# Proposal for MPCA Solid Waste Demonstration/Research Project for a Partnership between MnROAD and Bloom Consultants, LLC

# MnROAD Field Investigation of Highway Base Material Stabilized With High Carbon Fly Ash, Mn/DOT Partnership Agreement #90701-P


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**SOLID WASTE DEMONSTRATION/RESEARCH PROJECT**

This proposal is requesting a permit from the Minnesota Pollution Control Agency (MPCA) to allow the use of high carbon fly ash in road base stabilization under asphalt wearing course at the Minnesota Road Research Facility (MnROAD). The MnROAD facility is located in central Minnesota adjacent to Interstate 94 between Albertville and Monticello, Minnesota. Placed northwest of the Minneapolis/St. Paul metropolitan area, it is a cold-region testing laboratory unique in concept, design, and function. MnROAD resides approximately 2.5 miles south of the Mississippi River. Agriculture still dominates the business activities of the area, however urban expansion has brought industrialization into the area.

*Geologic description of MnROAD site*

The MnROAD site lies on surficial deposits associated with the Des Moines Lobe. In the top 40-50 feet the deposit is a gray, calcareous till with a texture of silty to clayey loam. Low topographic areas are typically filled with shallow organic deposits and/or ponds. Groundwater levels in the till vary considerably and can best be described as perched on low permeability soils. Below 50± feet lies a fairly thick layer of granular material (sand to sand & gravel) that is likely part of the Des Moines Lobe outwash that surfaces northwest of the site (near Monticello). Water levels in this layer were typically found below the contact with the overlying till, and thus it would likely act as an unconfined aquifer. Bedrock beneath the site is typically 200± feet below the surface. The bedrock is Cambrian sandstone (Ironton through Mount Simon) that is part of the extreme NW edge of the Twin Cities Basin.

The following maps show the bedrock and surficial geology of the MnROAD site.

