 3	50.67
Cutoff & Remove Sheetpiles	July	Year 3	12.67
Install & Remove Wales & Struts			
Install Wales & Struts	February	Year 4	5.42
Cutoff & Remove Sheetpiles	February	Year 4	1.45
Excavate Cell			
Clamshell Excavation	November	Year 3	37.17
Unload Barge & Export	December	Year 3	14.30
Drive Foundation Piles			
Provide Piles			
Purchase Piles, 24" X 90'	November	Year 3	16.88
Weld Bottom Closure & Joint	November	Year 3	33.75
Drive Piles			
Drive Foundation Piles	December	Year 3	45.00
Place Tremie Plug			
Unwater Cell	January	Year 4	2.00
Place Concrete	January	Year 4	6.18
Microtunnel Intake Conduits			
Set Pipe forms & Bulkhead	March	Year 4	15.00
Equip Intake for Jacking	April	Year 4	7.00
Set TBM & Jacking Frame	May	Year 4	36.00
Jack Pipe inplace	September	Year 4	120.00
Remove TBM & Haul to Pier	September	Year 4	15.00
Grouting			
Pump Anular Grout	October	Year 4	24.00

[4] It is assumed that all in-water construction activities will occur between June 1 and October 31.

Phase	Start Month	Start Year	Days
Clean Pipe	November	Year 4	12.00
Muck Disposal			
Muck Disposal	December	Year 4	82.00
Place Concrete Hopper			
Place Concrete			
Plant & Operations	July	Year 4	101.28
Placing Crew	July	Year 4	57.78
Point & Patch	August	Year 4	6.16
Treat CJ	September	Year 4	59.88
Cure & Cleanup	October	Year 4	16.90
Formwork	October	Year 4	92.18
Construct Walls & Deck			
Outside Walls Concrete			
Plant & Operations	November	Year 4	15.45
Placing Crew	November	Year 4	7.05
Point & Patch	November	Year 4	28.38
Treat CJ	December	Year 4	7.89
Cure & Cleanup	December	Year 4	33.12
Formwork	January	Year 5	132.38
Falsework Up/Down For Roof	August	Year 6	42.25
Slab Concrete			
Plant & Operations	January	Year 5	4.27
Placing Crew	January	Year 5	1.30
Finish	January	Year 5	5.84
Point & Patch	January	Year 5	7.15
Treat CJ	January	Year 5	1.27
Cure & Cleanup	January	Year 5	6.95
Formwork	January	Year 5	37.25
Bridge	February	Year 5	60.00
Rip Rap			
Place Rip Rap	March	Year 2	5.83
Place Bedding Material	March	Year 2	1.25
Place Fabric	March	Year 2	2.83
Barge Unloading Facility			
Construct Barge Unloading Facility	February	Year 5	21.00
Remove Barge Unloading Facility	December	Year 5	21.00
Cleanup, Demobe	December	Year 5	5.00
Intake 4			
Clear & Grub/Demolition	April	Year 3	1.00
Construct Detour Road			
Dewater	May	Year 3	6.00
Overexc/Recompact	May	Year 3	6.00
Import/Place Fill	May	Year 3	6.00
Base & Paving	May	Year 3	6.00
Stripe & Sign	May	Year 3	1.00
Const B/U Levee/Widen Levee Top Access			
Dewater	May	Year 3	6.00
Overexc/Recompact	May	Year 3	6.00
Import & Place Fill	June	Year 3	6.00
Asphalt Concrete F/Road	July	Year 3	6.00
Stripe & Sign	July	Year 3	1.00

Phase	Start Month	Start Year	Days
Construct Sheetpile Cofferdam[5]			
Install & Remove Sheet Piles			
Drive Sheet Piles, PZ40	May	Year 4	50.67
Cutoff & Remove Sheetpiles	June	Year 5	12.67
Install & Remove Wales & Struts			
Install Wales & Struts	January	Year 5	5.42
Cutoff & Remove Sheetpiles	January	Year 5	1.45
Excavate Cell			
Clamshell Excavation	October	Year 4	37.17
Unload Barge & Export	November	Year 6	14.30
Drive Foundation Piles			
Provide Piles			
Purchase Piles, 24" X 90'	October	Year 4	16.88
Weld Bottom Closure & Joint	October	Year 4	33.75
Drive Piles			
Drive Foundation Piles	November	Year 4	45.00
Place Tremie Plug			
Unwater Cell	January	Year 4	2.00
Place Concrete	January	Year 4	6.18
Microtunnel Intake Conduits			
Set Pipe forms & Bulkhead	February	Year 5	15.00
Equip Intake for Jacking	March	Year 5	7.00
Set TBM & Jacking Frame	April	Year 5	36.00
Jack Pipe inplace	August	Year 5	120.00
Remove TBM & Haul to Pier	August	Year 5	15.00
Grouting			
Pump Anular Grout	September	Year 5	24.00
Clean Pipe	October	Year 5	12.00
Muck Disposal			
Muck Disposal	November	Year 5	82.00
Place Concrete Hopper			
Place Concrete			
Plant & Operations	July	Year 5	101.28
Placing Crew	July	Year 5	57.78
Point & Patch	August	Year 5	6.16
Treat CJ	September	Year 5	59.88
Cure & Cleanup	October	Year 5	16.90
Formwork	October	Year 5	92.18
Construct Walls & Deck			
Outside Walls Concrete			
Plant & Operations	October	Year 5	15.45
Placing Crew	October	Year 5	7.05
Point & Patch	October	Year 5	28.38
Treat CJ	January	Year 5	7.89
Cure & Cleanup	January	Year 5	33.12
Formwork	December	Year 5	132.38
Falsework Up/Down For Roof	September	Year 6	42.25
Slab Concrete			
Plant & Operations	February	Year 6	4.27

[5] It is assumed that all in-water construction activities will occur between June 1 and October 31.

Phase	Start Month	Start Year	Days
Placing Crew	February	Year 6	1.30
Finish	February	Year 6	5.84
Point & Patch	February	Year 6	7.15
Treat CJ	February	Year 6	1.27
Cure & Cleanup	February	Year 6	6.95
Formwork	February	Year 6	37.25
Bridge	January	Year 6	60.00
Rip Rap			
Place Rip Rap	April	Year 3	5.83
Place Bedding Material	April	Year 3	1.25
Place Fabric	April	Year 3	2.83
Barge Unloading Facility			
Construct Barge Unloading Facility	January	Year 5	21.00
Remove Barge Unloading Facility	November	Year 6	21.00
Cleanup, Demobe	November	Year 6	5.00
Intake 5			
Clear & Grub/Demolition	May	Year 2	1.00
Construct Detour Road			
Dewater	June	Year 2	6.00
Overexc/Recompact	June	Year 2	6.00
Import/Place Fill	June	Year 2	6.00
Base & Paving	June	Year 2	6.00
Stripe & Sign	June	Year 2	1.00
Const B/U Levee/Widen Levee Top Access			
Dewater	June	Year 2	6.00
Overexc/Recompact	June	Year 2	6.00
Import & Place Fill	July	Year 2	6.00
Asphalt Concrete F/Road	August	Year 2	6.00
Stripe & Sign	August	Year 2	1.00
Construct Sheetpile Cofferdam[6]			
Install & Remove Sheet Piles			
Drive Sheet Piles, PZ40	May	Year 3	50.67
Cutoff & Remove Sheetpiles	June	Year 3	12.67
Install & Remove Wales & Struts			
Install Wales & Struts	January	Year 4	5.42
Cutoff & Remove Sheetpiles	January	Year 4	1.45
Excavate Cell			
Clamshell Excavation	October	Year 3	37.17
Unload Barge & Export	November	Year 3	14.30
Drive Foundation Piles			
Provide Piles			
Purchase Piles, 24" X 90'	November	Year 3	16.88
Weld Bottom Closure & Joint	November	Year 3	33.75
Drive Piles			
Drive Foundation Piles	December	Year 3	45.00
Place Tremie Plug			
Unwater Cell	December	Year 4	2.00
Place Concrete	December	Year 4	6.18
Microtunnel Intake Conduits			

[6] It is assumed that all in-water construction activities will occur between June 1 and October 31.

Phase	Start Month	Start Year	Days
Set Pipe forms & Bulkhead	April	Year 4	15.00
Equip Intake for Jacking	May	Year 4	7.00
Set TBM & Jacking Frame	June	Year 4	36.00
Jack Pipe inplace	October	Year 4	120.00
Remove TBM & Haul to Pier	October	Year 4	15.00
Grouting			
Pump Anular Grout	November	Year 4	24.00
Clean Pipe	December	Year 4	12.00
Muck Disposal			
Muck Disposal	January	Year 5	82.00
Place Concrete Hopper			
Place Concrete			
Plant & Operations	July	Year 4	101.28
Placing Crew	July	Year 4	57.78
Point & Patch	August	Year 4	6.16
Treat CJ	September	Year 4	59.88
Cure & Cleanup	October	Year 4	16.90
Formwork	October	Year 4	92.18
Construct Walls & Deck			
Outside Walls Concrete			
Plant & Operations	October	Year 4	15.45
Placing Crew	October	Year 4	7.05
Point & Patch	October	Year 4	28.38
Treat CJ	November	Year 4	7.89
Cure & Cleanup	November	Year 4	33.12
Formwork	December	Year 4	132.38
Falsework Up/Down For Roof	August	Year 5	42.25
Slab Concrete			
Plant & Operations	January	Year 5	4.27
Placing Crew	January	Year 5	1.30
Finish	January	Year 5	5.84
Point & Patch	January	Year 5	7.15
Treat CJ	January	Year 5	1.27
Cure & Cleanup	January	Year 5	6.95
Formwork	January	Year 5	37.25
Bridge	February	Year 5	60.00
Rip Rap			
Place Rip Rap	May	Year 2	5.83
Place Bedding Material	May	Year 2	1.25
Place Fabric	May	Year 2	2.83
Barge Unloading Facility			
Construct Barge Unloading Facility	March	Year 4	21.00
Remove Barge Unloading Facility	July	Year 5	21.00
Cleanup, Demobe	July	Year 5	5.00
Pumping Plant 1			
Clearing/Grubbing			
Clearing/Grubbing	February	Year 2	5.00
Dewatering	February	Year 2	434.00
Excavation & Backfill			
Excavation & Haul To Waste	March	Year 2	82.53
Excavation & Stockpile	July	Year 3	44.37

Phase	Start Month	Start Year	Days
Place Stockpiled Material As Backfill	July	Year 3	28.26
Import & Place Material	July	Year 3	190.14
Sedimentation Basin			
Place Gavel Bedding	February	Year 2	5.20
Drive Foundation Piles	May	Year 2	118.00
Place Concrete Fill In Piles	December	Year 2	42.46
Sedimentation SOG & Solids Lagoons			
Plant & Operations	November	Year 2	66.41
Placing Crews	November	Year 2	26.20
Point & Patch	November	Year 2	5.97
Treat CJ	December	Year 2	10.75
Cure & Cleanup	December	Year 2	115.00
Formwork	March	Year 3	37.37
Sedimentation Wall Concrete			
Plant & Operations	June	Year 3	140.00
Placing Crews	June	Year 3	27.41
Finish	June	Year 3	1.68
Point & Patch	July	Year 3	72.31
Treat CJ	September	Year 3	4.85
Cure & Cleanup	September	Year 3	451.95
Sedimentation Basin Roof Concrete			
Placing Crews	January	Year 4	2.23
Finish	January	Year 4	1.40
Point & Patch	January	Year 4	2.31
Cure & Cleanup	January	Year 4	12.00
Formwork	January	Year 4	14.42
Roof Falsework	February	Year 4	46.68
Hanging & Baffle Wall Concrete			
Plant & Operations	June	Year 2	9.05
Finish	June	Year 2	0.47
Point & Patch	June	Year 2	14.88
Treat CJ	June	Year 2	1.60
Cure & Cleanup	June	Year 2	20.78
Formwork	July	Year 2	93.00
Hanging Wall Falsework	October	Year 2	0.58
Pump House			
Place Gravel Bedding	April	Year 2	2.18
Drive Foundation Piles	July	Year 2	71.33
Place Concrete Fill On Piles	October	Year 2	25.65
Slab On Grade Concrete			
Plant & Operations	September	Year 2	50.00
Placing Crews	September	Year 2	20.19
Finish	September	Year 2	15.40
Point & Patch	October	Year 2	0.85
Treat CJ	October	Year 2	6.77
Cure & Cleanup	October	Year 2	28.70
Formwork	November	Year 2	5.29
Pump House Wall Concrete			
Plant & Operations	November	Year 2	100.00
Placing Crews	November	Year 2	32.96
Finish	December	Year 2	3.45

Phase	Start Month	Start Year	Days
Point & Patch	December	Year 2	80.32
Treat CJ	February	Year 3	6.77
Cure & Cleanup	February	Year 3	113.99
Formwork	June	Year 3	502.02
Pump House Roof Concrete			
Plant & Operations	April	Year 3	15.48
Placing Crews	April	Year 3	11.64
Finish	April	Year 3	15.68
Point & Patch	April	Year 3	19.29
Cure & Cleanup	May	Year 3	50.17
Formwork	July	Year 3	120.59
Roof Falsework	November	Year 3	46.68
Flow Meter Vaults			
Flow Meter Vault Concrete	December	Year 3	23.71
Ultra-Sonic Flow Meters	December	Year 3	14.00
Butterfly Valves			
Electrical Actuated BFV(96")	June	Year 3	35.00
Hydraulic Actuated BFV(96")	June	Year 3	35.00
Piping To Outside			
Discharge Piping (8' Dia)	June	Year 3	56.00
Installation Of Pumps, Valves & Fittings	June	Year 3	240.00
Flex Couplings	June	Year 3	14.00
Air Valves	June	Year 3	7.00
Pumping Plant 2			
Clearing/Grubbing			
Clearing/Grubbing	April	Year 2	5.00
Dewatering	April	Year 2	434.00
Excavation & Backfill			
Excavation & Haul To Waste	May	Year 2	82.53
Excavation & Stockpile	October	Year 3	44.37
Place Stockpiled Material As Backfill	October	Year 3	28.26
Import & Place Material	October	Year 3	190.14
Sedimentation Basin			
Place Gavel Bedding	June	Year 2	5.20
Drive Foundation Piles	September	Year 2	118.00
Place Concrete Fill In Piles	April	Year 3	42.46
Sedimentation SOG & Solids Lagoons			
Plant & Operations	February	Year 3	66.41
Placing Crews	February	Year 3	26.20
Point & Patch	February	Year 3	5.97
Treat CJ	March	Year 3	10.75
Cure & Cleanup	March	Year 3	115.00
Formwork	June	Year 3	37.37
Sedimentation Wall Concrete			
Plant & Operations	October	Year 3	140.00
Placing Crews	October	Year 3	27.41
Finish	October	Year 3	1.68
Point & Patch	November	Year 3	72.31
Treat CJ	January	Year 4	4.85
Cure & Cleanup	January	Year 4	451.95
Sedimentation Basin Roof Concrete			

