



Responsible Renewal. Reliable Results.

ARRA CONFERENCE

2016 TESTING IN CASS COUNTY

Dickinson, ND

In-Place Recycling & Reclaiming Seminar | Dickinson, ND | June 27-28, 2017

Cass County History w/ Stabilization and Recycle

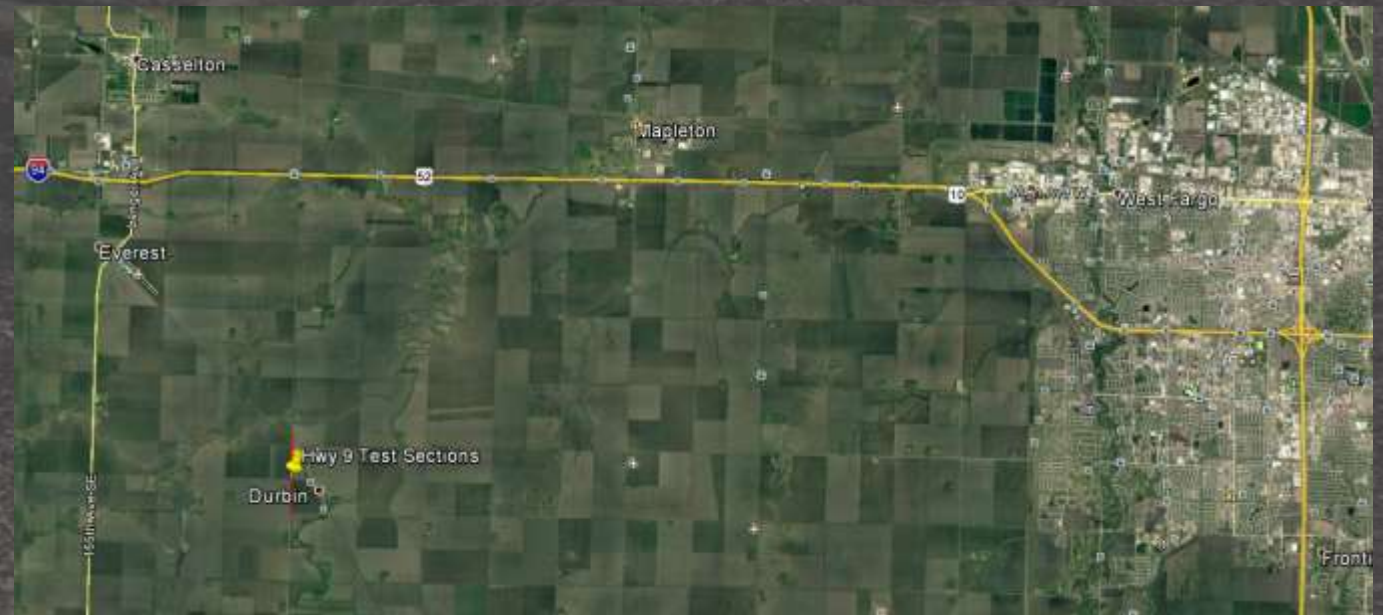
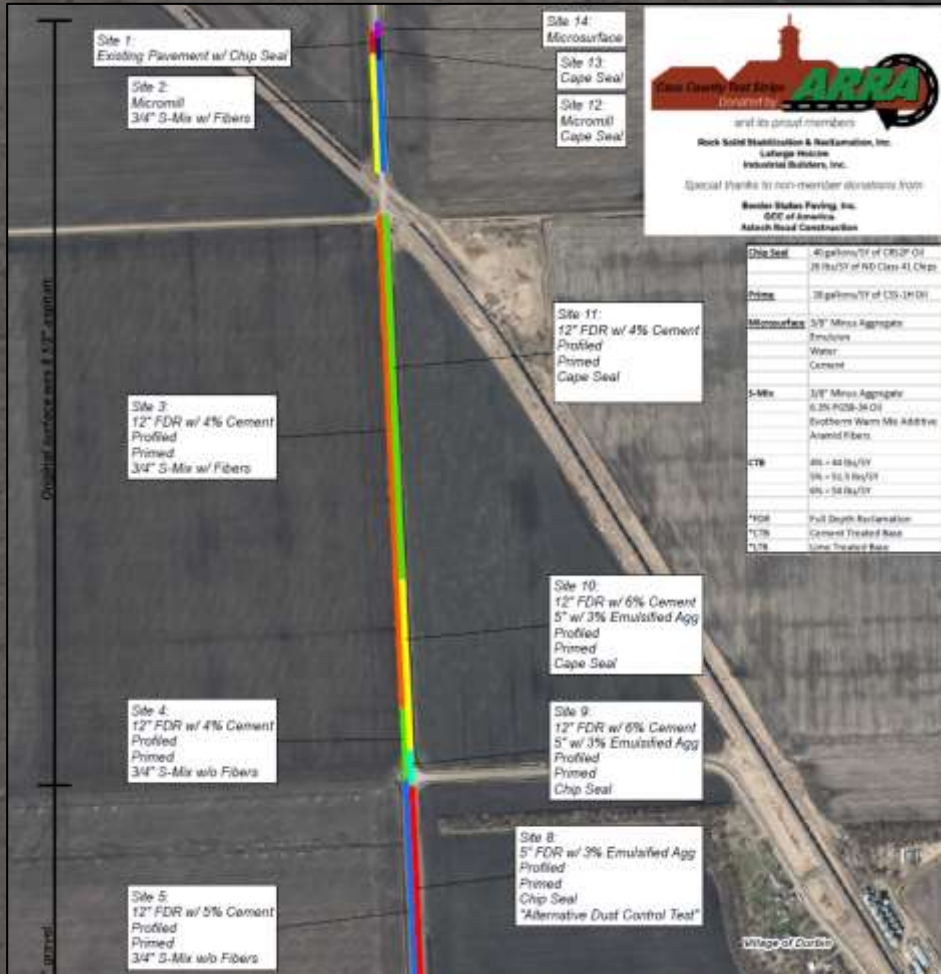
- 25 year regional wet cycle
- In the last 7 years completed over 80 lane miles of Cement Stabilized Subgrade with no issues
- In the last 10 years we've focused on adding RAP into our HBP and completed the first Warm Mix RAP project in North Dakota
- We were looking for better ways to reconstruct our roads.