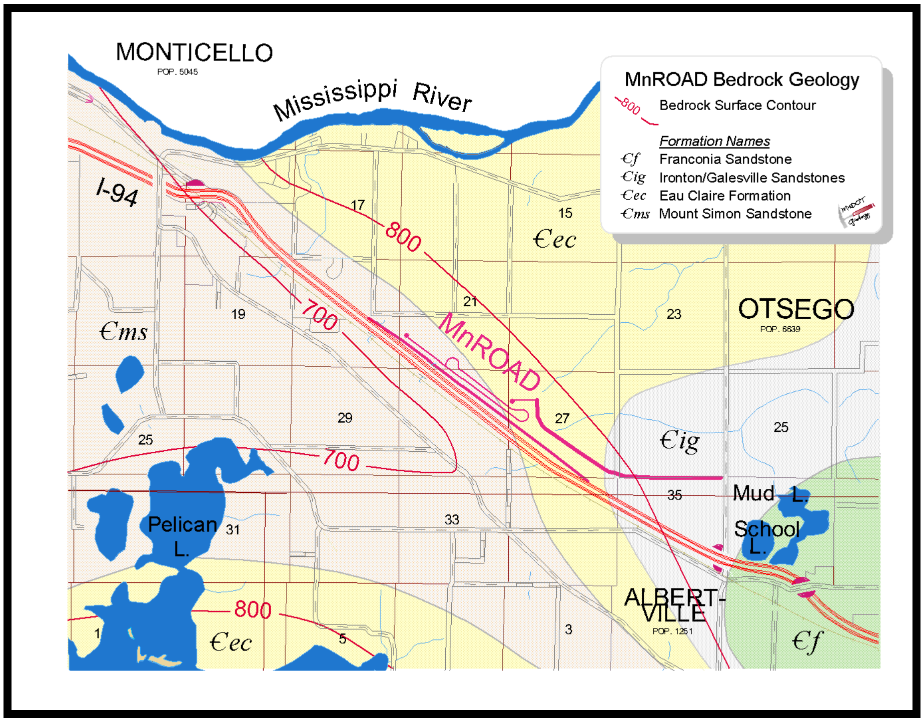



Figure 1 Map of MnROAD Bedrock Geology

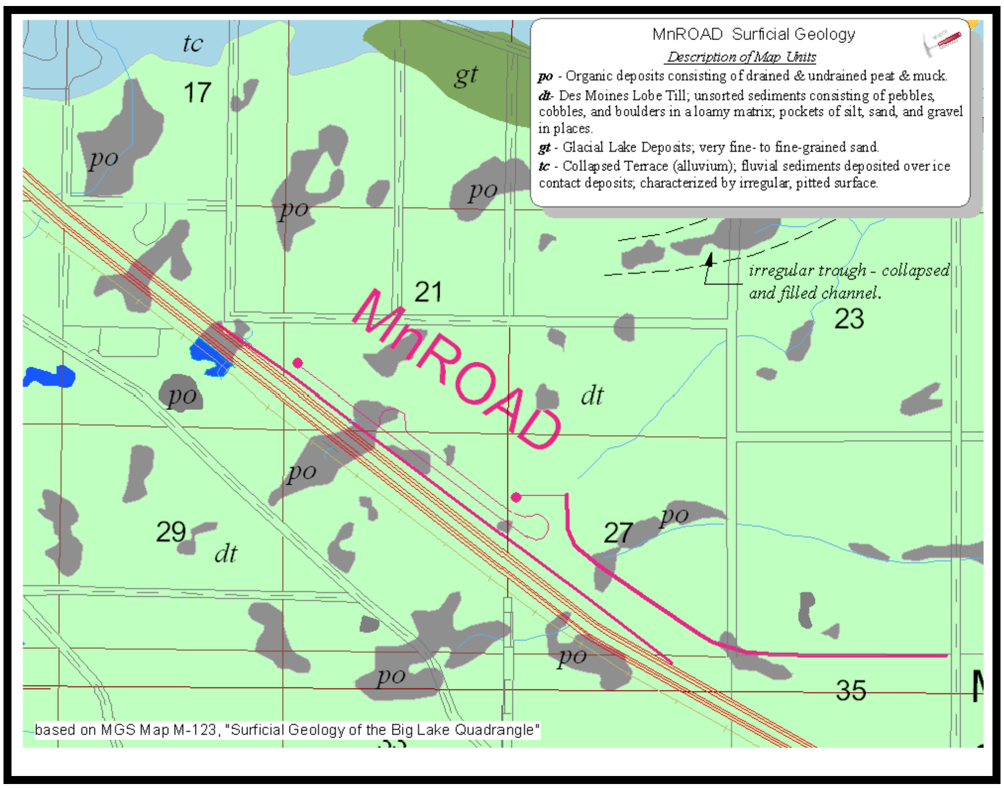



Figure 2 Map of MnROAD Surficial Geology

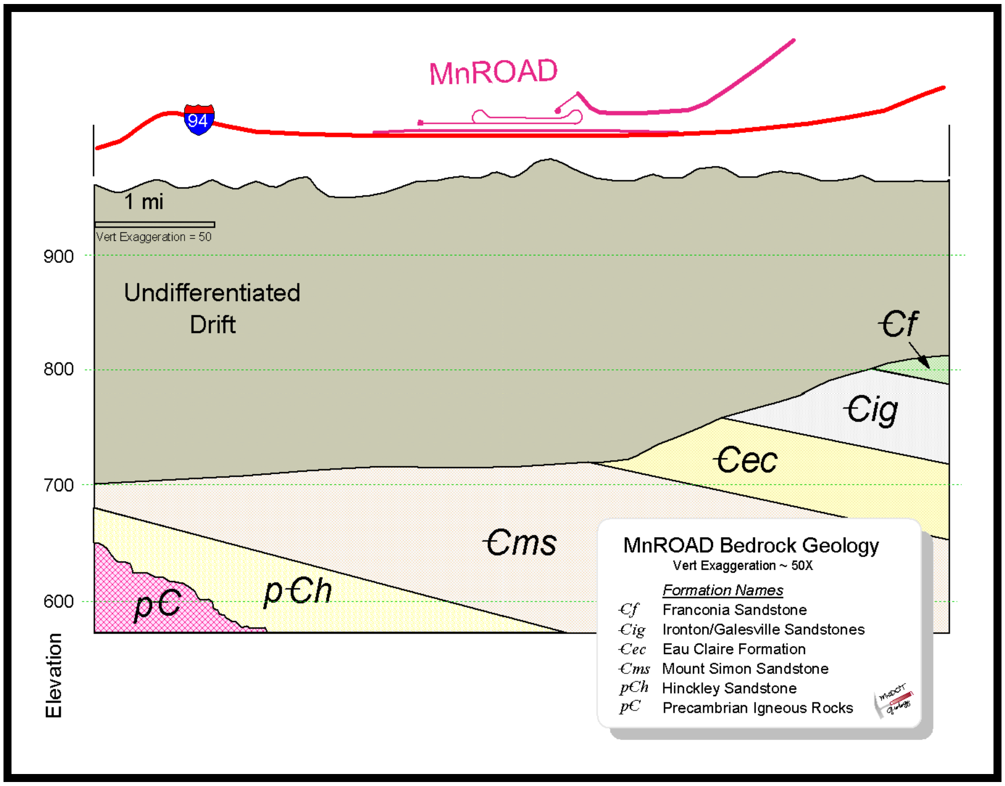



Figure 3 Map of MnROAD Bedrock Geology

## I. Detailed description of waste, generating process, and process to be evaluated.

High carbon fly ash is one of the by-products of burning coal in power generating facilities. Fly ash is frequently described as being composed of glassy, spherical particles that are primarily the size of silt. Combustion of bituminous or anthracite coal produces Class F (low calcium) fly ash while combustion of lignite or sub-bituminous coal produces Class C (high calcium) fly ash. Class F fly ash is pozzolanic while Class C fly ash is both self-cementitious and pozzolanic. According to ASTM C-618, the upper limit of loss on ignition (LOI) of both Class C and F fly ash is 6%. Fly ash within Mn/DOT specification is frequently included in concrete mixtures to improve durability.

