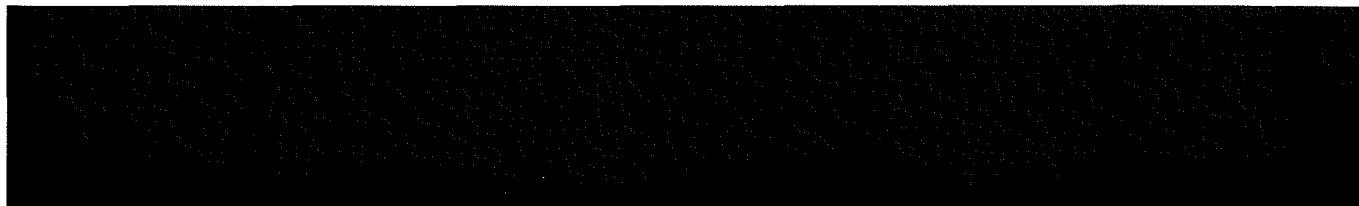
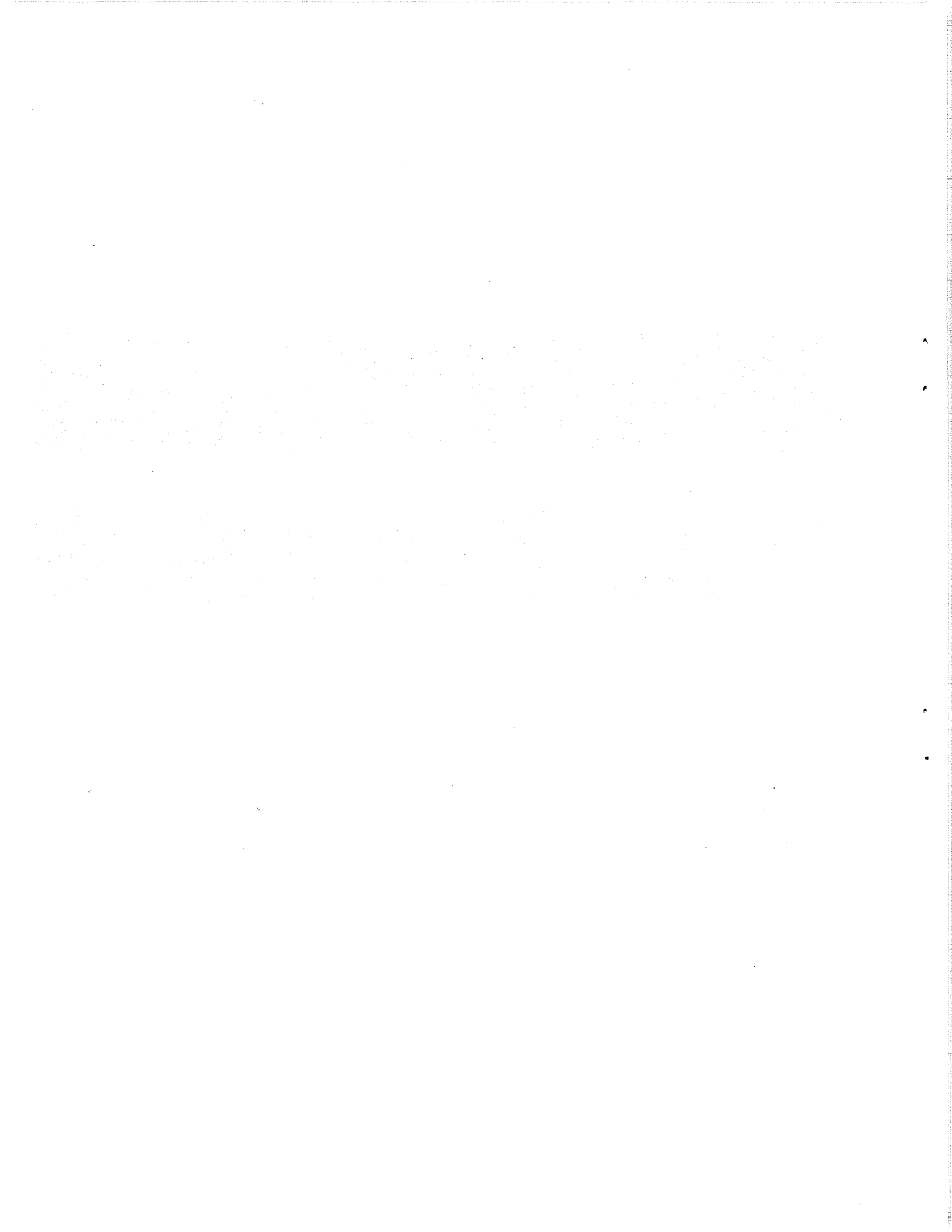


