

Cascade Road Fiber Reinforced Asphalt



Kent County
Road Commission

Wayne Harrall, P.E
Deputy Managing Director of Engineering

February, 2020



Fiber Reinforced Asphalt

- Much higher resistance to rutting and cracking
- Longer life expectancy
- Higher strength
- Reduced thickness





Project Details

- 2016
- Cascade Rd between Hall St and Spaulding Ave
- 2 inch mill and fill
- Rieth-Riley
- CSI Geoturf
- ADT exceeding 25,000





Kent County
Road Commission





Kent County
Road Commission





Rieth-Riley Bid

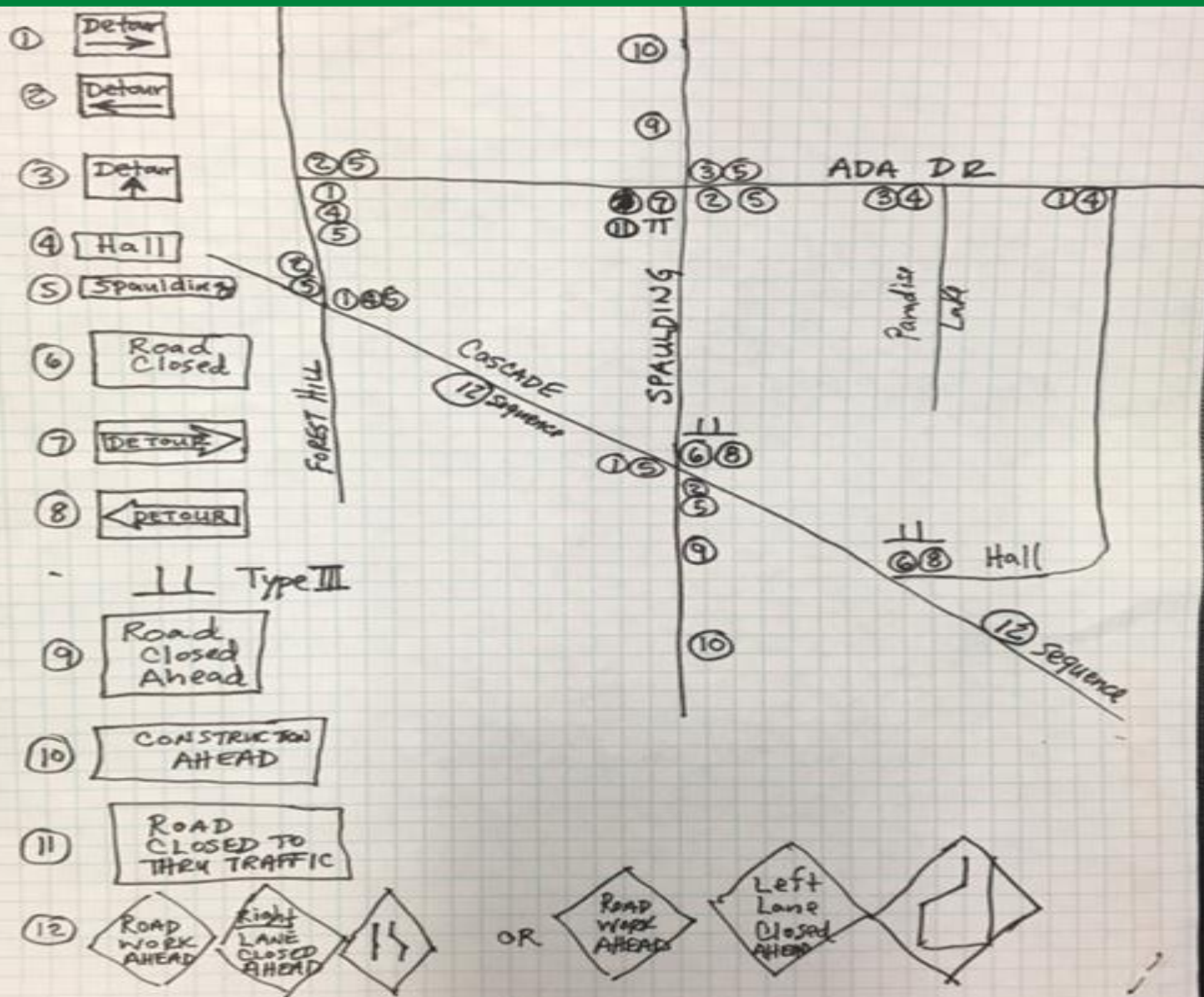
Items of Work	Amount	Unit Price	Amount
Cold Milling	5,600.00 Syd	\$1.90 per Syd	\$10,640.00
HMA, 5E3	550.00 Ton	\$98.88 per ton	\$54,384.00
Traffic Control	1.00 Lsum	\$6,000.00	\$6,000.00