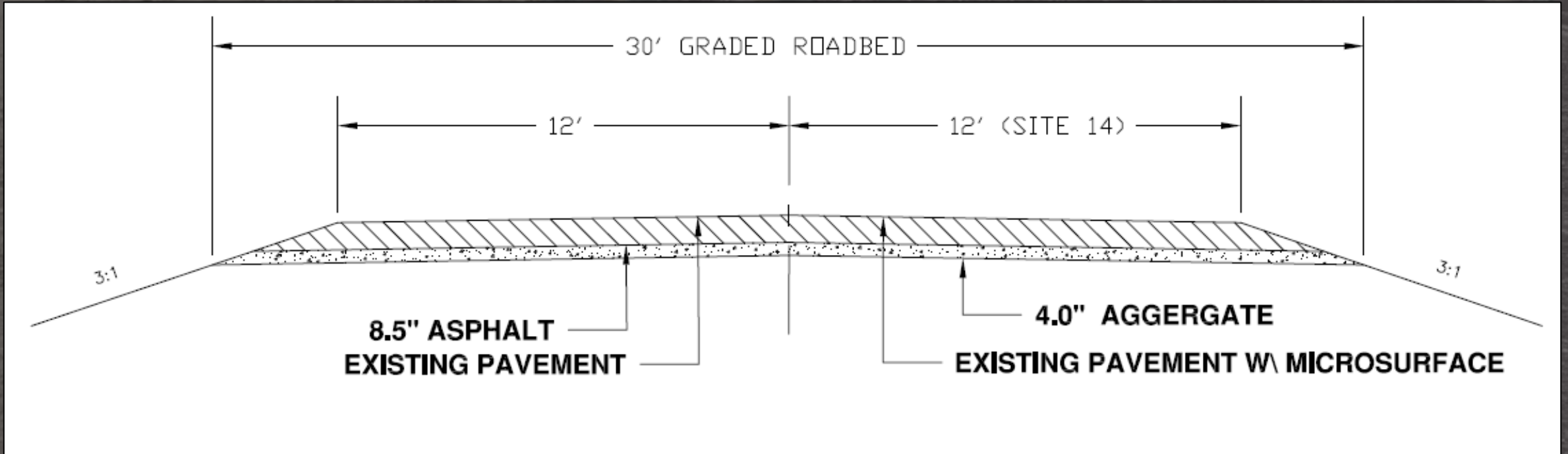
Responsible Renewal. Reliable Results.