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Minnesota Technology, Inc
2005 Annual Report
On State Science & Technology Research & Development



Foreword

This report is prepared by Minnesota Technology, Inc. according to its responsibilities outlined in Minnesota Statutes 1160.071, describes scientific and technological research and development (R&D) activities sponsored by the State of Minnesota between July 1, 2004 and June 30, 2005 (fiscal year 2005). The report includes:

- Analysis of research and development activities funded by the state during fiscal year 2005 and reported to Minnesota Technology, Inc.
- A list, organized by funding organization, of all reported R&D projects for which state dollars were allocated during FY 2005.

Minnesota Technology, Inc. greatly appreciates the cooperation of state agencies, boards, commissions, authorities and institutions for providing information on their R&D activities and review processes for this report.



Analysis of research and development activities funded by the state during FY 2005 and reported to Minnesota Technology, Inc.

1. Overview of Minnesota Technology's Reporting Guidelines

Under Minnesota Statutes, state agencies and other organizations are required to notify Minnesota Technology, Inc. of any state funds allocated for science and technology research and development.

This reporting requirement applies only to dollars for which the state of Minnesota is the source; funding allocations from private sector or federal sources are excluded.

Funding organizations are asked to categorize each R&D project they report into one of nine major research areas. These areas are:

- Agriculture & Food Science
- Transportation & Energy Sciences
- Natural Resources
- Environmental Protection & Waste Management
- Computers, Communications & Microelectronics
- Social Science
- Manufacturing & Engineering
- Human Health
- Physical & Natural Science

Further, because economic development and job creation are particularly important public policy goals, reporting organizations are asked to identify those R&D projects having job creation or economic development as an explicit goal.

2. Reporting Procedures

- When reporting multi-year projects, Minnesota Technology asked funding organizations to list only the amounts they actually intended to disburse in fiscal year 2005. In past years, some organizations have reported the total allocation for a multi-year project in one fiscal year, usually the year in which the project was initiated. Identifying actual per-year allocations for multi-year projects yields a truer picture of state-origin R&D expenditures in Minnesota. However, this reporting method, introduced in 1994, makes comparisons between funding levels identified in this report and those contained in reports prior to 1994 invalid.

3. Summary of R&D Expenditures in FY 2005

MTI requested R&D expenditure information from fifty state institutions and offices. Six institutions and offices responded. Reporting organizations allocated a total of \$11,909,642 in grants, loans and

special appropriations for scientific and technological research and development during FY 2005. In all, about 280 projects were funded by the six organizations that responded. A complete list of reported projects funded in FY 2005 is presented at the end of this document.

- The dominant research category was Transportation & Energy Sciences, accounting for 56.1 percent of the total reported R&D expended. The Natural Resources category was the next largest with 26.0 percent of the funding. Table 1 provides a breakdown of the respondents R&D activities by subject category.
- The largest funding organization by far was the Minnesota Department of Transportation, which supported 128 research projects totaling \$6.66 million in funding during FY 2005. This comprised 55.9 percent of all reported funding. The University of Minnesota Graduate School was the second-largest organizational funder of R&D projects, disbursing \$2.36 million for 104 projects in eight of the nine of the R&D categories.
- None of the research and development projects reported were oriented toward economic development or job creation as a primary goal.
- 97.5 percent of all projects from reporting organizations underwent some type of peer review process prior to final selection.

Table 1.
State-Supported Science and Technology Research and Development
Amount of Funding by Research Category
Fiscal Year 2005

Research Category	Major State-Funded Sources¹	Category Funding (All Sources)	Percent of Total R&D Funding
Transportation & Energy Sciences	<ul style="list-style-type: none"> • Minnesota Department of Transportation • University of Minnesota Graduate School 	\$6,685,880	56.14
Natural Resources	<ul style="list-style-type: none"> • Minnesota Geological Survey • Minnesota Department of Natural Resources - Lands and Minerals, Forestry, and Fisheries Divisions. • University of Minnesota Graduate School 	\$3,098,548	26.01
Agriculture & Food Sciences	University of Minnesota Graduate School	\$248,635	2.09
Computers, Communications, and Microelectronics	University of Minnesota Graduate School	\$43,188	0.36
Human Health	University of Minnesota Graduate School	\$774,734	6.51
Manufacturing Engineering	University of Minnesota Graduate School	\$266,377	2.24
Social Sciences	University of Minnesota Graduate School	\$377,790	3.17
Physical and Natural Sciences	University of Minnesota Graduate School	\$414,490	3.48
Environmental Protection & Waste Management	None reported	0	0
TOTAL		\$11,909,642	100.00

¹ A "major source" is considered a source contributing more than 20% of the funds disbursed in a particular research category. Therefore, a source may be listed for more than one category. For each category, sources are listed in order of reported funding level.



