Two New Pavement Cells at MnROAD using Mesabi Select Aggregate: What & Why

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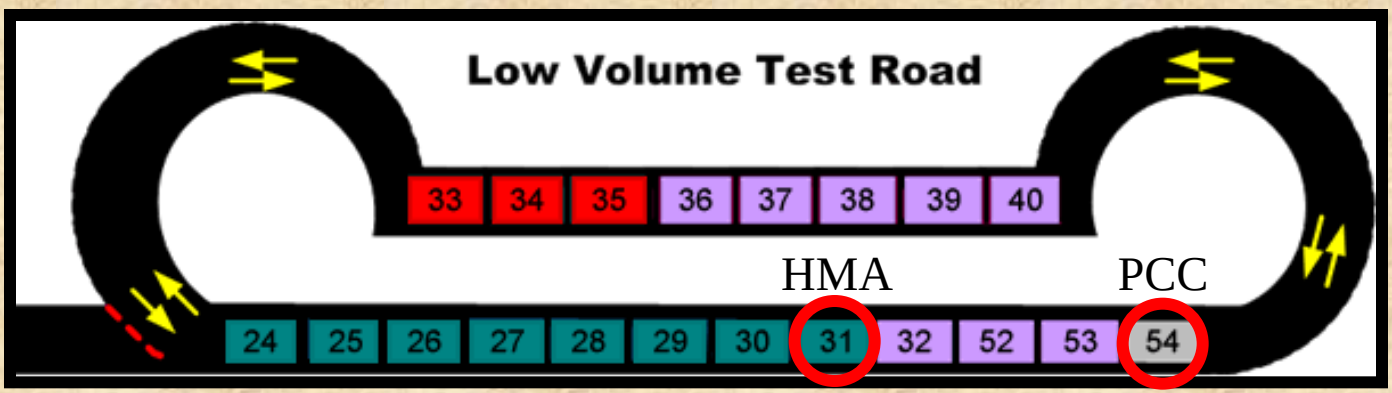
Photos provided by MnDOT, United Taconite, and Edward Kraemer & Sons

Minnesota Road Research Section



Minerals Coordinating Committee: Project Proposal

- *Interest in pursuing this business development project – perhaps in the next 5 year timeframe- & a need to reduce the risk to the business investment.*
- *The request was to determine if the taconite coarse aggregate would be approved by MnDOT and designated as a Class A aggregate, thereby helping to define the market potential.*

Acknowledgements: A Public – Private Partnership

Minerals Coordinating Committee sponsored and managed the project and provided funds.

Business Partners contributed materials, expertise, and funds.

MnDOT contributed expertise and funds.

