APPENDIX C: PROJECT CONSTRUCTION AND OPERATIONS ACTIVITIES

SANTA ANA RIVER WATER RIGHT APPLICATIONS FOR SUPPLEMENTAL WATER SUPPLY DRAFT ENVIRONMENTAL IMPACT REPORT

October 2004

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT • 1954 •

WESTERN MUNICIPAL WATER DISTRICT

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APPENDIX C
CONSTRUCTION AND OPERATION ACTIVITIES

This appendix contains detailed information that expands and complements information on construction and operation activities presented in the main body of the Environmental Impact Report (EIR). The information presented here pertains to the construction of new, or modification of existing, facilities required for implementation of the Project. These facilities include (i) a number of new pipelines designed to divert and distribute water from the Santa Ana River (SAR), and (ii) modifications to the intake structure of the Seven Oaks Dam and roadways in the vicinity of the reservoir.

1.0 CONSTRUCTION ACTIVITIES

Although implementation of the Project would use existing facilities to the extent feasible, new facilities would be constructed and existing facilities modified. These actions would occur in four general geographical areas as shown in Figure 1-1. They include the following:

1. Seven Oaks Dam and Reservoir Construction Area (see Figure 1-2).
2. Santa Ana River Construction Area that includes the lower canyon and alluvial fan area of the SAR immediately downstream of Seven Oaks Dam (see Figure 1-3).
3. Devil Canyon Construction Area adjacent to the Devil Canyon Power Plant and Afterbays of the State Water Project (SWP) (see Figure 1-4).
4. Lytle Creek Construction Area that includes the alluvial fan area of lower Lytle Creek just north of the City of Rialto and an area immediately to the south (see Figure 1-5).

1.1 Seven Oaks Dam and Reservoir Construction Area

Tables 1-1 and 1-2 summarize the major construction activities in the Seven Oaks Dam and Reservoir Construction Area. All construction in this area would be limited to the dry season, April to October.

Table 1-1. Summary of Major Construction Activities in the Seven Oaks Dam and Reservoir Construction Area

Construction Activity	*Quantity*
Ground Disturbance	10 acres
Estimated Excavation	21,000 cubic yards
Material Disposal	minimal
Maximum Daily Construction Personnel	45 persons
External Vehicle Trips per Day	53 vehicle trips

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Table 1-2. Equipment Anticipated in Construction Areas

Construction Equipment	CONSTRUCTION EQUIPMENT USED			
	Seven Oaks Dam and Reservoir Construction Area	*Santa Ana River Construction Area*	*Devil Canyon Construction Area*	*Lytle Creek Construction Area*
Concrete mixer	1	1	0	1
Compressor	1	1	1	1
Compactor	2	2	1	1
Vertical Auger Drill	1	1	1	1
Grader	2	1	1	1
Backhoe	3	2	1	1
Loaders	3	2	1	1
Excavator	2	2	1	2
Pavement Breaker	0	1	0	1
Portable Rock Screener	0	1	0	0
Generator	2	2	1	2
Crane	1	2	1	2
Pump	0	4	1	2
Welder	5	9	2	4
Dump Truck	6	16	4	8
Water Truck	2	2	1	3
Hydraulic Ram	0	1	1	2
Miscellaneous Truck	3	3	1	3
Street Sweeper	0	1	0	3

2

1.1.1 Modifications to Seven Oaks Dam

The following description of changes required to accommodate seasonal water conservation storage (50,000 acre-feet [af]) is taken from *Seven Oaks Dam Water Conservation Feasibility Report, Santa Ana River Basin, California, Appendix D – Design and Cost* (USACE June 1997). In this report, Alternative 3, Option 2 is the alternative most like the Project and therefore serves as the basis for the following discussion.

The intake tower would be raised using a four-story steel frame, the design of which would use various steel sections as beams, columns, and diagonal bracing (see Figures 1-6 and 1-7). The columns would be designed with a fixed connection to the maintenance deck at elevation 2,302 ft mean sea level (msl). They would align with the columns of the trashrack structure. The new deck (at elevation 2,425 ft msl) would be of similar design to the existing deck at elevation 2,302 ft msl. Access to the new service deck would be provided by a 205-foot, two span steel girder bridge. This arrangement would preserve access to the existing bridge at elevation 2,302 ft msl.

The existing deck at elevation 2,302 ft msl would not be accessible by vehicles due to the addition of the steel frame above. However, during low water, removal of debris from the steel frame would be partially completed from the existing deck, as would inspection of the frame itself. All crane work and inspection of the wet well, by skip, through the inspection slot, would be performed from the new deck at elevation 2,425 ft msl.

In order to support the additional loads induced by the steel frame extension of the intake structure, complete demolition and rebuilding of the trash structure is recommended to achieve the strengthened, integral structure required (see Figure 1-6). The existing intake structure is not designed for the seismic forces from the seasonal water conservation pool. Additional strength would be obtained in a concrete "jacket" placed around the existing structure and with additional concrete and anchor tendons to the sides of the structure (see Figure 1-7).

Due to the increased static head resulting from seasonal water conservation storage, a new bulkhead design would be required. A design similar to the existing bulkhead would provide adequate additional strength, provided that the design uses thicker steel components. The bulkhead guide slots (that would consist of steel plates and channels aligned with the existing slots) would be extended to the new maintenance deck.

Although the outlet tunnel would be subjected to additional external hydrostatic loading due to seasonal water conservation storage, the existing tunnel lining could resist this additional loading. The vent pipe within the intake structure used to dewater the tunnel would be extended within the new steel frame so as to be above the seasonal water conservation pool.

Operations and maintenance procedures would be similar to the existing intake structure. Bulkhead installation and removal would require additional hoisting time and the handling and storage of additional pendants. Since the maintenance deck would be 123 feet above the trashrack, debris removal from the trashrack would require more time and be more difficult to accomplish.

Based on information provided by the USACE (June 1997), it is estimated that modifications to the dam and intake tower would involve very little ground disturbance – approximately 3 acres of disturbance would be due to staging equipment at the bottom of the reservoir. This staging area would be located in the area that would be inundated by the dam's debris pool. Construction is estimated to take up to 18 months but, because construction is limited to the dry season, it would take up to 3 years before all modifications were completed. Between seasons, equipment would be stored in the SAR staging area (discussed in detail in section 1.2 of this appendix). Access to the construction area would be via the existing and new intake structure roads. Up to 20 construction workers would perform the intake tower modifications. Primary equipment would include a crane, drilling machines, and welders (see Table 1-2). After equipment has been delivered, daily deliveries would be minimal, estimated at about two per day.

1.1.2 New Intake Structure Road

Final construction details for the new intake structure road have not yet been developed. However, it is estimated that the road would be approximately 2,200 feet long, with about 300 feet excavated from bedrock. It is assumed the road would be paved, approximately 24 feet wide with a guardrail. The new road would follow elevation 2,420 ft msl along the upstream face of the dam, diverging from the existing intake structure access road beginning near the right abutment of the dam. The road would connect to the new 205-foot long bridge extending from the intake tower maintenance deck. The present intake structure access road would remain intact. The USACE (June 1997) proposed building a new intake access road by removing some of the rock layer from the dam. It is estimated that roadwork would disturb approximately 1 acre on the upstream side of the dam and could require over 11,000 cubic yards (cy) of excavation and 25,000 cy of fill. Following construction, the rock face of the dam would be replaced. Up to 14 construction workers would be needed to develop the new intake structure road. Equipment used to construct the road would include excavators and dump trucks. Roadwork would take approximately 12 months spread over two dry seasons.

