COPY

CONTRACT NO. 2004-0808/A1
AGENDA: DAB

MICHIGAN DEPARTMENT OF TRANSPORTATION

THE CORRADINO GROUP OF MICHIGAN, INC.

AMENDMENT

THIS AMENDATORY CONTRACT is made and entered into this date of _____ by and between the Michigan Department of Transportation, hereinafter referred to as the "DEPARTMENT," and The Corradino Group of Michigan, Inc., hereinafter referred to as the "CONSULTANT," for the purpose of amending Contract No. 2004-0808, dated December 27, 2004, hereinafter referred to as the "CONTRACT."

WITNESSETH:

WHEREAS, the CONTRACT provides for the CONSULTANT to perform professional planning, environmental, and engineering services for the Detroit River International Crossing Study; and

WHEREAS, the parties desire to amend the CONTRACT to provide for additional services and to increase the amount accordingly;

NOW, THEREFORE, the parties agree that the CONTRACT be and that the same is amended as follows:

1. In order to set forth the additional services and to increase the amount, Exhibit A of the CONTRACT, dated December 10, 2004, pages 1 through 238, as supplemented with Exhibit A-1, dated October 17, 2005, pages 1 through 70, attached hereto and made a part hereof, and all references in the CONTRACT to Exhibit A will be construed to mean as supplemented with Exhibit A-1, dated October 17, 2005, pages 1 through 70.

2. In order to increase the amount of the CONTRACT by Two Million Eight Hundred Thirty-Two Thousand Six Hundred Fifty-Five Dollars ($2,832,655), for a revised total CONTRACT amount of Nineteen Million Five Hundred Thirty-Four Thousand Three Hundred Seventy-Four Dollars ($19,534,374), Section 15a of the CONTRACT is amended to read as follows:

   "Compensation for the SERVICES will be on the basis of actual cost and a fixed fee for profit and, except as provided for in Section 40, will not exceed the maximum amount of Nineteen Million Five Hundred Thirty-Four Thousand Three Hundred Seventy-Four Dollars ($19,534,374), which amount includes a fixed fee for profit of One Million Five

Hundred Nineteen Thousand Twenty-Six Dollars ($1,519,026.00), as set forth in Exhibit A, dated December 10, 2004, pages 1 through 238, as supplemented with Exhibit A-1, dated October 17, 2005, pages 1 through 70. The CONSULTANT will be responsible for all costs in excess of the funds shown above."

3. In order to revise the subconsultant requirements, the last paragraph of Section 30 of the CONTRACT is amended to read as follows:

"The following named sub-consultant(s), as set forth in Exhibit A, will perform portions of the SERVICES:

Parsons Transportation Group
Alfred Benesch & Company
Wetland & Coastal Resources, Inc.
Commonwealth Cultural Resources Group, Inc.
Hamilton Anderson Associates
ACG: The al Chalabi Group, Ltd.
Woolpert Design, LLP
NTH Consultants, Ltd.
SOMAT Engineering, Inc.
Northwest Consultants, Inc.
TBE Group, Inc.
DLA Piper Rudnick Gray Cary US LLP"

4. All other provisions of the CONTRACT, except as herein amended, remain in full force and effect as originally set forth.

5. The CONSULTANT agrees that the compensation noted above represents payment in full for all services requested by the DEPARTMENT and waives any and all claims it has or may have against the DEPARTMENT that arise out of the need to amend the CONTRACT.

6. In the event of any discrepancies between the provisions of this Amendment and any exhibit(s) hereto, the provisions of the Amendment will govern.

7. This Amendatory Contract will become binding on the parties and of full force and effect upon signing by the duly authorized representatives of the CONSULTANT and the DEPARTMENT and upon adoption of a resolution approving said Amendatory Contract and authorizing the signature(s) thereto of the respective representative(s) of the CONSULTANT, a certified copy of which resolution will be sent to the DEPARTMENT with this Amendatory Contract, as applicable.

IN WITNESS WHEREOF, the parties have caused this Amendatory Contract to be awarded.

THE CORRADINO GROUP OF MICHIGAN, INC.

By: _____

Title:

MICHIGAN DEPARTMENT OF TRANSPORTATION

By: _____

Title: Department Director

* EXHIBIT A-1

CORR.

October 17, 2005

Mr. Mohammed Alghurabi, PE
Michigan Department of Transportation
425 West Ottawa
Lansing, Michigan 48933

RECEIVED
OCT 18 2005
By

Re: Detroit River International Crossing
CS 82900 - JN 802330
Contract 2004-0808

Dear Mr. Alghurabi:

By this letter we are responding to MDOT's request to amend Contract 2004-0808 by adding additional services as described in the RFP received by email on October 17, 2005. Attached is a copy of the Scope of Additional Services. Also included are Exhibit A (Corradino), Exhibits B (Parsons Transportation Group, Governor Blanchard, Commonwealth Cultural Resources Group, Hamilton Anderson Associates, NTH Consultants, and Woolpert Design), and Exhibit C (summarizing Exhibits A and B), that show hours and cost data associated with the scope. Two copies are being sent under separate cover to Judy Kransz, MDOT Operations Contract Support.

Should you have any questions or need additional information, please feel free to call at 1.800.880.8241. Thank you for your attention to this matter.

Sincerely,

THE CORRADINO GROUP

Joe C. Corradino, PE
Chief Executive Officer

JCC:ems
I:\projects\3600\wp\letters\Alghurabi 10-17-05.doc
Attachments
cc: Ted Stone
Jim Hartman
Judy Kransz

FIRST TRUST CENTRE • SUITE 300 NORTH
200 S. FIFTH STREET • LOUISVILLE, KY 40202
TEL 502.587.7221 • FAX 502.587.2636
WWW.CORRADINO.COM

1. Introduction

The consultant team led by The Corradino Group of Michigan, Inc. (Corradino) submits this proposal in response to the RFP issued by the Michigan Department of Transportation for work in the following areas:

- Additional Geotechnical Analysis
- Additional Public Involvement
  - ✓ Use of Radio Advertising
  - ✓ Additional Equipment Rentals/Materials/Accommodations
  - ✓ Use of CommentWorks
- Engagement of Governance Specialist
- Additional Cultural Analysis
- Additional Mapping

1.1 Additional Geotechnical Analysis

1.1.1 Background

Use of subsurface tomography and rock coring will yield the most promising and effective investigation method to respond to MDOT's RFP for Additional Geotechnical Analysis. Cross-hole seismic tomography uses hydrophones placed in one borehole and an energy source placed in a second borehole. Using many different source-receiver offset combinations, a 2D tomogram (similar to a medical MRI test) can be produced. The tomogram shows the velocity field between the two boreholes. Based on variations in the velocity distribution, detailed images of rock zones and cavities can be obtained, such as cavities from solution mining or loosened/collapsing rock zones.

As part of this proposal preparation, NTH, a subconsultant to Corradino, during the period June 1 through July 2, 2005, viewed the implementation of cross-hole seismic tomography in near similar rock conditions as those present for the DRIC Project. The survey was performed at the joint Massachusetts Institute of Technology (MIT), Michigan Technological University (MTU), United States Department of Energy (DOE), and Earth Resources Laboratory Reservoir Delineation Research Facility near Thompsonville, Michigan. Z-Seis Reservoir Seismic performed the series of surveys, under the direct guidance of Dr. Roger Turpening of Michigan Technological University. Dr. Turpening created the test site when working for the Massachusetts Institute of Technology approximately 30 years ago. The site consists of a series of three oil wells that were drilled to depths of approximately 6,000 feet and are situated more than 2,000 linear feet apart. The facility has been used for 30 years to develop, test, and perfect new geophysical methods and has nearly identical rock formations as many of the Practical Alternative sites of the DRIC Study. The formations, integrity, and seismic properties of the rock layers are well known and documented. The use of cross-hole seismic tomography with the rock layers present both at the test facility and in the Detroit solution mining logs, has been proven as a reliable method for evaluating the potential for voids and caverns within such formations.

1.1.2 Scope of Services

The scope of services will be conducted to meet MDOT P/PMS Task 3530 requirements. All work relating to the proposed brine well geotechnical investigation will be performed under the direction of a registered professional engineer acting as Project Coordinator/Project Manager. To perform the site evaluation, NTH has assembled a team led by Mr. Fritz Klingler, P.E., of NTH as project manager. Layne Christensen (qualifications and proposal attached) will perform rock coring and drilling, with NTH directing all drilling operations, logging the rock core holes, and preparing the documentation. Z-Seis Reservoir Seismic (qualifications and proposal attached) will conduct cross-hole seismic tomography; with Dr. Roger Turpening (resume attached) of Michigan Technological University providing technical consulting in planning the cross-hole tomography investigation and providing expert analysis of tomography data. Dr. Edward Cording (resume attached) of the University of Illinois will provide technical consulting in planning the investigation, performing technical analysis of rock-void propagation, and providing expertise in determining final conclusions regarding the risk of existing voids negatively impacting the project.

Generally, the number of boreholes and cross-hole seismic panels (i.e., set of two boreholes) were chosen based on the crossing's proximity to areas of known high density solution wells. Roadway crossing alignments that contain primary and secondary structural elements in areas of high to moderate density solution wells are proposed to be investigated in their entirety where the potential existence of solution wells is high. Crossing alignments that contain primary and secondary structural elements in areas of low proximity to know solution wells are proposed to be explored near primary structural elements to the proposal Detroit River Crossing. Primary structural elements are defined as structures or piers (such as main support piers and anchorage piers) that could cause catastrophic failure should settlement or ground subsidence occur. Secondary structural elements are defined as structures or piers (such as approach piers or abutments) that would cause substantial damage to a portion of the structure (as well as long-term shutdown of the bridge), but would not cause catastrophic failure of the entire structure should settlement or ground subsidence occur. Test boring locations were chosen based on available location of structural elements, span lengths, and geophysical constraints. Field review and exact boring location research has not been performed. Therefore, boring locations may need to be adjusted. For construction sequencing, insurance, time constraint, and geotechnical feasibility issues, test boring locations were selected to be performed on land.

The number of boreholes is presented in Table 1. A minimum of one-half the total number of boreholes will be cored using a minimum NQ/NX –sized tooling, reamed to a minimum of six inches, and lined with a minimum four-inch I.D. fiberglass of PVC casing to prevent rock collapsing. These will be bored to a depth of 1,500 feet. The additional boring(s) will be rotary drilled (not cored) also to approximately 1,500 feet. It will also be lined with casing. Drilling will be performed on a 24-hour basis under union guidelines.

Table 1
Test Borings – Crossing X-10.5

Crossing No.	Test Borings				Total Test Borings	Hole Seismic Cross-Panels	Proximity to Known High-Density Solution Mining Areas
	Land		River				
	Core [1]	Rotary [2]	Core [1]	Rotary [2]			
X-10.5	2	2	-	-	4	3	High

[1] Drilling with rock core recovery.
[2] Drilling without rock core recovery.

Crossing X-10.5, i.e., the area between Illustrative Alternatives Crossings X-10 and X-11, is located in high proximity to known high-density solution mining areas. Additionally, the Crossing X-10.5 alignment crosses land previously owned by known brine producing companies, which further indicates the potential for encountering solution mining wells.

A total of four borings will be performed on land to explore the entire alignment. Of the proposed borings, two will be drilled with rock core recovery. The remaining borings will be rotary drilled with no core recovery. Casing will be installed in all borings to allow for the cross-hole seismic tomography to be performed. A total of three cross-hole seismic panels between the borings will be performed to evaluate the subsurface rock conditions for signs of distress and subsidence. The cross-hole panels will be performed in the borings at approximate 1,000-foot o.c. spacing. For the proposed borings, it is estimated that the drilling rig will be in service approximately 30 days to complete each borehole.

In accomplishing this broad task, the following steps will be taken:

1. Conduct five meetings with MDOT's team to discuss the project, prioritize the investigation area, determine the limits of the foundations to be investigated, determine specific boring locations at the selected crossing location, and discuss findings of investigation.

2. Perform a detailed review of solution mining well records and available production records, conduct personal interviews, etc. This effort will require cooperation and assistance from the property owners, as all known public information has been obtained. Recognizing that some property owners may be somewhat reluctant to share information, past land use will be recorded using Sanborn Historical Maps, in an attempt to define areas of past undocumented solution mining activities.

3. Contact the appropriate domestic (i.e. city, county, state, Army Corps of Engineers) and foreign authorities (if applicable) and obtain the necessary fieldwork permits prior to beginning field activities at the selected site. Contact the MISS DIG utility notification service at least three days prior to the excavation of test holes at the project site. Contact MDOT personnel prior to making these contacts to determine if MDOT will make contact, as well as how contacts should be made. The assembled utility maps will be reviewed prior to beginning fieldwork.

4. Based on all obtained data, establish a field program to investigate brine well cavities beneath primary structure foundations as well as secondary foundations in high-density brine well areas.

5. Drill boreholes at the selected foundation areas to approximate depths of 1,500 feet. This depth will allow for the use of tomography up to depths of 1,500 feet (top of potential rock subsidence zone to below the suspected cavity zone). A minimum of one borehole at each location will be cored using a minimum NQ/NX-sized tooling, reamed to a minimum of six inches, and lined with minimum 4-inch I.D. fiberglass of PVC casing to prevent rock collapsing. The additional boring(s) at each location will be rotary drilled (not cored) to approximately 1,500 feet and also lined with casing. Logs will be recorded for the core runs using rock logging format. The coring results will be analyzed and the results presented in an evaluation report.

6. Perform gyroscopic surveys in the borings to determine variation of azimuth and dip of borehole with respect to depth along borehole. Perform cross-hole seismic tomography within the rock core holes spaced at approximately 1,000 feet on-center in a pattern as determined from the proposed crossing alignment.

7. Prepare a detailed report presenting all field data obtained and the results of the data analysis for the selected foundation area. The data and analysis will be evaluated and an assessment of risk of future subsidence and/or collapse of the solution mine cavities will be presented.

It is recognized that no amount of investigation is capable of arriving at a "Zero Risk" conclusion. However, the above-described work should be capable of providing enough information to allow for assessment of the risk in the foundation area investigated, and determine solutions to reasonably address risk (such as routing around danger zones and/or filling voids with grout). It is likely that for the final selected site, additional investigation (i.e., several additional boreholes and tomography) will be prudent to evaluate feasibility of mitigation and cost magnitude should the initial investigation show relevant signs of distress from known or suspected solution mining features.

1.1.3 River Boring Considerations

The base scope of services consists of performing the investigation entirely on land. As the bridge foundations may be constructed within the river, and depending on the suspected location of historical brine wells in the river, MDOT may desire for the investigation to be performed within the Detroit River. As such, considerations are presented for performing the investigation within the river as compared to drilling on land.

- Drilling in the river will require at least one jack-up barge 50 feet x 100 long to accommodate the core rig and an additional barge to re-supply the drilling operation and transport the cross-hole tomography test equipment. The current availability and rates for jack-up barge rental, which appear to be rising due to hurricane-related events on the gulf coast, are not included in this proposal. The actual charges for jack-up barge rental will be based on the charges incurred, which will be subject to market fluctuations.

- The drilling will continue for three 8-hour shifts per day. Provisions for the tugboat and barge crews to man the 3 shifts, and the resulting maintenance and fuel supply trips, will incur an additional cost.

- The drilling rig will have to remain on site for completion of cross-hole tomography to grout the borehole. This will result in additional cost due to the extra stand by time.

- Disposal of the rock cuttings from the barge and the drilling fluids containing drilling mud and/or brine will have to be separately considered. Potential presence of hydrogen sulfide in the artesian groundwater will also have to be considered for treatment and discharge.

- The time and additional cost of acquiring permits from the Michigan Department of Environmental Quality (MDEQ) and the US Army Corps of Engineers (USCOE) will have to be considered.

- Boreholes in the river will be abandoned and grouted after tomography. Therefore, using the boreholes in any additional investigation will not be feasible.

- We assume the drilling locations will be out of the main shipping channel. Once drilling, coring, cross-hole seismic tomography, and/or grouting begin, it will not be possible to move the barge for any reason. Also, it is assumed that drilling will be performed between the months of April through December, as barge drilling during winter months will not be feasible.

If the base scope of services would be modified to include drilling in the river, an estimated $501,240 would need to be required per individual boring for the cost of the barge, operation, and supply costs.

The actual charges for jack-up barge rental will be based on the charges incurred and will be subject to market conditions, which appear to be rising due to recent hurricane-related events on the gulf coast.

1.1.4 Additional Clarifications/Conditions

- Drilling will be performed on a 24-hour basis with 3 shifts at 8 hours per shift per day and will be according to union guidelines. All drilling sites are assumed to have open access, allow 24-hour operations, and be a minimum size of 50 feet x 100 feet.

- Drilling estimates are based on relatively stable ground conditions. Unusual drilling conditions, collapsing conditions, or rubble/subsidence zones may affect drilling methods, extend drilling time, and increase costs.

- During drilling operations, all boreholes will be cased entirely through overburden regions (i.e., glacial drift). Full depth casing will be installed within all drilled holes upon completion to prevent caving and/or sloughing conditions in preparation for cross-hole tomography.

- All boreholes are assumed to be drilled with standard drilling fluids and/or brine for portions of the borings that extend through salt beds. In the case of artesian groundwater conditions or collapsing borehole conditions, specialized drilling fluids such as weighted mud and/or brine solutions may be needed to maintain favorable drilling conditions. An additional fee would be required for such work.

- Borehole cuttings will be disposed of by roll-off dumpster with excess drill water to be disposed of in available sewers. Treatment of potential hydrogen sulfide water is not anticipated to be a problem, although an additional permit may be required to disperse excess water into the sewer system.

- In the event of lost equipment due to adverse ground conditions during the drilling and cross-hole tomography portions of this project, the cost of all lost equipment will be considered an extra cost and will be billed to the project. For estimating purposes, additional insurance fees for costs of tooling while performing cross-hole seismic have been included.

- All boreholes on land will be left open upon completion of cross-hole tomography. The boreholes will need to be grouted and abandoned after the need for further analysis is no longer required. Over this period of time, a locking steel flush mounted cover placed at ground surface will protect each borehole location. The location of the boreholes will be documented by hand-held GPS unit until further work activities proceed. Fees for abandonment are included in the estimate, but additional mobilization/demobilization fees are not included if required to perform hole abandonment services at a later date.

- This proposal is based on one mobilization, and all the authorized fieldwork being done concurrently.

1.1.5 Estimated Fees and Schedule

Work will be conducted only as authorized by MDOT. When field work is authorized, mobilization will take one month and fieldwork will take 16 weeks on Crossing X-10.5. Evaluations of the collected data will be performed shortly thereafter and a report will be available approximately two months after completion of fieldwork.

It should be noted that the time and cost estimates include the investigation of the proposed foundation areas based on one mobilization/demobilization charge per Layne Christensen Company and Z-Seis Reservoir Seismic. Investigations that require multiple mobilizations/demobilizations will significantly impact the estimate.

Significant delays and additional costs could be incurred as a result of a variety of factors beyond the control of the Consultant, including but not limited to weather, ground conditions, regulatory issues, etc. As such, the cost proposal is considered an estimate of the probable cost. Actual costs will be charged as incurred, based on the rates and scope provided herein.

Additional fees for services required by weather, unstable ground conditions, unusual field conditions, etc., will be established and MDOT will be notified immediately of such conditions prior to performing any additional work.

If the base scope of services would be modified to include drilling in the river, an estimated $501,240 would need to be required per individual boring for the cost of the barge, operation, and supply costs. The actual charges for jack-up barge rental will be based on the charges incurred and will be subject to market conditions, which appear to be rising due to recent hurricane-related events on the gulf coast.

1.2 Additional Public Involvement

The Consultant will provide to MDOT support in use of CommentWorks as prescribed in a training session conducted on September 30, 2005.

The Consultant will use radio advertising on the following outlets for each of six rounds of upcoming public meetings, including the set in December, 2005:

- WMXD
- WJLB
- WWJ
- WYCD
- WVMV
- ARABIC Cable
- WCHB
- WMKM

The Consultant will continue to supply printed materials and provide other accommodations (such as soft drinks and pizza), for each of the upcoming six rounds of public meetings (4 meetings per round) as well as 24 Local Advisory Council meetings.

The Consultant will support MDOT in the use of CommentWorks to address comments made in the public involvement process.

1.3 Engagement of Governance Specialist

Part of the proposal offered by The Corradino Group on the Detroit River International Crossing (DRIC) Study was the involvement of former Governor James Blanchard in the role of Governance Specialist. His service as Congressman, Governor of Michigan, U.S. Ambassador to Canada, and, now Consultant based in Michigan (Beverly Hills) and Washington, D.C., gives him unique credibility and experience to assist our consulting team. Governor Blanchard remains actively involved in US/Canada and Michigan/Ontario relations and is in regular contact with high level government officials on both sides of the border, including the Prime Minister of Canada and Premier of Ontario, as well as cabinet officials in the U.S. and Canada.

His service was proposed as a consultant on the DRIC Study to provide insights to persons in U.S. agencies such as the Department of Homeland Security, the Departments of Transportation, State, EPA, Trade, Customs and Border Protection and the General Services Administration. Also, as stated above, his ties to Canada bring a similar ability to access people at the Ontario and Toronto levels of the Canadian government as they affect issues on governance, border crossing facility ownership, the ability/willingness to establish private-public partnerships, etc. This is particularly important in light of the schedule of the DRIC Study.

The Corradino Group of consultants was pared down by an MDOT decision to eliminate "all lawyers." That affected Governor Blanchard. And, while he is a bar-certified lawyer with the third-largest law firm in the United States (Piper Rudnick) his practice is consulting, NOT law.

Therefore, Governor Blanchard is re-introduced as the consultant team's Governance Specialist. It is noteworthy his hourly rate ($630) is comparable to that being paid by the City of Windsor to its lawyer to address the environmental documents being prepared by MTO and Transport Canada on the DRIC Study (see attachment).

1.4 Additional Cultural Analysis

The scope of work in the contract with MDOT with the DRIC Consultant calls for cultural analysis work on six Illustrative Alternatives. Fifteen are being analyzed. The additional work is covered in the Cost Derivation Form.

1.5 Additional Mapping

The preliminary list of Practical Alternatives will cover the study of a freeway-to-freeway connection between I-75 and I-94 either by Schaefer Road or Outer Drive. Traffic analysis of such a connector can be covered in the current budget. But, additional mapping is needed to perform very preliminary engineering analyses. The results of the work in these two areas will be provided to MDOT for use in an independent study of the freeway-to-freeway connector, if that is needed.

Wayne County has Digital Ortho Photographs (DOP) and Digital Elevation Models (DEM) for sale to cover the required area. The DOP's and DEM's were generated from I:7920 (1"=660 feet) scale photography between the years 1997 to 2001. The consultant will purchase the Wayne County orthos and convert the data from the Michigan State Plan coordinate system in feet to the UTM metric system for the DRIC.

Exhibit A

Derivation of Cost Proposal

Control Section	MDOT Job #	Project Description
CS 82900	JN 802330	DRIC - EPE with EIS - Amend 1 Additional Public Involvement
		Use of Commentworks and Larger Meetings
Name of Prime Consultant:		The Corradino Group

DIRECT LABOR

Name	Classification	Person Hours	x	Hourly Rate	=	Labor Costs
Corradino, JC	Proj. Manager	300	x	$76.45		$22,935
Corradino, D	Planner	400	x	$25.24		$10,096
Butler	Planner	100	x	$23.82		$2,382
Hartman	Lead Traffic Eng.	100	x	$47.89		$4,789
Santana	Planner	400	x	$22.51		$9,004
Stone, T.	Lead Environ.	300	x	$45.74		$13,722
	Total Hours	1600			**Total Labor**	**$62,928**

LABOR ESCALATION

	$62,928	x	0.00%	**Escalation**	**$0**

OVERHEAD

	$62,928	x	164.07%	**Total Overhead**	**$103,246**

FACILITIES COST OF CAPITAL

	$62,928		0.3720%	**Total F.C.C.**	**$234**

DIRECT EXPENSES	Unit Cost		Units		
Supplies/Shipments	$600.00	x	1	Lump Sum	$600
Additional Equipment Rental (see attached sheet)					$119,102
Additional Meeting Printed Materials (see attached sheet)					$20,080
Subtotal					$139,782
Subconsultants					
Parsons Transportation Group					$25,595
ACG: The al Chalabi Group, Ltd.					$0
DLA Piper Rudnick Gray Cary US LLP					$241,830
Alfred Benesch & Company					$0
CCRG					$59,761
Hamilton Anderson Associates					$158,127
Northwest Consultants, Inc.					$0
NTH					$2,008,009
SOMAT Engineering, Inc.					$0
TBE Group, Inc.					$0
Wetland & Coastal Res., Inc.					$0
Woolpert Design, LLP					$14,863
				Total Direct Costs	**$2,647,968**

FIXED FEE

	$166,174	x	11.00%	**Total Fixed Fee**	**$18,279**

TOTAL Amend 1 COSTS $2,832,655

Exhibit A - *Attachment*

Derivation of Cost Proposal

Control Section		MDOT Job #	Project Description
CS 82900		JN 802330	DRIC - EPE with EIS, Amend 1 Additional Public Involvement
Name of Vendor: NA			

DIRECT COST INCREASE JUSTIFICATION

EQUIPMENT RENTAL

Contract Budget for Equipment Rental for Public Meetings	$0
Actual Cost Equipment Rental - 9 months - 3 sets of meetings	
Bluewater Technologies	$41,317
LA Exhibits	$10,280
Hall Rentals	$7,954
Subtotal	$59,551
Projected Cost - 6 more sets of meetings (2 x above subtotal)	$119,102
Additional Equipment Cost to Complete Poject	**$119,102**

PRINTED MATERIAL FOR MEETINGS

Contract Budget 3 years of Materials - public meeting related (1/10 of printing budget)	
($19,600 + $56,000) / 10 =	$7,560
Actual Cost Printing 3 meeting sets	$10,040
Projected Cost - 6 more sets of meetings (2 x above subtotal)	$20,080
Less 2/3 of original budget ($7560) to do this work (2 years of remaining budget)	$5,040
Additional Printing Cost to Complete Project	**$20,080**

DIRECT COST ADJUSTMENT	**$139,182**

Exhibit B

Derivation of Cost Proposal

Control Section	MDOT Job #	Project Description
CS 82900	JN 802330	DRIC - EPE with an EIS - Amendment 1 Geotech Support

Name of Prime Consultant: **Parsons Transportation Group**

DIRECT LABOR Classification	Classification	Person Hrs	x	Hourly Rate	=	Labor Costs
Regine Beauboeuf	Deputy Proj. Man.	32	x	$62.31		$1,994
Bruce L. Campbell	Lead Bridge	40	x	$49.00		$1,960
Patrick Cassity	Bridge Design	30	x	$68.75		$2,063
Ken Serzan	Rdway/Plaza/Bridge	20	x	$89.42		$1,788
Sr. Engineer	Rdway/Plaza/Bridge	40	x	$47.87		$1,915
	Total Hours	162			**Total Labor**	**$9,720**
LABOR ESCALATION						
		$9,720	x	0.00%	**Escalation**	**$0**
OVERHEAD						
		$9,720	x	137.00%	**Total Overhead**	**$13,316**
FACILITIES COST OF CAPITAL						
		$9,720		0.2655%	**Total F.C.C.**	**$26**
DIRECT EXPENSES		Unit Cost		Units		
NA		$0.00		0		$0
					Total Direct Costs	**$0**
FIXED FEE						
		$23,035	x	11.00%	**Total Fixed Fee**	**$2,534**
					TOTAL PARSONS COSTS	**$25,595**

Exhibit B

Derivation of Cost Proposal

Control Section		MDOT Job #	Project Description
CS 82900		JN 802330	DRIC - EPE with EIS - Amendment 1 - Goverance Issues
Name of Vendor:			**DLA Piper Rudnick Gray Cary US LLP**

DIRECT LABOR

Classification	Person Hours	x	Hourly Rate	=	Labor Costs
DLA Piper Rudnick Gray Cary US LLP	382	x	$630.00		$240,660
Total Hours	382			**Total Labor**	**$240,660**

DIRECT EXPENSES	Unit Cost		Units	
Mileage	$0.375	x	1200 Miles	$450
Shipping	$20	x	16 Overnights	$320
Misc.		x		$400
		x		$0
		x		$0
		x		$0
		x		$0
			Total Direct Costs	**$1,170**

TOTAL COSTS **$241,830**

Exhibit B

Derivation of Cost Proposal

Control Section	MDOT Job #	Project Description
CS 82900	JN 802330	DRIC - EPE with an EIS Amendment 1

Name of Sub Consultant: Commonwealth Cultural Resources Group

DIRECT LABOR

Name	Classification	Person Hrs	x	Hourly Rate	=	Labor Costs
D. J. Weir	Task Manager	328		$ 32.00		$ 10,496
C. S. Demter	Principal Investigator	633		$ 21.25		$ 13,451
E. Robinson	Architectural His.	65		$ 19.65		$ 1,277
J. Montney	GIS/Graphics	14		$ 15.75		$ 221
	Total Hours	1040			**Total Labor**	**$25,445**

LABOR ESCALATION

$25,445	x	0.00%	**Escalation**	**$0**

OVERHEAD

$25,445	x	108.03%	**Total OH**	**$27,488**

FACILITIES COST OF CAPITAL

$25,445	x	0.00%	**Total F.C.C.**	**$0**

DIRECT EXPENSES	Unit Cost		Units		
Rental Car	$90.00	x	10	Days	$900
Printing - B&W	$0.10	x	300	In-house	$30
Computer	$5.00	x	15	In-house	$75
				Total Direct Costs	**$1,005**

FIXED FEE

$52,933	x	11.00%	**Fixed Fee**	**$5,823**

TOTAL CCRG COSTS $59,761

Exhibit B

Derivation of Cost Proposal

Control Section	MDOT Job #	Project Description
CS82900	JN 802330	DRIC - EPE with an EIS Amendment 1

Name of Sub Consultant: Hamilton Anderson Associates

DIRECT LABOR

Classification	Classification	Person Hours	x	Hourly Rate	=	Labor Costs
Jeff Mason	Project Manager	84		$ 37.00		$ 3,108.00
	Total Hours	84			**Total Labor**	**$ 3,108**

LABOR ESCALATION

	$3,108	x	0.00%	**Escalation**	**$0**

OVERHEAD

	$3,108	x	168.65%	**Total OH**	**$5,242**

FACILITIES COST OF CAPITAL

	$3,108	x	0.73%	**Total F.C.C.**	**$23**

DIRECT EXPENSES

	Unit Cost	x	Units		
RADIO ADVERTISING	Unit Ad Cost	# Ads		Subtotal	
WMXD	$ 240	16		$ 3,840	
WJLB	$ 275	12		$ 3,300	
WWJ	$ 278	12		$ 3,336	
WYCD	$ 215	18		$ 3,870	
WVMV	$ 170	18		$ 3,060	
ARABIC Cable	$ 200	8		$ 1,600	
WCHB	$ 100	4		$ 400	
WMKM	$ 100	4		$ 400	
Subtotal One Meeting Set of Ads				$ 19,806	
DP & Company per ad production cost				$ 148,836	
Six Remaining Meeting Sets (subtotal above x 6)					
Additional Radio Advertising Cost					**$ 148,836**

FIXED FEE

	$8,350	x	11.00%	**Fixed Fee**	**$918**

TOTAL HAMILTON ANDERSON COSTS $ 158,127

DP&Company

Job #: MI06538

Client: Hamilton Anderson Associates/Corradino Group
143 Randolph Street
Suite 200
Detroit, MI 48226

Attn .Jeff Mason

Description: MDOT Public Meeting Announcements - :60 Radio Spot Development and Media Buy Summary

Costs associated with creating spot including agency time-of-staff, script review/proofreading, production, talent, studio time, edit suite, background music, etc...

Total	$ 5,000

Exhibit B

Derivation of Cost Proposal

Control Section	MDOT Job #	Project Description
CS 82900	JN 802330	DRIC - EPE with an EIS Amendment 1 - Add. Geotech Investigation

Name of Sub Consultant: NTH CONSULTANTS, LTD.