Acknowledgements

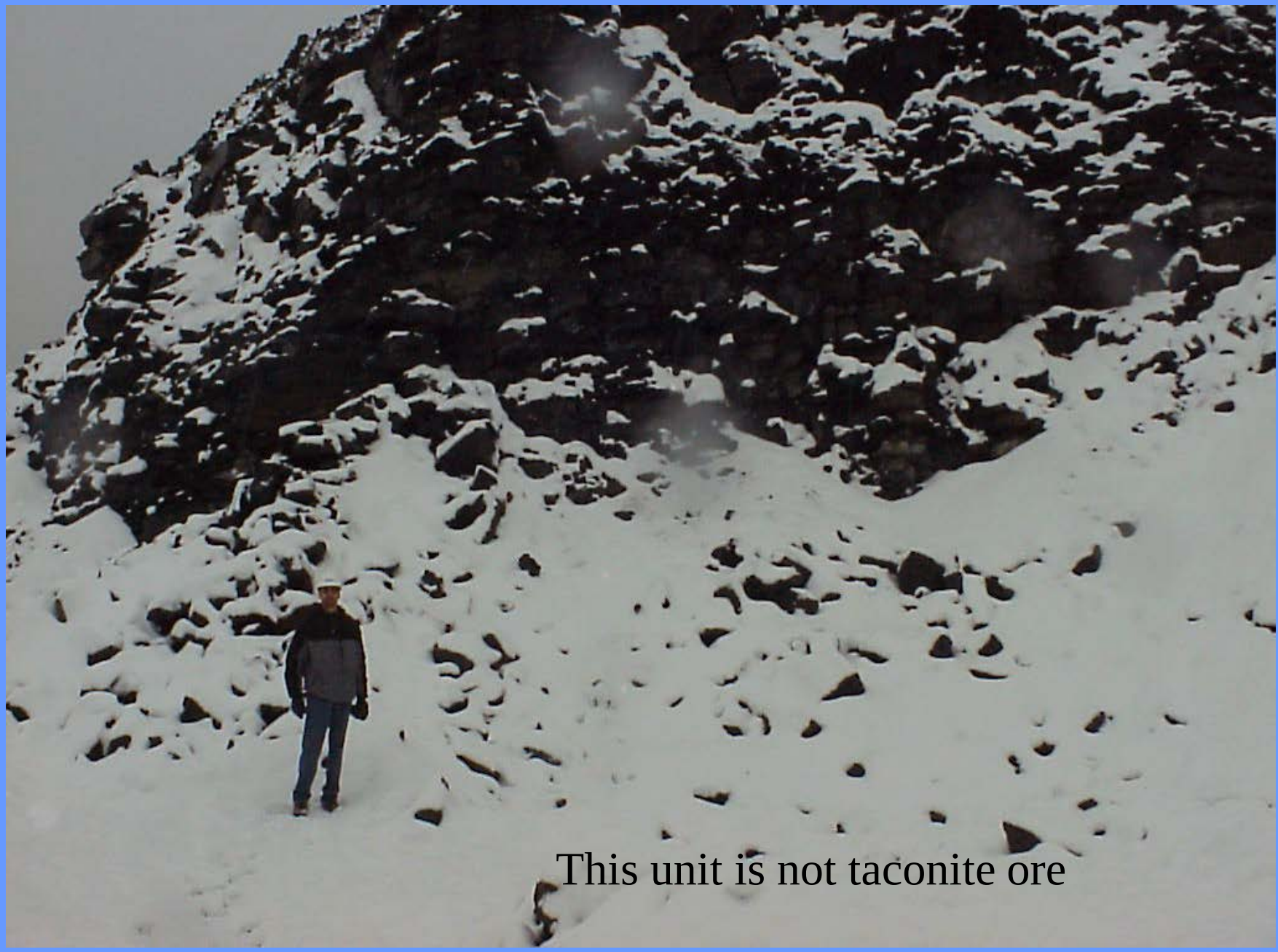
- Department of Transportation
- Business partners included:

  Edward Kraemer and Sons, Inc, who brought the proposal to the MCC; United Taconite, Ulland Brothers, Inc., CCI-Cliffs Erie, Commercial Asphalt (Tiller Corporation), and Bauerly Companies, Inc.