1) Minnesota Department of Natural Resources. Division of Lands and Minerals

Summary by Research Category

FY 2005

Natural Resources \$ 685,631

Recipient	Project Title		
In-house, St Paul, MN	Inland Inpit (ECR)	\$	12,518
In-house, St Paul, MN	Mercury/Taconite Studies	\$	50,652
In-house, St Paul, MN	Microencapsulation	\$	2,002
MN Department fo Transportation, St Paul, MN	MnRoad	\$	13,725
UofM, Minneapolis, MN	Utilization of Hemicellulous By-products	\$	45,827
Cliffs Mining, Duluth, MN	Alternative Fuels for Induration Furnaces	\$	96,405
UofM, Minneapolis, MN	Magnetically-enhanced Hydroseparator Study	\$	77,315
Northshore Mining Company, Silver Bay, MN	Dust Suppression in Iron Ore Processing Plants	\$	64,032
UofM, Minneapolis, MN	Green Ball Porosity Measurement	\$	41,182
UofM, Minneapolis, MN	Green Ball Characterization	\$	28,876
UofM, Minneapolis, MN	Pellet Fines Removal System	\$	57,500
In-house, St Paul, MN	Inland Inpit (IOCR)	\$	3,484
In-house, St Paul, MN	Mercury Project	\$	29,990
UofM, Minneapolis, MN	Follow-up Mapping & PGE Evaluation	\$	84,053
UofM, Minneapolis, MN	Bedrock and Quaternary Mapping of Mesabi Range	\$	58,169
In-house, St Paul, MN	Aggregate Mapping at the County Level	\$	19,902
	Subtotal	\$	685,631

2) Minnesota Department of Natural Resources. Fish and Wildlife Division

Summary by Research Category

FY 2005

Natural Resources \$ 309,031

Recipient	Project Title		
MN State University, Mankato, MN	River Otter Study	\$	12,500
Dr. A. Afton, Louisiana State University, Baton Rouge, LA	Effects of Spinning-wing Decoys on Mallards	\$	2,550
Dr. J. Jenks. South Dakota State University, Brookings, SD	Farmland Deer Study-1	\$	20,484
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Quality Deer Management Strategies	\$	4,300
Dr. J. Jenks. South Dakota State University, Brookings, SD	Farmland Deer Study-2	\$	9,733
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Hunter Survey	\$	16,600
Dr. P. Sorensen, Univ. of Minnesota, St. Paul, MN	Carp Pheromone Study	\$	24,444
Dr. S. Weisburg, Univ. of Minnesota, St. Paul, MN	Statistical Consulting	\$	7,500
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Human Dimensions Studies	\$	40,000
Dr. A. Kapuscinski, Univ. of Minnesota, St. Paul, MN	Diagnostic Genetic Markers at the Species and Subspecies Level	\$	30,000
Dr. C. Schwarz, Simon Frazer Univ., British Columbia, Canada	Statistical Consulting on Mark-Recapture Population Estimates Mille Lacs Lake	\$	2,000
Dr. G. Spangler, Univ. of Minnesota, St. Paul, MN	Real Time Mortality Estimation by Acoustic Telemetry	\$	16,920
Dr. P. Welle, Bemidji State Univ., Bemidji, MN	Red Lake SocioEconomic Survey	\$	1,500
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Fishing in the Neighborhood Human Diimensions Study	\$	48,000
Dr. E. Dibble, Mississippi State Univ., MS	Relationship Between Aquatic Plants and Selected Fish Species	\$	20,000
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Forestry BMP in Riparian Zone	\$	12,500
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Electronic Licensing Study Evaluation	\$	40,000
	Subtotal	\$	309,031