DIRECT LABOR

Name	Classification	Person Hours	x	Hourly Rate	=	Labor Costs
Keith Swaffar	Proj. Director	112	x	$ 50.00		$5,600
Fritz Klingler	Proj. Manager	280	x	$ 50.00		$14,000
Joe Alberts	Task Manager	420	x	$ 42.00		$17,640
Harry Price	Task Manager	420	x	$ 42.00		$17,640
Craig Johnson	Project Eng.	778	x	$ 22.00		$17,116
Jason Edberg	Project Eng.	654	x	$ 22.00		$14,388
Heather Audet	Project Eng.	654	x	$ 22.00		$14,388
Sanket Gole	Project Eng.	654	x	$ 22.00		$14,388
Mike Firestone	Project Eng.	654	x	$ 22.00		$14,388
Zachary Carr	Project Eng.	400	x	$ 22.00		$8,800
Nateira Farrington	Clerical	690	x	$ 15.00		$10,350
Dawn Pressley	Clerical	690	x	$ 15.00		$10,350
Latricia Giddens	Clerical	690	x	$ 15.00		$10,350
	Total Hours	7,096			**Total Labor**	**$169,398**

LABOR ESCALATION

	$169,398	x	0.00%	**Escalation**	**$0**

OVERHEAD

	$169,398	x	188.00%	**Total OH**	**$318,468**

FACILITIES COST OF CAPITAL

	$169,398	x	0.04%	**Total F.C.C.**	**$68**

DIRECT EXPENSES	Unit Cost	x	Units		
Mileage	$0.405		4000	miles	1620
Copies	$0.220		4000	pages	880
FedEx	$15.000		13	overnights	195
Digital Camera	$10.000		120	days	1200
Layne Christensen Drilling (attached)					
1 core-hole (land) to approximately 1,500 feet @ $292,238					$292,238
1 core-hole (land) to approximately 1,500 feet @ $292,238 - $40,000 (mob/demob)					$252,238
2 rotary borings to approximately 1,500 feet @ $189,873 / each					$379,746
Rig mud system (mob/demob)					$25,000
Moving btw holes / Standby allow. @ $10,000/boring ($3,588 + NTH-add $6,412/boring)					$40,000
Z-Seis Reservoir Seismic (tomography((attached))					
Project Setup, Mob / Demob @ $30,000					$30,000
Perform gyroscopic borehole surveys @ $10,000 per boring x 4 borings					$40,000
Crane Rental @ $5,000 per boring					$20,000
Perform cross-hole seismic tomography panel @ $50,000 per panel x 3 panels					$150,000
Tooling Insurance @ $25,000 per set of borings x 1 set per panel x 3 panels					$75,000
Standby time @ $10,000 per day x 1 day					$10,000
Equipment	$75.000		120		9000
Supplies	$1,500.000		1		1500
Permits (Corps, US)	$10,000.000		4		40000
External Consulting - Turpening				Not to exceed	52893
External Consulting - Cording				Not to exceed	44900
				Total Direct Costs	**$ 1,466,410**

FIXED FEE

	$487,866	x	11.00%	**otal Fixed Fee**	**$53,665**

TOTAL NTH COSTS $ 2,008,009

NTH Consultants, Ltd.

SUBCONTRACTOR PROJECT FEE ESTIMATING SHEET (Crossing X-10.5)

Client Name: Parsons
Project Description: DRIC Solution Mining Research
Prepared By: C. Johnson

Note: All subcontractor unit rates for Crossing X-10.5 are based on proposals by Layne Christensen Co. (dated 7/14/2005) and by Z-Seis (dated 7/12/2005) for a single cross-hole panel (see attached)

Work Package Designation:
Project/Proposal Name:
Date:

MDOT Proposal
15-050014-00
9/30/2005

Detailed List of Steps or Tasks Required To Complete This Project	ESTIMATED LABOR HOURS Initials of Team Members, Employee Classifications, and Fee Rates										Estimated Expenses	Fee Estimate
	SrPC	PC	SrPJ	PJ	SF	T3	CADD	T2	WP	Total Hours		
Investigate entire alignment with four land borings (2 core and 2 rotary)												
Task 2 - Drilling / Coring (see Layne Proposal)												
Drill 4 Borings to approximately 1,500 feet												
Layne Christensen Company												
1 core-hole (land) to approximately 1,500 feet @ $292,238												$292,238
1 core-hole (land) to approximately 1,500 feet @ $292,238 - $40,000 (mob/demob)												$252,238
2 rotary borings to approximately 1,500 feet @ $189,873 / each												$379,746
Rig mud system (mob/demob)												$25,000
Moving between holes / Standby allowance @ $10,000/boring ($3,588 + NTH-add $6,412 per boring)												$40,000
TASK 2 SUBTOTAL												**$989,222**
Task 3 - Tomography (see Z-Seis Proposal)												
Perform cross-hole seismic tomography												
Z-Seis Reservoir Seismic												
Project Setup, Mob / Demob @ $30,000												$30,000
Perform gyroscopic borehole surveys @ $10,000 per boring x 4 borings												$40,000
Crane Rental @ $5,000 per boring												$20,000
Perform cross-hole seismic tomography panel @ $50,000 per panel x 3 panels												$150,000
Tooling Insurance @ $25,000 per set of borings x 1 set per panel x 3 panels												$75,000
Standby time @ $10,000 per day x 1 day												$10,000
TASK 3 SUBTOTAL												**$325,000**
TOTAL HOURS PER TEAM MEMBER									TOTALS	$0	$0	**$1,314,222**

Detroit River International Crossing

10/17/05

17

Statement of Work

For Roger M. Turpening
Michigan Technological University

To NTH Consulting Inc.

This is the Statement of Work for Dr. Roger Turpening, part of NTH Consulting Inc.'s consulting team to investigate the effects of historical Brine Wells on a conceptual structure for crossing the Detroit River in Detroit, Michigan. At this time, the Brine Well Investigation may be conducted at one or both of two crossing alternatives designated as X-10.5 and X-11(R). Each of these crossings is located in the Zug Island area of Detroit and on the U.S. side of the river only.

The investigation for Crossing X-10.5 will consist of four test borings to an approximate depth of 1,500 feet each. Cross-hole tomography will be performed within each boring, resulting in three cross-hole seismic panels. NTH will prepare a report documenting the field work, evaluating for the presence and size of brine well cavities, evaluating the potential for these cavities to impact/limit the foundation system for the proposed crossing structure, and assess risk of future subsidence and/or collapse effects of these cavities on the proposed structure. For Crossing X-11(R), the field investigation consists of two test borings and one cross-hole seismic panel, with a similar report.

Scope of Services for Dr. Turpening:

For Each Crossing

1) Review overall project plan, boring locations, and field data acquisition methods before commencing field work. Provide recommendations for minor improvements/modifications. Participate in project kick-off planning meeting in Detroit.
2) Consult on methods used to analyze field data.
3) Be on site for field data acquisition.
4) Perform limited analysis of data to verify existence and probable extent of void propagation to the ground surface including angle of propagation if apparent.
5) Review and provide opinions on draft data report. Participate in internal meeting in Detroit via telephone.
6) Be an author and review report section assessing results of cross-hole seismic tomography. Participate in several phone meetings regarding this report section.
7) Review and provide opinions on draft interpretative report. Participate in internal meeting in Detroit via telephone.
8) Participate in meeting in Detroit with Michigan Department of Transportation (MDOT) to discuss report. Participate in one report revision to address MDOT concerns.
9) Be available for discussions via phone.

The services for this project will be provided on a not-to-exceed basis and it will be NTH's responsibility to keep Michigan Tech informed of the project and budget status.

MichiganTech

Confirming Order

Michigan Technological University
1400 Townsend Drive
Houghton, Michigan 49931

MTU Proposal No._____

To: Craig Johnson NTH Consultants Ltd 480 Ford Field (Gate G) 2000 Brush Street Detroit, MI 48226 phone: 313-237-3900, fax: 313-237-3909 email: crjohnson@nthconsultants.com	**Bill to:** (If different address, If same, write SAME)
Start date: November 1, 2005	**Completion date:** October 31, 2006

Payment terms:

Description of Project

Consulting services as per attached statement of work.
Not to exceed costs for each segment are:
Crossing X-10.5: $52,893
~~Crossing X-11: $17,107~~

Company Purchase Order No:_____

This Confirming Order must be signed by a Company official authorized to obligate the Company to the terms and conditions of this agreement which appear on the reverse side of this order.

NO OTHER TERMS SHALL APPLY

Project Total: ~~$70,000~~ $52,893 (Not to Exceed) *All payments to be made in US Dollars*

Offered By MTU: _____	**Accepted by:** _____
Name: _____	**Name:** _____
Title: _____	**Title:** _____
Date: _____	**Date:** _____

NTH Consultants, Ltd.

PROJECT FEE ESTIMATING SHEET(Crossing X-10.5)

Client Name: Parsons
Project Description: DRIC Solution Mining (Dr. Roger Turpening Scope)
Prepared By: C. Johnson

Work Package Designation:
Project/Proposal Name: 15-050014-00
Date: 9/30/2005

Detailed List of Steps or Tasks Required To Complete This Project	ESTIMATED LABOR HOURS Initials of Team Members, Employee Classifications, and Fee Rates										Estimated Expenses	Estimated Subcontractor Fees
	RT									Total Hours		
	$186											
Review Overall Project Plan and Provide Recommendations. **Meeting in Detroit**	16									16	$625	$3,602
Review and consult on field data analysis	12									12		$2,232
Onsite for field data acquisition	52									52	$6,250	$15,924
Perform void analysis modeling of data	68									68		$12,651
Review Draft Report	10									10		$1,860
Prepare brine well assesment section of report	30									30		$5,581
Review Draft Interpretative Report	24									24		$4,465
MDOT Meeting In Detroit	16									16	$624	$3,601
Phone Discussions	16									16		$2,977
										0		$0
										0		$0
AL HOURS PER TEAM MEMBER	244	0	0	0	0	0	0	0	0			
									TOTALS	228	$7,499	$52,893
												TOTAL ESTIMATED FEE

20

Edward J. Cording Geotechnical Consultant
P. 0. Box 125 4 College Park Court Savoy, IL 61874
Phone 217 351 8709 **Fax 217 351 8700**

Oct 14, 2005

Mr. J. Alberts
NTH Consultants, Ltd
2000 Brush St.
Suite 480
Detroit MI 48226

Subject: Detroit River International Crossing Study (DRIC), Task 2330 Collect EPE Geotechnical Data. Your Proj No: 15-0500014-00

Dear Mr. Alberts:

I am pleased to participate as part of the consulting team to investigate the effects of historical Brine Wells on a conceptual structure for crossing the Detroit River in Detroit, Michigan.

I understand that the Brine Well Investigation may be conducted at one or both of two crossing alternatives designated as X-10.5 and X-11(R), in the Zug Island Area, and on the U.S. side of the river. You plan test borings to a depth of 1500 ft and cross-hole seismic tomography.

I agree with the effort you propose for my services and have summarized my proposed scope of services as follows:

For each crossing:

1) Review overall project plan, boring locations, and field data acquisition methods before commencing field work. Provide recommendations for minor improvements/modifications. Participate in project kick-off planning meeting.
2) Review prepared boring logs during drilling and provide opinions and recommendations in timely manner so as modifications to the field procedures can be made.
3) Consult on methods used to analyze field data.
4) Review collected data on experience with brine well operation and subsidence in the Detroit Area.
5) Perform analysis to determine mode of and probable extent of void propagation to the ground surface including likelihood of propagation and angle of propagation.
6) Review and provide opinions on draft data report. Participate in internal meeting in Detroit in person.

7) Be primary author of report section assessing future risk of brine well cavities on future structures. Participate in several phone meetings regarding this report section.
8) Review methods to stabilize brine well cavities to an acceptable level if applicable.
9) Review and provide opinions on draft interpretative report. Participate in internal meeting in Detroit in person.
10) Participate in meeting in Detroit with Michigan Department of Transportation (MDOT) to discuss report. Participate in one report revision to address MDOT concerns.
11) Be available for discussions via phone.

My services will be on the basis of an hourly rate for services plus direct costs, without markup. My rate for this project is my current rate of $250 per hour, Support from my engineering/geotechnical staff is at $100/hour.

I look forward to working with you on this interesting project.

Sincerely yours,

Edward J. Cording

NTH Consultants, Ltd.

PROJECT FEE ESTIMATING SHEET(Crossing X-10.5)

Client Name: Parsons
Project Description: DRIC Solution Mining (Dr. Edward Cording Scope)
Prepared By: J. Alberts

Work Package Designation:
Project/Proposal Name: 15-050014-00
Date: 9/30/2005

Detailed List of Steps or Tasks Required To Complete This Project	ESTIMATED LABOR HOURS Initials of Team Members, Employee Classifications, and Fee Rates										Estimated Expenses	Estimated Subcontractor Fees
	EC	PC				T3				Total Hours		
	$250	$190				$50						
Review Overall Project Plan and Provide Recommendations. **Meeting in Detroit**	16										$800	$4,800
Review Boring Logs During Drilling and Provide Opinions	6											$1,500
Review and consult on field data analysis	6									6		$1,500
Review Draft Report, **Meeting In Detroit**	24									24		$6,000
Perform void propagation analysis	32	32				24				88	$800	$13,200
Prepare brine well risk section of report	8	16								24		$3,600
Review stablization methods	8									8		$2,000
Review Draft Interpretative Report,	24									24		$6,000
MDOT Meeting In Detroit	16									16	$800	$4,800
Phone Discussions	6									6		$1,500
										0		
										0		
TOTAL HOURS PER TEAM MEMBER	146	48	0	0	0	24	0	0	0			
									TOTALS	196	$2,400	$44,900
												TOTAL ESTIMATED FEE

Exhibit B

Derivation of Cost Proposal

Control Section		MDOT Job #	Project Description
CS 82900		JN 802330	DRIC - EPE with an EIS Amendment 1

Name of Sub Consultant: WOOLPERT

DIRECT LABOR

Name	Classification	Person Hours	x	Hourly Rate	=	Labor Costs
	Project Manager	16	x	$39.73		$636
	Professional Surveyor	8	x	$27.36		$219
	Crew Chief	2	x	$18.77		$38
	Survey Technical	8	x	$18.23		$146
	Photogrammetrist	6	x	$37.76		$227
	CADD Tech	30	x	$17.07		$512
	Photo Lab Tech	8	x	$16.81		$134
	Pilot	4	x	$27.38		$110
	Aerial Camera Operator	4	x	$16.70		$67
	Stereoplotter Operator	20	x	$17.70		$354
	Clerical	6	x	$15.40		$92
	Total Hours	112			**Total Labor**	**$2,534**

OVERHEAD

	$2,534	x	173.25%	**Total Overhead**	**$4,390**

FACILITIES COST OF CAPITAL

	$2,534	x	1.95%	**Total F.C.C.**	**$49**

DIRECT EXPENSES	Unit Cost	x	Units		
Shipping	10	x	10	Overnights	$100
Wayne County DEM	33.75	x	8		$270
Wayne County Breaklines	33.75	x	8		$270
Wayne Orthos	120	x	8		$960
Computer	10	x	10		$100
FLT Crew per Diem	300	x	1	Day	$300
SV per Diem	71	x	1	Day	$71
SV Truck/day	0.375	x	150	Day	$56
GPS Static/day	20	x	1	Day	$20
Aircraft/hr	500	x	3	Hour	$1,500
Camera/hr	500	x	1	Hour	$500
Film/exp.	2.06	x	150	0	$309
Film Process/ft.	1.15	x	150	Foot	$173
Computer Usage	10	x	190	Hour	$1,900
Supplies	600	x	1	0	$600
				Total Direct Costs	**$ 7,129**

FIXED FEE

	$6,924	x	11.00%	**Total Fixed Fee**	**$762**

TOTAL WOOLPERT COSTS $ 14,863

Exhibit C

Derivation of Cost
SUMMARY BY JOB NUMBER AND BY CATEGORY

Control Section		MDOT Job #	Project Description
CS 82900		JN 802330	DRIC - EPE with an EIS Amendment 1

DIRECT LABOR (with escalation)	Direct Labor Hours	Direct Labor Costs
Prime Consultant	1,600	$62,928
Subconsultants		
Parsons Transportation Group	162	$9,720
DLA Piper Rudnick Gray Cary US LLP	382	$240,660
CCRG	1,040	$25,445
Hamilton Anderson Associates	84	$3,108
NTH	7,096	$169,398
Woolpert Design, LLP	112	$2,534
Total Direct Labor	**10,476**	**$513,792**

OVERHEAD	Overhead Costs
Prime Consultant	$103,246
Subconsultants	
Parsons Transportation Group	$13,316
DLA Piper Rudnick Gray Cary US LLP	$0
CCRG	$27,488
Hamilton Anderson Associates	$5,242
NTH	$318,468
Woolpert Design, LLP	$4,390
Total Overhead	**$472,150**

FACILITIES COST OF CAPITAL	F.C.C. Costs
Prime Consultant	$234
Subconsultants	
Parsons Transportation Group	$26
DLA Piper Rudnick Gray Cary US LLP	$0
CCRG	$0
Hamilton Anderson Associates	$23
NTH	$68
Woolpert Design, LLP	$49
Total F.C.C. Costs	**$400**

DIRECT EXPENSES		Direct Costs
Prime Consultant		$139,782
Subconsultants		
Parsons Transportation Group		$0
DLA Piper Rudnick Gray Cary US LLP		$1,170
CCRG		$1,005
Hamilton Anderson Associates		$148,836
NTH		$1,466,410
Woolpert Design, LLP		$7,129
	Total Direct Expenses	**$1,764,332**

FIXED FEE		Fixed Fee Costs
Prime Consultant		$18,279
Subconsultants		
Parsons Transportation Group		$2,534
DLA Piper Rudnick Gray Cary US LLP		$0
CCRG		$5,823
Hamilton Anderson Associates		$918
NTH		$53,665
Woolpert Design, LLP		$762
	Total Fixed Fee	**$81,981**

TOTAL COSTS FOR THIS JOB	**$2,832,655**

Derivation of Cost

SUMMARY BY CATEGORY BY ORIGINAL CONTRACT AND AMENDMENTS

Control Section		MDOT Job #	Project Description
CS 82900		JN 802330	DRIC - EPE with an EIS

	Original Contract	Amend 1	Total
DIRECT LABOR			
Corradino	$ 2,017,175	$ 62,928	$ 2,080,103
Parsons Transportation Group	$ 1,742,723	$ 9,720	$ 1,752,442
ACG: The al Chalabi Group, Ltd.	$ 310,015		$ 310,015
DLA Piper Rudnick Gray Cary US LLP	$ -	$ 240,660	$ 240,660
Alfred Benesch & Company	$ 257,949		$ 257,949
CCRG	$ 224,488	$ 25,445	$ 249,933
Hamilton Anderson Associates	$ 299,019	$ 3,108	$ 302,127
Northwest Consultants, Inc.	$ 108,617		$ 108,617
NTH	$ 46,053	$ 169,398	$ 215,451
SOMAT Engineering, Inc.	$ 76,069		$ 76,069
TBE Group, Inc.	$ 6,703		$ 6,703
Wetland & Coastal Res., Inc.	$ 106,705		$ 106,705
Woolpert Design, LLP	$ 274,665	$ 2,534	$ 277,199
Total	**$5,470,181**	**$513,792**	**$5,983,973**
OVERHEAD			
Corradino	3398537.156	$ 103,246	$ 3,501,783
Parsons Transportation Group	$2,335,597	$ 13,316	$ 2,348,913
ACG: The al Chalabi Group, Ltd.	$0		$ -
DLA Piper Rudnick Gray Cary US LLP		$ -	$ -
Alfred Benesch & Company	$398,351		$ 398,351
CCRG	$242,514	$ 27,488	$ 270,003
Hamilton Anderson Associates	$504,296	$ 5,242	$ 509,537
Northwest Consultants, Inc.	$176,166		$ 176,166
NTH	$86,580	$ 318,468	$ 405,048
SOMAT Engineering, Inc.	$129,318		$ 129,318
TBE Group, Inc.	$11,078		$ 11,078
Wetland & Coastal Res., Inc.	$165,392		$ 165,392
Woolpert Design, LLP	$456,054	$ 4,390	$ 460,443
Total	**$7,903,882**	**$472,150**	**$8,376,032**

FACILITIES COST OF CAPITAL

Corradino	$6,336	$ 234	$ 6,570
Parsons Transportation Group	$4,627	$ 26	$ 4,653
ACG: The al Chalabi Group, Ltd.	$0		$ -
DLA Piper Rudnick Gray Cary US LLP	$0	$ -	$ -
Alfred Benesch & Company	$3,147		$ 3,147
CCRG	$0	$ -	$ -
Hamilton Anderson Associates	$2,180	$ 23	$ 2,203
Northwest Consultants, Inc.	$0		$ -
NTH	$18	$ 68	$ 86
SOMAT Engineering, Inc.	$0		$ -
TBE Group, Inc.	$20		$ 20
Wetland & Coastal Res., Inc.	$0		$ -
Woolpert Design, LLP	$3,378	$ 49	$ 3,428
Total	**$19,706**	**$400**	**$20,106**

DIRECT EXPENSES

Corradino	$400,251	$ 139,782	$ 540,033
Parsons Transportation Group	$ 372,903	$ -	$ 372,903
ACG: The al Chalabi Group, Ltd.	$ 7,596		$ 7,596
DLA Piper Rudnick Gray Cary US LLP		$ 1,170	$ 1,170
Alfred Benesch & Company	$ 52,290		$ 52,290
CCRG	$ 329,327	$ 1,005	$ 330,332
Hamilton Anderson Associates	$ 48,735	$ 148,836	$ 197,571
Northwest Consultants, Inc.	$ -		$ -
NTH	$ 217,619	$ 1,466,410	$ 1,684,029
SOMAT Engineering, Inc.	$ 112,000		$ 112,000
TBE Group, Inc.	$ 96,955		$ 96,955
Wetland & Coastal Res., Inc.	$ 70,544		$ 70,544
Woolpert Design, LLP	$ 162,686	$ 7,129	$ 169,815
Total	**$1,870,905**	**$1,764,332**	**$3,635,237**

FIXED FEE

Corradino	$	595,728	$	18,279	$	614,008
Parsons Transportation Group	$	448,615	$	2,534	$	451,149
ACG: The al Chalabi Group, Ltd.	$	-			$	-
DLA Piper Rudnick Gray Cary US LLP			$	-	$	-
Alfred Benesch & Company	$	72,193			$	72,193
CCRG	$	51,370	$	5,823	$	57,193
Hamilton Anderson Associates	$	88,365	$	918	$	89,283
Northwest Consultants, Inc.	$	31,326			$	31,326
NTH	$	14,590	$	53,665	$	68,255
SOMAT Engineering, Inc.	$	22,593			$	22,593
TBE Group, Inc.	$	1,956			$	1,956
Wetland & Coastal Res., Inc.	$	29,931			$	29,931
Woolpert Design, LLP	$	80,379	$	762	$	81,141
Total		**$1,437,045**		**$81,981**		**$1,519,026**

FIRM TOTALS

Corradino	$	6,418,028	$	324,469	$	6,742,497
Parsons Transportation Group	$	4,904,464	$	25,595	$	4,930,060
ACG: The al Chalabi Group, Ltd.	$	317,611	$	-	$	317,611
DLA Piper Rudnick Gray Cary US LLP	$	-	$	241,830	$	241,830
Alfred Benesch & Company	$	783,929	$	-	$	783,929
CCRG	$	847,700	$	59,761	$	907,460
Hamilton Anderson Associates	$	942,594	$	158,127	$	1,100,721
Northwest Consultants, Inc.	$	316,110	$	-	$	316,110
NTH	$	364,859	$	2,008,009	$	2,372,868
SOMAT Engineering, Inc.	$	339,979	$	-	$	339,979
TBE Group, Inc.	$	116,712	$	-	$	116,712
Wetland & Coastal Res., Inc.	$	372,571	$	-	$	372,571
Woolpert Design, LLP	$	977,162	$	14,863	$	992,025
TOTAL COSTS		**$16,701,719**		**$2,832,655**		**$19,534,374**

DRIC - EPE/EIS - COST - AMENDMENT 1

HOURS BY TASK			Public Involv.	SEE Studies	Geotech. Data	Aerial Topo	
The Corradino Group			1230/211M	2310	2330	3310	Total
Corradino, JC	Proj. Manager		300				300
Anderson	Graphics						0
Corradino, D	Planner		400				400
Butler	Planner		100				100
Hartman	Lead Traffic Eng.		100				100
Santana	Planner		400				400
Stone, T.	Lead Environ.		300				300
Strange	Planner						0
Wolf	Editor						0
	Subtotal Hours		1600	0	0	0	**1600**
Parsons Transportation Group							Total
Regine Beauboeuf	Deputy Proj. Man.				32		32
Bruce L. Campbell	Lead Bridge				40		40
Patrick Cassity	Bridge Design				30		30
Ken Serzan	Rdway/Plaza/Bridge				20		20
Sr. Engineer	Rdway/Plaza/Bridge				40		40
	Subtotal Hours		0	0	162	0	**162**
DLA Piper Rudnick Gray							Total
Blandchard	Consultant		382				382
	Subtotal Hours		382	0	0	0	**382**
CCRGroup Inc.							Total
D. J. Weir	Task Manager			328			328
C. S. Demter	Principal Investigator			633			633
E. Robinson	Architectural His.			65			65
J. Montney	GIS/Graphics			14			14
	Subtotal Hours		0	1040	0	0	**1040**
Hamilton Anderson Associates							Total
Jeff Mason	Project Manager		84				84
	Subtotal Hours		84	0	0	0	**84**
NTH Consultants							Total
Keith Swaffar	Proj. Director				112		112
Fritz Klingler	Proj. Manager				280		280
Joe Alberts	Task Manager				420		420
Harry Price	Task Manager				420		420
Craig Johnson	Project Eng.				778		778
Jason Edberg	Project Eng.				654		654
Heather Audet	Project Eng.				654		654
Sanket Gole	Project Eng.				654		654
Mike Firestone	Project Eng.				654		654
Zachary Carr	Project Eng.				400		400
Nateira Farrington	Clerical				690		690
Dawn Pressley	Clerical				690		690
Latricia Giddens	Clerical				690		690
	Subtotal Hours		0	0	7096	0	**7096**

WOOLPERT

							Total
	Project Manager					16	16
	Professional Surveyor					8	8
	Crew Chief					2	2
	Survey Technical					8	8
	Photogrammetrist					6	6
	CADD Tech					30	30
	Photo Lab Tech					8	8
	Pilot					4	4
	Aerial Camera Operator					4	4
	Stereoplotter Operator					20	20
	Clerical					6	6
	Subtotal Hours		0	0	0	112	**112**

TOTAL HOURS

							Total
The Corradino Group			1600	0	0	0	1,600
Parsons Transportation Group			0	0	162	0	162
DLA Piper Rudnick Gray Cary US LLP			382	0	0	0	382
CCRG			0	1040	0	0	1,040
Hamilton Anderson Associates			84	0	0	0	84
NTH			0	0	7096	0	7,096
Woolpert Design, LLP			0	0	0	112	112
			2066	1040	7258	112	**10,476**

COST BY TASK

The Corradino Group

		Wage Rate	Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total
Corradino, JC	Proj. Manager	$76.45	22935	0	0	0	$ 22,935
Anderson	Graphics	$19.88	0	0	0	0	$ -
Corradino, D	Planner	$25.24	10096	0	0	0	$ 10,096
Butler	Planner	$23.82	2382	0	0	0	$ 2,382
Hartman	Lead Traffic Eng.	$47.89	4789	0	0	0	$ 4,789
Santana	Planner	$22.51	9004	0	0	0	$ 9,004
Stone, T.	Lead Environ.	$45.74	13722	0	0	0	$ 13,722
Strange	Planner	$43.01	0	0	0	0	$ -
Wolf	Editor	$22.06	0	0	0	0	$ -
	Subtotal Wages		62928	0	0	0	$ 62,928
Overhead		164.07%	103246	0	0	0	$ 103,246
Facilities Cost of Capital		0.3720%	234	0	0	0	$ 234
Profit		11.00%	18279	0	0	0	$ 18,279
Subtotal - Wages + Overhead + Profit			184,687	-	-	-	$ 184,687.198

Direct Costs	Unit Cost	# Units	Type	Cost
Supplies/Shipments	$600.00	1	Lump Sum	600
Additional Equipment Rental (see attached sheet)				$119,102
Additional Meeting Printed Materials (see attached sheet)				$20,080
Radion Advertising Future Meetings				0
Subtotal Other Direct Costs				$139,782

TOTAL - COSTS	$324,469

COST BY TASK

Parsons Transportation Group

			Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total
Regine Beauboeuf	Deputy Proj. Man.	$62.31	0	0	1,994	0	$ 1,994
Bruce L. Campbell	Lead Bridge	$49.00	0	0	1,960	0	$ 1,960
Steve Nicaise	Lead Rdway & Plaza	$68.75	0	0	2,063	0	$ 2,063
Joel Fitts	Microsimulation	$89.42	0	0	1,788	0	$ 1,788
Sr. Engineer	Rdway/Plaza/Bridge	$47.87	0	0	1,915	0	$ 1,915
	Subtotal Wages		0	0	9,720	0	$ 9,720
Overhead		137.00%	-	-	13,316	-	$ 13,316
Facilities Cost of Capital		0.2655%	-	-	26	-	$ 26
Profit		11.00%	-	-	2,534	-	$ 2,534
Subtotal - Wages + Overhead + Profit			-	-	25,595	-	$ 25,595

TOTAL - COSTS	$ 25,595

COST BY TASK

DLA Piper Rudnick Gray

		Wage Rate	Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total
Blandchard	Consultant	$ 630.00	$ 240,660	$ -	$ -	$ -	$ 240,660
	Subtotal Wages		240660	0	0	0	$ 240,660

Direct Costs	Unit Cost	# Units	Type	Cost
Mileage	$0.3750	1200	Miles	$450
Shipping	$20	16	Overnights	$320
Misc.				$400
Subtotal Other Direct Costs				$1,170

TOTAL - COSTS	$ 241,830

COST BY TASK

CCRGroup Inc.