Due to the increasingly stringent environmental regulations promulgated by the US EPA and/or local authorities the power generation industry has taken measures to reduce the emission of NOx and SOx from burners fueled with coal. Low-NOx burners reduce emissions by changing the combustion characteristics of coal fueled boilers. Fly ash produced from power plants operated to reduce NOx emissions will produce ash that does not meet Mn/DOT specification. The resulting cementitious high carbon fly ash (CHCFA) has self-hardening properties in the presence of moisture, such as Class C fly ash, but cannot be used in concrete since the high carbon content absorbs air in the concrete and affects durability.

The material under consideration will be produced by the combustion of coal at the Riverside electric power plant. Riverside is the oldest coal-fired power plant in the Xcel Energy power generation system. When it was built in 1911, the plant was equiped with eight generating units with a capacity to generate 512 megawatts. Over the life of the plant, all but three of the original boilers have been retired. The remaining unit consist of Units 6 & 7 (collectively referred to as Unit #7) which produce a combined fly ash and the 231 megawatt Unit #8. Unit 8 fly ash is collected by electrostatic precipitator. The production of fly ash at Riverside Units 6 & 7 and Riverside 8 prior to 2006 has been well characterized by Xcel Energy and is well known to MPCA. Fly ash from the Riverside 8 plant is Class C high calcium high carbon cementitious ash but slightly off specification for use as a construction material in Mn/DOT construction projects. The higher than usual carbon content resulting from the addition of petroleum coke to the furnace feed stock for increased heat content results in a carbon content slightly higher than the Mn/DOT specified 5%.

The Riverside plant is currently planned to undergo conversion to burn natural gas through re-construction of certain plant equipment. Since the power generation will be from a combined cycle turbine design that burns natural gas, no fly ash will be produced when the plant is converted. For this reason, the fly ash to be installed at the MnROAD facility will have been fully characterized prior to plant closure through annual ash characterizations required by MPCA permit. Xcel Energy may be willing to share their fly ash characterization data with this study group. Fly ash installation at MnROAD will not occur unless MPCA has approved of the ash characterization data.

## II. Chemical and physical characterization of Xcel Riverside #8 plant fly ash.

The MPCA Solid Waste Utilization Permit SW-532 specifies five Xcel Energy plants as approved sources of material for waste utilization of which the Riverside #8 plant is one. However, the Riverside plant is not an approved source of material for soil stabilization as stated in the Case Specific Beneficial Use Determination (CSBUD Permit UT0018). The Riverside plant fly ash has, historically, contained levels of mercury that cause concern about exceeding human health risk limits and water quality criteria. Riverside #8 plant fly ash has also contained elevated concentrations of aluminum, arsenic, copper, iron, molybdenum, nickel, and vanadium that exceed Minnesota MPCA Soil Reference Values (SRV) or Soil Leaching Values (SLV).

Table 1 lists the inorganic elements required by the MPCA for total composition analysis for the CSBUD. The CSBUD limits the use of the material to less than a 20% mixture with soil.

On-going ash characterization from each plant also includes Synthetic Precipitation Leach Testing (SPLP) of a monthly ash composite once per year for each approved power plant.

Table 1. Inorganic parameters to be analyzed in fly ash.

| Element | Digestion Method | Analytical Method | Proposed MDL (mg/Kg) |
|---|---|---|---|
| Aluminum | EPA 3050B | EPA 200.7 | 1000 |
| Antimony | EPA 3050B | EPA 204.2 | 0.1 |
| Arsenic | EPA 3050B | EPA 206.2 | 1 |
| Barium | EPA 3050B | EPA 200.7 | 1 |
| Beryllium | EPA 3050B | EPA 200.7 | 0.1 |
| Boron | EPA 3050B | EPA 200.7 | 1 |
| Cadmium | EPA 3050B | EPA 200.7 | 0.1 |
| Calcium | EPA 3050B | EPA 200.7 | 1 |
| Chromium Total | EPA 3050B | EPA 200.7 | 1 |
| Cobalt | EPA 3050B | EPA 200.7 | 1 |
| Copper | EPA 3050B | EPA 200.7 | 1 |
| Iron | EPA 3050B | EPA 200.7 | 1000 |
| Lead | EPA 3050B | EPA 200.7 | 1 |
| Magnesium | EPA 3050B | EPA 200.7 | 1 |
| Manganese | EPA 3050B | EPA 200.7 | 1 |
| Mercury | EPA 3050B | EPA 245.1 | 0.1 |

| | | | |
|---|---|---|---|
| Molybdenum | EPA 3050B | EPA 200.7 | 1 |
| Nickel | EPA 3050B | EPA 200.7 | 1 |
| Potassium | EPA 3050B | EPA 200.7 | 100 |
| Selenium | EPA 3050B | EPA 270.2 | 1 |
| Silver | EPA 3050B | EPA 200.7 | 0.1 |
| Sodium | EPA 3050B | EPA 200.7 | 1000 |
| Strontium | EPA 3050B | EPA 200.7 | 100 |
| Sulfate | | | 1 |
| Sulfur | EPA 3050B | EPA 200.7 | 1000 |
| Thallium | EPA 3050B | EPA 200.7 | 0.01 |
| Tin | EPA 3050B | EPA 200.7 | 0.1 |
| Titanium | EPA 3050B | EPA 200.7 | 100 |
| Vanadium | EPA 3050B | EPA 200.7 | 1 |
| Zinc | EPA 3050B | EPA 200.7 | 1 |