Bid Total **\$71,024.00**

Second Bid= \$110,000

Plus fiber Cost \$10,000

Grand Total **\$81,024.00**





Kent County
Road Commission

Cascade Road between Spaulding Ave and Hall Street 2017





Kent County
Road Commission





Kent County
Road Commission





Kent County
Road Commission

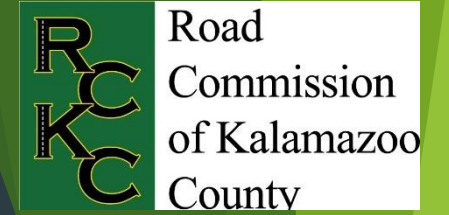




Kent County
Road Commission



RCKC Crumb Rubber Trials Chip Seal and HMA Overlay February 5, 2020



www.kalamazoocountyroads.com
Your Local Road Professionals since 1909

Schoolcraft Township

From: 14th Street
(Schoolcraft Village limits)
To: Portage Road

3.0 Mile Study Area

1.5 Miles HMA Overlay

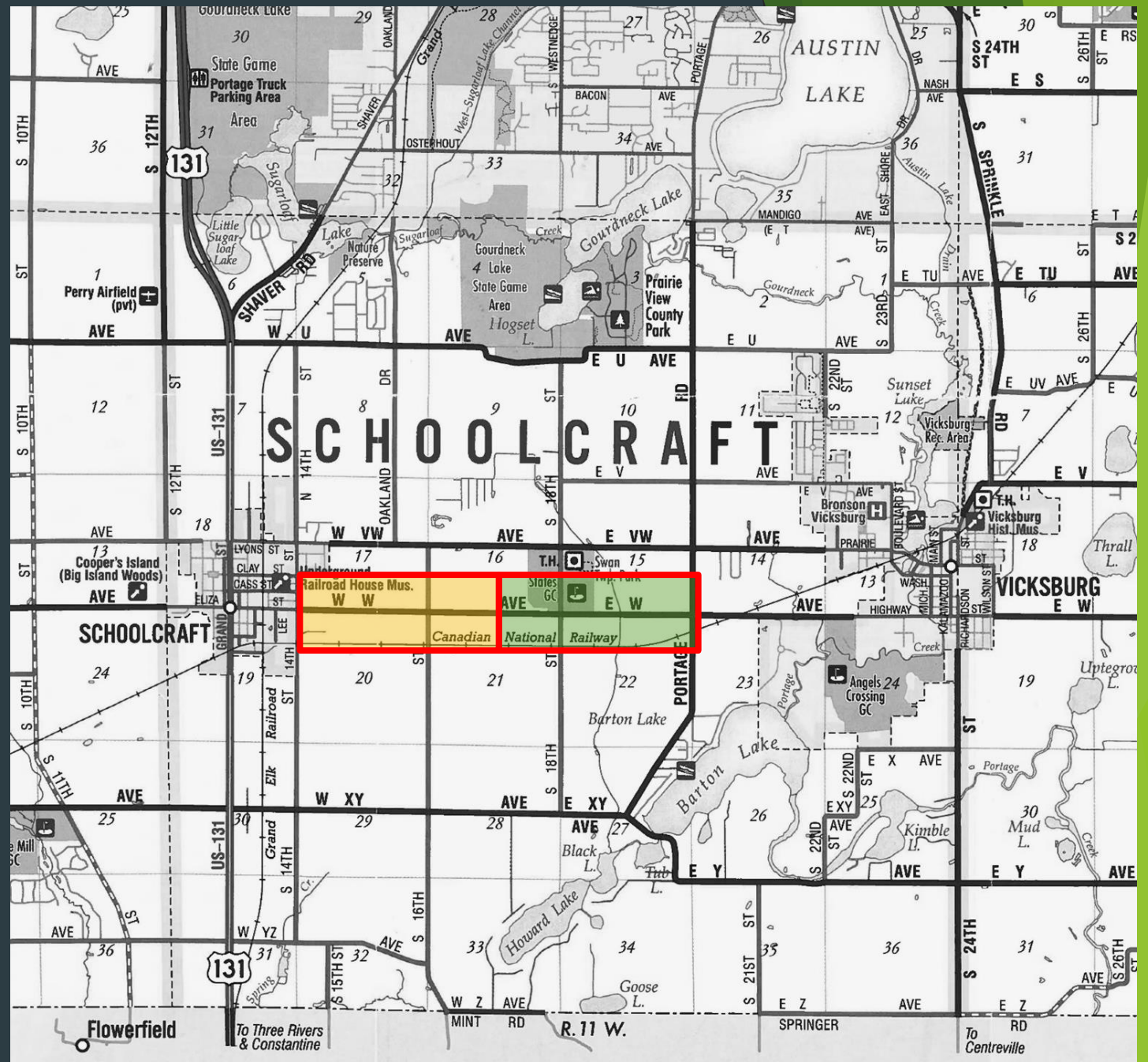
West half of study area

- 0.75 Miles trial (west end)
- 0.75 Miles control

1.5 Miles Chip Seal

East half of study area

- 0.75 Miles trial (east end)
- 0.75 Miles control







Sieve	CS1	Min	Max
¾"	100.0	100.0	100.0
½"	82.0	85.0	90.0
3/8"	26.0	0.0	30.0
¼"	7.0		
#4	3.0	0.0	5.0
#8	2.0		
#16	1.0		
#200	1.1	0.0	1.0



Asphalt Coated Chips

Target 1.0% (by weight of dry chips)

Asphalt

PG 58-28



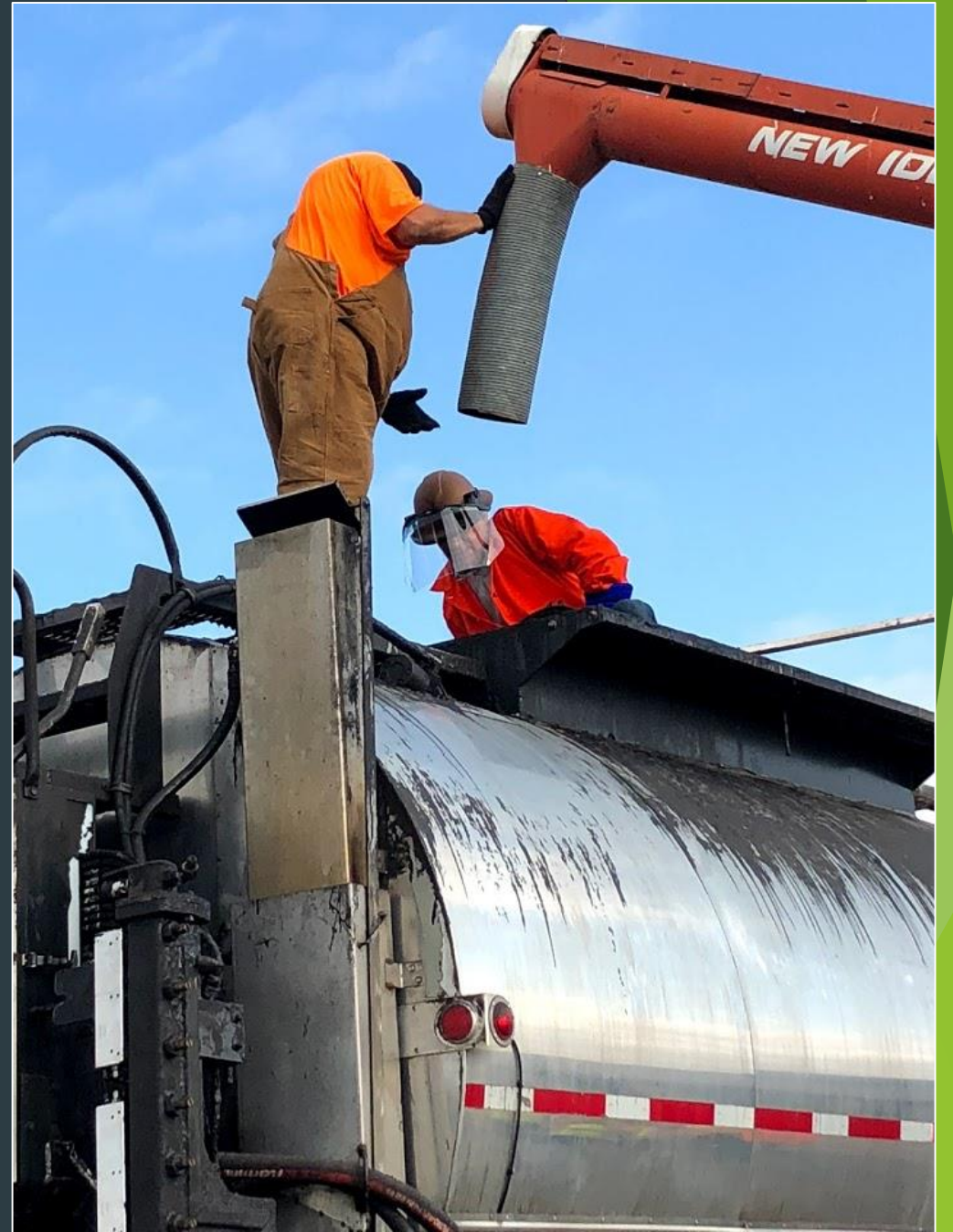




Rubber Modified Binder

Target 28% (by weight)