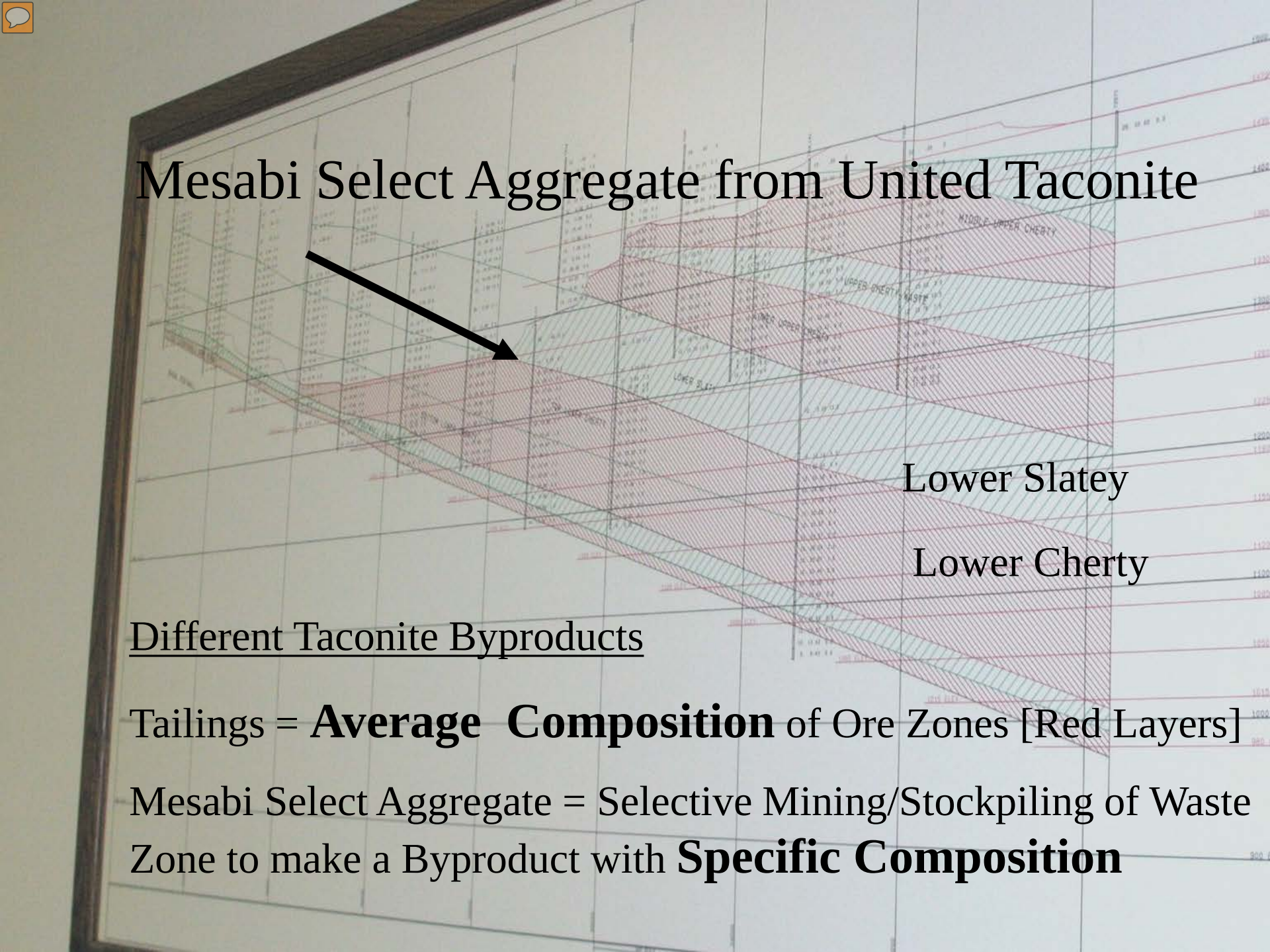
- The Iron Mining Association, Hibbing Taconite & Lakehead Constructors volunteered their services.

- Iron Range Resources, Natural Resources Research Institute, & Department of Natural Resources, and the Minerals Coordinating Committee