## III. Goals and objectives of the project.

The goal of this research project is to install a road base at the MnROAD facility with fly ash aggregate for long term monitoring of engineering and environmental characteristics. This study will provide a controlled long term evaluation of pavement base materials stabilized with high carbon fly ash. Engineering laboratory testing has shown high carbon fly ash to be a viable stabilizing material. Field construction of road test segments is necessary to validate the structural and environmental performance of high carbon fly ash stabilized bases.

This research opportunity is a portion of Phase II of a fly ash stabilization project performed by Bloom Consultants, LLC and is sponsored by the Department of Energy (DOE). The University of Wisconsin-Madison is a subcontractor of Bloom Consultants and is conducting ongoing evaluations as the project proceeds. Phase II is titled *Use of High Carbon Fly Ash to Stabilize Recycled Pavement as Base Course*, has a two-year time requirement, and will involve the proposed MnROAD test sections to be constructed in 2007. The estimated service life of this proposed MnROAD test cell will be 10 years. It is proposed that the monitoring and evaluation protocol established during DOE Phase II shall be continued through the test cell service life.

## IV. Scope of project including duration, location, and quantity of waste.

The construction of the test cell and control cell will occur during the summer of 2007 at the MnROAD test facility. Monitoring of the leachate from each cell will occur during at various times of the year depending on budgetary limits. The exact duration of the long term monitoring is not known at this time however the desired duration of the road-base monitoring is 10 years.

The beneficial use demonstration project will take place on MnROAD cell 29 (Figure 4), where an 8-in. layer of reclaimed pavement base material will be stabilized using cementitious high carbon fly ash. The stabilized layer will be located between a new asphalt surface layer and a portion of the existing aggregate base layer.

The quantity of high carbon fly ash required will depend on results of a mixture design process, to be performed by Bloom Consultants. Previous stabilization projects have incorporated fly ash at approximately 14 percent by weight of stabilized base material.

$$\frac{P_{HCFA} \times W_{BASE}}{100 - P_{HCFA}} = W_{HCFA}$$

Where:

> $P_{HCFA}$ is the percent of cementitious High Carbon Fly Ash by weight of stabilized base material.
>
> $W_{BASE}$ is the weight of reclaimed base material.
>
> $W_{HCFA}$ is the weight of cementitious High Carbon Fly Ash required for stabilization.

Bloom Consultants and Mn/DOT propose to construct a stabilized base section having dimensions of 30 ft by 350 ft by 8 inch depth. Base courses typically have unit weights near 130 pounds per cubic foot. Stabilization will require an estimated 50-100 tons of high carbon fly ash material at a rate of 14 percent by the dry weight of recycled pavement materials.