Phase	Start Month	Start Year	Days
Placing Crews	April	Year 4	2.23
Finish	April	Year 4	1.40
Point & Patch	April	Year 4	2.31
Cure & Cleanup	April	Year 4	12.00
Formwork	April	Year 4	14.42
Roof Falsework	May	Year 4	46.68
Hanging & Baffle Wall Concrete			
Plant & Operations	October	Year 2	9.05
Finish	October	Year 2	0.47
Point & Patch	October	Year 2	14.88
Treat CJ	October	Year 2	1.60
Cure & Cleanup	October	Year 2	20.78
Formwork	November	Year 2	93.00
Hanging Wall Falsework	February	Year 3	0.58
Pump House			
Place Gravel Bedding	August	Year 2	2.18
Drive Foundation Piles	October	Year 2	71.33
Place Concrete Fill On Piles	December	Year 2	25.65
Slab On Grade Concrete			
Plant & Operations	November	Year 2	50.00
Placing Crews	November	Year 2	20.19
Finish	November	Year 2	15.40
Point & Patch	December	Year 2	0.85
Treat CJ	December	Year 2	6.77
Cure & Cleanup	December	Year 2	28.70
Formwork	January	Year 2	5.29
Pump House Wall Concrete			
Plant & Operations	May	Year 3	100.00
Placing Crews	May	Year 3	32.96
Finish	June	Year 3	3.45
Point & Patch	June	Year 3	80.32
Treat CJ	August	Year 3	6.77
Cure & Cleanup	August	Year 3	113.99
Formwork	December	Year 3	502.02
Pump House Roof Concrete			
Plant & Operations	August	Year 3	15.48
Placing Crews	August	Year 3	11.64
Finish	August	Year 3	15.68
Point & Patch	August	Year 3	19.29
Cure & Cleanup	September	Year 3	50.17
Formwork	November	Year 3	120.59
Roof Falsework	March	Year 4	46.68
Flow Meter Vaults			
Flow Meter Vault Concrete	September	Year 5	23.71
Ultra-Sonic Flow Meters	September	Year 5	14.00
Butterfly Valves			
Electrical Actuated BFV(96")	October	Year 5	35.00
Hydraulic Actuated BFV(96")	October	Year 5	35.00
Piping To Outside			
Discharge Piping (8' Dia)	October	Year 5	56.00
Installation Of Pumps, Valves & Fittings	October	Year 5	240.00

Phase	Start Month	Start Year	Days
Flex Couplings	October	Year 5	14.00
Air Valves	October	Year 5	7.00
Pumping Plant 3			
Clearing/Grubbing			
Clearing/Grubbing	March	Year 2	5.00
Dewatering	March	Year 2	434.00
Excavation & Backfill			
Excavation & Haul To Waste	April	Year 2	82.53
Excavation & Stockpile	July	Year 3	44.37
Place Stockpiled Material As Backfill	July	Year 3	28.26
Import & Place Material	July	Year 3	190.14
Sedimentation Basin			
Place Gavel Bedding	March	Year 2	5.20
Drive Foundation Piles	June	Year 2	118.00
Place Concrete Fill In Piles	January	Year 3	42.46
Sedimentation SOG & Solids Lagoons			
Plant & Operations	January	Year 3	66.41
Placing Crews	January	Year 3	26.20
Point & Patch	January	Year 3	5.97
Treat CJ	February	Year 3	10.75
Cure & Cleanup	February	Year 3	115.00
Formwork	May	Year 3	37.37
Sedimentation Wall Concrete			
Plant & Operations	August	Year 3	140.00
Placing Crews	August	Year 3	27.41
Finish	August	Year 3	1.68
Point & Patch	September	Year 3	72.31
Treat CJ	November	Year 3	4.85
Cure & Cleanup	November	Year 3	451.95
Sedimentation Basin Roof Concrete			
Placing Crews	March	Year 4	2.23
Finish	March	Year 4	1.40
Point & Patch	March	Year 4	2.31
Cure & Cleanup	March	Year 4	12.00
Formwork	March	Year 4	14.42
Roof Falsework	April	Year 4	46.68
Hanging & Baffle Wall Concrete			
Plant & Operations	July	Year 2	9.05
Finish	July	Year 2	0.47
Point & Patch	July	Year 2	14.88
Treat CJ	July	Year 2	1.60
Cure & Cleanup	July	Year 2	20.78
Formwork	August	Year 2	93.00
Hanging Wall Falsework	November	Year 2	0.58
Pump House			
Place Gravel Bedding	June	Year 2	2.18
Drive Foundation Piles	September	Year 2	71.33
Place Concrete Fill On Piles	January	Year 3	25.65
Slab On Grade Concrete			
Plant & Operations	October	Year 2	50.00
Placing Crews	October	Year 2	20.19

Phase	Start Month	Start Year	Days
Finish	October	Year 2	15.40
Point & Patch	November	Year 2	0.85
Treat CJ	November	Year 2	6.77
Cure & Cleanup	November	Year 2	28.70
Formwork	December	Year 2	5.29
Pump House Wall Concrete			
Plant & Operations	February	Year 3	100.00
Placing Crews	February	Year 3	32.96
Finish	March	Year 3	3.45
Point & Patch	March	Year 3	80.32
Treat CJ	May	Year 3	6.77
Cure & Cleanup	May	Year 3	113.99
Formwork	September	Year 3	502.02
Pump House Roof Concrete			
Plant & Operations	May	Year 3	15.48
Placing Crews	May	Year 3	11.64
Finish	May	Year 3	15.68
Point & Patch	May	Year 3	19.29
Cure & Cleanup	June	Year 3	50.17
Formwork	August	Year 3	120.59
Roof Falsework	December	Year 3	46.68
Flow Meter Vaults			
Flow Meter Vault Concrete	April	Year 4	23.71
Ultra-Sonic Flow Meters	April	Year 4	14.00
Butterfly Valves			
Electrical Actuated BFV(96")	August	Year 3	35.00
Hydraulic Actuated BFV(96")	August	Year 3	35.00
Piping To Outside			
Discharge Piping (8' Dia)	August	Year 3	56.00
Installation Of Pumps, Valves & Fittings	August	Year 3	240.00
Flex Couplings	August	Year 3	14.00
Air Valves	August	Year 3	7.00
Pumping Plant 4			
Clearing/Grubbing			
Clearing/Grubbing	June	Year 2	5.00
Dewatering	June	Year 2	434.00
Excavation & Backfill			
Excavation & Haul To Waste	July	Year 2	82.53
Excavation & Stockpile	November	Year 3	44.37
Place Stockpiled Material As Backfill	November	Year 3	28.26
Import & Place Material	November	Year 3	190.14
Sedimentation Basin			
Place Gavel Bedding	June	Year 2	5.20
Drive Foundation Piles	September	Year 2	118.00
Place Concrete Fill In Piles	April	Year 3	42.46
Sedimentation SOG & Solids Lagoons			
Plant & Operations	March	Year 3	66.41
Placing Crews	March	Year 3	26.20
Point & Patch	March	Year 3	5.97
Treat CJ	April	Year 3	10.75
Cure & Cleanup	April	Year 3	115.00

Phase	Start Month	Start Year	Days
Formwork	July	Year 3	37.37
Sedimentation Wall Concrete			
Plant & Operations	November	Year 3	140.00
Placing Crews	November	Year 3	27.41
Finish	November	Year 3	1.68
Point & Patch	December	Year 3	72.31
Treat CJ	February	Year 4	4.85
Cure & Cleanup	February	Year 4	451.95
Sedimentation Basin Roof Concrete			
Placing Crews	May	Year 4	2.23
Finish	May	Year 4	1.40
Point & Patch	May	Year 4	2.31
Cure & Cleanup	May	Year 4	12.00
Formwork	May	Year 4	14.42
Roof Falsework	June	Year 4	46.68
Hanging & Baffle Wall Concrete			
Plant & Operations	November	Year 2	9.05
Finish	November	Year 2	0.47
Point & Patch	November	Year 2	14.88
Treat CJ	November	Year 2	1.60
Cure & Cleanup	November	Year 2	20.78
Formwork	December	Year 2	93.00
Hanging Wall Falsework	March	Year 3	0.58
Pump House			
Place Gravel Bedding	September	Year 2	2.18
Drive Foundation Piles	October	Year 2	71.33
Place Concrete Fill On Piles	January	Year 3	25.65
Slab On Grade Concrete			
Plant & Operations	January	Year 3	50.00
Placing Crews	January	Year 3	20.19
Finish	January	Year 3	15.40
Point & Patch	February	Year 3	0.85
Treat CJ	February	Year 3	6.77
Cure & Cleanup	February	Year 3	28.70
Formwork	March	Year 3	5.29
Pump House Wall Concrete			
Plant & Operations	May	Year 3	100.00
Placing Crews	May	Year 3	32.96
Finish	June	Year 3	3.45
Point & Patch	June	Year 3	80.32
Treat CJ	August	Year 3	6.77
Cure & Cleanup	August	Year 3	113.99
Formwork	December	Year 3	502.02
Pump House Roof Concrete			
Plant & Operations	September	Year 3	15.48
Placing Crews	September	Year 3	11.64
Finish	September	Year 3	15.68
Point & Patch	September	Year 3	19.29
Cure & Cleanup	October	Year 3	50.17
Formwork	December	Year 3	120.59
Roof Falsework	April	Year 4	46.68

Phase	Start Month	Start Year	Days
Flow Meter Vaults			
Flow Meter Vault Concrete	November	Year 5	23.71
Ultra-Sonic Flow Meters	November	Year 5	14.00
Butterfly Valves			
Electrical Actuated BFV(96")	January	Year 6	35.00
Hydraulic Actuated BFV(96")	January	Year 6	35.00
Piping To Outside			
Discharge Piping (8' Dia)	January	Year 6	56.00
Installation Of Pumps, Valves & Fittings	January	Year 6	240.00
Flex Couplings	January	Year 6	14.00
Air Valves	January	Year 6	7.00
Pumping Plant 5			
Clearing/Grubbing			
Clearing/Grubbing	April	Year 2	5.00
Dewatering	April	Year 2	434.00
Excavation & Backfill			
Excavation & Haul To Waste	May	Year 2	82.53
Excavation & Stockpile	August	Year 3	44.37
Place Stockpiled Material As Backfill	August	Year 3	28.26
Import & Place Material	August	Year 3	190.14
Sedimentation Basin			
Place Gavel Bedding	November	Year 2	5.20
Drive Foundation Piles	August	Year 2	118.00
Place Concrete Fill In Piles	March	Year 3	42.46
Sedimentation SOG & Solids Lagoons			
Plant & Operations	March	Year 3	66.41
Placing Crews	March	Year 3	26.20
Point & Patch	March	Year 3	5.97
Treat CJ	April	Year 3	10.75
Cure & Cleanup	April	Year 3	115.00
Formwork	July	Year 3	37.37
Sedimentation Wall Concrete			
Plant & Operations	September	Year 3	140.00
Placing Crews	September	Year 3	27.41
Finish	September	Year 3	1.68
Point & Patch	October	Year 3	72.31
Treat CJ	December	Year 3	4.85
Cure & Cleanup	December	Year 3	451.95
Sedimentation Basin Roof Concrete			
Placing Crews	March	Year 4	2.23
Finish	March	Year 4	1.40
Point & Patch	March	Year 4	2.31
Cure & Cleanup	March	Year 4	12.00
Formwork	March	Year 4	14.42
Roof Falsework	April	Year 4	46.68
Hanging & Baffle Wall Concrete			
Plant & Operations	August	Year 2	9.05
Finish	August	Year 2	0.47
Point & Patch	August	Year 2	14.88
Treat CJ	August	Year 2	1.60
Cure & Cleanup	August	Year 2	20.78

Phase	Start Month	Start Year	Days
Formwork	September	Year 2	93.00
Hanging Wall Falsework	December	Year 2	0.58
Pump House			
Place Gravel Bedding	September	Year 2	2.18
Drive Foundation Piles	November	Year 2	71.33
Place Concrete Fill On Piles	March	Year 3	25.65
Slab On Grade Concrete			
Plant & Operations	November	Year 2	50.00
Placing Crews	November	Year 2	20.19
Finish	November	Year 2	15.40
Point & Patch	December	Year 2	0.85
Treat CJ	December	Year 2	6.77
Cure & Cleanup	December	Year 2	28.70
Formwork	January	Year 2	5.29
Pump House Wall Concrete			
Plant & Operations	December	Year 2	100.00
Placing Crews	December	Year 2	32.96
Finish	January	Year 3	3.45
Point & Patch	January	Year 3	80.32
Treat CJ	March	Year 3	6.77
Cure & Cleanup	March	Year 3	113.99
Formwork	July	Year 3	502.02
Pump House Roof Concrete			
Plant & Operations	May	Year 3	15.48
Placing Crews	May	Year 3	11.64
Finish	May	Year 3	15.68
Point & Patch	May	Year 3	19.29
Cure & Cleanup	June	Year 3	50.17
Formwork	August	Year 3	120.59
Roof Falsework	December	Year 3	46.68
Flow Meter Vaults			
Flow Meter Vault Concrete	June	Year 4	23.71
Ultra-Sonic Flow Meters	June	Year 4	14.00
Butterfly Valves			
Electrical Actuated BFV(96")	August	Year 3	35.00
Hydraulic Actuated BFV(96")	August	Year 3	35.00
Piping To Outside			
Discharge Piping (8' Dia)	August	Year 3	56.00
Installation Of Pumps, Valves & Fittings	August	Year 3	240.00
Flex Couplings	August	Year 3	14.00
Air Valves	August	Year 3	7.00
Intermediate Pumping Plant			
Clearing/Grubbing/Dewatering			
Clearing & Grubbing	June	Year 1	2.00
Dewatering	June	Year 1	493.00
SWPPP	June	Year 1	5.00
PP Excavation & Backfill			
Excavate & Waste	August	Year 1	84.72
Excavation & Stockpile	August	Year 1	76.25
Place Stockpiled Material As Backfill	November	Year 1	334.45
Forebay From New North Canal			

Phase	Start Month	Start Year	Days
Forebay From New North Canal - Excavation & Stockpile	August	Year 1	263.64
Forebay From New North Canal - Place Stockpiled Material As Backfill	January	Year 2	34.38
Forebay Concrete			
Forebay From New North Canal Plant & Operations	September	Year 2	57.80
Forebay From New North Canal Placing Crews	September	Year 2	19.05
Forebay From New North Canal Finish	October	Year 2	3.45
Forebay From New North Canal Point & Patch	October	Year 2	15.68
Forebay From New North Canal Treat CJ	October	Year 2	0.30
Forebay From New North Canal Cure & Cleanup	October	Year 2	145.66
Forebay From New North Canal Formwork	October	Year 2	97.98
Pump House			
Place Gravel Bedding	August	Year 1	5.38
Drive Foundation Piles	April	Year 2	591.33
Place Concrete Fill On Piles	September	Year 2	212.89
Slab On Grade Concrete			
Plant & Operations	September	Year 2	77.72
Placing Crews	September	Year 2	31.31
Finish	October	Year 2	43.70
Point & Patch	November	Year 2	4.28
Treat CJ	November	Year 2	3.28
Cure & Cleanup	November	Year 2	80.41
Formwork	November	Year 2	26.75
Volute Concrete			
Plant & Operations	March	Year 3	68.71
Placing Crews	March	Year 3	15.10
Finish	March	Year 3	6.72
Point & Patch	March	Year 3	0.00
Cure & Cleanup	March	Year 3	6.88
Formwork	April	Year 3	0.00
Pump House Wall Concrete			
Plant & Operations	November	Year 2	211.22
Point & Patch	November	Year 2	296.55
Cure & Cleanup	February	Year 3	408.96
Formwork	February	Year 3	1853.46
Pump House Elevated Slab Concrete			
Plant & Operations	May	Year 3	101.68
Placing Crews	May	Year 3	18.89
Finish	May	Year 3	34.60
Point & Patch	June	Year 3	2.31
Cure & Cleanup	June	Year 3	58.37
Formwork	June	Year 3	14.46
Roof Falsework	July	Year 3	136.60
Haul Road			
Overexc & Recompact 40' Widex 5' Deep	July	Year 3	8.00
Remove Base Rock	July	Year 3	4.00
Piping			
11' Dia Piping	June	Year 4	48.00
12' Dia Piping	June	Year 4	80.00
Flex Couplings	June	Year 4	16.00
Air Valve	June	Year 4	16.00
Install All Piping, Fittings & Valves	June	Year 4	16.00