Application Rate

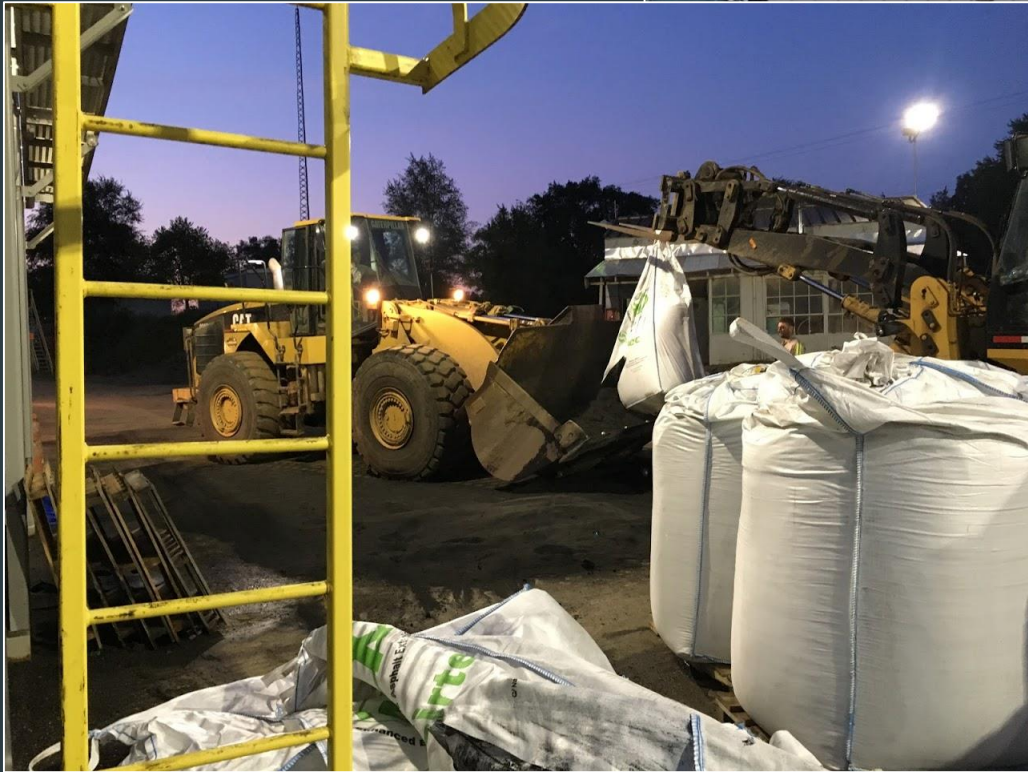
Target 0.6 Gallon/Yard²

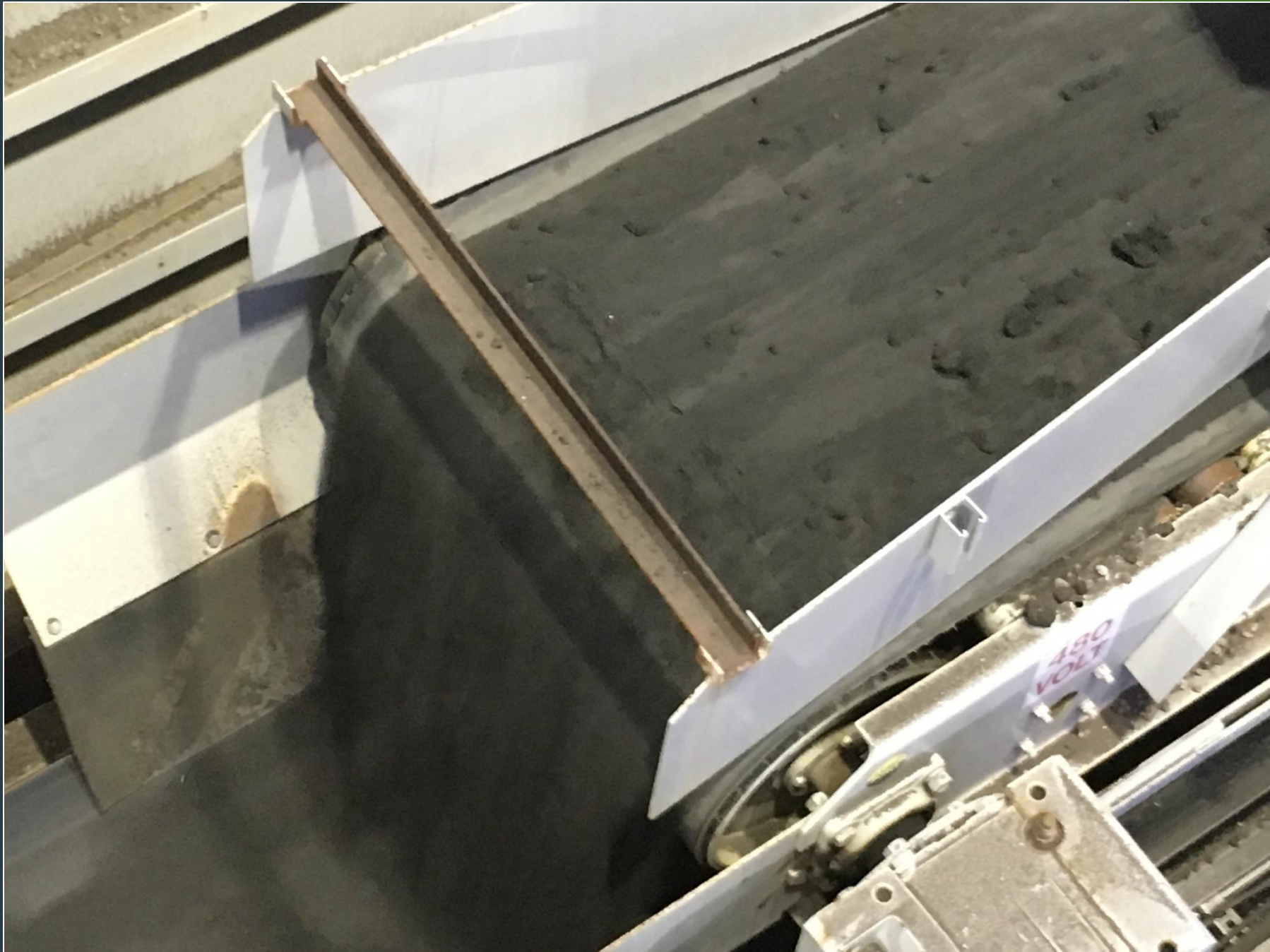


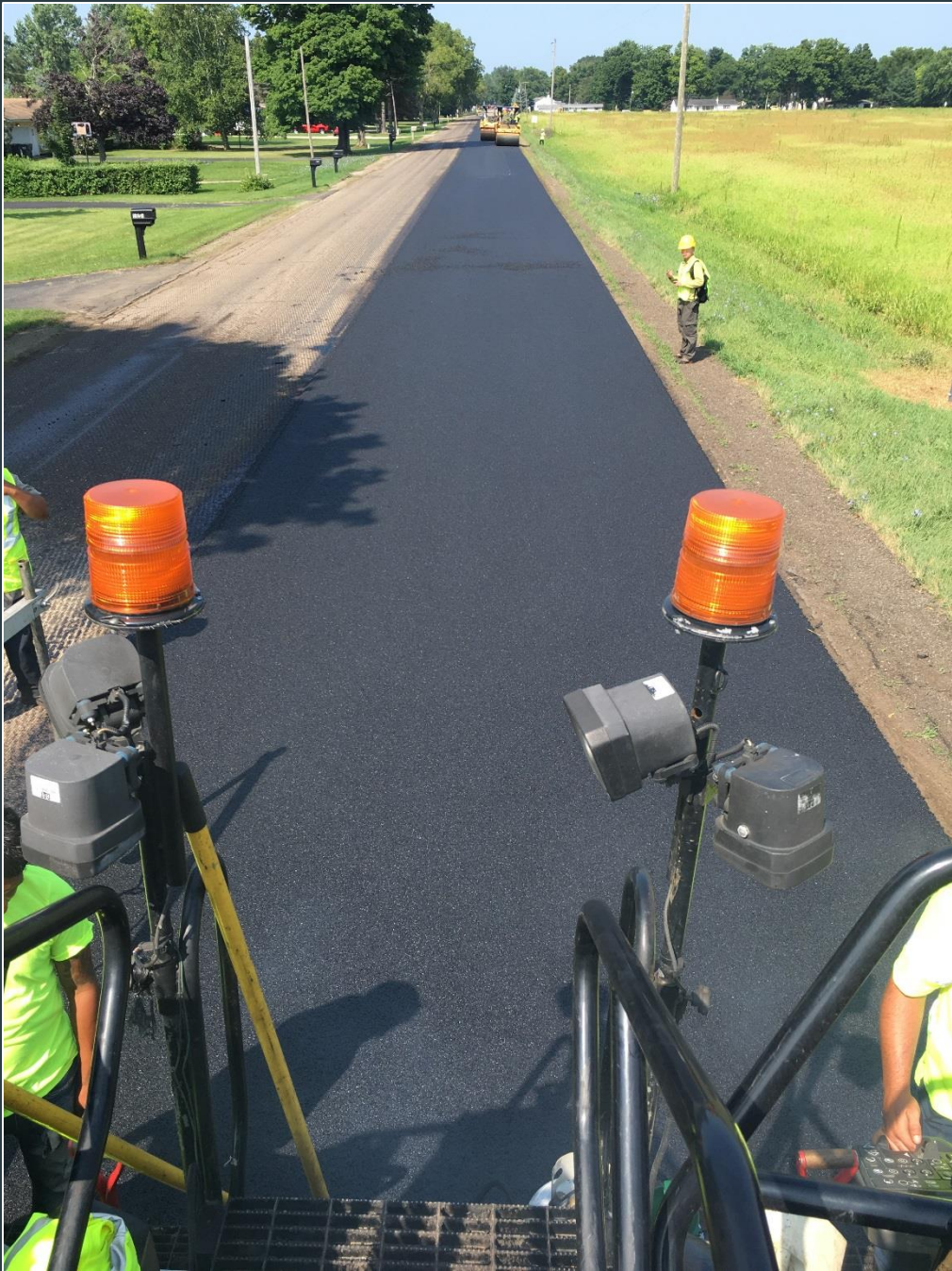


Final product with Fog Seal Application











Lessons Learned

- ▶ Local partners and team communication are key to success

Chip Seal:

- ▶ Rubber Modified Binder needs to come directly from a supplier
 - ▶ Avoids complications with mixing
 - ▶ Could use local equipment

HMA:

- ▶ Rubber was found to reduce noise from high speed vehicles (about 2.5 dBA)
- ▶ Steel rollers need to immediately compact the mixture after paving
