Margaret M. Darrow, Ph.D.

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Education

Doctor of Philosophy, Engineering: Arctic Engineering — May 2007
University of Alaska Fairbanks - Fairbanks, Alaska

Bachelor of Science Degree, Geological Engineering — December 2002
University of Alaska Fairbanks – Fairbanks, Alaska

Teachers for Alaska Certification Program, Math/Science — May 1997
University of Alaska Fairbanks – Fairbanks, Alaska

Master of Science Degree, Geology — December 1995
University of Alaska Fairbanks – Fairbanks, Alaska

Bachelor of Science Degree, Geology — August 1993
University of Washington – Seattle, Washington

Professional and Teaching Experience

Assistant Professor, Dept. of Mining and Geological Engineering — 1/2008 - present
University of Alaska Fairbanks

Geotechnical Engineering Assistant — 11/2005 – 1/2008
Graduate Intern — 3/2002 – 11/2005
Alaska Department of Transportation and Public Facilities, Fairbanks, Alaska

Teaching Assistant — 1/2002 – 5/2002
Student Assistant — 6/2001 – 8/2001
Department of Geological Engineering, UAF, Fairbanks, Alaska

Earth and Space Science Instructor — 6/2000 – 7/2000
Upward Bound Math/Science, Fairbanks, Alaska — 6/1998 – 7/1998
6/1997 – 7/1997
6/1996 – 7/1996
6/1995 – 7/1995

Secondary Teacher — 8/1997 – 5/1999
Minchumina Community School, Iditarod Area School District, Lake Minchumina, Alaska

Graduate Teaching Assistant — 8/1993 – 5/1995
Department of Geology and Geophysics, UAF, Fairbanks, Alaska

Professional Organizations, Honorary Membership, and Awards

- Tau Beta Pi (Advisor to the Alaska Alpha Chapter 2006-present)
- Phi Kappa Phi
- Association of Environmental and Engineering Geologists (Advisor to the Alaska Student Chapter 2008 – present)
- United States Universities Council on Geotechnical Education and Research
- American Society of Civil Engineers
- National Science Foundation Graduate Research Fellowship (2003-2006)
- Tau Beta Pi Fellow (2003-2004)

Courses Taught

ES209 Statics – An undergraduate-level course focusing on forces and force systems, principles of equilibrium as applied to various structures, friction, centroids, etc.

GE261 General Geology for Engineers – An undergraduate-level course providing an overview of minerals and rocks, major geologic processes, and geomorphic features, and the application of this knowledge to engineering

GE365 Geological Materials Engineering – An undergraduate-level course providing an overview on soil mechanics, groundwater hydrology, slope stability, foundations, and field exploration techniques with an emphasis on frozen ground

GE375 Principles of Engineering Geology and Terrain Analysis – An undergraduate-level course focusing on developing skills to identify geomorphic features, and their relationship to engineering site selection, evaluation, and design, and resource identification

GE376 GIS Applications in Geological and Environmental Engineering – An undergraduate-level course focusing on the application of GIS to geohazard recognition, resource identification, and strategic planning

GE381/382 Field Methods and Applied Design I & II – An undergraduate-level field course with a focus on training students in field mapping, geologic map development, application of field data to geological engineering problems, and report writing

GE430 Geomechanical Instrumentation – A 400-level course appropriate for juniors, seniors, and graduate students focusing on sensors and instrumentation systems used for geotechnical applications

GE480 Senior Design (team taught) – An undergraduate-level capstone course focusing on solving a real-life design problem with applied engineering, and presenting the solution to a client

GE692/MPR 688 Graduate Seminar – A graduate-level course focusing on teaching students effective communication through public speaking and writing abstracts, using topics in geological engineering, mineral engineering, and/or mineral preparation engineering

As a guest lecturer in GE101 and GEOG488

Research Interests

- Behavior of unfrozen water in frozen soils
- Frost heaving
- Soil physics
- Slope stability in frozen ground
- Thermal analysis of engineered structures over frozen ground

Graduate Students Advised

David Jensen, MS Geological Engineering. Thesis Topic: Design and Implementation of Embankment Monitoring Program over Ice-Rich Permafrost. Expected graduation date: 2013.