1.1.3 New/Modified Streambed Access Road

The approval of seasonal water conservation storage within existing flood control operations would cause seasonal inundation of the existing Warm Springs Canyon Road and connection to the road that provides upstream access to SCE Powerhouse No. 1 (see Figure 1-2). This would require relocating portions of these roads to above the seasonal water conservation pool. Final design of the road modifications is not complete, but it is estimated that two sections of road would have to be rerouted – a 550-foot segment of Warm Springs Canyon Road and a 10,075-foot segment of the upstream access road. The relocated road sections would be unpaved, 14 feet wide, and cut into the mountainside, with guardrails. Fifty-foot long turnouts would be placed approximately every 1,000 feet along the roadway. Roadwork would require first clearing the proposed roadway of any brush and small trees. After clearing, a road bench would be cut into the hillside. It is assumed that excavated soil would be scattered along the roadway or used as fill where necessary. Following road construction, the nearby slopes would be hydro-seeded.

1.1.4 Construction Schedule

The proposed construction schedule for the different construction elements at Seven Oaks Dam and Reservoir Area is illustrated in Figure 1-8. Because construction would be limited to the dry season, it would take approximately 4 years to complete all the Project elements in the Seven Oaks Dam and Reservoir Construction Area. The first construction element would be development of the new intake structure road. As the intake structure road is completed, work on the intake tower and the streambed access road would begin. As shown in Figure 1-8, it is likely that modifications to the dam, construction of the new intake access road, and relocation of the streambed access road could occur at the same time as construction in the Santa Ana River Construction Area. However, construction of these elements could also occur either before or after construction in the Santa Ana River Construction Area. Construction in the reservoir area could occur at the same time as the construction of most elements in the Santa Ana River Construction Area, with the exception of Phase III of the Plunge Pool Pipeline.

1.2 Santa Ana River Construction Area

Table 1-3 summarizes the major construction activities in the Santa Ana River Construction Area. The primary construction activity associated with implementation of the Project in this area involves the installation of the Plunge Pool Pipeline, Low Flow Connector Pipeline, and Morton Canyon Connector II Pipeline. These pipelines would be installed using a cut and cover method. Activities would include excavation of as open trench, placement of sand/aggregate in the bottom of the trench, placement of the pipe, filling around the pipe with sand/aggregate, addition of backfill, and replacement of topsoil.

An early step in the construction process for pipelines is site preparation, such as clearing the construction route and staging areas, setting up a construction office and fuel storage area, and relocating any utilities and structures in the construction corridor. Following site preparation, the trench would be excavated, the depth and width of which would vary by pipeline segment. Vertical side excavations with shoring are not practical in the type of rocky ground that would be encountered in the unimproved area and, thus, freestanding walls with sloped sides (1 unit of vertical change for every 1.5 unit of horizontal change) are proposed. New pipes would be placed 7 to 20 feet below the ground surface.

This analysis conservatively assumes the largest anticipated construction ground disturbance area, i.e., the widest trench slope and the deepest pipe placement. Figure 1-9 illustrates the different cross sections for the different pipeline segments assuming maximum probable construction corridors.

The above discussion focuses on trenching in unimproved areas. In those areas where the pipelines cross roads or are installed within roads (such as where the Plunge Pool Pipeline crosses Greenspot Road), vertical side slopes would be used to the extent feasible to reduce trench width and limit disruption to the roadway. To open the trench, the roadway pavement would be removed and the material recycled.

Table 1-3. Summary of Major Construction Activities in the Santa Ana River Construction Area

Construction Activity	*Quantity*
Total Ground Disturbance	133 acres
Construction Corridor Width	
Low Flow Connector (portion outside of common trench with Plunge Pool Pipeline Phase III)	100 feet
Plunge Pool Pipeline Phase I	300 feet
Plunge Pool Pipeline Phase II	300 feet
Plunge Pool Pipeline Phase III	300 feet
Morton Canyon Connector II	100 feet
Estimated Excavation	1,786,000 cubic yards
Material Disposal without Rock Screener	403,000 cubic yards
Material Disposal with Rock Screener	116,000 cubic yards
Maximum Daily Construction Personnel	63 persons
External Vehicle Trips per Day without Rock Screener	143 vehicle trips
External Vehicle Trips per Day with Rock Screener	68 vehicle trips

Because the floor of a trench is irregular with hard places created by large rocks, a layer of sand or fine gravel would be placed on the floor of the trench to act as pipe bedding. Pipe bedding cushions the pipe and provides a surface that can be graded to a straight plane. The proposed pipes would be made of welded steel with some sections encased in up to 2 feet of concrete.

Pipe for construction would be delivered to the construction sites on an as-needed basis, and storage of pipe at the construction sites would be minimal.

Following pipe installation, the area around the pipe would be backfilled with a sand/aggregate mix. This pipe zone backfill material is chosen for its ability to be readily placed and compacted, be non-damaging to the pipe exterior, and for its ability to provide structural support for empty pipe. Above the pipe zone backfill, common backfill (material removed as part of trenching) would be replaced. Common backfill is placed with minimum compaction, unless under a roadway, in which case the backfill is compacted to a denser state appropriate for road fill.

Final steps in construction would be to restore ground surfaces to contours similar to pre-construction conditions. Existing drainage courses would be restored to approximate original slope and shape. Disturbed areas would be revegetated with native plants.

The proposed SAR staging area is illustrated in Figure 1-3. This 12-acre site (formerly a staging area for construction of Seven Oaks Dam) would accommodate equipment/vehicle storage, stockpiling, fuel storage, and the construction management office. It is proposed that a portable rock screener be placed within the staging area of the Santa Ana River Construction Area. The rock screener would take material excavated during trenching and create the sand/aggregate

mix necessary for the pipe zone backfill material. The rock screener would eliminate truck trips associated with delivery of pipe zone backfill. It is estimated that as much as 1.79 million cy of overburden would be excavated during trenching for the SAR area pipelines. Without use of a rock screener, as much as 0.40 million cy of left-over material would need disposal. With a rock screener much of the excavated material would be used to create pipe zone backfill, thereby greatly reducing left-over material. With the rock screener, the majority of the remaining material would be rocks over 1-foot in diameter, which would be sold to one of the aggregate companies located within 10 miles of the Santa Ana River Construction area. Any very large rocks (up to 10 feet in diameter) unearthed would be left in clusters adjacent to the pipeline routes.

1.2.1 Ancillary Pipeline Facilities

The pipelines would have various appurtenances such as air valves, drains, and access vaults. The exact numbers, size, and locations of these facilities cannot be defined until pipeline design is complete. Air valves would be located approximately every 2,000 feet and/or at every topographic high point in the pipelines. Blow off structures (i.e., drains) would occur at topographic lows in the pipelines. In general, it is Muni's practice to locate manholes at every air valve and blowoff and at intervening points so that the pipelines can be accessed approximately every 1,000 to 2,000 feet. These inspection ports, air valves, and drains would generally be located underground in a concrete vault, with only the vault roof exposed.

At pipeline junctions and inspection ports, access and parking is necessary. Generally a driveway from an existing road, and a parking area approximately 50 feet by 100 feet to accommodate maintenance vehicles and equipment, would be required. An access road is proposed along the western most 4,500 feet of the Plunge Pool Pipeline Phase II. This road would be one lane (approximately 10 feet wide) with a gravel surface.

In addition to these various appurtenances, the Plunge Pool Pipeline would have two or three large associated facilities: the connection to the Inland Feeder intertie (Phase II), the potential new intake structure in Phase I, and the new intake structure in Phase III. The connection to the Inland Feeder would require the construction of an above-ground building to house flow measurement and control equipment. This structure would be approximately 12 feet by 20 feet in size with approximately 200 square feet of adjacent gravel surface parking. Similar structures would be required at the junction of the Low Flow Connector and Greenspot pipelines.

