LANDSLIDE REPAIR

CODORNIU NAPA WINERY PROJECT
NAPA COUNTY, CALIFORNIA

PROJECT DESCRIPTION

During the winter of 1994-95, a massive landslide destroyed the access road and entry area and threatened to destroy the 26-million dollar Codorniu Napa winery facility located near Napa, California. Cotton, Shires and Associates (CSA) was retained to investigate the failure and provide immediate design of measures to stabilize the hillside. The failure was approached in three phases: 1) protect the winery structure against upslope encroachment of the landslide activity by pinning the upper portion of the landslide, 2) repairing the entry facilities upslope of the pinning to return the winery to limited service, and 3) stabilizing the larger, lower portion of the landslide to restore the main access road and to bring the winery up to full service.

ENGINEERING SOLUTION

The upper portion of the landslide was pinned in place in the summer and fall of 1995 with a combination buried shear pin retaining wall and a tied-back soldier pile retaining wall. Reinforced concrete shear pins with maximum dimensions of 42 inches in diameter by 50 feet deep and with tiebacks over 125 feet long (unbonded length) and locked off at over 100 kips each. Inclinometer data showed that the shear pin array arrested upward progression of the landsliding. During the winter of 1995-96, the remaining, unpinned 300,000 cubic yards of landslide material situated below the retaining wall moved downslope approximately 80 feet. The main entry fountain area was re-established using curved retaining walls, and re-routing the access road to accommodate traffic. The remaining unstable landslide mass was repaired in the summer and fall of 1996 by constructing an earth fill buttress designed to bring the factor of safety against future failure up to 1.5. Detailed slope stability analyses were performed to balance the stability of landslide debris left in place above and below the buttress fill. This grading involved over 100,000 cubic yards of fill and was completed during the fall of 1996, just prior to the onset of the two, back-to-back wettest months recorded this century. The total construction cost using conventional repair measures (protection pinning and removal and replacement of the landslide) was estimated to exceed $6 million. The actual cost using our phased approach and detailed analyses was $2.2 million. CSA provided a total design package on this challenging project, including investigation, design, contract documents, drawings and specifications, construction monitoring and surveying. Structural Engineering was provided by Carl Chan and the General Contractors were Case Pacific / DBM for Phase 1 and Ghilotti Construction for Phases 2 and 3.

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