Kyle Obermiller, MS Geological Engineering. Thesis: Investigation of a Landslide in Discontinuous Permafrost near Chitina, Alaska. *GRADUATED: December 2011.*

Jason Zottola, MS Arctic Engineering. Thesis Topic: Effects of Groundwater Flow on the Thermal Considerations of Roadway Embankment Designs over Permafrost Using Thermal Modeling. Expected graduation date: 2013.

Funded Research, Academic Grants, and Travel Awards

Title: "REU Supplement – CAREER: Mobility of Unfrozen Water in Frozen Soil"
Funding Agency: National Science Foundation
Project Duration: 9/1/2012 – 5/15/2013
Award Amount: $6,000

Title: "CAREER: Mobility of Unfrozen Water in Frozen Soil"
Funding Agency: National Science Foundation
Project Duration: 9/1/2012 – 8/31/2017
Award Amount: $402,954

Title: Travel Award to attend 2011 Annual Meeting of AEG
Funding Agencies: UAF College of Engineering and Mines
Project Duration: Fall semester, 2011
Award Amount: $1,682

Funded Research, Academic Grants, and Travel Awards (continued)

Title: "Impact of Groundwater Flow on Permafrost Degradation and Transportation Infrastructure Stability"
Funding Agencies: Alaska University Transportation Center and Transport Canada
Project Duration: 4/1/2011 – 12/31/2012
Award Amount: $581,126

Title: Travel Award to attend "Geotechnical Instrumentation for Field Measurements" short course
Funding Agencies: UAF College of Engineering and Mines
Project Duration: Spring semester, 2011
Award Amount: $2,200

Title: "A Study of Unstable Soil Slopes in Permafrost Areas: Alaskan Case Studies Used as a Training Tool"
Funding Agency: Alaska University Transportation Center
Project Duration: 10/1/2010 – 12/31/2011 *(COMPLETED)*
Award Amount: $161,752

Title: Travel Award to attend NSF CAREER Proposal Writing Workshop
Funding Agencies: Institute of Northern Engineering, UAF
Project Duration: Spring semester, 2010
Award Amount: $2,000

Title: "Evaluation of In-place MEMS Inclinometer Strings in Cold Regions: Additional Funding Request"
Funding Agency: Alaska University Transportation Center and Alaska Department of Transportation and Public Facilities
Project Duration: 7/1/2009 – 12/31/2012
Award Amount: $100,000

Title: Travel Award to attend 2009 Annual Meeting of AEG
Funding Agencies: UAF College of Engineering and Mines
Project Duration: Fall semester, 2009
Award Amount: $2,200

Title: Travel Award to attend ASCE 14th Conference on Cold Regions Engineering
Funding Agencies: Institute of Northern Engineering, UAF
Project Duration: Fall semester, 2009
Award Amount: $2,000

Title: Travel Award to attend ASCE 14th Conference on Cold Regions Engineering
Funding Agencies: UAF Faculty Development
Project Duration: Fall semester, 2009
Award Amount: $750

Title: "UAF Support for Shishmaref Airport Master Plan, Stage II, Wind Study & Climate Data Collection"
Funding Agency: Geo-Watersheds Scientific
Project Duration: 7/1/2009 – 12/31/2011 *(COMPLETED)*
Award Amount: $18,740

Title: "Evaluation of In-place MEMS Inclinometer Strings in Cold Regions"
Funding Agency: Alaska University Transportation Center and Alaska Department of Transportation and Public Facilities
Project Duration: 7/1/2009 – 6/30/2012
Award Amount: $300,000