It is Muni's practice to install communications cable conduit with all new pipelines. The conduit, typically 2 inches in diameter, is placed on the exterior of the pipeline, and the communications cable is pulled through the conduit after the pipeline is complete. Generally, access vaults that serve the pipe are sufficient to serve the communications cable, but it is sometimes necessary to install a separate cable access point.

1.2.2 Rerouting and/or Replacement of Existing Infrastructure

As shown in Table 1-4, several utilities would have to be rerouted and/or replaced as part of the construction of the proposed facilities in the Santa Ana River Construction Area.

Table 1-4. Infrastructure to be Rerouted and/or Replaced during Construction in the Santa Ana River Construction Area

Infrastructure	*Location*	*Description of Activity*
Plunge Pool By-Pass Pipeline	Seven Oaks Dam Outlet Work	Portion of the Plunge Pool By-Pass Pipeline would need to be rerouted to accommodate the Plunge Pool Pipeline (Phase III) Intake Structure. During construction, deliveries to users of the Plunge Pool By-Pass would be maintained.
SCE River Crossing Pipeline/North Fork Canal	SAR channel	While it may be possible to support the pipeline and dig underneath, it is assumed that it is necessary to take the SCE River Crossing out of service during construction of the Plunge Pool Pipeline Phase II. Deliveries that would have occurred through the SCE River Crossing Pipeline would instead be facilitated using existing Muni facilities. The affected sections of the SCE River Crossing would be replaced in-kind after construction.
North Fork Canal	Northwestern edge of SAR canyon	Construction of Phase I of the Plunge Pool Pipeline would eliminate an approximately 300-foot section of the North Fork Canal. Because a portion of the canal is comprised of a ditch lined with unreinforced masonry, it is not feasible to support the canal during construction. After construction, the affected section would be replaced with an in-kind structure.
Conservation District Canal	North bank SAR	To the extent possible, construction of Phase I of the Plunge Pool Pipeline would avoid those periods when licensed diversions are taken at the Francis Cuttle Weir. If necessary, deliveries that would have occurred through the Conservation District Canal would instead be facilitated using existing Muni facilities. After construction, the affected sections of the canal would be replaced with an in-kind structure.
Greenspot Pipeline	East bank of SAR south of Santa Ana Canyon Road	Construction of the Low Flow Connector would require a junction with the Greenspot Pipeline. During construction, it would be necessary to suspend use of the pipeline for approximately 2 weeks.
Redlands Aqueduct	SAR channel near Greenspot Road Bridge	The proposed Morton Canyon Connector II would cross the Redlands Aqueduct near the head of Morton Canyon, where the Redlands Aqueduct is a concrete pipe. During construction this portion of the Redlands Aqueduct pipe would be supported and kept in service. Closer to the Greenspot Pump Station, the proposed Morton Canyon Connector II would enter Greenspot Road to avoid crossing a portion of the original Redlands Aqueduct headworks (no longer in service).
Greenspot Road	South of SAR Crossing, north of Greenspot Pump Station	Approximately one lane of Greenspot Road would have to be closed for approximately 2 weeks for the installation of the Morton Canyon Connector II. Flaggers, markers, and barriers, would be used to direct traffic flow on Greenspot Road during lane closure.

Table 1-4. Infrastructure to be Rerouted and/or Replaced during Construction in the Santa Ana River Construction Area (continued)

Foothill Pipeline and SARC Pipeline	At junction of Foothill Pipeline and SARC Pipeline	Construction of Phase I of the Plunge Pool Pipeline would require a junction with the Foothill Pipeline near the SARC pipeline. During construction it would be necessary to suspend use of these pipelines for approximately 2 weeks.
Greenspot Road	Near junction of Foothill Pipeline and SARC Pipeline	It will be necessary to install the Plunge Pool Pipeline Phase II under approximately 300 feet of Greenspot Road. This would be accomplished in one of three ways: (a) crews would tunnel under Greenspot Road and the road would remain open; (b) this portion of Greenspot Road would be closed for approximately 1 month while crews trenched and installed pipe; or (c) this portion of Greenspot Road would be closed for approximately 2 months and a 1,000 to 1,500 foot long, up to 40 foot wide detour would be placed in the SAR wash just south of the existing road (see Figure 1-3).
Natural gas pipeline	Along Greenspot Road near access road for Seven Oaks Dam	This pipe would be exposed and supported in place and the Plunge Pool Pipeline would be installed underneath.
SCE electric line	Along Greenspot Road in the City of Highland	Where possible, the Plunge Pool Pipeline would avoid these lines, but if necessary the poles would be relocated.
Inland Feeder/Foothill Pipeline Intertie	Near Cone Camp Road	Construction of Phase II of the Plunge Pool Pipeline would require a junction with the Inland Feeder/Foothill Pipeline Intertie near Cone Camp Road. During construction, it would be necessary to suspend use of the intertie for an approximately 2-week period. During this time, the Foothill Pipeline would remain in service but the Inland Feeder operation would need to be interrupted.

1.2.3 Construction Equipment and Personnel

It is expected that each of the various construction activities – excavation, pipe installation, and backfilling – could occur simultaneously and throughout the construction period. It is anticipated that all pieces of equipment listed in Table 1-2 would be used at some time during construction activities in the Santa Ana River Construction Area.

In addition to the equipment listed in Table 1-2, deliveries of pipe segments and aggregate, trips by water trucks, and movement of dump trucks from the trenches to the soil stockpile area would occur continuously throughout the construction period. It is estimated that during the busiest construction periods, all these activities would generate approximately 68 off-site trips per day (if a rock screener is used), or 143 off-site trips per day if a rock screener is not used. A maximum of 63 workers would be on site during the most intense construction periods.

1.2.4 Construction Schedule

The proposed construction schedule for the different pipeline segments in the Santa Ana River Construction Area is illustrated in Figure 1-8. Phase I of the Plunge Pool Pipeline would be built over two dry seasons, taking 12 months stretched over a 17-month period. Construction of

later phases of the Plunge Pool Pipeline would occur in the future. Phase II of the Plunge Pool Pipeline would take approximately 19 months but, because this phase of the pipeline is generally outside the river corridor, it could be built in both the wet and the dry seasons. Before Phase III of the Plunge Pool Pipeline could be installed, a new intake structure and the upstream portion of the Low Flow Connector would have to be completed. Construction of Phase III of the Plunge Pool Pipeline and the remainder of the Low Flow Connector would take approximately 7 months and construction would be limited to the dry season.

Figure 1-8 shows Morton Canyon Connector II construction occurring in a future year of construction, concurrent with construction of the Plunge Pool Pipeline Phase III Intake. The Morton Canyon Connector II would benefit both Muni's existing and future operations and is necessary to fully utilize the Low Flow Connector Pipeline. It is possible that the Morton Canyon Connector could be built at the same time as any of the other pipelines in the Santa Ana River Construction Area or after completion of the these pipelines, but it would probably be constructed in the same timeframe as the Low Flow Connector.

Figure 1-8 also shows that it is likely that modification to the dam, construction of the new intake access road, and relocation of the streambed access road could occur at the same times as construction in the Santa Ana River Construction Area. However, construction of these elements could occur either before or after construction in the Santa Ana River Construction Area. Construction in the reservoir area could occur at the same time as the construction of most elements in the SAR Area, with the exception of Phase III of the Plunge Pool Pipeline and the Low Flow Connector.