Mining at United Taconite


This unit is not taconite ore

Mesabi Select Aggregate from United Taconite



Different Taconite Byproducts

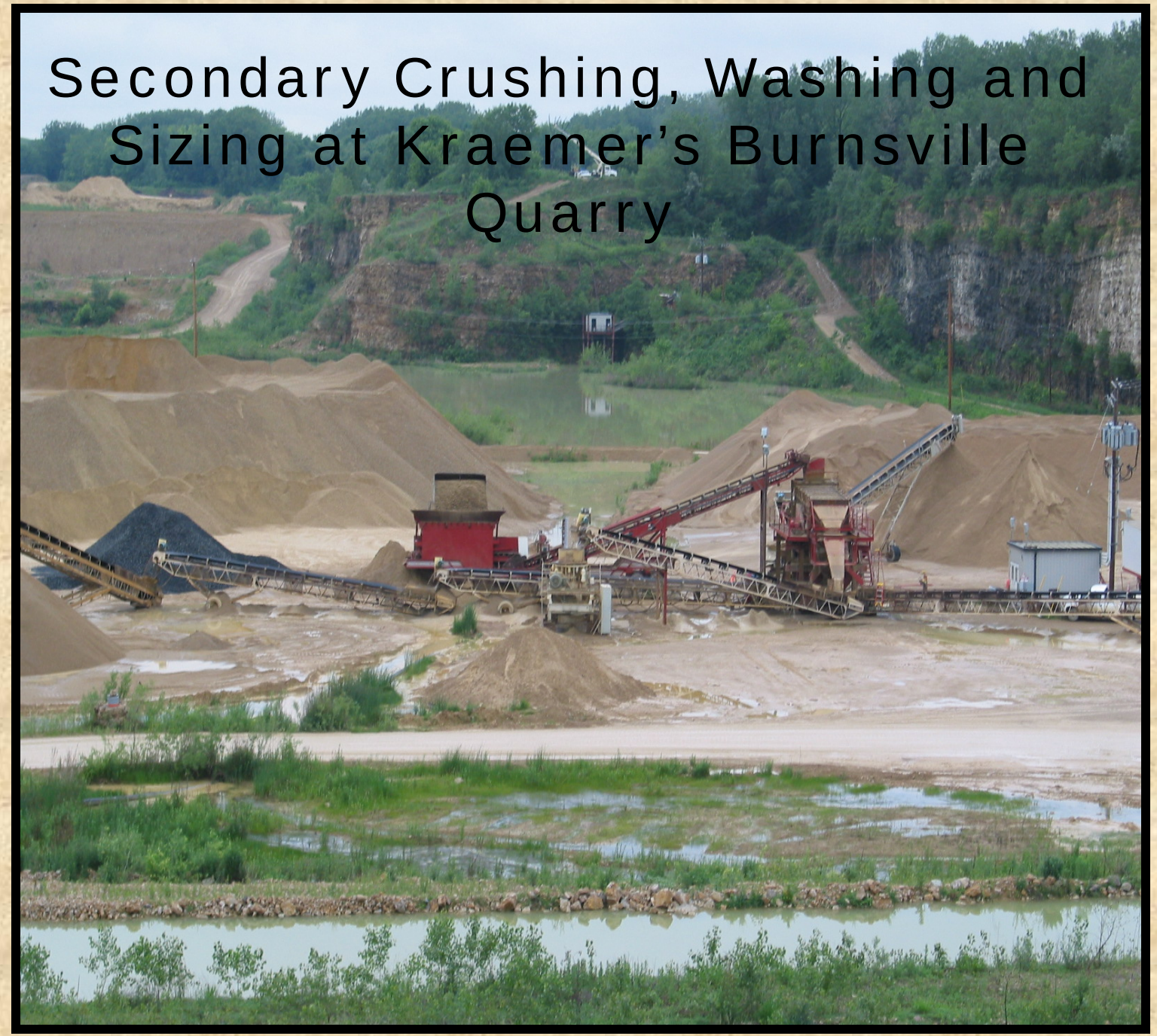
Tailings = **Average Composition** of Ore Zones [Red Layers]