3) Minnesota Department of Natural Resources. Forestry Division

Summary by Research Category

FY 2005

Natural Resources \$ 232,500

Recipient	Project Title		
Mike Kilgore	Assessment of the costs of applying Minnesota's forest guidelines	\$	8,500
In-house, St Paul, MN	Monitoring Land Use Change and the Implementation of the Timber Harvesting and	\$	95,000
Federal pass-thru to community which is cost-shared to landowners	Statewide Oak Wilt Assessment	\$	68,000
Legislative Commission on Minnesota Resources (LCMR) pass	MN Releaf Program	\$	36,000
In-house, St Paul, MN	Two-Lined Chestnut Borer Survey - Risk Assessment	\$	5,000
Andrew David	Forest Tree Improvement	\$	10,000
Bill Berg	Forest Productivity Cooperative	\$	10,000
Subtotal		\$	232,500

4) Minnesota Department of Transportation

Summary by Research Category

FY 2005

Transportation & Energy \$ 6,664,320

Recipient	Project Title		
University of Minnesota	Retaining Walls	\$	137
University of Minnesota	INV 676: A Test Case for the Mn/ROAD Project	\$	22,118
University of Minnesota	Human Factors Issues in Traffic Signing	\$	979
University of Minnesota	INV 689: Non-Vibratory Methods of Compaction for Urban Utility Projects - Phase I	\$	1,485
University of Minnesota	Grain, Oilseeds & Meal Imports	\$	6,033
University of Minnesota	Influence of Roofing Shingles on Asphalt Concrete Mixture Properties	\$	35,800
University of Minnesota	Interaction of Non-Driving Tasks with Driving	\$	1,174
University of Minnesota	Lighted Guidance Devices: Intelligent Work Zone Traffic Control	\$	23,335
University of Minnesota	Interpreting FWD Tests of Curled and/or Warped PCC	\$	69,566
University of Minnesota	Transportation and Regional Growth - Administration	\$	82,070
U of M - Duluth	Integration of RTMS and SQL Server to Mn/DOT Next Generation R/WIS	\$	398
University of Minnesota	State Aid Mechanic Training	\$	125,000
University of Minnesota	Transportation and Regional Growth - Part V, Urban Design: Transportation & Urban Growth - Connectivity	\$	188,016
University of Minnesota	Assistance in Validating the Mn/ROAD Database	\$	8,557
University of Minnesota	Treatments, & Cover Crops	\$	28,000
University of Minnesota	Experimental Investigation of the Effect of Vertical Pre-Release Cracks in Prestressed Bridge Girders, Phase II	\$	10,000
University of Minnesota	User-Centered Auditory Warning Signals in Snowplows	\$	6,250
University of Minnesota	ITS Institute Match Funding	\$	250,000
University of Minnesota	INV 761: Eliminating Driver Forward Blindspots at Rural Intersections	\$	1,717
University of Minnesota	Management of Control of Reed Canary Grass in Restored Wetlands.	\$	10,000
University of Minnesota	Driver Behavioral Response in Incipient Accident Conditions - Phase II	\$	1,180
University of Minnesota	Transportation Technologies for Sustainable Communities	\$	100,000
University of Minnesota	Northstar Workshop "Connecting the Minnesota Safety Agenda"	\$	55,000
University of Minnesota	Phase 3 - Rapid Assessment of and Decision-Making Strategies for Distortional Fatigue in Multi-Girder Steel Bridges	\$	22,000
University of Minnesota	GPS-Based Real-Time Identification of Tire-Road Friction Coefficient	\$	21,000
University of Minnesota	Real-Time Collision Warning and Avoidance at Intersections	\$	39,000