1.3 Devil Canyon Construction Area

Table 1-5 summarizes the major construction activities in the Devil Canyon Construction Area. Construction in this area involves the installation of the Devil Canyon By-Pass. Pipeline installation would be the same as described for the Santa Ana River Construction Area. The proposed cross section for the Devil Canyon By-Pass Pipeline is shown in Figure 1-9 and the proposed construction staging is illustrated in Figure 1-4. Excavated material in the Devil Canyon area would be substantially less than in the other construction areas, on the order of 17,000 cy, with less than 3,300 cy of left-over material. This material would be spread over and adjacent to the pipeline route. Soil would be placed to avoid drainages, shaped and sloped to minimize erosion, and revegetated with native plants.

As shown in Table 1-6, several utilities would be crossed, but would not be interrupted, by construction of the proposed facilities in the Devil Canyon Construction Area.

It is anticipated that all pieces of equipment listed in Table 1-2 would be used at some time during construction in the Devil Canyon Construction Area. This construction area would not use a portable rock screener. In addition to the equipment listed in Table 1-2, trips by water trucks and deliveries of pipe segments and aggregate would occur continuously throughout the construction period. It is estimated that during the busiest construction periods, all these activities would generate approximately 22 off-site trips per day. A maximum of 13 workers would be on site during the most intense construction periods. As illustrated in Figure 1-8, construction of the Devil Canyon By-Pass is anticipated to take no more than 4 months.

Table 1-5. Summary of Major Construction Activities in the Devil Canyon Construction Area

Construction Activity	*Quantity*
Ground Disturbance	3 acres
Construction Corridor Width *Devil Canyon By-Pass*	150 feet
Estimated Excavation	17,000 cubic yards
Material Disposal	3,300 cubic yards
Maximum Daily Construction Personnel	13 persons
External Vehicle Trips per Day	22 vehicle trips

Table 1-6. Infrastructure to be Rerouted and/or Replaced during Construction in the Devil Canyon Construction Area

Infrastructure	*Location*	*Description of Activity*
DWR California Aqueduct	South of Devil Canyon Powerplant	Construction of the Devil Canyon By-Pass Pipeline would cross over the California Aqueduct. The California Aqueduct would not be taken out of service.
Metropolitan's Inland Feeder	South of Devil Canyon Powerplant	Construction of the Devil Canyon By-Pass Pipeline, depending on alignment, could cross near the Inland Feeder. Construction trenching would not be deep enough to affect the Inland Feeder.

1.4 Lytle Creek Construction Area

Table 1-7 summarizes the major construction activities in the Lytle Creek Construction Area. Construction in this area involves the installation of the Lower Lytle Creek Pipeline and Cactus Basins Pipeline. The proposed cross sections for the Lower Lytle Creek and Cactus Basins pipelines are shown in Figure 1-9. The proposed construction staging area for the Lytle Creek Construction Area is illustrated in Figure 1-5. In the Lytle Creek Construction Area, trenching could generate as much as 49,000 cy of excess material. This sand-silt would be trucked to the construction staging area for later sale.

Pipeline installation would be similar to that described for the Santa Ana River Construction Area, except pipelines would be installed in existing streets and vertical shoring would be used. The pipeline trench would be installed in one lane of traffic and the adjacent lane would be reserved for construction equipment. To the extent possible, vehicles would be detoured from the construction area and the streets would be closed to general traffic. For homes with driveways connecting to the affected roadways, a temporary bridge would be placed across the pipeline trench and these residences would be allowed use of the remaining traffic lane. To limit disruption to roadways, the Cactus Basins Pipeline would be built in two-block segments. Each segment would be finished and opened to traffic before the next section of construction begins.

Table 1-7. Summary of Major Construction Activities in the Lytle Creek Construction Area

Construction Activity	*Quantity*
Ground Disturbance	20 acres
Construction Corridor Width	
Lower Lytle Creek Pipeline (in roadway)	30 to 60 feet
Lower Lytle Creek Pipeline (outside roadway)	100 feet
Cactus Basins Pipeline	30 to 60 feet
Estimated Excavation	277,000 cubic yards
Material Disposal	49,000 cubic yards
Maximum Daily Construction Personnel	42 persons
External Vehicle Trips per Day	78 vehicle trips

Because both the Lower Lytle Creek and the Cactus Basins pipelines would be placed primarily in existing city streets, they would have multiple underground, and some overhead, utilities to cross. These would include West Valley Water District untreated and treated water pipelines, sanitary sewers, storm drains, underground electric, telephone, CATV and natural gas pipelines. Because the pipelines would be in an urban street, crossing utilities would be unavoidable. Crossings would use the normal construction techniques of support-in-place or remove-and-replace. In the case of West Valley Water District water pipelines, preliminary analysis shows that it would be possible to either avoid or support in place these pipelines during construction.

It is anticipated that all pieces of equipment listed in Table 1-2 would be used at some time during construction in the Lytle Creek Construction Area. This construction area would not use a portable rock screener. In addition to the equipment listed in Table 1-2, trips by water trucks and deliveries of pipe segments and aggregate would occur continuously throughout the construction period. It is estimated that during the busiest construction periods, all these activities would generate approximately 78 off-site trips per day. A maximum of 42 workers would be on site during the most intense construction periods. As illustrated in Figure 1-8, construction of the Lower Lytle Creek Pipeline would take no more than 5 months, but construction of the Cactus Basins Pipeline would take up to 2 years.

Construction in the Lytle Creek area would be a separate Project from construction in either the SAR or Devil Canyon areas, meaning construction in these three areas could, but would probably not, occur during the same period.

