



FALKIRK

THE FALKIRK MINING COMPANY

A SUBSIDIARY OF THE NORTH AMERICAN COAL CORPORATION

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DAN W. SWETICH
PRESIDENT

September 30, 1997

Ms. Karlene Fine, Executive Director
North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

RE: The Falkirk Mining Company,
Riverdale Haulroad Grade Separation

Dear Ms. Fine:

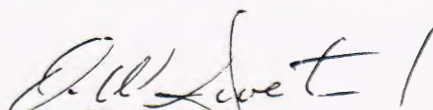
Enclosed please find a proposal entitled "Riverdale Haulroad Grade Separation - Lignite Ash Demonstration Project" and the \$100.00 application fee. Our grant application has been prepared using the guidelines provided by the Lignite Research Council.

At The Falkirk Mining Company, we are committed to the use of lignite as a fuel for generating power and are most interested in utilizing the coal combustion by-products as well. If you can help fund our demonstration project, we hereby agree to design and construct the Riverdale Haulage Grade Separation.

If you have any questions regarding this proposal, feel free to contact Mr. Lynn Bergman, Owner's Representative, at (701) 442-5751, at your convenience.

Sincerely,

THE FALKIRK MINING COMPANY


Dan W. Swetich
President

DWS/dgn
Enc.



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RIVERDALE HAULROAD GRADE SEPARATION
LIGNITE ASH DEMONSTRATION PROJECT

4. ABSTRACT

The use of coal combustion by-products (CCB's) as a natural resource for construction materials has been a goal of both the public and private sector for quite some time. Much research has been performed by the various groups pursuing this goal, including the Coal Ash Resources Research Consortium (CARRC) and the Energy and Environmental Research Center (EERC), along with several private companies and the North Dakota Industrial Commission (NDIC).

To date, this goal has met with limited success. Although several studies have characterized CCB's and defined their physical properties, more work needs to be done in demonstrating their use as actual construction materials. The transportation system in North Dakota (specifically public roads and bridges) is very natural resource intensive and has been identified as a prime candidate for the use of CCB's. The objective of this project is to construct a grade separation (bridge overpass) between two roadways while utilizing CCB's to the highest extent possible. The successful use of CCB's in typical construction materials such as precast concrete, cast-in-place concrete, controlled density backfill and stabilized embankments shall demonstrate to the construction industry that CCB's can and should be used for construction materials.

The proposed Riverdale Haulroad Grade Separation will be constructed over a four month period during the summer of 1998. The estimated cost for this project is \$1,189,230.

The design team will consist of the following companies and their designated representatives:

Owner/Applicant

The Falkirk Mining Company
Lynn Bergman, P.E. & L.S.

Civil Consultant

Houston Engineering, Inc.
Richard Gunderson, P.E.

Geotechnical Consultant

Arman Engineering Testing Ltd.

Gary Arman, P.E.

Contractor

(Pre-Qualified) - to be determined by competitive bid

5. PROJECT SUMMARY

Falkirk has, during the last year, consulted with appropriate officials of McLean County, Coal Creek Station, the North Dakota Department of Transportation (NDDOT), and product suppliers to arrive at a plan for the relocation of Coal Creek's ash haulroad and Falkirk's coal haulage road, as well as revised grades for two McLean County roads. Critical to this solution is a "Grade Separation Structure" which allows McLean County road traffic to pass over Falkirk's Riverdale haulroad. Roadway alignments, cross-sections, and grades to be applied to the design of the structure have already been developed. A successful public hearing of the McLean County Commission has resulted in assembling a team for the design and construction management of the structure.

The proposed grade separation structure is to be located approximately 100 feet north of the southwest corner of Section 5, Township 145 North, Range 82 West of the Fifth Principal Meridian. An 80' span with a deck width of 36' is proposed. The bridge would use precast concrete girders with a cast-in-place concrete deck. Approach embankments and wing walls will also be constructed.

The first objective of the project is to increase the safety of the travelling public by eliminating an "at grade" crossing with the coal hauling trucks. This will also decrease the travel time for Falkirk trucks, thereby providing economic benefits. The other objective is to use coal combustion by-products in the construction materials. Fly ash can be used as a replacement for Portland Cement in precast and cast-in-place concrete. Other types of ash can be used to create more stable roadbeds and embankments and decrease the need for high cost aggregates or specialty fill material.

6. PROJECT DESCRIPTION

The value of coal combustion by-products as a natural resource has been recognized for some time. The long-term goal for CCB's is to eliminate disposal of this valuable resource and implement its use as a high volume replacement for other material components used in construction. This goal is slowly being realized. However, CCB's are still viewed with some skepticism at the state and local level. This is mainly due to the lack of demonstration projects outlining the advantages of CCB's. The project's objectives are to decrease haul time, increase public safety and demonstrate the advantage of CCB's.