University of Minnesota	Development of a Dynamic Route Clearance Strategy for Emergency Vehicle Operations - Phase I	\$	8,700
University of Minnesota	Minnesota Airport Technical Assistance Program Supplement (AirTAP)	\$	100,000
University of Minnesota	INV 785: Cost/Benefit Study of Spring Load Restrictions	\$	300,195
University of Minnesota	Identification of Causal Factors and Potential Countermeasures for Fatal (and Severe) Rural Crashes	\$	4,500
University of Minnesota	Using ITS to Better Serve Diverse Populations	\$	33,750
SRF Consulting Group, Inc	INV 789: Traffic Calming - Implementation Procedures and Tools	\$	8,418
University of Minnesota	Moisture Retention Characteristics of Base and Sub-Base Materials and the Development of Pedo-transfer Functions	\$	13,500
University of Minnesota	Load Rating by Load Testing on Bridges	\$	100,000
University of Minnesota	Inventory of Properties of Minnesota Certified Asphalt Binders	\$	17,978
University of Minnesota	Developing Project Management Expertise	\$	784
University of Minnesota	Moisture Effects on DCP and Portable Vibratory Deflectometer (PVD) Measurements - Phase II	\$	51,464
University of Minnesota	INV 783: Development of Simple Asphalt Test for Determination of RAP Blending Chart	\$	22,680
University of Minnesota	INV 788: Recycled Asphalt Pavement (RAP) Effects on Binder and Mixture Quality	\$	23,153
U of W Milwaukee	The Effect of MN Aggregates on Rapid Chloride Permeability Tests	\$	52,849
University of Minnesota	Adaptability and DNA Fingerprinting of Native Plant Populations from Eco-Regions	\$	78,821
University of Minnesota	INV 787: Risk Assessment Tool for Selection of Erosion Control Practices	\$	50,000
University of Minnesota	INV 781: Investigating the Effects of In-Lane Rumble Strips on the Stopping Perf. of Sleep-Deprived & Alcohol-Impaired	\$	25,000
University of Minnesota	Research Management and Outreach Services	\$	107,200
University of Minnesota	Intersection Decision Support	\$	190,282
Ed Knoyle	Pavement Management System & Transportation Information System Support	\$	195
University of Minnesota	Minnesota Guidestar Support - 2003 - 2006	\$	198,890
University of Minnesota	INV 795: Screening Tool for Using Waste Materials in Paving Projects	\$	12,000
University of Minnesota	INV 798: Preliminary Laboratory Investigation of a Commercial Enzyme Solution as a Soil Stabilizer	\$	10,619
SRF Consulting Group, Inc	INV 645: Implementation of Research Findings (2003-2005)	\$	86,242
University of Minnesota	IMP 2003-03 (2 of 2) TRAMLAB Software, Training, and Support	\$	1,600
Mark King	IMP 2003-04 (2 of 3) Roadside Design Guide and Forum	\$	5,000
University of Nebraska	IMP 2003-04 (3 of 3) Roadside Design Guide and Forum	\$	5,000
University of Minnesota	INV 797: Urbanization of MN's Countryside: 2000-2025 - Future Geographics & Trans. Impacts	\$	75,000
University of Minnesota	INV 799: Impact of Alternative Storm Water Management Approaches on Highway Infrastructure	\$	56,795
Mankato State University	INV 802: Perf. Of Pvmt. Crack Sealants Beneath Bituminous Overlays	\$	7,500
University of Minnesota	INV 803: Determ. of Optimum Time for Applic. of Surface Treatment to Asphalt Concrete	\$	5,680
University of Minnesota	INV 804: Determ. Of Low-Temp. Fracture Properties of Three Mn/Road Asphalt Mixtures	\$	24,366
Iowa State University	INV 805: Safety Impacts of Street Lighting at Isolated Rural Intersections - Phase II	\$	17,060
University of Minnesota	INV 806: Snow & Ice Maint Operation Field Guide & Accompanying Training Course	\$	29,640
University of Minnesota	Motor Grader and Gravel Road Maintenance Techniques Training Video and Suggested Instructional Guide	\$	63,000
University of Minnesota	INV 668: 2003 Minnesota Technology Transfer (T2) LTAP Program	\$	70,000
University of Minnesota	Capacity expansion in the Twin Cities: The roads-transit balance	\$	50,100
University of Minnesota	Right of way preservation for future development of highways	\$	12,048
University of Minnesota	Adequacy of Future Road Funding	\$	22,275

