

The Concrete Producer

hanley wood

By Mike Stolpa

All in a Night's Work

Collaboration and ingenuity conquer a challenging concrete pour.

When most people think of Wisconsin, they picture dairy farms, cheese production, and, of course, beer making. They probably don't picture sand processing facilities, but that's exactly what they would find in the northwestern part of the state. »

Ready-mix trucks from several producers poured concrete for 12 hours during the cold December night.



Many companies are continuously looking for good sources of silica sand, and Wisconsin has the distinction of having some excellent pockets of this precious resource. After various processing steps, the resulting high-purity product is used in many applications, including glassmaking, metal casting, paints and coatings, ceramics, and water filtration. It also is in especially high demand in the oil and natural gas drilling industry.

The considerable sand processing required to reduce impurities involves huge storage, classifying, and drying silos. Concrete is the ideal material for these silos' massive foundations.

By any measure, the production and placement logistics required to construct a huge concrete slab at the Chippewa Falls sand plant in northwestern Wisconsin were challenging. For 12 hours, the trucks kept coming, turning one after another into the sand processing facility located just north of Chippewa Falls. Trucks from almost every ready-mix producer in the area participated on the job, and even they were not enough. Companies as far away as the Twin Cities sent trucks.

Measuring 168,939 cubic feet and holding more than 800 tons of steel reinforcement, the slab will support 12 silos, each 70 feet high and 48 feet in diameter. Placing the required quantity of concrete for such a large slab within 12 hours would require five batch plants and almost 100 trucks. Meeting these supply challenges was compounded by the approaching harsh Wisconsin winter.

Soil stabilization

Construction of the base slab hit an early roadblock. Site engineers Krech Ojard & Associates and excavator/producer Haas Sons discovered that the very properties that make for good silica sand can make for very poor compaction, especially for a foundation weighing more than 10,000 tons and supporting even greater weights. Several options were considered and turned down due to time constraints.

Haas Sons contacted their cement supplier, Lafarge North America, which designed an initial lean mix solution for meeting the specific objectives of this soil stabilization application. The low-strength, coarse aggregate mix is similar to flowable fill, but this project demanded more stability.

After some fine tuning by the project engineers to slightly increase cement quantities, the final lean mix used was 66% Class C fly ash (250 pounds), 33% Type I/II portland cement (125 pounds), 50-50% rock to sand and 46 gallons of water with air at 9-10% and 8-inch slump. Compressive strengths of 400 psi were required to support the monolithic foundation slab.

Haas Sons' ready-mix plants in Eau Claire and Thorp supplied 14,500 cubic yards and A-1 Redi Mix produced the balance. On the last day, R&S Pumping Service topped off the mat with Lewis Construction's 240 Somero Laser Screed. "We poured the mix very wet so it was very easy to place," says Gary Haas of Haas Sons.

Among the lessons learned at this point was that the lean fill worked well

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and that a single supplier in this small market would not be able to supply the quantities required for the monolithic placement.

Slab placement

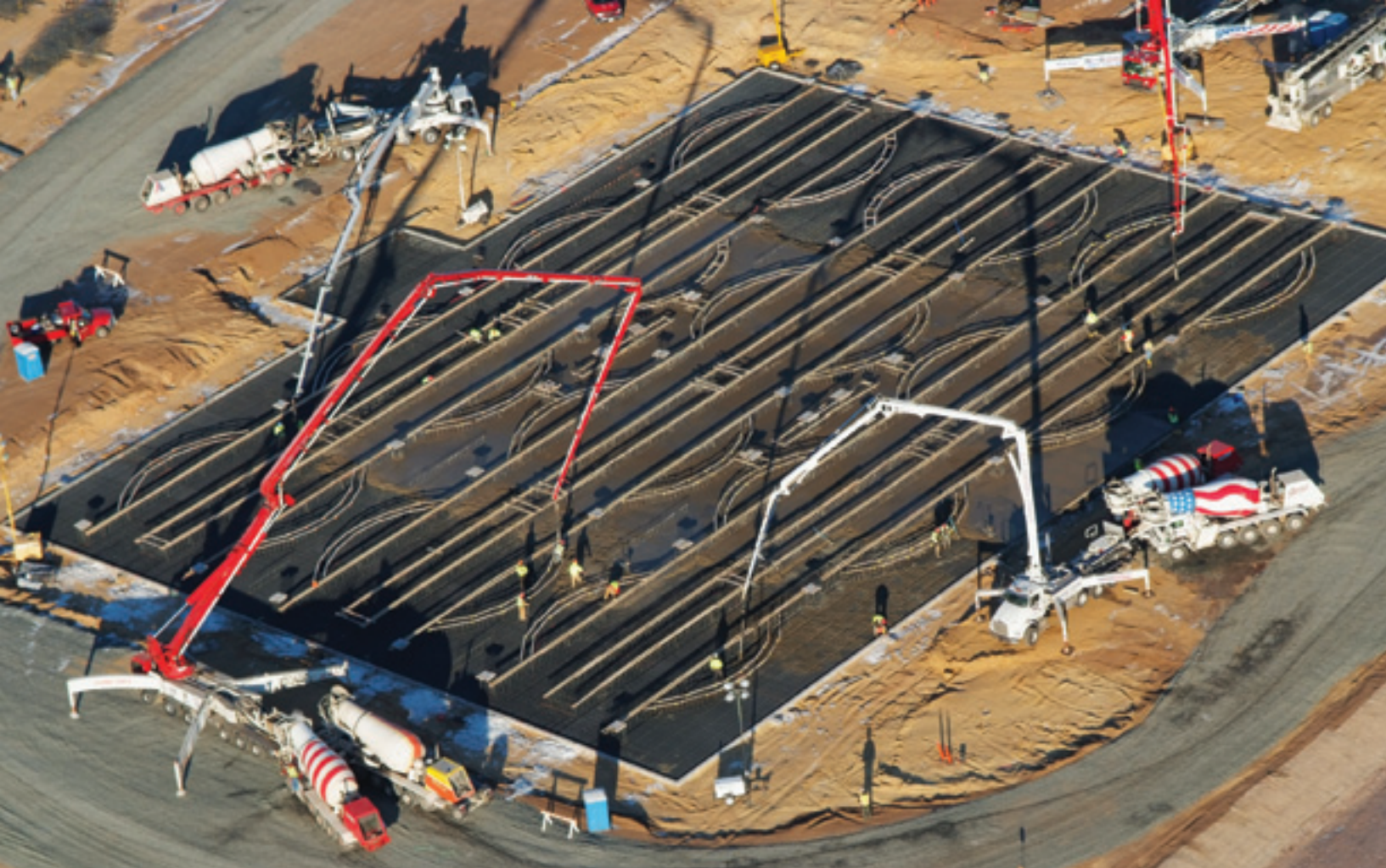
Where in a town of 13,540 do you get enough ready-mix concrete for a job requiring placing 6253 cubic yards of 4500 psi concrete into a 4-foot-deep footing pad in less than 12 hours?

