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MEMO

To: Foster County Commission

From: Michael Rivinius, P.E.
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Date: April 23, 2024

PROJECT: Foster County Paved Roads Future Needs

This memo is in response to the Foster County Commission’s request to provide a plan for future paving projects in Foster County. In this memo the paving costs are estimated using the most current costs available. The traffic data is based on the North Dakota Department of Transportation’s 2022 traffic counts. The Present Serviceability Rating (PSR) value is based on the Upper Great Plains Transportation Institute 2021 roadway inventory and condition data. The PSR value is defined as “The judgment of an observer as to the current ability of a pavement to serve the traffic it is meant to serve” (Highway Research Board, 1972). The pavement age and history are based on Wold Engineering’s past project data. Based on the history and review of the condition data, there are 42 miles of pavement that need an overlay, reconstruction, or grading/reconstruction, see Table 1. The attached Figure 1 shows the 42 miles highlighted in yellow along with the pavement history and 2022 ADT. Figure 2 shows the age range since the last overlay and Figure 3 shows the age range since the last chip seal.

Table 1 – Roads Requiring Overlay, Reconstruction, or Grading/Reconstruction

Road	Length (miles)	Pavement Age (years)	2022 ADT	UGPTI 2021 GRIT PSR Combined Number
Barlow Road - East of 281	11	40	100	2.89
Bordulac South Road - South of 200	9	53	95	2.33
Bordulac North Road - North of 200	8	50	155	2.56
Club Hall Road – West 5 Miles	5	33	55	2.31
Club Hall Road – East 3 Miles	3	31	40	1.92
Murphy Road – West 2 Miles	2	26	105	2.81
Murphy Road – East 4 Miles	4	45	70	1.87

An equation was developed to evaluate the roadway and provide a project ranking. This equation, Equation 1, was developed based on project cost per mile, PSR value, ADT, and pavement age. Table 2 below shows the project ranking based on Equation 1, and Table 3 below is a summary of the total estimated cost for each roadway.

Equation 1

$$\text{Project Ranking} = \frac{(\text{Estimate Project Cost per Mile}) \times (\text{PSR Value})}{(2022 \text{ ADT}) \times (\text{Pavement Age})}$$

Table 2 – Project Ranking

Location	Proposed Work	Cost / Mile	2022 ADT	UGPTI 2021 GRIT PSR Number	Age of Asphalt	Equation 1 (Low Value has a higher need ranking)
Bordulac South Road	Overlay	\$400,000	155	2.33	53	113
Bordulac North Road	Overlay	\$400,000	95	2.56	50	216
Barlow Road - East of 281	Overlay	\$400,000	100	2.89	40	289
Murphy Road - East 4 Miles	Overlay	\$500,000	70	1.87	45	445
Murphy Road - West 2 Miles	Overlay	\$400,000	105	2.81	26	772
Club Hall Road East 3 Miles	Grading/Reconstruction	\$1,000,000	55	1.92	31	1126
Club Hall Road West 5 Miles	Reconstruction	\$750,000	40	2.31	33	1313

Table 3 – Estimated Project Costs

Location	Proposed Work	Total Cost
Bordulac South Road	Overlay	\$3,600,000
Bordulac North Road	Overlay	\$3,200,000
Barlow Road - East of 281	Overlay	\$4,400,000
Murphy Road - East 4 Miles	Reconstruction	\$4,500,000
Murphy Road - West 2 Miles	Reconstruction	
Club Hall Road East 3 Miles	Grading/Reconstruction	\$6,750,000
Club Hall Road West 5 Miles	Reconstruction	

In addition to the proposed overlay, reconstruction, or grading/reconstruction projects shown in Tables 1 to 3, maintenance projects consisting of a chip seal should be completed every 8 to 10 years on the existing pavements at a current estimated cost of \$55,000/mile. The new pavement on the McHenry Road will be chip sealed in 2024. It is recommended to chip seal the Barlow Road west of US281 and the south 5 miles of the Kensal Road in 2025, for a total estimated cost of \$550,000, see Table 4 below. Table 4 summarizes proposed maintenance projects through 2027. This table does not include any of the roads listed in Tables 1 to 3, but the Club Hall and Murphy Roads have reached the age limit on the existing chip seal. Based on the current condition of these two roads, a chip seal will not be cost effective.