 - ▶ Soapy water should be applied to prevent sticking

Costs

- Grant Estimate: \$273,928 (\$136,964 ELGE Grant + \$136,964 local match)

Chip Seal Trial Estimate: \$124,000

Chip Seal Control Estimate: \$35,000

Total Estimate: \$159,000

Final Total: \$245,300

HMA Trial Estimate: \$165,000

HMA Control Estimate: \$109,000

Total Estimate: \$274,000

Final Total: \$234,300

Project Total: \$479,600

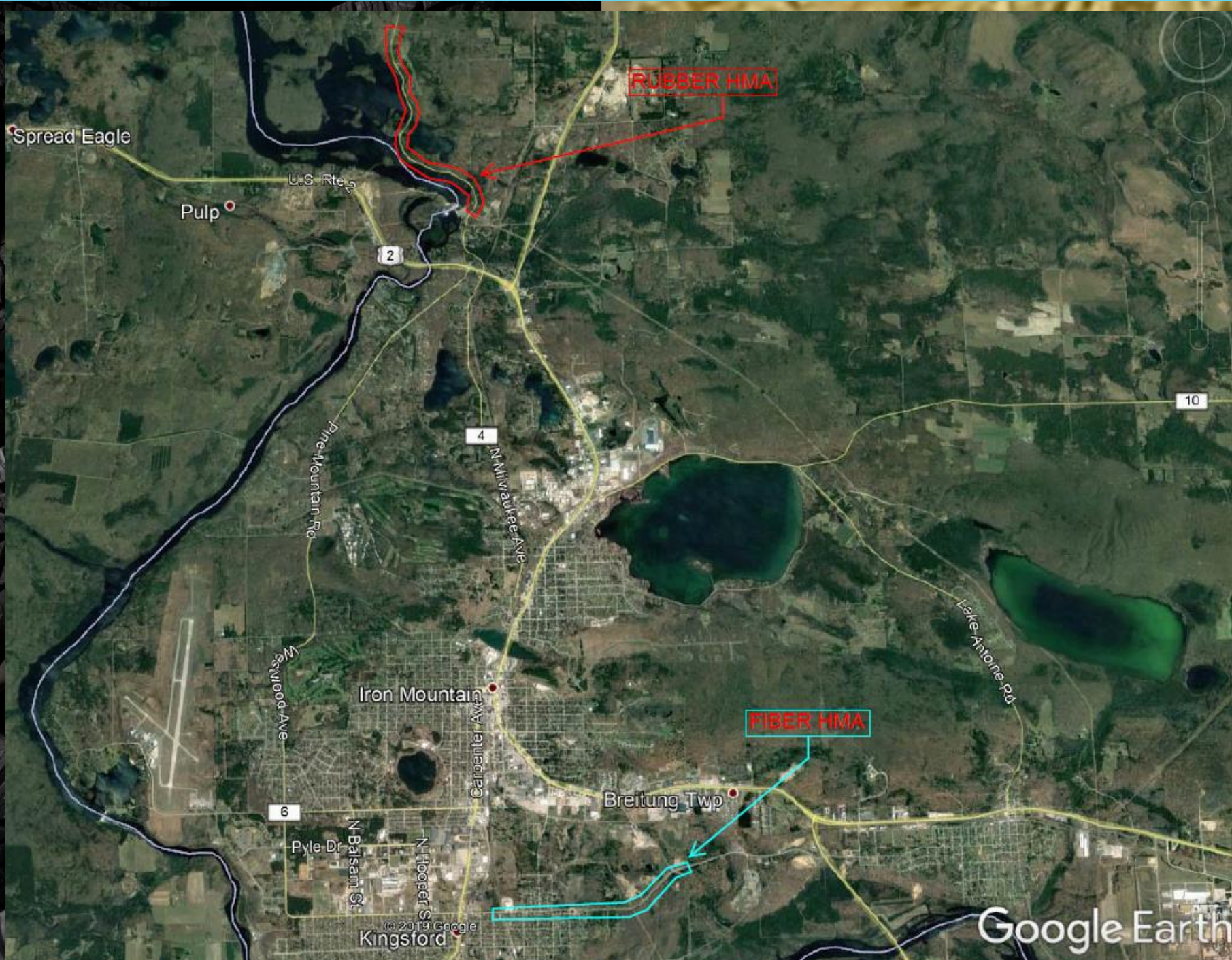


Thanks to all of our partners!
EGLE, Michigan Tech
Lakeland Asphalt, Bit-Mat Products, SME,
FNF Construction, RAR X