		Wage Rate	Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo Map 3310	Total
D.J Weir	Task Manager	$ 32.00	0	10496	0	0	$ 10,496
C. S. Demeter	Principal Investigator	$ 21.25	0	13451.25	0	0	$ 13,451
E. Robinson	Architectural His.	$ 19.65	0	1277.25	0	0	$ 1,277
J. Montney	GIS/Graphics	$ 15.75	0	220.5	0	0	$ 221
	Subtotal Wages		0	25445	0	0	$ 25,445
Overhead		108.03%	-	27,488	-	-	$ 27,488
Facilities Cost of Capital		0.00%	-	-	-	-	$ -
Profit		11.00%	-	5,823	-	-	$ 5,823
Subtotal - Wages + Overhead + Profit			-	58,756	-	-	$ 58,756

Direct Costs	Unit Cost	# Units	Type	Cost
Rental Car	$ 90.00	10	Days	$ 900
Printing - B&W	$ 0.10	300	In-house	$ 30
Computer	$ 5.00	15	In-house	$ 75
Subtotal Other Direct Costs				$ 1,005

TOTAL - COSTS	$ 59,761

COST BY TASK

Hamilton Anderson Associates

		Wage Rate	Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total
Jeff Mason	Project Manager	$ 37.00	3108	0	0	0	$ 3,108
	Subtotal Wages		3108	0	0	0	$ 3,108
Overhead		168.65%	5242	0	0	0	$ 5,242
Facilities Cost of Capital		0.73%	23	0	0	0	$ 23
Profit		11.00%	918	0	0	0	$ 918
Subtotal - Wages + Overhead + Profit			9,291	-	-	-	$ 9,291

Direct Costs	Unit Cost	# Units	Type	Cost
Radio Ads				
WMXD	$ 240	16		$ 3,840
WJLB	$ 275	12		$ 3,300
WWJ	$ 278	12		$ 3,336
WYCD	$ 215	18		$ 3,870
WVMV	$ 170	18		$ 3,060
ARABIC Cable	$ 200	8		$ 1,600
WCHB	$ 100	4		$ 400
WMKM	$ 100	4		$ 400
Subtotal One Meeting Set of Ads				$ 19,806
DP & Company per ad production cost				$ 5,000
Six Remaining Meeting Sets (subtotal above x 6)				$ 148,836

TOTAL - COSTS	$ 158,127

COST BY TASK

NTH Consultants			Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total
Keith Swaffar	Proj. Director	$ 50.00			$ 5,600		$ 5,600
Fritz Klingler	Proj. Manager	$ 50.00			$ 14,000		$ 14,000
Joe Alberts	Task Manager	$ 42.00			$ 17,640		$ 17,640
Harry Price	Task Manager	$ 42.00			$ 17,640		$ 17,640
Craig Johnson	Project Eng.	$ 22.00			$ 17,116		$ 17,116
Jason Edberg	Project Eng.	$ 22.00			$ 14,388		$ 14,388
Heather Audet	Project Eng.	$ 22.00			$ 14,388		$ 14,388
Sanket Gole	Project Eng.	$ 22.00			$ 14,388		$ 14,388
Mike Firestone	Project Eng.	$ 22.00			$ 14,388		$ 14,388
Zachary Carr	Project Eng.	$ 22.00			$ 8,800		$ 8,800
Nateira Farrington	Clerical	$ 15.00			$ 10,350		$ 10,350
Dawn Pressley	Clerical	$ 15.00			$ 10,350		$ 10,350
Latricia Giddens	Clerical	$ 15.00			$ 10,350		$ 10,350
	Subtotal Wages		0	0	$ 169,398	0	$ 169,398
Overhead		188.00%	0	0	318468	0	$ 318,468
Facilities Cost of Capital		0.04%	0	0	68	0	$ 68
Profit		11.00%	0	0	53665	0	$ 53,665
Subtotal - Wages + Overhead + Profit			-	-	$ 541,599	-	$ 541,599

Direct Costs	Unit Cost	# Units	Type	Cost
Mileage	$0.405	4000	miles	$1,620
Copies	$ 0.22	4000	pages	$880
FedEx	$15	13	overnights	$195
Digital Camera	$10	120	days	$1,200
Layne Christensen Drilling (attached)			lump sum	$989,222
Z-Seis Reservoir Seismic (tomography((attached)			lump sum	$325,000
Equipment	$75	120		$9,000
Supplies	$1,500	1		$1,500
Permits (Corps, US)	$10,000	4		$40,000
External Consulting - Turpening			Not to exceed	$52,893
External Consulting - Cording			Not to exceed	$44,900
Subtotal Other Direct Costs				$ 1,466,410

TOTAL - COSTS	**$ 2,008,009**

COST BY TASK

WOOLPERT

		Wage Rate	Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total
	Project Manager	39.73	0	0	0	636	$ 636
	Professional Surveyor	27.36	0	0	0	219	$ 219
	Crew Chief	18.77	0	0	0	38	$ 38
	Survey Technical	18.23	0	0	0	146	$ 146
	Photogrammetrist	37.76	0	0	0	227	$ 227
	CADD Tech	17.07	0	0	0	512	$ 512
	Photo Lab Tech	16.81	0	0	0	134	$ 134
	Pilot	27.38	0	0	0	110	$ 110
	Aerial Camera Operator	16.70	0	0	0	67	$ 67
	Stereoplotter Operator	17.70	0	0	0	354	$ 354
	Clerical	15.40	0	0	0	92	$ 92
	Subtotal Wages		0	0	0	2534	$ 2,534
Overhead		173.25%	0	0	0	4390	$ 4,390
Facilities Cost of Capital		1.95%	0	0	0	49	$ 49
Profit		11.00%	0	0	0	762	$ 762
Subtotal - Wages + Overhead + Profit			0	0	0	7735	$ 7,735

Direct Costs	Unit Cost	# Units	Type	Cost
Shipping	$ 10.00	10	Overnights	$ 100
Wayne County DEM	$33.75	8		$ 270
Wayne County Breaklines	$33.75	8		$ 270
Wayne Orthos	$120	8		$ 960
Computer	$10	10		$ 100
FLT Crew per Diem	$ 300.00	1	Day	$ 300
SV per Diem	$ 71.00	1	Day	$ 71
SV Truck/day	$ 0.38	150	Day	$ 56
GPS Static/day	$ 20.00	1	Day	$ 20
Aircraft/hr	$ 500.00	3	Hour	$ 1,500
Camera/hr	$ 500.00	1	Hour	$ 500
Film/exp.	$ 2.06	150		$ 309
Film Process/ft.	$ 1.15	150	Foot	$ 173
Computer Usage	$ 10.00	190	Hour	$ 1,900
Supplies	$ 600.00	1		$ 600
Subtotal Other Direct Costs				$ 7,129

TOTAL - COSTS	$ **14,863**

COST TOTALS BY TASK AND FIRM

FIRM	Public Involv. 1230/211M	SEE Studies 2310	Geotech. Data 2330	Aerial Topo 3310	Total Service $	Directs	Totals
The Corradino Group	184,687	-	-	-	$ 184,687	$ 139,782	$ 324,469
Parsons Transportation Group	-	-	25,595	-	$ 25,595	$ -	$ 25,595
DLA Piper Rudnick Gray	240,660	-	-	-	$ 240,660	$ 1,170	$ 241,830
CCRG	-	58,756	-	-	$ 58,756	$ 1,005	$ 59,761
Hamilton Anderson Associates	9,291	-	-	-	$ 9,291	$ 148,836	$ 158,127
NTH	-	-	541,599	-	$ 541,599	$ 1,466,410	$ 2,008,009
Woolpert Design. LLP	-	-	-	7,735	$ 7,735	$ 7,129	$ 14,863
TOTALS	434,638	58,756	567,194	7,735	$ 1,068,323	$ 1,764,332	**$ 2,832,655**

Date:	July 14, 2005
Prepared For:	Craig Johnson
Affiliation:	NTH Consultants
Project Location:	Detroit Michigan
Scope:	Core Drilling on Land
Phone	313-237-3917
Fax	
Email	crjohnson@nthconsultants.com

	UNITS	UNIT COST	ESTIMATED QUANTITY	ESTIMATED EXTENSION
Mobilization & Demobilization				
D 40 K Rotary Drill / Core Drill	Each	$40,000.00	1	$40,000.00
Vertical Hole Drilling Overburden				
10 3/4" Overburden Drilling	Per Foot	$52.00	100	$5,200.00
7" Surface Casing	Per Foot	$35.00	100	$3,500.00
7" Casing Shoe	Each	$85.00	1	$85.00
Grout 7" Casing (0-100')	Per Foot	$25.00	32	$800.00
HW Surface Casing	Per Foot	$31.00	100	$3,100.00
HW Casing Shoe	Each	$595.00	1	$595.00
HQ Casing Advancer Sub Left In Hole	Each	$1,475.00	0	$0.00
Reaming H Q Core Hole To 6"	Per Foot	$41.00	1500	$61,500.00
5.5" Fiberglass Casing	Per Foot	$52.00	1500	$78,000.00
Installation of 5" Fiberglass Casing	Per Hour	$375.00	24	$9,000.00
HQ Core Drilling				
Drilling Per Foot 0-500 ft.	Per Foot	$34.00	500	$17,000.00
Drilling Per Foot 501-1000 ft.	Per Foot	$39.00	499	$19,461.00
Drilling Per Foot 1001-1500 ft.	Per Foot	$41.00	499	$20,459.00
NQ Core Drilling				
Drilling Per Foot 0-500 ft.	Per Foot	$28.00	0	$0.00
Drilling Per Foot 501-1000 ft.	Per Foot	$29.50	0	$0.00
Drilling Per Foot 1001-1500 ft.	Per Foot	$32.00	0	$0.00
Drilling Per Foot 1501-2000 ft.	Per Foot	$28.00	0	$0.00
Signal Shot Surveys	Per Hour	$250.00	0	$0.00
Hourly Rig and Crew Charges				
Moving Between Holes	Per Man Hour	$92.00	39	$3,588.00
Hole Stabilizing Per Hour or Abandonment	Per Hour	$375.00	20	$7,500.00
Hole Abandonment Materials (300 bags estimated)	Cost Plus 15%	$4,500.00	1	$4,500.00
Drill Additives (estimated)	Cost Plus 15%	$5,500.00	1	$5,500.00
Standby With 2 Man Crew	Per Hour	$300.00	0	$0.00
Signal Shot Survey Camera	Per Month	$2,500.00	0	$0.00
Rig Operating With 2 Man Crew	Per Hour	$375.00	0	$0.00
Water Truck Rental	Per Day	$150.00	0	$0.00
Hauling Water With Water Truck	Per Hour	$95.00	0	$0.00
Core Boxes	Each	$8.75	200	$1,750.00
Drilling Fluid and Drill Cuttings Disposal	By Others	Estimated		$5,000.00
ABI or OBI Borehole Logging Equipment	Mob Each	$2,500.00	0	$0.00

ABI or OBI Borehole Logging	Per Foot	$11.00	0	$0.00
Per Deim	Per Man Day	$95.00	60	$5,700.00
		TOTAL COST ESTIMATE		**$292,238.00**

This quotation is subject to change after 60 days from original proposal date as cited above.
This quotation is subject to the attachment entitled "QUALIFICATIONS AND ASSUMPTIONS."

Prepared By:

Keith Meyers - Operation Manager
LAYNE CHRISTENSEN COMPANY
Specialized Drilling Division - Milwaukee
W229 N5005 Duplainville Road
Pewaukee, WI 53072
Phone: (262) 246-4646

Date:	July 14, 2005
Prepared For:	Craig Johnson
Affiliation:	NTH Consultants
Project Location:	Detroit Michigan
Scope:	Rotary Drilling on Land
Phone	313-237-3917
Fax	
Email	crjohnson@nthconsultants.com

	UNITS	UNIT COST	ESTIMATED QUANTITY	ESTIMATED EXTENSION
Mobilization & Demobilization				
D 40 K Rotary Drill / Core Drill	Each	$40,000.00	0	$0.00
Vertical Hole Drilling Overburden				
10 3/4" Overburden Drilling	Per Foot	$52.00	100	$5,200.00
7" Surface Casing	Per Foot	$35.00	100	$3,500.00
7" Casing Shoe	Each	$85.00	1	$85.00
Grout 7" Casing (0-100')	Per Bag	$25.00	32	$800.00
HW Surface Casing	Per Foot	$31.00	0	$0.00
HW Casing Shoe	Each	$595.00	0	$0.00
HQ Casing Advancer Sub Left In Hole	Each	$1,475.00	0	$0.00
Drilling 6.5"	Per Foot	$41.00	1500	$61,500.00
5.5" Fiberglass Casing	Per Foot	$52.00	1500	$78,000.00
Installation of 5" Fiberglass Casing	Per Hour	$375.00	24	$9,000.00
HQ Core Drilling				
Drilling Per Foot 0-500 ft.	Per Foot	$34.00	0	$0.00
Drilling Per Foot 501-1000 ft.	Per Foot	$39.00	0	$0.00
Drilling Per Foot 1001-1500 ft.	Per Foot	$41.00	0	$0.00
NQ Core Drilling				
Drilling Per Foot 0-500 ft.	Per Foot	$28.00	0	$0.00
Drilling Per Foot 501-1000 ft.	Per Foot	$29.50	0	$0.00
Drilling Per Foot 1001-1500 ft.	Per Foot	$32.00	0	$0.00
Drilling Per Foot 1501-2000 ft.	Per Foot	$28.00	0	$0.00
Signal Shot Surveys	Per Hour	$250.00	0	$0.00
Hourly Rig and Crew Charges				
Moving Between Holes	Per Man Hour	$92.00	39	$3,588.00
Hole Stabilizing Per Hour or Abandonment	Per Hour	$375.00	20	$7,500.00
Hole Abandonment Materials (300 bags estimated)	Cost Plus 15%	$4,500.00	1	$4,500.00
Drill Additives (estimated)	Cost Plus 15%	$5,500.00	1	$5,500.00
Standby With 2 Man Crew	Per Hour	$300.00	0	$0.00
Signal Shot Survey Camera	Per Month	$2,500.00	0	$0.00

Rig Operating With 2 Man Crew	Per Hour	$375.00	0	$0.00
Water Truck Rental	Per Day	$150.00	0	$0.00
Hauling Water With Water Truck	Per Hour	$95.00	0	$0.00
Core Boxes	Each	$8.75	0	$0.00
Drilling Fluid and Drill Cuttings Disposal	By Others	Estimated		$5,000.00
ABI or OBI Borehole Logging Equipment	Mob Each	$2,500.00	0	$0.00
ABI or OBI Borehole Logging	Per Foot	$11.00	0	$0.00
Per Diem	Per Man Day	$95.00	60	$5,700.00
		TOTAL COST ESTIMATI		**$189,873.00**

Note: A one time mobilization / demobilization of $40,000 is included if all three sites (2 borings per site) are drilled in succession. Additional mobilizations / demobilizations will be charged at $40,000 per mob / demob.

This quotation is subject to change after 60 days from original proposal date as cited above.
This quotation is subject to the attachment entitled "QUALIFICATIONS AND ASSUMPTIONS."

Prepared By:

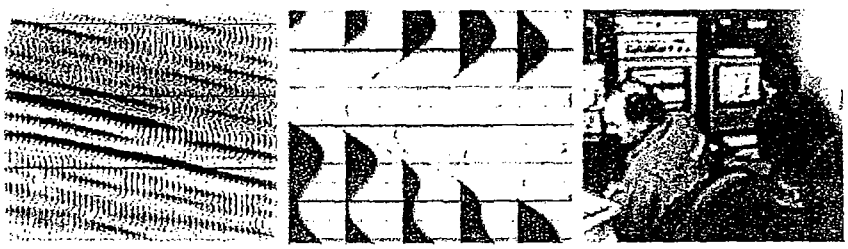
Keith Meyers - Operation Manager
LAYNE CHRISTENSEN COMPANY
Specialized Drilling Division - Milwaukee
W229 N5005 Duplainville Road
Pewaukee, WI 53072
Phone: (262) 246-4646

Z-SEIS Reservoir Seismic

Home
About Z-Seis
Technology Overview
Operations
News Room
Publications
Contact

About Z-Seis

Z-Seis Corporation exists to provide superior reservoir information through advanced borehole-seismic technology -- information detailed enough and dependable enough to dramatically enhance hydrocarbon recovery from even the most complex formations.



Worldwide, the experts at Z-Seis are the recognized authorities in cost-effective crosswell seismic. Why? Because the company's principal personnel have been applying and refining that extraordinary imaging technique since 1992, and were the innovators responsible for making it commercially viable.

Working jointly with Core Laboratories, Z-Seis helps oil and gas companies solve reservoir problems via TomoSeis™ technology.

Working independently, Z-Seis offers the full slate of reservoir-seismic methodologies and services. Everything from survey design through data acquisition, processing, interpretation, and incorporation in customers' models. Furthermore, Z-Seis has the resources -- in both equipment and expertise -- to perform these wide-ranging services in a variety of environments.

TomoSeis is a registered trademark of Core Laboratories.

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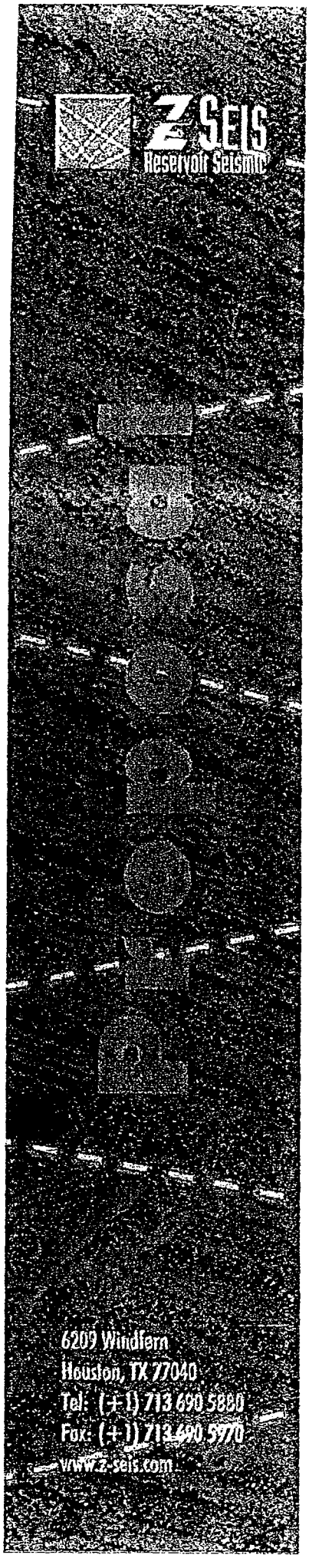


NTH CONSULTANTS

IMAGING SOLUTION MINING ZONES

PROPOSAL FOR
CROSSWELL SEISMIC SERVICES

JULY 12, 2005

TABLE OF CONTENTS

PROJECT OBJECTIVE

This proposal provides specific pricing and information regarding the project approach developed during a meeting between NTH, Layne Christensen and Z-Seis on 12 July 2005. The approach is to drill 2 boreholes and conduct a single crosswell profile between the boreholes in each of 3 areas. The boreholes will be 1000 feet apart and about 1500 feet in depth. The target zone of interest is from about 400 feet (an upper potential collapse zone) to about 1200 feet including the potential cavities/galleries in the salt formation.

As to the maximum distance between boreholes, three factors were considered: imaging coverage, resolution and signal-to-noise ratio. Based on geology information and logs received from NTH and Dr. Roger Turpening, we expect high frequency data to be generated to distances well in excess of 1,000 feet between wells. Therefore, we expect high vertical resolution for well spacings to 1,500 or even 2,000 feet. Signal-to-noise ratio may, however, be a limiting factor, due to the shallowness of the wells and the proximity to cultural noise in the river environment. Horizontal resolution also decreases as a function of distance. As long as the cavities have significant lateral extent, any reduction in horizontal resolution may not be a significant concern.

Imaging coverage appears to be the primary driver in determining the maximum well separation. We have run preliminary survey plans for 1500-foot deep wells, with a zone of interest from 400 to 1200 feet. We would like to achieve reasonably uniform coverage for imaging angles from 50 to 80 degrees from the vertical. To maximize the well separation we consider using both upgoing and downgoing reflection imaging coverage. Upgoing coverage uses source and receiver positions above the imaged zone and downgoing coverage uses source and receiver positions below the imaged zone. Therefore, we would image the salt cavity zone using upgoing reflection data and downgoing reflection data to image the upper collapse zone at about 400 feet.

In the survey plan section below we have considered two well separations: 1,000 feet and 1,500 feet. At 1,000 feet separation, we see uniform coverage from 400 to 1200 feet with the crossover point between downgoing and upgoing coverage at about 800 feet. At 1,500 feet separation, we have a gap in uniform coverage from about 500 to 1100 feet. We believe that 1,000 foot separation should provide good resolution, likely adequate SNR and gives full coverage of the interval from 400 to 1200 feet in depth.

These survey plans also give a conservative estimate of survey duration. We have provided a project price estimate in the Pricing section below.

PRICING AND ESTIMATE

The following special pricing is provided to NTH based on the current scope of work. If gyroscopic deviation surveys are purchased from a 3rd party, Z-Seis can operated the gyro survey tools on its wireline at the acquisition daily rate. Typically, 2 boreholes can be logged for gyro surveys in 0.5 acquisition days or charges of $4,000 / gyro survey for Z-Seis services in addition to the charges of the gyro survey contractor.

Pricing

Planning and Project Setup, Mobilization & Demobilization each cew/equipment mobilization[1]	$ 30,000.00	U.S.
Lump sum pricing per profile for wells spaced 1,000 feet apart as in the survey plan given below, including up to 2.5 days of acquisition and/or standby days and data processing including tomography and reflection imaging (upgoing and downgoing) but not including mobilization and demob [1,5]	$ 50,000.00	U.S.
Tool insurance per profile (pair of wells) [1,6]	$ 25,000.00	U.S.
Additional Acquisition Operating Day [1,2]	$ 16,000.00	U.S.
Additional Stand-By Day[1,3]	$ 10,000.00	U.S.
Third Party Services [1,4]	at cost + 15%	

Notes:

1. All prices are:
   - In U.S. dollars ($) based on the proposed scope of work;
   - Exclusive of all and any taxes and duties, including but not limited to, sales tax. In the event that such taxes, duties or fees apply, these shall be borne by client;
   - Subject to standard terms and conditions attached;
   - Subject to the pricing inclusions and exclusions below;
   - Payment terms: Project Set-Up and Mobilization/Demobilization upon mobilization of equipment, Acquisition upon completion of data acquisition, Processing upon completion of processing. In the event of extended data acquisition or processing, charges will be invoiced on a monthly and pro-rata basis.
   - This quotation is valid for 90 days and is based on information available.
2. Acquisition Days are calculated as the number of 24-hour operating days from and including the day the equipment arrives at the well site to and including the day of all equipment is rigged down from all wells. Excluded from this calculation are the number of hours of down time directly attributable to Z-Z-Seis. Acquisition Days are rounded up to the nearest half day. Within each Acquisition Day, 3 hours are reserved for routine maintenance and equipment servicing.

3. Stand-By Days are calculated as the number of days Z-Seis crew and equipment are required by to remain without operating. Stand-by Days are rounded up to the nearest half day.
4. Other third party services required for performance of the services are not included in the price (see pricing inclusions and exclusions below). Should Z-Seis be required to organize and provide these services then the surcharge listed will apply.
5. Lump sum pricing is for a typical set of logging conditions for the conditions as described to Z-Seis. If additional acquisition time is required to enhance SNR due to unexpected attenuation or high noise, additional operating day charges will apply.
6. Tool insurance is for the repair/replacement of tools lost in the well. Unless tool insurance is elected in writing at the start of the project, equipment liabilities shall be the Clients as stated in the standard terms and conditions. When tool insurance is elected, Z-Seis has the right to suspend operation in any situation in which Z-Seis personnel judge there to be a risk of tool loss. If the Client elects to proceed when so warned of a potential risk of tool loss, the equpment liability shall revert to Client as in the standard terms and conditions.

Pricing Inclusions & Exclusions

Included in the prices (i.e. to be provided by Z-Seis) are:

Downhole seismic equipment

- Crosswell seismic source
- TARS receiver system

Personnel

- Field crew

Crosswell seismic recording system

- Inter-unit communications & remote triggering system
- Source power amplifier
- Wellsite QC workstation

Auxiliary acquisition hardware

- Correlation logging system
- Source wireline hoist w/cable
- Receiver wireline hoist or hoists w/ cable

Services provided by Z-Seis

- Equipment Preparation, Staging, Mobilization and Demobilization
- Crosswell data recording
- Field QC of data
- Tomographic Processing of the data
- Generation of final reports

Excluded from pricing (to be provided by Client or arranged as third party services by Z-Seis).

- Preparation of wells
- Equipment for moving equipment to and from and on location
- Pressure control equipment and wellhead flanges if required
- Safety information
- Information for survey planning, including: Well logs, reservoir data, wellhead connections, pressure control requirements, fluid levels.
- Cranes for well access
- Gyroscopic deviation surveys
- Light plants or equivalent for night operations
- Special deployment and operating equipment needed for operation where wellheads are located in water, including but not limited to barge(s).

Pricing Estimate

The following pricing estimate is based on the preliminary survey plans given below and current project information. The example is for 1 profile in each of 3 areas with boreholes 1000 feet apart and 1500 feet deep. The zone of interest is from 400 to 1200 feet. No tool insurance is shown for downhole tools in this example.

No other third party charges are shown in the estimate.

	Vertical Well Crosswell Operations
Project Set-up / Mob / Demob	$ 30,000.00
Project Scope (profiles)	3 1,000 foot well distance Profiles
Lump sum acquisition and processing of 3 profiles.	$ 150,000.00
Total ($ U.S.)	**$ 180,000.00**

SURVEY PLANS

Survey plans describe in concise form different parameters of a crosswell profile. Outputs such as the estimated seismic coverage and time frame of each profile are used to plan the survey more effectively. Note that survey plans are often updated in the field, as new acquisition information becomes available. All coverage charts are computed assuming straight ray paths.

In this section, we provide preliminary survey plans for two 1500 foot boreholes, separated be either 1,000 or 1,500 feet. The level spacing is set to a conservative 5 feet and plans were run using a 20-level receiver system. To familiarize the reader with the form and content of the survey plan, below is a description of some of the pertinent plots.

Acquisition parameters/statistics

The planned acquisition parameters are noted in the upper left of the chart. Details such as interval of interest, source shooting parameters, well spacing and other parameters that affect the speed of acquisition are listed.

Shooting Chart

The shooting chart is a graphical representation of the source/receiver positions that are to be occupied during the survey. The horizontal axis is receiver depth and vertical axis is source depth. A tabular form is also created with depth intervals for source and receiver clearly detailed.

Direct Fold

This chart shows the number of rays crossing each bin (see Fold Cell size) assuming straight raypaths. This shows the approximate coverage that will be possible for this profile using the direct ray incidence angles noted. The horizontal axis extends from receiver well to source well. The vertical axis is depth relative to datum elevation.

Upgoing Reflection Minimum Angle

This chart shows the smallest incidence angle illuminating each bin in the inter-well region. Horizontal axis is offset from the receiver well in the direction of the source well. Negative offset numbers are measure from the receiver well in the direction away from the source well. The vertical axis is depth below datum elevation.

Upgoing (Downgoing) Reflection Fold

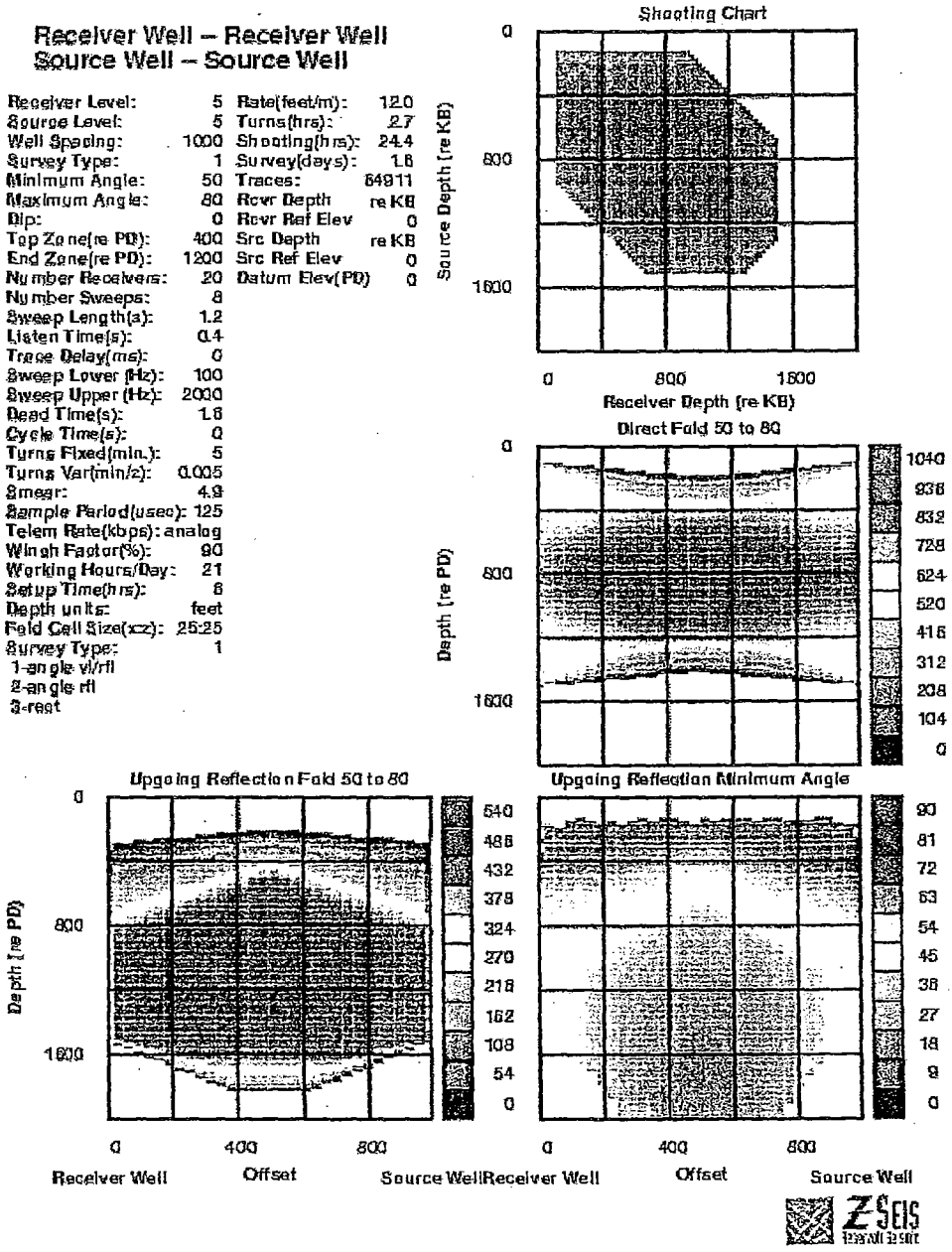
This chart shows the number of rays intersecting a bin for the range of incidence angles noted. The horizontal and vertical axes are as noted in "Upgoing Reflection Minimum Angle". Upgoing coverage is for source and receiver positions above the zone of interest and downgoing coverage is for source and receiver positions below the zone of interest.

Detroit Crosswell Peliminary - 1 - Jul 8 2005 10:28:04

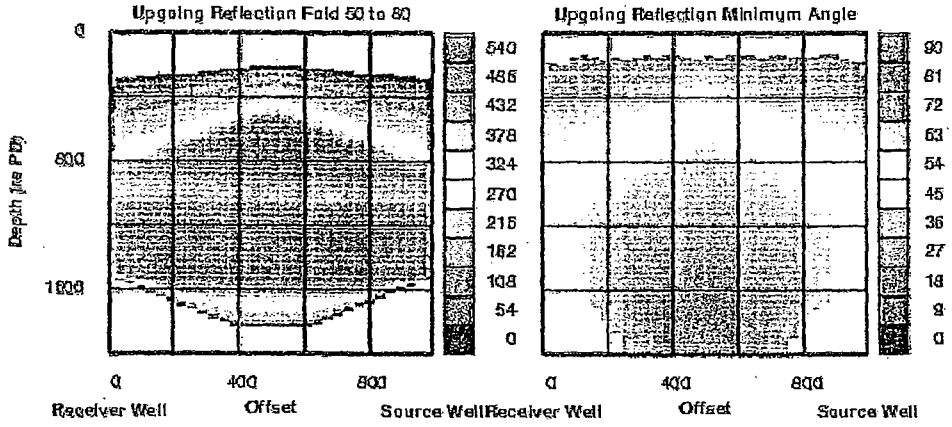
Receiver Well – Receiver Well
Source Well – Source Well

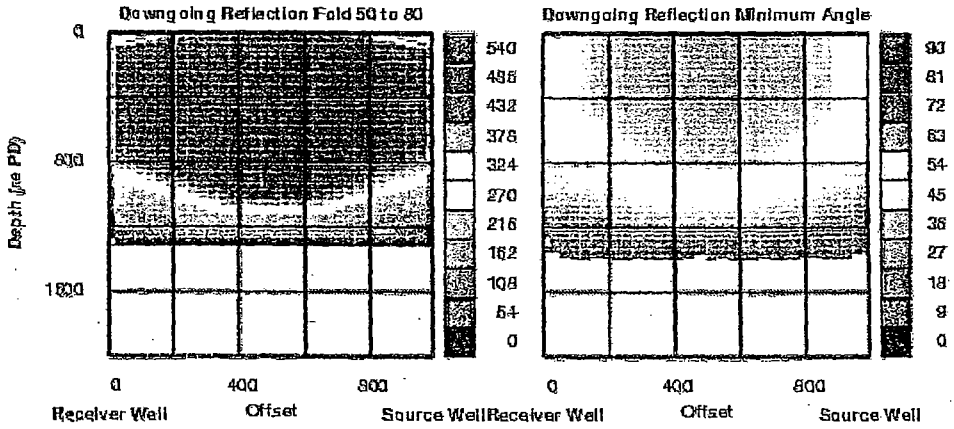
Receiver Level:	5	Rate(feet/m):	12.0
Source Level:	5	Turns(hrs):	2.7
Well Spacing:	1000	Shooting(hrs):	24.4
Survey Type:	1	Survey(days):	1.6
Minimum Angle:	50	Traces:	64911
Maximum Angle:	80	Rcvr Depth	re KB
Dip:	0	Rcvr Ref Elev	0
Top Zone(re PD):	400	Src Depth	re KB
End Zone(re PD):	1200	Src Ref Elev	0
Number Receivers:	20	Datum Elev(PD)	0
Number Sweeps:	8		
Sweep Length(s):	1.2		
Listen Time(s):	0.4		
Trace Delay(ms):	0		
Sweep Lower (Hz):	100		
Sweep Upper (Hz):	2000		
Dead Time(s):	1.6		
Cycle Time(s):	0		
Turns Fixed(min.):	5		
Turns Var(min/z):	0.005		
Smear:	4.8		
Sample Period(usec):	125		
Telem Rate(kbps):	analog		
Winch Factor(%):	90		
Working Hours/Day:	21		
Setup Time(hrs):	6		
Depth units:	feet		
Fold Cell Size(xz):	25:25		
Survey Type:	1		

1-angle vl/rfl
2-angle rfl
3-rest



Survey Plan - 3 - 8 Jul 2005



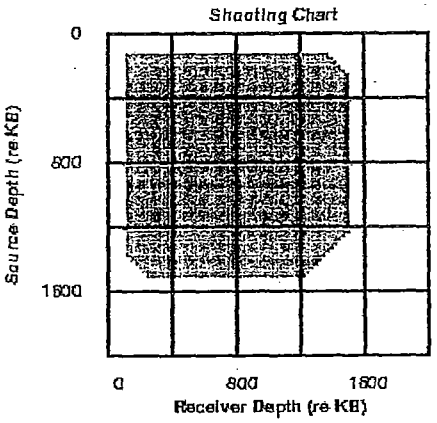


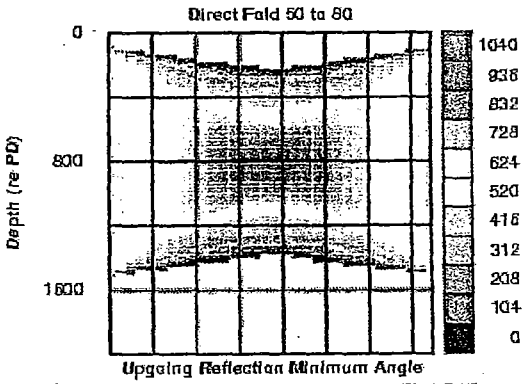
Detroit Crosswell Preliminary - 1 - Jul 8 2005 10:32:21