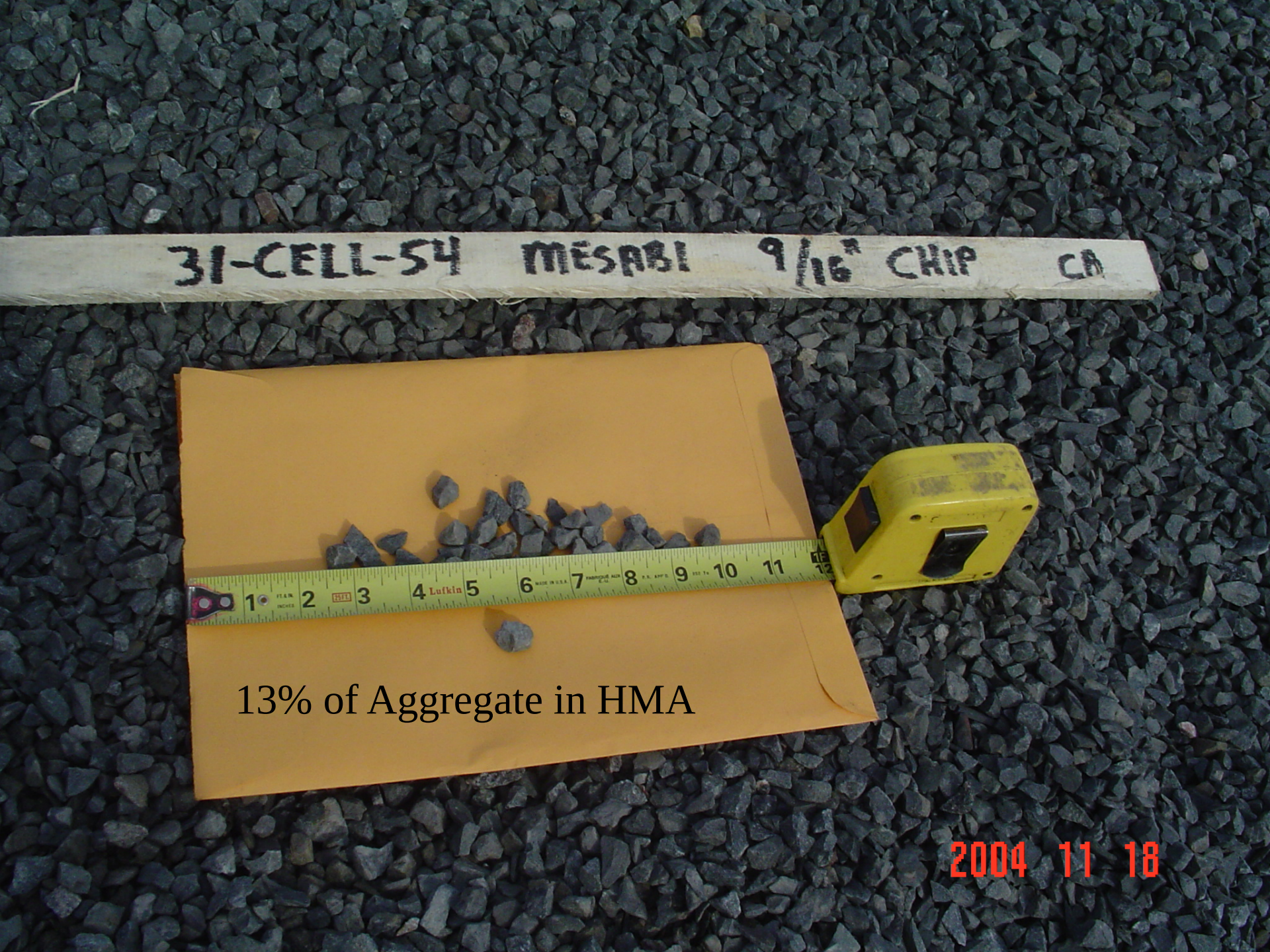
Mesabi Select Aggregate = Selective Mining/Stockpiling of Waste Zone to make a Byproduct with **Specific Composition**


Primary Crushing by
Ulland Bros., Inc.