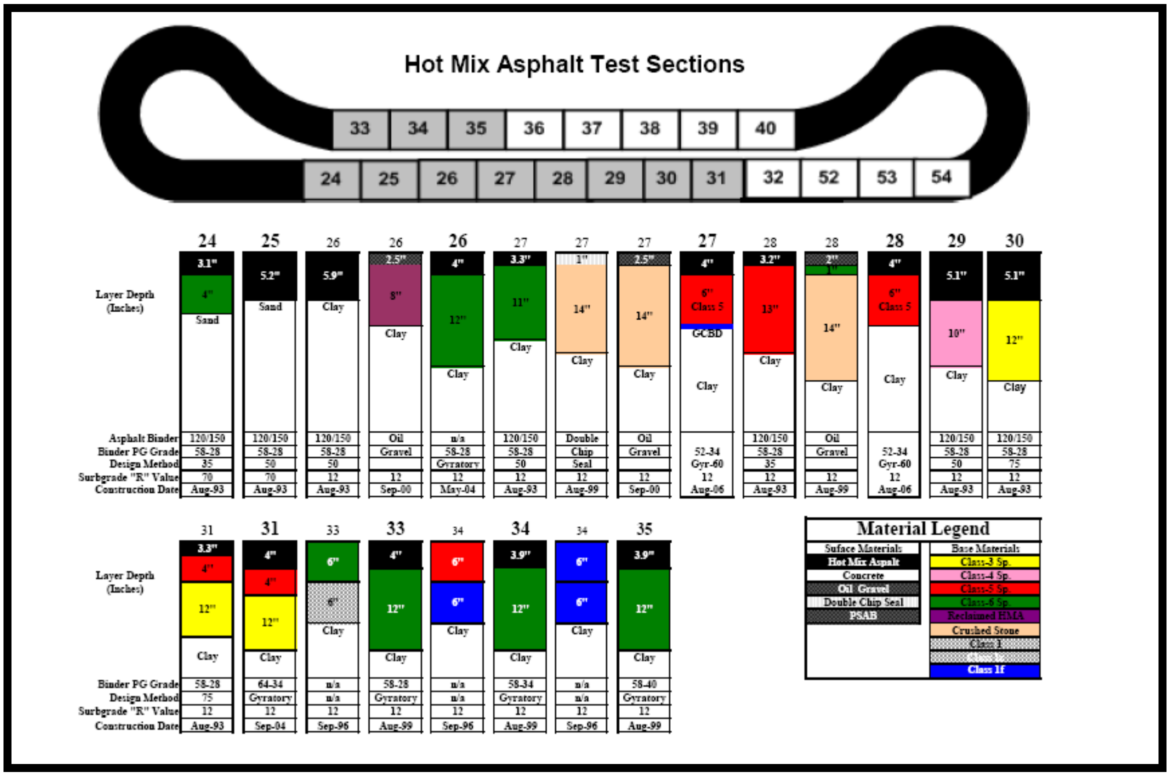



Figure 4 MnROAD Low Volume Road – updated 2006

## V. Outline of final report.

This research project will be run as part of Phase II of the DOE-funded project *Use of High Carbon Fly Ash to Stabilize Recycled Pavement as Base Course*. It is proposed that the final report from Phase II should be used to satisfy MPCA demonstration project reporting requirements. The project will evaluate high carbon fly ash stabilization from both environmental and pavement design perspectives.

In order to evaluate the effectiveness of stabilizing base materials with high carbon fly ash in comparison to recycled pavement materials and crushed stone, the project final report will take the following form:

i. Introduction
ii. MnROAD mission and layout
iii. Aggregate base and HMA surface mixture designs
    1. Description and Properties of Materials
        a. Aggregate characterization
        b. High carbon fly ash
        c. Asphalt binder
iv. Test Cell Design and Construction
v. Laboratory Testing of aggregate
    1. Optimum moisture and dry density
    2. Resilient modulus
    3. Unconfined compression
    4. HMA testing
vi. HMA Performance Evaluation
    1. Temperature
    2. Moisture
    3. Deflection testing
    4. Cracking
    5. Rutting
    6. Smoothness
vii. Leachate Sample Results
    1. Inorganic data
    2. Other chemical data
    3. Statistical analysis
    4. Comparison with HRL and Class 2B standards
viii. Economic Analysis
ix. Discussion
x. Conclusions
xi. Recommendations for future use of high carbon fly ash

## VI. Literature review

*Regulatory history of fly ash*

Fly ash was first used as mineral filler in asphalt mixes in the 1930s. Further uses in the 1940s included tunnel spillway repair at the Hoover Dam, manufacturing concrete pipes, and construction of the Hungry Horse Dam in Montana. In the 1950s, the Tennessee Valley Authority began using fly ash as a partial replacement for Portland cement.

In 1976 the Resource Conservation and Recovery Act (RCRA) was enacted and became the primary legislation regulating the use of fly ash. The Solid Waste Disposal Act Amendments (1980) to RCRA (i.e. The Bevill Amendment) which excluded fly ash from regulation under Subtitle C. The EPA submitted a report to Congress in 1993 as final determination that fly ash does not usually exhibit hazardous characteristics as should therefore be regulated under RCRA Subtitle D.

*Current use of fly ash in road construction*

Current uses of fly ash include many applications within the transportation industry but are not limited to this industry alone. Fly ash can be found in the following applications; cement/concrete, flowable fill, structural fills, road base, soil modification, mineral filler, mining applications, waste stabilization, and agriculture. The largest use of fly ash is in concrete.

*Current use of high carbon fly ash*

Fly ashes that exceed the AASHTO and ASTM 5% carbon content specification (USDOT 2003) are not currently used in transportation construction projects. The higher carbon content reduces certain desirable engineering characteristics. The use of high carbon ash in road base stabilization is one application where the carbon content is not critical to the strengthening of weak soils.

In 2003, the use of bottom ash in road base construction was the second largest application of bottom ash (EPA 2005) in highway construction. Consequently, the use of high carbon fly ash in road base stabilization is a reasonable application to investigate.

*Permeability of road surface*

NCHRP Report 531 (Brown 2004) and other studies have shown that permeability can increase above 125 x $10^{-5}$ cm/s (0.03 in./min) when the volume of air voids exceeds 8 percent for hot mix asphalt (HMA) pavements. NCHRP 531 also reported that laboratory measurements of permeability were typically 30 x $10^{-5}$ cm/s (0.007 in./min) for HMA's having 8 percent air voids and a 12.5-mm nominal maximum aggregate size. Since 2004 MnROAD has constructed four dense-graded 12.5-mm HMA cells on the Low Volume Road. The cells were constructed using standard paving practices based on current Minnesota specifications, at an average void level of 6.8 percent.