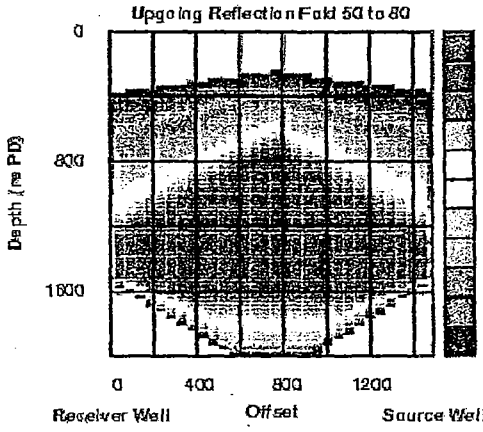
Receiver Well – Receiver Well
Source Well – Source Well

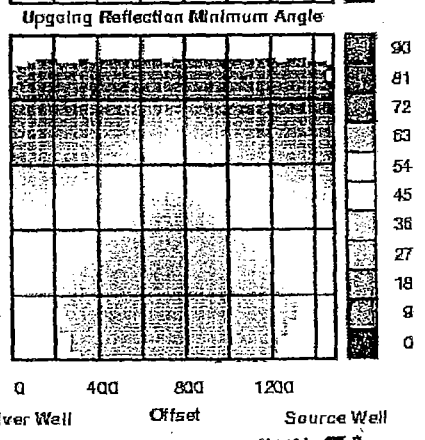
Receiver Level:	5	Rate(feet/m):	8.0
Source Level:	5	Turns(hrs):	2.9
Well Spacing:	1500	Shooting(hrs):	42.6
Survey Type:	1	Survey(days):	2.5
Minimum Angle:	50	Traces:	75906
Maximum Angle:	80	Rcvr Depth	re KB
Dip:	0	Rcvr Ref Elev	0
Top Zone(re PD):	400	Src Depth	re KB
End Zone(re PD):	1200	Src Ref Elev	0
Number Receivers:	20	Datum Elev(PD)	0
Number Sweeps:	12		
Sweep Length(s):	1.2		
Listen Time(s):	0.4		
Trace Delay(ms):	0		
Sweep Lower (Hz):	100		
Sweep Upper (Hz):	2000		
Dead Time(s):	1.6		
Cycle Time(s):	0		
Turns Fixed(min.):	5		
Turns Var(min/z):	0.005		
Smear:	4.9		
Sample Period(usec):	125		
Telem Rate(kbps):	analog		
Wingh Factor(%):	90		
Working Hours/Day:	21		
Setup Time(hrs):	6		
Depth units:	feet		
Fold Cell Size(xz):	25:25		
Survey Type:	1		

1-angle w/rfl
2-angle rfl
3-rect

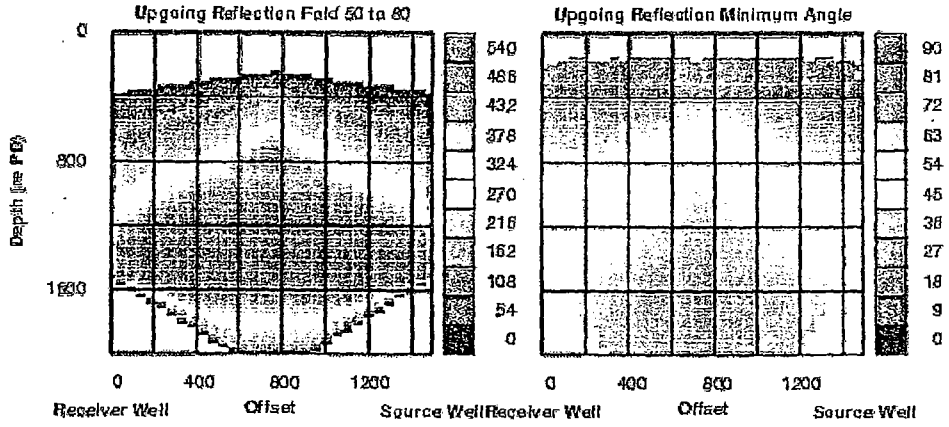


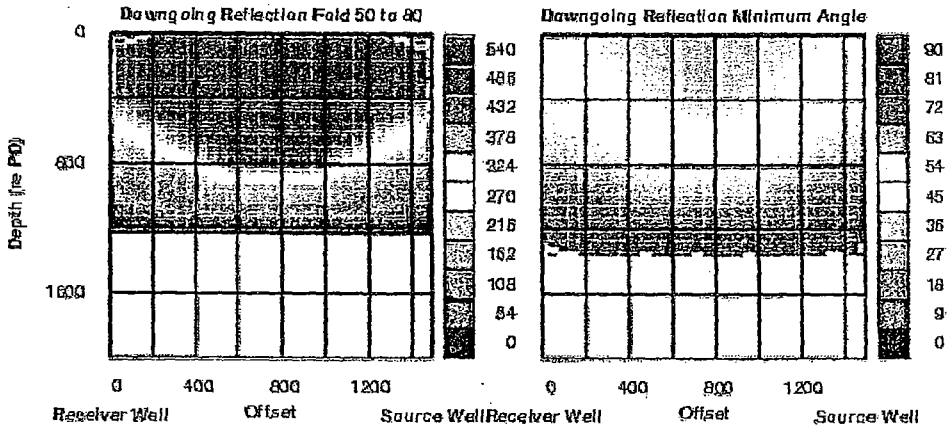






52


Upgoing Reflection Fold 50 to 80
Upgoing Reflection Minimum Angle
Depth (ft PD)
0
800
1600
540
486
432
378
324
270
216
162
108
54
0
90
81
72
63
54
45
36
27
18
9
0
0
400
800
1200
Receiver Well
Offset
Source Well


Downgoing Reflection Fold 50 to 80
Downgoing Reflection Minimum Angle
Depth (ft PD)
0
800
1600
540
486
432
378
324
270
216
162
108
54
0
90
81
72
63
54
45
36
27
18
9
0
0
400
800
1200
Receiver Well
Offset
Source Well

Resumes of Key Personnel

Bruce P. Marion, President Z-Seis Corporation, received B.S. and M.S. degrees in electrical engineering from Texas A&M University in 1973 and the Engineers Degree in electrical engineering from Stanford University in 1976. He founded Tomex Corporation in 1984 with Professor Bernard Widrow and developed the Tomex seismic-while-drilling ("SWD") technology. He developed the key signal processing algorithms for SWD and invented the continuous seismic velocity log for SWD. In 1992 he and Professor Jerry Harris of Stanford University founded TomoSeis, a pioneer company in the development of commercial, low-cost crosswell technology. He developed many of the crosswell processing algorithms and was co-inventor of a unique borehole source. In 2000 he sold TomoSeis to Core Labs and was President of the TomoSeis Division of Core Labs, for 3 years. In 2003 he founded Z-Seis Corporation as a successor to TomoSeis, purchasing the crosswell assets of Core Labs, to take crosswell technology to the next level.

Professional Publications

Rector, J. W. and Marion, B. P., 1989, Real-time VSP and checkshot surveys using the drill bit as a downhole seismic source, Oil and Gas Journal, 66-72, February 12.

Rector, J. W. and Marion, B. P., 1989, MWD VSP and checkshot surveys using the drill bit as a downhole energy source, presented at the 21st Annual OTC Conference, Houston.

Society of Exploration Geophysicists, 1989, Best OTC Geophysical Paper Award

Rector, J. W., and Marion, B. P., 1991, The use of drill-bit energy as a downhole seismic source, Geophysics 56, 628-634.

Lazaratos, S. K., Langan, R., Harris, J. M., and Marion, B. P., 1994, Shear-wave crosswell reflection imaging in West Texas, in Expanded Abstracts of the 64th Annual International SEG Meeting, Los Angeles.

Lazaratos, S. K., and Marion, B. P., 1996, Log-scale seismic for reservoir characterization, in Expanded Abstracts of the 66th Annual International SEG Meeting, Denver.

Lazaratos, S. K., and Marion, B. P., 1996 Crosswell seismic imaging of reservoir changes caused by CO_2 injection, in Expanded Abstracts of the 66th Annual International SEG Meeting, Denver.

Patents

Rector, J.W., Marion, B.P., Widrow, B., Salehi, I., 1991, "Signal processing to enable utilization of a rig reference sensor with a drill bit seismic source", U.S. No. 5,050,130.

Rector, J.W., Marion, B.P., Widrow, B., Salehi, I., 1992, "Signal processing to enable utilization of a rig reference sensor with a drill bit seismic source", U.S.No. 4,926,391.

Rector, J.W., Marion, B.P., Widrow, B., Salehi, I., 1993, "Signal processing to enable utilization of a rig reference sensor with a drill bit seismic source", U.S. No. 5,191,557.

Harris, J.M., Marion, B.P., Canny, D., 1998, "Dual well multiple-element resonant cavity piezoceramic borehole energy source", U.S. No. 6,135,234.

GENERAL TERMS AND CONDITIONS (ZS0503)

Z-Seis Corporation (Z-Seis) offers services and equipment under the following General Terms and Conditions.

1. **Independent Contractor.** Z-Seis acts solely as an independent contractor in performing services or furnishing equipment.
2. **Customer Responsibility.** Customer shall at all times be responsible for the complete care, custody and control of the well and direction of services to be performed. Customer is responsible for safety and conditions in and about the well and for advising Z-Seis of the same. Customer has superior knowledge of the hazards and dangers existing in and about the well which could cause damage to property or personal injury or death as a result of services performed hereunder by Z-Seis. Customer shall provide Z-Seis with all information required to enable Z-Seis to perform its services safely and efficiently. Customer shall provide adequate safety apparatus and written safety instructions, as per applicable laws and regulations, and will be responsible for ensuring that adequate means for emergency evacuation are in place. A representative of the Customer must be present to furnish instructions, and to specify depths and methods to be employed for any service which is to be performed hereunder.
3. **Interpretation.** In making interpretations, Z-Seis' employees will give Customer the benefit of their best judgement, but since all interpretations are opinions based on inferences from electrical or other measurements, Z-Seis cannot, and does not, guarantee the accuracy or the correctness of any interpretation, nor the availability of any specific geophysical data from any subsurface formation. In no event should the Customer base a decision concerning drilling, completion, treatment or production of a well or a decision concerning any procedure involving the safety of any persons or equipment solely on such an interpretation by Z-Seis' employees.
4. **Data Transmission and Storage.** Z-Seis does not warrant the accuracy of logging data transmitted by electronic processes, and will not be responsible for accidental or intentional interception of such data by others. Without prejudice to paragraph 11 hereof, Z-Seis does not guarantee the safe storage or the length of time of storage of any digital tapes, optical prints or transparencies, or other similar products or materials.
5. **No Warranties.** Z-Seis cannot guarantee any results from the performance of services, nor the availability of any specific geophysical data from any subsurface formation. Z-Seis shall not be liable for loss or damage arising from the performance of services and makes no warranties, express or implied regarding Z-Seis' performance of services.
6. **Limitation of Liability.** Z-Seis shall not be liable for any incidental, special, consequential or exemplary damages, including without limitation, loss of anticipated profits or benefits. In no event shall Z-Seis' liability to customer resulting from Z-Seis' performance of the services exceed the total price paid by customer to Z-Seis for the performance of services.
7. **Joint Ownership.** If Customer is not the sole owner of the mineral interests, the well or the field, Customer's request for services shall constitute Customer's warranty that Customer is the duly constituted agent of each and every owner and has full authority to represent the interests of the same with respect to all decisions taken throughout the performance of any services performed hereunder. Customer shall indemnify and hold Z-Seis, its employees, officers, directors and shareholders harmless from and against any and all liabilities, losses or damages, claims, demands, causes of action, suits and associated expenses (including reasonable attorney's fees) and awards resulting from the allegation by any person that Customer has misrepresented or lacked sufficient authority to represent such person as warranted by Customer in this paragraph.
8. **Indemnification.**
   a) Z-Seis agrees to defend, indemnify, and hold harmless Customer against any claims brought against Customer by Z-Seis' officers, employees, agents, subcontractors, business invitees, and guests, including but not limited to claims on account of personal injury, death or property damage resulting from operations conducted pursuant to this Agreement, except those which are caused, in whole or in part, by the gross negligence or intentional misconduct of Customer, its officers, employees, agents, business invitees, or guests.
   b) Customer agrees to defend indemnify, and hold harmless Z-Seis against any claims brought against Z-Seis by Customer's officers, employees, agents, subcontractors, business invitees, and guests, including but not limited to claims on account of personal injury, death or property damage resulting from operations conducted pursuant to this Agreement, except those which are caused, in whole or part, by the gross negligence or intentional misconduct of Z-Seis, its officers, employees, agents, business invitees, or guests.
   c) Notwithstanding subparagraph (a) above, if any Z-Seis equipment is lost, destroyed or damaged while at the well site, in the well or outside the well or while being transported by or on behalf of Customer or by conveyance arranged by Customer, or while in Customer's custody; or if any Z-Seis equipment is expropriated, nationalized or otherwise lost due to force majeure; then (i) Customer shall attempt to recover such equipment for Z-Seis at Customer's sole risk and expense; (ii) Customer shall reimburse Z-Seis for the cost of replacement or repair of such equipment, if reparable, even if such loss, destruction or damage is due in whole or part to the sole, concurrent, active or passive negligence of Z-Seis or its officers, directors, or employees, or to force majeure. Customer shall promptly return to Z-Seis damaged equipment, or lost equipment subsequently recovered without inspecting or opening such equipment.
   d) Customer agrees to protect defend, indemnify and hold Z-Seis and its officers, directors and employees harmless from and against all loss, liability claims, demand and causes of action (including all costs and

expenses thereof and attorney's fees) of every kind and character, without limit and without regard to the cause or causes thereof or the negligence of any party, including but not limited to the sole concurrent, active or passive negligence of Z-Seis or its officers, directors or employees, arising in connection herewith in favor of Customer or any third party on account of pollution, contamination or radiation damage, subsurface loss or damage, or damage or personal injury or death arising on the surface as a result of subsurface loss or damage, including without limitation loss or damage to the well or reservoir.

9. **Equipment**
   a) Notification of Hazardous Conditions. Z-Seis' downhole equipment is designed to operate under conditions normally encountered in the wellbore. The equipment may be seriously damaged by excessive well temperature and pressure, gas-cut drilling mud, deviated borehole, obstacles in the borehole, corrosive gas or chemicals, and other hazardous conditions existing in the borehole. Customer shall notify Z-Seis in advance and make special arrangements for servicing wells in which hazardous or unusual conditions exist.
   b) Fishing. In case it is necessary for Customer to fish for any Z-Seis equipment, Customer shall assume the entire responsibility for such operations, but Z-Seis will, if so desired by Customer, render assistance in advisory capacity for the recovery of such equipment. Z-Seis' employees have no special expertise in fishing operations, nor are they authorized to do anything other than advise and consult with Customer in connection with any such fishing operations. Any fishing tools furnished by Z-Seis are furnished solely as an accommodation.

10. **Manufacturers and Suppliers.** All of these General Terms and Conditions shall also apply in favor of (a) any supplier which designs, manufactures and/or supplies any equipment or services Z-Seis may use in connection with the performance of work or services for Customer and (b) the contractors and subcontractors of such suppliers.

11. **Access to Well.** With respect to onshore and offshore operations, Customer shall provide, at its expense, adequate means of transportation required for Z-Seis' equipment and personnel to gain access to or return from a well site, and shall obtain at Customer's sole cost and expense all permits, licenses or other authorization required for Z-Seis to enter upon work area for the purposes contemplated. When necessary to repair roads or bridges, or to provide transportation to move Z-Seis' equipment or personnel, such shall be arranged and paid for by the Customer.

12. **Confidentiality.** Results obtained by Z-Seis are held in strict confidence and will not be disclosed by Z-Seis to any third party without authorization from Customer as long as such results are not in the public domain, except as required by law or legal process.

13. **Intellectual Property Rights.** Intellectual rights of inventions, patents and results arising out of this agreement shall be the property of Z-Seis.

14. **Payment.** Customer shall pay Z-Seis in accordance with the applicable quotation. Terms for payment of charges not otherwise modified in the quotation are NET CASH within thirty (30) days from the date services are rendered. Any amount unpaid at the end of said thirty (30) days is subject to interest at the maximum rate permitted by law. If unpaid amounts are collected through legal proceedings or by a collection agent, Customer shall pay reasonable costs and attorney's fees.

15. **Taxes.** Customer shall pay Z-Seis in accordance with the terms of Paragraph 12 and shall pay any and all taxes or other levies imposable or imposed by any government or authority with respect to the charges made or payments received in connection with Z-Seis' products or services.

16. **Force Majeure.** Z-Seis shall not be responsible for delay or its failure to perform this Agreement due to causes beyond its control which are not the result of its fault or negligence.

17. **Entire Agreement:** Changes. This Agreement represents the entire agreement and understanding between the parties with respect to its subject matters and supersedes any prior and/or contemporaneous discussions, representations, or agreements, whether written or oral, of the parties regarding this subject matter. Purported amendments or changes shall be of no force or effect unless they are in writing and signed by duly authorized representatives of the parties.

May 2001

EXPERIENCE RECORD

EDWARD J. CORDING
Professor of Civil Engineering
University of Illinois at Urbana-Champaign

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Savoy, Illinois 61874
Phone: (217)351-8709
Fax: (217)351-8700

Education

Wheaton College, Wheaton, Illinois: B.S. Geology, 1960
University of Illinois, Urbana, Illinois:
Civil Engineering, M.S., 1963, Ph.D., 1967

Professional Societies and Committees

American Society of Civil Engineers
Geo-Institute of ASCE
Fellow, Geological Society of America
International Society for Rock Mechanics
President, Commission on Teaching of Rock Mechanics, 1974-81
Association of Engineering Geologists
International Association of Engineering Geologists
International Society for Soil Mechanics and Foundation Engineering
U. S. National Committee on Tunneling Technology
Chairman, 1981-82, Vice-Chairman, 1980-81
Chairman, Commission on Education and Training, 1977-1980
American Rock Mechanics Association, Founding member

Honors:

ASTM Hogentogler Award, 1976,
ASCE Thomas A. Middlebrooks Award, 1985
Wheaton College Scholastic Honor Society
Chi Epsilon (Civil Engineering Honor Society)
Member, National Academy of Engineering
ASCE Martin S. Kapp Award, 1993

Professional Experience

1960- 1967: Research Assistant, Univ. of Illinois; Soils Engineer, Chicago and Seattle; Mining Engineer, Fenix and Scisson Inc, for large cavern construction, Nevada Test Site; 1st Lt and Cap-

Edward J. Cording - Experience Record

tain (Soils Engineer) U.S. Army Corps of Engineers, Waterways Experiment Station and Vietnam.

1967- Present: University of Illinois, Urbana-Champaign

Teaching courses in rock and soils engineering.
Supervision of program of field measurements in tunnels and excavations during construction of Washington, D.C. Metro, 1969-1975. Research on design of tunnels, movements about tunnels in soil, stability of large chambers for subway construction, control of movements about braced excavations, influence of movements on building damage. Destructive testing and analyses of concrete and shotcrete tunnel linings in jointed rock masses. Subsidence over Illinois coal mines. Field measurements and analysis of support pressures and ground movements in deep tunnels in squeezing ground. Investigation of building distortion and damage due to adjacent excavation and tunneling, Large-scale model studies and analysis of soil-nailed and tied-back walls and effects on adjacent brick and frame buildings. Field measurements on loads, displacements, and water pressures around tunnels in Chicago clay. Investigation of strength of non-persistent joints in rock slopes. Analysis of hydro-mechanical coupling around lined pressure tunnels in rock. Evaluation of micro-tunneling ground movements and jacking forces. Investigation of leakage, capacity, and joint rotation of gasketed concrete segmental tunnel linings.

Consulting Activities:

Geotechnical consultant, rock and soil engineering. Projects include the following:

Design of linings and control of ground movement for tunnels in soil: Research on ground movements on subway tunnels in Washington, D.C.; recommendations for compaction grouting and evaluation of field instrumentation, Baltimore Subway and existing stone arch tunnel, Minneapolis; evaluation of dewatering requirements for tunneling through a buried valley, Minneapolis; evaluation of collapses of tunnels in soft clay, Detroit, and recommendations for repair; evaluation of tunnel ground conditions, Louisville; evaluation of segmented concrete linings for proposed diversion tunnel, Portland; recommendations for preliminary design of subway tunnels and braced cuts, Detroit; evaluation of causes of settlement during soft ground tunneling, Ottawa, Canada; recommendations
for design of protection structures around Holland Tunnel, New York
City; evaluation of ground movements around compressed air tunnel in residual soils, Atlanta; geotechnical studies for tunnels and braced excavations, proposed subway, Houston. Monitoring of ground movements and compaction grouting for subway tunnels, Washington Metro. Recommendations for ground control, Phoenix storm water tunnels. Supervised geotechnical investigations and tunnel design for sewer tunnel in soil and rock, Honolulu, Hawaii. Consultant for design of Muni tunnels to be placed adjacent to BART tunnels,
San Francisco. Investigation of collapse of pipe-jacked tunnel in silt, Queen Anne Hill, Seattle. Design of jet-grouted arch to protect large sewer during tunneling, Washington, D.C. Recommendations for support and dewatering in mixed face tunnel for Wellesley, Mass. replacement sewer being advanced beneath houses. Investigation of initial support design for tunnels and shafts, Cleveland. Investigation of ground movements for tunneling with closed face machine, Los Angeles. Design of ground control measures for tunneling with closed face machine, Washington, D.C. Metro. Evaluation of support and ground condition for station chamber in soil, Fort Totten, Washington Metro. Design of tunnel and shaft linings and ground control for sewer tunnel in soft clay, Evanston, IL. Direction of monitoring program to evaluate ground movements and lining loads on Evanston Tunnel. Consultant on feasibility study for mined station chambers in soil on Los Angeles Metro.

Design and evaluation of performance of braced excavations: Control of ground movements adjacent to historic structures in Washington, D.C. and Philadelphia; evaluation of earth pressures and support requirements for braced excavations in Washington, D.C. and Chicago. Consultant on guidelines for design of permanent tieback systems and soil nailing. Investigation and design of excavation support system to protect historic structures, San Juan, Puerto Rico.

Edward J. Cording - Experience Record

Landslide investigations: Evaluation of landslides on abutment of Kariba Dam, Rhodesia; 150 km pipeline over Andes in Colombia; 48 km Highway in Bolivian Andes; million yard slide on abutment of Castaic Dam, California; slope at village site, Snowmass, Colorado; cut in Powerplant site, Yampa Valley, Colorado; slope behind electric sub-station, Steamboat Springs, Colorado; slopes at temple site, Kathmandu, Nepal for UNESCO; rock fall problems, Matadi, Zaire and U.S. Naval submarine base, Groton, Connecticut. Evaluation of landslides and debris flows, Vail, Colorado.

Design of permanent and temporary tiebacks and support for rock cuts: Design of foundations and support of slopes for structure at West Point, N.Y.; permanent tieback wall to stabilize slope, hospital in Scranton, Pa.; tieback walls in shale for hospital, Cincinnati, Ohio; design recommendations for permanent support of highway cut in Appalachian Mountains, Virginia; recommendations for support of rock walls inside cofferdams on the Ohio River, design of rock cuts in New York City, Kansas City, design and recommendations for supporting rock cuts adjacent to structures, Washington, D.C. Evaluation of rock slopes along highway, Tennessee. Evaluation of support requirements for rock cut adjacent to Georgetown incinerator

Foundation Investigations: Design of foundations and construction observations for structure located over abandoned mines and mine waste, Pennsylvania; evaluation of failure due to hydrostatic uplift in holding basin, Ohio; review of foundation design and observations during construction of research facility on weathered limestone, New Jersey; evaluation of rock blasting for footings for hospital, Washington, D.C.; evaluation of damage to structures over abandoned mines, Illinois; evaluation of heave on shale foundation, Cincinnati. Investigation of geologic conditions and availability of materials in 15 million cu. yard borrow area, Antelope Island, Salt Lake City.

Evaluation of tunnels in rock: Investigation of geotechnical conditions and recommendations for 5000-ft-deep shaft, Alaska; tunnel in sandstone, California; evaluation of support for deep tunnels in squeezing ground, including highway, mine and water tunnels in Colorado, water supply tunnels in Utah, waste storage site, Nevada; design of low head hydro tunnel, Vermont; research and design studies for concrete tunnel linings, pre-cast concrete linings, shotcrete support; design recommendations for stream diversion tunnel, West Virginia; evaluation of support for water intake tunnel under Lake Erie; evaluation of sewer outfall tunnel adjacent to slope in Rochester, NY; evaluation of deformation and leakage and recommendations for testing and repair of water pressure tunnel, Washington, D.C. suburbs; review of design and seismic design criteria for shafts for nuclear waste repositories; consulting board, Taiwan Area Expressway Engineering Bureau, for series of road tunnels, Taipei-Ilan Expressway; recommendations for shaft support and tunnel excavation in shale, San Antonio River Tunnels, Corps of Engineers; member SSC Underground Technical Advisory Panel, subsequently consultant to PB/MK Team for design of tunnels, shafts and underground chambers in chalk and shale on Superconducting Supercollider Project, Texas; consultant to contractor for pre-bid and construction of large deep shaft in frozen soil and in rock, New York City Water Tunnel.

Large rock chambers: Monitoring and construction control of 120-ft-diameter chambers in weak tuff, Nevada; feasibility study for
200 to 300-ft-diameter chambers in tuff; evaluation of support for
rock chambers, New York City Water Tunnel No. 3 and 2nd Avenue subway; recommendations for design of rock chambers for subway stations in Washington, Boston, Atlanta; field monitoring, instrumentation, and research for large shallow rock chambers on Washington, D.C. Metro; evaluation of excavation and support practices, Drakensberg underground pumped storage project, South Africa; consultant on feasibility study for U.S. Army Corps of Engineers Pumped Storage Scheme, Gregory County, including underground powerhouse in weak rock and stability of reservoir dikes.

Evaluation of stability and design of mines and room and pillar storage facilities: Propane and ethane caverns in granite, gneiss, limestone, shale, sandstone in Pennsylvania, South Carolina, Indiana, Illinois, Iowa, New York; studies for limestone mines in Illinois, Indiana, Kansas City; evaluation of 50 to 90-ft-wide
blasting chambers in former limestone mine, Pennsylvania; evaluation of stability and support in oil shale mine, Colorado, evaluation of 2500-ft-deep rock caverns for natural gas storage, New York City area.

Edward J. Cording - Experience Record

Recommendations for rehabilitation of existing tunnels: Transit tunnel in rock, Pittsburgh; 15 railroad tunnels near Rio de Janeiro; railroad tunnel in Ohio; stormwater tunnel in Detroit; hydraulic tunnel, Rochester, N.Y.

Prebid geotechnical studies: For dam foundations, water supply tunnels, railroad tunnels, wastewater tunnels, subway tunnels, subway stations, and shafts, in Texas, Utah, Atlanta, Colorado, Chicago, Washington,D.C., Baltimore, Kansas City, Los Angeles, San Diego, Seattle, Pittsburgh, Milwaukee, Buffalo, New York State, California, Washington State, Alabama, Puerto Rico, Alberta, Canada.

Disputes Review Boards: Glenwood Canyon, Colorado: Reverse Curve Tunnel, Hanging Lake Tunnel; Stanley Canyon Project, Colorado Springs; Cumberland Gap Tunnel, Kentucky-Tennessee; Richmond Transport Tunnel, City and County of San Francisco; Tri-Met West Side Light Rail Tunnel, Portland; Rio Piedras Station and tunnels, Tren Urbano, San Juan P.R.; Lake Mead Intake No. 2, Southern Nevada Water Authority; Chatahoochie Tunnel, Atlanta.

Other,recent projects:

1992-1997: Member, U.S. Nuclear Waste Technical Review Board. Presidential board responsible for technical review of site characterization work of Department of Energy for high level nuclear waste facility at Yucca Mountain.

1994-1998: Member, Tunnel Advisory Panel, Toronto Transit Commission, for Sheppard Line extension to Toronto Subway.

1993-1994: Chairman, Tunnel Review Panel, Los Angeles County Metropolitan Transportation Authority, to evaluate structural adequacy of existing tunnel linings on Segment One.

1993-Present: Member, Federal Energy Review Board, Mt. Hope Waterpower Project: Deep shafts, underground reservoir and power plant.

1997: Member, review panel for Alameda Corridor Project, a 1 billion dollar project to design and construct a high speed, depressed and dedicated rail link from the Port of Long Beach.

Consultant to Massachusetts Water Resources Authority to review feasibility and evaluate risks for Dorchester Bay interceptor, Boston.

1997-1998: Investigation of feasibility of constructing underground rail line and four stations, Vina del Mar, Chile.

1999-present: Member, Sound Transit oversight review panel, light rail design-build project, stations and running tunnels, Seattle.

1999-present: Consultant to URS for Long Island RR East Side Access, running tunnels and station caverns, from Queens to Grand Central Terminal in Manhattan.

2000-present: Reconnaissance study, immersed tube or shield-driven highway tunnel beneath harbor, Honolulu, Hawaii, U.S. Army Corps of Engineers.

Publications:

Over 70 publications on research and practice in geotechnical engineering.

1. D. U. Deere, A. J. Hendron, F. D. Patton and E. J. Cording, "Design of surface and near-surface construction in rock," In Failure and Breakage of Rock, ed. by Fairhurst, American Institute of Mining, Metallurgy and Petroleum Engineering, New York, pp. 237-302, 1967.

Edward J. Cording - Experience Record

2. E. J. Cording, "The stability during construction of three large underground openings in rock," U. S. Army Engineer Waterway Experiment Station, Corps of Engineers, Vicksburg, Mississippi, Technical Report No. 1-813, 1967.

3. E. J. Cording, "Stability of Large Underground Openings at the Nevada Test Site," Second Space Age Facilities Conference, American Society of Civil Engineers, 1968.

4. D. U. Deere and E. J. Cording, "Interrelations of Soil Mechanics, Rock Mechanics, and Engineering Geology," Proceedings, 8th Annual Engineering Geology and Soil Engineering Symposium, Pocatello, Idaho, Department of Geology, Idaho State University, pp. 295-313, 1970.

5. E. J. Cording, A. J. Hendron and D. U. Deere, "Rock Engineering for Underground Caverns, in Underground Rock Chambers," Proceedings, ASCE Symposium on Underground Rock Chambers, Phoenix, January 1971.

6. K. R. Chapman, E. J. Cording and H. Schnabel, "Performance of a Braced Excavation in Granular and Cohesive Soils," ASCE Specialty Conference on Performance of Earth and Earth-Supported Structures, Purdue, June 1972, pp. 271-293.

7. J. W. Mahar, F. L. Gau and E. J. Cording, "Observations During Construction of Rock Tunnels for the Washington, D.C. Subway," Proceedings, Vol. 1, North American Rapid Excavation and Tunneling Conference, AIME, 1972, pp. 659-682.

8. W. H. Hansmire and E. J. Cording, "Performance of a Soft Ground Tunnel on the Washington Metro," Proceedings, Vol. 1, North American Rapid Excavation and Tunneling Conference, AIME, 1972, pp. 371-390.

9. E. J. Cording and D. U. Deere, "Rock Tunnel Supports and Field Measurements," Proceedings, Vol. 1, North American Rapid Excavation and Tunneling Conference, AIME, 1972, pp.

10. E. J. Cording, "Geologic Considerations in Shotcrete Design," Proceedings of Conference on Use of Shotcrete for Underground Structural Support, Berwick, Maine, Engineering Foundation, 1974.

11. T. D. O'Rourke and E. J. Cording, "The History of Loads and Displacements for a Deep Excavation in a Mixed Soil Profile," 53rd Annual Meeting, Highway Research Board, Washington, D.C., January 1974.

12. T. D. O'Rourke and E. J. Cording, "The Measurement of Strut Loads by Means of Vibrating Wire Strain Gauges, "ASTM, Performance Monitoring for Geotechnical Construction, STP 584, Washington, D.C., June 1974, pp. 58-77.

13. T. D. O'Rourke and E. J. Cording, "Observed Loads and Displacements for a Deep Subway Excavation," Chapter 84, Proceedings, 2nd Rapid Excavation and Tunneling Conference, Vol. 2, San Francisco, June 1974.

14. E. J. Cording and J. W. Mahar, "The Effect of Natural Geologic Discontinuities on Behavior of Rock in Tunnels, "Chapter 12, Proceedings, 2nd Rapid Excavation Conference Vol. 1, San Francisco, June 1974.

15. D. U. Deere, A. H. Merritt, and E. J. Cording, "Engineering Geology and Underground Construction," 2nd International Congress of the International Association of Engineering Geologists, Brazil, 1974.

16. E. J. Cording, "Measurements of Displacements in Tunnels," Vol. 2, Proceedings, 2nd International Congress of the International Association of Engineering Geologists, August 1974, Sao Paulo, Brazil.

Edward J. Cording - Experience Record

17. W. H. Hansmire and E. J. Cording, Discussion of "Subsidence over Soft Ground Tunnel," R. A. Butler and Delon Hampton, March 1975, Journal Geotechnical Engineering Division, V102 No. GT3, Proc. ASCE, pp. 259-261.

18. E. J. Cording and W. H. Hansmire, "Displacements Around Soft Ground Tunnels," General Report, Session 4, 5th Panamerican Congress on Soil Mechanics and Foundation Engineering, Buenos Aires, November, 1975, Vol. 4, pp. 571-633.