Coarse Product from Primary Crusher

Secondary Crushing, Washing and Sizing at Kraemer's Burnsville Quarry




31-CELL-54 MESABI 9/16" CHIP CA
13% of Aggregate in HMA
2004 11 18

Mesabi Select Aggregate in Stockpiles by Size Fraction at MnROAD


CELL-31 MESABI SAND FA
22% of Aggregate in HMA
2004 11 18


CELL-31 MESABI 3/4" MINUS
45% of Aggregate in HMA
2004 11 18


CELL-54 PCC SAND
20% of Aggregate in HMA
2004 11 18

Pre-Construction Condition

Asphalt Milling

Base Compaction

Sensor Installation

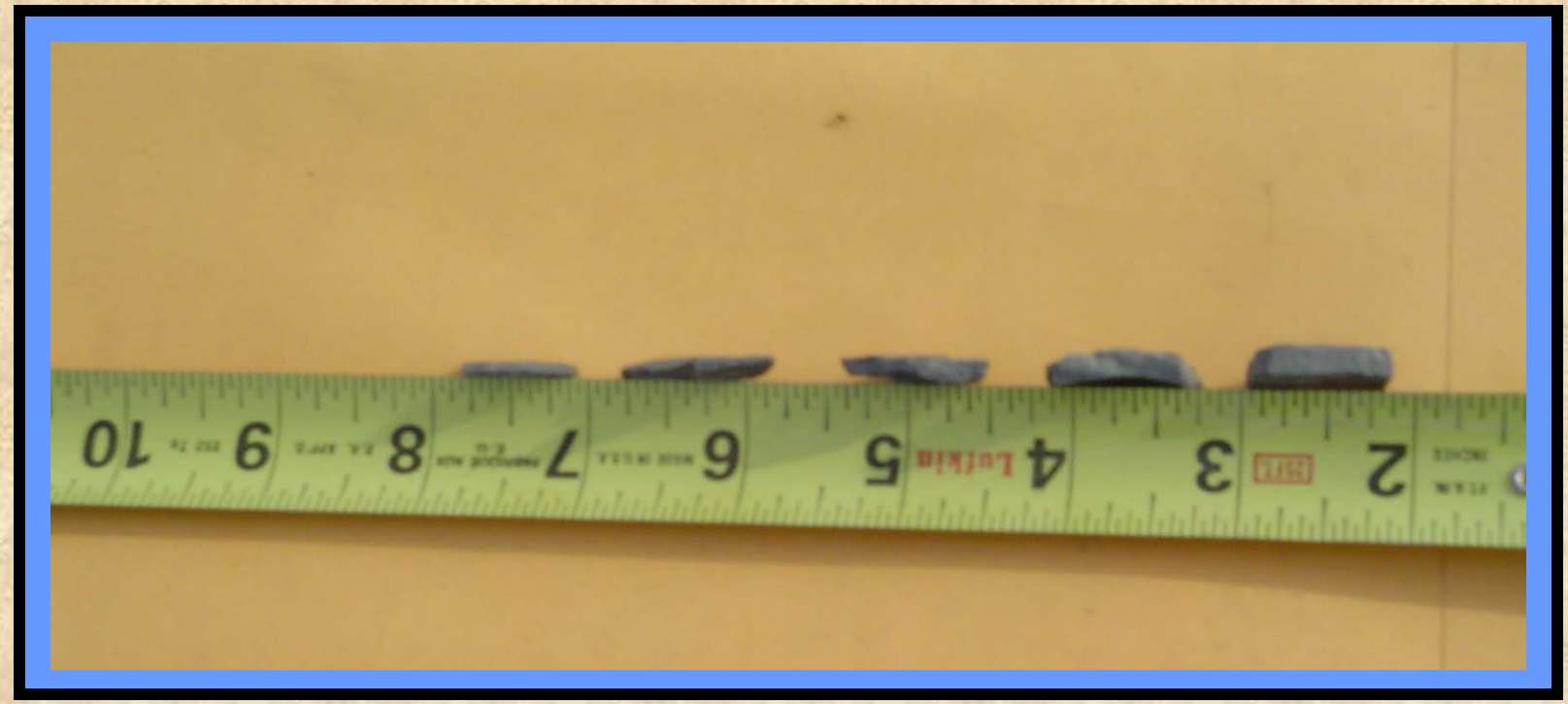
Paving

Paving

MnROAD Cell 31 with Mesabi Select Aggregate

What did we learn?

Special attention must be paid to crushing the rock. "Flat and elongate particles" are deleterious to asphalt pavement, and there is a specification minimum that must be met.



