In 2020 Utah Department of Transportation (UDOT) Region 4, with headquarters in Richfield, Utah, identified a 7.75 mile section of US 89 north of Fairview, Utah as a viable cost effective candidate for Cold in Place Recycling (CIR). Hales Sand & Gravel was awarded the job in 2021 and contracted with Coughlin Company to perform the CIR portion of the project.

BACKSTORY:

US Route 89 is one the West's most scenic highways reaching from Mexico to Canada. Known as the "National Park Highway". With over 1600 miles of mostly a two-lane paved highway, US 89 passes through five states, numerous cities and towns and is the gateway to seven national parks including Grand Canyon, Yellowstone and Glacier and 14 national monuments. Over the past three years, UDOT has conducted three CIR projects on US-89 – one each year from 2019 to 2021—totaling nearly 24 miles of placement.

PROBLEM:

Prior to processing the cold in-place recycle, Coughlin Company was tasked to remove the upper 1.5 inch of the existing asphalt which primarily consisted of chip and crack seal. This material was accepted by Sanpete County as a product they could use as patching or shouldering material. Coughlin Company began removal of this layer a few hours ahead of the CIR process in order to facilitate a smooth ride for the public during construction operations.

The decision to use CIR was benefited by an unseasonably warm heatwave to begin the project.Ambient temperatures surged to highs of 98°F during the week of June 14th which led to internal windrow temperatures as high as 116°F during placement. The compaction of the mix was benefited greatly from such high temperatures with compaction averaging nearly 95% during these processes. The product was also benefited by roller operators that were able to catch on to the differences between CIR and HMA. The project began with three operators typically performing three passes on the first CAT CB15 as breakdown, three passes on the CW34 as an intermediate roller, and varying between three to five static passes on the CAT CB15 roller used to finish. During the first week of production, no supplemental rolling was required to achieve the minimum 92% average established by UDOT.

Weather did not continue to work in favor of the project the next week with only three days of production accomplished due to rain in the areaCloud cover that week was as high as 100% at times with temperatures at 10am averaging 20° cooler than the week prior and daily highs about 10°F cooler. The project added a fourth roller – a CAT CCS9 -- during the second week of production when temperatures dipped to their typical highs, reducing the passes of the second CB15 to three to four and performing two passes on its own. On the 6th day of production, June 22nd, the first final density results below 92% were recorded. Those locations were able to be sufficiently rolled the next day, but similar issues presented themselves on the 7th day of production. These areas were not able to be supplemental rolled until two weeks after placement due to the pace of production – yet the material was able to gain 1.3% compaction during processes that much later. Average compaction from that day increased from 90.8% to 92.1% without having the mat break over and lose compaction due to breaking up of the aggregate structure. Supplemental rolling processes did not begin until the asphalt temperature achieved 90°F and peaked at 102°F.

SOLUTION:

The CIR mix design for this project was developed by Idaho Asphalt and used Peak Asphalt's PASS-R emulsion with a targeted emulsion content of 3.0%. This mix used a total of 3% lime slurry (33% solids) using lime provided from the Graymont-Cricket Mountain Plant. Emulsion and lime were introduced to the mix utilizing the Roadtec RT-500 Mixing Trailer. The mix also incorporated 0.5% cement by weight from Ash Grove - Leamington. The cement powder was integrated into the mix during the milling operation by being spread up to 500 ft ahead of the mill and then processes with the milled RAP using a Roadtec RX-900 mill. This combination of materials lead to a compactible mix, and with the integration of cement powder the team saw a rapid gain in strength.

PHOTOS:

Coughlin Company Multi-Unit Cold In-Place Recycling train in the cut on US 89