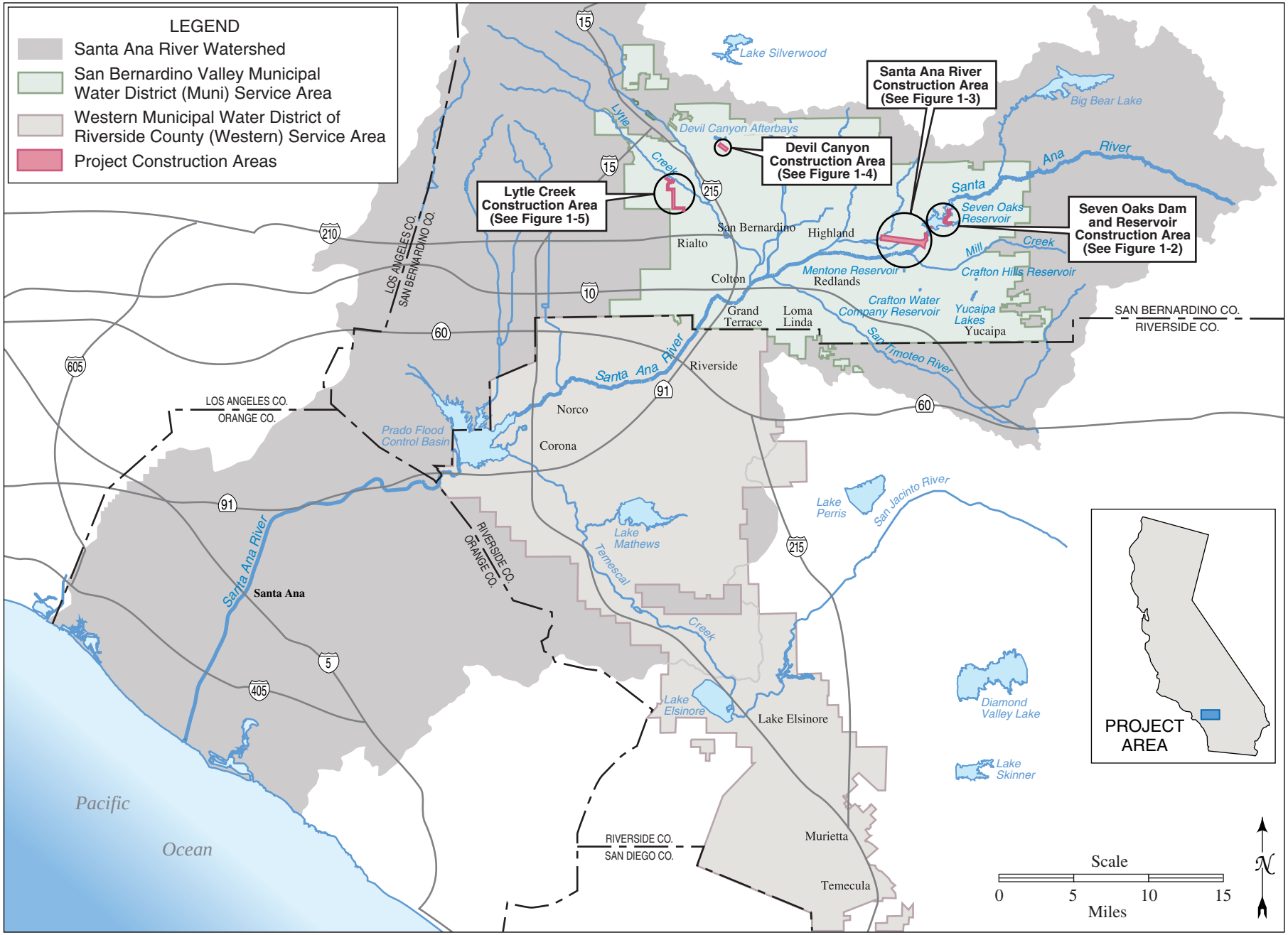


Figure 1-1. General Location of Project Construction Areas

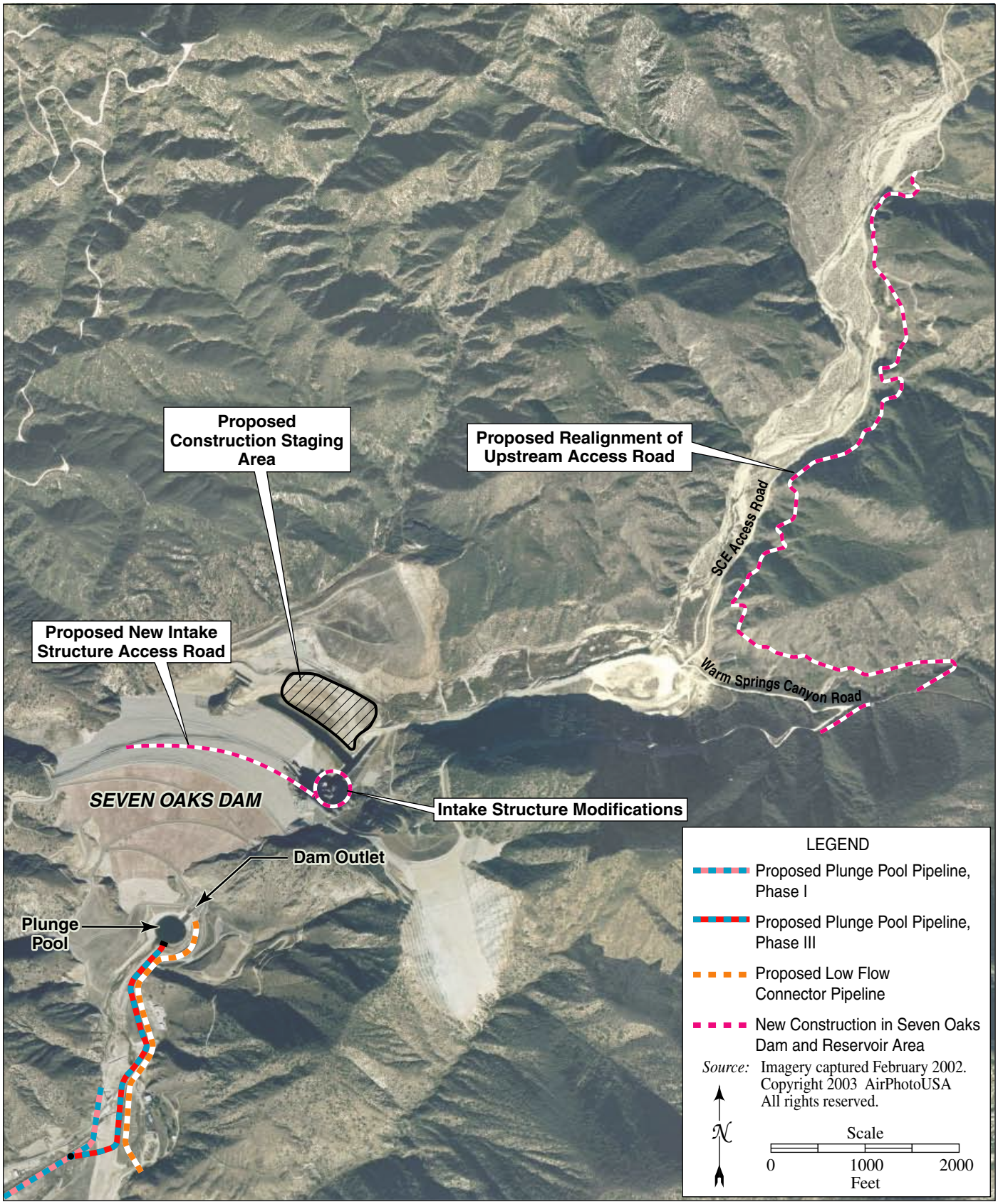


Figure 1-2. Seven Oaks Dam and Reservoir Construction Area

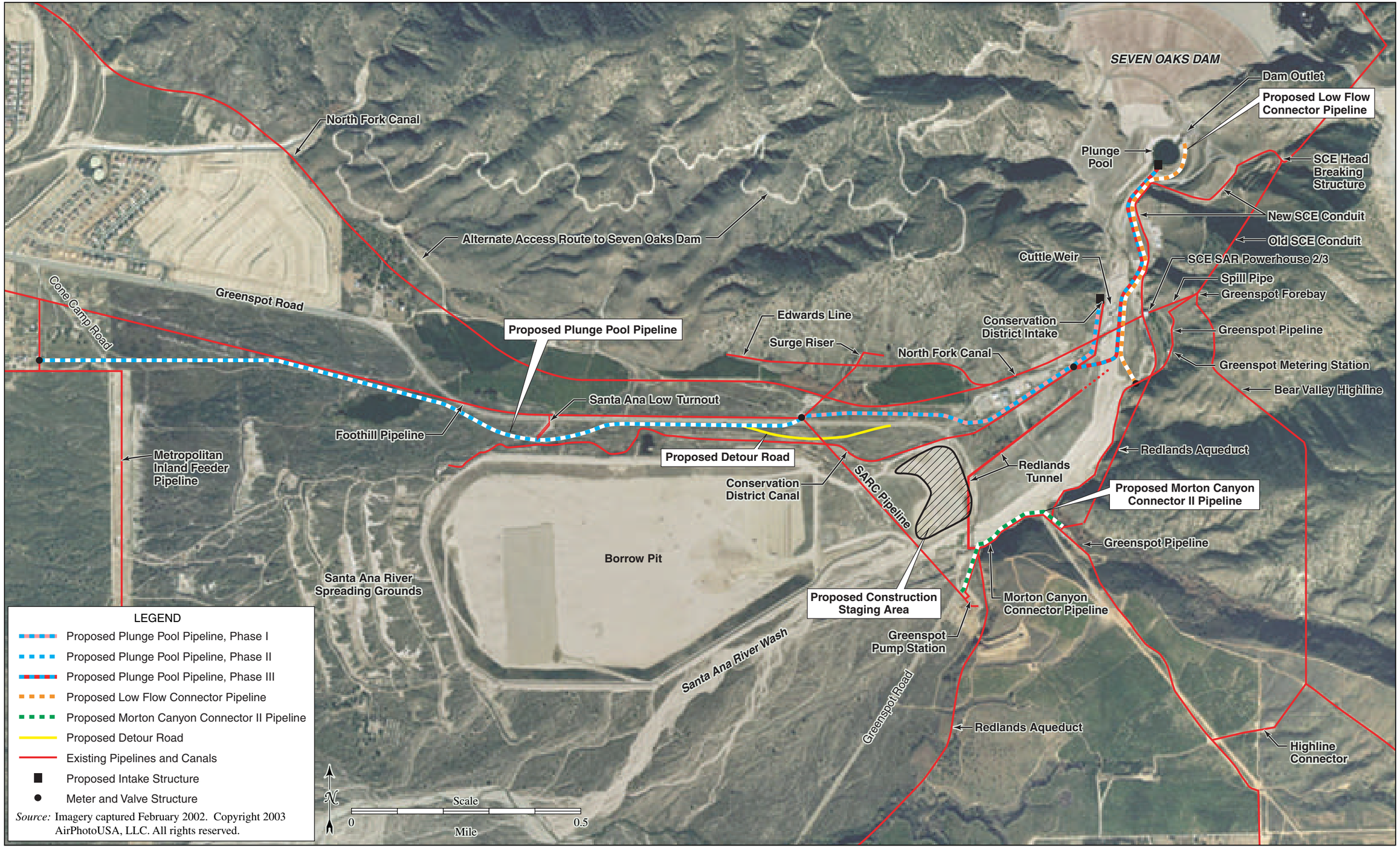


Figure 1-3. Proposed Project Facilities in the Santa Ana River Construction Area

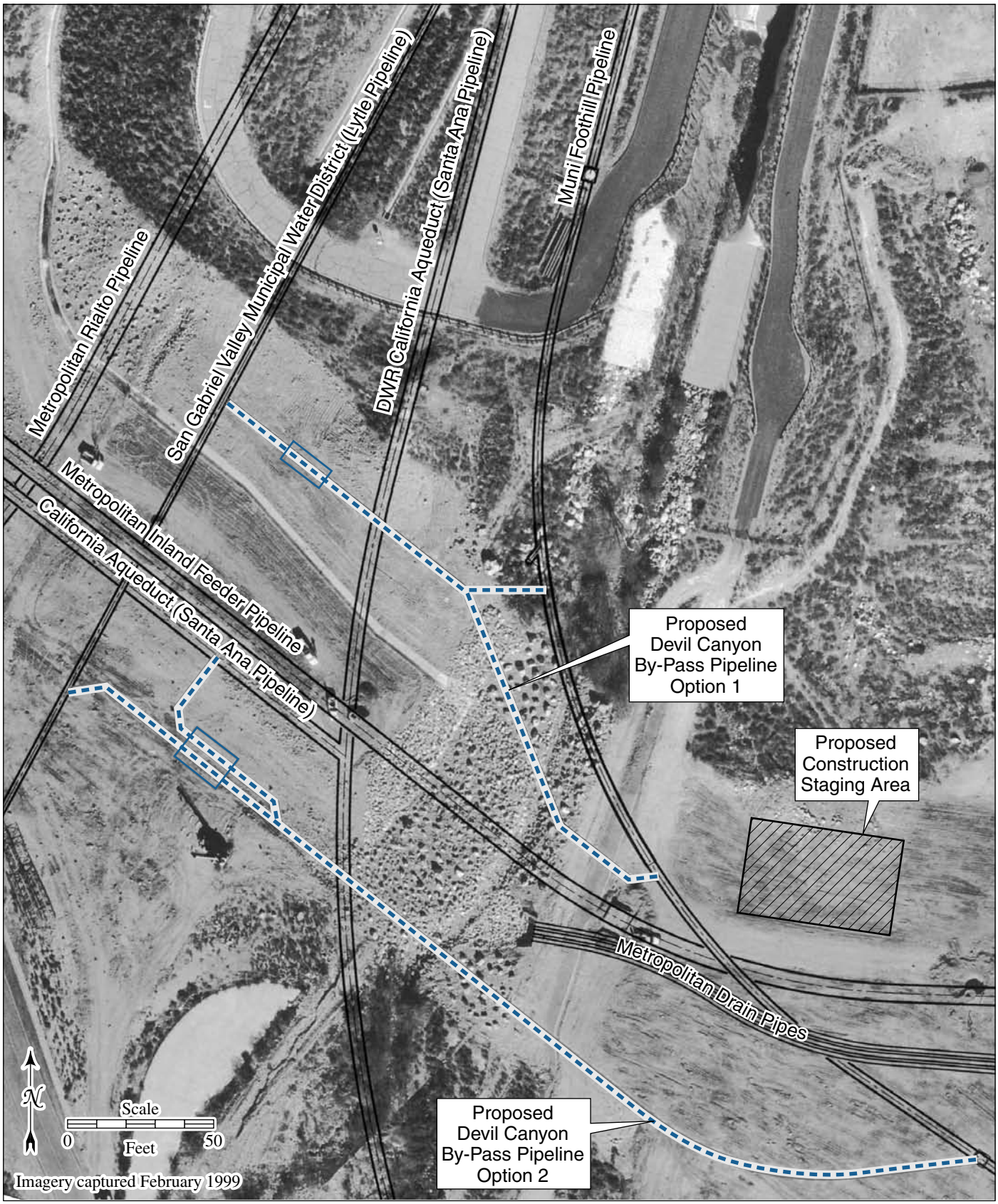


Figure 1-4. Proposed Project Facilities in Devil Canyon Construction Area

Figure 1-5. Proposed Project Facilities in Lytle Creek Construction Area

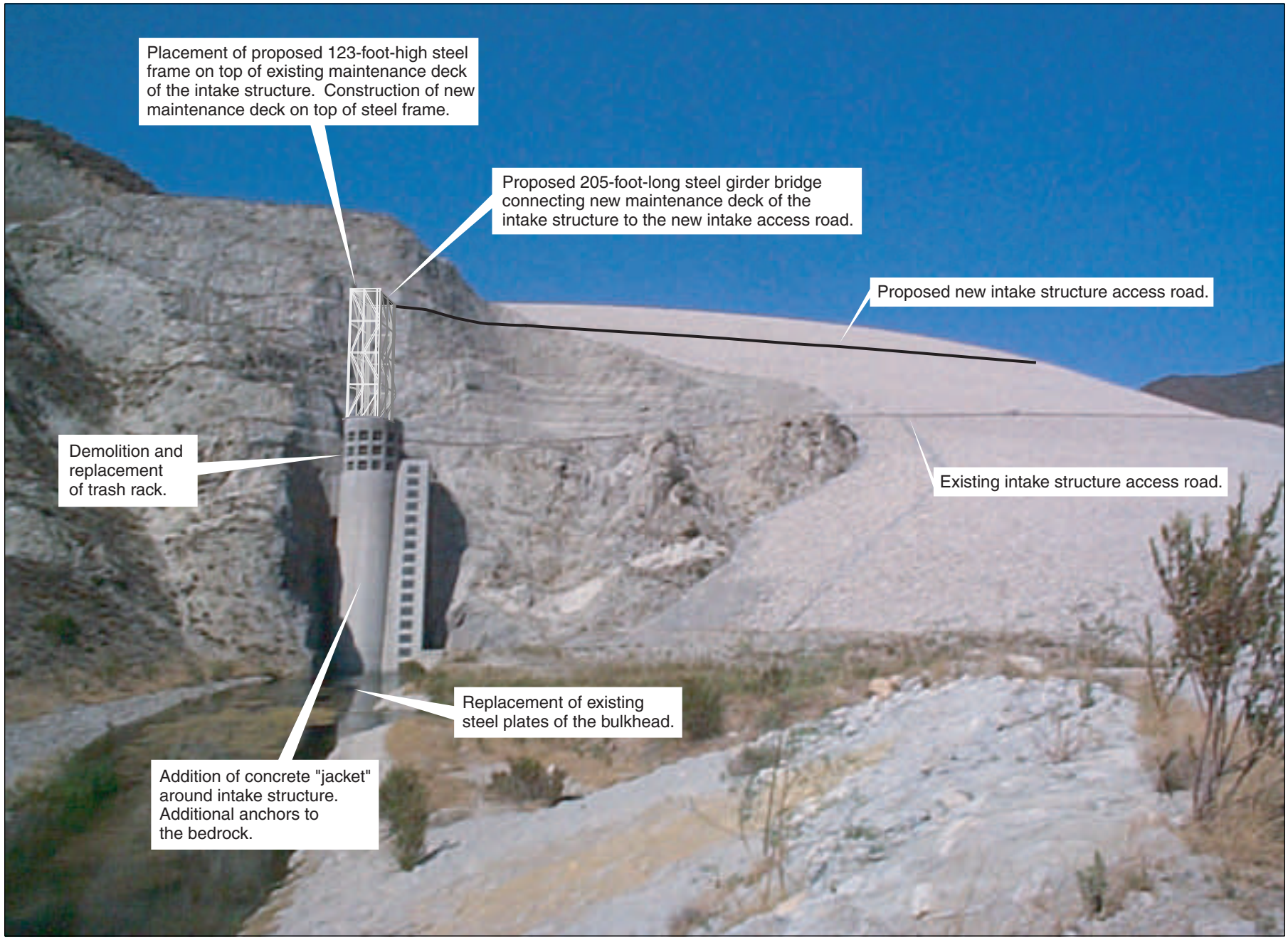
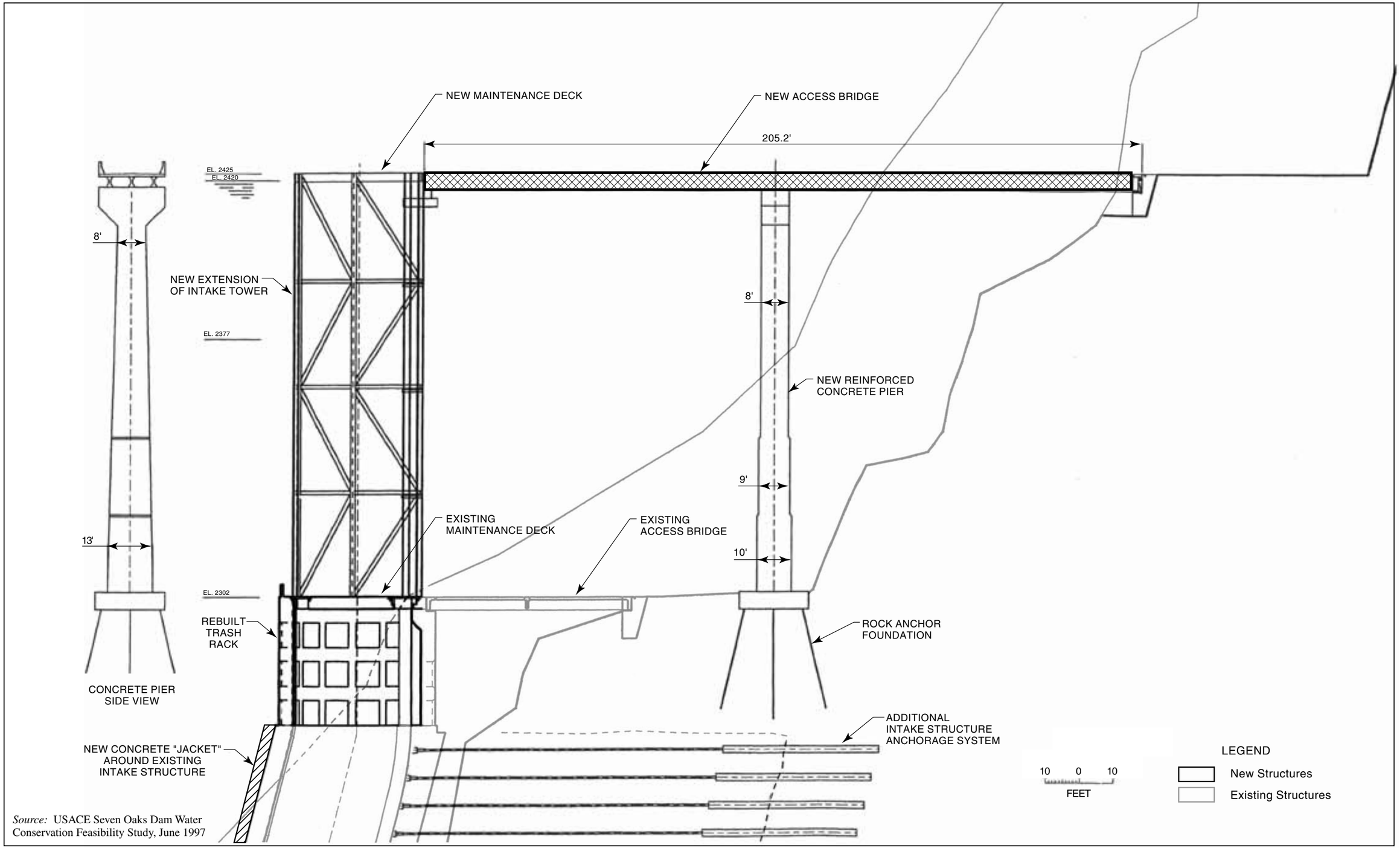