University of Minnesota	Real Impact of Transportation Facilities Expansion on Adjoining Property Valuation	\$	17,414
University of Minnesota	Self Compacting Concrete (SCC) for Prestressed Bridge Girders	\$	58,000
University of Minnesota	Resilient Modulus Dev. Containing Recycled Bituminous and Concrete for 2002 Design Guide and Mn/PAVE Pavement Design	\$	5,500
University of Minnesota	Tools for predicting usage and benefits of urban bicycle network improvements	\$	40,870
University of Minnesota	Water Quality Performance of Dry Detention Ponds with Underdrains	\$	58,000
University of Minnesota	Chemical Inventory and Database Development for Recycled Material Substitutes	\$	69,000
University of Minnesota	Biological Control of Canada Thistle in Wetland Prairie Restoration	\$	43,200
University of Minnesota	INV 645 (2003-2005) (RIC Task 10): Truck Weight Compliance Education Program	\$	156,048
University of Minnesota	CTS 2004-2005 Operations	\$	800,000
Castle Rock Consultants Inc	LRRB-ORS Web Site Maintenance	\$	23,070
URS, Corp	North/West Passage Transportation Pooled Fund - Integrated Traveler Information and Maintenance. TPF-5(093)	\$	127,669
University of Minnesota	2004-2005 Minnesota Airport Technical Assistance Program (AirTAP)	\$	1,662
University of Minnesota	INV 807: Implementation and Closeout of FY02-03 Research Projects	\$	28,914
U of W - Madison	INV 810: Demonstration of Ash Utilization in Low Volume Roads	\$	137,160
Short Elliott Hendrickson	INV 811: Match for Snow Plow Routing Study	\$	30,000
University of Minnesota	INV 812: Resilient Modulus & Strength of Base Course with Recycled Asphalt Pavements	\$	32,900
University of Minnesota	INV 813: Rural and Urban Safety Cultures (Also known as: Human-Centered Interventions Toward Zero Deaths in Rural MN)	\$	94,402
University of Minnesota	INV 814: Implications of State Aid Cuts for Local Road Funding (LRRB funds withdrawn 3/05. See Status Note 5/6/05)	\$	81,597
University of Minnesota	INV 815: Calibration of the 2002 AASHTO Pavement Design Guide for MN PCC/HMA Pavements	\$	131,492
University of Minnesota	INV 816: Low Temperature Cracking of Flexible Pavement Due to Thermal Fatigue and Combined Effects Temp/Load	\$	154,998
University of Minnesota	Research Publication and Outreach Services (2004-2006)	\$	94,620
University of Minnesota	Towards Zero Deaths (TZD) Program Administration and Outreach	\$	98,475
University of Minnesota	Quick-Edge: Rapid Underbody Plow Cutting Edge Changing System	\$	10,316
University of Minnesota	INV 668: 2004 Minnesota Technology Transfer (T2) LTAP Program	\$	280,000
University of Minnesota	Transportation and Regional Growth Study Information Dissemination Project	\$	15,000
University of Minnesota	INV 818: Spring Load Restriction Study	\$	20,000
University of Minnesota	Determining Shear Capacity of Prestressed Concrete Beams	\$	19,000
University of Minnesota	Determining Economic Strategies for Repair and Replacement of Low Slump Overlays of Bridge Decks	\$	55,000
University of Minnesota	Application of Precast Decks and Other Elements to Bridge Structures	\$	10,000
University of Minnesota	Improved methodologies for the inoculation of prairie legumes in roadside/revegetation settings	\$	50,181
University of Minnesota	Facilitating native plant community establishment in wetlands following invasive plant removal	\$	32,989
University of Minnesota	Compaction Remediation for Construction Sites	\$	72,880
Iowa State University	Cost Effectiveness of Design-Build, and A + B Contracting Techniques	\$	71,500
University of Minnesota	Beyond "Business as Usual". Ensuring the Network We Want is the Network we Get.	\$	39,600
University of Minnesota	Pavement Evaluation Using Ground Penetrating Radar	\$	25,920
Iowa State University	INV 820: Impacts of Overweight Implements of Husbandry on Minnesota Roads and Bridges.	\$	19,939
University of Minnesota	Automated Winter Road Maintenance Using Road Surface Condition Measurements	\$	40,000
University of Minnesota	The Safety of Pedestrian and Bicycle Travel in Minnesota Inventory, Analysis and Prospectus	\$	28,400
U of M - Duluth	A Nonlinear State Space Approach to Arterial Travel Time Prediction	\$	49,783