Cass County Hwy 9 Test Sections

Test Section information can be found at:
<https://www.casscountynd.gov>



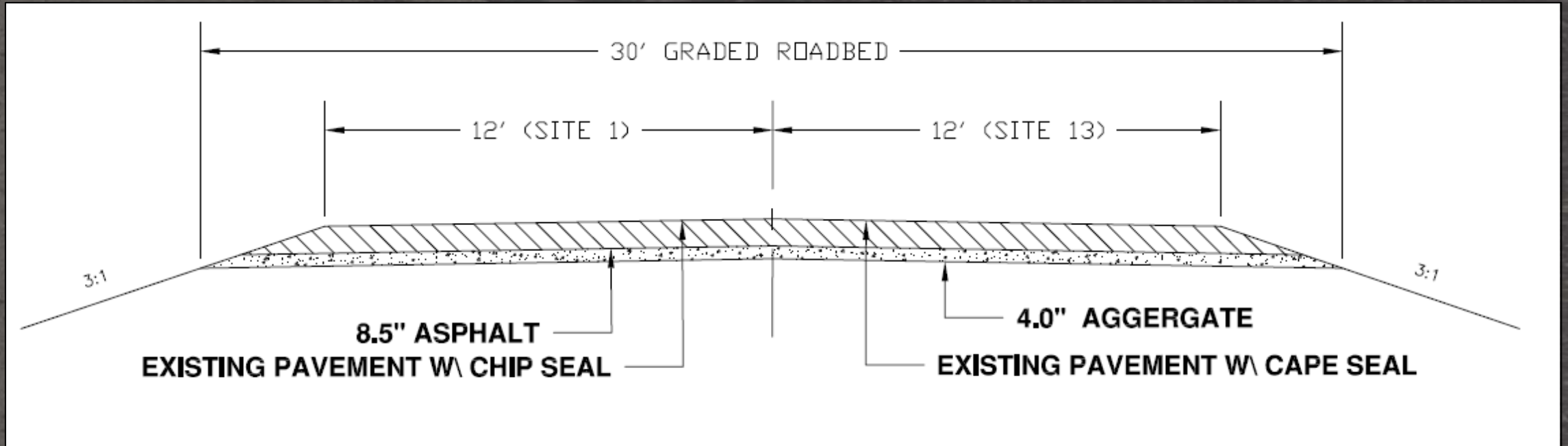
Test Section 14



- 4" OVERLAY IN 1993

- REFLECTIVE CRACKING
- NO FINE AGGERGATE LOSS

Test Sections 1 & 13



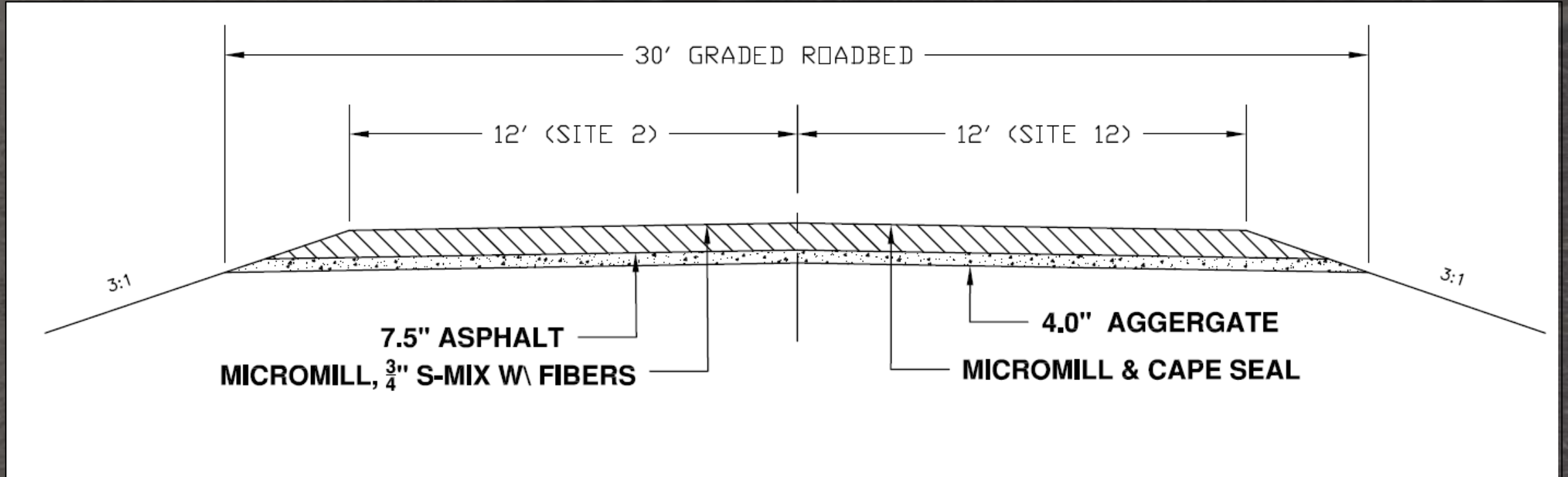
- REFLECTIVE CRACKING
- NO CHIP LOSS

- REFLECTIVE CRACKING
- NO AGGERGATE LOSS

Test Sections 1 & 13



Test Sections 2 & 12



- THERMO CRACKING

- THERMO CRACKING
- BETWEEN WHEEL TRACKS ROUGHER PAVMENT – PLOW MARKS



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Test Sections 2 & 12



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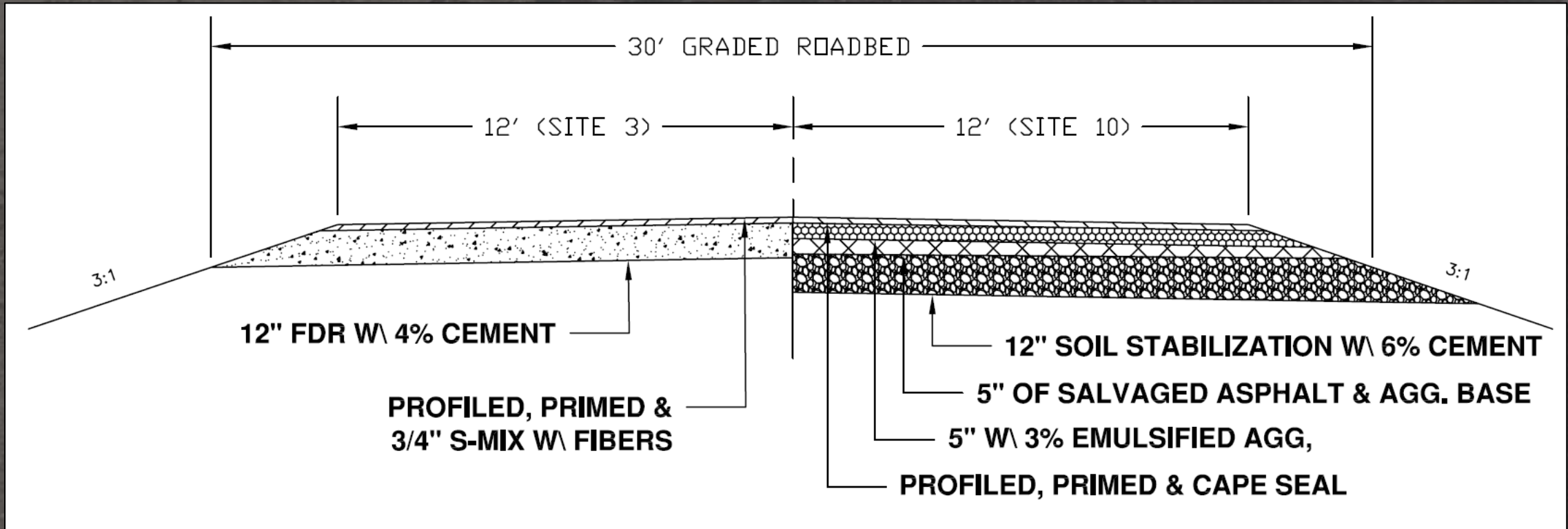
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Test Section 2 & 12



