Soil Stabilization In Southern California

Originally home to a long-range naval communication installation, the Chollas Heights (San Diego, California) site is now home to one of the largest military housing projects in southern California. This 75-acre residential community includes 412 housing units, a historical district, and a 25 acre nature preserve. The $50 million design and build project was managed and constructed by a joint venture between Keller Construction Company and Swinerton & Walberg Company.

Pavement Considerations

The redevelopment of this site required construction of approximately 400,000 square feet of residential streets. Up to four inches of hot mix asphalt (HMA) and 15 inches of aggregate base course (ABC) over a traditionally prepared subgrade were specified for a typical pavement section. The original design was based on an anticipated pavement subgrade R-value of 20.

However, the pavement subgrade exposed at the completion of grading consisted of clay soils exhibiting low R values that ranged from 5 to 21. Given the poor soil quality, the project geotechnical consultant, Robert Prater Associates, presented Keller/Swinerton with a lime-based soil stabilization plan that would provide structural and economic benefits. The proposal for the redesigned pavement section retained the four inches of HMA, specified only three inches of ABC, and added 12 inches of lime-stabilized subgrade (LSS).

The original specification required the extensive export (or removal) and disposal of soil. The LSS method eliminated this requirement as the application of hydrated lime chemically alters the soil properties, producing the required structural support conditions. The elimination of soil removal costs, in concert with enhanced soil structural and pavement performance properties, convinced Keller/Swinerton to select the LSS method.

The chemical alteration of soil properties through soil stabilization begins when the pH of the soil/lime mixture is raised and ion exchange occurs in the expansive clay soils. A pozzolanic reaction occurs between the clay and the lime that results in long-term strength development and durability of the pavement subgrade.

Construction Considerations

Chemical Lime supplied 1,100 tons of hydrated lime slurry to meet the specified application rate of 6% hydrated lime. The lime was slaked on-site with Chemical Lime's PORTA BATCH® mobile lime slurry production system. The slurry was spread at the rate of 5.0 to 7.8 pounds per square foot, depending on the thickness of the section. After spreading, the lime slurry is uniformly mixed with the soil and compacted to the engineer's design specification.

Dave Hespeler, project engineer for Robert Prater Associates, stated "the PORTA BATCH® provided a good way of monitoring the rate of lime slurry application. PORTA BATCH® also manufactured a superior lime slurry that facilitated a uniform

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soil/lime mixture." Laboratory testing performed as part of the lime mix design process yielded uncured R values ranging from 64 to 77—a substantial increase over the untreated soils.

Economic Benefits

The use of the lime stabilization process was instrumental in reducing expenses for labor, materials, and other supplies. According to Bill Lee, Senior Project Engineer, Keller/Swinerton, the actual stabilization process required only eight working days—half the time required for traditional aggregate base course construction. Lee also stated that the lime stabilization process proved to be the structural and economic solution for correcting unexpected, poor pavement support conditions.

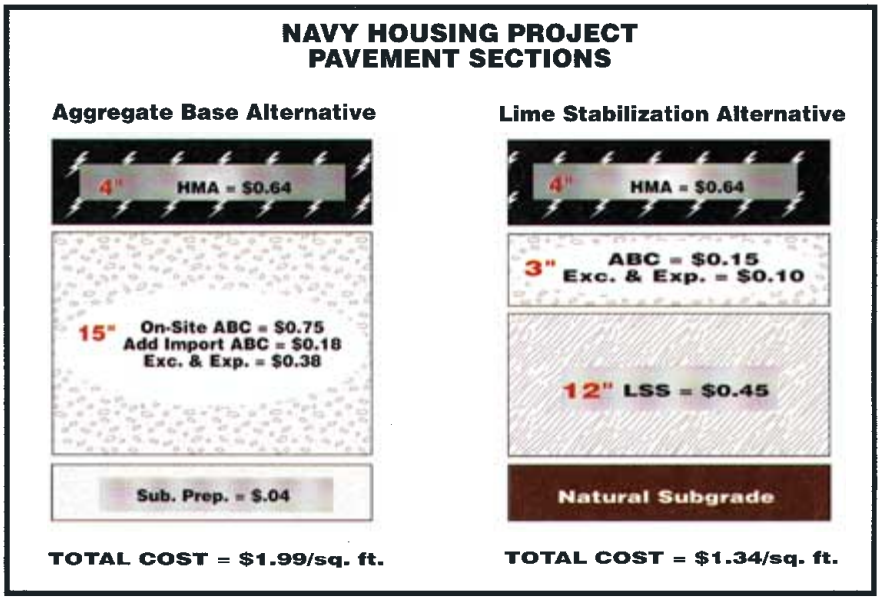
"The pavement sections were not expected to be heavy. The poor soil conditions put us in a situation where significantly higher expenses would be incurred to construct the pavement. Lime stabilization of the clay soils kept us from realizing these higher costs while providing the required structural support for the pavements," commented Lee.

The original aggregate base course was budgeted at $1.99/square foot. Actual costs using the LSS alternative were $1.34/square foot. This represented a cost differential of $0.65/square foot, a 33% savings on a square foot basis. When the final project costs were compiled, the use of the lime stabilization process was responsible for project savings of almost one quarter million dollars.

The Chollas Heights Navy Housing project began in July 1995. Completion of the project was celebrated with a ribbon-cutting ceremony in February 1997.

Chemical Lime Company is North America's leading producer and supplier of solutions-oriented, lime-based products for industrial, municipal, and environmental applications. CLC, headquartered in Fort Worth, Texas, has more than 40 locations in North America. The company serves the water; wastewater; steel; paper; building construction; highway construction, soil, and asphalt; mining; copper, gold, and alumina processing; flue gas desulfurization (FGD); and industrial markets. CLC is a member of the Lhoist Group, Brussels, Belgium.

For more information, contact your Chemical Lime Company representative or call 1-800-365-6724 (eastern U.S.) or 1-800-978-0325 (western U.S.) or write to the address below. PORTA BATCH® is a registered trademark of Chemical Lime Company. HGH-106-12/97.



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