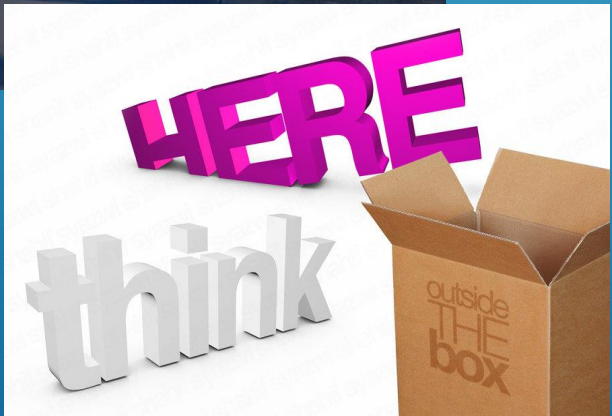
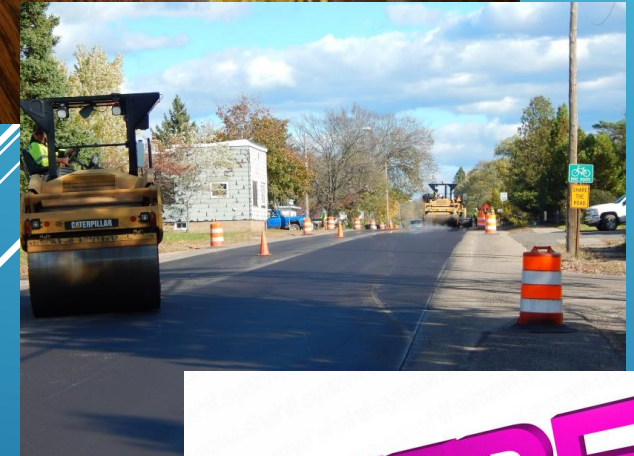
DICKINSON COUNTY'S USE OF FIBER & RUBBER IN ASPHALT PAVING

Dickinson County Road Commission
Engineering Department

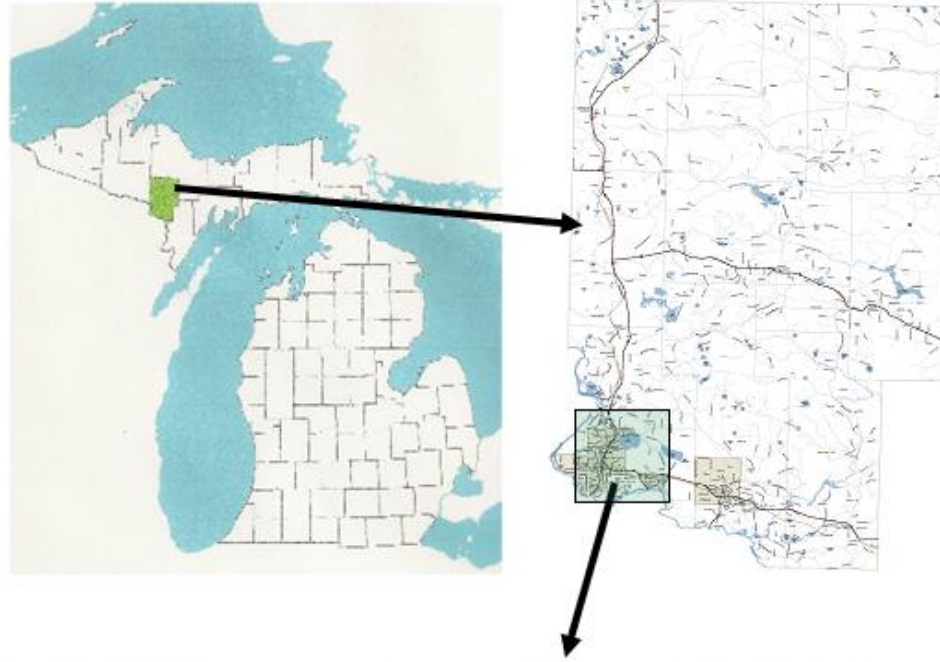


BREITUNG CUT-OFF MILL & FILL USING ARAMID FIBERS

*Dickinson County Road Commission
Iron Mountain, Michigan*

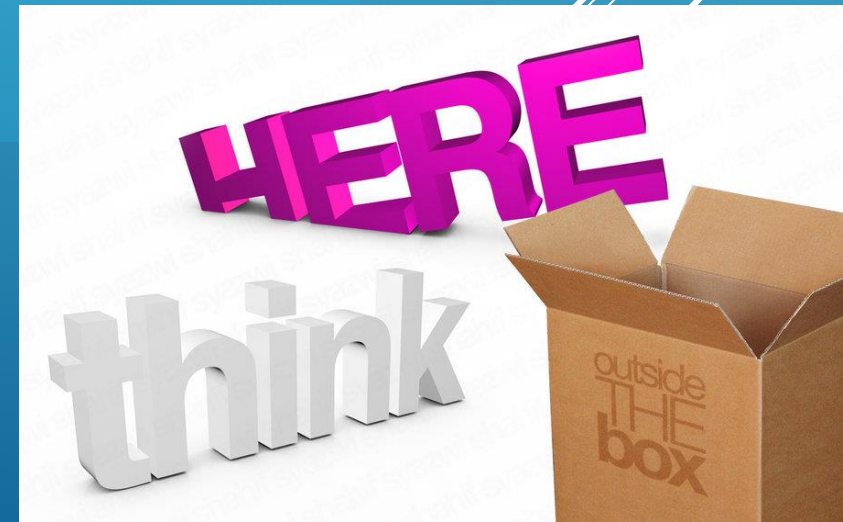


BREITUNG CUT-OFF MILL & FILL PROJECT
In Dickinson County, Michigan



THE SITUATION

- ▶ Breitung Avenue (aka- Breitung Cut-off Road) is a minor arterial road connecting Kingsford to US-141.
- ▶ It is 2.8 miles long between Kingsford City limit and the newer approach at US-141
- ▶ It has the 2nd highest ADT of all County Roads (ADT=6500, 6% commercial)
- ▶ The pavement is failing rapidly. (PASER in 2015= 6 & 5, 2018 = 2 & 3)
- ▶ Board made this a priority to get this road fixed







WHAT FUNDING?

- ▶ \$1.3 million project for the 2.8 miles
- ▶ (\$800,000 to Powder Lake Road , 1.51 miles)
- ▶ Not eligible for RTF dollars as in the Iron Mountain - Kingsford small urban area
- ▶ DCRC won't get the small urban funds until 2022, and then only \$375,000
- ▶ We have a definite situation

NO SIMPLE SOLUTION?