- ROUGHER SECTION BETWEEN WHEEL TRACKS – PLOW MARKS

Test Sections 3 & 10



- MAT LOOKS GOOD – NO FINES LOSS
- TRANSVERSE & LONGITUDINAL CRACKING

Test Sections 3 & 10



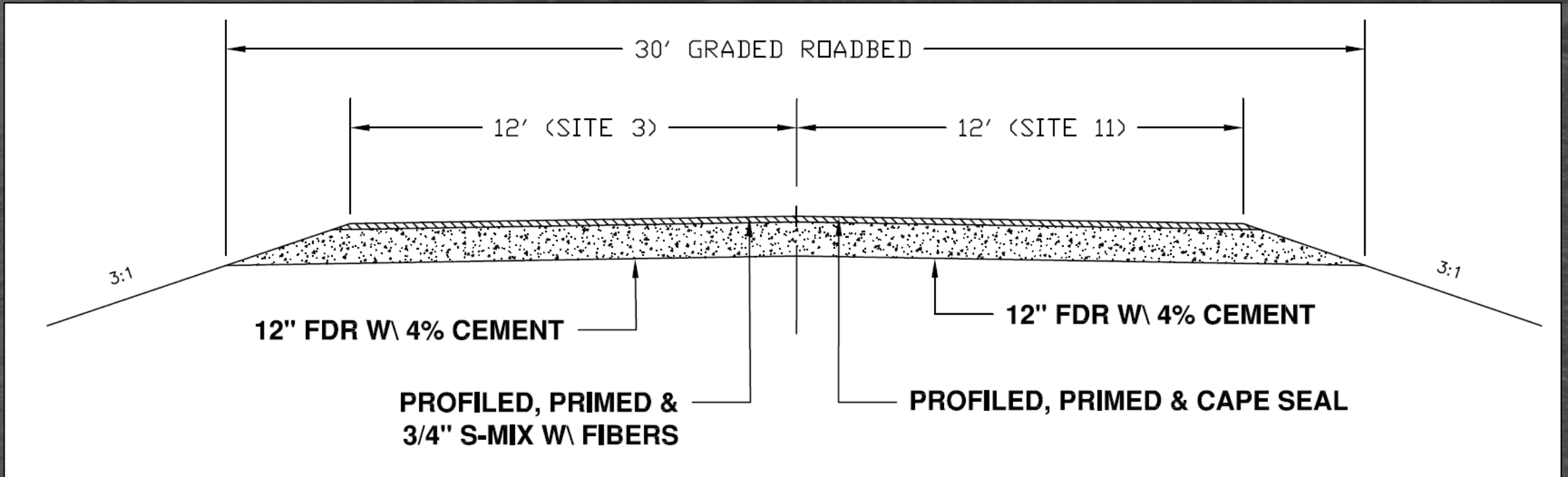
- ROLLER PAD MARKS AFTER MILLING

Test Sections 3 & 10



- LONGITUDINAL CRACK
POSSIBLY FROM MILLING

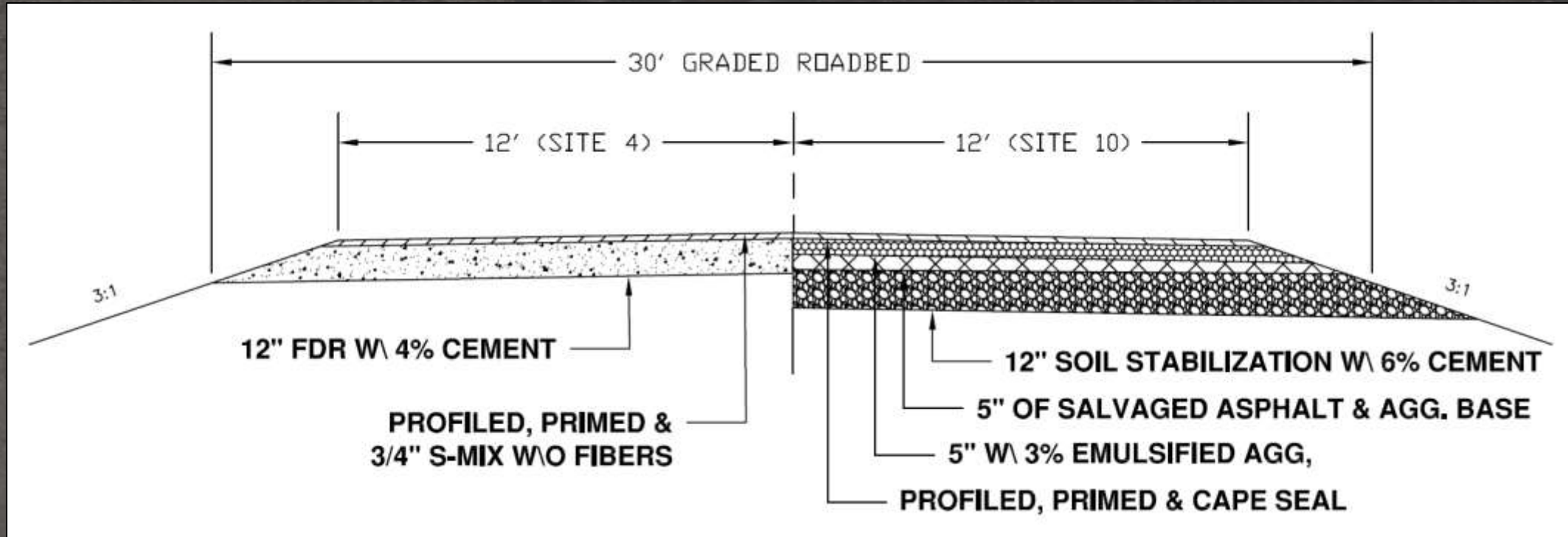
Test Sections 3 & 11



- MAT LOOKS GOOD – NO FINES LOSS
- TRANSVERSE & LONGITUDINAL CRACKING

- MAT LOOKS GOOD – NO FINES LOSS
- TRANSVERSE & LONGITUDINAL CRACKING

Test Sections 4 & 10



- MAT LOOKS GOOD
- THERMO CRACKING
- COUNTY FORCES SCRATCHED SURFACE WITH CARBIDE POINTS

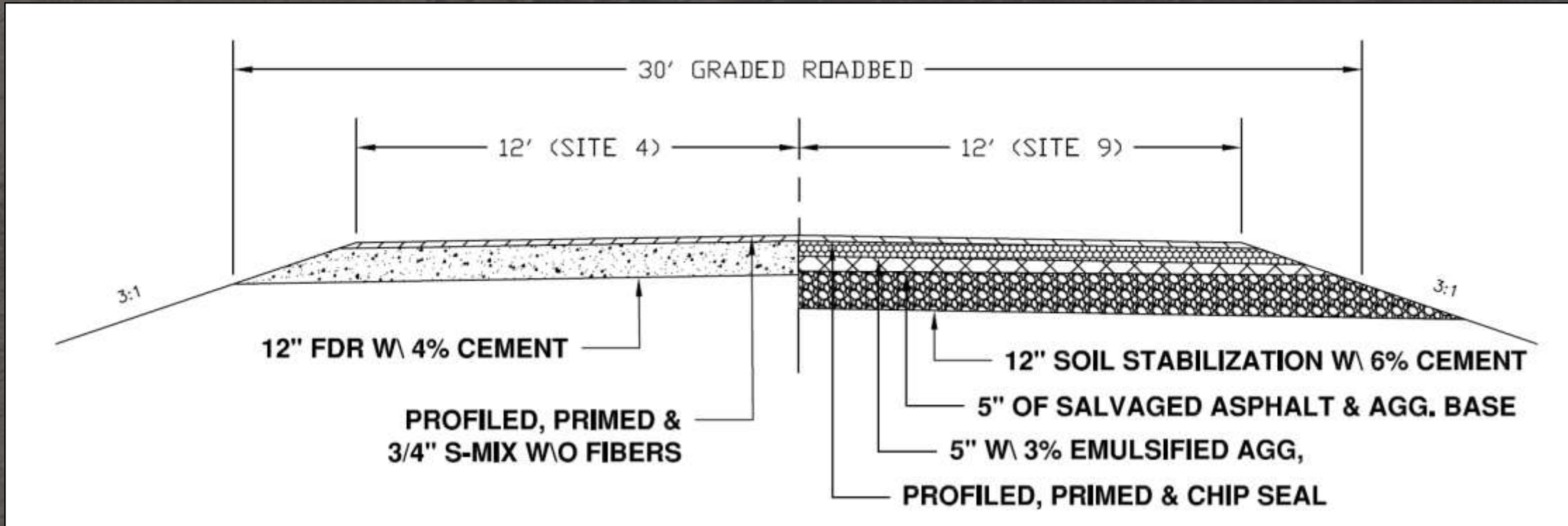