As outlined in previous sections, the project will consist of a new grade separation structure in which a north-south county road will be routed over a haul road via the overpass. Falkirk would reroute both the coal and ash haul roads. A second east-west county road would intersect the north-south route at a "T" intersection from the east.

Construction is typical of rural road and bridge projects. Earth embankments will need to be constructed to form the approaches to the bridge. The bridge itself will be comprised of precast concrete beams with cast-in-place reinforced concrete abutments and decking. Wing walls are used to transition from the structure back to natural grades at the toe of the embankment slopes. The design and construction are typical of NDDOT projects and, as such, machinery, manpower and materials are readily available.

For the design, a geotechnical analysis of the soils at the site is the first step. Based on the study, the foundation will be designed. This can either be a pile type abutment or spread footing abutment. A pozzocrete (concrete with a percentage replacement of fly ash for cement) mix will be developed and tested for the abutments, beams and deck. Previous work by the EERC, Cooperative Power and Falkirk will be utilized to prepare the mix designs. Embankments and structural backfill will also be designed using CCB's. The entire construction of the structure will be observed, monitored and documented by a construction engineer or specialist. Materials will be systematically

tested for adherence to the specifications and mix requirements.

There are no significant environmental impacts. Economic impacts for the project itself stem from a capital expenditure in excess of \$1,000,000 into the construction marketplace. Long-range impacts are unknown. Documentation of the use of CCB's in this project may ultimately achieve the goal of their increased use in the public and private sector. The project is needed to demonstrate these advantages.

7. STANDARDS OF SUCCESS

The success achieved by this project can be measured in several different ways. The following items have been identified as logical benchmarks:

1. The degree to which this project furthers technology in the area of Coal Combustion By-Products (CCB's) Utilization.
2. The degree to which this project causes the accelerated use (as opposed to disposal) of CCB's in the marketplace.
3. The economic benefit of CCB utilization in construction and maintenance of this structure.
4. The structural equality (or superiority) of this approach as opposed to conventional materials and methods.

8. BACKGROUND

The Falkirk Mining Company has worked on several projects that used fly ash or bottom ash as a replacement for Portland Cement or aggregate base. The following projects were done in association with the University of North Dakota at Grand Forks.

1. Coal Haulage Road - Falkirk Mine: The road was constructed using 1/3 fly ash, 1/3 bottom ash, and 1/3 gravel.
2. Dragline Tub Rebuild Pads - Falkirk Mine: The pads (900 c.y.) were constructed using fly ash as a replacement for Portland Cement (70% by weight).
3. Haul Road Curb and Gutter - U.S. Highway 83 Underpass: Oversize curb and gutter (130 c.y.) for the haulroad consisted of 70% (by weight) replacement of Portland Cement with fly ash in the concrete mix design.

The Falkirk Mining Company, Cooperative Power Association, Houston Engineering, and the EERC at UND are also working on the relocation of N.D. State Highway No. 200. Although the final design is only partially complete and the relocation has pushed back, the EERC completed their characterization study. This study reviewed physical and chemical characteristics of various ashes in order to utilize them as replacements for more common construction materials.

9. QUALIFICATIONS

Mr. Lynn Bergman will be the Project Manager for the Riverdale Haulroad Grade Separation. Mr. Bergman graduated from the University of North Dakota with a degree in Civil Engineering and has 25 years of experience in design and construction. He is a Senior Mining Engineer for the Falkirk Mining Company. Richard Gunderson, Houston Engineering, Inc., and Gary Arman, Arman Engineering Testing, Ltd., represent the project's civil and geotechnical consultants. Both are registered engineers in North Dakota and have previous experience with CCB's from the proposed N.D. State Highway 200 relocation. Mr. Arman was also involved in materials testing for the high volume pozzocrete (fly ash concrete) placed at the Coal Creek Station. Houston Engineering has been involved in many unique projects including the use of roller compacted concrete and most recently the ProGold Site Improvements.

Oscar Manz, a recognized expert in CCB's, and Dr. James Jorgenson, structural specialist, have also been retained to assist in any unique applications of CCB's proposed during project design development. Resumes for key participants are included in Appendix A.

10. VALUE TO NORTH DAKOTA

The State of North Dakota and the lignite producers and users will benefit from this project in several ways. They are summarized below:

- Local, municipal and state government can use the information to reduce the amount of Portland Cement and high cost aggregate in their construction projects. Portland Cement is a costly imported material into the state, and the availability of high quality aggregate is declining.
- Currently, CCB's are disposed of when they cannot be recycled. The disposal of high volumes of CCB's is costly and a waste of a natural resource.
- Establishing the benefits of CCB's in concrete products will eventually create a market for their use. Ash that is marketed and exported to other states will create jobs in this sector.