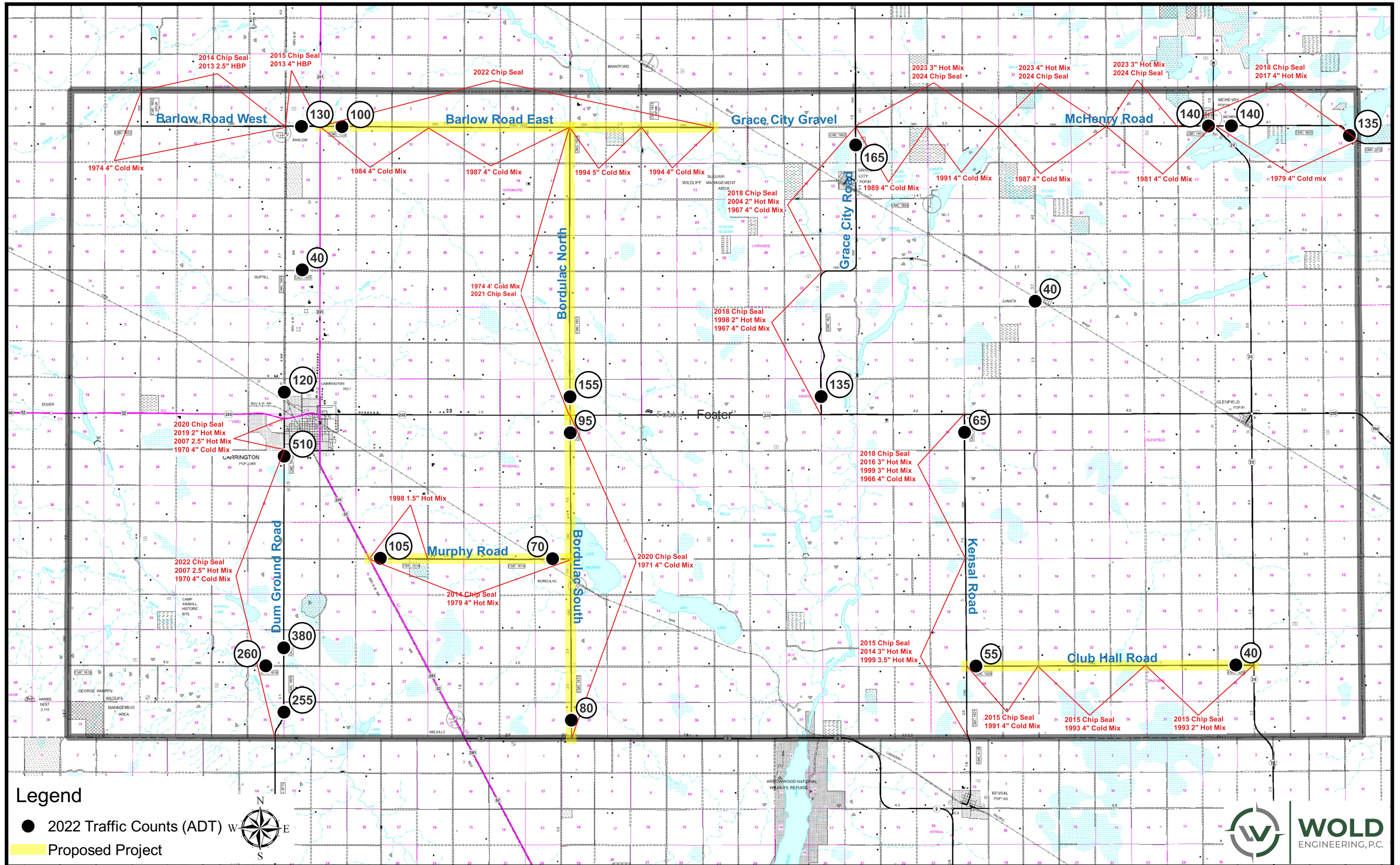
Table 4 – Maintenance Projects

Location	Proposed Work	Total Cost	Recommended Year
Barlow Road -West	Chip Seal	\$275,000	2025
Kensal Road – South 5 Miles	Chip Seal	\$275,000	2025

2025-2027: Foster County was awarded \$4,090,000 in Flexible Transportation Fund Program funding through the NDDOT for the 4 miles of gravel on the Grace City Gravel. This funding will require a minimum local match of \$1,022,500. The project will include regrading and paving the 4 miles of remaining gravel.