- MAT LOOKS GOOD
- THERMO CRACKING
- MINIMAL AGGERGATE LOSS

Test Section 4 & 10



- COUNTY FORCES SCRATCHED SURFACE WITH CARBIDE POINTS

Test Section 4 & 9



- MAT LOOKS GOOD
- THERMO CRACKING
- COUNTY FORCES SCRATCHED SURFACE WITH CARBIDE POINTS

- LOOSING CHIPS
- MILLED SURFACE ROUGHER



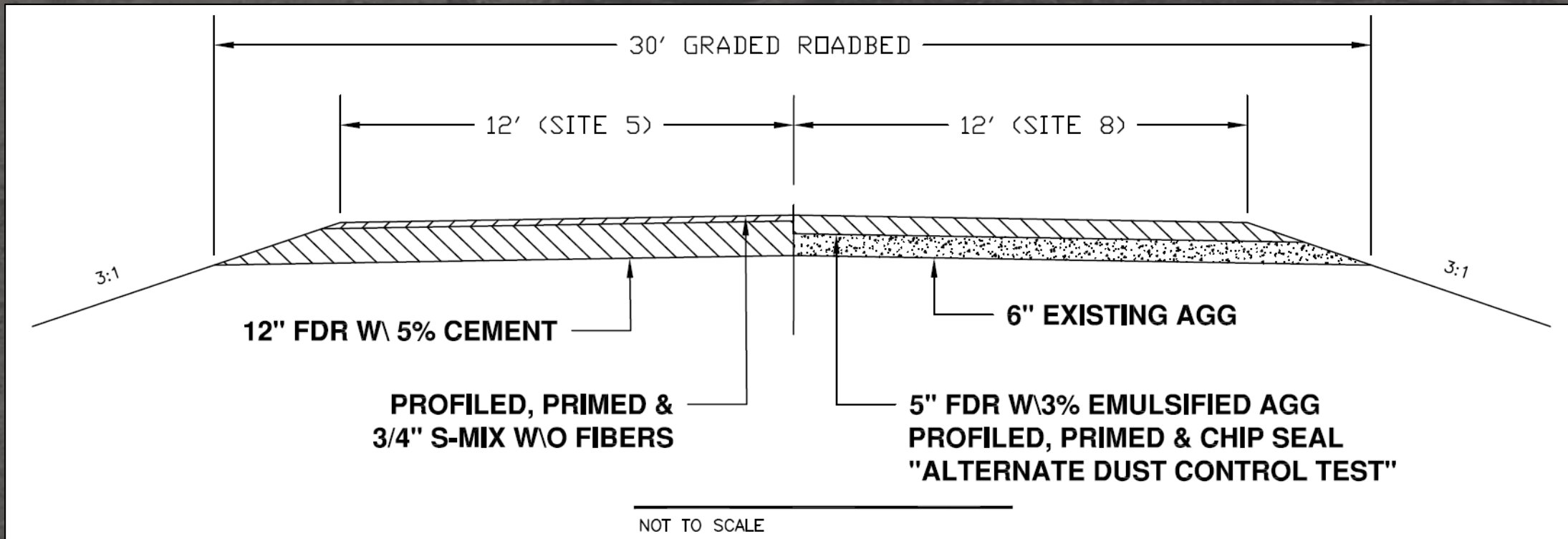
Responsible Renewal. Reliable Results.

Test Sections 4 & 9



- LOOSING CHIPS
- MILLED SURFACE ROUGHER

Test Sections 5 & 8



- MAT LOOKS GOOD
- THERMO CRACKING
- COUNTY FORCES SCRATCHED SURFACE WITH CARBIDE POINTS

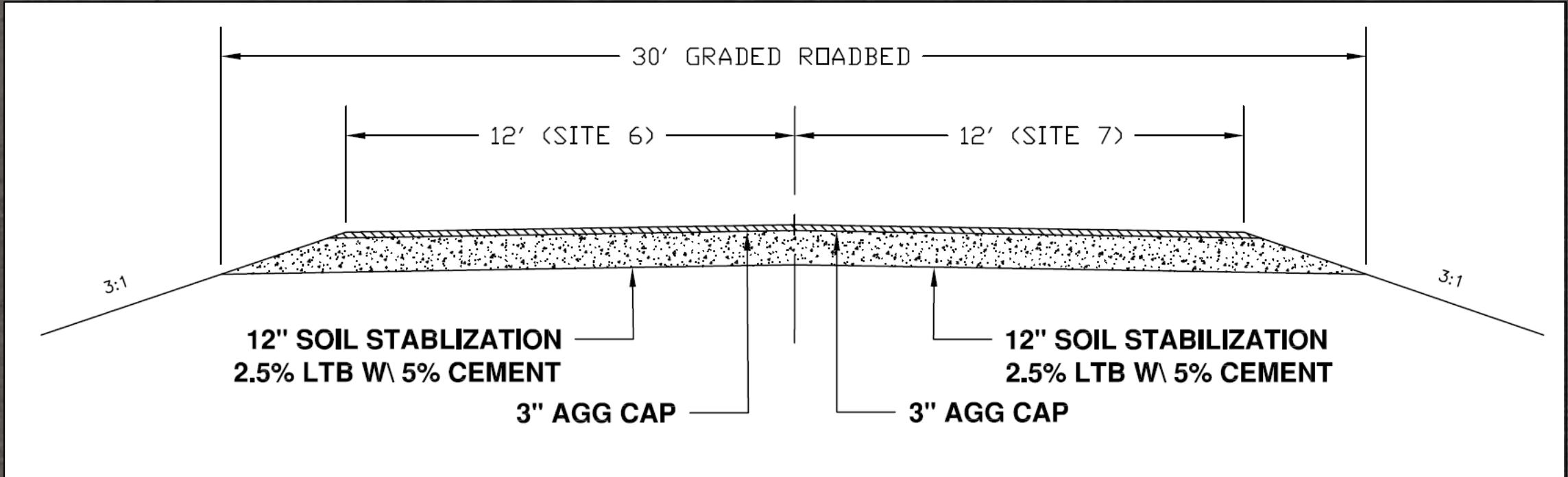
- RAVELING BETWEEN WHEEL TRACKS
- COUNTY FORCES SCRATCHED SURFACE WITH CARBIDE POINTS