19. S. D. Wilson and E. J. Cording, "Measurement, Prediction, and Control of Movements Around Tunnels in Soil," Summary of Panel Discussion, Tunneling in Soil, Session 4, 5th Panamerican Congress in Soil Mechanics and Foundation Engineering, Buenos Aires, November, 1975, Vol. 5.

20. E. J. Cording, A. J. Hendron, Jr., H. H. MacPherson, W. H. Hansmire, R. A. Jones, J. W. Mahar, T. D. O'Rourke, "Methods for Geotechnical Observations and Instrumentation in Tunneling," UILU-ENG 75 2022, University of Illinois, Vol. 1 and Vol. 2, December 1975, 566 pp.

21. T. D. O'Rourke, E. J. Cording and M. Boscardin, "The Ground Movements Related to Braced Excavation and Their Influence on Adjacent Buildings," University of Illinois at Urbana-Champaign, UILU-ENG 76 2023 for U. S. Department of Transportation Office of the Secretary and Federal Railroad Administration, DOT-TST-76T-23, August, 1976, 137 pp.

22. E. J. Cording, W. H. Hansmire, H. H. MacPherson, P. A. Lenzini, and A. P. Vonderohe, "Displacements Around Tunnels in Soil," University of Illinois at Urbana-Champaign, for U. S. Department of Transportation, Office of Secretary and Federal Railroad Administration, DOT-TST-76T-22, August, 1976, 211 pp.

23. Cording, Edward J., "Shear Strength on Bedding and Foliation Surfaces," Rock Engineering for Foundations and Slopes, Proceedings of Specialty Conference, Geotechnical Engineering Division, ASCE, Boulder, Colorado, August 1976, ASCE, N.Y., p. 172-192.

24. Cording, E. J. and J. W. Mahar, Discussion of "Finite Element Methods for the Nonlinear and Time-Dependent Analysis of Geotechnical Problems," C. Chang, K. Nair, and R. Singh, ASCE Specialty Conference, Austin, 1974.

25. Hendron, A. J., Jr., E. J. Cording, and A. K. Aiyer, "Analytical and Graphical Methods for the Analysis of Slopes in Rock Masses," NCG Technical Report No. 36, July, 1971.

26. O'Rourke, T. D. and E. J. Cording, "The Observed Per-formance of Deep Subway Excavation, Project 1B0011," for Washington Metropolitan Area Transit Authority, Final Report, September 1974, 103 pp.

27. Hansmire, W. H. and E. J. Cording, "Field Measurements of Ground Displacements About a Tunnel in Soil," Final Report, Instrumentation on Project A-2, Washington, D.C. Metro, UILU-ENG-75-2021, University of Illinois, September 1975, 333 pp.

28. Cording, E. J., J. W. Mahar and G. S. Brierley, "Obser-vations for Shallow Chambers in Rock," Proceedings, Field Measurements in Rock Mechanics, International Symposium, Zurich, Switzerland, April, 1977.

29. Cording, E. J. and T. D. O'Rourke, "Excavation, Ground Movements, and Their Influence on Buildings," paper presented at Session 40 Protection of Structures Adjacent to Braced Excavations, ASCE Conference, San Francisco, October 1977.

Edward J. Cording - Experience Record

30. Cording, E. J., T. D. O'Rourke and M. Boscardin, "Ground Movements and Damage to Structures," presented at the Third Annual Conference on DOT Research and Development in Tunneling Technology, Atlanta, Georgia, October, 1977.

31. Cording, E. J. and R. E. Heuer, "Research Needs in Ground Support and Ground Movement Prediction and Control," Issue Paper, Second Annual Conference on DOT Research and Development in Tunneling Technology, Easton, Maryland, 1976.

32. Fernandez-Delgado, G., J. Mahar, E. Cording and H. Parker, "Shotcrete: Large Scale Testing of Thin Liners with a Flat Arch Geometry," University of Illinois for U.S. Department of Transportation, DOT-TST-76T-19, 1976.

33. Brierley, G. S. and E. J. Cording, "The Behavior During Construction of the Dupont Circle Subway Station Lining," Proceedings Shotcrete for Ground Support, Engineering Foundation Conference, Easton, Maryland, October 1976, pp. 675-712.

34. Cording, E. J., editor, "Stability of Rock Slopes," Proceedings, 13th Symposium on Rock Mechanics, Urbana, Illinois, August, 1971.

35. T. D. O'Rourke, E. J. Cording and M. Boscardin, "Damage to Brick-Bearing Wall Structures Caused by Adjacent Braced Cuts and Tunnels," Preprint, Conference on Large Ground Movements and Structures, Cardiff, Wales, July, 1977.

36. M. Boscardin, E. J. Cording and T. D. O'Rourke, "Case Studies of Building Behavior in Response to Adjacent Excavation," Final Report No. UMTA-IL-06-0043-78-2, U.S. Department of Transportation, 1978.

37. H. H. MacPherson, J. W. Critchfield, S. W. Hong, and E. J. Cording, 1978, "Settlements Around Tunnels in Soil: Three Case Histories," U.S. Department of Transportation, Final Report No. UMTA-IL-06-0043-78-1, 143 pp.

38. E. J. Cording, T. D. O'Rourke, and M. Boscardin, 1978, "Ground Movements and Damage to Structures," International Conference on Evaluation and Prediction of Subsidence,ASCE, pp. 516-537.

39. E. J. Cording and J. W. Mahar, "Index Properties and Observations for Design of Chambers in Rock," Engineering Geology, 12 (1978), pp. 113-142.

40. E. J. Cording, "Control of ground movements and support of tunnels - research and practice," Underground Space, Volume 2, No. 2, Dec. 1977.

41. Fernandez-Delgado, G., E. J. Cording, J. W. Mahar and M. L. Van Sint Jan, "Thin Shotcrete Linings in Loosening Ground," Proceedings 1979 Rapid Excavation and Tunneling Conference, V. 1, p. 790, Atlanta, 1979, AIME.

42. T. R. Kipp, E. J. Cording, A. H. Merritt, and R. P. Kennedy, "Feasibility Evaluation for the Excavation of Large Hemispherical Cavities at the Nevada Test Site," Proceedings, 1979 Rapid Excavation and Tunneling Conference, V. 1, Atlanta, 1979, AIME.

43. W. H. Baker, H. H. MacPherson, and E. J. Cording, "Compaction Grouting to Limit Ground Movements, Instrumented Case History Evaluation of the Bolton Hill Tunnels," U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Technology, Development and Deployment, Office of Rail and Construction Technology, Report No. UMTA-MD-06-0036-B1-1, Washington, D.C., 1981.

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44. E. J. Cording "USNC/TT Moves Forward in its Program to Improve Underground Construction," interview, Underground Space, V. 7N3, Pergamon Press, Nov. 1982/January 1983, pp. 152-155.

45. S. L. Paul, A. J. Hendron, Jr., E. J. Cording, G. E. Sgouros, and P. K. Saha, "Design Recommendations for Concrete Linings for Transportation Tunnels," U.S. Department of Transportation, Urban Mass Transportation Administration Transportation Systems Center, Cambridge, Mass., 1983.

46. W. H. Baker, E. J. Cording and H. H. MacPherson, "Compaction Grouting to Control Ground Movements During Tunneling," Underground Space, V. 7, N3, Pergamon Press, Nov. 1982, Jan. 1983, p. 205-213.

47. M. Van Sint Jan and E. J. Cording, "Construction of Large Shallow Underground Rock Chambers for the Washington, D.C. Metro," 1st Chilean Congress on Geotechnical Engineering, Vol. 1, 1982.

48. Cording, E. J., "Assessment of Rock Slope Stability," Seminar on Research for Multiple Hazard Mitigation, AIT-CCNAA, Taiwan, Jan. 1984.

49. Cording, E. J., "State of the Art: Rock Tunneling," Geotech III Specialty Conference, ASCE, Atlanta, May 1984.

50. Cording, E. J., "Investigation of Rock Slopes," Joint Seminar on Multiple Hazard Mitigation, USA-PRC-Japan, Peking, Jan. 1985.

51. Cording, E. J., "Use of Empirical Data for Braced Excavations and Tunnels in Soil," Proceedings of Chicago Lecture Series, Illinois Section ASCE, September 1984.

52. M. Van Sint Jan and E. J. Cording, "Ground and Lining Behavior of Shallow Underground Rock Chambers for the Washington, D.C. Metro." Symposium on Design and Performance of Underground Excavations, International Society for Rock Mechanics, Cambridge, G.B., September 1984.

53. Marino, G. G. and E. J. Cording, "Geotechnical Aspects of Subsidence Over Room and Pillar Mines in Illinois," Fourth Conference on Ground Control and Mining, Morgantown, West Virginia, July 22-24, 1985.

54. Cording, E. J., "Evaluation and Control of Ground Move-ments Around Tunnels and Excavations in Soil," Contri-bution on the Influence of Earthwork Construction on Structures, Resendiz and Romo, ed., XI ICSMFE, San Francisco, CA, August, 1985.

55. Gamble, W. L., E. J. Cording, and J. W. Mahar, "Failure of a Large Reinforced Concrete Pipeline," Proc. of Int. Conf. on "Advances in Underground Pipeline Engineering", Madison, Wisconsin, Aug. 1985, pp. 133-142.

56. Hansmire, W. H. and E. J. Cording, "Soil Tunnel Test Section: Case History Summary," Journal of Geotechnical Engineering Division, ASCE, Vol. 111, No. 7, Nov. 1985, pp. 1301-1320.

57. Paul, S. L., E. J. Cording and J. R. Jenkins, "Model Test Simulation of Deeply Buried Openings in Jointed Rock," University of Illinois at Urbana-Champaign, for the Defense Nuclear Agency, DNA 001-82-C-0260 and DNA 001-84-C-0157, May 1, 1986.

58. Cording, E. J., G. S. Brierly, J. W. Mahar, and M. D. Boscardin, "Controlling Ground Movements During Tunneling," Proceedings of Peck Symposium at University of Illinois at Urbana-Champaign, 1987.

Edward J. Cording - Experience Record

59. Cording, E. J., "Constraints on Tunneling Technology," Tunneling and Underground Transport, Frank P. Davidson, editor, Elsevier, 1987, pp. 121-141.

60. Cording, E. J., "Observation of Ground Movement Caused by Tunneling," Proceedings of the 2nd International Symposium on Field Measurements in Geomechanics, ed. S. Sakurai, V2, pp. 799-820, Balkema, 1988.

61. Cording, E. J., W. J. Hall, J. D. Haltiwanger, A. J. Hendron, and G. Mesri, eds., "The Art and Science of Geotechnical Engineering at the Dawn of the Twenty-First Century," A Volume Honoring Ralph B. Peck, Prentice Hall, Englewood Cliffs, New Jersey, 1988.

62. Kwong, J. K. P., J. W. Mahar, and E. J. Cording, "Tunneling Investigation in a Highly Complex Marine-Volcanic Sequence," 5th International Symposium, Tunneling '88, Honolulu, Hawaii, USA, Int. of Mining and Metallurgy, April 1988.

63. Boscardin, M., and E. J. Cording, "Building Response to Excavation-Induced Settlement," Journal of Geotechnical Engineering, ASCE, Vol. 115, pp. 1-21, January 1989.

64. Hisatake, M., E. J. Cording, T. Ito, S. Sakurai, and N. Phien-weja, "Effects of Non-linearity and Strength Reduction of Rocks on Tunnel Movements," Rock at Great Depth, Proceedings, International Symposium ISRM-SPE, 1989.

65. Long, J. H., W. F. Sieczkowski, Jr., E. Chow, and E. J. Cording, "Stability Analyses for Soil Nailed Walls," ASCE Specialty Conference on Design and Performance of Earth Retaining Structures, June 1990.

66. Phien-wej, N., and E. J. Cording, "Sheared Shale Response to Deep TBM Excavation," Engineering Geology, 30 (1991), 371-391.

67. Cording, E. J., "General Report: Control of Ground Movements around Tunnels in Soil," Ninth Pan American Conference, Session on Underground Excavations in Urban Areas, Chile, August 1991.

68. Cording, E. J., "Tunneling in Difficult Ground: Problems and Progress," Proceedings U.S.-Japan-Korea Seminar on Frontier R&D for Constructed Facilities, Honolulu, October 1991.

69. Cording, E. J., "Design Philosophies for Tunnels in Soil," Ch. 2, Underground Structures--Design and Construction, Sinha, ed., Elsevier, 1991.

70. Bennett, R. D., E. J. Cording, and T. Iseley, "Auger and Slurry Microtunneling Tests under Controlled Ground Conditions," Transportation Research Board, Washington, D.C., February 1994, 28 pp.

71. Cording, E. J. and S. M. Jamil, "Slide Geometries on Rock Slopes and Walls," General Rept., Session on Slope Stability, Symposium of the Intl. Soc. for Rock Mech., Santiago, June 1994.

72. Mueller, C. G., J. H. Long, E. J. Cording, and D. E. Weatherby, "Ground Movements from Tieback Wall Construction," ASCE Symposium on Vertical and Horizontal Deformations for Foundations and Embankments, Geotechnical Special Publication No. 40, June 1994, pp. 1337-1352.

73. Alvarez, T. A., E. J. Cording, and R. A. Mikhail, "Hydro Mechanical Behavior of Rock Joints: A Reinterpretation of Published Experiments," Proceedings, 35th U.S. Symposium on Rock

Mechanics, Daemen and Schultz, Eds., Balkema Publishers, Reno, NV, June 1995, pp. 665-674.

74. Cording, E. J. Rock - "Tunnel Interaction." General Report, Proceedings North American Rock Mechanics Symposium, Cancun, Mexico, June, 1998.

75. Bennett, R. D. and E. J. Cording, "Jacking Loads Associated with Microtunneling." Proceedings, 3rd National Conference of the Geo-Institute, Geo-Engineering for Underground Facilities, University of Illinois at Urbana-Champaign, Geotechnical Special Publication No. 90, June 1999, pp 731-745.

76. Alvarez, T. A., Jr., E. J. Cording, and G. G. Fernandez, "Pressure Tunnels in Fractured Rock: Minimum Cover Criteria from the Stability of Rock Wedges." Proceedings, 3rd National Conference of the Geo-Institute, Geo-Engineering for Underground Facilities, University of Illinois at Urbana-Champaign, Geotechnical Special Publication No. 90, June 1999, pp 459-470.

77. Mueller, C. G, J. H. Long and E. J. Cording, "Toe Penetration Requirements for Tieback Walls." Proceedings, 3rd National Conference of the Geo-Institute, Geo-Engineering for Underground Facilities, University of Illinois at Urbana-Champaign, Geotechnical Special Publication No. 90, June 1999, pp 417-428.

78. Kawamura, N. and E. J. Cording, "Long-Term Behavior of Tunnels in Chicago Clay." Proceedings, 3rd National Conference of the Geo-Institute, Geo-Engineering for Underground Facilities, University of Illinois at Urbana-Champaign, Geotechnical Special Publication No. 90, June 1999, pp 866-878.

79. Cording, E. J., J. Long, M. Son, and D. Laefer, "Model Tests and Analyses of Building Damage and Distortion Using a Strain-Based Criterion," Proceedings, Conference on Response of Buildings to Excavation-Induced Ground Movements, London, July 2001, Accepted for publication

80. Powderham, A.,E. J. Cording, and T. Geilen, "Performance of Frame and Masonry Buildings at London Bridge Street Station, Jubilee Line," Proceedings, Conference on Response of Buildings to Excavation-Induced Ground Movements, London, July 2001. Accepted for publication.

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Education

THE UNIVERSITY OF MICHIGAN: B.S. in Geology with Honors, 1961
Major: Geophysics; Minor: Mathematics
THE UNIVERSITY OF MICHIGAN: M.S. in Geology, 1963
THE UNIVERSITY OF MICHIGAN: Ph.D. in Geology, 1966
Thesis: A Linear Mode Filter (Processing of Seismic Data with an Optical Computer)

Experience

U. S. DEPARTMENT OF ENERGY 2000—2003
Office of Science, Geosciences Program

MICHIGAN TECHNOLOGICAL UNIVERSITY 2000-present
Dept. of Geological and Mining Engineering and Sciences

MASSACHUSETTS INSTITUTE OF TECHNOLOGY 1982-2000
Earth Resources Laboratory
Associate Director, 1982-1997

LINCOLN LABORATORIES, M.I.T. 1978-1982
Staff Member

ENVIRONMENTAL RESEARCH INST. OF MICHIGAN 1967-1978
Ann Arbor, Michigan
Research Geophysicist

Professional Societies

American Association of Petroleum Geologists, American Geophysical Union, European Association of Exploration Geophysicists, Seismological Society of America, Society of Automotive Engineers, Society of Exploration Geophysicists, Society of Petroleum Engineers.

Offices Held

Chairman, Development and Production Committee, 2003-2005
Executive Council of Society of Exploration Geophysicists, 1989-1990, 1997-1999, 2001-2003
Member of Development and Production Committee, Society of Exploration Geophysicists, 1992 –present

Publications

Stewart, R., R. Turpening, and M. N. Toksoz, 1981, Study of a subsurface fracture zone by vertical seismic profiling, Geophysical Research Letters 8, pp

Turpening, R, 1984, Differential vertical seismic profiling--Fracture volume analysis, Chapter 8 in Vertical Seismic Profiling, edited by A. Balch and M. Lee, I.H.R.D.C., Boston, Mass.

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Keho, T., A. Cheng, M. N. Toksoz, R. Turpening, 1984, Wave dynamics in a Gulf Coast VSP, Vertical Seismic Profiling: Advanced Concepts, Handbook of Geophysical Exploration, K. Helbig and S. Treitel (eds.), Geophysical Press, London

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Stephen, R. A, D.E. Koelsch, H. Berteaux, A. Bocconcelli, S. Bolmer, J. Cretin, N. Etourmy, A. Fabre, R. Goldsborough, M. Gould, S. Kery, J. Laurent, G. Omnes, K. Peal, S. Swift, R. Turpening, and C Zani, 1994, The Seafloor Borehole Array Seismic System (SEABASS) and VLF Ambient Noise, Marine Geophysical Researches, 16, p 243-286

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Border bill $1.7M, so far

Toronto lawyer David Estrin charges $500 per hour

By Dave Battagello
Star Border Reporter

The city has paid more than $1.7 million to Toronto lawyer David Estrin and his consultants — including traffic expert Sam Schwartz — to fight its border battles, according to figures released by city hall.

The Bay Street environmental specialist has billed the city $500 per hour since he was retained in September 2003, with an articling student under his guidance receiving $150 per hour, confirmed city solicitor George Wilkki.

"He is the guru for environmental law. The rates are not out of line for the expertise involved," said Wilkki, noting rates paid to local lawyer Cliff Sutts for the MFP scandal were in the range of $400 to $450 per hour.

Schwartz got a one-time payment by the city in 2004 of $337,754 US ($416,315 Cdn) for his work — even though his report was not released until 2005, the figures show.


David Estrin

There are no payments listed to Schwartz for this year, despite the unveiling of his work at the Cleary International Centre in January and several return visits to Windsor. Wilkki said payments to Schwartz for this year are going through Estrin.

Payments to Estrin, his Gowlings firm and other consultants for 2004 and six months of this year are listed as $416,067.68 for "border traffic issues."

They include legal advice on E.C. Row Expressway, the Ambassador Bridge and the Detroit River Tunnel Partnership and the binational commission's early recommendations for the location of the next crossing.

Many of the payments to Estrin are not listed under the border file — he was paid $642,568.66 to defend the city's rail lands use bylaw before the Ontario Municipal Board. A hearing is to begin in early December.

Alan McKinnon, leader of a residents' group fighting a proposed truck corridor through Ojibway Park, has filed freedom of information requests since early this year asking for the city's retainer agreements with Estrin.

"I don't think it's complete," said McKinnon when told of the city's $1.7-million figure.

The city's figures do not [illegible] ly's four public hearings conducted by a handful of Toronto experts appointed by Estrin to discuss the binational committee's early recommendations.

Council has budgeted $75,000 for those hearings and a summary by Estrin's experts.

McKinnon said he has concerns over the city's expectation that its legal bills on the border issue will eventually be paid by the federal government under the $300-million border fund.

"The city is resisting the federal review of Schwartz," he said. "I don't think you can then expect the feds to pick up the tab for Estrin and Schwartz."

City Coun. Ken Lewenza conceded Estrin's bill to date is a "very high number." But he defended the cost.

"Do we have a concern? Sure, it's come up a number of times among council. But nobody has provided us with a better alternative. We are in the

Scope of Additional Services

The Detroit River International Crossing Study has reached a point where the preliminary list of Practical Alternatives, in light of the extensive amount of work conducted in analyzing Illustrative Alternatives to develop this list, requires additional work to be conducted to prepare the Draft Environmental Impact Statement and conduct the Early Preliminary Engineering. That work includes the following.

- Additional Geotechnical Analysis
- Additional Public Involvement
  - ✓ Use of CommentWorks
  - ✓ Use of Radio Advertising
  - ✓ Additional Equipment Rentals/Materials/Accommodations
- Engagement of Governance Specialist
- Additional Cultural Analysis
- Additional Mapping

The scope of work in each area follows.

1. Additional Geotechnical Analysis

The proposed alternatives are near historically identified salt solution mining wells, which are associated with issues regarding the suitability of bedrock formations in these areas to support bridge foundations because the Michigan Basin is one of the largest areas of halite (salt-NaCl) deposition in the world. Salt has historically been mined either in solid form as rock salt or as natural or artificial brine pumped through solution mining wells. The area beneath Detroit and Windsor within the Michigan Basin is currently mined using conventional room-and-pillar excavation methods. This area has also been historically mined for salt using solution mining methods. Known areas of solution mining have been identified and discussed in the DRIC Report "Draft Preliminary Geotechnical Evaluation for the Proposed Detroit River International Crossing dated May 23, 2005 for the DRIC Study. While the known solution mining areas are located south of Zug Island to the southern end of the DRIC study area, the occurrence of unknown brine wells throughout the corridor cannot be precluded as many unknown wells are thought to exist. The solution wells extended to depths of 1,100 to 1,300 feet.

In general, solution mining consists of introducing water from the surface down a well casing between an outer casing and a central tube. The brine produced from the salt dissolving in the water is recovered through the central tube. Cavities using this method are usually greater at the top of the stratum than at the bottom because the fresh water, which tends to stratify above the denser salt brine in the cavity, dissolves salt more rapidly near cavity roofs than at the base of the cavities, which are in contact with saturated brine. This would result in an inverted cone shaped cavity.

With continued production using this method, solution cavities often coalesce with adjacent cavities to form composite cavities called galleries. When this occurred historically, one or more of the wells were then converted to water inlet wells and the brine was pumped out through other wells in the interconnected system. As production continued in the gallery, large spans of unsupported roofs were sometimes created which, in turn, could cause sagging, downward flexure, and local separation of rock units resulting in local roof collapse and eventual surface subsidence in some instances. Uncontrolled solution mining near the top of a salt layer commonly leaves overlying weak or weakened rocks exposed at the top of the cavity, which increase potential for roof collapses.

COPY

CONTRACT NO. 2004-0808/A2
AGENDA: DAB

MICHIGAN DEPARTMENT OF TRANSPORTATION

THE CORRADINO GROUP OF MICHIGAN, INC.

AMENDMENT

THIS AMENDATORY CONTRACT is made and entered into this date of SEP 2 0 2006 by and between the Michigan Department of Transportation, hereinafter referred to as the "DEPARTMENT," and The Corradino Group of Michigan, Inc., hereinafter referred to as the "CONSULTANT," for the purpose of amending Contract No. 2004-0808, dated December 27, 2004, as amended, hereinafter referred to as the "CONTRACT."

WITNESSETH:

WHEREAS, the CONTRACT provides for the CONSULTANT to perform professional planning, environmental, and engineering services for the Detroit River International Crossing Study; and

WHEREAS, the parties desire to amend the CONTRACT to provide for the performance of additional services, to increase the amount accordingly, and to extend the CONTRACT term to provide sufficient time for the CONSULTANT to perform the additional services; and

WHEREAS, the parties also desire to address ownership of any software and/or hardware purchased by the CONSULTANT in support of the services under the CONTRACT;

NOW, THEREFORE, the parties agree that the CONTRACT be and that the same is amended as follows:

1. In order to set forth the additional services and the additional costs, Exhibit A of the CONTRACT, dated December 10, 2004, as supplemented with Exhibit A-1, dated October 17, 2005, is supplemented with Exhibit A-2, dated May 19, 2006, pages 1 through 111, attached hereto and made a part hereof, and all references in the CONTRACT to Exhibit A will be construed to mean as supplemented with Exhibit A-1, dated October 17, 2005, and with Exhibit A-2, dated May 19, 2006.

2. In order to increase the amount of the CONTRACT by One Million Nine Hundred Forty-One Thousand Three Hundred Ninety-One Dollars ($1,941,391.00), for a revised total CONTRACT amount of Twenty-One Million Four Hundred Seventy-Five Thousand Seven Hundred Sixty-Five Dollars ($21,475,765.00), Section 15a of the CONTRACT is amended to read as follows:

"a. Compensation for the SERVICES will be on the basis of actual cost and a fixed fee for profit and, except as provided for in Section 40, will not exceed the maximum amount of Twenty-One Million Four Hundred Seventy-Five Thousand Seven Hundred Sixty-Five Dollars ($21,475,765.00), which amount includes a fixed fee for profit of One Million Six Hundred Thirty-Four Thousand Thirty-Seven Dollars ($1,634,037.00)."

3. In order to extend the CONTRACT term by approximately six (6) months, Section 45 of the CONTRACT is amended to read as follows:

"45. This contract will be in effect from December 27, 2004, through December 31, 2008."

4. In order to address ownership of any software and/or hardware purchased by the CONSULTANT in support of the services under the CONTRACT, a new second paragraph is added to Section 7 of the CONTRACT as follows:

"Upon completion of the SERVICES, the CONSULTANT will also deliver to the DEPARTMENT any software and/or hardware purchased by the CONSULTANT in support of the SERVICES. Any such software and/or hardware will be the property of the DEPARTMENT."

5. All other provisions of the CONTRACT, except as herein amended, remain in full force and effect as originally set forth.

6. The CONSULTANT agrees that the compensation noted above represents payment in full for all services requested by the DEPARTMENT and waives any and all claims it has or may have against the DEPARTMENT that arise out of the need to amend and/or extend the CONTRACT.

7. In the event of any discrepancies between the provisions of this Amendment and any exhibit(s) hereto, the provisions of the Amendment will govern.

8. This Amendatory Contract will become binding on the parties and of full force and effect upon signing by the duly authorized representatives of the CONSULTANT and the DEPARTMENT and upon adoption of a resolution approving said Amendatory Contract and authorizing the signature(s) thereto of the respective representative(s) of the CONSULTANT, a certified copy of which resolution will be sent to the DEPARTMENT with this Amendatory Contract, as applicable.

IN WITNESS WHEREOF, the parties have caused this Amendatory Contract to be awarded.

THE CORRADINO GROUP OF MICHIGAN, INC.

By: _____ Chairman, CEO
Title:

MICHIGAN DEPARTMENT OF TRANSPORTATION

By: _____
Title: Department Director

APPROVED
Administrative Board
09/19/06

* EXHIBIT A-2
May 19, 2006

Detroit River International Crossing Study
Work Plan
Amendment #2

1. Introduction

The consultant team led by The Corradino Group of Michigan, Inc. (Corradino) submits this work plan in response to the RFP issued by the Michigan Department of Transportation for work in the following areas:

- Geotechnical Analysis Prior to Drilling
- Additional Public Involvement
- 17 Workshops and Context Sensitive Solutions (CSS) Public Meetings
- Delray Display
- Additional Equipment Rentals/Materials/Accommodations
- Work of Governance Specialist
- Engagement of Rail Specialist
- Additional Coordination with Canadian Team

A series of attachments provide information supporting this proposal. Attachment A includes letters from the firms indicating their commitment to the project, statements regarding conflict of interest, and anticipated payment type. Attachment B provides additional information on Fletcher & Sippel LLC. Attachment C is new resumes of new people. Attachment D is the Derivation of Cost Proposal.

2. Geotechnical Analysis Prior to Drilling

The MDOT-approved contract amendment (November 2005) for brine well investigation includes the drilling of four 1,500-foot-deep test borings, combined with crosswell seismic imaging and evaluating the resulting data. While MDOT is considering approval of a more intensive investigation be performed at two crossing corridors (X-10 and X-11) to more fully investigate the deep rock profile that will ultimately support the envisioned primary and secondary foundations for a new bridge across the Detroit River, preparatory work will begin with Forward Modeling and engaging an international panel of experts to review the geotechnical analysis as it proceeds.

The Border Transportation Partnership has identified two crossing corridors – X-10 and X-11 – for a new bridge between Detroit and Windsor. Both of the proposed alternatives along the U.S. shore are near historically identified or suspected solution mining wells. MDOT has adopted a bridge foundation policy that requires the foundations to be located outside of the influence of any rock cavities such as those produced by solution mining activities. NTH, subconsultant to The Corradino Group, has an approved but limited work scope to investigate the possible solution mining areas and the potential impact of the cavities created by the wells on the bedrock's capacity to support bridge foundations. But, prior to that and possibly additional work beginning, Forward Modeling will be conducted and a Geotechnical Issues Advisory Group will be convened.

2.1 Work Plan

2.1.1 Forward Modeling

Forward modeling will be performed in two areas: rock mechanics and geophysics. Each are described below. The modeling will consist of a geophysical element to estimate expected signal configurations for the crosswell seismic imaging along with a rock mechanics element to analyze for future collapse potential of solution mined voids. All efforts will be directed and coordinated by NTH Consultants. As the first step of the forward modeling, a decision tree will be developed to examine the proposed program, the various outcomes, and the appropriate decisions that should be made based on these outcomes. This decision tree will be maintained, modified, and expanded as appropriate along the course of the forward modeling and field program. The decision tree will consider the current view of the MDOT, that a void of any size will not be acceptable, and will be modified, should the results of the forward modeling change that view. In any case, the geotechnical and geophysical program will be developed and carried out accordingly.

Rock Mechanics Modeling Task

The outcome of the Rock Mechanics Forward Modeling effort is prediction of the size, geometry, and location of brine well cavities of concern. Step 1 will be the evaluation of the stability above solution mined cavities using existing data and assumed rock mass-over-void conditions, similar to those known for coal mining. Parametric analysis and logic will be the basis of this effort. Step 2 will advance the work of Step 1 by using 2-D finite-element analysis. Step 3 will involve applying the model 3DEC to define rock fractures, movements, etc. The analysis will be calibrated with known stable and unstable conditions for the brine well cavities in the Detroit area.

Based on the results of the first three steps combined with input from the MDOT, the parameters that the geophysical investigation must consider will be determined (i.e., size of the void that must be detected, angle of draw, and other factors). On this basis, the field investigation method – crosswell seismic imaging – will be reviewed and, if necessary, additional forward modeling conducted to advance the fieldwork.

Geophysical Modeling Task

The desired outcome of the Geophysical Forward Modeling effort is to predict image quality of brine well cavities of concern and to provide models for use in developing an approach to seismic imaging data acquisition. The first step will incorporate the modeled cavity dimensions and characteristics from the Rock Mechanics Forward Modeling program, described above. Based on 2-D models of velocity and density representing six possible formation states (cavity/no cavity for the three proposed geophysical methods); 2-D images will be produced to represent the capability of 3-D surface seismic, VSP/RVSP, and crosswell seismic imaging for each of the six models. At each offset in the model, a synthetic amplitude-versus-angle (AVA) gather will be produced showing seismic reflectivity as a function of angle for the assumed bandwidth of the imaging method. The AVA gathers will then be stacked over a range of incidence angles typical for the imaging method to produce a seismic reflection trace for that offset. The traces produced for all offsets will be displayed as a 2-D seismic section. The wavelet will be assumed to have an effective bandwidth based on the propagation paths for each imaging method and the characteristics of data in the local area. The surface seismic will be assumed to have an upper frequency of 55 Hz; the VSP will be assumed to have an upper frequency of 100 Hz; and, the crosswell seismic imaging, an upper frequency of 2,000 Hz. The 2-D reflection sections for the three methods and the six models will be compiled to include reflection displays in addition to reflection displays overlaid on the colorized input model.

The next steps will encompass the modeling of a cavity and/or absence of a cavity, respectively, in two (2-D) dimensions, relevant to field data acquisition procedures. A 2-D finite difference model with five or more model cells per wavelength, to avoid dispersion effects, will be created. For 2kHz data at 18,000 feet per second (a nine-foot wavelength), as anticipated in the DRIC project corridors, each cell will be two feet by two feet. For the crosswell program, with borings spaced 1,000 feet apart and about 60 percent padding to avoid edge effects, an 800 by 800 cell model is anticipated. A crosswell data set and process to produce velocity / reflection images for use in data acquisition will be generated.

The final step in the Geophysical Forward Modeling program will consist of a 3-D model of a cavity outside the image plane but within the first Fresnel zone in the crosswell seismic imaging. The number of cells will be limited to reduce the size of the model in the 3rd dimension, by reducing the upper frequency below 2kHz, or allowing greater dispersion of the data. Several common shot gathers will be generated from the 3-D model and the data inspected by hand because the computer resources to generate a complete crosswell data set in a reasonable timeframe are not feasible to obtain.