*Leaching of road-base water to surface and ground water*

Numerous laboratory studies and several field studies have been conducted to determine the leaching concentrations of metals from fly ash. A much smaller number of studies have investigated the leaching of organic chemicals. There are few field data from monitoring studies that measured the leaching and migration of metals, and particularly organic chemicals, from fly ash. Also, most laboratory and field studies have been conducted with fresh fly ash or fly ash mixtures. No studies have investigated the long term (greater than 5 years) release or migration of metals or organics from fly ash in the field.

Moisture conditions (i.e. water flow) beneath the wearing course of a roadway may be variable over time and space. Furthermore the sources of water and flow directions may also be variable.

U.S. Department of Transportation, Federal Highway Administration. "Fly Ash Facts for Highway Engineers, Fourth Edition", FHWA-IF-03-019, June 2003.

U.S. Environmental Protection Agency. "Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts", EPA-530-K-05-002, April 2005.

Roberson, R. and J. Siekmeier. "Determining Material Moisture Characteristics for Pavement Drainage and Mechanistic Empirical Design", Materials & Road Research Bulletin, Minnesota Department of Transportation, 2002.

Journal references in the original Phase II study proposal to the DOE included the below listed articles. Discussions with reference to these articles can be found in the proposal by Bloom Consultants, LLC in the Phase II document:


1. American Coal Ash Association, “2002 Coal Combustion Product (CCP) Production and Use Survey”, November 2003.
2. Ramme B. and Tharaniyil M., “Coal Combustion Byproduct Utilization Handbook”, We Energies, 2000.
3. Wisconsin Department of Transportation, “Standard Specifications for Highway and Structure Construction”, Madison, Wisconsin, 2003.
4. Hunt, Roy E. “Geotechnical Engineering Techniques and Practices.” McGraw Hill Book Company, 1986.
5. Witczak et al., “Laboratory Determination of Resilient Modulus for Flexible Pavement Design,” National Cooperative Highway Research Program (NCHRP) 1-28A, Research Results Digest, No. 285, Washington D.C., January 2004.
6. Eggen P., “Determination of Influences on Support Strength of Crushed Aggregate Base Course Due to Gradational, Regional and Source Variations,” Final Report to Wisconsin Highway Research Program, February 2004.
7. City of Austin, “Texas Transportation Criteria Manual,” December 2005.
8. Minnesota Department of Transportation, “MnROAD Phase II 2007 Plan,” St. Paul, Minnesota, 2005.
9. Wen H., Tharaniyil M., Ramme B., and Krebs S., “Field Performance Evaluation of Type C Fly Ash in Full-depth Reclamation: A Case History Study”, Transportation Research Records, No. 1869, Washington D.C., 2004.
10. Wen H., Titi H., Berry D., “Study of Rutting and Roughness in Asphalt Overlay and Local Calibration of Roughness Prediction Model in 2002 Design Guide”, accepted for presentation at annual Transportation Research Board Meeting, National Research Council, Washington DC, January 2005.
11. Illinois Department of Transportation, “Pavement Technology Advisory,” Bureau of Materials and Physical Research, Spring Field, Illinois, 2005.
12. Sawangsuriya, A., Bosscher, P.J. and Edil, T.B., 2002. Laboratory evaluation of the soil stiffness gauge. Transportation Research Record, No. 1808: National Research Council, Washington D.C., 30-37.

13. Edil, T.B. et al., 2002. Field evaluation of construction alternatives for roadways over soft subgrade. Transportation Research Record, No. 1786: National Research Council, Washington D. C., 36-48.
14. Bin-Shafique, S., Benson, C.H., Edil, T.B. and Hwang, K., 2005. Leachate concentrations from water leach and column leach tests on fly-ash stabilized soils. Environmental Science & Technology, in press.

## VII. Experimental design

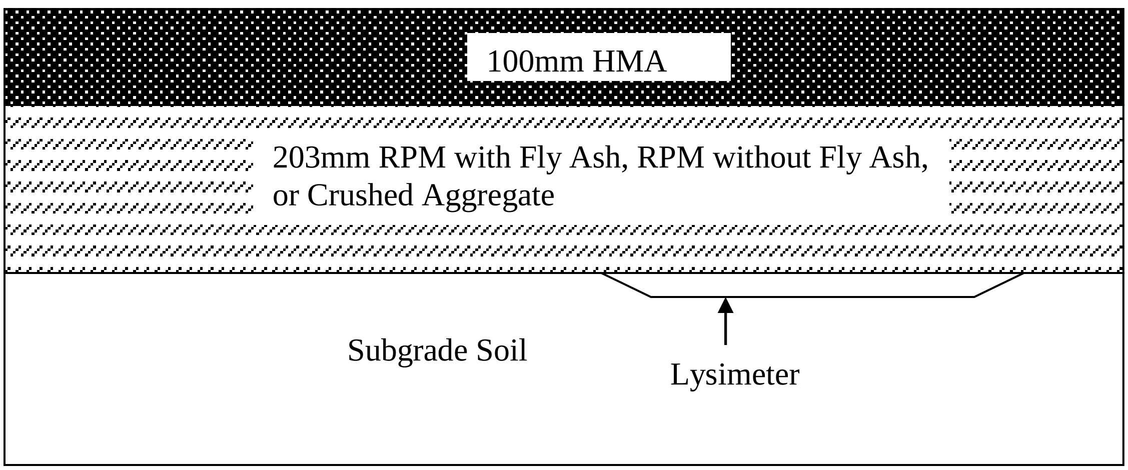
It is proposed that three test sections at the MnROAD Research Facility will be constructed with the same asphalt layers, sub-base, and sub-grade. However, road base construction will vary to evaluate the physical properties of base materials stabilized with high carbon fly ash. One treatment cell will include fly ash with a high carbon content that is slightly off specification. A second untreated cell will be constructed without fly ash. Both cells will be constructed using reclaimed asphalt and base material (cold in-place recycled base). A third cell will use traditional crushed aggregate base course, as a control section.