- ▶ Not enough money for Crush-Shape-Pave.
- ▶ Not a candidate for chipseal.
 - Road too far gone.
- ▶ Not comfortable with an overlay.
 - Top lift is delaminating and crumbling so not a good bond for an overlay.
 - Plus lots of cracks would reflect up through the surface.
- ▶ NEED TO FIND A DIFFERENT FIX



NO SIMPLE SOLUTION?

- ▶ The only fix which seemed to be close to the money was mill & fill.
 - Would be quick with minimal traffic disruption to a major road.
 - But a mill & fill only has a 3-5 year life expectancy.
 - Susceptible to reflective cracking, especially at the widening joint in wheel path
 - Still can't get to Powder Lake Rd with the money.



OVERCOMING THE ISSUES

- ▶ A mill & fill only has a 5 year life expectancy.
 - Fix- Strengthen the asphalt and control the cracking.
- ▶ Susceptible to reflective cracking especially the widening joint in wheel path
 - Fix- Control the cracking.



USE FIBERS

- ▶ Mostly natural fibers (mostly jute) used in Michigan.
 - This for oil retention in open graded asphalts only.
 - No strength or crack control recognized by MDOT.
- ▶ Aramid and other fibers have been tested in other states and shown to improve pavement strength and crack resistance.
 - ▶ Not used in Michigan
 - ▶ Learned FHWA calls these a non-proven technology



WHAT IS THIS STUFF??



Available through Elsey Construction Products



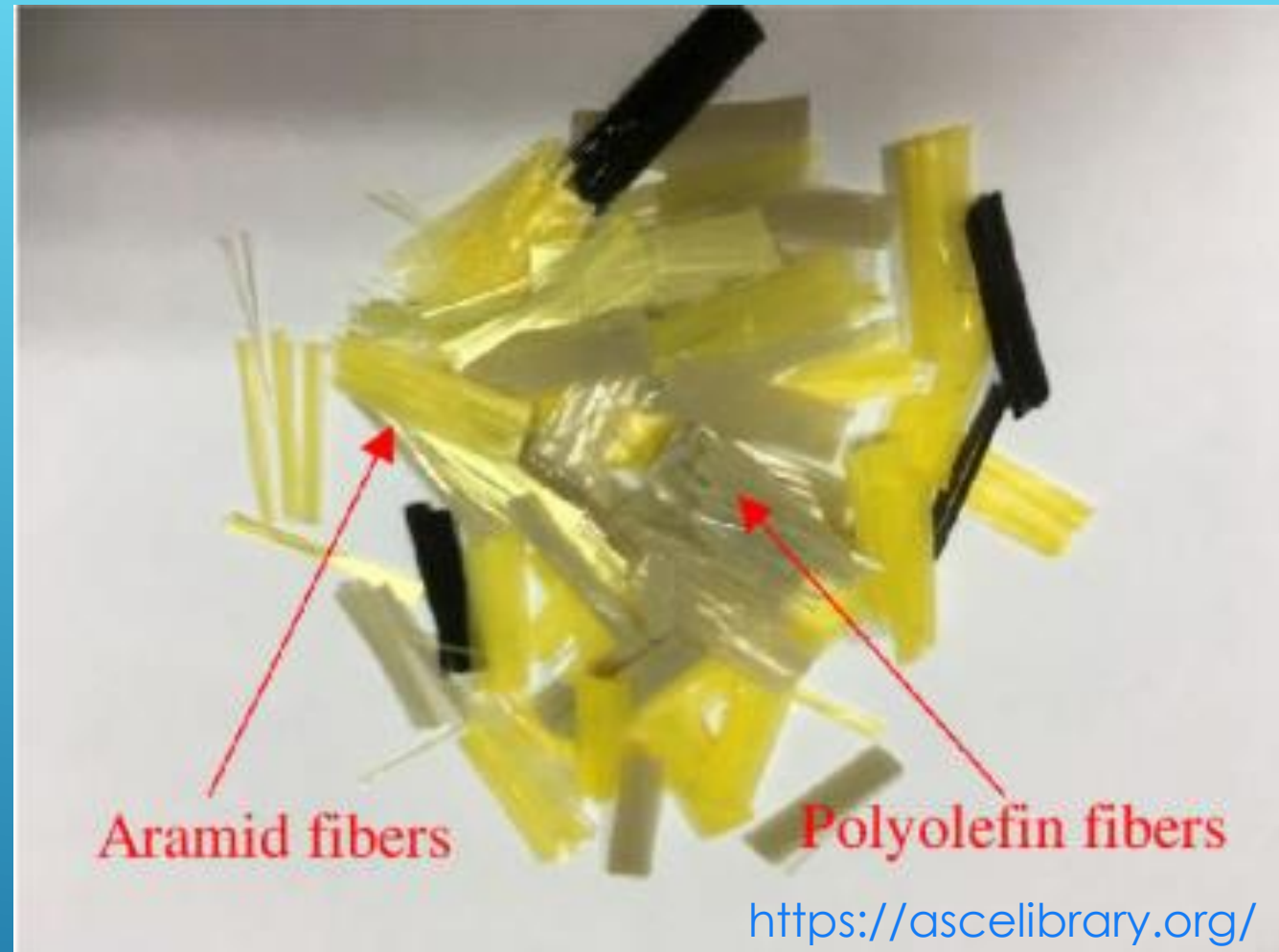
Available through CSI Geoturf

Per the manufacture's aramid fibers literature and salesmen

- made of **AR**omatic poly**AMIDE** (ARAMID), same chemical composition as Kevlar
 - increase material strength (load capacity)
 - better resists rutting, shoving, and cracking



