

MEMORANDUM

To: Li Boccia, Parsons Engineering Science, Inc. *Juy*
cc: Andy Hauge, HBA
Rich Maurer, Parsons Engineering Science, Inc.
From: Stan Kline ^{SKK}, Rust Environment & Infrastructure
Date: September 28, 1995
Project No. 88230.356
Subject: Dam and Reservoir Construction Operations
EIR/EIS Input
Santa Rosa Subregional Wastewater Project

You have requested some input regarding typical construction operations and procedures, in particular anticipated types of equipment and work scheduling, associated with dam and reservoir construction. Based on previous experience with projects similar in type and magnitude, we offer the following general input.

CONSTRUCTION ACTIVITIES

Although various contractors will take different approaches to construction, the following basic activities will be required for dam and reservoir construction:

- Mobilization of construction equipment.
- Clearing and grubbing of dam and reservoir area.
- Stripping of dam foundation and on-site borrow areas.

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- Dam foundation excavation and on-site borrow area excavation.
- Control of water.
- Dam foundation drilling and grouting (only anticipated at Two Rock site and only selective grouting at Huntley and Tolay Creek sites).
- Dam foundation clean-up and preparation.
- Earthwork fill placement for dam construction.
- Earthwork fill placement for reservoir lining (varies with site and not required at all sites).
- Tunnel construction for inlet pipeline (only planned at Two Rock and Tolay Creek sites).
- Construction of appurtenant structures and ancillary facilities such as spillway, inlet/outlet conduit, diversion channels, pipelines, access roads, fencing, etc.
- Installation of dam instrumentation such as piezometers, survey/settlement monuments, etc.
- Site clean-up and demobilization.

CONSTRUCTION EQUIPMENT

The most equipment-intensive activity is probably the earthwork fill placement. Typical types of primary earthwork equipment associated with the major earthwork and a possible range of the equipment spread for a typical reservoir being evaluated (would include Valley Ford East, Carroll

Road North, Bloomfield, Huntley, Two Rock, Adobe Road, and Sears Point, similar in magnitude - depending on alternative, Tolay Creek is larger in magnitude and more spread out with multiple structures and Lakeville Hillside is significantly smaller) may include the following:

- Dozers (Cat D8 or larger) 3 to 5
- Scrapers (loader/trucks is an alternative) 5 to 8
- Graders 2
- Water wagons 2 to 3
- Self-propelled compactors (Cat 825) 2 to 3
- Backhoe excavator 2 to 3
- Loader and Trucks

Other operations requiring specialty equipment at some sites include drilling and grouting (Two Rock, Huntley, and Tolay Creek), blasting for rock quarry (Two Rock), and tunneling (Two Rock and Tolay Creek). The above typical equipment listing does not reflect other special equipment for construction of appurtenant facilities or concrete and pipeline construction. Equipment spreads will vary for different sites and reservoir sizes depending on the earthwork quantities, will vary throughout the job depending on the stage of construction and working area, and will vary depending on the contractor's approach and construction schedule.

CONSTRUCTION SCHEDULE

As with types of equipment, the schedule for dam and reservoir construction projects can vary significantly depending on the parameters established and the specific site conditions. However, based on some assumed production rates for the major earthwork, work schedules, and construction season, one can make a judgement regarding the overall length of construction:

- Range of earthwork volumes for most reservoirs 3 to 5 million cubic yards
(4,500 million gallon or maximum site capacity,
excluding Lakeville Hillside)
- Assumed earthwork production rate (based on 10,000 cubic yards/day
spread of 6 scrapers with 30 cubic yard capacity,
6 trips per hour cycle time at 10 hours per day)
- Work shift 10 hours/day
6 days/week
- Construction schedule (March through October) 8 months

Based on the above assumptions, the number of days required to place the range of fill volume indicated would be 300 to 500 days. Considering the work shift and schedule shown, construction at this rate would span 1.5 to 2.5 construction seasons. Higher production rates could be achieved with more equipment or longer construction shifts. Considering this and the other associated construction activities in addition to fill placement, some of which has to be staged with the major earthwork, it appears reasonable to assume that complete construction of one of the typical maximum capacity dam and reservoir projects, including all the ancillary facilities, would span 2 to 3 construction seasons.