Phase	Start Month	Start Year	Days
Butterfly Valves			
11' Hydraulically Activated BFV	July	Year 4	50.00
8' Electrically Activated BFV	July	Year 4	30.00
Flow Meter Vaults			
Flow Meter Vaults, 16'x16'x20' Deep	July	Year 4	218.84
Ultra Sonic Flow Meters	July	Year 4	12.00
Pipelines			
Pipeline			
Dewatering for Conduits			
Wellpoint System	October	Year 2	22.00
Excavate & Stockpile For Reuse As BF	December	Year 2	886.36
Pipe Procurement			
Stage and Handle Pipe	January	Year 3	59.98
Place Pipe Bedding			
Place Bedding	November	Year 2	375.00
Set & Weld Pipe			
Place Pipe	January	Year 3	2495.20
Weld Pipe	January	Year 3	2500.00
Place Backfill			
Place Sand in Pipe Zone	January	Year 3	916.25
Backfill - Load and Haul	January	Year 3	1300.00
Backfill - Place and Compact	January	Year 3	130.00
Air and Vacuum Release	January	Year 3	12.00
SWPPP	November	Year 2	1240.00
Pumping Plant Transition Structure			
Place Bedding	January	Year 3	1.00
Excavate and Stockpile	December	Year 2	53.71
Backfill	March	Year 3	25.82
SOG Concrete			
Plant & Operations	January	Year 3	197.06
Placing Crews	January	Year 3	32.78
Finish	February	Year 3	18.75
Point and Patch	February	Year 3	17.12
Treat CJ	March	Year 3	50.00
Cure & Cleanup	April	Year 3	82.26
Formwork	July	Year 3	107.07
Place Wall Concrete			
Plant & Operations	January	Year 3	148.71
Placing Crews	January	Year 3	49.01
Finish	February	Year 3	0.63
Point and Patch	February	Year 3	112.26
Treat CJ	June	Year 3	14.13
Cure & Cleanup	June	Year 3	155.42
Formwork	December	Year 4	701.61
Roof Falsework			
Plant & Operations	March	Year 3	74.93
Placing Crews	March	Year 3	12.47
Finish	March	Year 3	21.88
Point and Patch	April	Year 3	44.00
Cure & Cleanup	June	Year 3	70.20
Formwork	July	Year 3	169.23

Phase	Start Month	Start Year	Days
Pipeline - Canal Transition Structure			
Excavate and Haul	July	Year 3	36.50
Excavate and Stockpile	July	Year 3	17.21
Backfill	January	Year 4	25.82
Place Bedding	August	Year 3	1.00
SOG Concrete			
Plant & Operations	October	Year 3	220.00
Placing Crews	October	Year 3	60.45
Finish	December	Year 3	86.92
Point and Patch	February	Year 4	31.87
Treat CJ	March	Year 4	13.17
Cure & Cleanup	April	Year 4	191.18
Formwork	October	Year 4	199.16
Place Wall Concrete			
Plant & Operations	November	Year 3	936.56
Placing Crews	November	Year 3	119.92
Finish	February	Year 4	13.10
Point and Patch	February	Year 4	216.62
Treat CJ	September	Year 4	13.68
Cure & Cleanup	October	Year 4	307.57
Formwork	May	Year 5	1374.71
Canals			
Canal Stations			
Clear and Grub			
Clear and Grub	March	Year 2	482.60
Demolition of Structures	March	Year 2	136.36
Overexcavate & Replace Under Embankments			
Dewatering Embankment Area			
Excavate Trenches	March	Year 2	1934.54
Operate Pumps	March	Year 2	1766.86
Pump Install and Maintain	March	Year 2	588.95
Construct/Remove Sedimentation Ponds	March	Year 2	196.32
Waste Unsuitable Material			
Unsuitable to ROW Spoil Berm	June	Year 3	81.00
Unsuitable to Borrow Backfill 5 Truck	June	Year 3	81.00
Unsuitable to Borrow Backfill 6 Truck	June	Year 3	81.00
Unsuitable to Borrow Backfill 7 Truck	June	Year 3	81.00
Scarify and Recompact Canal Invert	March	Year 2	401.10
Flip Flop Non Organics	May	Year 2	166.03
Import and Replace to OG			
Truck from Borrow 2.5 m to 7 m Haul, Truck	May	Year 2	1,013.13
Truck from Borrow 7 m to 11 m Haul, Truck	May	Year 2	1,032.77
Truck from Borrow >11 m Haul, Truck	May	Year 2	762.47
Truck from Borrow to King Island	May	Year 2	482.43
On-Site Excavation			
Export Unsuitable Material			
Unsuitable from Canal Excavation to ROW Berms	May	Year 2	680.05
Unsuitable from Canal Excavation to Borrow BF 2.5 m to 7 m truck	May	Year 2	152.01
Unsuitable from Canal Excavation to Borrow BF 7 m to 11 m truck	May	Year 2	818.22

Phase	Start Month	Start Year	Days
Unsuitable from Canal Excavation to Borrow BF from >11 m truck	May	Year 2	639.52
Cut and Fill Suitable Material			
Canal Exc to Replace Unsuit Exc Under Embankment	May	Year 2	1583.57
Canal Exc to Canal Embankment Lower Section	May	Year 2	2255.65
Canal Exc to Dry Bed For Emb. Top Out	May	Year 2	383.77
Canal Exc to Dry Bed Reach To Reach	May	Year 2	367.92
Moisture Condition Suitable Material			
Construction Drying Beds	March	Year 2	93.33
Operate Drying Beds	July	Year 2	1500.00
Double Handle Suitable	March	Year 2	1519.55
Dewater Canal Exc Area			
Excavate Trenches	May	Year 2	11.00
Operate Pumps	March	Year 2	1800.00
Pump Install and Maintain	March	Year 2	600.00
Construct/Remove Sedimentation Ponds	June	Year 2	200.00
Import and Place as Embankment			
Import and Place			
Clear and Grub Borrow Area	June	Year 2	849.41
Strip Unsuitable from Borrow Areas	June	Year 2	1621.02
Haul from Borrow, 100 T Tr, <2,500	June	Year 2	45.19
Haul from Borrow, 100 T Tr, 2,500-7,000	June	Year 2	1439.84
Haul from Borrow, 100 T Tr, >11,000	June	Year 2	512.55
Haul from Borrow to King Island	June	Year 2	1196.79
Excavate Trenches	July	Year 3	11.00
Operate Pumps	March	Year 2	1800.00
Pump Install and Maintain	March	Year 2	600.00
Construct/Remove Sedimentation Ponds	May	Year 2	200.00
Slope Finish	May	Year 2	1533.83
Channel Bottom Finish	May	Year 2	768.30
Embankment Top Finish	May	Year 2	131.39
Other Flat Area Finish	May	Year 2	1125.55
Toe Roads			
Excavate for Toe Roads	September	Year 2	685.16
Backfill Excavation from Borrow	September	Year 2	787.93
Drainage			
Export Unsuitable Material	May	Year 2	216.79
Finish Grade Ditch	May	Year 2	667.69
Irrigation Ditches			
Export Unsuitable Material	May	Year 2	324.09
Finish Grade Ditch	May	Year 2	1068.30
SWPPP	June	Year 2	1333.33
Haul Roads			
Overexc and Recompact 40'W X3'Dx 71 Miles			
Excavate Overburden to 3' Depth	September	Year 2	296.99
Refill from Borrow	September	Year 2	296.99
Remove Haul Road Base	September	Year 2	215.28
Construct Trestles Over Slough	September	Year 2	1111.00
Maintain Haul Roads	September	Year 2	2025.02
Siphons			
E1 Stone Lake Drain			
Upstream & Downstream Transitions			

Phase	Start Month	Start Year	Days
Excavation/Grading	April	Year 4	0.75
Place Gravel Bedding	January	Year 4	1.05
Place Invert Slab Concrete			
Plant & Operations	June	Year 4	30.00
Placing Crews	June	Year 4	13.55
Finish	June	Year 4	62.07
Point and Patch	August	Year 4	4.58
Treat CJ	August	Year 4	6.22
Cure & Cleanup	August	Year 4	98.44
Formwork	November	Year 4	17.60
Place Wall Concrete			
Plant & Operations	July	Year 4	60.00
Placing Crews	July	Year 4	19.64
Point and Patch	July	Year 4	4.58
Treat CJ	July	Year 4	6.22
Cure & Cleanup	August	Year 4	3.66
Formwork	August	Year 4	132.11
Backfill	October	Year 4	5.03
Upstream & Downstream Control Structures			
Excavation/Grading	April	Year 4	0.83
Place Gravel Bedding	January	Year 4	0.33
Drive Foundation Piles	June	Year 4	18.33
Place Invert Slab Concrete			
Plant & Operations	July	Year 4	15.00
Placing Crews	July	Year 4	5.05
Finish	July	Year 4	4.89
Point and Patch	July	Year 4	0.92
Treat CJ	July	Year 4	1.25
Cure & Cleanup	July	Year 4	9.77
Formwork	July	Year 4	5.74
Place Wall Concrete			
Plant & Operations	July	Year 4	25.65
Placing Crews	July	Year 4	1677.00
Point and Patch	February	Year 9	11.75
Cure & Cleanup	March	Year 9	15.27
Backfill	October	Year 4	5.03
Box Culvert Section			
Excavate Channel/Build Levee	April	Year 4	22.50
Install and Remove Sheetpile Cutoff			
Place Sheetpile Cells	March	Year 5	300.00
Cell Fill	March	Year 5	100.00
Remove Cell Fill	June	Year 5	62.50
Remove Sheet Pile	August	Year 5	50.00
PZ 32 Crew	October	Year 5	200.00
Install Walers	May	Year 6	200.00
Repair Levee	February	Year 5	30.00
Excavation			
Wet Exc/Dragline	April	Year 4	65.12
Dry Exc/Backhoe	April	Year 4	55.96
Drive Foundation Piles	June	Year 4	58.50
Place Gravel Bedding	December	Year 3	6.81

Phase	Start Month	Start Year	Days
SOG Concrete			
Plant & Operations	June	Year 4	100.00
Placing Crews	June	Year 4	17.50
Finish	June	Year 4	3.88
Point and Patch	June	Year 4	7.37
Treat CJ	June	Year 4	6.50
Cure & Cleanup	July	Year 4	67.56
Formwork	September	Year 4	49.39
Wall Concrete			
Plant & Operations	July	Year 4	200.00
Placing Crews	July	Year 4	14.31
Point and Patch	July	Year 4	105.56
Treat CJ	November	Year 4	13.00
Cure & Cleanup	November	Year 4	145.03
Formwork	April	Year 5	70.37
Roof Concrete			
Plant & Operations	September	Year 4	240.00
Placing Crews	September	Year 4	12.44
Finish	September	Year 4	13.10
Point and Patch	September	Year 4	44.00
Cure & Cleanup	November	Year 4	119.08
Formwork	March	Year 5	12.11
Backfill	October	Year 4	76.23
SWPPP	January	Year 4	480.00
E2 Beaver Slough			
Upstream & Downstream Transitions			
Excavation/Grading	November	Year 2	1.01
Place Gravel Bedding	October	Year 4	1.05
Place Invert Slab Concrete			
Plant & Operations	April	Year 3	15.00
Placing Crews	April	Year 3	13.55
Finish	April	Year 3	62.07
Point and Patch	June	Year 3	4.58
Treat CJ	June	Year 3	6.22
Cure & Cleanup	July	Year 3	98.44
Formwork	November	Year 3	17.60
Place Wall Concrete			
Plant & Operations	March	Year 3	30.00
Placing Crews	March	Year 3	19.64
Point and Patch	March	Year 3	4.58
Treat CJ	March	Year 3	0.00
Cure & Cleanup	March	Year 3	3.66
Formwork	April	Year 3	132.11
Backfill	June	Year 3	26.43
Upstream & Downstream Control Structures			
Excavation/Grading	April	Year 3	15.62
Place Gravel Bedding	October	Year 4	0.33
Drive Foundation Piles	January	Year 3	18.33
Place Invert Slab Concrete			
Plant & Operations	March	Year 3	15.00
Placing Crews	March	Year 3	5.05

Phase	Start Month	Start Year	Days
Finish	March	Year 3	4.89
Point and Patch	March	Year 3	0.92
Treat CJ	March	Year 3	1.25
Cure & Cleanup	March	Year 3	9.77
Formwork	March	Year 3	5.74
Place Wall Concrete			
Plant & Operations	April	Year 3	40.00
Placing Crews	April	Year 3	7.99
Point and Patch	April	Year 3	11.75
Cure & Cleanup	April	Year 3	15.27
Formwork	May	Year 3	73.43
Backfill	June	Year 3	34.35
Box Culvert Section			
Overexc & Recompact Diversion Channel	October	Year 2	22.50
Install and Remove Sheetpile Cutoff			
Erect Cells	January	Year 4	300.00
Cell Fill	October	Year 4	100.00
Remove Cell Fill	January	Year 5	62.50
Remove Sheet Pile	March	Year 5	50.00
PZ 32 Crew	May	Year 5	225.00
Install Walers	December	Year 5	225.00
Repair Levee	September	Year 3	30.00
Excavation			
Wet Exc/Dragline	September	Year 2	73.90
Dry Exc/Backhoe	September	Year 2	55.96
Drive Foundation Piles	February	Year 3	62.00
Place Gravel Bedding	June	Year 2	8.12
SOG Concrete			
Plant & Operations	January	Year 3	120.00
Placing Crews	January	Year 3	20.86
Finish	January	Year 3	7.07
Point and Patch	January	Year 3	6.04
Treat CJ	February	Year 3	15.50
Cure & Cleanup	February	Year 3	115.73
Formwork	June	Year 3	37.76
Wall Concrete			
Plant & Operations	March	Year 3	200.00
Placing Crews	March	Year 3	17.06
Point and Patch	March	Year 3	125.86
Treat CJ	July	Year 3	15.50
Cure & Cleanup	August	Year 3	172.92
Formwork	January	Year 4	83.91
Roof Concrete			
Plant & Operations	April	Year 3	260.00
Placing Crews	April	Year 3	14.83
Point and Patch	April	Year 3	52.46
Cure & Cleanup	June	Year 3	141.98
Formwork	October	Year 3	14.43
Backfill	June	Year 3	50.15
SWPP	June	Year 2	480.00
<u>E3 Hog Slough</u>			

Phase	Start Month	Start Year	Days
Upstream & Downstream Transitions			
Excavation/Grading	December	Year 2	1.26
Place Gravel Bedding	September	Year 2	1.05
Backfill	August	Year 3	26.43
Upstream & Downstream Control Structures			
Excavation/Grading	December	Year 2	0.83
Place Gravel Bedding	September	Year 2	0.33
Drive Foundation Piles	March	Year 3	18.33
Backfill	August	Year 3	5.03
Box Culvert Section			
Overexc & Recompact Diversion Channel	September	Year 2	22.50
Install and Remove Sheetpile Cutoff			
Erect Cells	January	Year 4	300.00
Cell Fill	October	Year 4	100.00
Remove Cell Fill	January	Year 5	62.50
Remove Cells	March	Year 5	50.00
Set Walers	May	Year 5	225.00
Repair Levee	December	Year 3	30.00
Excavation			
Wet Exc/Dragline	December	Year 2	64.06
Dry Exc/Backhoe	December	Year 2	95.09
Drive Foundation Piles	March	Year 3	65.50
Place Gravel Bedding	September	Year 2	8.12
SOG Concrete			
Plant & Operations	March	Year 3	120.00
Placing Crews	March	Year 3	20.86
Finish	March	Year 3	7.07
Point and Patch	March	Year 3	6.04
Treat CJ	April	Year 3	15.50
Cure & Cleanup	April	Year 3	115.73
Formwork	August	Year 3	37.76
Wall Concrete			
Plant & Operations	April	Year 3	200.00
Placing Crews	April	Year 3	17.06
Point and Patch	April	Year 3	125.86
Treat CJ	August	Year 3	15.50
Cure & Cleanup	September	Year 3	172.92
Formwork	February	Year 4	83.91
Roof Concrete			
Plant & Operations	June	Year 3	260.00
Placing Crews	June	Year 3	14.83
Finish	June	Year 3	15.62
Point and Patch	July	Year 3	52.46
Cure & Cleanup	August	Year 3	141.98
Formwork	January	Year 4	14.43
Backfill	July	Year 3	50.56
SWPP	September	Year 2	480.00
E4 Sycamore Slough			
Upstream & Downstream Transitions			
Excavation/Grading	August	Year 3	1.51
Place Gravel Bedding	April	Year 3	1.05