Title: "Unstable Slope Management Program Research – Phase I (Part II)"
Funding Agency: Alaska University Transportation Center and Alaska Department of Transportation and Public Facilities
Project Duration: 2/15/2009 – 8/15/2009 *(COMPLETED)*
Award Amount: $50,000

Title: "EPSCoR: Developing International Partnerships for the Investigation of Unfrozen Water in Frozen Soil"
Funding Agency: Alaska NSF EPSCoR
Project Duration: 1/5/2009 – 8/21/2009 *(COMPLETED)*
Award Amount: $20,000

Funded Research, Academic Grants, and Travel Awards (continued)

Title: Travel Award to attend GIS training course
Funding Agencies: UAF College of Engineering and Mines
Project Duration: Fall semester, 2008
Award Amount: $2,200

Title: "Measurement of Temperature and Soil Properties for Finite Element Model Verification"
Funding Agencies: Alaska University Transportation Center and Alaska Department of Transportation and Public Facilities
Project Duration: 7/1/2008 – 6/30/2010 *(COMPLETED)*
Award Amount: $100,000

Title: Travel Award to attend 2008 Annual Meeting of AEG
Funding Agencies: Institute of Northern Engineering, UAF
Project Duration: Fall semester, 2008
Award Amount: $2,000

Title: Travel Award to attend 2008 Annual Meeting of AEG
Funding Agencies: UAF Faculty Development
Project Duration: Fall semester, 2008
Award Amount: $750

Title: "Enhancing Geological Engineering Field Methods with Innovative Technology"
Funding Agency: UAF Technology Advisory Board
Project Duration: Fall semester, 2008
Award Amount: $11,130

Title: "gINT Software Implementation in Geological Engineering"
Funding Agency: UAF Technology Advisory Board
Project Duration: Spring semester, 2008
Award Amount: $1,588

Title: "Experimental Study on Bending Behavior of Natural Gas Pipeline at the Boundary of Permafrost and Non-permafrost – Planning a Field Experiment in West Siberia"
Funding Agency: Hokkaido University
Project Duration: 3/3/2008 – 3/31/2008 *(COMPLETED)*
Award Amount: $6,490

Publications

Refereed Journals

1. **Darrow, M. M.**, Huang, S. L., Shur, Y., Akagawa, S. (2008). "Improvements in frost heave laboratory testing of fine-grained soils." *Journal of Cold Regions Engineering*, 22(3), 65-78.
2. **Darrow, M. M.**, Huang, S. L., Akagawa, S. (2009). "Adsorbed cation effects on the frost susceptibility of natural soils." *Cold Regions Science and Technology*, 55, 263-277.
3. **Darrow, M. M.** (2011). "Thermal modeling of roadway embankments over permafrost." *Cold Regions Science and Technology*, 65, 474-487.
4. Daanen, R. P., Grosse, G., **Darrow, M. M.**, Hamilton, T. D., Jones, B. M. "Rapid movement of frozen debris-lobes: implications for permafrost degradation and slope instability in the south-central Brooks Range, Alaska." *Natural Hazards and Earth System Science*, 12, 1521-1537, doi:10.5194/nhess-12-1521-2012.
5. **Darrow, M. M.**, Bray, M. T., Huang, S. L. (2012). "Analysis of a deep-seated landslide in permafrost, Richardson Highway, South-Central, Alaska." *Environmental and Engineering Geoscience*, 18(1), (accepted, in press).
6. Obermiller, K. E., **Darrow, M. M.**, Huang, S. L., Chen, G. "Investigation of a soil slope failure near Chitina, Alaska." *Environmental and Engineering Geoscience*, (accepted, in press).

Conference Proceedings and Paper Presentations

1. **Darrow, M. M.**, and Akagawa, S. (2005). "Improvements in frost heave testing apparatus for fine-grained soil." *Proc., Alaska Rocks 2005: 40th U.S. Symposium on Rock Mechanics*, American Rock Mechanics Association, Anchorage, Alaska (CD-ROM).