University of Minnesota	INV 773: Shredded Tires Used for Road Bases; Part 1 Well Drilling	\$	14,887
University of Minnesota	Investigation of Deterioration of Stainless Steel Dowel Tubes Under Repeated Loading	\$	14,999
ERES Consultants - ARA	INV 821: Assess Life-Cycle Costs and Roadway Surfacing Impacts of Increasing Roadway Construction Standards	\$	82,537
University of Minnesota	INV 808: Pavement Rehabilitation Selection	\$	1,530
University of Minnesota	Post-Occupancy Evaluation of the Minnesota Department of transportation St. Cloud District Headquarters	\$	18,060
University of Minnesota	INV: 998 2004/2005 Operational Research Program for Local Transportation Groups	\$	6,087
University of Minnesota	Improving the Ability of Drivers to Avoid Collision with Snowplows in Fog and Snow	\$	15,499
University of Minnesota	Development of a Trash Harvester for Mn/DOT - Phase 1	\$	12,000
University of Minnesota	TERRA Board Support	\$	13,300
University of Iowa	Turn Lane Lengths for Various Speed Roads and Evaluation of Determining Criteria	\$	25,164
University of Minnesota	IMP 2005: Conflict Management in Transportation Project Public Involvement.	\$	18,000
Mark Snyder	IMP 2005 Refinement and Validation of the Washington Hydraulic fracture Testing Specification/Training	\$	24,960
CNA consulting Engineers	IMP 2005: Implementation of Enhanced PFWD Recommendations	\$	7,399
Frentress Enterprises LLC	INV 645: 2005/2006 Task 9 - Best Practices Manual for Rehabilitation of Low Volume Concrete Roads in Minnesota	\$	5,000
University of Minnesota	INV 645: 2005/2006 Task 10 - Screening Tool for Using Waste Materials (fly ash) in Paving Projects-Demo/Training	\$	10,000
University of Minnesota	Development of Accessibility Measures	\$	11,000
University of Minnesota	INV 668: 2005 Minnesota Technology Transfer (T2) LTAP Program	\$	122,786
North Dakota State Univ.	Development of Measurement Sources for Freight Performance Indicators	\$	10,000
North Dakota State Univ.	INV 832: Volume Warrants for Right Turn Lanes	\$	11,267
University of Minnesota	Mn/ROAD Lessons Learned - Synthesis	\$	3,833
Darlene Gorrill	Powerpoint Presentation on LRRB - 2005 NACE conference	\$	900
Mankato State University	INV 836: Design Procedures for Bituminous Stabilized Road Surfaces for Low Volume Roads	\$	1,221
University of Minnesota	Implementation and Closeout of FY 04 Research Projects	\$	5,255
University of Minnesota	Refining Methods for Calculation Non-Auto Travel Times	\$	2,037
University of Minnesota	2005 Midwest Regional Contet Sensitive Design and Solutions Workshop	\$	50,000
		Subtotal	\$ 6,664,320

5) Minnesota Geological Survey

Summary by Research Category

Natural Resources	FY 2005
	\$ 1,658,422

Recipient	Project Title		
MGS	State Special Appropriation to MGS-many projects	\$	1,029,433
MGS from DNR	County Geologic Atlas Program	\$	209,967
MGS match of USGS	USGS Statemap and EdmapCost Share	\$	171,661
MGS from MPCA	Karst 319	\$	10,047
MGS from LCMR	Mesabi Iron Range Maps	\$	79,597
MGS from DNR MCC	MCC Aggregate Mapping, Mesabi bedrock	\$	67,512
MGS from Met Council	Geol. Invest of NW metro area	\$	10,608
MGS from LCMR	Geologic and Hydrogeol. Map of the Mesabi	\$	79,597
		Subtotal	\$ 1,658,422

6) University of Minnesota--Graduate School

Summary by Research Category

FY 2005

Agriculture and Food Science	\$	248,635
Natural Resources	\$	212,964
Computers, Communications & Microelectronics	\$	43,188
Human Health	\$	774,734
Manufacturing Engineering	\$	266,377
Environmental Protection & Waste Management	\$	-
Transportation & Energy	\$	21,560
Social Science	\$	377,790
Physical & Natural Science	\$	414,490

