Concrete
For segmental construction, a high-performance concrete is required. This bridge’s design specifically required concrete with a 28-day compressive strength of 6000 psi, and a 3500-psi minimum strength was required prior to tensioning the post-tensioned tendons. To meet the fast-paced construction schedule of the desired seven-day casting cycle, a high-early-strength concrete mixture was ideal.

To achieve a concrete mixture that met these requirements, more than 20 trial batches using local materials and admixtures were tested. A concrete mixture with an 8 to 9 in. slump to facilitate placement among congested reinforcement and a strength of 3500 psi within 12 hours was achieved.

The project’s concrete supplier was located in Tucumcari, N.Mex., 25 miles south of the project site. To address the challenges of producing a special concrete mixture and transporting it over 30 minutes by truck, the contractor opted to set up a temporary batch plant at the project site. The on-site facility enabled easier communication and immediate response times, and provided concrete production that met the project specifications and demands.

Weather
Logan is located at an elevation of approximately 3800 ft above sea level, with a relatively dry climate. However, this region also sees a wide range of temperatures—with high temperatures above 100°F during the summer, and lows below freezing with periodic snow in the winter—and experiences extreme weather swings throughout the year. These drastic weather swings can occur within the same week or even within a 24-hour period.

Another weather obstacle for construction operations and schedule are high, gusty winds, which are common in this area. In March 2019, wind gusts of over 60 miles per hour derailed two dozen train cars on a rail bridge downstream from the project.

Design Support During Construction
Throughout the segmental construction, the project team—NMDOT, the design team, and the contractor—worked together to collaborate on the successful execution of vital construction operations.

Comprehensive Concrete Repair Plan
The design engineer and NMDOT coordinated with the segmental contractor to develop a comprehensive concrete repair plan that could be used as necessary throughout the construction to address repairs efficiently and effectively. In the early development of the optimal concrete mixture, concerns arose about slump, the effect of the dry desert climate on the mixture, and consolidation issues. Nondestructive testing, including the impact-echo method, was conducted in areas of significant repair to provide assurance and confidence regarding the quality of the final product.

Post-Tensioning and Grouting
During segmental post-tensioning operations, the design team and the contractor’s engineer worked to fine-tune the design parameters based on field-verified values. The theoretical design prestressing parameters for