Test Section 5 & 8



- RAVELING BETWEEN WHEEL TRACKS
- COUNTY FORCES SCRATCHED SURFACE WITH CARBIDE POINTS

Test Sections 6 & 7

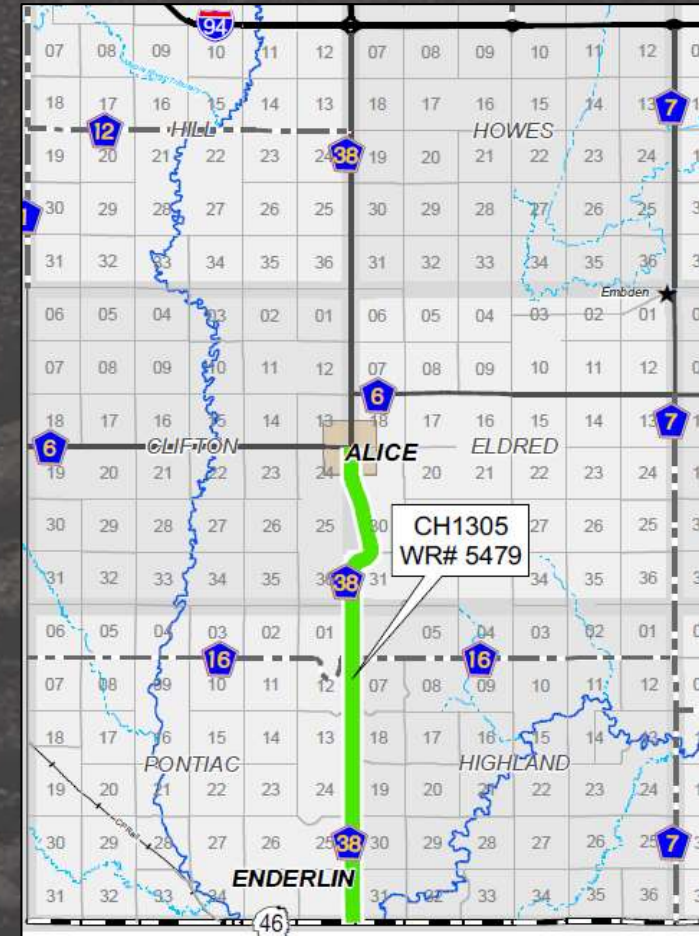
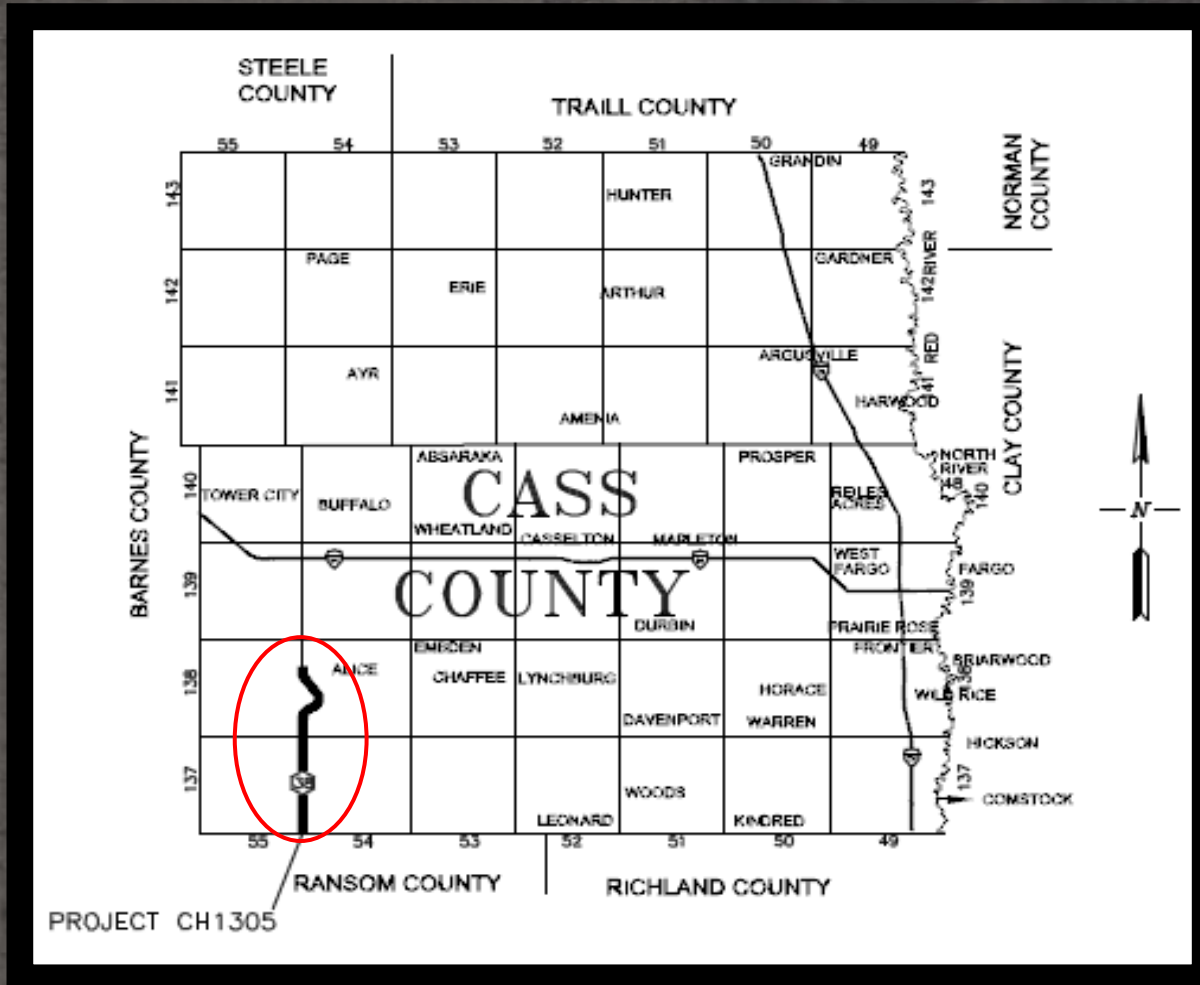


- SUBGRADE SHOWING NO SOFT SPOTS



Responsible Renewal. Reliable Results.

