Project Spotlight

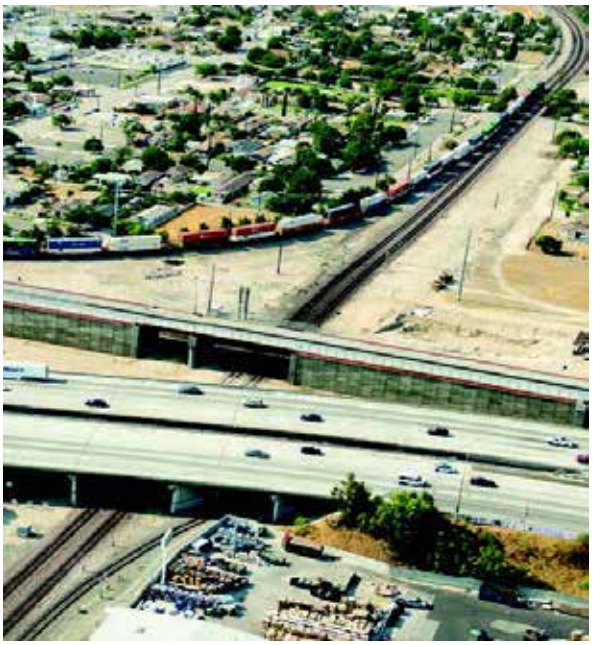
Colton Crossing Flyover - Colton, CA

Project Designer: HDR, Inc. Owner: U.S. Department of Transportation

Funding: Transportation Investment Generating Economic Recovery (TIGER)

Background Information

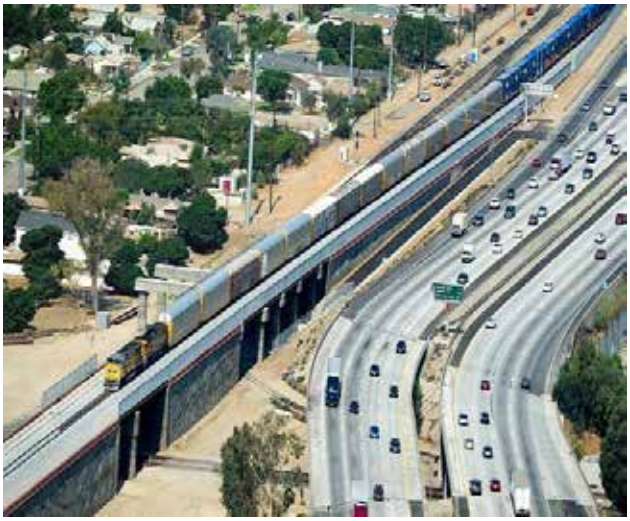
Cellular lightweight concrete (CLWC) has been used for decades in the commercial construction industry for a wide variety of applications. Its density, insulating properties and extreme lightweight make it an ideal choice for many construction projects. Until recently, when additional industry testing was completed, CLWC wasn't considered a viable, high-performance option for geomaterial applications. The Colton Crossing Flyover project, which was a 2015 OCEA (Outstanding Civic Engineering Achievement) award finalist, highlighted the agility and superior performance of CLWC as a geomaterial.



Originally built in 1883, Colton Crossing, located in Colton, California, was one of the most highly trafficked at-grade rail-to-rail crossings in the United States.[2] More than 100 trains travel through this crossing each day and, until recently, the two primary rail routes crossed this location at-grade, which caused significant traffic congestion. The crossing is utilized by Union Pacific Railroad's east-west freight lines and BNSF's north-south freight trains as well as Amtrak and Metrolink passenger trains.[3] In 2013, a number of invested railway companies and stakeholders decided to undertake a major redesign project in an effort to minimize train and traffic congestion—the result was the Colton Crossing Flyover.

Project Details

Colton Crossing was a challenging project for several reasons. First, the grade tracks needed to be separated, which required that an 8,150-foot flyover be constructed to carry the Union Pacific Railroad tracks above the BNSF tracks. Part of the flyover construction required that a vertical embankment be built with a material that was more stable than soil. This 40-foot-high by 50-foot-wide freestanding embankment was required to support three freight train loads simultaneously as well as seismic loading from an earthquake event.[4]



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Cellular Lightweight Concrete Added

Cellular lightweight concrete was chosen as the material for embankment construction because of its extreme lightweight and low density. Because of these characteristics, CLWC not only provided the earthquake resistance required for this location but also reduced the possibility of future soil settlement.[5] A record amount of 200,000 cubic yards of CLWC, installed to a maximum height of 39 feet, was utilized on this project.[6]

The use of CLWC not only ensured long-term stability for this flyover structure and the trains that rely upon it, but also significantly reduced labor time, enabling the project to be completed eight months ahead of schedule and cutting the entire project's budget by $45 million.[7]

With the help of cellular lightweight concrete, the Colton Crossing Flyover provided increased travel efficiency for nearly 125 trains that pass through each day and reduced vehicular traffic delays in the city of Colton. Because the north-south and east-west rails are no longer at-grade, they no longer need to sound their horns as the enter the crossing[8], which means that the residents and business owners in Colton enjoy a more peaceful existence. This creative, cutting-edge project highlighted the incredible strength and flexibility of cellular lightweight concrete, establishing it as an ideal alternative material for geomaterial applications that require long-term performance.

References

[1] J. Anderson, S. Bartlett, N. Dickerson and P. Poepsel. "Development of Seismic Design Approach for Freestanding Freight Railroad Embankment Comprised of Lightweight Cellular Concrete," Geo-Congress 2012, 1721.

[2] Jeff Tieg and Tom Kim. "Creative Use of Cellular Concrete Keys Colton Crossing Victory," 17.

[3] Ibid.

[4] Anderson, Bartlett, Dickerson, and Poepsel,1720.Anderson, Bartlett, Dickerson, and Poepsel,1720.

[5] Ibid., 1721.

[6] Tieg and Kim 19.

[7] Ibid

[8] Ibid