Figure 1-6. Visual Simulation of Modifications to Seven Oaks Dam Intake Structure and Access Road



Source: USACE Seven Oaks Dam Water Conservation Feasibility Study, June 1997

Figure 1-7. Modifications to Seven Oaks Dam Intake Structure

Seven Oaks Dam & Reservoir and Santa Ana River Construction Areas

	Construction Time (months)	Year 1				Year 2				Year 3				Year 4			
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Modifications to Dam	18 months over 28 month period							1 2 3 4			5 6 7 8 9 10 11				12 13 14 15 16 17 18		
Modifications to Intake Tower Access Road	12 months		1 2 3 4 5 6 7				8 9 10 11 12										
Modifications to the Streambed Access Road	6 months						1 2 3 4 5 6										
Plunge Pool Pipeline Phase I	12 months over 17 month period		1 2 3 4 5 6 7				8 9 10 11 12										

	Construction Time (months)	Future Year				Future Year				Future Year				Future Year			
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Plunge Pool Pipeline Phase II	19 months	1 2 3 4 5 6 7 8 9 10 11 12				13 14 15 16 17 18 19											
Morton Canyon Connector II	3 months										1 2 3						
Plunge Pool Phase III Intake	6 months										1 2 3 4 5 6						
Low Flow Connector, suspended	2 months												1				2
Plunge Pool Pipeline Phase III/ Low Flow Connector, underground shared trench	7 months														1 2 3 4 5 6 7		