Publications (continued)

Conference Proceedings and Paper Presentations (continued)

2. **Darrow, M. M.**, Huang, S. L., Akagawa, S., Iwahana, G. (2006). "Surface chemistry effects on the frost susceptibility of Hanover silt." *Proc., 1st International Workshop on Geotechnical Engineering in Permafrost Regions Related to Pipeline Construction, Fairbanks, Alaska, Oct. 1-4, 2006* (CD-ROM).

3. **Darrow, M. M.**, Huang, S. L., Akagawa, S., Iwahana, G. (2008). "Effect of adsorbed cations on unfrozen water in silty soil as determined using the NMR method." *Proc., Permafrost: Ninth International Conference, Fairbanks, Alaska, June 29 – July 3, 2008*, 327-331.

4. **Darrow, M. M.** (2008). "A river calls its bluff – monitoring a slide area in Interior Alaska." *AEG News, Program with Abstracts 2008 Annual Meeting, New Orleans, Louisiana, Sept. 15-20, 2008.*

5. **Darrow, M. M.** (2008). "Implementation of a geotechnical data management system in Alaska DOT&PF, Northern Region." *AEG News, Program with Abstracts 2008 Annual Meeting, New Orleans, Louisiana, Sept. 15-20, 2008.*

6. **Darrow, M. M.** (2009). "Active layer and frost bulb interaction for a full-scale, buried chilled gas pipeline." *ASCE 14th Conference on Cold Regions Engineering, Duluth, Minnesota, Aug. 30 – Sept. 2, 2009.*

7. **Darrow, M. M.** (2009). "Thermal modeling use in mitigating geotechnical issues in Alaska." *AEG News, Program with Abstracts 2009 Annual Meeting, Lake Tahoe, Nevada, Sept. 21-26, 2009.*

8. Xu, L. **Darrow, M. M.**, Paetzold, R. F. (2011). "Relocating the Shishmaref airport: thermal modeling of an Alaskan airport embankment over permafrost." *AEG News, Program with Abstracts 2011 Annual Meeting, Anchorage, Alaska, Sept. 19-24, 2011.*

9. Obermiller, K. E., **Darrow, M. M.**, Huang, S. L. (2011). "What a dump – investigating a slope failure near Chitina, Alaska." *AEG News, Program with Abstracts 2011 Annual Meeting, Anchorage, Alaska, Sept. 19-24, 2011.*

10. **Darrow, M.** "Evaluating automated MEMS-based in-place inclinometers in cold regions." *15th International Conference on Cold Regions Engineering, Québec, Canada, Aug. 19-22, 2012.*

11. Zottola, J., **Darrow, M.**, Daanen, R., Fortier, D., de Grandpré, I. "Investigating the effects of groundwater flow on the thermal stability of embankments over permafrost." *15th International Conference on Cold Regions Engineering, Québec, Canada, Aug. 19-22, 2012.*

Reports and Other Presentations

1. **Darrow, M.** (2003). *Parks Highway MP 276 Rex Railroad Overpass*, Federal Project No. REH-OA4-4(14) / State Project No. 60926: Northern Region, Alaska Department of Transportation and Public Facilities, 31 p.

2. **Darrow, M.** (2004). *Dayville Road Improvements*, Federal Project No. STP-0863(6) / State Project No. 60751: Northern Region, Alaska Department of Transportation and Public Facilities, 66 p.

3. **Darrow, M.** (2004). *Tok Cutoff MP 110-124 Reconstruction*, Federal Project No. IM-OA1-2(2) / State Project No. 60511: Northern Region, Alaska Department of Transportation and Public Facilities, 108 p.

4. **Darrow, M.** (2004). *University Avenue Rehabilitation and Widening*, Federal Project No. STP-RS-M-0617(3) / State Project No. 63213: Northern Region, Alaska Department of Transportation and Public Facilities, 41 p.