Phase	Start Month	Start Year	Days
Place Wall Concrete			
Plant & Operations	December	Year 3	60.00
Backfill	March	Year 4	31.71
Upstream & Downstream Control Structures			
Excavation/Grading	August	Year 3	1.66
Place Gravel Bedding	April	Year 3	2.18
Drive Foundation Piles	October	Year 3	18.33
Place Invert Slab Concrete			
Plant & Operations	November	Year 3	1.88
Placing Crews	November	Year 3	5.05
Finish	November	Year 3	4.89
Point and Patch	November	Year 3	0.92
Treat CJ	November	Year 3	1.25
Cure & Cleanup	November	Year 3	9.77
Formwork	November	Year 3	5.74
Place Wall Concrete			
Plant & Operations	December	Year 3	1.79
Placing Crews	December	Year 3	7.99
Point and Patch	December	Year 3	11.75
Cure & Cleanup	December	Year 3	15.27
Formwork	January	Year 4	73.43
Backfill	March	Year 4	6.04
Box Culvert Section			
Overexc & Recompact Diversion Channel	May	Year 3	75.00
Install and Remove Sheetpile Cutoff			
Erect Cells	August	Year 4	300.00
Cell Fill	May	Year 5	100.00
Remove Cell Fill	August	Year 5	62.50
Remove Sheet Pile	October	Year 5	50.00
PZ 32 Crew	December	Year 5	275.00
Set Walers	September	Year 6	275.00
Repair Levee	July	Year 4	100.00
Excavation			
Wet Exc/Dragline	August	Year 3	63.29
Dry Exc/Backhoe	August	Year 3	113.72
Drive Foundation Piles	October	Year 3	68.83
Place Gravel Bedding	April	Year 3	8.78
SOG Concrete			
Plant & Operations	November	Year 3	120.00
Placing Crews	November	Year 3	22.55
Finish	November	Year 3	7.64
Point and Patch	December	Year 3	6.27
Treat CJ	December	Year 3	16.75
Cure & Cleanup	January	Year 4	124.73
Formwork	May	Year 4	39.20
Wall Concrete			
Plant & Operations	December	Year 3	280.00
Placing Crews	December	Year 3	18.43
Finish	December	Year 3	0.00
Point and Patch	December	Year 3	136.01
Treat CJ	May	Year 4	16.75

Phase	Start Month	Start Year	Days
Cure & Cleanup	May	Year 4	186.86
Formwork	October	Year 4	850.06
Roof Concrete			
Plant & Operations	February	Year 4	280.00
Placing Crews	February	Year 4	19.61
Finish	February	Year 4	20.65
Point and Patch	March	Year 4	69.39
Cure & Cleanup	May	Year 4	187.78
Formwork	December	Year 4	19.09
Backfill	March	Year 4	57.06
SWPP	April	Year 3	480.00
E5 White Slough			
Upstream & Downstream Transitions			
Excavation/Grading	August	Year 2	11.30
Place Gravel Bedding	March	Year 2	1.05
Drive Foundation Piles	September	Year 2	18.33
Backfill	January	Year 3	34.69
Upstream & Downstream Control Structures			
Excavation/Grading	August	Year 2	1.38
Place Gravel Bedding	April	Year 2	0.33
Drive Foundation Piles	September	Year 2	18.33
Backfill	January	Year 3	7.54
Box Culvert Section			
Overexc & Recompact Diversion Channel	May	Year 3	75.00
Install and Remove Sheetpile Cutoff			
Place Sheet Pile Cells	April	Year 2	840.00
Cell Fill	July	Year 4	280.00
Remove Cell Fill	April	Year 5	175.00
Remove Cells	October	Year 5	140.00
PZ 32 Crew	March	Year 5	170.00
Set Walers	August	Year 5	170.00
Excavation			
Wet Exc/Dragline	July	Year 3	236.61
Dry Exc/Backhoe	July	Year 3	28.65
Drive Foundation Piles	September	Year 3	79.17
Place Gravel Bedding	May	Year 3	10.74
SOG Concrete			
Plant & Operations	September	Year 3	140.00
Placing Crews	September	Year 3	27.59
Finish	September	Year 3	9.34
Point and Patch	October	Year 3	6.97
Treat CJ	October	Year 3	20.50
Cure & Cleanup	November	Year 3	151.73
Formwork	April	Year 4	43.53
Wall Concrete			
Plant & Operations	October	Year 3	240.00
Placing Crews	October	Year 3	22.56
Point and Patch	October	Year 3	166.46
Treat CJ	April	Year 4	20.50
Cure & Cleanup	April	Year 4	228.70
Formwork	December	Year 4	110.97

Phase	Start Month	Start Year	Days
Roof Concrete			
Plant & Operations	December	Year 3	280.00
Placing Crews	December	Year 3	19.61
Finish	December	Year 3	20.65
Point and Patch	January	Year 4	69.39
Cure & Cleanup	March	Year 4	187.78
Formwork	September	Year 4	19.09
Backfill	January	Year 4	73.11
SWPP	April	Year 3	480.00
E6 Disappointment Slough			
Upstream & Downstream Transitions			
Excavation/Grading	September	Year 2	11.86
Place Gravel Bedding	June	Year 2	1.05
Drive Foundation Piles	September	Year 2	18.33
Backfill	January	Year 3	39.37
Upstream & Downstream Control Structures			
Excavation/Grading	August	Year 3	1.38
Place Gravel Bedding	May	Year 3	0.33
Drive Foundation Piles	September	Year 3	82.67
Backfill	January	Year 4	7.54
Box Culvert Section			
Install and Remove Sheetpile Cutoff			
Erect Cells	January	Year 4	900.00
Cell Fill	July	Year 6	300.00
Remove Cell Fill	May	Year 6	187.50
Remove Cells	November	Year 6	150.00
PZ 32 Crew	April	Year 7	175.00
Set Walers	October	Year 7	175.00
Excavation			
Wet Exc/Dragline	August	Year 3	257.11
Dry Exc/Backhoe	August	Year 3	32.45
Drive Foundation Piles	September	Year 3	82.67
Place Gravel Bedding	May	Year 3	11.39
SOG Concrete			
Plant & Operations	October	Year 3	160.00
Placing Crews	October	Year 3	29.28
Finish	November	Year 3	9.91
Point and Patch	November	Year 3	7.20
Treat CJ	November	Year 3	21.75
Cure & Cleanup	December	Year 3	160.73
Formwork	May	Year 4	44.97
Wall Concrete			
Plant & Operations	September	Year 3	360.00
Placing Crews	September	Year 3	23.94
Point and Patch	September	Year 3	176.61
Treat CJ	March	Year 4	21.75
Cure & Cleanup	April	Year 4	242.64
Formwork	December	Year 4	117.74
Roof Concrete			
Plant & Operations	December	Year 3	380.00
Placing Crews	December	Year 3	20.81

Phase	Start Month	Start Year	Days
Finish	December	Year 3	21.91
Point and Patch	January	Year 4	73.62
Cure & Cleanup	March	Year 4	199.23
Formwork	October	Year 4	20.25
Backfill	January	Year 4	80.02
SWPP	February	Year 3	480.00
E7 BNSF Railroad			
Upstream & Downstream Transitions			
Excavation/Grading	April	Year 3	1.69
Place Gravel Bedding	August	Year 2	1.05
Drive Foundation Piles	April	Year 3	18.33
Backfill	July	Year 3	34.69
Upstream & Downstream Control Structures			
Excavation/Grading	April	Year 3	1.45
Place Gravel Bedding	August	Year 2	0.33
Drive Foundation Piles	April	Year 3	18.33
Place Invert Slab Concrete			
Plant & Operations	June	Year 3	15.00
Placing Crews	June	Year 3	5.05
Finish	June	Year 3	4.89
Point and Patch	June	Year 3	0.92
Treat CJ	June	Year 3	1.25
Cure & Cleanup	June	Year 3	9.77
Formwork	June	Year 3	5.74
Place Wall Concrete			
Plant & Operations	May	Year 3	40.00
Placing Crews	May	Year 3	7.99
Point and Patch	May	Year 3	11.75
Cure & Cleanup	May	Year 3	15.27
Formwork	June	Year 3	73.43
Backfill	August	Year 3	2.04
Box Culvert Section			
Shoofly Railroad			
Embankment	August	Year 2	33.33
Sub-Ballast	September	Year 2	8.33
Dry Exc/Backhoe	April	Year 3	96.27
Drive Foundation Piles	April	Year 3	51.67
Place Gravel Bedding	August	Year 2	5.50
SOG Concrete			
Plant & Operations	June	Year 3	80.00
Placing Crews	June	Year 3	14.13
Finish	June	Year 3	4.79
Point and Patch	June	Year 3	5.12
Treat CJ	June	Year 3	10.50
Cure & Cleanup	July	Year 3	79.73
Formwork	October	Year 3	31.99
Wall Concrete			
Plant & Operations	May	Year 3	200.00
Placing Crews	May	Year 3	11.56
Point and Patch	May	Year 3	85.26
Treat CJ	August	Year 3	10.50

Phase	Start Month	Start Year	Days
Cure & Cleanup	August	Year 3	117.14
Formwork	December	Year 3	56.84
Roof Concrete			
Plant & Operations	August	Year 3	180.00
Placing Crews	August	Year 3	10.05
Finish	August	Year 3	10.58
Point and Patch	August	Year 3	35.54
Cure & Cleanup	September	Year 3	96.18
Formwork	January	Year 4	9.78
SWPP	August	Year 3	31.58
Backfill	August	Year 3	31.58
PZ 32 Crew	April	Year 3	170.00
Set Walers	April	Year 3	210.00
E8 Middle River Slough			
Upstream & Downstream Transitions			
Excavation/Grading	March	Year 3	3.39
Place Gravel Bedding	September	Year 2	1.05
Drive Foundation Piles	May	Year 3	18.33
Backfill	January	Year 4	34.69
Upstream & Downstream Control Structures			
Excavation/Grading	March	Year 3	0.21
Place Gravel Bedding	September	Year 2	0.33
Drive Foundation Piles	May	Year 3	18.33
Backfill	January	Year 4	7.54
Box Culvert Section			
Install and Remove Sheetpile Cutoff			
Erect Cells	February	Year 4	840.00
Cell Fill	May	Year 6	280.00
Remove Cell Fill	February	Year 6	175.00
Remove Cells	August	Year 6	140.00
PZ 32 Crew	December	Year 6	195.00
Set Walers	July	Year 7	195.00
Excavation			
Wet Exc/Dragline	March	Year 3	217.74
Dry Exc/Backhoe	March	Year 3	43.38
Drive Foundation Piles	April	Year 3	82.67
Place Gravel Bedding	April	Year 3	11.39
SOG Concrete			
Plant & Operations	May	Year 3	160.00
Placing Crews	May	Year 3	29.28
Finish	June	Year 3	9.91
Point and Patch	June	Year 3	7.20
Treat CJ	June	Year 3	21.75
Cure & Cleanup	July	Year 3	160.73
Formwork	January	Year 4	44.97
Wall Concrete			
Plant & Operations	June	Year 3	360.00
Placing Crews	June	Year 3	23.94
Point and Patch	June	Year 3	176.61
Treat CJ	January	Year 4	21.75
Cure & Cleanup	February	Year 4	242.64

Phase	Start Month	Start Year	Days
Formwork	November	Year 4	117.74
Roof Concrete			
Plant & Operations	April	Year 3	380.00
Placing Crews	April	Year 3	20.81
Finish	April	Year 3	21.91
Point and Patch	May	Year 3	73.62
Cure & Cleanup	July	Year 3	199.23
Formwork	February	Year 4	20.25
Backfill	January	Year 4	85.30
SWPP	October	Year 2	480.00
Control Structures			
Forebay Outlet 1 Inline Control Structure			
Upstream & Downstream Transitions			
Excavation/Grading	November	Year 3	18.18
Place Gravel Bedding	November	Year 3	0.80
Backfill	November	Year 3	102.33
Upstream & Downstream Control Structures			
Excavation/Grading	November	Year 3	1.78
Place Gravel Bedding	November	Year 3	0.18
Drive Foundation Piles	November	Year 3	18.33
Place Invert Slab Concrete			
Finish	November	Year 3	0.52
Point and Patch	November	Year 3	0.94
Treat CJ	November	Year 3	1.13
Cure & Cleanup	November	Year 3	2.73
Formwork	November	Year 3	5.89
Place Wall Concrete			
Placing Crews	November	Year 3	7.18
Point and Patch	November	Year 3	10.56
Cure & Cleanup	November	Year 3	13.73
Formwork	December	Year 3	65.99
Backfill	November	Year 3	102.33
SWPP	November	Year 3	240.00
Forebay Outlet 2 Inline Control Structure			
Upstream & Downstream Transitions			
Excavation/Grading	January	Year 2	27.75
Place Gravel Bedding	January	Year 2	0.91
Backfill	January	Year 2	53.39
Upstream & Downstream Control Structures			
Excavation/Grading	January	Year 2	3.01
Place Gravel Bedding	January	Year 2	0.08
Drive Foundation Piles	January	Year 2	18.33
Place Invert Slab Concrete			
Placing Crews	January	Year 2	4.54
Finish	January	Year 2	0.52
Point and Patch	January	Year 2	0.94
Treat CJ	January	Year 2	1.13
Cure & Cleanup	January	Year 2	2.73
Formwork	January	Year 2	5.89
Place Wall Concrete			
Placing Crews	January	Year 2	7.18

Phase	Start Month	Start Year	Days
Point and Patch	January	Year 2	10.56
Cure & Cleanup	January	Year 2	13.73
Formwork	January	Year 2	65.99
Backfill	January	Year 2	113.95
SWPP	January	Year 2	240.00
California Aqueduct Inline Control Structure			
Upstream and Downstream Transitions			
Excavation/Grading	April	Year 2	27.75
Place Gravel Bedding	April	Year 2	0.91
Place Invert Slab Concrete			
Plant & Operations	April	Year 2	15.00
Placing Crews	April	Year 2	13.55
Finish	April	Year 2	62.07
Point & Patch	July	Year 2	4.58
Treat CJ	July	Year 2	6.22
Cure & Cleanup	July	Year 2	98.44
Formwork	November	Year 2	17.60
Place Wall Concrete			
Plant & Operations	November	Year 2	30.00
Placing Crews	December	Year 2	19.64
Point & Patch	December	Year 2	4.58
Cure & Cleanup	December	Year 2	3.66
Formwork	December	Year 2	132.11
Backfill	April	Year 3	53.39
Upstream and Downstream Control Structures			
Install / Remove Sheetpile Cutoff In River			
Erect Cells	April	Year 2	75.00
Cell Fill	July	Year 2	25.00
Remove Cell Fill	July	Year 2	15.63
Remove Cells	July	Year 2	12.50
Set Walers	August	Year 2	56.25
Excavation/Grading	September	Year 2	3.01
Place Gravel Bedding	September	Year 2	0.08
Drive Foundation Piles	September	Year 2	18.33
Place Invert Slab Concrete			
Plant & Operations	September	Year 2	1.68
Placing Crews	September	Year 2	4.54
Finish	September	Year 2	0.52
Point & Patch	September	Year 2	0.94
Treat CJ	September	Year 2	1.13
Cure & Cleanup	September	Year 2	2.73
Formwork	September	Year 2	5.89
Place Wall Concrete			
Plant & Operations	September	Year 2	1.61
Placing Crews	September	Year 2	7.18
Point & Patch	October	Year 2	10.56
Cure & Cleanup	October	Year 2	13.73
Formwork	October	Year 2	65.99
Backfill Shaft	January	Year 3	113.95
SWPPP	April	Year 2	240.00
Delta Mendota Inline Control Structure			

