



Project Profile

Extended
Joint Floor,
Paving, Walls

Extended-Joint Floor/Paving/Wall

Tucco Concrete Plant, Buckhead, GA

October 2006

Project Description:

During construction planning for a new ready-mix concrete plant in Buckhead, GA, Dale Henderson of Tucco-Tucker Concrete contacted FORTA Corporation to investigate possible steel-reinforcement alternatives with second-generation structural or macro-synthetic fibers. The project included a foundation pad for the new batch plant, considerable surrounding pavement for high-load truck traffic, and a building and floor for an on-site mechanical shop. Naturally, concrete was the building material of choice for Tucco, and the goal was to minimize or eliminate as much conventional reinforcing steel as possible by using the new HVSF (High Volume Synthetic Fiber) technology. FORTA® representative Tom Baggett connected Tucco with Don Aiken of local design-engineering firm Macon Gooch Engineers, Lawrenceville, GA, a firm that has considerable history of designing with HVSF technology as a steel alternative.

The end-result was synthetic fiber used to reduce or eliminate steel reinforcing in almost every aspect of the project - the plant pad, paving areas, the mechanical building walls and floor, and even in a precast underground junction box used to protect plant water pumps. The foundation pad was 12' x 60' x 36" thick, and originally called for 2 mats of #5 bar 12" O.C. FORTA-FERRO® was used at a dosage of 7.5 lbs./cu. yd. in the 4,000 psi concrete mix as a total steel replacement, offering a significant savings in both construction time and material costs. The pavement segment of the project called for 3,000 psi concrete 6" thick, reinforced with # 4 bar on 24" centers. Again, FORTA-FERRO® was used at 7.5 lbs./cu. yd. as a total steel replacement.

A precast concrete junction box 5' wide x 8' long x 4.5' high with 2 1/2" thick walls was used as a pump station, and buried underground to prevent plant water pumps from freezing in inclement weather. This precast unit used first-generation fibrillated (net-shaped) synthetic fiber — FORTA® ECONO-NET® — at a 3.0 lb./cu. yd. dosage as an alternate to all of the steel in both sides and bottom. The mechanical/vehicle-repair building was a 52' x 39' structure that included an interior 10' x 14' storage room. Naturally, Tucco chose concrete for the building walls as well as the floors, pouring the 16' high x 12" thick walls all at one time. One exterior wall of the structure would also serve as one side of an aggregate storage pit. The original wall steel design was #4 rebar on 12" centers, a high percentage of which was eliminated with the use of FORTA-FERRO®. Four-foot long #4 bars on 18" centers were wet-placed on the inside and outside footing with 2" of concrete cover to anchor the base of the wall to the footing. Two bands of #4 bar were also used on the wall top perimeter for continuity. Additional bar was added to the bottom 12 feet of the wall serving as the aggregate bin to provide additional protection for possible impact and horizontal loading. The 3,500 psi wall mix contained 7.5 lbs. of HVSF per cubic yard with enough super-plasticizer to allow for easy placement and consolidation in the continuous pour into aluminum forms. Even at high fiber dosages, there was no evidence of fiber on the formed finish, and the walls were placed without construction joints and resulted in no observable cracking. The mechanical building floor also used the 7.5 lb. fiber dosage in the 3,000 psi mix, replacing the #4 bars on 24" centers. This fiber dosage also permitted a joint-free design on the 40' x 50' slab.



Details:

Owner: Tucco-Tucker Concrete Co., Cumming, GA

Structural Engineer: Macon Gooch Engineers, Lawrenceville, GA

FORTA® Representative: Tom Baggett, Macon, GA



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