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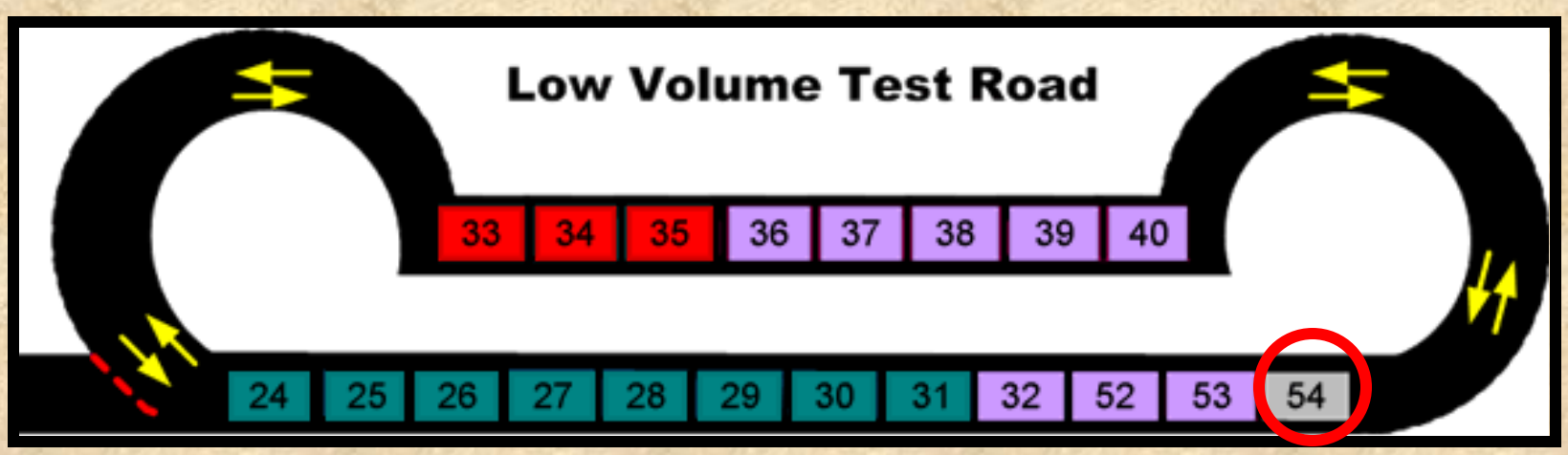
A 200 foot concrete pavement cell was installed at Cell 54



Mesabi Select aggregate was used to make concrete.

Compared to the asphalt, different size fractions were used.


Aggregate in PCC
36%
32%
32%
ELK RIVER SAND
cell-31 HMA
cell-54 PCC
2004
20% HMA
MESABI 9/16" CHIP
cell-31 HMA
cell-54 PCC
2004
MESABI 3/4" +
cell-54 PCC
2004
2004 11 18


BAUERLY
BAUERLY
BUILDING
BETTER
COMMUNITIES
BAUERLY
BUILDING
BETTER
COMMUNITIES
2004 11 18

Placing the Pavement


PCI


Aggregate in PCC
36%
32%
32%
2004 11 18

MnROAD Cell 54 concrete pavement has Mesabi Select Aggregate

What have we heard during the last year?

- Performance testing by MnDOT will likely influence the evaluation by other states DOT's & speed up communication throughout MN via MnROAD and the LRRB.

- The topic of long-term warranty of pavements may be an opportunity to help market this material.

- Companies that make asphalt and ready-mix concrete have specific questions relative to optimizing the overall value of their products and services.

- Paving Companies for both asphalt and concrete may want to try to do tests to optimize to attain a high level of quality assurance/quality control.

- Questions are asked about the economics of delivery to distant markets.

MnROAD Cell 31 asphalt pavement with Mesabi Select Aggregate

Summary

- Asphalt and concrete pavement cells containing Mesabi Select Aggregate are in place at MnROAD
- MnDOT engineers played pivotal roles to get this done
- Future performance tests and the experience gained by MnDOT staff with this project are key elements on the path to the determination of …….

Will this material be designated Class A aggregate by MnDOT?