Phase	Start Month	Start Year	Days
Upstream and Downstream Transitions			
Excavation/Grading	June	Year 3	6.00
Place Gravel Bedding	June	Year 3	6.00
Place Invert Slab Concrete			
Plant & Operations	June	Year 3	6.00
Placing Crews	June	Year 3	6.00
Finish	July	Year 3	7.00
Point & Patch	September	Year 3	9.00
Treat CJ	September	Year 3	9.00
Cure & Cleanup	September	Year 3	9.00
Formwork	January	Year 4	1.00
Place Wall Concrete			
Plant & Operations	January	Year 4	1.00
Placing Crews	January	Year 4	1.00
Point & Patch	January	Year 4	1.00
Cure & Cleanup	January	Year 4	1.00
Formwork	January	Year 4	1.00
Backfill Shaft	May	Year 4	5.00
Upstream and Downstream Control Structures			
Install / Remove Sheetpile Cutoff In River			
Erect Cells	June	Year 3	6.00
Cell Fill	June	Year 3	6.00
Remove Cell Fill	June	Year 3	6.00
Remove Cells	June	Year 3	6.00
Set Walers	June	Year 3	6.00
Excavation/Grading	July	Year 3	7.00
Place Gravel Bedding	July	Year 3	7.00
Drive Foundation Piles	July	Year 3	7.00
Place Invert Slab Concrete			
Plant & Operations	July	Year 3	7.00
Placing Crews	July	Year 3	7.00
Finish	July	Year 3	7.00
Point & Patch	July	Year 3	7.00
Treat CJ	July	Year 3	7.00
Cure & Cleanup	July	Year 3	7.00
Formwork	July	Year 3	7.00
Place Wall Concrete			
Plant & Operations	July	Year 3	7.00
Placing Crews	July	Year 3	7.00
Point & Patch	July	Year 3	7.00
Cure & Cleanup	July	Year 3	7.00
Formwork	July	Year 3	7.00
Backfill	July	Year 3	7.00
SWPPP	June	Year 3	6.00
Bridges			
G2 Scribner Road			
Bridge Construction	May	Year 2	123.00
Roadway Embankment			
Load and Haul Borrow	April	Year 2	59.95
Place Embankment	April	Year 2	59.95
G3 Hood-Franklin Road			

Phase	Start Month	Start Year	Days
Bridge Construction	December	Year 3	125.00
Roadway Embankment			
Load and Haul Borrow	November	Year 3	39.19
Place Embankment	November	Year 3	39.19
G4 Lambert Road			
Bridge Construction	February	Year 5	168.00
Roadway Embankment			
Load and Haul Borrow	January	Year 5	36.93
Place Embankment	January	Year 5	36.93
G5 Dierssen Road			
Bridge Construction	October	Year 2	201.00
Roadway Embankment			
Load and Haul Borrow	September	Year 2	34.87
Place Embankment	September	Year 2	34.87
G6 Twin Cities Road			
Bridge Construction	October	Year 3	167.00
Roadway Embankment			
Load and Haul Borrow	September	Year 3	78.19
Place Embankment	September	Year 3	78.19
G7 West Barber Road			
Bridge Construction	February	Year 4	177.00
Roadway Embankment			
Load and Haul Borrow	January	Year 4	27.51
Place Embankment	January	Year 4	27.51
G8 West Walnut Grove Road			
Bridge Construction	February	Year 5	177.00
Roadway Embankment			
Load and Haul Borrow	February	Year 5	38.99
Place Embankment	February	Year 5	38.99
G9 North Blossom Road			
Bridge Construction	September	Year 2	292.00
Roadway Embankment			
Load and Haul Borrow	August	Year 2	17.96
Place Embankment	August	Year 2	17.96
G10 West Woodbridge Road			
Bridge Construction	February	Year 4	171.00
Roadway Embankment			
Load and Haul Borrow	January	Year 4	31.78
Place Embankment	January	Year 4	31.78
G11 SR12			
Bridge Construction	March	Year 2	167.00
Roadway Embankment			
Load and Haul Borrow	February	Year 2	67.87
Place Embankment	February	Year 2	67.87
G12 North Guard Road			
Bridge Construction	February	Year 3	198.00
Roadway Embankment			
Load and Haul Borrow	January	Year 3	22.25
Place Embankment	January	Year 3	22.25
G13 West Eight Mile Road			
Bridge Construction	March	Year 4	167.00

Phase	Start Month	Start Year	Days
Roadway Embankment			
Load and Haul Borrow	February	Year 4	49.51
Place Embankment	February	Year 4	49.51
<u>G14 West McDonald Road</u>			
Bridge Construction	February	Year 3	167.00
Roadway Embankment			
Load and Haul Borrow	January	Year 3	70.32
Place Embankment	January	Year 3	70.32
<u>G15 SR4</u>			
Bridge Construction	October	Year 2	167.00
Roadway Embankment			
Load and Haul Borrow	September	Year 2	107.19
Place Embankment	September	Year 2	107.19
<u>G16 West Bacon Island Road</u>			
Bridge Construction	August	Year 3	170.00
Roadway Embankment			
Load and Haul Borrow	July	Year 3	15.82
Place Embankment	July	Year 3	15.82
<u>G17 South Tracy Road</u>			
Bridge Construction	June	Year 4	218.00
Roadway Embankment			
Load and Haul Borrow	May	Year 4	7.03
Place Embankment	May	Year 4	7.03
<u>G18 Cal Pack Road</u>			
Bridge Construction	March	Year 2	231.00
Roadway Embankment			
Load and Haul Borrow	February	Year 2	67.89
Place Embankment	February	Year 2	7.03
<u>G19 Clifton Court Road</u>			
Bridge Construction	May	Year 3	241.00
Roadway Embankment			
Load and Haul Borrow	April	Year 3	88.68
Place Embankment	April	Year 3	88.68
Forebay			
Remove Unsuitable-Export			
Excavate and Haul Off Unsuitable	July	Year 2	1063.85
Cut/Fill-Build Levees			
Scraper Cut/Fill	January	Year 5	500.13
Slope Finish	May	Year 6	86.00
Bottom Finish	January	Year 5	160.00
Export Suitable			
Load and Haul	June	Year 2	593.02
Slope Protection			
Place Rip Rap	June	Year 2	315.58
Place Bedding Material	June	Year 2	26.53
Place Fabric	June	Year 2	167.13
SWPP	June	Year 2	500.00
Utilities			
Temporary Power SMAQMD (12 kV)	June	Year 1	89.00
Temporary Power SMAQMD (69 kV)			
Temporary Power SJVAPCD (12 kV)	September	Year 1	244.00

Phase	Start Month	Start Year	Days
Temporary Power SJVAPCD (69 kV)	August	Year 1	273.00
Temporary Power BAAQMD (12 kV)	March	Year 2	16.00
Temporary Power BAAQMD (69 kV)	March	Year 2	44.00
Permanent Power SMAQMD (69 kV)	August	Year 1	43.00
Permanent Power SJVAPCD (230 kV)	October	Year 1	1718.00
Permanent Power BAAQMD (230 kV)	August	Year 6	585.00
Tunnels			
Mokelumne River Tunnel			
Launch Shaft "A"			
Excavate and Support Shaft	September	Year 2	44.00
Invert work slab	July	Year 2	2.67
Shaft Invert & Wall Rebar	September	Year 2	6.00
Place invert slab	September	Year 2	1.00
Form Shaft Walls	September	Year 2	6.00
Place Shaft Walls	September	Year 2	2.00
Clean Shaft Invert	September	Year 2	1.00
Shaft Tunnel Invert Pour	September	Year 2	1.33
Tunnel & Riser Rebar	September	Year 2	8.00
Tunnel & Elbow Forms	September	Year 2	10.77
Place tunnel & Elbow Concrete	September	Year 2	3.33
Set & Strip Riser forms	October	Year 2	16.33
Place Riser Shaft Concrete	October	Year 2	3.00
Controlled Density Fill	September	Year 2	18.67
33 ft Tunnel "A"			
Set Up For Tunnel Excavation	April	Year 4	6.00
TBM.	March	Year 4	51.00
Mine 37' Tunnel	June	Year 4	225.33
Tunnel Mining Surface Support	May	Year 4	307.00
Remove TBM @ Launch Shaft	January	Year 5	8.67
Grout Leakage	January	Year 5	12.33
Remove Rail, Utilities, and Clean Tun.	February	Year 5	10.00
Equip Op Cost 24/7	March	Year 4	329.00
Retrieval Shaft "A"			
Excavate Retrieval Shafts	March	Year 3	11.67
Invert prep	February	Year 3	0.67
Invert Rebar	February	Year 3	0.67
Place invert slab	April	Year 3	0.33
Clean Shaft Invert	April	Year 3	0.33
Elbow Forms	April	Year 3	5.33
Elbow & Riser Rebar	April	Year 3	4.00
Place Elbow Concrete	April	Year 3	3.33
Set & Strip Riser forms	April	Year 3	7.67
Place Riser Shaft Concrete	April	Year 3	0.00
Controlled Density Fill	April	Year 3	6.80
Launch Shaft "B"			
Excavate and Support Shaft	November	Year 2	44.00
Invert work slab	July	Year 2	2.67
Shaft Invert & Wall Rebar	November	Year 2	7.33
Place invert slab	November	Year 2	1.00
Form Shaft Walls	November	Year 2	6.00
Place Shaft Walls	November	Year 2	288.00

Phase	Start Month	Start Year	Days
Clean Shaft Invert	April	Year 5	1.00
Shaft Tunnel Invert Pour	April	Year 5	1.33
Tunnel & Riser Rebar	April	Year 5	8.00
Tunnel & Elbow Forms	April	Year 5	10.77
Place tunnel & Elbow Concrete	April	Year 5	3.33
Set & Strip Riser forms	May	Year 5	16.33
Place Riser Shaft Concrete	May	Year 5	3.00
Controlled Density Fill	November	Year 2	18.67
33 ft Tunnel "B"			
TBM.	April	Year 5	51.00
Mine 37' Tunnel	August	Year 5	225.33
Tunnel Mining Surface Support	July	Year 5	0.00
Remove TBM @ Launch Shaft	February	Year 6	8.67
Grout Leakage	February	Year 6	12.33
Remove Rail, Utilities, and Clean Tun.	March	Year 6	10.00
Equip Op Cost 24/7	April	Year 5	329.00
Retrieval Shaft "B"			
Excavate Retrieval Shafts	August	Year 3	11.67
Invert prep	July	Year 3	0.67
Invert Rebar	July	Year 3	0.67
Place invert slab	October	Year 3	0.33
Clean Shaft Invert	October	Year 3	0.33
Elbow Forms	October	Year 3	5.33
Elbow & Riser Rebar	October	Year 3	4.00
Place Elbow Concrete	October	Year 3	3.33
Set & Strip Riser forms	October	Year 3	7.67
Place Riser Shaft Concrete	October	Year 3	2.67
Controlled Density Fill	October	Year 3	6.80
Muck Disposal Shafts			
Load & Haul excavated materials	December	Year 3	251.00
Muck Disposal Tunnel			
Muck Disposal	December	Year 3	77.67
Old River Tunnel			
Launch Shaft "A"			
Excavate and Support Shaft	June	Year 2	44.00
Invert work slab	May	Year 2	2.67
Shaft Invert & Wall Rebar	July	Year 2	7.33
Place invert slab	July	Year 2	1.00
Form Shaft Walls	July	Year 2	6.00
Place Shaft Walls	July	Year 2	2.00
Clean Shaft Invert	July	Year 2	1.00
Shaft Tunnel Invert Pour	July	Year 2	1.33
Tunnel & Riser Rebar	July	Year 2	8.00
Tunnel & Elbow Forms	July	Year 2	10.77
Place tunnel & Elbow Concrete	July	Year 2	3.33
Set & Strip Riser forms	August	Year 2	16.33
Place Riser Shaft Concrete	August	Year 2	3.00
Controlled Density Fill	July	Year 2	18.67
33 ft Tunnel "A"			
Set Up For Tunnel Excavation	January	Year 6	6.00
TBM.	November	Year 5	51.00

Phase	Start Month	Start Year	Days
Mine 27' Tunnel	March	Year 6	88.00
Tunnel Mining Surface Support	February	Year 6	121.00
Remove TBM @ Launch Shaft	April	Year 6	8.67
Grout Leakage	April	Year 6	4.00
Remove Rail, Utilities, and Clean Tun.	May	Year 6	3.00
Equip Op Cost 24/7	November	Year 5	141.00
Retrieval Shaft "A"			
Excavate Retrieval Shafts	January	Year 4	11.67
Invert prep	December	Year 3	0.67
Invert Rebar	December	Year 3	0.67
Place invert slab	March	Year 4	0.33
Clean Shaft Invert	March	Year 4	0.33
Elbow Forms	March	Year 4	5.33
Elbow & Riser Rebar	March	Year 4	4.00
Place Elbow Concrete	March	Year 4	3.33
Set & Strip Riser forms	March	Year 4	7.67
Place Riser Shaft Concrete	March	Year 4	2.67
Controlled Density Fill	April	Year 4	6.80
Launch Shaft "B"			
Excavate and Support Shaft	September	Year 3	44.00
Invert work slab	July	Year 3	2.67
Shaft Invert & Wall Rebar	September	Year 3	7.33
Place invert slab	September	Year 3	1.00
Form Shaft Walls	September	Year 3	6.00
Place Shaft Walls	September	Year 3	2.00
Clean Shaft Invert	September	Year 3	1.00
Shaft Tunnel Invert Pour	September	Year 3	1.33
Tunnel & Riser Rebar	September	Year 3	8.00
Tunnel & Elbow Forms	September	Year 3	10.77
Place tunnel & Elbow Concrete	October	Year 3	3.33
Set & Strip Riser forms	October	Year 3	16.33
Place Riser Shaft Concrete	October	Year 3	3.00
Controlled Density Fill	September	Year 3	18.67
33 ft Tunnel "B"			
TBM.	August	Year 6	51.00
Mine 27' Tunnel	December	Year 6	88.00
Tunnel Mining Surface Support	October	Year 6	121.00
Remove TBM @ Launch Shaft	January	Year 7	8.67
Grout Leakage	January	Year 7	4.00
Remove Rail, Utilities, and Clean Tun.	February	Year 7	3.00
Equip Op Cost 24/7	August	Year 6	141.00
Retrieval Shaft "B"			
Excavate Retrieval Shafts	July	Year 4	11.67
Invert prep	June	Year 4	0.67
Invert Rebar	June	Year 4	0.67
Place invert slab	September	Year 4	0.33
Clean Shaft Invert	September	Year 4	0.33
Elbow Forms	September	Year 4	5.33
Elbow & Riser Rebar	September	Year 4	4.00
Place Elbow Concrete	September	Year 4	3.33
Set & Strip Riser forms	September	Year 4	7.67

