

Like many of our nation's rural highways, Logan County Highway 25 was not only showing signs of distress accumulated over its 40-year life, it was a safety concern for the traveling public with its narrow driving lanes. Restricted by available funding to construct to federal standards with traditional rehabilitation options, the Logan County Highway Department utilized Full Depth Reclamation (FDR) to widen the pavement to the desired width and used a cape seal treatment as a surface course to safely carry traffic until additional funding becomes available.

BACKSTORY:

Logan County 25 is a rural two lane county highway connecting the community of Atlanta to US 136 in Central Illinois. After years of servicing the community and withstanding not only the central Illinois winter climate but also the agricultural equipment and loads, the pavement had accumulated severe levels of distress.

PROBLEM:

The Logan County Highway Department needed a solution to CH 25 that addressed two major concerns. The first concern was the existing width of the pavement. At the existing 22-foot width, the pavement posed safety concerns for the travelling public with its narrow driving lanes and lack of existing shoulder. This was compounded by the fact that the highway regularly carries agricultural equipment and farm to market loads throughout the year. The second major concern was the existing condition and ride quality of the roadway. CH 25 was plagued with high severity and high frequency full depth transverse cracking throughout its entire length. Emergency milling was performed to improve the ride. However, it did not fully address all the issues.

Like many other small, rural county agencies in Illinois and across the US, Logan County did not have enough funds to reconstruct CH 25 to full federal standards. The preliminary estimate to widen the pavement and replace the existing distressed pavement with traditional road reconstruction methods exceeded the funding available to fix the road.

“ Logan County did not have the funding to construct the roadway to full federal standards at this time. FDR allowed us to correct the problems with the existing road, improving the ride quality and the level of safety. ”

— Bret Aukamp, County Highway Engineer

SOLUTION:

A conventional approach to widen and upgrade CH 25 would have been to trench and excavate shoulder materials and replace with virgin materials. The existing pavement surface would have been milled to remove distressed pavement and covered with a thin lift of HMA. Instead, Logan County elected to use a more economically friendly option for the budget and was able to reuse the material on site. The county utilized FDR and applied a cape seal as the wearing course. The recycled and cape seal option saved Logan County approximately 26% of the estimated cost of the traditional widen, mill and pave option.

The county widened the existing pavement by removing 2 feet of material on each side of the pavement and spreading it along the edge of the pavement as shoulder backing material. The FDR process then called for pulverization of 11 inches of pavement at the existing 22 feet in width. The pulverized material was spread across the new final width of 26 feet. The FDR process stabilized the material with a combination of 3% engineered emulsion and 1% cement additive at a depth of 9 inches per mix design recommendations. Using this combination of treatments as compared to traditional option saved approximately 1,500 truck journeys to the pavement, by eliminating the need to export materials from the project and significantly reduced the amount of new materials required for construction.

Upon completion of the FDR layer, the surface was profile milled for ride and cross slope enhancement. The road was then covered with a single chip seal and then capped with a microsurface layer to complete the cape seal. This cape seal was designed and is intended to be the surface for the first five years of traffic loading. Falling weight deflectometer (FDW) testing collected 4 months after construction completion confirmed the initial pavement designs. Logan County is using a staged construction approach to reach the full 20 years design of the pavement's life. When additional funding becomes available, the widened FDR pavement will be ready for future wearing courses and meet future structural capacity requirements.

PHOTOS:

FDR Combined with the Cape Seal saved 26% versus traditional alternative design

The FDR/ Cape Seal combination reduced over 1,500 truck journeys to and from the project by eliminating any material removal and minimizing imported materials to the project site

Reused 100% of the existing pavement

Safer, wider curves for the traveling public



Original Narrow, Distressed Pavement



Trenching Material for Widening with FDR



FDR Stabilization with Engineered Asphalt Emulsion



Applying the Microsurfacing



Part 1 of the Cape Seal was Chip Seal with HFP Emulsion



Finished Project with Cape Seal Surface



Safety Enhanced in Curves with FDR and Widening