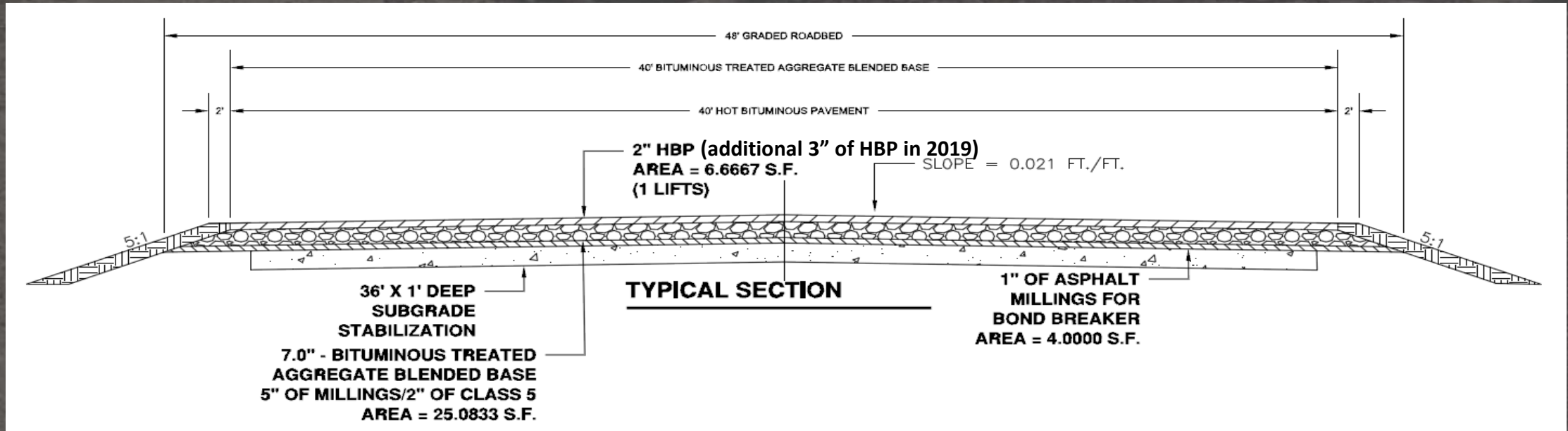
Cass County Hwy 38 Regrade Project



Cass County Road 38 Regrade Project

- Consulted with other agencies that have done similar sections.
- With a limited budget on a large project we had to design the new roadway for under 1 million a mile.
- By integrating the material already on the project we found that we could save large amounts of money by doing this type of section without giving up the strength.
- 9 Mile Regrade Project (ultimate build of 17 miles with north 8 miles in 2018)
 - 9-12” of existing asphalt – All to be milled off
 - Road being widened from 24’ top to 36’ top
 - Cutting down Road 1’-3’ through hill sections
 - 36’ X 12” wide cement treated subgrade
 - Bring back 6” of millings
 - Haul in 2” of Gravel
 - Blend top 7” of material with Engineered Emulsion
 - Top blended material with 5” of Asphalt Pavement

Cass County Hwy 38 Regrade Project



- **New Design:**

- Cement Treated Subgrade Structural # per inch = 0.14, total 1.68
- Blended Base Structural # per inch = 0.25, total 1.75
- HBP Structural # per inch = 0.4, total 0.8
- Total Structural # = 4.23, with additional 3" HBP will be 5.43

- **Old Design:**

- 12" of aggregate and 7" of HBP
- Gravel Structural # per inch = 0.1, total 1.2
- HBP Structural # per inch = 0.4, total 2.8
- Total Structural # = 4.0

Strength and Cost

- Increases Strength by 35%: 5.43 vs 4.0
- Reduces Cost by 30%: \$970k vs \$1.4 million

Cass County Hwy 38 Reconstruction Project

- Engineer's Estimate: \$9.1 million
- Low Bid: \$7.0 million
- Cost per Mile: \$777,000/mile
- With 3" Overlay in 2019, total cost: \$981,000/mile