After several meetings that were spearheaded by concrete contractor Steve Lewis of Lewis Construction, facilitated by the general contractor Tom Hubbard of Cedar Falls Building Systems, and coordinated by Lafarge, a team of three ready mix producers—Haas Sons, A1 Redi Mix Concrete, and American Materials—came together to work on the project. They, in turn, rented additional trucks from other ready-mix companies.

Supplying a steady stream of this much concrete required five batch plants belonging to the three ready-mix pro-

Four pumps placed the concrete, starting in the center and moving out to all four outside corners of the wall. Thermocouples were embedded to continuously monitor core temperatures.





Measuring 168,939 cubic feet and holding more than 800 tons of steel reinforcement, the concrete slab at the Chippewa Falls, Wis., sand plant will support 12 silos, each 70 feet high and 48 feet in diameter.

Ready-mix trucks from a variety of producers supplied concrete.



ducers—Haas Sons’ plants in Eau Claire and Thorp, Wis.; A-1 Redi Mix Concrete’s mega plant in Eau Claire; and American Materials’ plants in Eau Claire and Menomonie, Wis.—and 96 concrete trucks supplied by 10 ready-mix producers.

Lafarge calculated the amounts and delivery times required. Haas Sons committed to producing 200 yards per hour, A1 committed to 150 yards, and American Materials committed to 200 yards.

Quality control at the forefront

Eight days after completing the lean fill placement and with QC personnel making sure there were no problems with the mix, the pour started at 3 a.m. on Dec. 2.

The specifications called for a 4500 psi air-entrained mix containing 428 Type I/II portland cement, 183 Type C fly ash, no wa-

ter reducers, 1285 natural sand, and 1783 crushed gravel. “We were shooting for 4% air to help pumpability and a 40° F surface temperature to mitigate thermal cracking,” says Steve Lewis. “We embedded thermocouples to continuously monitor and maintain the core temperature at 70° F.”

“From the quality end, teamwork was key to our success, as representatives from all three ready-mix companies, Lafarge, and Midwest Engineering Services, which is an independent QC laboratory, were continuously testing and worked closely to ensure a job well done,” says Gary Haas. “We tested the first batch out of each plant and then every 250 cubic yards after that.”

There was a heated enclosed trailer for storing cylinders, which were tested by the independent QC laboratory. QC personnel



A special type of sand is mined in the town of Howard, Wis., which will be processed at the Chippewa Falls plant. Called frac sand, it helps energy companies extract more oil and natural gas.

onsite continuously tested temperature, slump, and air.

R&S Pumping Service used four pumps with a belt placer as backup. With a 60-meter Concord and 58-meter Schwing facing each other and a 45-meter Schwing and 36-meter Putzmeister on each side, R&S hit all the corners of the pour. The pumps never had to wait for trucks and the only backup that occurred was when a pump was being moved.

R&S unloaded 640 yards of concrete in the first hour and averaged between 500 to 600 yards per hour throughout the day. Air temperatures ranged from 8 to 18° F, with concrete

temperatures around 40° F. The first boom was washed out by 3 p.m. and the last one two hours later. “At the end, we only called for an additional 16 cubic yards of concrete,” says Lewis.

Key to the smooth operation and completion was the amount of pre-planning, planning, estimating, traffic coordination at the site, and strong commitment to quality.

“Everything that day went as smooth as clockwork,” says Gary Haas. “From an estimating standpoint, it was an outstanding effort on the part of Lafarge to come within 16 yards of the required amount. Rick Borowicz, owner of R&S Pumping, did an amazing job of

directing the trucks to specific pumps. Through constant contact with the individual pumpers, a pump never ran out.”

“It was fun to watch the competitive spirit of these dedicated professionals come shining through and it was impressive to see them work together as a unified team,” says Lewis.

It was so cold, Haas Sons brought out a salt truck to treat the main exit off of U.S. Route 53 and the washout area due to ice buildup. **TCP**

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