The dimensions of each test cell will be approximately 30 ft. by 350 ft. The cells will each have one 13 foot by 13 foot lysimeter installed in the road base for the collection and channeling of leachate from the road base to a collection point. Leachate collections will be performed depending on precipitation events. If drought conditions prevail during the summer months, the collection schedule will be adjusted to when ever a precipitation event occurs. Each precipitation event will require approximately 1 liters of leachate for chemical analysis. Leachate collected from the three cells will provide valuable data on the release of metals from asphalt road segments with high carbon ash and without ash. Since the asphalt wear course is not entirely water repellant, this portion of the study will provide data about leachate from the asphalt alone and asphalt with high carbon fly ash under closely monitored field conditions.

## VIII. Proposed monitoring

The environmental monitoring program consists of monitoring the volume of water draining from the pavement and concentrations of trace elements in the leachate. Leachate draining from the pavement will be monitored using a pan lysimeter (Fig. 1). The lysimeter will be 4 m wide, 4 m long, and 200 mm deep and will be lined with 1.5-mm-thick linear low density polyethylene geomembrane. The base of the lysimeter will be overlain by a geocomposite drainage layer (geonet sandwiched between two non-woven geotextiles). Stabilized recycled pavement material (RPM) will be placed in the lysimeter and compacted.

(a)



(b)

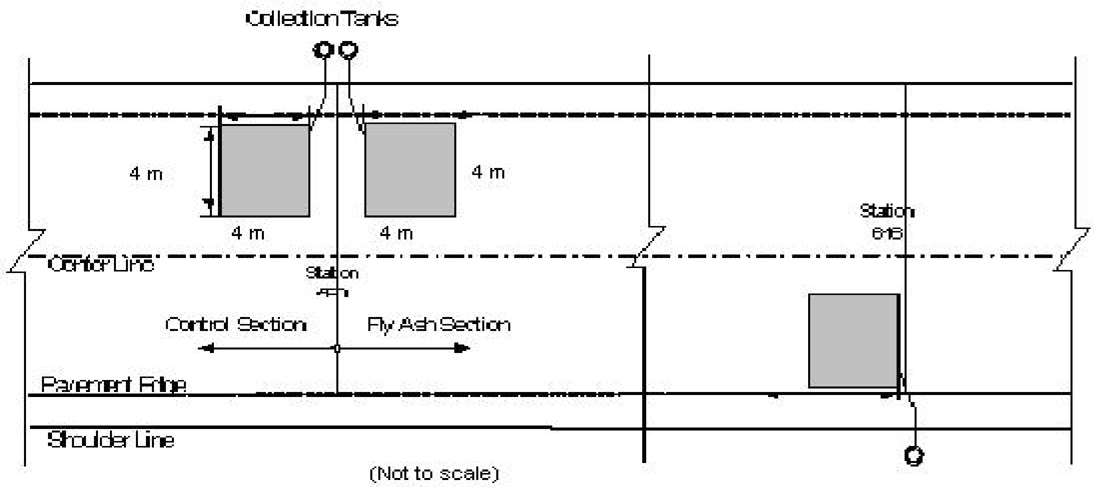



Fig. 1. MnROAD control and fly ash test sections: (a) profiles of pavement structure and (b) layout of three lysimeters.

A photograph showing the lysimeter construction for a similar project is found below.

Water collected in the drainage layer will be directed to a sump plumbed to a 120-L polyethylene collection tank buried adjacent to the roadway (photograph shown below). The collection tank will be insulated with extruded polystyrene to prevent freezing. Leachate that accumulates in the collection tank will be removed periodically with a pump. The volume of leachate removed will be recorded with a flow meter, a sample for chemical analysis will be collected, and the pH, Eh, and electrical conductivity of the leachate are recorded. Leachate samples will be collected by the "clean hands/dirty hands" technique described in detail in EPA Method 1669. Samples will be filtered, preserved, and analyzed.