Phase	Start Month	Start Year	Days
Place Riser Shaft Concrete	September	Year 4	2.67
Controlled Density Fill	September	Year 4	6.80
Muck Disposal Shafts			
Load & Haul excavated materials	December	Year 4	251.00
Muck Disposal Tunnel			
Muck Disposal	December	Year 4	29.33
San Joaquin River Tunnel			
Launch Shaft "A"			
Excavate and Support Shaft	July	Year 2	44.00
Invert work slab	May	Year 2	2.67
Shaft Invert & Wall Rebar	July	Year 2	7.33
Place invert slab	July	Year 2	1.00
Form Shaft Walls	July	Year 2	6.00
Place Shaft Walls	July	Year 2	2.00
Clean Shaft Invert	July	Year 2	1.00
Shaft Tunnel Invert Pour	July	Year 2	1.33
Tunnel & Riser Rebar	July	Year 2	8.00
Tunnel & Elbow Forms	July	Year 2	10.77
Place tunnel & Elbow Concrete	August	Year 2	3.33
Set & Strip Riser forms	August	Year 2	16.33
Place Riser Shaft Concrete	August	Year 2	3.00
Controlled Density Fill	July	Year 2	18.67
33 ft Tunnel "A"			
Set Up For Tunnel Excavation	May	Year 4	6.00
TBM.	March	Year 4	51.00
Mine 27' Tunnel	July	Year 4	144.00
Tunnel Mining Surface Support	June	Year 4	165.00
Remove TBM @ Launch Shaft	October	Year 5	8.67
Grout Leakage	October	Year 4	4.00
Remove Rail, Utilities, and Clean Tun.	November	Year 5	6.00
Equip Op Cost 24/7	March	Year 4	192.67
Retrieval Shaft "A"			
Excavate Retrieval Shafts	January	Year 3	11.67
Invert prep	December	Year 2	0.67
Invert Rebar	December	Year 2	0.67
Place invert slab	March	Year 3	0.33
Clean Shaft Invert	March	Year 3	0.33
Elbow Forms	March	Year 3	5.33
Elbow & Riser Rebar	March	Year 3	4.00
Place Elbow Concrete	March	Year 3	3.33
Set & Strip Riser forms	March	Year 3	7.67
Place Riser Shaft Concrete	March	Year 3	2.67
Controlled Density Fill	April	Year 3	6.80
Launch Shaft "B"			
Excavate and Support Shaft	September	Year 2	44.00
Invert work slab	July	Year 2	2.67
Shaft Invert & Wall Rebar	September	Year 2	7.33
Place invert slab	September	Year 2	1.00
Form Shaft Walls	September	Year 2	6.00
Place Shaft Walls	September	Year 2	2.00
Clean Shaft Invert	September	Year 2	1.00

Phase	Start Month	Start Year	Days
Shaft Tunnel Invert Pour	September	Year 2	1.33
Tunnel & Riser Rebar	September	Year 2	8.00
Tunnel & Elbow Forms	September	Year 2	10.77
Place tunnel & Elbow Concrete	October	Year 2	3.33
Set & Strip Riser forms	October	Year 2	16.33
Place Riser Shaft Concrete	October	Year 2	3.00
Controlled Density Fill	September	Year 2	18.67
33 ft Tunnel "B"			
TBM.	January	Year 5	51.00
Mine 27' Tunnel	May	Year 5	144.00
Tunnel Mining Surface Support	March	Year 5	165.00
Remove TBM @ Launch Shaft	July	Year 5	8.67
Grout Leakage	October	Year 5	4.00
Remove Rail, Utilities, and Clean Tun.	August	Year 5	6.00
Equip Op Cost 24/7	January	Year 5	192.67
Retrieval Shaft "B"			
Excavate Retrieval Shafts	June	Year 3	11.67
Invert prep	May	Year 3	0.67
Invert Rebar	May	Year 3	0.67
Place invert slab	August	Year 3	0.33
Clean Shaft Invert	August	Year 3	0.33
Elbow Forms	August	Year 3	5.33
Elbow & Riser Rebar	August	Year 3	4.00
Place Elbow Concrete	August	Year 3	3.33
Set & Strip Riser forms	August	Year 3	7.67
Place Riser Shaft Concrete	August	Year 3	2.67
Controlled Density Fill	August	Year 3	6.80
Muck Disposal Shafts			
Load & Haul excavated materials	September	Year 3	251.00
Muck Disposal Tunnel			
Muck Disposal	September	Year 3	42.67
Head of Old River Barrier *			
Phase 1	January	Year 9	290
Phase 2	November	Year 9	390
Phase 3	December	Year 10	120
* Barrier only included for Alternative 2B			

1 **Table 3C-20. Alternative 4 (Modified Pipeline/Tunnel Alignment) Construction Schedule**

Phase	Start Month	Start Year	Days
Intake 2	Same as Pipeline/Tunnel Alignment (see Table 3C-9)		
Intake 3	Same as Pipeline/Tunnel Alignment (see Table 3C-9)		
Intake 5	Same as Pipeline/Tunnel Alignment (see Table 3C-9)		
Pumping Plant 2	Same as Pipeline/Tunnel Alignment (see Table 3C-9)		
Pumping Plant 3	Same as Pipeline/Tunnel Alignment (see Table 3C-9)		
Pumping Plant 5	Same as Pipeline/Tunnel Alignment (see Table 3C-9)		
Pipelines	Same as Pipeline/Tunnel Alignment (see Tables 3C-12 and 3C-13)		
Utilities			
Temporary Power SMAQMD (230 kV)	February	Year 1	272
Temporary Power SJVAPCD (34.5 kV)	November	Year 1	76
Temporary Power SJVAPCD (230 kV)	November	Year 1	1309
Temporary Power BAAQMD (230 kV)	February	Year 2	864
Permanent Power SMAQMD (69 kV)	September	Year 1	17
Permanent Power SMAQMD (230 kV)	September	Year 1	998
Forebays			
Intermediate Forebay	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Byron Tract Forebay (Clifton Court)			
Dewatering	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Pump Install & Maintain	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Remove Unsuitable-Export	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Cut/Fill-Build Levees			
Scraper Cut/Fill	March	Year 4	218
Slope Finish	March	Year 4	47
Bottom Finish	March	Year 4	81
Levee Top Finish	March	Year 4	12
Export Suitable	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Slope Protection	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Primary Maintenance Road	Same as Pipeline/Tunnel Alignment (see Table 3C-17)		
Control Structures	Same as Pipeline/Tunnel Alignment (see Table 3C-18)		
Head of Old River Barrier	Same as Pipeline/Tunnel Alignment (see Table 3C-18)		
Expanded Clifton Court			
East Side Embankment			
Clearing and Grubbing	October	Year 3	30
Dewatering/Underwatering	October	Year 3	545
Sheetpile Cell	October	Year 3	208
Excavation	November	Year 4	109
Embankment	December	Year 4	277
Remove Sheetpiles	January	Year 6	104
Area Restoration	March	Year 6	30
Demobilization	May	Year 6	21
West Side Embankment			
Clearing and Grubbing	July	Year 4	30
Dewatering/Underwatering	July	Year 4	528
Sheetpile Cell	July	Year 4	206
Excavation	September	Year 5	103
Embankment	October	Year 5	262
Remove Sheetpiles	September	Year 6	103
Area Restoration	January	Year 7	30
Demobilization	January	Year 7	21
Partition Forebay			

Phase	Start Month	Start Year	Days
Clearing and Grubbing	April	Year 5	30
Dewatering/Underwatering	April	Year 5	686
Sheetpile Cell	April	Year 5	369
Excavation	December	Year 6	202
Embankment	January	Year 7	257
Remove Sheetpiles	January	Year 8	185
Area Restoration	March	Year 8	30
Demobilization	September	Year 8	21
North Side Embankment			
Clearing and Grubbing	April	Year 5	30
Dewatering/Underwatering	April	Year 5	497
Sheetpile Cell	April	Year 5	188
Excavation	March	Year 6	98
Embankment	April	Year 6	249
Remove Sheetpiles	March	Year 7	94
Area Restoration	June	Year 7	30
Demobilization	July	Year 7	21
CCF Embankment Removal			
Clearing and Grubbing	April	Year 6	30
Dewatering/Underwatering	April	Year 6	740
Sheetpile Cell	April	Year 6	573
Excavation	January	Year 9	127
Remove Sheetpiles	March	Year 9	144
Demobilization	December	Year 9	21
Dredge Forebay			
Dredge Forebay	September	Year 6	534

Table 3C-21. Alternative 4 (Modified Pipeline/Tunnel Alignment) Construction Schedule

Tunnel							
Reach #1							
Retrieval Shaft	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Muck Disposal Shafts			
Muck Disposal Shafts	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Load & Haul excavated materials	July	Year 4	244.33
23' ID Tunnel 115+00 => 267+00 *				33 ft Tunnel A *			
Set Up For Tunnel Excavation	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Set Up For Tunnel Excavation	July	Year 4	6.00
TBM & Vertical Conv. Assy.	Same as Pipeline Tunnel Alignment (see Table 3C-14)			TBM & Vertical Conv. Assy.	April	Year 4	83.00
Mine 26' Tunnel	December	Year 4	342	Mine 37' Tunnel	July	Year 4	1302
Tunnel Mining Surface Support	December	Year 5	503.00	Tunnel Mining Surface Support	July	Year 4	1562
Sunday Maint.	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Sunday Maint	November	Year 7	29.33
Remove TBM @ Launch Shaft	Same as Pipeline Tunnel Alignment (see Table 3C-14)			TBM Removal @ Retrieval Shaft	February	Year 8	2.00
Grout	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Grout Leakage	November	Year 7	87.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	February	Year 8	70.00
Final Lining over TBM Skin	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Equip Op Cost 24/7	April	Year 4	1452.33
Equip Op Cost 24/7	Same as Pipeline Tunnel Alignment (see Table 3C-14)			33 ft Tunnel B *			
Muck Disposal Tunnel	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Set Up For Tunnel Excavation	August	Year 4	6.00
Reach #2				TBM & Vertical Conv. Assy.	August	Year 4	83.00
Launch Shaft	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Mine 37' Tunnel	November	Year 4	1302
Intermediate Shaft	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Tunnel Mining Surface Support	November	Year 4	1562
Retrieval Shaft	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Sunday Maint	March	Year 8	29.33
Muck Disposal Shafts	Same as Pipeline Tunnel Alignment (see Table 3C-14)			TBM Removal @ Retrieval Shaft	May	Year 8	2.00
33 ft Tunnel *				Grout Leakage	March	Year 8	87.00
Set Up For Tunnel Excavation	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	May	Year 8	70.00
TBM & Vertical Conv. Assy.	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Equip Op Cost 24/7	August	Year 4	1452.33
Mine 37' Tunnel	March	Year 4	827	Muck Disposal Tunnels			
Tunnel Mining Surface Support	March	Year 4	959.33	Muck Disposal	March	Year 4	342.00
Sunday Maint.	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Reach #6			
Remove TBM @ Retrieval Shaft	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Launch Shaft A			
Grout Leakage	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Excavate and Support Shaft	October	Year 2	30.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Invert work slab	January	Year 3	2.67
Equip Op Cost 24/7	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Shaft Invert & Wall Rebar	January	Year 3	7.33
Muck Disposal Tunnel	Same as Pipeline Tunnel Alignment (see Table 3C-14)			Place invert slab	January	Year 3	1.00
Reach #3				Form Shaft Walls	January	Year 3	6.00
Launch Shaft				Place Shaft Walls	January	Year 3	2.00

Tunnel							
Excavate and Support Shaft	February	Year 3	30	Clean Shaft Invert	January	Year 3	1.00
Invert work slab	December	Year 2	3	Shaft Tunnel Invert Pour	January	Year 3	0.67
Shaft Invert & Wall Rebar	February	Year 3	7	Tunnel & Riser Rebar	January	Year 3	6.00
Place invert slab	February	Year 3	1	Tunnel & Riser Forms	January	Year 3	9.67
Form Shaft Walls	February	Year 3	6	Place tunnel & Riser concrete	March	Year 3	1.67
Place Shaft Walls	February	Year 3	2	Controlled Density Fill	April	Year 3	14.00
Clean Shaft Invert	February	Year 3	1	Launch Shaft B			
Shaft Tunnel Invert Pour	February	Year 3	1	Excavate and Support Shaft	August	Year 2	30.00
Tunnel & Riser Rebar	February	Year 3	6	Invert work slab	November	Year 2	2.67
Tunnel & Riser Forms	February	Year 3	10	Shaft Invert & Wall Rebar	February	Year 3	7.33
Place tunnel & Riser concrete	February	Year 3	2	Place invert slab	February	Year 3	1.00
Controlled Density Fill/Backfill	April	Year 3	14	Form Shaft Walls	February	Year 3	6.00
Intermediate Shaft				Place Shaft Walls	February	Year 3	2.00
Form & Place Shaft Collar	December	Year 3	1	Clean Shaft Invert	February	Year 3	1.00
Excavate and build tunnel / shaft collar	November	Year 3	3	Tunnel & Riser Rebar	February	Year 3	6.00
Install ladder / Vent & Cover	December	Year 3	1	Tunnel & Riser Forms	February	Year 3	9.67
Backfill Shaft	January	Year 4	3	Place tunnel & Riser concrete	April	Year 3	1.67
Retrieval Shaft				Controlled Density Fill	June	Year 3	14.00
Excavate Retrieval Shafts	September	Year 2	2	Intermediate Shaft A			
Invert prep	October	Year 2	5	Form & Place Shaft Collar	January	Year 4	1.33
Invert Rebar	October	Year 2	5	Excavate and build tunnel / shaft collar	December	Year 3	3.00
Place invert slab	January	Year 3	8	Install ladder / Vent & Cover	January	Year 4	0.67
Clean Shaft Invert	January	Year 3	8	Backfill Shaft	January	Year 4	2.67
Tunnel Forms	January	Year 3	8	Intermediate Shaft B			
Tunnel Rebar	January	Year 3	8	Form & Place Shaft Collar	March	Year 4	1.33
Place tunnel concrete	January	Year 3	8	Excavate and build tunnel / shaft collar	February	Year 4	3.00
Controlled Density Fill	January	Year 3	8	Install ladder / Vent & Cover	March	Year 4	0.67
Muck Disposal Shafts				Backfill Shaft	March	Year 4	2.67
Load & Haul excavated materials	February	Year 3	244	Retrieval Shaft			
33 ft Tunnel *				Excavate Retrieval Shafts	August	Year 4	8.00
Set Up For Tunnel Excavation	February	Year 4	6	Invert prep	June	Year 4	0.67
TBM & Vertical Conv. Assy.	February	Year 4	76	Invert Rebar	June	Year 4	0.67
Mine 37' Tunnel	April	Year 4	623	Place invert slab	September	Year 4	0.33
Tunnel Mining Surface Support	June	Year 4	503	Clean Shaft Invert	September	Year 4	1.00
Sunday Maint	May	Year 7	11	Tunnel Rebar	September	Year 4	1.46

