

LAYER BY LAYER

Staged Road Construction in Williams County

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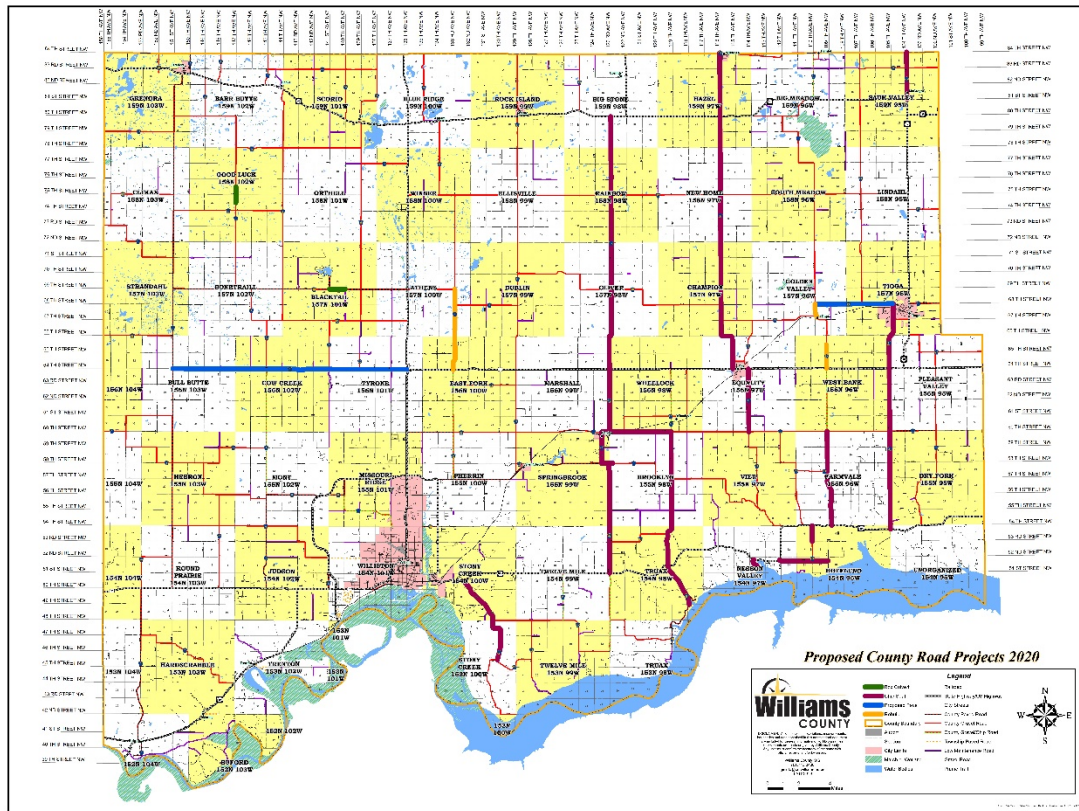
“Roadway network improvements can often be tackled best through phased construction. Phased construction not only spreads the investment needs over several years but it also bears numerous other advantages. Williams County is a role model for staged construction, a fundamental long-term network planning tool. When asked if they would be willing to share their success story, the team jumped at the opportunity. Here’s their story.”

– Dale Heglund, NDLTAP

Building roads in phases – also known as staged construction – is a great option for building quality roads while also managing funding, according to Williams County Highway Superintendent Dennis Nelson. “Williams County has been doing staged construction for about the past 10 years when the oil industry picked up and roads needed more attention as traffic and loads increased” he says.

Nelson and his team at the Williams County Highway Department oversee approximately 180 miles of paved roads and 620 miles of chip seal and gravel roads. His team continuously drives the county roads to assess road conditions. Because doing a road construction project in one area often shifts the traffic impact to a different area for the duration of the project, they constantly have to balance deteriorating road conditions with new construction projects. Staged construction can help to alleviate this situation because stages can be completed over a multiple-year period.

Staged construction also lends itself well to fluctuating funding. Each stage can be completed as funding is available. This allows for the road to be improved over time, allowing any bad spots to surface when they are more economical to repair in gravel and dirt versus when the road has been chip sealed or paved. Allowing each stage to mature over time also allows the road to go through at least one freeze-thaw cycle so that managers can better assess how the road respond to the environment.



county map

So, what exactly is staged construction? Staged construction is a way to slowly and consciously build up a paved road so that it can support the legal weight limit (105,500 GVW).

When scoping the project, ensure that the ditches and drainage are in good shape before starting. In the first stage, the road is raised and widened to its original design dimensions and the inslopes are evened out. Crews will then dig into the subgrade about 12 to 24 inches to pack the dirt back in. Gravel and soil stabilizer are laid down to prevent the road from slumping and being beat back down from traffic. This is also a good time to repair or replace any culverts. If the ditches and drainage were not in good shape initially, then the road will likely need additional gravel and soil stabilizer to successfully complete this stage.

A road typically sits for about a year after the first stage is complete. “The first year is important because it will tell us where the holes, blemishes, and weak spots are so we can go in with more soil stabilizer or do repairs before the road is chip sealed or paved,” Nelson says. Doing so is much less costly than having to go back and repair the entire road. Once a road has been staged for double chip sealing, then the determination can be made as to whether or not to pave the road. Nelson considers this factor when creating the Williams County-wide paving plan.

Building the crown of the road with a 4% grade from the shoulder to the center of the road is crucial to successfully completing stages 1 and 2. If the crown is not built up properly, the road will not shed water, significantly compromising the integrity of the road over time. Given the high volumes of traffic, especially heavy traffic, in Western North Dakota, the crown can be compressed into an inverted crown, allowing water to sit on the road and causing many problems over time. Motor grader operators work at keeping the crown up at all times, but it’s not an easy job!



enzyme stabilized gravel – stage 1



armor coat – stage 2

The third and final stage is paving. This stage is reached if the second-stage built-up road has remained stable. It can take a few years to get to this stage. For example, this year Williams County will pave about 15 miles of County Road 8, located in the western part of the county. The road was originally prepared about five years ago, is currently chip sealed, but is in rough shape. Funding is only just now available. Another example is County Road 10 near Tioga. After waiting for 7 years, Williams County will finally be able to grade and pave 5 miles of County 10, which is also currently chip seal and in pretty rough shape. Gross Production Tax revenue, which Williams County relies on for most road projects, dipped with the industry downturn in 2015 – 2016, thus affecting funding for these projects. If funding lags for too long to bring a stage 2 road to stage 3, then the road will sometimes deteriorate too quickly and the surface will need to be ground up and possibly chip sealed again. However, if the road is properly stabilized and chip sealed, the delay between chip sealing and paving doesn't affect the integrity of the road too much. The road can also be repaired as needed by using oil and small rock (chips) or recycled asphalt.



paved road – stage 3