ACE FIBERS



FORTA FIBERS























BEFORE & MAY 28, 2019



BEFORE & MAY 28, 2019



FIBERS ARE WORKING

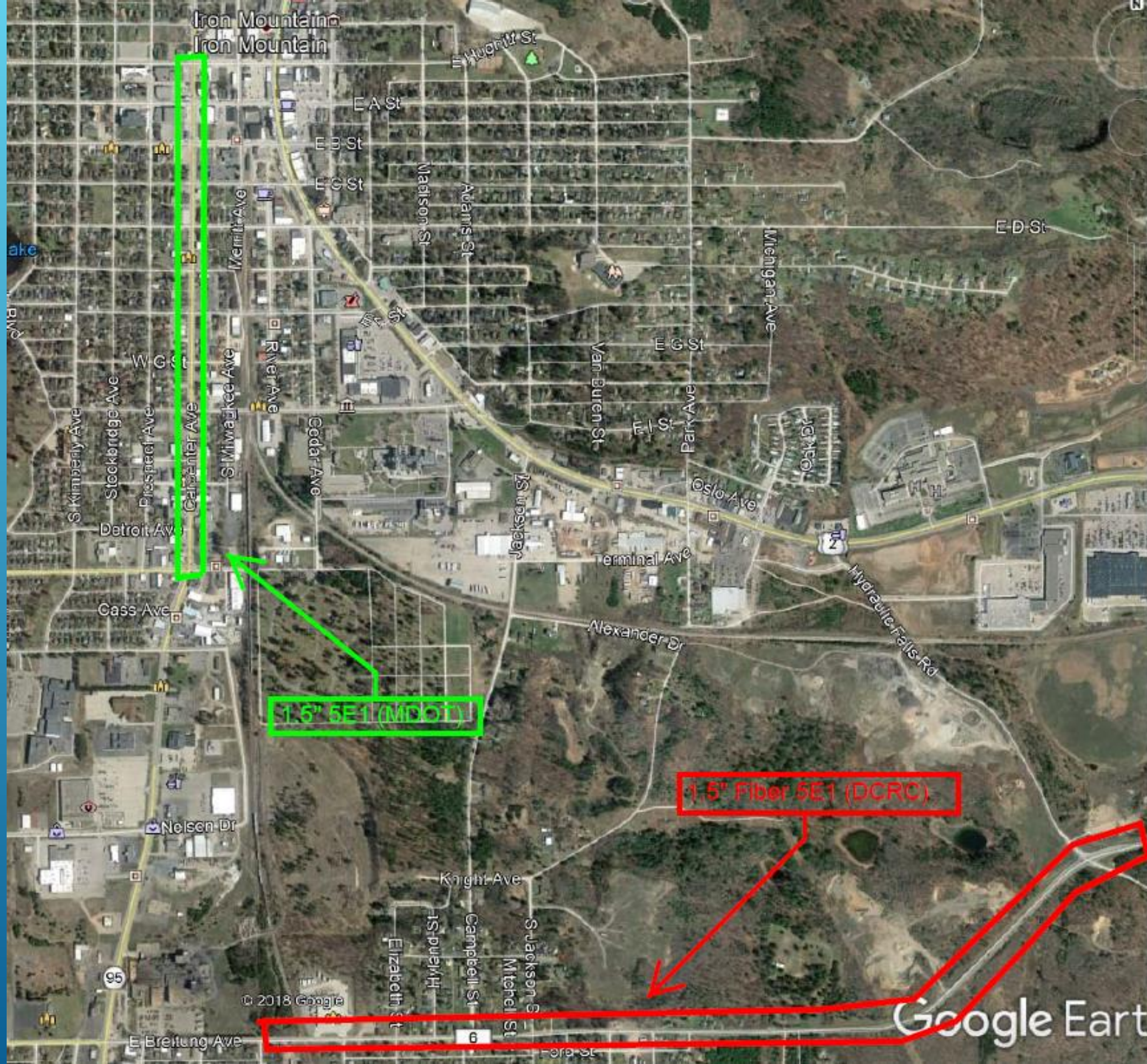


FIBERS ARE WORKING



THE SUMMARY

- ▶ 1.51 miles
 - 28,129 Syd cold milled 1.5 inch deep
 - 2,377 tons fiber reinforced 5E1 laid
- ▶ Contractor cost \$331,587
- ▶ Performing better than traditional mill & fill

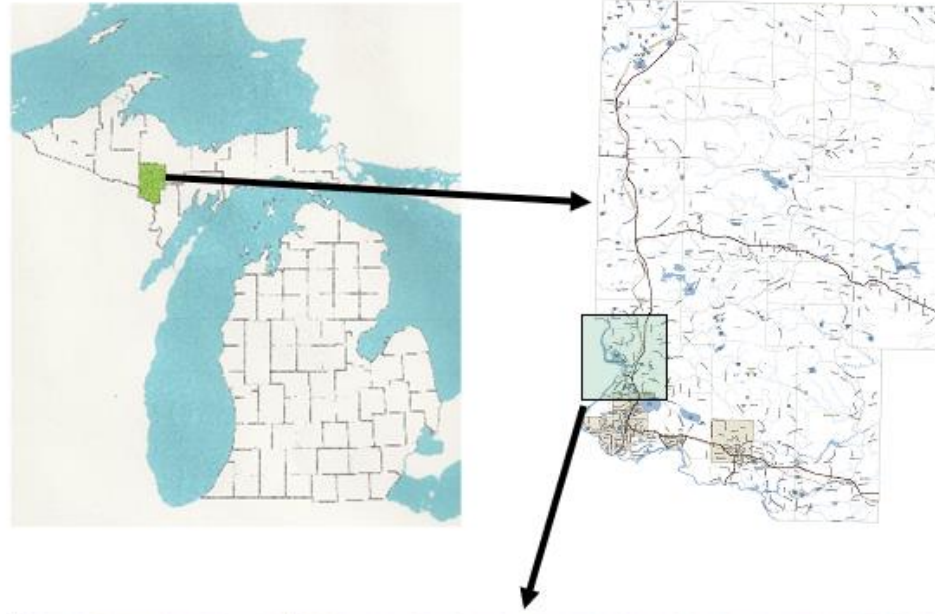




Using Engineered Crumb Rubber from Recycled Tires on CR 607, Dickinson County

Dickinson County Road
Commission Engineering
Department

CR 607 ECR PROJECT
In Dickinson County, Michigan



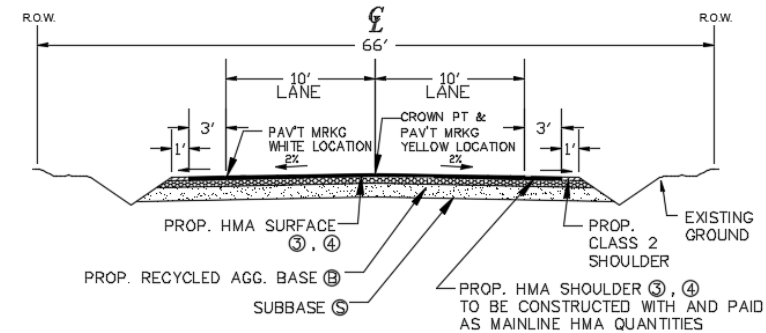
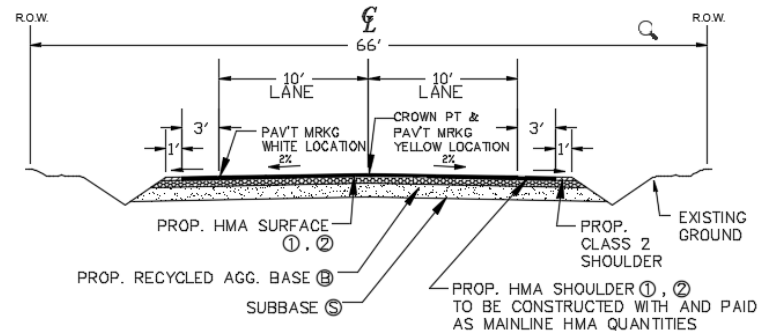
THE SITUATION

- ◆ County Road 607 (aka- Bass Lake Road) is a Primary and a Major Collector road connecting Iron Mountain to Randville.
- ◆ It is about 13 miles long
- ◆ It is a beautiful scenic route along the Menominee River. Many locals and tourist alike travel this for the natural beauty.
- ◆ The pavement was failed. (PASER in 2011= 2, 2018 = still a 2)
- ◆ Truck drivers often use this as a bypass of M-95, failing it more
- ◆ Board gave direction to get this road fixed

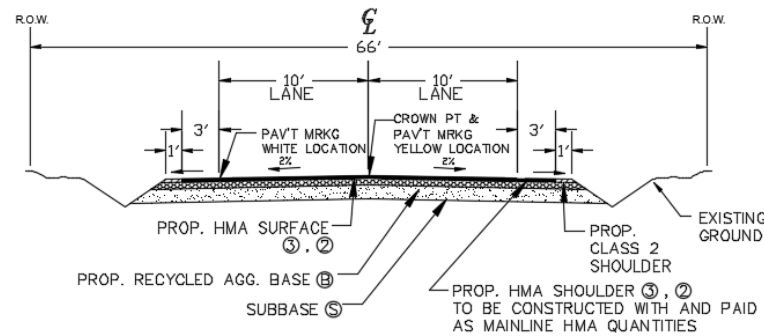
Existing Conditions



3 Sections, a Control and 2 Test Sections



NOTE: ALL CURVES SHALL HAVE A
SUPER ELEVATION RATE OF 6%.