2.1.2 Geotechnical Issues Advisory Group

MDOT wishes to establish a panel of geophysical/geotechnical experts (see attached resumes) to formulate protocol by which data collected in the field will be analyzed by the U.S. and Canadian consulting teams and the process by which the recommendation from the team will be reviewed, modified, and, eventually, confirmed.

The Advisory Group will provide objective expert opinion, advice and direction regarding the investigation program, which will ultimately determine the suitability of bedrock conditions for siting the proposed international bridge and approach structures. It is expected the Advisory Group will meet four times.

The mandate of the Advisory Group is to work as a team to provide direction and written reviews regarding:

i. The investigation program.

ii. The geophysics/geotechnical field investigation program including data analysis protocol and interpretation procedure(s).

iii. Findings presented by the U.S. and Canadian consulting teams, including modifications to the investigation program and analysis protocol to draw conclusion regarding the soundness of the bedrock for purposes of siting long-span bridge and approach structures.

The Advisory Group members will consist of experts in geophysics and geotechnical areas from the Michigan Department of Transportation, the Federal Highway Administration, the Ontario Ministry of Transportation and the Transport Canada. They will be joined by outside experts from academia and the private sector as approved by the Partnership agencies. An Advisory Group of 12 members is expected.

The Scope of Work involves providing direction and written reviews on the geophysical/geotechnical program (as approved by the Partnership agencies) used to evaluate the alternatives as defined by the Partnership for the proposed international crossing. It is expected that this work will be undertaken between May 2006 and February 2007 and will consist of:

- Familiarization with the Area of Continued Analysis in the vicinity of the Detroit River, particularly the geotechnical and bedrock conditions.

- Familiarization with the alternatives as defined by the Partnership.

- Study of the geophysical/geotechnical investigation program with direction and written review including any revisions.

- Progress review of field results and data from the investigation program and direction regarding modifications.

- Review of the draft recommendations and advice to the Partnership's Working Group so that final recommendations can be formulated and offered to the Partnership's Steering Committee for final action.

It is expected that the Advisory Group will meet four times between May 2006 and February 2007. Budgets should be based on six days for meetings and 14 days for preparation, familiarization, review and reporting. It is anticipated that the Advisory Group will meet as follows:

Meeting #1:	**Kickoff in June, 2006 for 2.5 days**
Info required:	Background (NTH Advantages/Disadvantages Paper plus SOMAT Review Paper plus past NTH reports, background materials, as needed, from files).
Meeting #2:	**Review of drilling to date in Fall 2006 for one day**
Info required:	Results of drilling program that is produced as normal course of business.
Meeting #3:	**Review drilling program final report in Spring 2007 for one day**
Info required:	Drilling Program Final Report that is produced as normal course of business.
Meeting #4:	**Make recommendations to Steering Committee in Summer 2007 for one day**
Info required:	Response to questions on Drilling Program Final Report.

3. Additional Public Involvement

3.1 Additional Workshops and Public Meetings

Additional work is also required of the consultant in the conduct of 17 public workshops to conduct land-use-related planning in the focused analysis area of Delray, both with and without the proposed new bridge. This includes equipment rental, printed materials and other meeting accommodations, as well as services to conduct them. A part of this public engagement is the set of Context Sensitive Solutions workshops, including:

- August 2006-- will focus on potential themes that could be expressed by materials, textures, images, colors, etc. for the components of the system other than the main river crossing. Prior to the meeting, community and regional images – historical and modern – will be assembled to determine

the possibilities of aesthetic treatments for interchange bridge types, walls, streetscape elements, etc. The Hamilton/Anderson exhibits/ideas for Delray's future and vision will be incorporated into the possible images for structural aesthetics and landscape designs. The community participants will indicate their preferences of themes, materials, textures, images, colors, etc. This would give the team an indication of what the participants are favoring and what can be focused on for developing alternatives. Also at this meeting there will be a demonstration of the noise levels one could expect at a new crossing and plaza. A noise simulation based on noise measurements at the existing Ambassador Bridge will be set up in a separate room from the main meeting.

- November 2006-- will present to the public examples and simulations of the crossing system based on the work produced by the community at a September 2006 set of public meetings already included in the scope. Another part of this November workshop will involve the U.S. consultant preparing much of the computer software infrastructure for the Canadian version of the workshop. The Consultant Team will also support and participate in this Canadian workshop.

- February 2007-- will build on the October 2006 interactive bridge workshop, which will express community preferences for themes, materials, textures, images, colors, etc. At this workshop the results of the Bridge Type Study and its affect on the development of bridge options will be presented. In addition, the community will be given an opportunity to view simulations of the ways in which the architects and engineers have interpreted their preferences in the continued development of the Plazas and Interchanges.

- April 2007 CSS -- will also build on the October 2006 and February 2007 workshops, as the Bridge Type Study technical work and early Conceptual Design will be incorporated into the simulations of the main bridge and its approaches. The community will be given an opportunity to view simulations of the ways in which the architects and engineers have interpreted their preferences in the continued development of the main bridge and its approaches.

- August 2007 -- will build on the April 2007 CSS meeting by presenting final Conceptual Designs of the main river bridge and approaches with input/ feedback on incorporation of design themes. The result will be final bridge treatment preferences.

- October 2007-- will provide final guidelines/requirements for the interchange bridges, retaining and sound/security walls, gateway element(s), landscape design theme based upon the preferences provided at earlier meetings.

3.2 Portable Display

MDOT requests the consultant develop a movable/portable display to depict the past, present and foreseeable future of the focused analysis area. This includes acquiring appropriate equipment (display panels), which will become the property of MDOT.

3.3 Governance Specialist

A part of the communications program has been the engagement of a governance specialist to address issues with U.S. agencies, such as the Department of Homeland Security and Canadian governmental agencies in Ottawa and Toronto. Because this work was to end in December 2007, and it is now expected the drilling program will cause that schedule to be extended an additional eight months, extension of the services of the Governance Specialist (James Blanchard) is needed.

4. Engagement of Rail Specialists

The U.S. Department of Homeland Security, Customs and Border Protection Agency, has made it clear the railroad line crossing through the entirety of the focused analysis area is a threat to the development of the new border crossing plaza. To address this issue, the rail line may need to be relocated or abandoned. In the latter case, MDOT requires the assistance of a specialist in rail line abandonment including work with the federal Surface Transportation Board (STB). This includes research, involvement with the affected shippers/customers along the rail line, and meetings/briefings of MDOT, FHWA and the STB including filing of appropriate materials with each of these federal agencies.

In response, William Sippel, Janet Gilbert, T.J. Litwiler and Michael Barion, Jr. of the firm of Fletcher & Sippel, LLC will provide rail abandonment special services. Fletcher & Sippel (F&S) is a firm of national experts in rail issues, including rail line abandonments. The firm has handled dozens of exempt and fully-regulated line abandonment cases before the STB and its predecessor agency, the Interstate Commerce Commission. F&S has also advised and represented clients in several "Offer of Financial Assistance" (OFA) proceedings before the STB. This is the procedure under which an interested party can require the abandoning railroad to sell the line to it for continued rail service.

The F&S expertise in OFA matters includes representation of the City of Cincinnati in the lead case that established the test for when an exemption from the OFA procedures (i.e., a determination that the OFA procedures should not be invoked) is appropriate. In that matter, the firm recommended to the abandoning railroad that, as part of its abandonment petition, it seek (with the support of the public authorities supporting a redevelopment project) an exemption from the OFA procedures. The City's riverfront redevelopment project included a new Cincinnati Bengals' football stadium, a possible Cincinnati Reds' baseball stadium, a multimodal passenger transportation center and a museum and theater complex – most of which is unrelated to the provisions of rail service. The STB found the parties sufficiently demonstrated that the right-of-way was needed for a valid public purpose and that, even though the unused rail line was part of a potentially important rail bypass route, there was no overriding public need for continued rail service. The STB allowed the line to be abandoned and the redevelopment project proceeded as planned. The test established in the Cincinnati case is still the test used by the STB.

The scope of work in this area includes the following:

4.1 Conduct Investigation/Draft Petition for Exemption

- **Factual investigation**: Obtain information required by STB regulations for the abandonment petition. This includes information on the applicant, a description of the line, mileposts, length, width of ROW, whether line contains any federally-granted ROW, type, weight and condition of the rail, ties, bridges, Federal Railroad Administration (FRA) class, stations and zip codes on the line, number of industries (active and inactive), traffic volumes and commodities handled over past two calendar years and 2006 to date, availability of transportation alternatives, net liquidation value of the line, number of grade crossings and how equipped, frequency of service on the line and other pertinent information.

- **Legal research**: Research case law supporting STB's authority to exempt OFA process, legal and factual bases for doing so, STB cases where proposed new on-line facility with claimed public benefits is weighed against public benefits of abandonment.

- **Meetings**: Make at least two trips (five days total) to Michigan for meetings to review status, obtain information and discuss strategy. The initial visit will include an inspection of the line to confirm location, condition, industry spurs, etc. and to view the proposed bridge site. Another visit

will include meetings with on-line shippers/receivers to discuss the planned abandonment and, if possible, obtain a statement of support or non-opposition. Another trip (two days) is included to discuss status, strategy, and obtain an MDOT support statement. In addition, one pre-filing trip is planned to meet with the STB in Washington in order to brief STB staff and/or Commissioners regarding the DRIC Study and proposed rail strategy and, separately, meetings with Homeland Security and any other pertinent federal agencies to secure support statements (two days). Finally, one trip (one day) is included with CSXT and NS in Michigan to outline strategy, discuss plans to possibly relocate CSX Transflo facility and discuss the possibility of a proposed new connection to facilitate continued rail movements to Zug Island.

- **Drafting of Petition to STB**: As appropriate, the petition to the STB for an exemption will be drafted for the owning railroad to abandon the line. The owning railroad will handle the required environmental and historic notification letters and prepare the environmental/historic report to be attached to the petition.

4.2 STB Filings with Anticipated Opposition and Related Matters

Upon written authorization from the MDOT DRIC Project Manager, the following services will be undertaken.

- **Replies to challenges**: Obtain and draft verified statements for project support, including verified statements from Michigan DOT, shippers, federal government agencies involved, other supporting groups or agencies and any special experts that are appropriate (these statements will also include focused responses to arguments made by the opposition).

- **Discovery**: Draft responses to interrogatories and document production requests, drafting of a response to a motion to compel, etc.

- **STB Filings**: Draft all rebuttal evidence and argument in response to protests, opposition evidence and/or a motion to dismiss, including developing factual information/evidence for rebuttal statements from MDOT, Homeland Security, Canadian authorities, and others, as appropriate, discussing the public benefits of the DRIC Study, the effect of abandonment/non-abandonment on the international bridge project, Port of Detroit, legal research on issues raised by the opponents, etc. Oral argument, if necessary.

- **Meetings**: Three additional trips to Detroit or Washington D.C. for meetings with witnesses (not included in Phase I above), including with MDOT, Homeland Security and other supporting parties to discuss status and strategy and obtain information for support/rebuttal statements.

5. Additional Coordination with Canadian Team

The Border Transportation Partnership has engaged in a detailed examination of the steps towards project implementation of the proposed new crossing. It involves: 1) developing a financial model to serve as a benchmark for the Partnership to assess and evaluate various governance options and funding scenarios; 2) methods to construct the facility; 3) development of a public-private partnership, etc. The consultant will provide support in these areas from its Project Manager (Joe Corradino) and other qualified specialists in the area from key members of the consultant team. (See resumes of Burt Deutsch, President of Corradino; Fred P'Pool, COO of Corradino; Stephen Mayer, Market Development Manager–P3, Parsons; and, Jeffrey Squires, Market Development Manager, Parsons.)

Attachment A

Letters from firms indicating:

- commitment to the project
- statements of conflict of interest
- anticipated payment type

May 19, 2006

Mr. Mohammed Alghurabi, PE
Michigan Department of Transportation
425 West Ottawa Street
Lansing, Michigan 48933

Re: Detroit River International Crossing Study Amendment 2

Dear Mohammed:

1. Commitment to the Project

The Corradino Group of Michigan, Inc. is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

2. Conflict of Interest

Neither The Corradino Group of Michigan, Inc. personnel nor The Corradino Group of Michigan, Inc. as a firm has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

3. Basis of Payment

The Corradino Group of Michigan, Inc understands it will be compensated on a cost-plus-fixed fee basis.

Very truly yours,

Joe C. Corradino, PE
Chief Executive Officer

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20300 CMC CENTER DRIVE • SUITE 410
SOUTHFIELD, MI 48076
TEL 248.799.0140 • FAX 248.799.0146
WWW.CORRADINO.COM

COMMONWEALTH

CULTURAL RESOURCES
GROUP, INC.

August 28, 2006

Mr. Ted Stone, Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, Kentucky 40202

Dear Mr. Stone:

Commonwealth Cultural Resources Group, Inc. (CCRG) states the following:

Commitment to the Project

Commonwealth Cultural Resources Group, Inc. (CCRG) is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

Conflict of Interest

Neither Commonwealth Cultural Resources Group personnel or Commonwealth Cultural Resources Group, Inc. as a firm has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

Basis of Payment

Commonwealth Cultural Resources Group, Inc. understands it will be compensated on a cost-plus-fixed fee basis.

Sincerely,

Donald J. Weir, RPA
President

FLETCHER & SIPPEL LLC
ATTORNEYS AT LAW

29 North Wacker Drive
Suite 920
Chicago, Illinois 60606-2832

Phone: (312) 252-1500
Fax: (312) 252-2400
www.fletcher-sippel.com

JANET H. GILBERT
(312) 252-1507
jgilbert@fletcher-sippel.com

August 29, 2006

VIA FEDERAL EXPRESS

CONFIDENTIAL-PRIVILEGED
ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT

Ted Stone
Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, KY 40202

Re: Federal Regulatory Consulting Services

Dear Mr. Stone:

1. Commitment to the Project

Fletcher & Sippel LLC is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

2. Conflict of Interest

Neither Fletcher & Sippel LLC personnel nor Fletcher & Sippel LLC as a firm believes there is any conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The firm previously disclosed that in November of 2000, one member of the firm wrote a second opinion letter for Mr. Blashfield and Mr. Lindley of Centra. The letter involved a question of the application of federal preemption to the Jefferson Terminal Railroad and a condemnation issue Jefferson Terminal had with the City of Detroit by Jefferson and Freud Avenues near the Chrysler plaint. We were not retained for any purpose other than a second opinion letter and did not represent nor have we represented Centra since. We do represent Canadian National and its U.S. subsidiaries whose interests in the past have been adverse to Riverview-Trenton Railroad.

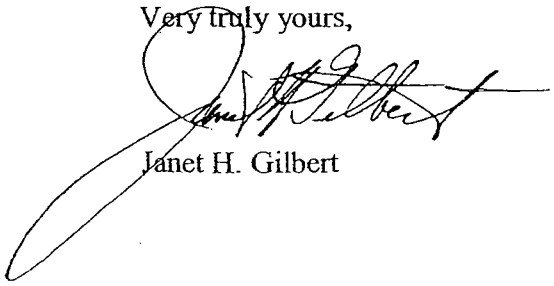
The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

3. Basis of Payment

Fletcher & Sippel LLC understands it will be compensated on a unit cost plus directs basis.

Very truly yours,



Janet H. Gilbert

JHG:kb

NTH Consultants, Ltd.

Infrastructure Engineering
and Environmental Services

480 Ford Field
2000 Brush Street
Detroit, MI 48226
313.237.3900
313.237.3909 Fax

Mr. Ted Stone
Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, KY 40202

May 18, 2006
Project No. 15-050014-01

RE: Detroit River International Crossing
Detroit, Michigan

1. Commitment to the Project

NTH Consultants, Ltd. is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

2. Conflict of Interest

Neither, NTH Consultants, Ltd.'s personnel or NTH Consultants, Ltd. as a firm has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

3. Basis of Payment

NTH Consultants, Ltd. understands it will be compensated on a cost-plus-fixed fee basis.

Sincerely,

NTH Consultants, Ltd.

Fritz J. Klingler, P.E.
Vice President

FJK/lg/lh

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PARSONS

[illegible] Central Park Boulevard · Suite 27[illegible] · [illegible] 48075 · (248) [illegible] · Fax: (248) 262-0938 · www.parsons.com

May 18, 2006

Mr. Joseph Corradino
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, KY 40202

Mr. Corradino:

Parsons Transportation Group Inc. of Michigan (Parsons) is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

Neither Parsons personnel nor Parsons as a firm has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. Parsons warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership;
- The Work/Services to be performed under future contractual agreements;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

Parsons understands it will be compensated on a cost-plus-fixed fee basis.

Sincerely,

PARSONS

Mark C. Fialkowski, PE
Vice President

Somat Engineering, INCORPORATED

May 17, 2006

Mr. Ted Stone, Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, KY 40202

Dear Mr. Stone:

Herein are statements in regards to the following:

1. Commitment to the Project

SOMAT Engineering, Inc. is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

2. Conflict of Interest

Neither SOMAT Engineering, Inc. personnel nor SOMAT Engineering, Inc. as a firm has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed, or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

3. Basis of Payment

SOMAT Engineering, Inc. understands it will be compensated on a cost-plus-fixed fee basis.

Sincerely,
SOMAT Engineering, Inc.

G. Ramanujam, P.E. (Ram)
President

660 Woodward Ave, Suite 1243, Detroit, Michigan 48226 web: www.somateng.com phone. 313-963-2721 fax: 313-963-2736 email. info@somateng.com

Infrastructure Engineering Solutions

DLA PIPER RUDNICK GRAY CARY

DLA Piper Rudnick Gray Cary US LLP
1200 Nineteenth Street, N.W.
Washington, D.C. 20036-2412
T 202.861.3900
F 202.223.2085
W www.dlapiper.com

GOVERNOR JAMES J. BLANCHARD
james.blanchard@dlapiper.com
T 202.861.6415 F 202.689.8565

September 1, 2006

Mr. Ted Stone
Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, Kentucky 40202

Dear Mr. Stone:

DLA Piper Rudnick Gray Cary US LLP ("DLA Piper") is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

Neither DLA Piper personnel nor DLA Piper as a firm has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership;
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

DLA Piper understands it will be compensated on a unit cost plus directs basis.

Sincerely,

James J. Blanchard

Edward J. Cording Geotechnical Consultant
P. 0. Box 125 4 College Park Court Savoy, IL 61874
Phone 217 351 8709 **Fax 217 351 8700**

May 19, 2006

Ted Stone
Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, KY 40202
Cell: 502.396.2131
Phone: 502.587.7221

Dear Mr. Stone:

Edward J. Cording is pleased to be part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

Neither Edward J. Cording, as an individual, nor Edward J. Cording (sole proprietor) as a firm, has a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

Edward J. Cording understands he will be compensated on a unit cost plus directs basis.

Sincerely yours,

Edward J. Cording

1. Commitment to the Project

Rick Miller is pleased to be a part of the consultant team working on the Detroit River International Crossing Project and is committed to working on the project.

2. Conflict of Interest

Rick Miller has not conflict of interest or potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. The consultant warrants that it does not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request for Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

3. Basis of Payment

Rick Miller understands he is to be compensated on a unit cost plus directs basis.

Rick Miller, Consultant

8/28/06

Date

RICHARD D. WOODS, Ph.D., P.E., NAE, Hon.M. ASCE
7436 Lake Street
Dexter, Michigan 48130

May 19, 2006

Ted Stone
Vice President
The Corradino Group
200 S. Fifth Street, Suite 300N
Louisville, KY 40202

RE: Commitment to Project

I, Richard D. Woods, am pleased to be a part of the consultant team working on the Detroit River International Crossing Project and I am committed to working on the project.

I do not have a conflict of interest or a potential conflict of interest as defined in the Letter of Interest request issued by the Michigan Department of Transportation for the Detroit River International Crossing Project. I warrant that I do not have any special knowledge of or exceptional access to confidential information concerning:

- The Ontario-Michigan Border Transportation Partnership,
- The Work/Services to be performed under future contractual agreement;
- Pricing of the Work/Services to be performed; or
- The Letter of Interest evaluation process and/or Request or Proposal evaluation process, where such special knowledge of or exceptional access to confidential information may prejudice the Michigan Department of Transportation or constitute an unfair advantage to the consultant.

I, Richard D. Woods, understand I will be compensated on a unit cost plus directs basis.

Sincerely Yours,

Richard D. Woods

Attachment B

Additional Information on Fletcher & Sippel, LLC

FLETCHER & SIPPEL LLC

ATTORNEYS AT LAW

29 North Wacker Drive
Suite 920
Chicago, Illinois 60606-2832

Phone: (312) 252-1500
Fax: (312) 252-2400
www.fletcher-sippel.com

JANET H. GILBERT
(312) 252-1507
JGILBERT@FLETCHER-SIPPEL.COM

April 4, 2006

CONFIDENTIAL-PRIVILEGED
ATTORNEY-CLIENT COMMUNICATION/
ATTORNEY WORK PRODUCT

Mr. Joe Corradino
DRIC Project Manager
The Corradino Group
535 Griswold Street Buhl Building
Suite 918
Detroit, Michigan 48226-3688

Re: **Federal Regulatory Consulting Services**

Dear Mr. Corradino:

We appreciate the opportunity to advise and assist The Corradino Group and the Detroit River International Crossing Project (DRIC) in its efforts to resolve rail-related issues involved in Project, most specifically issues relating to the Surface Transportation Board's (STB) jurisdiction over rail matters, rail line abandonments and federal preemption.

As we discussed at our recent meeting, Fletcher & Sippel are national experts in rail issues, including rail line abandonments. The firm has handled dozens of exempt and fully regulated line abandonment cases before the STB and its predecessor agency, the Interstate Commerce Commission. We have also advised and represented clients in several "Offer of Financial Assistance" (OFA) proceedings before the STB. This is the procedure under which an interested party can require the abandoning railroad to sell the line to it for continued rail service.

Our expertise in OFA matters includes representation of the City of Cincinnati in the lead case that established the test for when an exemption from the OFA procedures (i.e., a determination that the OFA procedures should not be invoked) is appropriate. In that matter, our firm recommended to the abandoning railroad that, as part of its abandonment petition, it seek (with the support of the public authorities supporting the redevelopment project) an exemption from the OFA procedures. The City's riverfront development project included a new Cincinnati

Bengals' football stadium, a possible Cincinnati Reds' baseball stadium, a multimodal passenger transportation center and a museum and theater complex -- most of which is unrelated to the provisions of rail service. The STB found the parties sufficiently demonstrated that the right-of-way was needed for a valid public purpose and that, even though the unused rail line was part of a potentially important rail bypass route, there was no overriding public need for continued rail service. The STB allowed the line to be abandoned and the redevelopment project proceeded as planned. The test established in the Cincinnati case is still the test used by the STB. A copy of the decision is attached.

You asked that we outline the possible costs involved in assisting you with the DRIC Project. For legal consulting services rendered to you on this matter, the following individuals would be involved in varying degrees depending on the complexity of the proceedings:

William C. Sippel:	$285/hour
Janet H. Gilbert:	$250/hour
T.J. Litwiler:	$235/hour
Michael J. Barron, Jr.:	$200/hour

The above rates are the current hourly rates we charge for work performed for State Departments of Transportation and are below our standard hourly rates charged to non-public clients for such matters.

Unlike most law firms, we do not charge for routine, ordinary office expenses (i.e., on-site copies, faxes, local and long-distance telephone charges, basic computer research, postage and letter-sized Federal Express packages). We have chosen to treat these expenses as normal overhead and cover them in our hourly rates. Any large copying projects would be handled through an off-site copy service with the cost billed to the client. Similarly, the cost of any Federal Express package larger than letter-size (or weighing over one pound) and any out-of-pocket or extraordinary expense that we incur (such as travel or retrieval of documents from the Surface Transportation Board files) would be billed to the client and itemized on our statement. As a matter of policy, we strive to keep such expenses to the minimum and, where feasible, discuss them with the client in advance.

Also, we understand that our clients work within budgets and that controlling costs is important. As such, we have outlined below an estimate of potential fees for the project you outlined to us at our recent meeting. The estimates assume the project will take place in phases and, since at this stage there are a number of unknowns, we have provided a range:

Phase I: Conduct investigation/Draft Petition for Exemption

Factual investigation: Obtain information required by STB regulations for the abandonment petition. This includes information on the applicant, a description of the line, mileposts, length, width of ROW, whether line contains any federally-granted ROW, type, weight and condition of the rail, ties, bridges, FRA class, stations and zip codes on the line, number of industries (active and inactive), traffic volumes and commodities handled over past two calendar years and 2006 to date, availability of transportation alternatives, net liquidation value of the line, number of grade crossings and how equipped, frequency of service on the line and other pertinent information.

Legal research: Research case law supporting STB's authority to exempt OFA process, legal and factual bases for doing so, STB cases where proposed new on-line facility with claimed public benefits is weighed against public benefits of abandonment.

Meetings: Make at least two trips (5 days total) to Detroit for meetings with Corradino in Detroit to review status, obtain information, and discuss strategy. The initial visit will include an inspection of the line to confirm location, condition, industry spurs, etc. and to view the proposed bridge site. Another visit would include meetings with on-line shippers/receivers to discuss the planned abandonment and, if possible, obtain a statement of support or non-opposition. We have assumed one trip (2 days) to MDOT in Lansing or Detroit to discuss status, strategy, and obtain an MDOT support statement. In addition, we assume one pre-filing trip to meet with the STB in Washington to brief STB staff and/or Commissioners regarding proposed bridge project and proposed abandonment and, separately, meetings with Homeland Security and any other pertinent federal agencies to secure support statements (2 days). Finally, we have assumed one trip (1 day) with CSXT and NS in Detroit to outline strategy, confirm plans to relocate CSX Transflo facility and discuss the proposed new connection to facilitate continued rail movements to Zug Island.

Drafting of Petition to STB: Draft the petition to the STB for an exemption for the owning railroad to abandon the line. The owning railroad will handle the required environmental and historic notification letters and prepare the environmental/historic report to be attached to the petition.

Phase I: Cost Estimate

Fees:

PERSON	ACTIVITY	RATE	EST. HRS.	TOTAL
Sippel	Attend some or all interviews, attend meeting with STB, obtain and draft statements, review final drafts of STB filing	$285/hr	70	$19,950
Gilbert	Project coordination, attend some or all of interviews, draft statements, draft portions of STB filing	$250/hr	60	$15,000
Litwiler	Draft legal/factual analysis for STB filing	$235/hr	21	$ 4,935
Barron	Research, gather technical information needed for and draft portions of STB filing	$200/hr	45	$ 9,000
TOTAL			**196**	**$48,885**

Expenses:

ITEM	DESCRIPTION	TOTAL
Air travel to Michigan (primarily Detroit)	Estimate four trips, three of which will involve two people	$ 1,750
Lodging – Detroit area	Estimate seven days, of which five involve two people	$ 2,000
Meals	Average $35/day, two people for five days	$ 420
Taxis	To/from airport	$ 240
Rental Car in Detroit	Estimate seven days at $40/day plus gas	$ 450
Air travel to D.C.	Estimate one 2-day trip involving one person	$ 350
Lodging – DC area	Estimate two nights, one person	$ 350
Taxis	To/from airport and around DC, estimate six	$ 75
Meals	Estimate $35/day	$ 70

Filing Fees (exempt)	Fees depend on type of application but range from $5,300 to $18,700	$ 18,700
Printing	Major projects not included in fee	$ 500
Other	Miscellaneous	$ 500
Total		**$ 25,405**

Note: The above assumes preparation of a petition for exemption. If it is confirmed that no traffic has originated or terminated on the line for at least two years (which we understand is not the case), a somewhat simpler filing (a Notice of Exemption) may be made. The estimate does not include the cost of preparing a full abandonment application should the STB require that. Such a circumstance would be included in Phase II.

Subtotal: Estimated Fees and Expenses – Phase I: $ 74,290

Phase II: STB Filings with Anticipated Opposition and Related Matters

Replies to challenges: Obtain and draft verified statements for project support, including verified statements from Michigan DOT, shippers, federal government agencies involved, other supporting groups or agencies and any special experts that are appropriate (these statements will also include focused responses to arguments made by the opposition)

Discovery: Draft responses to interrogatories and document production requests, drafting of a response to a motion to compel, etc.

STB Filings: Draft all rebuttal evidence and argument in response to protests, opposition evidence and/or a motion to dismiss, including developing factual information/evidence for rebuttal statements from MDOT, Homeland Security, Canadian authorities, and others, as appropriate, discussing the public benefits of the bridge project, the effect of non-abandonment on the bridge project, the effect of abandonment on the proposed port project, legal research on issues raised by the opponents, etc. Oral argument, if necessary.

Meetings: Three additional trips to Detroit or Washington D.C. for meetings with witnesses (not included in Phase I above), including Corradino Group, MDOT, Homeland Security and other supporting parties to discuss status and strategy and obtain information for support/rebuttal statements.

Phase II: Cost Estimate

Fees:

PERSON	ACTIVITY	RATE	EST. HRS.	TOTAL
Sippel	Draft and/or review verified statements with focus on shippers, Ports and expert analysis, if any; review response to discovery; draft and/or respond to motions to compel; attend possible oral argument before STB	$285/hr	75	$21,375
Gilbert	Draft and/or review verified statements with focus on government agencies and expert analysis, prepare response to discovery, retain any necessary experts and draft statements	$250/hr	50	$12,500
Litwiler	Draft legal/factual analysis for STB filing, focusing on opposition theories, assist in drafting verified statements	$235/hr	25	$5,875
Barron	Research, follow-up on verified statements, assist in drafting verified statements and responses to discovery; draft portions of STB filing;	$200/hr	55	$11,000
TOTAL			**205**	**$50,750**

Expenses:

ITEM	DESCRIPTION	TOTAL
Air travel to Michigan (primarily Detroit)	Estimate six trips, three of which will involve two people	$2,070
Lodging	Estimate seven days, of which five involve two people	$1,800

Meals	Estimate seven days, average $35/day, two people for five days	$420
Taxis	To/from airport	$320
Rental Car in Detroit	Estimate seven days at $40/day plus gas	$450
Air travel to D.C.	Estimate two 1-day trips involving one person	$700
Taxis	To/from airport and around DC, estimate six	$75
Meals	Estimate $35/day	$70
Retained Experts	If necessary to refute arguments of public necessity or geographic rail port competition; average $200/hr. for 50 hours of time	$10,000
Printing	Major projects not included in fee	$1,000
Other	Miscellaneous	$1,000
Total		**$17,905**

Note: Estimate does not include cost of any appeals of the STB's decision, Motions to Stay or other procedural motions before and during appeal. It also does not assume the STB would require an abandonment application, the additional fees for which would range from $75-000 to $85,000.

Subtotal: Estimated Fees and Expenses – Phase II: $68,655

TOTAL: Phase I and II: Estimated Fees: $ 99,635
Estimated Exp. Estimated Expenses: 43,310
$142,945

We issue our statements on a monthly basis and request that payment be made within 30 days. Our statements identify the attorney performing the work, the date and description of the work performed, the amount of time spent (in tenths of an hour), and the applicable hourly rate. Any chargeable expenses are shown separately.

Please let me know what additional information you may need. We look forward to working with you on this matter.

Very truly yours,

Janet H. Gilbert

JHG
Enclosure

AFFIDAVIT

I, WILLIAM C. SIPPEL, am a partner in the law firm of Fletcher & Sippel LLC, 29 N. Wacker Drive, Suite 920, Chicago, IL 60606 and do hereby state as follows:

1. I have the authority to enter into contracts for the provision of legal services by the firm of Fletcher & Sippel and to commit to the terms and conditions therefor.

2. The firm does business with state entities, including state transportation departments, and offers its services to such entities at reduced rates.

3. Attached hereto as Exhibit 1 to this Affidavit is a document entitled "Attachment 1 to Exhibit A." This document is an Exhibit to a service contract recently entered into by me on behalf of Fletcher & Sippel with a state transportation department and sets forth the rates agreed upon.

4. Attached hereto as Exhibit 2 to this Affidavit is the last page of the most recent bill submitted to the state transportation department referenced in 3. above, which sets forth actual hours billed and rates charged pursuant to the service contract.

I certify that the above statement is true and accurate.

William C Sippel 4-4-06

William C. Sippel, Partner
Fletcher & Sippel LLC

ATTACHMENT 1 TO EXHIBIT A

CONTRACTOR shall adhere to the schedule set below, as services are rendered for:

The legal services to be provided include primarily federal and state rail counsel and representation pertaining to the central [redacted] rail corridor. Negotiations of contractual matters involving a railroad are contemplated. Legal matters will include freight and commuter rail, shared use corridors, acquisitions and contract issues, transit systems, and labor law, in particular railroad labor law, as well as other related matters.

CONTRACTOR'S attorney and paralegal staff to be used under this contract include the following individuals at the hourly rates indicated:

Name	Hourly Rate
William C. Sippel	$ 285.00
T. J. Litwiler	$ 235.00
Michael J. Barron	$ 200.00
Ronald A. Lane	$ 285.00
Myles L. Tobin	$ 285.00
Janet R. Gilbert	$ 275.00

The above listed schedule of rates are guaranteed through the duration of this Agreement. Adjustment by the parties shall be documented in writing by amendment to this Agreement.