Recipient	Project Title		
Roeber, Deborah L	Impact of feeding distillers grains on sensory traits & color stability of beef	\$	26,040
Anderson, Neil O	Molecular characterization of clonal variability in Easter lily	\$	25,369
Gillman, Jeffrey H	An investigation into the Nitrogen and Mycorrhial Requirements of Hybrid Hazelnuts in the Midwest	\$	25,351
Sowokinos, Joseph R	Introduction of an anti-sweetening gene into chipping potatoes	\$	19,945
Springer, Nathan M	Identification of cis-acting elements regulation imprinted gene expression	\$	30,301
Sanderfoot, Anton A	Intracellular Localization of SNARE proteins in Chlamydomonas	\$	21,991
Hollingsworth, Charla R	Pathotype virulence of a common fungal pathogen attacking barley in Minnesota	\$	13,948
Skinner, Pamela J	Gene expression alterations and the pathogenesis of prion disease	\$	28,066
Goyal, Sagar M	Mechanisms of spread of antimicrobial resistance on the farm	\$	25,000
Sharkey, Leslie C	Doxorubicin cardiotoxicity: effect of gender and genetic cardiovascular disease	\$	32,624
Kim, Yongdae	New Approaches to Timed-Release Cryptography and their Applications	\$	21,887
Schuler, William E	Denotational Language Models for Speech-Based Control of Real-World Agents	\$	21,301
Perkins, Edward L	Interaction of p27 tumor suppressor with the human cyclin A1 oncogene	\$	7,740
Fitzakerley, Janet L	Activity-dependent Modification of Potassium Channel Expression	\$	14,023
Anderson, Grant W	Thyroid hormone regulation of oligodendrocyte accumulation during brain development	\$	24,729
Worley-Louis, Marcia M	Exploring Diabetics' Medication Use Via Pharmacist-Patient Relationships	\$	17,606
Rose-Hellekant, Teresa A	Acquisition of a Real-Time PCR Machine for the Duluth Campus	\$	15,000
Rose-Hellekant, Teresa A	Chemoprevention of Mammary Tumors in TGFalpha Transgenic Mice	\$	29,365
Wyckoff, Timna J	Comparison of bacterial antibiotic resistance on conventional and organic dairies	\$	17,854
Armitage, Ian M	Interactions of Metallothionein 3 in the Brain: Role in Alzheimer's Disease	\$	22,000
Khasabov, Sergey G	Spinal Cannabinoid Receptors and the Modulation of Hyperalgesia Produced by Bone Cancer	\$	28,102
Hamamoto, Darryl T	Effects of Cannabinoids on Nociceptive Spinal Neurons in a Model of Cancer Pain	\$	25,000
Erlandsen, Stanley L	Model for Analysis of Giardia Trophozoite Adhesion	\$	21,516
Conklin, Kathleen F	Identification of candidate oncogene on human chromosome 7q36	\$	30,000
Hirsch, Betsy A	A Comparative Genomic Hybridization Study of Developmental Disorders	\$	28,458
Fecik, Robert A	Identification of Novel Drug Targets for Cystic Fibrosis	\$	21,944
Sturla, Shana J	Inert Gas Glove Box	\$	15,000
Xing, Chengguo	GENios Pro Multidetector Microplate Reader	\$	14,750
Raatz, Susan K	Omega-3 Fatty Acids: Anti-inflammatory Properties and Influence on C-Reactive Protein	\$	23,331
Chen, Yingjie	Endogenous nitric oxide synthase inhibitor modulates myocardial hypertrophy	\$	30,000
Ashrani, Aneel A	Role of Statins in Reducing the Risk of Venous Thromboembolism	\$	21,934
Schiff, Leslie A	Viral Determinants of Reovirus Cell Entry	\$	30,738
Bresnahan, Wade A	Regulation of the Host Antiviral Response by Human Cytomegalovirus	\$	29,958

Asakura, Atsushi	Characterization of muscle-derived endothelial progenitor cells	\$	30,000
Wessendorf, Martin W	Circuitry underlying pain facilitation	\$	25,000
O' Conner-Von, Susan K	Preparation of Children for Painful Procedures: A Web-Based Program	\$	19,501
Braunlin, Elizabeth A	High Resolution Ultrasound Biomicroscope	\$	25,000
Bendel-Stenzel, Michael R	The Role of Cadherins and Catenins in Early Kidney Development	\$	24,355
Potegal, Michael	Flushing-related forehead temperature as a measure of anger intensity	\$	22,922
Zhou, Xianzheng	T Cell Gene Transfer and Therapy by the Sleeping Beauty Transposon System	\$	23,000
Cline, Richard R	Older Adults' Drug Benefit Beliefs: Construct Definition and Measurement	\$	28,973
Carey, James R	Training in Repetitive Transcranial Magnetic Stimulation	\$	10,400
El-Fakahany, Esam E	Coupling of opioid receptors to nitric oxide signaling	\$	30,000
Luciana, Monica M	Serotonin, mood and cognition in anorexia nervosa	\$	20,700
Watson, Peter J	Lung volume initiation and intelligibility in persons with dysarthria	\$	16,468
Bellman, Greg J	The Relaxation Response as a Mild Stress	\$	29,367
Hayee, Imran	40Gb/s Transmission on Conventional Fiber Dispersion Maps	\$	24,069
Enemuoh, Emmanuel U	Acousto-Ultrasonic Characterization of Adhesive Bonded Joints	\$	25,171
Pedersen, William E	Non-destructive Material Characterization of Metal Matrix Composites	\$	23,027
Pappenfus, Ted M	Asymmetric Oligothiophenes for Electronic Device Applications	\$	17,136
Labuz, Joseph F	Teststar Ilm: Multi-Station Controller for Materials and Systems Testing	\$	30,000
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Minnesota Technology, Inc.
111 Third Avenue South
Minneapolis, MN 55401
612-373-2900

<http://www.minnesotatechnology.org>