HMA APPLICATION TABLE

CODE	ITEM	YEILD	BINDER GRADE	A.W.I	REMARKS
①	5E1	165 lb/Syd	PG 58-34	220	SURFACE
②	LVSP	220 lb/Syd	PG 58-34	N.A.	LEVELING
③	ECR Modified 5E1	165 lb/Syd	PG 58-34	220	SURFACE
④	ECR Modified LVSP	220 lb/Syd	PG 58-34	N.A.	LEVELING
	* BOND COAT	0.05-0.15 GAL/Syd	* FOR INFORMATION ONLY. PAYMENT INCLUDED IN SURFACE COURSE HMA.		
⑧	8' RECYCLED HMA & GRAVEL MIX				
⑨	3+ Ft SAND & GRAVEL SUBBASE				

REVISION NO.	REVISION REASON	REVISED BY	DATE

DICKINSON COUNTY ROAD COMMISSION
1107 S. MILWAUKEE AVE
IRON MOUNTAIN, MI 49801



SCALE: HORIZ. 1"=40'
VERT. 1"=10'
PROJECT: 1-18-2019
PROJECT NO.: 458.002

PROJECT: CRR607 (BASS LAKE ROAD)
ECR RESEARCH PROJECT
TOWNSHIP: BREITUNG

SHEET TITLE: PROPOSED TYPICAL SECTIONS

SHEET 3
OF 8





Testing



Rubber



Rubber Blower & Operator



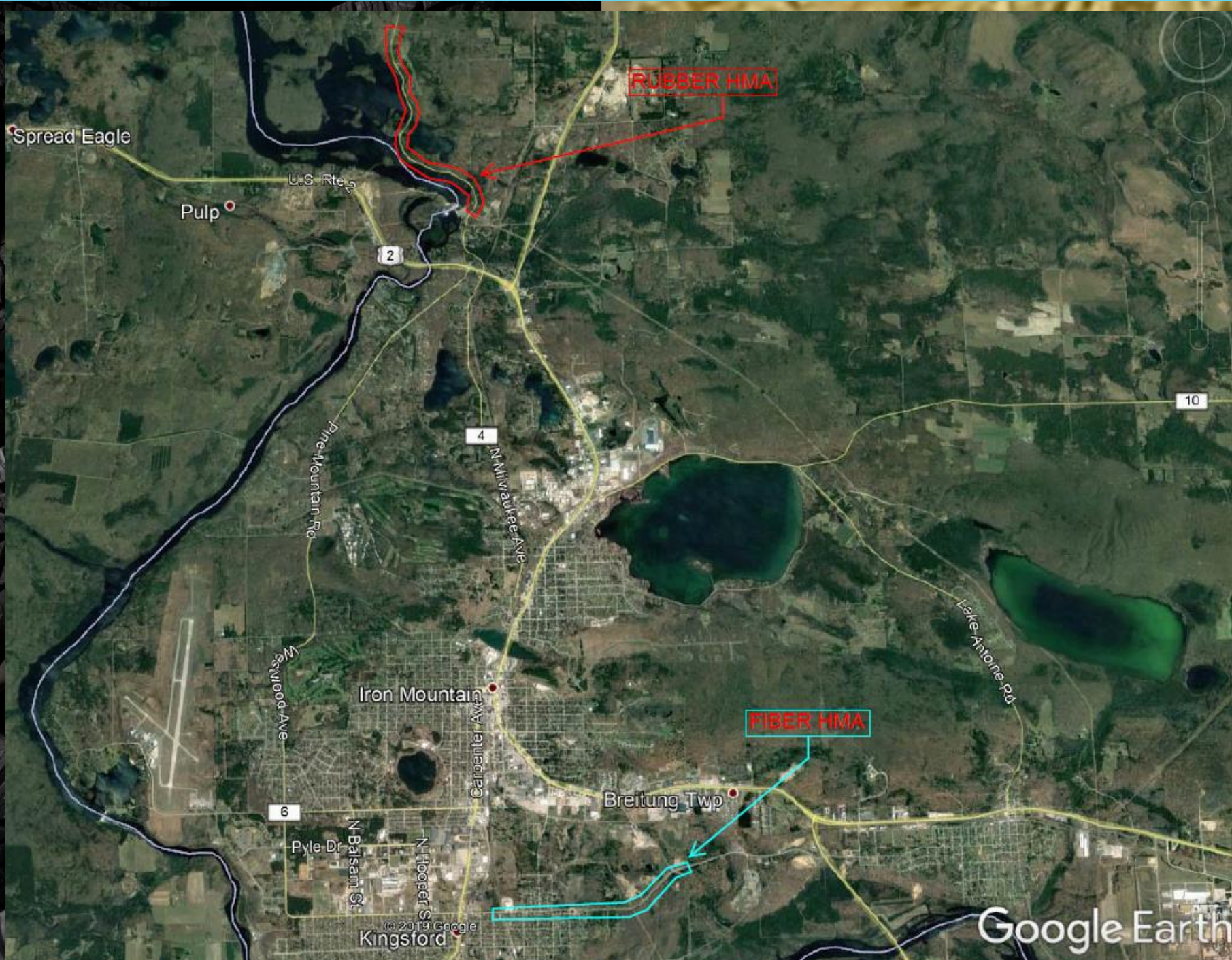


Finished Product



Summary

- ◆ 10,000 Feet (1.9 miles)
 - 3,300 Ft traditional HMA leveling & surface control section
 - 3,300 Ft Traditional HMA leveling & ECR modified HMA surface
 - 3,300 Ft ECR modified HMA leveling & ECR modified Surface
- ◆ Project construction cost \$531,830
- ◆ All together 2,661 tons of ECR modified asphalt was used.
 - Used 29,271 lbs rubber, or the equivalent of about 3,659 scrap tires
- ◆ Performing well, will know more in the spring.
- ◆ Multi year test section for MTU



QUESTIONS?



Dickinson County Road Commission
Main: (906) 774-1588
Engineering: (906) 774-1162

FOR MORE INFORMATION

Lance Malburg, P.E.
Engineer
E-Mail: Lance@Dicknsoncrc.com

Brent Swanson
Engineering Technician
E-Mail: Brent@Dicknsoncrc.com