The total Contract amount shall not exceed $ [redacted] inclusive of costs, without written approval.

Date	Init.	Description	Hours	Amount
02/28/06	WCS	Review NJT and Puget Sound SUA's regarding [redacted] issues; continue review of Feasibility Study information.	4.20	1,197.00
Total for professional services rendered			63.40	$17,969.00

Costs:

Date	Description	
2/12/2006	[redacted] meetings with [redacted]. 2/12-2/15.	1,182.32
Total costs		$1,182.32

Timekeeper Summary

Name	Hours	Rate	Amount
Ronald A. Lane	2.30	285.00	$655.50
Thomas J. Litwiler	2.00	235.00	$470.00
William C. Sippel	59.10	285.00	$16,843.50
Total amount of this bill			$19,151.32

I certify that all costs and fees claimed for payment are accurate and were performed in furtherance of the Agreement between Fletcher & Sippel LLC, Attorneys at Law, 29 North Wacker Drive, Suite 920, Chicago, Illinois and the [redacted] Department of Transportation.

William C. Sippel

Partner

FLETCHER & SIPPEL LLC
ATTORNEYS AT LAW

29 North Wacker Drive
Suite 920
Chicago, Illinois 60606-2832

Phone: (312) 252-1500
Fax: (312) 252-2400
www.fletcher-sippel.com

JANET H. GILBERT
(312) 252-1507
jgilbert@fletcher-sippel.com

May 19, 2006

CONFIDENTIAL-PRIVILEGED
ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT

VIA FACSIMILE (248/799-0146) AND U.S. MAIL

Mr. Joe Corradino
DRIC Project Manager
The Corradino Group
20300 Civic Center Drive
Suite 410
Southfield, MI 48076

Re: Federal Regulatory Consulting Services

Dear Mr. Corradino:

Per our recent conversation, you requested additional explanation of the following items discussed in our letter to you of April 4, 2006 (copy attached). I was not sure if you wanted me to redo the April 4 letter to incorporate explanations of the items or we should provide a separate letter. If the explanations below are satisfactory, they can easily be incorporated into a revised version of the April 4 letter in footnote fashion:

1. Filing Fees: In Phase I summary of expenses, we reference filing fees for various types of abandonments ranging from $5300 for a simple exempt abandonment to $18,700 for a fully regulated abandonment. These fees are set by the Surface Transportation Board and they are published in the Code of Federal Regulations. I've attached a copy of the STB's current filing fees related to abandonment proceedings.

2. Copying charges: It is our firm policy to absorb most routine copying costs; however, if there is a major printing project beyond what our internal capacity can reasonably handle, such as a project involving special binding, color copying, oversize exhibits or maps or a significant number of pages, we will send the

project to an outside copying firm. The outside copy firm we currently uses charges $.12/copy for black & white copies, $1.25/page for color and $1.25/square foot for oversized items such as maps. Assuming the abandonment application is an exempt filing, our past experience suggests we will be able to handle most or all of the printing in house. We are also amenable to prior consultation with your firm to assess whether certain printing jobs could be more efficiently and cost effectively printed by your firm.

3. Experts: In our expense summary, we referenced the possible need for experts. Experts would not normally be anticipated in exempt abandonment filings but, in this matter we anticipate strong opposition and a possible Offer of Financial Assistance (OFA) filing to gain control of the rail line. In the event of an OFA, the client may opt to bolster the application with outside experts, such as a public policy or transportation expert, to refute an argument that the line is necessary for rail service or that it serves any valid public purpose. Before outside experts would be used, we would consult with you, the Michigan Department of Transportation and other agencies which might be able to provide appropriate supporting affidavits without the need to use outside help. No outside experts would be retained without your prior approval.

4. Rental cars/taxis: Reference was made in our expense estimates of costs for both use of rental cars and taxis when in Detroit. Please be assured that we will chose the most reasonable and cost effective use of those options. We included the use of rental cars because we anticipated being in Detroit for consecutive days at a time traveling to several different locations for interviews. If we were to travel to one location and back, the use of taxis would likely be the most cost efficient means of transportation and we would opt for that choice.

Please let me know if the above satisfactorily answers the questions raised by MDOT and, if so, whether you would like me to submit the above information in a revised version of our letter of April 4.

Very truly yours,

Janet H. Gilbert

Janet H. Gilbert

JHG:kb

	(ii) Notice of exemption under 49 CFR 1150.41 - 1150.45	$1,500.
	(iii) Petition for exemption under 49 U.S.C. 10502 relating to an exemption from the provisions of 49 U.S.C. 10902	$5,600.
(15)	A notice of a modified certificate of public convenience and necessity under 49 CFR 1150.21-1150.24	$1,400.
(16)-(20)	[Reserved]	

PART III: Rail Abandonment or Discontinuance of Transportation Services Proceedings:		
(21)	(i) An application for authority to abandon all or a portion of a line of railroad or discontinue operation thereof filed by a railroad (except applications filed by Consolidated Rail Corporation pursuant to the Northeast Rail Service Act [Subtitle E of Title XI of Pub. L. 97-35], bankrupt railroads, or exempt abandonments)	$18,700.
	(ii) Notice of an exempt abandonment or discontinuance under 49 CFR 1152.50	$3,100.
	(iii) A petition for exemption under 49 U.S.C. 10502	$5,300.
(22)	An application for authority to abandon all or a portion of a line of a railroad or operation thereof filed by Consolidated Rail Corporation pursuant to Northeast Rail Service Act.	$400.
(23)	Abandonments filed by bankrupt railroads	$1,600.
(24)	A request for waiver of filing requirements for abandonment application proceedings	$1,500.
(25)	An offer of financial assistance under 49 U.S.C. 10904 relating to the purchase of or subsidy for a rail line proposed for abandonment	$1,300.
(26)	A request to set terms and conditions for the sale of or subsidy for a rail line proposed to be abandoned	$19,100.
(27)	(i) Request for a trail use condition in an abandonment proceeding under 16 U.S.C.1247(d)	$200.

Attachment C

Resumes

Resumes

Geophysical Advisory Group

RÉSUMÉ

Richard D. Woods
Professor Emeritus of Civil Engineering
Department of Civil and Environmental Engineering
University of Michigan

EDUCATION

B.S. Civil Engineering, University of Notre Dame, 1957
M.S. Civil Engineering, University of Notre Dame, 1962
Ph.D. Civil Engineering, University of Michigan, 1967

EMPLOYMENT (full time)

July 2002	Professor Emeritus, Civil Engineering, University of Michigan
2002 (Jan) to June 2002	Melchor Distinguished Visiting Professor of Civil Engineering, University of Notre Dame
2001 (Oct) to June 2002	Professor of Civil Engineering, Department of Civil & Environmental Engineering, University of Michigan
1996 (July) thru Sept. 2001	Professor and Chairman, Department of Civil & Environmental Engineering, University of Michigan.
1994 (Nov.) (June) 1996	Professor and Interim Chairman, Department of Civil & Environmental Engineering, University of Michigan.
1987 to (Nov.) 1994	Professor and Associate Chairman, Department of Civil Engineering, University of Michigan.
1976 to 1987	Professor, Civil Engineering, University of Michigan.
1971 to 1976	Associate Professor, Civil Engineering, University of Michigan.
1973 to present	**Registered Professional Engineer, Michigan # 21080**

1967 to 1971	Assistant Professor, Civil Engineering, University of Michigan.
1965 to 1967	Graduate Student, University of Michigan; supported on NSF Traineeship.
1963 to 1964	Instructor, Civil Engineering, Michigan Technological University, Houghton, Michigan.
1962 to 1963	Project Engineer, (GS-11), Air Force Weapons Laboratory, Kirkland, AFB, Albuquerque, New Mexico; supervised contracts which were directed at determining engineering properties of soils under dynamic loads.
1960 to 1962	Graduate Student, University of Notre Dame, teaching assistantship; taught surveying including camp.
1957 to 1960	Lieutenant, U.S. Marine Corps., Camp Pendelton, California; six months as platoon leader, movable bridge 1960 company; remainder of service as hydraulic engineering officer preparing evidence for water rights litigation.

ORGANIZATIONS

American Society of Civil Engineers
American Society of Testing and Materials
American Society for Engineering Education
International Society for Soil Mechanics and Foundation Engineering
National Society of Professional Engineers
Society for Exploration Geophysics
Chi Epsilon
Society of the Sigma Xi
ADAC, International Association of Drilled Shaft Contractors
Deep Foundations Institute
Environmental and Engineering Geophysical Society (EEGS)
American Underground-Space Association
ASFE
NAE

AWARDS

Collingwood Prize American Society of Civil Engineers, 1969
ASCE News Correspondent Award, 1983
Outstanding Civil Engineer Award, Michigan Section, ASCE, 1985

Excellence in Teaching Award, University of Michigan, College of Engineering, 1987
Outstanding Civil Engineer Award, Ann Arbor Branch, ASCE, 1995
Terzaghi Lecturer, ASCE Geotechnical Engineering Division, 1997
Distinguished Scientist Award, 8th Great Lakes Geotechnical and Geoenvironmental Conference.
Fellow, ASCE 1998
Life Member ASCE, 2000
The Civil and Environmental Engineering Award for Outstanding Accomplishment, Department and College of Engineering. February 2002.
Distinguished Engineering Alumni, College of Engineering, Notre Dame University, April 2002
Distinguished Faculty Achievement Award, 2001-2002, Univ. of Michigan
Member of National Academy of Engineers, (NAE), elected February 2003

OTHER EMPLOYMENT AND SPECIAL APPOINTMENTS

1969 1970 — Staff Engineer, Woodward-Clyde Consultants, Orange, California; summer employment to gain experience in consulting engineering practice. Rock Tunneling – Tahachapi Pass

1971 — Visiting Professor, Indian Institute of Technology, Kanpur, India; advised in establishing basic soil dynamics laboratory and course on dynamic soil properties.

1972 — Visiting Professor, Institute for Soil and Rock Mechanics, University of Karlsruhe, Germany; taught Soil Dynamics and advised in establishing soil dynamics laboratory. Performed research on Propagation of Rayleigh Waves in region of obstacles.

1976 — Fugro Fellow, University of Florida; on sabbatical leave from University of Michigan; investigated use of static one penetrometer with built-in pore pressure transducer to predict liquefaction potential of sands.

1977 — Invited Principal Lecturer, NATO sponsored International Symposium on Dynamical Methods in Soil and Rock Mechanics, Karlsruhe, Germany.

1979 to 1984 — Chairman, Policy Board of National Geotechnical Centrifuge Facility (NSF Funded).

1980 to — Newsletter Correspondent, Geotechnical Engineering

1986	Division ASCE News Correspondent.
1983	Visiting Research Professor, Zhejiang University, Hangzhou, China.
1986	Appointed to four year term on Geotechnical Engineering Division Executive Committee, ASCE.
1989	Chairman, ASCE Geotechnical Engineering Division Executive Committee.
1987	Secretary, United States Universities Council on Geotechnical Engineering Research (USUCGER).
1989	President, United States Universities Council on Geotechnical Engineering Research (USUCGER).
1990	Visiting Professor of Civil Engineering, University of Florida, Gainesville, Florida; application of centrifuge to modeling of pile groups under dynamic loads.
1990	Invited NATO Lecturer, Shear Waves in Sea Floor Materials, La Spazia, Italy.
1992	United Nations Lead Evaluator, Central Materials Testing Station, Lahore, Pakistan.
1992 to 1994	Visiting Professor of Earthquake Engineering, American University of Armenia, Yerevan, Armenia.
1994	Invited Special Lecturer, Brazilian National Society of Geotechnical Engineers, Annual Convention.
1996	External Reviewer, College of Engineering, University of Colorado, Denver.
2000	Special Advisor for Formation of new Department of Civil Engineering, Petronas University, Kuala Lumpur, Malaysia
2002	Melchor Distinguished Visiting Professor, Department of Civil Engineering and Geological Sciences, Notre Dame University, Winter Term, 2002

TEACHING

Courses taught:

University of Notre Dame -

Plane Surveying & Route Surveying (1960-1961)
Geotechnical Earthquake Engineering (2002)
Engineering Properties of Soils (2002)

Michigan Technological University -

Basic Soil Mechanics
Foundation Engineering
Reinforced Concrete Structures Design

University of Michigan -

Engineering Properties of Soils
*Foundation Engineering
*Field Sampling and Lab Testing of Soils
Foundations of Marine Structures
*Tunneling And Underground Construction
Theoretical Soil Mechanics
Soil Dynamics
*Civil Engineering Vibrations Laboratory
Surveying for Architects
Engineering Surveying
Applied Mechanics, Strength of Materials & Statics
Applied Mechanics, Dynamics
*Professional Issues in Civil & Environmental Engineering
*Geophysical Techniques in Environmental Geotechnology
Coordinator in development of Master's of Engineering (M.ENG.) Degree Program in Environmental Geotechnology, 1994
*Capstone Design Course for Civil and Environmental Engineering, 2000

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*Courses which I developed.

RESEARCH

University of Notre Dame -

Preliminary Design of Dynamic Direct Shear Device

Michigan Technological University -

Mechanics of Slide Dams: Investigation of creation of dams by blasting material from canyon walls.

University of Michigan -

Isolation of Vibrations by Barriers: Full scale and model studies of parameters affecting effectiveness of slit trenches and cylindrical holes as barriers to seismic surface waves.

Field Measurement of Dynamic Soil Properties: Adoption of cross-hole seismic method from seismology for use in geotechnical engineering.

Holographic Interferometry: First application of holographic interferometry to investigation of basic wave propagation and surface wave propagation in region of barriers.

Response of Pile Foundations to Dynamic Loads: Full scale and model tests on both single piles and pile groups in both sand and clay.

Dynamic Properties of Soils: Laboratory and field measurement of compression and shear wave velocity and shear modulus of soils at both low and high amplitudes.

Development of SASW Method: Applications of FFT to evaluate shear modulus of layered media, method known as Spectral-Analysis-of-Surface-Waves (SASW).

Cone Penetrometer & Dilatometer: Study of use of penetrometer for identification of soils, and dilatometer for determination of Ko.

Grouting of Soils for Liquefaction Mitigation: Measurement of properties of grouted soils and development of economical methods of grouting to prevent liquefaction during earthquakes.

Foam Grouting to Remediate Wastes in the Ground: Discovery and development of surfactant foam grouting techniques which cleanses 99% of NAPLS and DNAPLS from contaminated soils.

Applications of Geophysics to Geoenvironmental Engineering: Selection of geophysical techniques which can be effectively applied in environmental problems.

System Director, Development of National Geotechnical Experimentation Sites: These sites are intended to reduce the site characterization costs for in situ experimentation in geotechnical engineering and geophysics.

SERVICE

Department -

Chairman and Interim Dept. Chairman, 1994-2001
Department ABET Review Coordinator, 1993.
Associate Chairman, Civil & Environmental Engineering 1987-1994.
Department Executive Committee, twice elected to four-year terms, Ex. Officio Member as Assoc. Chairman.
Department Research Committee, Member 1978-1992, Chairman for twelve years.
Department Research and Safety Committee, Member and Chairman, 1992-1994.
Chairman, Materials Faculty Member Search Committee, 1989-1990.
Department Honors Committee, Member 1986-1987.
Chairman, Geotechnical Engineering Faculty Search Committee, 1985.
Department Technician Coordinator, 1977-present.
Department Foreign Teaching Assistants (TA's) English Language Screening Coordinator, 1987-2001..
Department Metrication Committee, Member, 1972-1973.
Department Scholarship and Loan Coordinator, 1972-1974.
ASCE Student Chapter Faculty Advisor, 1968-1971.

College -

College of Engineering (CoE), Safety Committee, Member, 1994-1995.
Minority Engineering Program Faculty Advisory Committee, Member, 1982 to 1998.
CoE Graduate Advisory Committee, 1994 to 1996.
CoE Awards Committee, Member, 1988.
CoE Awards Committee, Chairman, 1989.
CoE Nominating Committee, Member, 1978, 1983, and 1986.
CoE Curriculum Committee, Member, 1982-1985;
Chairman, 1984-1985.
CoE Scholarship Committee, Member, 1973-1975;
Chairman, 1974-1975.

University -

Military Officers Education Committee, Member, 1992 - 1999.
University Faculty Senate Assembly, CoE Representative, 1989-1992.
University Financial Aid Advisory Committee, Member, 1969-1971.
University Classified Research Review Panel, 1986-1988.
Nominator, University Honorary Doctorate Recipient, Dr. George Housner, 1990.

Local, State and National Professional Activities -

Member, Southeast Michigan Branch, ASCE, 1967-1975.
Chairman, Southeast Michigan Branch, Geotechnical Group, 1974-1975.
Member, Ann Arbor Branch, ASCE, 1976-present.
Member, ASCE Geotechnical Engineering Division Executive Committee, 1985-1990, Chairman, 1989.
ASCE, Soil Dynamics Committee, Member 1972-1980, Control Group Member, 1984-1992.
ASCE, Engineering Geophysics Committee, Control Group Member, 1990-present, Chairman, 1993-1997
ASCE, Member Geotechnical Division Awards Committee, 1992-1998
ASCE, Member Technical Communication Council (TCC), 2001-present.
ASTM, Member Committee D-18, Soils, and member of three subcommittees: Soil Dynamics, Static Cone Penetrometer, and Dilatometer.
International Society for Soil Mechanics and Foundation Engineering, Technical Committee #10, Geophysical Site Characterization, Chairman 1989-1997.
Environmental and Engineering Geophysical Society, Vice President, 1993-1994, President, 1994-1995
Vice President for North America, International Society for Soil Mechanics and Geotechnical Engineering, 2001-2005

CONSULTING EXPERIENCE

Areas of Consulting -

Vibration mitigation
Vibration Measurements on machines, in soils, on structures
Measurement of Dynamic Soil Properties, in lab and in field
Design of Foundations for Dynamic Loads
Design of Foundations for Sensitive Instruments
Stability of Soil Slopes
Site Investigations with Dutch Cone Penetrometer
Blasting Damage Evaluations
Blasting Code Drafting

Geophysical Site Investigations
Marina Pier Design and Rehabilitation
Tunnel Stability Evaluation (soft ground) Toronto, Ontario

Principal Clients -

Nuclen (Nuclear Brazil), four nuclear plants in Brazil
Bechtel Power Corporation, Ann Arbor, Michigan
Attorney General, State of Michigan, (Reserve Mining Asbestos Case)
Giffels and Associates, Detroit, Michigan
Cities of Ann Arbor and Harbor Springs, Michigan
Ford, General Motors, and Chrysler
Honeywell Corporation, Minneapolis, Minnesota
Woodward-Clyde Consultants, Orange, California, Oakland, California, and Philadelphia, Pennsylvania
Eaton Corporation, Detroit Michigan, Milwaukee Wisconsin, Cleveland Ohio
Tippetts-Abbett-McCarthy-Stratton, New York (Tarbela Dam, Pakistan)
Rockwell International
Corning Incorporated, Corning, New York and worldwide
Day and Zimmermann, Philadelphia, Pennsylvania
Albert Kahn Associates, Detroit, Michigan
Gilbert/Commonwealth, Jackson, Michigan, Reading, Pennsylvania
Transportation Research Board, National Academy of Engineering
Michigan Bell Telephone Company
Soil & Material Engineers
NTH Consultants, Ltd.
Stoll, Evans, Woods, and Associates, Former Principal
Geo Consultants, Inc., Former Principal
SOMAT Engineering, Inc.
Arvin/Meritor

PUBLICATIONS (recent 16 years) [54 previous peer reviewed publications]

Chang, T.S. and Woods, R.D. (1987), "Effect of Confining Pressure on Shear Modulus of Cemented Sand," *Developments in Geotechnical Engineering Vol. 43, Soil-Structure Interaction*, Elsevier, Amsterdam, pp. 193-208.

Li, N. and Woods, R.D. (1987), "Dynamic Behavior of Grouted Sand," *Developments in Geotechnical Engineering Vol. 43, Soil-Structure Interaction*, Elsevier, Amsterdam, pp. 221-242.

Wu, S.M. and Woods, R.D. (1987), "Time Effects on Shear Modulus of Unsaturated Cohesionless Soils," *Developments in Geotechnical Engineering Vol. 43, Soil-Structure Interaction*, Elsevier, Amsterdam, pp. 243-256.

Chang, T.S. and Woods, R.D. (1992), "Effect of Particle Contact Bond on Shear Modulus," *Journal of Geotechnical Engineering, ASCE*, Vol. 118, No. 8, August, pp. 1216-1235.

Gucunski, N. and Woods, R.D. (1992), "Numerical Simulation of the SASW Test," *Soil Dynamics and Earthquake Engineering*, Vol. 11, No. 4, Aug., pp. 1216-1233.

Krstulovic-Opara, N. and Woods, R.D. (1992), "Non-Destructive Testing of Concrete Structures Using the Rayleigh Wave Dispersion Technique," *Proceedings of Society of Experimental Mechanics Conference*, November.

Qian, X., Gray, D.H. and Woods, R.D. (1993), "Voids and Granulometry: Effects on Shear Modulus of Unsaturated Sands," *Journal of Geotechnical Engineering, ASCE*, Vol. 119, No. 2, Feb., pp. 295-314.

Woods, R.D. (1994) *Geophysical Characterization of Sites*, **Editor**, Oxford & IBH Publishing, New Delhi, 141 pp.

Woods, R.D. (1994), "Borehole Methods in Shallow Seismic Exploration," *Geophysical Characterization of Sites*, R.D. Woods editor, Oxford & IBH Publishing, New Delhi, pp. 91-100.

Woods, R.D. and Tseng, C-C. (1994), "Annotated Bibliography of Proceedings of: Symposia on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP), 1-5 (1989-1993)," *Geophysical Characterization of Sites*, R.D. Woods editor, Oxford & IBH Publishing, New Delhi, pp. 101-141.

Setareh, M. and Woods, R.D. (1994), "Machine-Induced Vibrations on Reinforced Concrete Structures," *Concrete International*, Vol. 16, No. 1, Jan., pp. 43-47.

Al-Shayea, N., Woods, R.D. and Gilmore, P. (1994), "SASW and GPR to Detect Buried Objects," *Proceedings of the Symposium on the Application*

of Geophysics to Engineering and Environmental Problems (SAGEEP), Vol. 1, pp. 543-560.

Al-Shayea, N., Woods, R.D. and Gilmore, P. (1994), "Detection of Buried Objects by the GPR Method," *Proceedings of GPR '94*, Waterloo, Ontario, June 12-16.

Woods, R.D. (1994), "**Topic Overview Paper** - Laboratory Measurement of Dynamic Soil Properties," *Symposium on Dynamic Geotechnical Testing II, ASTM STP 1213*, San Francisco, Jan. 28, pp. 25-43.

Woods, R.D. (1994), "National Geotechnical Experimentation Sites," *Geotechnical News*, Vol. 12, No. 1, pp. 39-44, Mar.

Chuanromanee, O., Hanson, R.D. and Woods, R.D.(1994), "The Influence of Soil-Structure Interaction on the Natural Frequencies of Structures with High Damping," *Proceedings of 5th U.S. National Conference on Earthquake Engineering*, Vol. 4, Chicago, July, pp. 45-52.

Chuanromanee, O., Hanson, R.D. and Woods, R.D.(1995), "The Influence of Soil-Structure Interaction on the Overall Damping of Structures with High Damping," *Proceeding of the Conference, Soil Dynamics and Earthquake_Engineering '95*, Greece.

Chu, H-S., Woods, R.D. and Demond, A.H. (1995), "Foam Displacement of Organic Liquids from Saturated Sands,"_*Proceedings of the Conference on Industrial Hazardous Wastes*, Pittsburgh, PA, July, sponsored by the Water Environment Federation.

Krstulovic-Opara, N. Woods, R.D. and Al-Shayea, N.(1996), "Use of Rayleigh Wave Dispersion Technique for Non-Destructive Testing of Concrete Structures," *ACI Materials Journal*, Vol. 93, No. 1, Jan-Feb., p. 75-86.

Chu, H.S., Woods, R. D. (1996), "Remediation with Surfactant Foams," *Proceedings of Fourth Great Lakes Geotechnicall Geoenvironmental Conference*, University of Illinois, Chicago, May 17.

Chu, H-S., Salehzadreh, A. and Demond, A. H. and Woods, R.D. (1996), "Mechanisms of Removal of Residual Dodecane Using Surfactant Foam," *Proceedings of the Conference on Non-Aqueous Phase Liquids (NAPLs) in Subsurface Environment: Assessment and Remediation*, Environmental Engineering Division, ASCE, Washington, DC, Nov. 12-14.

Woods, R. D. (1997), "Dynamic Effects of Pile Installation on Adjacent Structures," ***TRB SYNTHESIS, Topic 26-16,*** Transportation Research Board, NCHRP Project 20-5.

Svinkin, M. and Woods, R.D. (1998), "Accuracy of Determining Pile Capacity by Dynamic Methods," ***Proceedings of the Deep Foundation Institute,* 98 Conference, Vienna,** Austria, June 15-17.

Al-Shayea, N. and Woods, R.D. (1998), "SASW to Detect Underground Cavities and Inclusions," submitted *to ASCE Geo Institute Journal.*

Alshunnar, Ibraheem S., Afifi, Sherif S. and Woods, R.D. (1998), "Engineered Filling of Landfills," presented in San Antonio, Texas, February 1.

Hayakawa, K. and Woods, R. D. (1998), "PC Piles to Isolate Vibrations," ***Fourth International Conference on Case Histories in Geotechnical Engineering,*** March, 9-12, St. Louis, Mo.

Alshunar, I. S., Afifi, S.S., and Woods, R.D. (1998) "Engineered Filling of Landfills," presented in San Antonio, Texas 2-1-98,..

Hayakawa, K, Kani, Y., Matsubara, N, Tamotsu, M, and Woods, R.D. (1998) "Isolation by PC Wall-Piles," ***Fourth Inter. Conf. on Case Histories in Geotechnical Engineering,*** March 9-12, St. Louis, Mo., pp 672-677.

Hayakawa, K., Kani, Y., Matsubara, N, and Woods, R.D. (1998) "The Effectiveness of Pre-Cast Wall-Piles in Reducing Ground Vibrations," ***Journal of Building Acoustics,*** Vol. 5, No. 3, Multi-Science Publishing Co. Ltd., 5 Wates Way, Brentwood, Essex CM 15 9TB, UK.

Matsubara, N., Kani, Y., Hayakawa, K, and Woods, R.D. (1998) "Isolation effects of ground vibration due to PC wall-piles on several sites," ***Proceedings, Earthquake Geotechnical Engineering,*** Seco e Pinto (editor), Balkema, Rotterdam, pp 427-432.

Woods, R.D. (editor) (1999), "Decades of Technology – Advancing into the Future," Deep Foundations Institute, ***24th Annual Members' Conference Proceedings,*** Oct. 14-16, Dearborn, Michigan, 299 p.

Woods, R.D. (editor) (1999), ***Distinct Element Modelling in Geomechanics,*** Oxford and IBH Publishing, Co. Pvt.Ltd, New Delhi, 222p. with V.M. Sharma and K.R. Saxena

Woods, R.D.(2000), "Applications of Small Strain Seismic Velocities to Static Design in Geotechnical Engineering," ***Proceedings of the 3rd International Workshop on the Application of Geophysics to Rock and Soil Engineering,*** Nov. 18, 2000, Melbourne, Australia, pp. 13-18.

Woods, R.D. (2001), *A Look Back for Future Geotechnics*, Editor, Oxford/IBF Publishers, New Delhi, 426p.

Woods, R.D (2001), "Vibration Screening with Wave Barriers," *A Look Back for Future Geotechnics*, Oxford & IBH Publishing, New Delhi, pp. 325-348.

Hiltunen, D.R., Griffin, L.M. and Woods, R.D. (2003), "Liquefaction Evaluation of Vincent Thomas Bridge Sites via Crosshole Seismic Shear Wave Measurements," *Proceedings of Soil and Rock America (SARA), 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering*, Vol. 1, pp. 253-260.

Woods, R.D. (2003), "Foundation Dynamics in the Auto Industry," *Proceedings 20th Central Pennsylvania Geotechical Conference*, Hershey, PA, Oct 29-31, 2003, 22p.

Hiltunen, D.R., Nolen-Hoeksema, R.C. and Woods, R.D. (2004), "Characterization of Abandoned Mine Sites Beneath I-70 Via Crosshole and SASW Seismic Wave Methods," *Proceedings: Fifth International Conference on Case Histories in Geotechnical Engineering*, New York, NY, April 13-17, 2004

Richart, F.E., Jr. and Woods, R.D. (1982), "Foundations for Auto Shredder," American Concrete Institute, 1978 Fall Convention, Houston, Texas

BOOKS-

Vibration of Soils and Foundations, Prentice-Hall, 1970, 414pp, (translated into Japanese, Chinese and Romanian), with F.E. Richart, Jr. and J.R. Hall, Jr.

Dynamic Effects of Pile Installations on Adjacent Structures, A.A. Balkema Publishers, Leiden, Netherlands, 2004, 163p. with V.M. Sharma.

CHAPTER AUTHOR –

"Vibration Problems in Seismic Effects," for U.S. Army Corps of Engineers, *Soil Manual*, 1974,

"Vibrations of Soils", for *Ground Engineer's Reference Book*, Butterworth and Co., 1983

DOCTORAL STUDENTS

20 Completed Ph.D.'s

SHORT COURSES

"Vibration of Soils and Foundation," University of Michigan, June 1968.

"Behavior of Soils for Builders," Chairman, University of Michigan, October 1970.

"Soil Dynamics and Soil-Structure Interaction Relevant to Earthquake Engineering," Univ. of Massachusetts, May 1971.

"Application of Soil Mechanics to Foundation Engineering," Chairman, Commonwealth Associates, Inc., Jackson, Michigan, November 1972 and March 1973.
"Soil Mechanics," Chairman, Consumers Power Company, Jackson, Michigan, May 1982.
"Soil Testing: Field and Laboratory Methods," University of Wisconsin, Madison, Wisconsin, February 1983.
"Soil Dynamics," at Zhejiang University, Hangzhou, PRC, October 1983.
"Laboratory and Field Investigation for Soil Dynamics," Central Soils and Materials Research Station, Ministry of Irrigation, New Delhi, India, November 1983.
"Laboratory Testing in Soil Dynamics," Central Soils and Materials Research Station, Ministry of Irrigation, New Delhi, India, April 1986.
"Laboratory and Field Testing for Soil Dynamics," Zhejiang University, Hangzhou, PRC, May 1986.
"5th Short Course on Machine Foundation Design", Univ. of Missouri, St. Louis, MO, Feb. 1988.

OTHER MISCELLANEOUS ASSIGNMENTS

NSF, Research Initiation Grant Reviewer, 1973.
Paper Review Chairman, ASCE Speciality Conference, "Geotechnical Practice for Disposal of Soil Waste Materials," Ann Arbor, MI, June 1977.
NSF, National Geotechnical Centrifuge Facility Proposal Review Panel Member, 1978 and 1984.
NSF, Chairman, Advisory Panel, National Geotechnical Centrifuge Facility, Univ. of California, Davis, CA,
NASA, Marshall Space Flight Center, Workshop on Earthquake Engineering Research Potential, Invited Participant, February 1979.
NSF, Invited Participant, NASA-NSF Centrifuge Workshop, August 1979.
NSF, University of Texas, Review Committee member for NSF Sponsored Project, "Dynamic Stiffness of Pile Foundations," Nov. 1981.
Session Moderator, "International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics," St. Louis, MO, May 1981.
Invited Participant, Cambridge University Workshop on Centrifuge Application in Geotechnical Engineering, Cambridge, England, June 1981.
Session Chairman, International Conference on Soil Dynamics and Earthquake Engineering, Southampton, England, July 1982.
Invited Participant, NASA-NSF, Workshop on Earthquake Simulator for Centrifuge Applications, MIT, Cambridge, Mass., July 1982.
Invited Lecturer, Zhejiang University and Nanjing Hydraulics Institute, People's Republic of China, October 1983.

FRANCE/USA (NRS/NSF) Workshop on Research Cooperation in Civil Engineering, Participant, Paris, October 1983.

Session _Chairman, International Workshop on Soil Structure Interaction, Roorkee, India, November 1983.

Session Chairman, "Measurement and Use of Shear Wave Velocity for Evaluating Dynamic Soil Properties," ASCE Convention, Denver, Colorado, May 1985.

Session Chairman, RICHART COMMEMORATIVE LECTURES, ASCE October Convention, Detroit, Michigan, October 1985. Editor, Proceedings of Specialty Conference, Geotechnical Practice For Waste Disposal, 1987

Session Chairman, Vibration of Machine Foundations, 3rd International Conference on Soil Dynamics and Earthquake Engineering, June 1987.

ASCE Liaison Member, Geotechnical Board, National Research Council, National Academy of Engineering, 1987-1990.

NSF Workshop, Soil Improvement and Foundation Remediation for Seismic Hazards, Participant, Seattle, 1991.

NSF Workshop, Experimental Needs for Geotechnical Earthquake Engineering, Participant, Albuquerque, N.M. 1991.