11. MANAGEMENT

The Riverdale Haulroad Grade Separation project will be managed and coordinated by Mr. Lynn Bergman of The Falkirk Mining Company. Mr. Bergman is a Senior Mining Engineer and is responsible for all aspects of civil construction projects at the mine.

The overpass is a scheduled capital project. A design and construction schedule has already been developed. Status meetings will be held as the design progresses to ensure the project will be ready for 1998 construction. The contractors will be prequalified prior to bidding. The engineering consultants have been selected due to their previous construction management experience and success records. The emphasis will be placed on using CCB's wherever feasible.

12. TIMETABLE

The project schedule is outlined below:

- Geotechnical Analysis 10-15-97
- Preliminary Plans & Estimates 11-1-97
- Final Plans, Specifications, Estimates 12-1-97
- Receive Bids 1-15-98
- Award Contract 2-1-98
- Construction Start-Up 6-1-98
- Detour - Start By-Pass 7-1-98
- Detour - End By-Pass 9-1-98
- Construction Completion 10-1-98
- Record Drawings and Contract Close-Out 11-15-98

13. BUDGET

An itemized project cost estimate is included below. We are requesting 50% funding of each item listed. The funding is necessary to create incentives to use CCB's in this demonstration project. If county, state and federal funds are secured for road projects, typically very few CCB's will be used. Contractors are also reluctant to use fly ash or bottom ash unless they are specified in the construction documents. If funds are not available the cost benefit ratio for this project is unfavorable and the project may be delayed.

COST ESTIMATE FOR RIVERDALE GRADE SEPARATION

Item	Quantity	Unit Price	Total
Earthwork volumes for N-S county road bridge	203,995 c.y.	\$1.00	\$203,995.00
Gravel volumes for N-S county road bridge, 3400' x 28 x 4"	1,175 c.y.	1.00	1,175.00
Structural fill for bridge clay/bottom ash	20,000 c.y.	1.50	30,000.00
Earthwork volumes for ash road	29,400 mi.	1.00	29,400.00
Earthwork volumes for ash road topsoil	56,820 c.y.	0.50	28,410.00
Gravel volumes for ash road, 7200 x 70 x 6"	9,333 c.y.	1.00	9,333.00
Earthwork volumes for E-W county road	36,250 c.y.	1.00	36,250.00
Gravel volumes for E-W county road, 600 x 28 x 4"	207 c.y.	1.00	207.00
Earthwork volumes for Falkirk haulroad	73,630 c.y.	1.00	73,630.00
Earthwork volumes for Falkirk haulroad topsoil	38,085 c.y.	0.50	19,043.00

Item	Quantity	Unit Price	Total
Gravel volumes for Falkirk haulroad (salvaged), 7000' x 70 x 2"	3,025 c.y.	1.00	3,025.00
Earthwork for N-S county road bypass, 3000 x 36 x 2'	8,000 c.y.	1.00	8,000.00
Gravel for N-S county road bypass, 3000 x 36 x 4"	1,037 c.y.	1.00	1,037.00
Signs, flagmen, misc.	1 l.s.	1,600.00	1,600.00
80 ft. span, 36 ft. width, \$70 per sq. ft. deck	1 l.s.	201,600.00	201,600.00
Wing walls (26' x 150/2 x 4)	1 l.s.	210,600.00	210,600.00
Raise WAPA power line (raise 10') from haulroad 1912-1936	1 l.s.	50,000.00	50,000.00
Adjust Falkirk batwing corner structure (3-pole)	1 l.s.	10,000.00	10,000.00
Raise Falkirk power line (raise 20') from haulroad 1908-1929	1 l.s.	32,000.00	32,000.00
Concrete county road ash truck crossing 28' x 70 x 1'	73 c.y.	150.00	10,950.00
Guard railing on bridge	400 ft.	20.00	8,000.00
Culverts, 16 @ 140' ea. (10 - 24", 5 - 36", 1 - 60")	1 l.s.	48,000.00	48,000.00
Engineering/Construction Management			90,000.00
Contingencies - 7.5%			82,975.00
TOTAL			\$1,189,230.00

All gravel will be salvaged from existing Falkirk haulroads.

14. MATCHING FUNDS

The Falkirk Mining Company will save 50% on the funding through conventional financing, capital funding, or both. The Falkirk Mining Company may also work with lignite users to obtain funds. The 50% share requested from the North Dakota Industrial Commission is \$594,615.00.