CASS COUNTY HIGHWAY DEPARTMENT ABSTRACT OF BIDS - LETTING DATE: MARCH 16, 2017 @ 1:00 PM							ENGINEER'S ESTIMATE		GLADEN CONSTRUCTION 40739 HWY 71 N LAPORTE, MN 56461			
PROJECT NO. CH1305 GRADING, TREATED BASE, BITUMINOUS SURFACING & INCIDENTALS CASS HIGHWAY 38 FROM STATE HIGHWAY 48 TO CASS COUNTY HIGHWAY 6 WEST							ESTIMATED QUANTITIES		UNIT COST		TOTAL	
ITEM NO.	SPEC	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL		
1	103	CONTRACT BOND	L SUM	1	\$20,000.00	\$20,000.00	\$39,000.00	\$39,000.00				
2	107	HAUL/DETOUR ROAD MAINTENANCE	HR	180	\$180.00	\$22,500.00	\$145.00	\$21,750.00				
3	201	CLEARING AND GRUBBING	L SUM	1	\$5,000.00	\$5,000.00	\$1,000.00	\$1,000.00				
4	201	REMOVAL OF TREES	ACRE	1.07	\$20,000.00	\$21,400.00	\$8,000.00	\$8,560.00				
5	202	REMOVAL OF ASPHALT PAVEMENT	SY	5,000	\$7.00	\$35,000.00	\$2.50	\$12,500.00				
6	202	REMOVAL OF CULVERTS - ALL TYPES AND SIZES	LF	2,591	\$10.00	\$25,910.00	\$11.50	\$29,786.50				
7	203	COMMON EXCAVATION - TYPE B	CY	184,772	\$5.00	\$923,860.00	\$2.48	\$458,634.56				
8	203	TOPSOIL	CY	109,956	\$5.00	\$549,780.00	\$2.30	\$252,898.80				
9	203	TOPSOIL - IMPORTED	CY	9,000	\$15.00	\$135,000.00	\$0.10	\$900.00				
10	203	BORROW - EXCAVATION SITE A	CY	17,000	\$7.00	\$119,000.00	\$5.88	\$99,960.00				
11	203	BORROW - EXCAVATION SITE B	CY	27,820	\$10.00	\$278,200.00	\$5.07	\$141,047.40				
12	203	PLACEMENT OF MILLINGS	CY	38,853	\$5.00	\$194,265.00	\$4.31	\$168,564.43				
13	210	SELECT BACKFILL	TON	2,990	\$20.00	\$59,800.00	\$20.75	\$62,042.50				
14	216	WATER	M GAL	1,000	\$25.00	\$25,000.00	\$18.00	\$18,000.00				
15	234	CEMENT STABILIZED SUBGRADE	SY	181,500	\$2.00	\$363,000.00	\$1.13	\$205,095.00				
16	234	STABILIZED BLENDED BASE	SY	201,867	\$1.25	\$252,333.75	\$0.74	\$149,233.88				
17	251	SEEDING CLASS II	ACRE	127.19	\$1,000.00	\$127,190.00	\$646.00	\$82,037.86				
18	251	TEMPORARY COVER CROP	NLE	10.19	\$1,500.00	\$15,285.00	\$2,500.00	\$25,475.00				
19	253	STRAW MULCH	ACRE	117.18	\$280.00	\$41,016.00	\$285.00	\$33,411.06				
20	253	HYDRAULIC MULCH	ACRE	10.00	\$2,000.00	\$20,000.00	\$1,250.00	\$12,500.00				
21	256	EROSION CONTROL BLANKET TYPE 1	SY	1,800	\$2.00	\$3,600.00	\$1.05	\$1,890.00				
22	256	RIPRAP GRADE II	CY	611	\$100.00	\$61,100.00	\$72.80	\$44,356.80				
23	256	RIPRAP - SALVAGED	SY	5,889	\$50.00	\$294,450.00	\$12.00	\$68,288.00				
24	261	TEMPORARY FIBER ROLLS 12IN	LF	9,000	\$4.00	\$36,000.00	\$2.25	\$21,000.00				
25	261	FIBER ROLL 12IN	LF	6,500	\$3.00	\$19,500.00	\$2.25	\$14,625.00				
26	262	FLOATING SILT CURTAIN	LF	3,600	\$15.00	\$54,000.00	\$11.00	\$39,600.00				
27	302	AGGREGATE BASE COURSE CL 5	TON	29,648	\$22.00	\$652,256.00	\$13.30	\$394,318.40				
28	302	REMOVE AND RELAY AGGREGATE BASE COURSE	CY	792	\$15.00	\$11,880.00	\$10.50	\$8,316.00				
29	302	AGGREGATE SURFACE COURSE - HAUL/DETOUR ROAD REPAIR	TON	5,321	\$15.00	\$79,815.00	\$13.30	\$70,769.30				
30	408	SAWING BITUMINOUS PAVEMENT - FULL DEPTH	LF	200	\$15.00	\$3,000.00	\$5.00	\$1,000.00				
31	411	MILLING PAVEMENT SURFACE - 1 INCH	SY	109,917	\$1.00	\$109,917.00	\$0.70	\$76,941.90				
32	411	MILLING PAVEMENT SURFACE - FULL DEPTH	SY	131,222	\$5.00	\$656,110.00	\$2.55	\$333,717.10				
33	430	RAP - SUPERPAVE FAA 42	TON	25,957	\$55.00	\$1,428,635.00	\$55.00	\$1,428,635.00				
34	430	BITUMINOUS MATERIAL FOR MIXTURE	TON	2,821	\$40.00	\$1,128,400.00	\$40.00	\$1,128,400.00				
35	430	CORING BITUMINOUS SURFACING	EA	100	\$25.00	\$2,500.00	\$8.00	\$800.00				
36	702	MOBILIZATION	L SUM	1	\$200,000.00	\$200,000.00	\$242,000.00	\$242,000.00				
37	704	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	112	\$100.00	\$11,200.00	\$25.00	\$2,800.00				
38	704	TRAFFIC CONTROL	L SUM	1	\$23,200.00	\$23,200.00	\$10,000.00	\$10,000.00				
39	706	BITUMINOUS LABORATORY	L SUM	1	\$5,000.00	\$5,000.00	\$7,000.00	\$7,000.00				
40	706	CONTRACTORS LABORATORY	L SUM	1	\$5,000.00	\$5,000.00	\$7,000.00	\$7,000.00				
41	709	GEOTEXTILE FABRIC - TYPE R1	SY	8,374	\$3.00	\$25,122.00	\$1.85	\$13,811.10				
42	714	PIPE CORR STEEL 0.075IN 24IN	LF	2,089	\$30.00	\$62,670.00	\$38.50	\$79,541.00				
43	714	PIPE CONC REINF 24IN	LF	1,722	\$130.00	\$223,860.00	\$48.75	\$83,967.50				
44	714	PIPE CONC REINF 30IN	LF	96	\$150.00	\$14,400.00	\$44.80	\$6,636.80				
45	714	END SECT CORR STEEL 0.064IN 24IN	EA	81	\$175.00	\$14,175.00	\$25.00	\$2,025.00				
46	714	END SECT CORR STEEL 0.064IN 24IN	EA	42	\$1,200.00	\$50,400.00	\$638.30	\$22,008.60				
47	714	END SECT CONC REINF 30IN	EA	2	\$1,500.00	\$3,000.00	\$867.40	\$1,734.80				
48	762	SHORT TERM 4 IN BROKEN LINE-PNT TAPE OR RSD MRK	LF	37,912	\$0.15	\$5,686.80	\$0.04	\$1,504.48				
49	762	SHORT TERM 4 IN LINE NPZ - PN TR OR RS MRK	LF	123,789	\$0.15	\$18,568.35	\$0.04	\$4,951.56				
50	762	PVMT MK PAINTED 4IN LINE	LF	157,623	\$0.10	\$15,762.30	\$0.06	\$9,457.38				
51	804	PORTLAND CEMENT	TON	5,881	\$160.00	\$940,960.00	\$168.00	\$988,008.00				
52	930	CG/GA TESTING	L SUM	1	\$25,000.00	\$25,000.00	\$35,000.00	\$35,000.00				
53	930	CONSTRUCTION SURVEYING	L SUM	1	\$10,000.00	\$10,000.00	\$15,000.00	\$15,000.00				
54	930	CALCIUM CHLORIDE	GAL	44,362	\$1.25	\$55,452.50	\$1.25	\$55,452.50				
					TOTAL =	\$9,108,314.35	TOTAL =	\$6,997,503.33				



Responsible Renewal. Reliable Results.

Cass County Hwy 38 Regrade Project



Cass County Hwy 38 Regrade Project



Cass County Hwy 38 Regrade Project



Cass County Hwy 38 Regrade Project



- NUCLEAR GAGE DENSITY TESTING OF THE SUBGRADE
- DCP TESTING OF THE SUBGRADE & BITUMINOUS BLENDED TREATED BASE – 7 DAY

Cass County Hwy 38 Regrade Project



Gravel Stabilization & Cement Treated Base



- 2" CLASS 13 MODIFIED
- 2" ASPHALT MILLINGS
- TEAM BASE ONE
- CALCIUM CHLORIDE

- APPROXIMATELY 40 MILES OF GRAVEL ROADS WITH CEMENT

Future Testing and Data

- We will be conducting FWD testing this summer on our test road and will continue to do annual testing for the next 5 years.
- More information can on the Test Sections can be found at: <https://www.casscountynd.gov>