NSF/France Geotechnical Workshop, Participant, Paris, 1992.United Nations Development Program, Soil Dynamics and Earthquake Engineering Advisor for Central Soil and Materials Research Station, New Delhi, 1989-1994.

United Nations Development Program, Soil Dynamics Laboratory Advisor to Central Materials Testing Laboratory, Lahore, Pakistan, 1993.

NSF Workshop, Geophysical Techniques for Site and Material Characterization, Organizer,_ Atlanta, 1993.

NSF Review Panel Member, NSF Young Investigator Awards, 1993

NSF/Scandinavia Geotechnical Engineering Workshop, Participant, Trondheim, Norway, 1994.

NSF/CERF Workshop: Defining Geo-Engineering for the 21st Century, Participant, May 1994.

NSF Review Panel Member, NSF Small Business Innovation Research Program (SBIR), 1996.

CONDENSED VITA

General Information

Name: **RICHARD D. MILLER**
Address: 599 N 1000 Road
Lawrence, Kansas 66047

Telephone: (Home) 785-748-0842
(Office) 785-864-2091
Date of Information: January 2006

Education

B.A., Physics (Minor, Chemistry), Benedictine College, 1980.
M.S., Physics, Emphasis Geophysics, University of Kansas, 1983.

Professional Experience

Associate Scientist, Kansas Geological Survey, University of Kansas, 1996-present.
Courtesy Associate Professor of Geology, Department of Geology, University of Kansas, 1997-present.
Chief, Exploration Services Section, Kansas Geological Survey, University of Kansas, 1987-present.
Seismic Application Research experience in thirty-three states and seven foreign countries.
Certification: 40-hour 29 CFR 1910.120, CPR, First Aid.

Honors, Memberships, and Affiliations

The Distinguished Achievement Award, Society of Exploration Geophysicists, October 2002.
Nominated best paper at SAGEEP EEGS annual meeting, 2002.
President's Certificate for Excellence in Presentation (Poster) for the Energy Minerals Division of the American Association of Petroleum Geologists, May 2002.
University of Kansas Unclassified employee of the Month, May 2002.
Hal Mooney Award (for scientific and technical excellence and innovation leading to the advancement of near-surface geophysics), Near-Surface Geophysics Section of the Society of Exploration Geophysicists, 1995.
Nominated best paper in *Geophysics*, 1990: Miller and Steeples, 1990; Steeples et al., 1990.
Member, American Geophysical Union (AGU).
Member, Geophysical Society of Kansas (GSK).
Member, Near-Surface Geophysics Section of SEG (NSG).
Member, Society of Exploration Geophysicists (SEG).
Member, National Eagle Scout Association (NESA).
Selected, Sigma Pi Sigma, Physics Honor Society, 1984.
Eagle Scout, 1972.

Administrative Experience

Chief, Exploration Services Section, Kansas Geological Survey, 1987-present. Responsible for coordinating budget, planning, administration and research of six professional staff, one office specialist, five engineering technicians, one geologist, and four graduate and undergraduate student assistants. Total budget responsibility exceeds one million dollars per year with total vehicle and equipment responsibility in excess of two million dollars.

Grant and Contract Funding (over $5.3 million)

Sponsors of Seismic Dissolution Research include: Kansas Department of Transportation, Mosaic Company, Kansas Corporation Commission, U.S. Army Corps of Engineers, ELM Consulting LLC, Burns & McDonnell, North American Salt Company, Burlington Northern Railroad.

Selected Publications: Subsidence

Miller, R.D., and K. Millahn, 2006, High-resolution seismic reflection investigations of dissolution sinkholes [Ext. Abs.]: European Association of Geoscientists and Engineers (EAGE) 68th Conference and Exhibition, Vienna, Austria, June 12-15, 4 p.

Miller, R.D., 2006, High-resolution seismic reflection to identify areas with subsidence potential beneath U.S. 50 Highway in eastern Reno County, Kansas: Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP 2006), Seattle, Washington, April 2-6, Paper 28, 13 p.

Miller, R.D., J. Xia, and C.B. Park, 2005, Seismic techniques to delineate dissolution features (Karst) at a proposed power plant site: Soc. Explor. Geophys., Investigations in Geophysics no. 13, Dwain K. Butler, ed., *Near-Surface Geophysics*, p. 663-679.

Miller, R.D., A. Villella, J. Xia, and D.W. Steeples, 2005, Seismic investigation of a salt dissolution feature in Kansas: Soc. Explor. Geophys., Investigations in Geophysics no. 13, Dwain K. Butler, ed., *Near-Surface Geophysics*, p. 681-694.

Miller, R.D., J. Ivanov, D.W. Steeples, W.L. Watney, and T.R. Rademacker, 2005, Unique near-surface seismic-reflection characteristics within an abandoned salt-mine well field, Hutchinson, Kansas [Exp. Abs.]: Soc. of Expl. Geophys., p. 1041-1044.

Lambrecht, J.L., R.D. Miller, and S. Durrant, 2005, Time-lapse high resolution seismic imaging of a catastrophic salt dissolution sinkhole in central Kansas: Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP 2005), Atlanta, Georgia, April 3-7, p. 943-951.

Miller, R.D., and R. Henthorne, 2004, High-resolution seismic reflection to identify areas with subsidence potential beneath U.S. 50 Highway in eastern Reno County, Kansas: Proceedings of the 55th Highway Geology Symposium, September 8-10, Kansas City, Missouri, p. 29-48.

Miller, R.D., J. Ivanov, S. Hartung, and L. Block, 2004, Seismic investigation of a sinkhole on Clearwater Dam: Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP 2004), Colorado Springs, Colorado, February 22-26, Paper KAR01, p. 1082-1098.

Miller, R.D., 2003, High-resolution seismic-reflection investigation of a subsidence feature on U.S. Highway 50 near Hutchinson, Kansas: in K.S. Johnson and J.T. Neal, eds., *Evaporite Karst and Engineering/Environmental Problems in the United States,* Oklahoma Geological Survey Circular 109, p. 157-167.

Miller, R.D., J. Xia, and C.B. Park, 2001, Detecting fracture related voids and abandoned lead/zinc mines near Baxter Springs, Kansas: Proceedings of the National Association of Abandoned Mine Lands Annual Conference, August 19-22, Athens, Ohio, proceedings published on CD.

Miller, R.D., A. Villella, and J. Xia, 1997, Shallow high resolution seismic reflection to delineate upper 400 m around a collapse feature in central Kansas: *AAPG Division of Environmental Geosciences Journal*, v. 4, no. 3, p. 119-126.

Miller, R.D., and J. Xia, 1996, Shallow high resolution seismic reflection to delineate upper 400 m around a collapse feature in central Kansas [Exp. Abs.]: Soc. Explor. Geophys., p. 892-895.

Miller, R.D., J. Xia, R.S. Harding, J.T. Neal, J.W. Fairborn, and D.W. Steeples, 1995, Seismic investigation of a surface collapse feature at Weeks Island Salt Dome, Louisiana: *AAPG Division of Environmental Geosciences Journal*, v. 2, no. 2, p. 104-112.

Anderson, N.L., R.W. Knapp, D.W. Steeples, and R.D. Miller, 1995, Plastic deformation and dissolution of the Hutchinson Salt Member in Kansas: in N.L. Anderson and D.E. Hedke, eds., *Geophysical Atlas of Selected Oil and Gas Fields in Kansas*: Kansas Geological Survey Bulletin 237, p. 66-70.

Miller, R.D., D.W. Steeples, and T.V. Weis, 1995, Shallow seismic-reflection study of a salt dissolution subsidence feature in Stafford County, Kansas: in N.L. Anderson and D.E. Hedke, eds., *Geophysical Atlas of Selected Oil and Gas Fields in Kansas*: Kansas Geological Survey Bulletin 237, p. 71-76.

Miller, R.D., D.W. Steeples, L. Schulte, and J. Davenport, 1993, Shallow seismic-reflection feasibility study of the salt dissolution well field at North American Salt Company's Hutchinson, Kansas, facility: *Mining Engineering,* October, p. 1291-1296.

Knapp, R.W., D.W. Steeples, R.D. Miller, and C.D. McElwee, 1989, Seismic reflection surveys at sinkholes in central Kansas; *in* Proc. Symposium on Geophysics in Kansas, D.W. Steeples, ed.: *Kansas Geological Survey Bull. 226,* p. 95-116.

Steeples, D.W., and R.D. Miller, 1987, Direct detection of shallow subsurface voids using high-resolution reflection techniques; *in* Sinkholes: their geology, engineering, and environmental impact, 2nd ed., ed. Barry Beck and W.L. Wilson: A.A. Balkema, Boston, p. 179-183.

Miller, R.D., D.W. Steeples, and J.A. Treadway, 1985, Seismic reflection survey of a sinkhole in Ellsworth County, Kansas [Exp. Abs.]; *in* Technical Program Abstracts and Biographies: Soc. Explor. Geophys. 55th Ann. Mtg., Washington, D.C., p. 154-156.

Steeples, D.W., R.W. Knapp, and R.D. Miller, 1984, Examination of sinkholes by seismic reflection; *in* Sinkholes, their geology, engineering, and environmental impact, ed. Barry Beck: A.A. Balkema, Boston, p. 217-224.

Resumes

Assistance in Project Implementation

Burt J. Deutsch, J.D.
President
General Counsel

Education

College of the Holy Cross, Worcester, Massachusetts, 1960-1961
Bellarmine College, Louisville, Kentucky: B.A., 1966
University of Louisville Law School, Louisville, Kentucky: J.D., 1971
University of Louisville Graduate School's Institute of Community Development, working toward an M.S. in Community Development, 1973-1977

Professional Experience

As President of The Corradino Group since 1990 and as General Counsel, Mr. Deutsch serves as a top business advisor to the Chief Executive Officer and Chief Operating Officer and as a key program manager for major client projects. For the past several years, Mr. Deutsch has served as the Program Manager of the $800+ million Louisville Airport Improvement Program (LAIP) and has been a key member of the LAIP Project Management Team from the beginning of the program in 1988. He has been the Program Manager from its beginning in 1997 of the world-publicized Heritage Creek program, the top-funded project of the Federal Aviation Administration's Innovative Financing Program, to relocate and rebuild an entire town out of the path of Louisville International Airport. For more than 30 years, Mr. Deutsch has served as a principal government manager and urban economic development, community development, land development, and transportation systems planning professional in a variety of positions including City Attorney and then Deputy Mayor for Louisville, Ky., and Deputy County Executive for Jefferson County, Ky. Mr. Deutsch also has significant private experience as a commercial real estate developer.

Mr. Deutsch has been a key professional in economic development and economic forecasting projects. He has served as the principal-in-charge of Corradino's Engineering Report for the Louisville-Jefferson County Metropolitan Sewer District's capital improvement bond issues since 1992 overseeing the financial and economic forecasting for those reports. He has also overseen the economic forecasting and reporting for the LAIP's Aviation Economic Index prepared by the University of Louisville's Bureau of Economic Research and for the Detroit Intermodal Freight Terminal project in conjunction with Regional Economic Models, Inc. (REMI) and their assorted consultants.

1990 - Present

The Corradino Group, President and General Counsel. Burt J. Deutsch serves as a top business advisor to the Chief Executive Officer and Chief Operating Officer of The Corradino Group and as an active urban economic development, community development, land development, and transportation systems planning professional. Working closely with senior Corradino professionals, Mr. Deutsch participates in the execution and quality control of the firm's projects in the professional disciplinary areas of planning and urban design; land and commercial/industrial site development; urban transportation and public transit planning; environmental impact assessment and environmental planning; traffic and transportation engineering; systems and management planning; airport planning and design; surface water drainage and wastewater system design; and general civil engineering. As a lawyer, he also provides analytical support in projects dealing with financial and legal issues. Key assignments include:

- Program Manager for the $750+ million Louisville Airport Improvement Program (LAIP). Working closely with the Project Management Team of airport and local governmental leaders, local business leaders, and other senior Corradino professionals and other consultant managers, Mr. Deutsch oversees the management, finance, legal, communication, design, construction, and relocation elements of the LAIP.

- Program Manager for the completion of the 2,179-family Louisville International Airport FAA-approved Part 150 voluntary residential relocation program.

- Program Manager for the presently $70 million, 500+-home Heritage Creek residential relocation program (Louisville International Airport) under the Federal Aviation Administration's Innovative Financing Program. Mr. Deutsch is directly responsible for overseeing the creation, development, and implementation of this unique program to offer existing homeowners newly constructed comparable homes in a new city. Program involves developing comparable housing standards, design of the new city, and relocation of 500+ families.

- Program Manager for the Business Acquisition Program (LAIP) involving the relocation of 150 businesses over a five-year period with the three largest relocations costing $30, $20, and $10 million, respectively.

- Program Advisor and financial oversight for $47 million school construction and rehabilitation program (Jefferson County Public Schools).

- Program Manager for Transit 2020, visioning program and transit development program (Transit Authority of River City).

1988 - 1990

NTS Corporation, Louisville, Ky. Senior Vice President and head of the Commercial Properties Division. Responsible for the operational management, marketing and leasing, and oversight for development and construction of all NTS office space, business centers, and retail operations. This encompassed developments in Louisville, Indianapolis, Atlanta, Orlando, and Fort Lauderdale. Level of operation included 1.6 million square feet of office space under active management. Mr. Deutsch was responsible for the future development of over 500 acres of commercially zoned NTS property.

- Mr. Deutsch's primary developments in Louisville were the 75-acre Springs office, hotel, and retail center; the 400-acre Blankenbaker Crossings development; and NTS's eight office buildings in the Plainview Office Park.

- Mr. Deutsch was responsible, as owner's representative, for the development, construction, and initial lease up of seven individual office buildings in Louisville, Orlando, and Fort Lauderdale comprising 600,000 square feet of rentable space.

1986 - 1988

Jefferson County Government, Jefferson County, Ky. Deputy County Judge/Executive. The County Judge/Executive is the chief elected county executive official; the Deputy County Judge/Executive is a statutory appointive office. In this position, Mr. Deutsch participated as a senior policy advisor to the Judge/Executive with specific authority and responsibility for overseeing and coordinating government development and financing strategies in economic development and future infrastructure development.

- Responsible for the financing and development of a 500-car, nine-story public parking garage in downtown Louisville and a new 20,000 square foot headquarters for the Tourist and Convention Bureau.

- Principal county official responsible for the planning and financing of the extension of Hurstbourne Parkway from a 2-1/2 mile major suburban commercial center to an eleven-mile suburban economic development cross arterial and for the approval of the Fourth Avenue Trolley and Transitway in downtown Louisville.

- Oversaw policy for the development, financing, and marketing of over 2,600 acres of industrial land owned by Jefferson County, including Jefferson RiverPort; Jefferson RiverPark; Hurstbourne Green, a 200-acre Class A office park; the Freeway Reserve, a 600-acre land reserve for future industrial sites; and a 190-acre industrial park adjacent to the airport.

- Developed and oversaw the county's targeted economic development incentive program for primary employers producing, among others, $500,000 for GE's Customer Answer Center location in Louisville, and $250,000 for Prudential's 700-employee Tesseract location in Louisville.

1983 - 1985

Louisville City Government, Louisville, Ky. Deputy Mayor (formerly Secretary of the Cabinet). As Chief administrative officer for all city government line and staff departments and agencies, Mr. Deutsch reported directly to the Mayor and presided over the Mayor's Cabinet of ten line and staff managers.

- Principal city policy director for Phase I of the Broadway Project (a mixed-used hotel, office, retail, parking garage, and public square downtown development); Phase II of the Broadway Project (a 300-unit residential and retail development); and a 500-car, nine-story award-winning downtown parking garage.

- Oversaw the financing by the City of Louisville of Chestnut Manor Apartments, Station House Square Apartments, Phoenix Place II Apartments, and Brook and Oak Apartments.

1982 - 1983

Louisville City Government, Louisville, Ky. Director of Public Health and Safety Cabinet. Mr. Deutsch served as top executive manager for police, fire, EMS, Civil Preparedness, and associated public protection agencies for the City of Louisville.

1980 - 1982

Regional Office of the U.S. Merit Systems Protection Board, San Francisco. Regional Administrator. As chief supervisory attorney and management head of the Region IX Office (for California, Arizona, Nevada, Hawaii, and the Far East), Mr. Deutsch supervised and managed the adjudication of appeals from federal employee personnel actions.

1978 - 1980

U.S. Department of Housing and Urban Development. Assistant General Counsel. As Chief Supervisory Attorney for FHA multi-family mortgage insurance programs nationally, Mr. Deutsch supervised an office of 19 attorneys; responsible for the preparation of all legal opinions for those programs; reviewed, for legal sufficiency, all regulations, issuances, deeds, notes, forms, documents, and related material for use through throughout the country; supervised all legal processing of MMI claims and payments for FHA; supervised foreclosures of all such defaulted mortgages; supervised litigation and advised the Assistant Secretary for Housing.

1977 - 1978

Private law practice, Louisville, Ky., including advising the Louisville Board of Aldermen, the legislative body for the City of Louisville.

1974 - 1977

Louisville City Government. Director of Law. Chief legal officer for the largest municipal government in Kentucky. Coordinated legal advice by more than 20 attorneys to all departments and agencies of city government. Was a member of the city's seven-member Executive Management and Policy Committee.

1974

Louisville City Government. Special Assistant to the Mayor. Served as the mayor's direct personal assistant, overseeing and evaluating the performance and programs of various city departments, including the Department of Works, Department of Sanitation, Department of Building and Housing Inspection, and the Department of Law.

1973 - 1974

Louisville City Government. Director of the Department of Building and Housing Inspection. As director of the code enforcement department of city government, enforced building, plumbing, electrical, heating, zoning, and housing codes throughout the city.

1971 - 1973

Louisville City Government. Assistant Director of Law. Served as legal advisor to city's legislative body, prepared all ordinances and legislation for the city. Advised other departments, handled litigation, and assisted the Director of Law in the administration of the Department.

Frederick C. P'Pool
Chief Operating Officer

Education

University of Kentucky, Lexington, Ky., B.S. (Agricultural Economics) (1978)

Experience

1994-Present

The Corradino Group: Responsible for oversight of Corradino's overall operations as well as leadership/involvement in projects dealing with economic development, infrastructure development/financing, and transportation planning. Also, leads marketing strategy of Corradino.

1992-1994

Indiana Department of Transportation, Indianapolis: Commissioner. Responsible for day-to-day operations of a 5,000+ employee, $950 million-budget state agency with 154 field locations. Included policy, budget, personnel and legislative responsibilities. Reduced operating costs by $63 million in Fiscal Years 1993 and 1994. Savings were reinvested in highway construction contracts. Operating costs declined from 28 percent of total highway spending in Fiscal Year 1988 to 24 percent in Fiscal Year 1993. Full-time and seasonal-authorized positions cut by 3.2 percent since 1989 with current employment at 5,300 down from a high in 1991 of 6,065. Implemented new procurement/distribution system resulting in savings of more than $6 million.

1/89-12/92

Office of Indiana Governor Evan Bayh, Indianapolis: Executive Assistant for Commerce, Agriculture and Trade. Primarily responsible for economic development and job creation. This required one-on-one negotiations with executives from large and small companies desiring to locate and/or expand in Indiana. Personally involved in the projects listed below as well as numerous others.

United Airlines Maintenance Operations Center, Indianapolis International Airport. At the time, this was a $1.0 billion project to create 6,300 jobs. It was also the largest economic development project in the United States in 1991 and one of the ten largest in the world. The state agreement included provisions that required United Airlines to guarantee the dollar investment and jobs to be created.

Cummins Engine Company, Walesboro, Ind., a $230 million project creating 600 jobs.

Dow-Elanco, Indianapolis, a $200 million project creating 750+ jobs.

International Experience

1/89-1992

Office of Governor Evan Bayh, Indianapolis: Executive Assistant for International Trade. Authored and negotiated the first-ever State/Japan trade agreement with Japan's Ministry of International Trade and Industry and the Japan External Trade Organization. Authored and negotiated the first-ever State/Russia trade agreement with the Moscow Oblast, Moscow, Russia in 1991. Personally worked on a variety of projects with both private and public sector representatives from the international community.

1/89-12/92

Office of Governor Evan Bayh, Indianapolis: Executive Assistant. The Governor's liaison with the following agencies: INDOT, Bureau of Motor Vehicles, Department of Commerce, Alcoholic Beverage Commission, Department of Revenue, and the Indiana State Fair Commission. Responsible for implementing the 1989 pari-mutuel wagering law which has resulted in the issuance of two pari-mutuel permits. Testified before legislative and congressional committees and lobbied on behalf of the state of Indiana. Personally dealt with numerous state, federal and international agencies on a number of diverse issues.

1980-1989

Farmers Feed and Fertilizer Inc., Princeton, Ind.: Owner/manager of small wholesale/retail agribusiness company.

Civic Activities

Princeton Area Chamber of Commerce, President, 1986-89
Salvation Army, Advisory Board, 1985-89
Gibson County Area Rehabilitation Council, Board of Directors, 1987-89
Indiana Grain and Feed Association, Board of Directors, 1984-86
Numerous other organization's Boards while in Princeton

STEPHEN F. MAYER, Ph.D., P.E.
Market Development Manager-Public Private Programs

EDUCATION

Doctor of Philosophy, Geography, State University of New York at Buffalo, 2005

Master of Business Administration, Management, State University of New York at Buffalo, 1983

Bachelor of Science, Civil Engineering, State University of New York at Buffalo, 1980

Bachelor of Science, Forestry, Syracuse University, 1974

Bachelor of Science, Photogrammetric Engineering, SUNY College of E.S. & Forestry, 1974

REGISTRATIONS

Professional Engineer, 60383, NY
Professional Engineer, 15267, MD
Professional Engineer, 18492, VA

PROFESSIONAL AFFILIATIONS

International Bridge, Tunnel & Turnpike Association (IBTTA)
Board Member, 1995-2000; 2002
President, 2005

Association of International Border Agencies (AIBA)
President, 1997-1999
Board Member, 1994-2002

Bridge and Tunnel Operators Association (BTOA)
Board Member, 1993-2003;
President, 2002-2003

Continental One
Board Member and Secretary, 1999-2003
Retained Consultant/Advisor, 2004-2006

Town of Aurora, NY
Board Member, Planning and Conservation Board, 2002-Present

American Society of Civil Engineers
Member; Co-Chair, Transportation & Development Institute, Subcommittee on Homeland Security-Professional Discourse, 2004-Present

EXPERIENCE PROFILE

Dr. Mayer is an innovative and results-oriented leader possessing a strong business acumen and exceptional communication, negotiation, decision-making, and applied problem solving skills. He is an accomplished Professional Engineer with expertise in technical project management, operational oversight, regulatory compliance, change facilitation, organizational leadership, profit and loss management, quality control, strategic planning, and marketing.

PARSONS
Washington, DC
2005-date
Market Development Manager-Public Private Programs

Dr. Mayer is responsible for leading Parsons initiatives in Public Private Partnerships (P3s) related to toll financed transportation infrastructure. Consults with a wide array of public and private organizations to utilize P3s to solve funding shortfalls and address urban transportation congestion and traffic management issues.

Works with strategic partners to arrange funding, provide technological, design/build and organizational solutions for both new transportation infrastructure and upgrades of existing transportation facilities.

Possesses 30 years of experience in a wide array of infrastructure projects. Includes 13 years of experience in funding, designing, constructing, and operating toll financed transportation infrastructure. This includes the installation and operation of ITS technologies.

NIAGARA UNIVERSITY
Niagara, New York
2005-date
Assistant Professor/Adjunct Professor

Dr. Mayer teaches capstone strategic management courses to seniors and graduate students in the College of Business Administration.

MAYER CONSULTING
Buffalo, New York
2003-2005
Executive Consultant-Owner

Dr. Mayer consulted with business and transportation organizations on a wide array of strategic and operational issues. Adjunct instructor at the SUNY at Buffalo, teaching international business.

BUFFALO AND PORT ERIE PUBLIC BRIDGE AUTHORITY
Buffalo, New York
1993-2003
Co-Chief Executive Officer-General Manager/Operations

Project: Peace Bridge
Role: Co-Chief Executive Officer-General Manager/Operations
Start Date, End Date: 1993-2003
Served as General Manager and American Officer in a co-CEO model. Led an organization of 110 U.S. and Canadian (union and non-union) employees

with $33 million in revenues and a $24 million operating budget in a politically complex, environmentally sensitive, and technologically challenging environment. Consulted with business, community, and special interest groups. Oversaw capital programming, bridge/facilities maintenance, and general operations. Completed a $53 million public bond offering. Prepared and tracked annual operating and capital improvement budgets. Recruited, trained, mentored, and developed staff. Negotiated agreements with labor and government shareholders.

Prepared a threat assessment and vulnerability review for the bridge, plazas, access roads, and related facilities. Developed plans and specifications for security upgrades and emergency response programs and implemented improvements at the Peace Bridge.

Testified before Congressional Field Hearings on security, immigration reform, and trade corridor issues. Also testified before a New York State Senate Committee on infrastructure security and emergency response.

Working with the Bridge and Tunnel Operators Association through an effort funded by Transport Canada, developed **"Best Management Practices for Infrastructure Security at Border Crossings."**

- Developed and advanced a $300 million capital expansion program, including the planning and environmental assessments for a new bridge span.
- Developed effective partnering strategies with regulatory agencies and private businesses to implement a wide array of projects and initiatives.
- Implemented qualifications-based selection procedures for contractors and consultants.
- Represented the Authority at scores of media events including documentary and promotional films, magazine and newspaper interviews, television programs and interviews, and radio talk shows.
- Implemented new border crossing, toll, and traffic management procedure as part of ITS strategies.
- Managed complex engineering and construction contracts

KREHBIEL ASSOCIATES, INC. / INTELIGIS CORPORATION
Tonawanda, New York
1990-1993

Project Role: President
Start Date, End Date: 1992-1993
Managed 60-person engineering and surveying firm. Performed staffing functions including hiring, training, resource allocation, and performance evaluation. Translated corporate goals into tangible departmental objectives. Oversaw strategic business planning and day-to-day operations. Created and monitored budgets, defined pricing, developed new clients, and maintained excellent customer relations.

- Directed the ownership transition and succession of firm.
- Managed the firm's largest project, a $21 million sewer expansion project in Niagara County.

Project Role: Director of Operations & Engineering
Start Date, End Date: 1990-1992
Managed all daily operations of the firm. Provided technical leadership and

comprehensive project/program management. Ensured that critical milestones were met, managed dynamic schedule, and ensured service quality.

- Instituted Total Quality Management (TQM) process; totally revamped engineering standards, specifications and design processes; created new disciplines in land planning and environmental services; re-directed investments and greatly expanded recruiting and training.
- Implemented a major restructuring and refocusing of the firm.

Project Role: Town Engineer – Towns of Alden & Eden
Start Date, End Date: 1992-1993

BENGSTON, DEBELL, ELKIN & TITUS, LTD.
Centreville, Virginia
1986-1990

Project Role: Vice President, Operations/Board Member
Start Date, End Date: 1988-1990
Officer-in-Charge of corporation's second largest office. Oversaw human resources, operations, marketing, and technical and financial management of 60-person, $3.8 million office. Provided services to a diversified client base in the areas of planning, surveying, land development, and public words engineering.

- Developed a Management Team and instituted effective TQM and Productivity Improvement processes.

Project Role: Corporate Director of Marketing
Start Date, End Date: 1986-1988
Directed marketing and business development. Prepared yearly marketing plan and budget. Developed yearly sales forecasts, evaluated market segment potential, selected/implemented strategic marketing mix.

- Led the firm in entering two new market areas; transportation and waterfront development.

WENDEL ENGINEERS, PC/UPSTATE BUILDING CORPORATION
Buffalo, New York
1980-1986

Project Role: Principal/Director of Marketing
Start Date, End Date: 1985-1986
Managed marketing and business development for municipal/industrial clients and design/build services for conventional and pre-engineered buildings. Member of Executive Committee and Board of Directors.

Project Role: Project Manager
Start Date, End Date: 1980-1984
Served as Project Manager for civil and environmental engineering projects. Performed site analysis, planning, and design. Completed wastewater facilities planning, collection system designs, and system rehabilitation programs.

Project Role: Village Engineer, Lewiston
Start Date, End Date: 1982-1986

PUBLICATIONS

"Sources of Competitive Advantage in U.S. Engineering Firms" (Ph.D. Dissertation-2005)

Written testimony before Congressional Field Hearing, May, 1993 on Border and Infrastructure Security.

AWARDS

New York State Society of Professional Engineers, Statewide Award – P.E. Manager of the Year, 1999

New York State Society of Professional Engineers, Erie-Niagara Chapter - Engineer Manager of the Year, 1999

U.S. Customs - Service Award of Appreciation for Technological Leadership

EDUCATION

Bachelor of Arts, History, St. Anselm's College, 1971

Master of Arts, Urban/Regional Planning, Mankato State University, 1973

Master of Arts, Urban and Regional Studies, Minnesota State University, 1975

ADDITIONAL COURSEWORK/TRAINING

Leadership/Management Program, Parsons, 2005

Transportation Management, University of Virginia, 1991

Environmental Law, Vermont Law School, 1992

PROFESSIONAL AFFILIATIONS

Center for Research on Vermont, University of Vermont

American Planning Association

Transportation Research Board

EXPERIENCE PROFILE

Mr. Squires has over 30 years experience in finance, public policy, planning, development and management. Prior to joining Parsons, he was Deputy Staff Director for the United States Senate Committee on Environment and Public Works. Mr. Squires led staff efforts in the 107th and 108th Congress to reauthorize the nation's surface transportation program, TEA 21.

Mr. Squires was Program Manager for the General Management, Architecture and Engineering Consortium on Tren Urbano, a heavy rail transit project, providing design and construction management services to the Puerto Rico Highway and Transportation Authority.

Mr. Squires was Vermont's Deputy Transportation Secretary. He also served as the state's first Transportation Planning Director.

Mr. Squires was a Founding Partner in Humstone Squires Associates, an award-winning consulting practice. He has taught, lectured and written widely on matters of finance, public policy and project development.

PROJECT EXPERIENCE

PARSONS
Washington, DC
2005-date
Vice President, Transportation Program Development

As part of the company's senior management team, Mr. Squires works with all of Parsons' modal divisions, advising on matters of finance, partnering and policy application. His recent experience on Capitol Hill affords Mr. Squires a unique perspective. With the federal role in transportation evolving, Mr. Squires helps clients achieve results in program financing and delivery.

UNITED STATES SENATE, COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
Washington, DC
2001-2005
Deputy Staff Director/Senior Policy Advisor

Mr. Squires assisted the Committee in all matters related to transportation. Focused primarily on reauthorization of TEA 21, the nation's surface transportation program, Mr. Squires organized Committee hearings, developed legislative drafts and negotiated funding authorizations and new program financing. He participated in the Committee's markup of S 1072, the Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2004 (SAFE TEA) and staffed the bill managers on the Senate floor, where SAFE TEA passed with seventy six votes. Mr. Squires negotiated on behalf of the Senate minority in the House/Senate conference. Throughout the process, Mr. Squires worked closely with the administration, state and local organizations, trade groups and other interested parties.

DMJM+HARRIS, INC.
San Juan, Puerto Rico
1998-2001
Vice President

As Program Manager and Director of Planning for Tren Urbano, the eleven-mile, sixteen station, heavy rail transit system in metropolitan San Juan, Puerto Rico, Mr. Squires managed all contractual issues for the General Management, Architecture and Engineering Consultant consortium that oversees the project. He supervised staff and sub-consultants in the areas of project finance, environmental compliance, urban planning, design and intermodal connectivity. He coordinated federal relations and technology transfer. He assisted the client, the Puerto Rico Highway and Transportation Authority, in its successful $560 M revenue bond offering and helped secure $300 M in credit assistance through the US Department of Transportation's TIFIA Program.

VERMONT AGENCY OF TRANSPORTATION
Montpelier, Vermont
1991-1998
Deputy Secretary/Director of Planning

Appointed by then Governor Howard Dean, Mr. Squires advised the Governor on transportation matters and participated in all aspects of Agency management. His responsibilities included policy development, legislative liaison, contract negotiations, interagency and interstate coordination and Federal relations. As the Agency's first Planning Director, Mr. Squires organized and managed a 50-person staff focused on resource allocation, policy formulation, systems planning, data collection, and concept-level project design. Mr. Squires chaired numerous consultant selection committees. The Planning Division produced the State's first long-range transportation plan, reformatted its capital program and established a network of regional transportation advisory committees.

HUMSTONE SQUIRES ASSOCIATES
Burlington, Vermont
1986-1991
Founding Partner

Mr. Squires formed this planning practice in Burlington, Vermon,t with partner Elizabeth Humstone. The firm offered a wide range of services to public and private sector clients. Projects included capital programming, impact assessment, town plan and bylaw preparation, transportation solutions, open space plans, and preparation of training materials for state and local officials.

UNIVERSITY OF VERMONT SCHOOL OF NATURAL RESOURCES
Burlington, Vermont
1992-1998
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PUBLICATIONS/PRESENTATIONS

Vermont State Government and Administration: 1965-1995 – (Contributed), Center for Research on Vermont, University of Vermont, 1996

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