Tunnel							
TBM Removal @ Retrieval Shaft	August	Year 7	2	Tunnel Forms	September	Year 4	4.00
Grout Leakage	May	Year 7	38	Place tunnel concrete	September	Year 4	1.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	August	Year 7	33	Controlled Density Fill	September	Year 4	5.52
Final Lining over TBM Skin	July	Year 7	4	Muck Disposal Shafts			
Equip Op Cost 24/7	February	Year 4	611	Load & Haul excavated materials	November	Year 4	199.33
Muck Disposal Tunnels				33 ft Tunnel A *			
Muck Disposal	April	Year 8	317	Set Up For Tunnel Excavation	February	Year 4	6.00
<u>Reach #4</u>				TBM & Vertical Conv. Assy.	February	Year 4	76.00
Launch Shaft A				Mine 37' Tunnel	April	Year 4	1344
Excavate and Support Shaft	July	Year 2	30.00	Tunnel Mining Surface Support	April	Year 4	1613
Invert work slab	October	Year 2	2.67	Sunday Maint	September	Year 7	27.00
Shaft Invert & Wall Rebar	December	Year 2	7.33	TBM Removal @ Retrieval Shaft	September	Year 7	8.67
Place invert slab	December	Year 2	1.00	Grout Leakage	August	Year 7	83.00
Form Shaft Walls	January	Year 3	6.00	Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	September	Year 7	68.00
Place Shaft Walls	January	Year 3	2.00	Final Lining over TBM Skin	September	Year 7	4.00
Clean Shaft Invert	January	Year 3	1.00	Equip Op Cost 24/7	February	Year 4	1500.00
Shaft Tunnel Invert Pour	January	Year 3	0.67	33 ft Tunnel B *			
Tunnel & Riser Rebar	January	Year 3	6.00	Set Up For Tunnel Excavation	May	Year 4	6.00
Tunnel & Riser Forms	January	Year 3	9.67	TBM & Vertical Conv. Assy.	May	Year 4	76.00
Place tunnel & Riser concrete	January	Year 3	1.67	Mine 37' Tunnel	July	Year 4	1344
Controlled Density Fill	February	Year 3	14.00	Tunnel Mining Surface Support	July	Year 4	1613
Launch Shaft B				Sunday Maint	November	Year 7	27.33
Excavate and Support Shaft	July	Year 2	30.00	TBM Removal @ Retrieval Shaft	January	Year 8	8.67
Invert work slab	October	Year 2	2.67	Grout Leakage	November	Year 7	83.00
Shaft Invert & Wall Rebar	January	Year 3	7.33	Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	January	Year 8	68.00
Place Invert Slab	January	Year 3	1.00	Final Lining over TBM Skin	January	Year 8	4.00
Form Shaft Walls	January	Year 3	6.00	Equip Op Cost 24/7	May	Year 4	1,500.0 0
Place Shaft Walls	January	Year 3	2.00	Muck Disposal Tunnels			
Clean Shaft Invert	January	Year 3	1.00	Muck Disposal	April	Year 8	327.00
Shaft Tunnel Invert Pour	January	Year 3	0.67	<u>Reach #7</u>			
Tunnel & Riser Rebar	January	Year 3	6.00	Launch Shaft A			
Tunnel & Riser Forms	January	Year 3	9.67	Excavate and Support Shaft	December	Year 2	30.00
Place tunnel & Riser concrete	February	Year 3	1.67	Invert work slab	October	Year 2	2.67
Controlled Density Fill	March	Year 3	14.00	Shaft Invert & Wall Rebar	January	Year 3	7.33
Intermediate Shaft A				Place invert slab	January	Year 3	1.00
Form & Place Shaft Collar	November	Year 3	1.33	Form Shaft Walls	January	Year 3	6.00

Tunnel							
Excavate and build tunnel / shaft collar	October	Year 3	3.00	Place Shaft Walls	January	Year 3	2.00
Install ladder / Vent & Cover	November	Year 3	0.67	Clean Shaft Invert	January	Year 3	1.00
Backfill Shaft	November	Year 3	2.67	Shaft Tunnel Invert Pour	January	Year 3	0.67
Intermediate Shaft B				Tunnel & Riser Rebar	January	Year 3	6.00
Form & Place Shaft Collar	November	Year 3	1.33	Tunnel & Riser Forms	January	Year 3	9.67
Excavate and build tunnel / shaft collar	October	Year 3	6.67	Place tunnel & Riser concrete	March	Year 3	1.67
Tunnel / Shaft Collar	November	Year 3	3.00	Controlled Density Fill	April	Year 3	14.00
Install ladder / Vent & Cover	November	Year 3	0.67	Launch Shaft B			
Backfill	November	Year 3	2.67	Excavate and Support Shaft	February	Year 3	30.00
Retrieving Shaft A				Invert work slab	December	Year 2	2.67
Excavate Retrieval Shafts	March	Year 4	8.00	Shaft Invert & Wall Rebar	February	Year 3	7.33
Invert prep	April	Year 4	0.67	Place invert slab	February	Year 3	1.00
Invert Rebar	April	Year 4	0.67	Form Shaft Walls	February	Year 3	6.00
Place invert slab	July	Year 4	0.33	Place Shaft Walls	February	Year 3	2.00
Clean Shaft Invert	July	Year 4	0.33	Clean Shaft Invert	February	Year 3	1.00
Elbow & Riser Forms	July	Year 4	8.67	Shaft Tunnel Invert Pour	February	Year 3	0.67
Elbow & Riser Rebar	July	Year 4	9.33	Tunnel & Riser Rebar	February	Year 3	6.00
Place Elbow & Riser concrete	July	Year 4	2.33	Tunnel & Riser Forms	February	Year 3	9.67
Controlled Density Fill	July	Year 4	2.67	Place tunnel & Riser concrete	April	Year 3	1.67
Retrieving Shaft B				Controlled Density Fill	June	Year 3	14.00
Excavate Retrieval Shafts	May	Year 4	8.00	Intermediate Shaft A			
Invert prep	May	Year 4	0.67	Form & Place Shaft Collar	December	Year 3	1.33
Invert Rebar	May	Year 4	0.67	Excavate and build tunnel / shaft collar	November	Year 3	3.00
Place invert slab	September	Year 4	0.33	Install ladder / Vent & Cover	December	Year 3	0.67
Clean Shaft Invert	September	Year 4	0.33	Backfill Shaft	December	Year 3	2.67
Elbow & Riser Forms	September	Year 4	8.67	Intermediate Shaft B			
Elbow & Riser Rebar	September	Year 4	9.33	Form & Place Shaft Collar	March	Year 4	1.33
Place Elbow & Riser concrete	September	Year 4	2.33	Excavate and build tunnel / shaft collar	February	Year 4	3.00
Controlled Density Fill	September	Year 4	2.67	Install ladder / Vent & Cover	March	Year 4	0.67
Muck Disposal Shafts				Backfill Shaft	March	Year 4	2.67
Load & Haul excavated materials	October	Year 4	322.67	Retrieval Shaft A			
33 ft Tunnel A *				Excavate Retrieval Shafts	April	Year 4	1.67
Set Up For Tunnel Excavation	January	Year 4	6.00	Invert prep	May	Year 4	5.00
Mine 37' Tunnel	March	Year 4	1,027	Invert Rebar	May	Year 4	5.00
Tunnel Mining Surface Support	March	Year 4	1,232	Place invert slab	May	Year 4	8.00
Sunday Maint	September	Year 6	22.00	Clean Shaft Invert	May	Year 4	8.00
TBM Removal @ Retrieval Shaft	October	Year 6	8.67	Tunnel Forms	May	Year 4	8.00
Grout Leakage	October	Year 6	66.00	Tunnel Rebar	May	Year 4	8.00

Tunnel							
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	October	Year 6	52.00	Place tunnel concrete	May	Year 4	8.00
Equip Op Cost 24/7	January	Year 4	1130.33	Controlled Density Fill	August	Year 4	8.00
33 ft Tunnel B *				Retrieval Shaft B			
Set Up For Tunnel Excavation	February	Year 4	6.00	Excavate Retrieval Shafts	June	Year 4	1.67
TBM & Vertical Conv. Assy.	February	Year 4	83.00	Invert prep	August	Year 4	5.00
Mine 37' Tunnel	March	Year 4	1,027	Invert Rebar	August	Year 4	5.00
Tunnel Mining Surface Support	March	Year 4	1,232	Place invert slab	November	Year 4	8.00
Sunday Maint	January	Year 7	22.00	Clean Shaft Invert	November	Year 4	8.00
TBM Removal @ Retrieval Shaft	January	Year 7	8.67	Tunnel Forms	November	Year 4	8.00
Grout Leakage	April	Year 7	66.00	Tunnel Rebar	November	Year 4	8.00
Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	January	Year 7	52.00	Place tunnel concrete	November	Year 4	8.00
Equip Op Cost 24/7	February	Year 4	1130.33	Controlled Density Fill	November	Year 5	8.00
Muck Disposal Tunnels							
Muck Disposal	May	Year 7	266.33	Muck Disposal Shafts			
Reach #5				Load & Haul excavated materials	November	Year 4	244.33
Launch Shaft A				33 ft Tunnel A *			
Excavate and Support Shaft	July	Year 2	30.00	Set Up For Tunnel Excavation	May	Year 4	6.00
Shaft Invert & Wall Rebar	November	Year 2	7.33	TBM & Vertical Conv. Assy.	May	Year 4	76.00
Place invert slab	November	Year 2	1.00	Mine 37' Tunnel	July	Year 4	1345
Form Shaft Walls	November	Year 2	6.00	Tunnel Mining Surface Support	July	Year 4	1614
Place Shaft Walls	November	Year 2	2.00	Sunday Maint	September	Year 7	26.67
Clean Shaft Invert	November	Year 2	1.00	TBM Removal @ Retrieval Shaft	November	Year 7	8.67
Shaft Tunnel Invert	November	Year 2	0.67	Grout Leakage	September	Year 7	83.00
Tunnel & Riser Rebar	November	Year 2	6.00	Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	November	Year 7	68.00
Tunnel & Riser Forms	January	Year 3	9.67	Equip Op Cost 24/7	May	Year 4	1373.06
Place tunnel & Riser concrete	February	Year 3	1.67	33 ft Tunnel B *			
Controlled Density Fill	March	Year 3	14.00	Set Up For Tunnel Excavation	August	Year 4	6.00
Launch Shaft B				TBM & Vertical Conv. Assy.	October	Year 4	1345
Excavate and Support Shaft	July	Year 2	30.00	Mine 37' Tunnel	October	Year 4	1614
Invert work slab	November	Year 2	2.67	Tunnel Mining Surface Support	December	Year 4	1177.00
Shaft Invert & Wall Rebar	January	Year 3	7.33	Sunday Maint	January	Year 8	26.67
Place invert slab	January	Year 3	1.00	TBM Removal @ Retrieval Shaft	January	Year 8	8.67
Form Shaft Walls	January	Year 3	6.00	Grout Leakage	January	Year 8	83.00
Place Shaft Walls	January	Year 3	2.00	Remove Rail, Utilities, TBM, Ventilation, and Clean Tun.	January	Year 8	68.00
Clean Shaft Invert	January	Year 3	1.00	Equip Op Cost 24/7	August	Year 4	1373.00

Tunnel							
Shaft Tunnel Invert Pour	January	Year 3	0.67	Muck Disposal Tunnels			
Tunnel & Riser Rebar	January	Year 3	6.00	Muck Disposal	May	Year 8	322.00
Tunnel & Riser Forms	January	Year 3	9.67				
Place tunnel & Riser concrete	March	Year 3	1.67				
Controlled Density Fill	May	Year 3	14.00				
Intermediate Shaft A							
Form & Place Shaft Collar	December	Year 3	1.33				
Excavate and build tunnel / shaft collar	December	Year 3	3.00				
Install ladder / Vent & Cover	December	Year 3	0.67				
Backfill Shaft	December	Year 3	2.67				
Intermediate Shaft B							
Form & Place Shaft Collar	November	Year 3	1.33				
Excavate and build tunnel / shaft collar	November	Year 3	3.00				
Install ladder / Vent & Cover	November	Year 3	0.67				
Backfill	December	Year 3	2.67				
Retrieving Shaft A							
Excavate Retrieval Shafts	May	Year 4	8.00				
Invert prep	June	Year 4	0.67				
Invert Rebar	June	Year 4	0.67				
Place invert slab	September	Year 4	0.33				
Clean Shaft Invert	September	Year 4	1.00				
Elbow & Riser Forms	September	Year 4	1.46				
Elbow & Riser Rebar	September	Year 4	4.00				
Place Elbow & Riser concrete	September	Year 4	1.00				
Controlled Density Fill	September	Year 4	5.52				
Retrieving Shaft B							
Excavate Retrieval Shafts	May	Year 4	8.00				
Invert prep	June	Year 4	0.67				
Invert Rebar	June	Year 4	0.67				
Place invert slab	September	Year 4	0.33				
Clean Shaft Invert	September	Year 4	1.00				
Elbow & Riser Forms	September	Year 4	0.67				
Elbow & Riser Rebar	September	Year 4	1.46				
Place Elbow & Riser concrete	September	Year 4	4.00				
Controlled Density Fill	September	Year 4	1.00				
* Tunnel size for modeling purposes only. Please refer to tables above for actual tunnel diameters.							

1 **Table 3C-22. Alternative 4 (Modified Pipeline/Tunnel Alignment) Construction Schedule**

Siphons							
Main Tunnel Siphon				Phase 2	March	Year 6	20
Phase 1				Clearing & Grubbing / Demolition	March	Year 6	477
Clearing & Grubbing / Demolition	June	Year 3	20	Dewatering / Unwatering	March	Year 6	507
Dewatering / Unwatering	July	Year 3	448	Erosion & Sediment Control BMP's	April	Year 6	60
Erosion & Sediment Control BMP's	July	Year 3	478	Sheetpile Cell	September	Year 6	33
Sheetpile Cell	July	Year 3	60	Excavation	October	Year 6	24
Excavation	February	Year 5	25	Pile Installation	October	Year 6	32
Pile Installation	March	Year 5	15	Slab On Grade	November	Year 6	52
Slab On Grade	April	Year 5	20	Siphon Walls	February	Year 7	32
Siphon Walls	May	Year 5	33	Siphon Roof	February	Year 7	58
Siphon Roof	June	Year 5	20	Backfill & Embankments	May	Year 7	21
Backfill & Embankments	July	Year 5	39	Waterway Reconstruction	June	Year 7	170
Waterway Reconstruction	August	Year 5	21	Inlet & Outlet Transition Structure			
Inlet & Outlet Transition Structure	September	Year 5	170	Upstream & Downstream Transitions	May	Year 5	4
Upstream & Downstream Transitions				Excavation/Grading	May	Year 5	2
Excavation/Grading	September	Year 5	4	Place Gravel Bedding	May	Year 5	30
Place Gravel Bedding	September	Year 5	2	Place Invert Slab Concrete:Plant & Operations	June	Year 5	7
Place Invert Slab Concrete:Plant & Operations	September	Year 5	30	Place Invert Slab Concrete:Placing Crews	June	Year 5	7
Place Invert Slab Concrete:Placing Crews	October	Year 5	7	Place Invert Slab Concrete:Finish	July	Year 5	3
Place Invert Slab Concrete:Finish	October	Year 5	7	Place Invert Slab Concrete:Point and Patch	July	Year 5	3
Place Invert Slab Concrete:Point and Patch	November	Year 5	3	Place Invert Slab Concrete:Treat CJ	July	Year 5	49
Place Invert Slab Concrete:Treat CJ	November	Year 5	3	Place Invert Slab Concrete:Cure & Cleanup	August	Year 5	18
Place Invert Slab Concrete:Cure & Cleanup	November	Year 5	49	Place Invert Slab Concrete:Formwork	June	Year 5	60
Place Invert Slab Concrete:Formwork	December	Year 5	18	Place Wall Concrete:Plant & Operations	June	Year 5	20
Place Wall Concrete:Plant & Operations	October	Year 5	60	Place Wall Concrete:Placing Crews	June	Year 5	6
Place Wall Concrete:Placing Crews	October	Year 5	20	Place Wall Concrete:Point and Patch	July	Year 5	6
Place Wall Concrete:Point and Patch	October	Year 5	6	Place Wall Concrete:Treat CJ	July	Year 5	4
Place Wall Concrete:Treat CJ	December	Year 5	6	Place Wall Concrete:Cure & Cleanup	July	Year 5	60
Place Wall Concrete:Cure & Cleanup	December	Year 5	4	Place Wall Concrete:Formwork	October	Year 5	2
Place Wall Concrete:Formwork	December	Year 5	60	Backfill (Including Embankment)			
Backfill (Including Embankment)	February	Year 6	2	Upstream & Downstream Control Structures	July	Year 5	3
Upstream & Downstream Control Structures				Excavation/Grading	July	Year 5	1
Excavation/Grading	November	Year 5	3	Place Gravel Bedding	July	Year 5	15
Place Gravel Bedding	November	Year 5	1	Drive Foundation Piles	August	Year 5	15