Water samples for inorganic analysis will be collected following the generation of at least 1 liter of leachate after precipitation events. Inorganics water samples will be collected in polyethylene bottles of the appropriate size and preserved with the appropriate chemicals for transport and storage at the analytical laboratory. All samples will be delivered to the analytical laboratory within the same day of collection or stored over night in a refrigerator. No samples will be stored for more than 24 hours before being delivered to the laboratory. The analytical laboratory will observe all appropriate water sample holding times as specified by the US EPA.

Leachate samples will be collected each month for the first quarter following construction and at least once quarterly thereafter for the duration of the project. Following the collection of leachate the collection tanks will be totally pumped out after each sampling event and the quantity of water recorded.

Table 2 lists the chemical parameters that may be analyzed in the leachate collected from the three test cells. The final list of monitoring parameters will be the fly ash characterization parameter list.

Table 2. Possible chemical parameters for analysis in leachate.

| Element | Digestion Method | Analytical Method | Estimated MDL (ug/L) |
|---|---|---|---|
| Antimony | EPA 3050B | EPA 200.8 | 0.02 |
| Arsenic | EPA 3050B | EPA 200.8 | 0.1 |
| Barium | EPA 3050B | EPA 200.8 | 0.02 |
| Beryllium | EPA 3050B | EPA 200.8 | 0.02 |
| Boron | EPA 3050B | EPA 200.8 | 0.2 |
| Cadmium | EPA 3050B | EPA 200.8 | 0.08 |
| Calcium | EPA 3050B | EPA 200.8 | 5 |
| Chromium Total | EPA 3050B | EPA 200.8 | 0.04 |
| Cobalt | EPA 3050B | EPA 200.8 | 0.01 |
| Copper | EPA 3050B | EPA 200.8 | 0.07 |
| Iron | EPA 3050B | EPA 200.8 | 100 |
| Lead | EPA 3050B | EPA 200.8 | 0.01 |
| Manganese | EPA 3050B | EPA 200.8 | 0.03 |
| Mercury | EPA 3050B | EPA 200.8 | 0.2 |
| Molybdenum | EPA 3050B | EPA 200.8 | 0.08 |
| Nickel | EPA 3050B | EPA 200.8 | 0.05 |
| Selenium | EPA 3050B | EPA 200.8 | 2.0 |

| | | | |
|---|---|---|---|
| Silver | EPA 3050B | EPA 200.8 | 0.02 |
| Strontium | EPA 3050B | EPA 200.8 | 0.01 |
| Thallium | EPA 3050B | EPA 200.8 | 0.006 |
| Tin | EPA 3050B | EPA 200.8 | 0.04 |
| Vanadium | EPA 3050B | EPA 200.8 | 0.06 |
| Zinc | EPA 3050B | EPA 200.8 | 0.2 |
| pH | | EPA 9040C | 0.1 S.U. |

The principal investigators will provide the MPCA with an annual report summarizing the data that have been collected the previous year.

## IX. Evaluation of possible environmental impacts. Safeguards proposed for duration of project.

On April 18, 2006 Mn/DOT District 3 prepared a field review of the potential wetland impacts for small projects planned at MnROAD between 2006 and 2008. The letter summarized information from the original MnROAD construction permit (Department of the Army Permit number 90-449-74), and stated that no wetlands impacts should occur from the construction planned for the MnROAD Mainline (I-94), Low Volume Loop, or stockpile site.

In order to safeguard health and environment, MnROAD proposes that special equipment for, and personnel specializing in the transport, treatment, and mixing of fly ash and fly ash treated soils and aggregates be used for the base course stabilization during the construction of MnROAD test cell 29.

It is anticipated that the high carbon fly ash stabilized test cell will remain in place several years after the project has concluded. The long-term nature of this study necessitates sample collection beyond the two year funding period. During this time MnROAD proposes to continue monitoring leachate at various times as long as the lysimeters remain operational.

## X. Verification that Local Governmental Units (LDUs) and residents within one-mile radius of the project have been notified.

Dave Schwarting, P.E., Project Manager Mn/DOT District 3, will send the following notice:

i. Notice is hereby given that the Minnesota Department of Transportation (Mn/DOT) will be reconstructing a portion of the MnROAD National Research Facility. As part of this project Mn/DOT will be using "Coal Fly Ash" in the road pavement mixture in one of the __' by __' road cells. The MnROAD National Research Facility is located adjacent to Interstate 94 between Monticello and Albertville, 9011 77th Street NE, Monticello, MN. www.mnroad.dot.state.mn.us The Minnesota Pollution Control Agency considers fly ash a solid waste. Therefore, Mn/DOT has applied to MPCA to use fly ash as part of this demonstration/research project in accordance with Minn. Rule part 7035.2860 subp 5.

ii. MPCA requires notification of local units of government and residents within a one mile radius of the project to allow for input and comments. If you have any input or comments regarding the use of fly ash for this project, please contact Geoff Strack, 520 Lafayette Rd. N., St. Paul, MN 55155. Phone: (651)296-7716. Email: Geoffry.strack@pca.state.mn.us