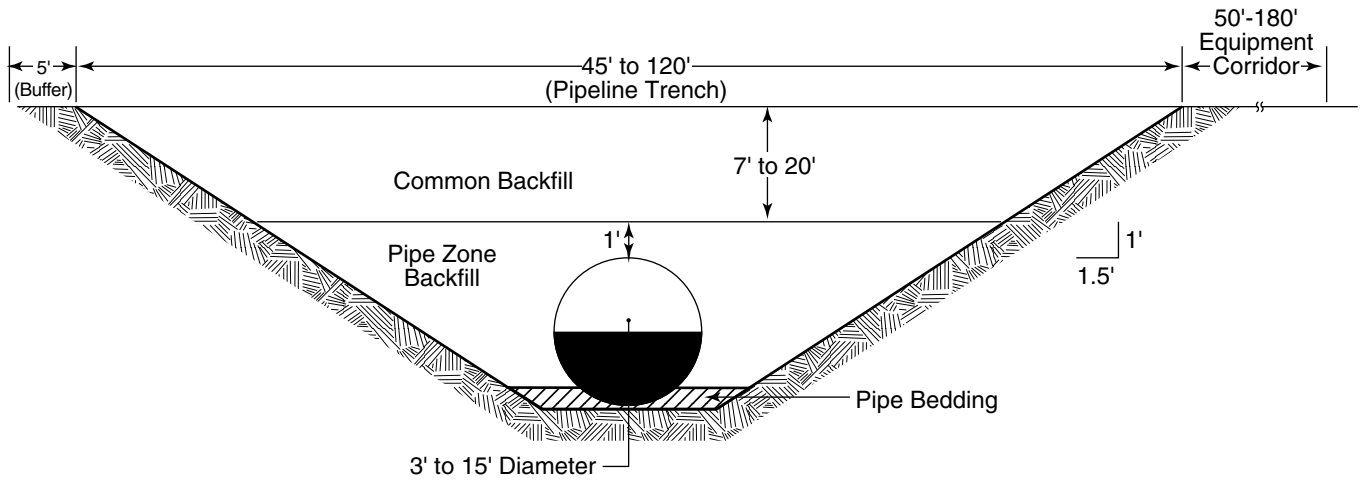
Devil Canyon Construction Area

	Construction Time (months)	Year 1				Year 2				Year 3				Year 4			
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Devil Canyon Bypass Pipeline	4 months	1 2 3 4															

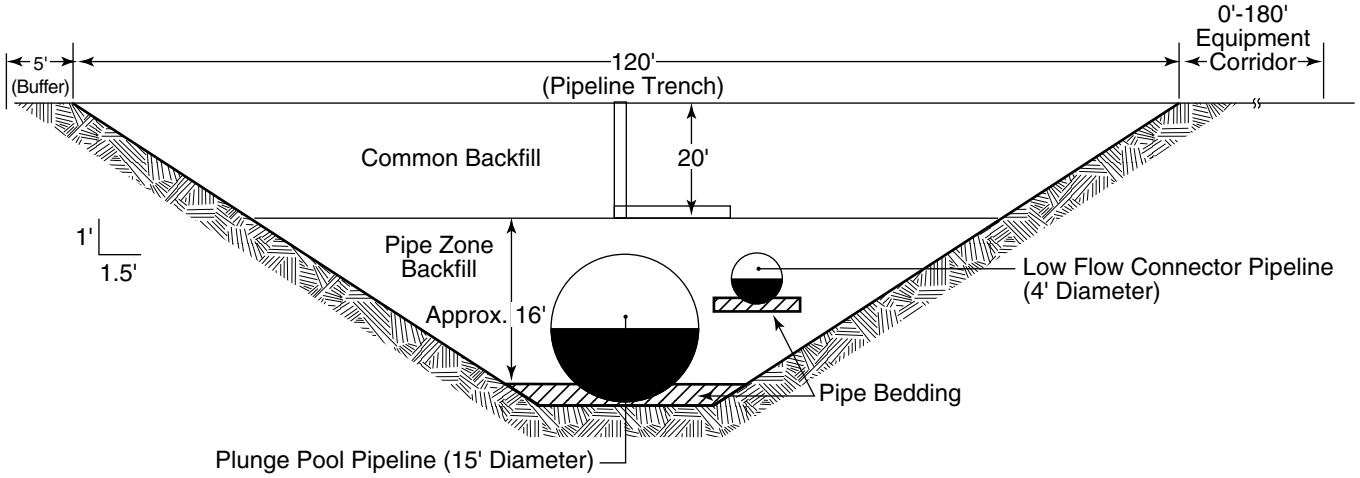
Lower Lytle Creek Construction Area

	Construction Time (months)	Year 1				Year 2				Year 3				Year 4			
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Lower Lytle Creek Pipeline from Lytle Creek Pipeline	3 months	1 2 3															
Lower Lytle Creek Pipeline from Cactus Basin Pipeline	2 months		1 2														
Cactus Basins Pipeline	20 months	1 2 3 4 5 6 7 8 9 10 11 12				13 14 15 16 17 18 19 20											

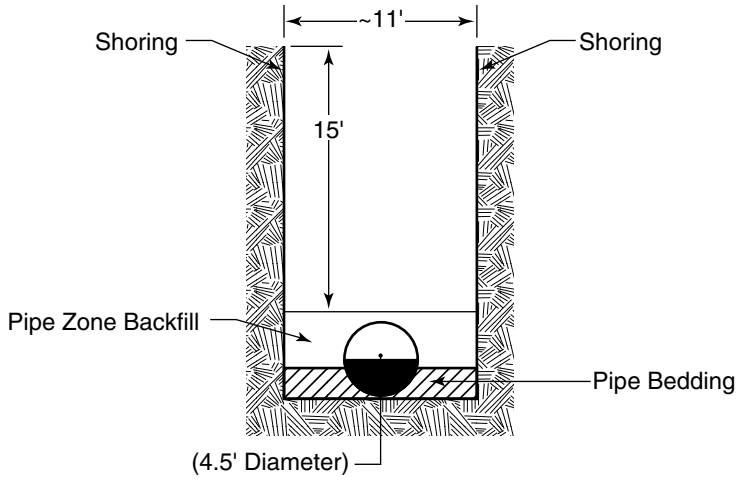
Figure 1-8. Construction Schedule for Seven Oaks Dam and Reservoir and Santa Ana River Construction Areas



Low Flow Connector (portion), Plunge Pool Pipeline (Phases I & II), Morton Canyon Connector II, Devil Canyon Bypass, Lower Lytle Creek Pipeline (portion)



Plunge Pool PIpeline Phase III/Low Flow Connector (portion)



Lower Lytle Creek Pipeline (portion), Cactus Basins Pipeline

Not to Scale

Figure 1-9. Cross-Sections of Proposed Trench Methods

2.0 OPERATIONS AND MAINTENANCE OF NEW FACILITIES

2.1 Routine Maintenance Activities

Regular maintenance of the pipelines would include monthly visits to pipeline structures, i.e., valve vaults, manholes, and drains, for basic inspection and equipment testing. Pipeline turnouts would be inspected daily. The spreading basins would be visited once a day when in use. These daily visits are needed to check on water levels and the general state of the basins, dikes, and other structures. Depending on prevailing winds and proximity to other development, regular maintenance activities at the spreading basins may include trash collection.

2.2 Periodic Maintenance Activities

Periodically, generally every 3 to 5 years, piping and related equipment that is above ground or within structures must be cleaned and painted. For spreading basins, as with conveyance facilities, piping and any other exposed equipment must be cleaned and painted at similar intervals. At intervals of 6 months to a year, depending upon water source and the length of time a basin has been in service, spreading basins are cleaned. Basins are taken out of service, allowed to dry and the bottom of the basins disked by tractor. These activities are necessary to maintain percolation rates. Activities associated with the Project would not affect the frequency with which spreading basins are cleaned.

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