Siphons							
Drive Foundation Piles	November	Year 5	15	Place Invert Slab Concrete:Plant & Operations	August	Year 5	4
Place Invert Slab Concrete:Plant & Operations	December	Year 5	15	Place Invert Slab Concrete:Placing Crews	August	Year 5	4
Place Invert Slab Concrete:Placing Crews	December	Year 5	4	Place Invert Slab Concrete:Finish	August	Year 5	1
Place Invert Slab Concrete:Finish	December	Year 5	4	Place Invert Slab Concrete:Point and Patch	August	Year 5	1
Place Invert Slab Concrete:Point and Patch	December	Year 5	1	Place Invert Slab Concrete:Treat CJ	August	Year 5	10
Place Invert Slab Concrete:Treat CJ	December	Year 5	1	Place Invert Slab Concrete:Cure & Cleanup	August	Year 5	5
Place Invert Slab Concrete:Cure & Cleanup	December	Year 5	10	Place Invert Slab Concrete:Formwork	September	Year 5	20
Place Invert Slab Concrete:Formwork	December	Year 5	5	Place Wall Concrete:Plant & Operations	September	Year 5	6
Place Wall Concrete:Plant & Operations	January	Year 6	20	Place Wall Concrete:Placing Crews	September	Year 5	12
Place Wall Concrete:Placing Crews	January	Year 6	6	Place Wall Concrete:Point and Patch	October	Year 5	15
Place Wall Concrete:Point and Patch	January	Year 6	12	Place Wall Concrete:Cure & Cleanup	October	Year 5	3
Place Wall Concrete:Cure & Cleanup	February	Year 6	15	Backfill (Including Embankment)	February	Year 8	30
Backfill (Including Embankment)	February	Year 6	3	Remove Sheetpiles	February	Year 8	30
Remove Sheetpiles	June	Year 6	30	Area Restoration	March	Year 8	20
Area Restoration	June	Year 6	30	Demobilization	March	Year 6	20
Demobilization	July	Year 6	20	Byron Highway			
Phase 2				Clearing & Grubbing / Demolition	September	Year 4	20
Clearing & Grubbing / Demolition	September	Year 6	20	Dewatering / Unwatering	September	Year 4	529
Dewatering / Unwatering	September	Year 6	817	Erosion & Sediment Control BMP's	September	Year 4	559
Erosion & Sediment Control BMP's	September	Year 6	847	Build Highway Detour and Railroad Shoofly			
Sheetpile Cell	October	Year 6	60	Detour Road			
Excavation	March	Year 7	25	Demolition (Remove Road)	October	Year 4	20
Pile Installation	April	Year 7	15	Place Road and Bedding	November	Year 4	44
Slab On Grade	May	Year 7	20	Pave Road/Striping	December	Year 4	24
Siphon Walls	June	Year 7	33	Shoofly			
Siphon Roof	July	Year 7	20	Rails/Ballast/subBallast	October	Year 4	84
Backfill & Embankments	July	Year 7	39	Excavation	April	Year 5	30
Waterway Reconstruction	October	Year 7	21	Pile Installation	May	Year 5	24
Inlet & Outlet Transition Structure	April	Year 8	170	Slab On Grade	June	Year 5	33
Upstream & Downstream Transitions				Siphon Walls	June	Year 5	53
Excavation/Grading	April	Year 8	4	Siphon Roof	August	Year 5	33
Place Gravel Bedding	April	Year 8	2	Backfill & Embankments	September	Year 5	30
Place Invert Slab Concrete:Plant & Operations	April	Year 8	30	Railroad and Highway Reconstruction			
Place Invert Slab Concrete:Placing Crews	May	Year 8	7	Highway			
Place Invert Slab Concrete:Finish	May	Year 8	7	Place Road and Bedding	October	Year 5	80
Place Invert Slab Concrete:Point and Patch	June	Year 8	3	Pave Road/Striping	November	Year 5	24

Siphons							
Place Invert Slab Concrete:Treat CJ	June	Year 8	3	Railroad			
Place Invert Slab Concrete:Cure & Cleanup	June	Year 8	49	Rails/Ballast/subBallast	October	Year 5	80
Place Invert Slab Concrete:Formwork	July	Year 8	18	Inlet & Outlet Transition Structure	February	Year 6	170
Place Wall Concrete:Plant & Operations	May	Year 8	60	Upstream & Downstream Transitions			
Place Wall Concrete:Placing Crews	May	Year 8	20	Excavation/Grading	February	Year 6	4
Place Wall Concrete:Point and Patch	May	Year 8	6	Place Gravel Bedding	February	Year 6	2
Place Wall Concrete:Treat CJ	July	Year 8	6	Place Invert Slab Concrete:Plant & Operations	February	Year 6	30
Place Wall Concrete:Cure & Cleanup	July	Year 8	4	Place Invert Slab Concrete:Placing Crews	March	Year 6	7
Place Wall Concrete:Formwork	July	Year 8	60	Place Invert Slab Concrete:Finish	March	Year 6	7
Backfill (Including Embankment)	September	Year 8	2	Place Invert Slab Concrete:Point and Patch	April	Year 6	3
Upstream & Downstream Control Structures				Place Invert Slab Concrete:Treat CJ	April	Year 6	3
Excavation/Grading	June	Year 8	3	Place Invert Slab Concrete:Cure & Cleanup	April	Year 6	49
Place Gravel Bedding	June	Year 8	1	Place Invert Slab Concrete:Formwork	May	Year 6	18
Drive Foundation Piles	June	Year 8	15	Place Wall Concrete:Plant & Operations	March	Year 6	60
Place Invert Slab Concrete:Plant & Operations	July	Year 8	15	Place Wall Concrete:Placing Crews	March	Year 6	20
Place Invert Slab Concrete:Placing Crews	July	Year 8	4	Place Wall Concrete:Point and Patch	March	Year 6	6
Place Invert Slab Concrete:Finish	July	Year 8	4	Place Wall Concrete:Treat CJ	May	Year 6	6
Place Invert Slab Concrete:Point and Patch	July	Year 8	1	Place Wall Concrete:Cure & Cleanup	May	Year 6	4
Place Invert Slab Concrete:Treat CJ	July	Year 8	1	Place Wall Concrete:Formwork	May	Year 6	60
Place Invert Slab Concrete:Cure & Cleanup	July	Year 8	10	Backfill (Including Embankment)	July	Year 6	2
Place Invert Slab Concrete:Formwork	July	Year 8	5	Upstream & Downstream Control Structures			
Place Wall Concrete:Plant & Operations	August	Year 8	20	Excavation/Grading	April	Year 6	3
Place Wall Concrete:Placing Crews	August	Year 8	6	Place Gravel Bedding	April	Year 6	1
Place Wall Concrete:Point and Patch	August	Year 8	12	Drive Foundation Piles	April	Year 6	15
Place Wall Concrete:Cure & Cleanup	September	Year 8	15	Place Invert Slab Concrete:Plant & Operations	May	Year 6	15
Backfill (Including Embankment)	September	Year 8	3	Place Invert Slab Concrete:Placing Crews	May	Year 6	4
Remove Sheetpiles	November	Year 8	30	Place Invert Slab Concrete:Finish	May	Year 6	4
Area Restoration	November	Year 8	30	Place Invert Slab Concrete:Point and Patch	May	Year 6	1
Demobilization	January	Year 9	20	Place Invert Slab Concrete:Treat CJ	May	Year 6	1
North Forebay				Place Invert Slab Concrete:Cure & Cleanup	May	Year 6	10
Phase 1				Place Invert Slab Concrete:Formwork	May	Year 6	5
Clearing & Grubbing / Demolition	February	Year 4	20	Place Wall Concrete:Plant & Operations	June	Year 6	20
Dewatering / Unwatering	February	Year 4	477	Place Wall Concrete:Placing Crews	June	Year 6	6
Erosion & Sediment Control BMP's	February	Year 4	507	Place Wall Concrete:Point and Patch	June	Year 6	12
Sheetpile Cell	March	Year 4	60	Place Wall Concrete:Cure & Cleanup	July	Year 6	15

Siphons							
Excavation	August	Year 4	33	Backfill (Including Embankment)	July	Year 6	3
Pile Installation	September	Year 4	24	Area Restoration	October	Year 6	30
Slab On Grade	October	Year 4	32	Demobilization	December	Year 6	20
Siphon Walls	October	Year 4	52				
Siphon Roof	December	Year 4	32				
Backfill & Embankments	January	Year 5	58				
Waterway Reconstruction	April	Year 5	21				
Inlet & Outlet Transition Structure	May	Year 5	170				
Upstream & Downstream Transitions							
Excavation/Grading	April	Year 8	4				
Place Gravel Bedding	April	Year 8	2				
Place Invert Slab Concrete:Plant & Operations	April	Year 8	30				
Place Invert Slab Concrete:Placing Crews	May	Year 8	7				
Place Invert Slab Concrete:Finish	May	Year 8	7				
Place Invert Slab Concrete:Point and Patch	June	Year 8	3				
Place Invert Slab Concrete:Treat CJ	June	Year 8	3				
Place Invert Slab Concrete:Cure & Cleanup	June	Year 8	49				
Place Invert Slab Concrete:Formwork	July	Year 8	18				
Place Wall Concrete:Plant & Operations	May	Year 8	60				
Place Wall Concrete:Placing Crews	May	Year 8	20				
Place Wall Concrete:Point and Patch	May	Year 8	6				
Place Wall Concrete:Treat CJ	July	Year 8	6				
Place Wall Concrete:Cure & Cleanup	July	Year 8	4				
Place Wall Concrete:Formwork	July	Year 8	60				
Backfill (Including Embankment)	September	Year 8	2				
Remove Sheetpiles	January	Year 6	30				
Area Restoration	January	Year 6	30				
Demobilization	February	Year 6	20				

1 **Table 3C-23. Alternative 4 (Modified Pipeline/Tunnel Alignment) Construction Schedule**

Canals							
Clear and Grub	October	Year 4	23	Dewater Canal Exc Area			
Demolition of Structures	October	Year 4	23	Excavate Trenches	December	Year 4	184
Overexcavate & Replace Under Embankments				Operate Pumps	January	Year 5	276
Dewatering Embankment Area				Pump Install and Maintain	January	Year 5	276
Excavate Trenches	October	Year 4	23	Construct/Remove Sedimentation Ponds	January	Year 5	69
Operate Pumps	October	Year 4	92	Import and Place as Embankment			
Pump Install and Maintain	October	Year 4	46	Import and Place : Haul from Borrow, 100 T Tr <2,500	February	Year 5	276
Construct/Remove Sedimentation Ponds	October	Year 4	23	Embankment Finish			
Waste Unsuitable Material				Slope Finish	November	Year 5	92
Unsuitable to ROW Spoil Berm	October	Year 4	23	Channel Bottom Finish	November	Year 5	92
Unsuitable to Borrow Backfill 5 Truck	October	Year 4	23	Embankment Top Finish	November	Year 5	92
Scarify and Recompact Canal Invert	October	Year 4	10	Other Flat Area Finish	November	Year 5	92
Flip Flop Non Organics	November	Year 4	23	Haul Roads			
Import and Replace to OG : Truck from Borrow 2.5 m to 7 m Haul, Truck :	November	Year 4	92	Overexc and Recompact 40'W X3'Dx <7 Miles : Excavate Overburden to 3' Depth :	November	Year 4	35
On-Site Excavation				Overexc and Recompact 40'W X3'Dx <7 Miles : Refill from Borrow :	November	Year 4	35
Export Unsuitable Material				Remove Haul Road Base	December	Year 5	46
Unsuitable from Canal Excavation to ROW Berms	January	Year 5	92	Maintain Haul Roads	November	Year 4	46
Unsuitable from Canal Excavation to Borrow BF 2.5 m to 7 m truck	January	Year 5	92	Drainage			
Cut and Fill Suitable Material				Export Unsuitable Material	May	Year 5	69
Canal Exc To Replace Unsuit Exc Under Embankment	February	Year 5	161	Finish Grade Ditch	May	Year 5	69
Canal Exc To Canal Embankment Lower Section	February	Year 5	161	SWPPP	October	Year 4	85
Canal Exc To Dry Bed For Emb. Top Out	February	Year 5	161				
Canal Exc To Dry Bed Reach To Reach	February	Year 5	161				
Moisture Condition Suitable Material							
Construction Drying Beds	January	Year 5	184				
Double Handle Suitable	January	Year 5	184				
Operate Drying Beds	January	Year 5	184				

1 **Table 3C-24. Alternative 9 (Separate Corridors Conveyance) Construction Schedule**

Phase[7]	Start Month	Start Year	Days
Temporary Power SMAQMD (12 kv)	January	Year 1	48
Temporary Power SJVAPCD (12 kv)	March	Year 1	77
Temporary Power BAAQMD (12 kv)	June	Year 1	9
DCC Fish Screen Intake Facility (1st half)	July	Year 4	450
DCC Fish Screen Intake Facility (2nd half)	May	Year 6	450
Georgiana Slough Fish Screen Intake Facility (1st half)	January	Year 1	450
Georgiana Slough Fish Screen Intake Facility (2nd half)	October	Year 2	450
San Joaquin at Old River Pumping Plant	December	Year 1	200
Middle River Diversion Pumping Plant	February	Year 3	200
Old River Siphon	February	Year 2	405
West Canal Siphon	September	Year 3	405
Coney Island Canal	August	Year 1	150
Flood Gate at SJR at Old River	July	Year 1	300
Tidal Gate at Middle River	September	Year 2	300
Flood Gate at Sacramento River at Meadows Slough	April	Year 1	300
Tidal Gate w/Boat Lock at Snodgrass Slough	October	Year 3	350
Control Gate at Mokelumne River near Lost Slough w/Boat Lock	July	Year 2	350
Frank's Tract (Type III Barrier w/Boat Lock)	February	Year 4	300
Three Mile Slough (Type III Barrier)	June	Year 1	450
Fisherman's Cut (Type III Barrier w/Boat Lock)	February	Year 3	250
Victoria Canal / North Canal (Type III Barrier w/Boat Lock)	April	Year 5	150
Connection Slough (Type III Barrier w/Boat Lock)	February	Year 5	150
Railroad Cut (Type III Barrier w/Boat Lock)	October	Year 5	150
Woodward Canal / North Victoria Canal (Type III Barrier w/Boat Lock)	November	Year 5	150
Intertie Channel from CCF to DMC Approach	January	Year 5	150
Control Gate in DMC Approach	January	Year 4	250
Victoria Canal Dredging	February	Year 1	865
Middle River Dredging	June	Year 4	850
Re-Channeling for River's End Marina Diversion	April	Year 3	132
Levee for Victoria Canal Enlargement	July	Year 1	200
Intertie Channel at CCF Perimeter Road Bridge	September	Year 3	264
Intertie Channel at Herdlyn Road Bridge	January	Year 4	264

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[7] It is assumed that all in-water construction activities will occur between June 1 and October 31.