The recommended project priority is shown in Table 2. The pavement on these roadways are well beyond their design life and are showing signs of distress. These proposed projects should be addressed as soon as financially possible. Delaying these projects too far into the future could require reconstruction of the roadbed, which would greatly increase the project costs. The Club Hall Road and the Murphy Road have reached this point.

Figure 1 - Pavement History, ADT, Proposed Projects



Legend

- 2022 Traffic Counts (ADT)
- Proposed Project

Figure 2 - Pavement Age Range

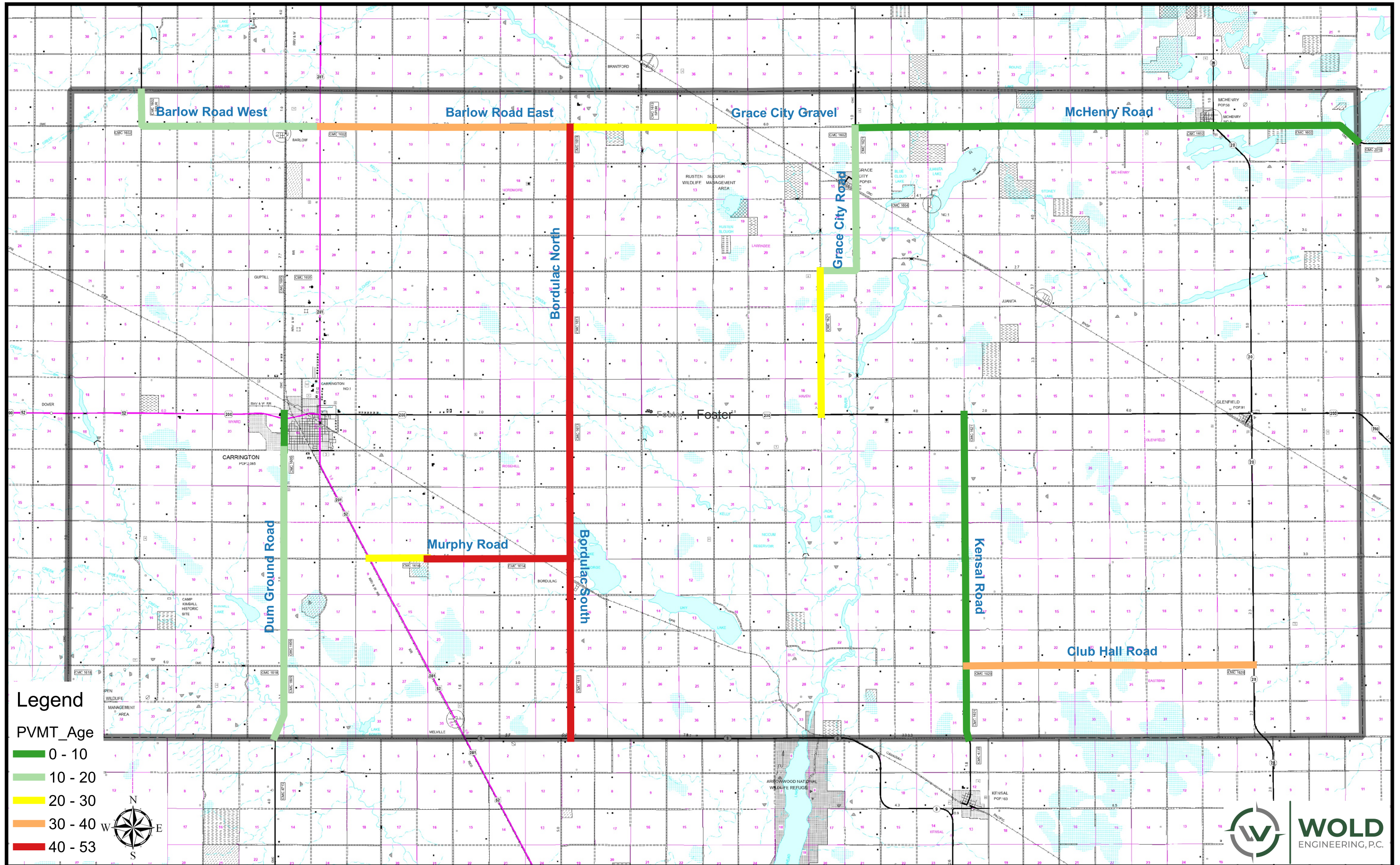


Figure 3 - Chip Seal Age Range