5. Bergstrom, T. and **Darrow, M.** (2005). *Parks Highway MP 194 Broad Pass Railroad Overcrossing*, Federal Project No. REH-OA4-3(16) / State Project No. 61277: Northern Region, Alaska Department of Transportation and Public Facilities, 40 p.

6. **Darrow, M.** (2005). *Richardson Highway MP 148-173*, Federal Project No. F-071-3(10) / State Project No. 63186: Northern Region, Alaska Department of Transportation and Public Facilities, 171 p.

7. **Darrow, M.** (2006). *Dalton Highway MP 274-289 Rehabilitation*, Federal Project No. STP-NH-TEA-065-5(5) / State Project No. 67018: Northern Region, Alaska Department of Transportation and Public Facilities, 213 p.

8. **Darrow, M.** (2006). *Glenn Highway MP 172-189 Rehabilitation*, Federal Project No. IM-TEA-OA1-4(6) / State Project No. 60922: Northern Region, Alaska Department of Transportation and Public Facilities, 76 p.

9. **Darrow, M.** (2006). *Taylor Highway MP 64-Canadian Border*, Federal Project No. STP-0785(11) / State Project No. 66446: Northern Region, Alaska Department of Transportation and Public Facilities, 192 p.

10. Schlichting, S., and **Darrow, M.** (2006). *Dalton Highway 9 Mile Hill North*, Federal Project No. NH-F-065-2(3) / State Project No. 64899: Northern Region, Alaska Department of Transportation and Public Facilities, 92 p.

Publications (continued)

Reports and Other Presentations (continued)

11. **Darrow, M.** (2007). *Dalton Highway Culverts MP 260-321*, Federal Project No. IM-065-6(4) / State Project No. 62622: Northern Region, Alaska Department of Transportation and Public Facilities, 106 p.

12. **Darrow, M.** (2007). *St. Mary's Crosswind Runway*, Federal Project No. AIP-3-02-162-XX / State Project No. 60563: Northern Region, Alaska Department of Transportation and Public Facilities, 77 p.

13. **Darrow, M. M.** (2008). *Glenn Highway MP 172-189 Rehabilitation*, Supplemental Material Site Report, Federal Project No. IM-TEA-OA1-4(6) / State Project No. 60922: Northern Region, Alaska Department of Transportation and Public Facilities, 27 p.

14. Huang, S. L., and **Darrow, M. M.** (2008). "Experimental Study on Bending Behavior of Natural Gas Pipeline at the Boundary of Permafrost and Non-permafrost – Planning of a Field Experiment in West Siberia, Final Report." In Akagawa, S., ed., *Current Problems of Natural Gas Pipelines in Permafrost Regions,* Hokkaido University.

15. **Darrow, M. M.** (2008). *Parks Highway MP 194 Broad Pass Railroad Overcrossing*, Supplemental Material Site Report, Federal Project No. REH-HHE-0A4-3(16) / State Project No. 61277: Northern Region, Alaska Department of Transportation and Public Facilities, 65 p.

16. **Darrow, M. M.** (2008). *Taylor Highway MP 64 to Canadian Border Rehabilitation*, Federal Project No. STP-0785(11) / State Project No. 66446: Northern Region, Alaska Department of Transportation and Public Facilities, 133 p.

17. Huang, S. L., **Darrow, M. M.**, and Calvin, P. (2009). *Unstable Slope Management Program: Background Research and Program Inception, Phase I Final Report*: USDOT Award DTRT06-G-0011, AUTC RR08.10; UAF Institute of Northern Engineering, 86 p.

18. **Darrow, M. M.** (2010). *Measurement of Temperature and Soil Properties for Finite Element Model Verification, Final Report*: USDOT Award DTRT06-G-0011, AUTC RR08.11; UAF Institute of Northern Engineering, 277 p.

19. **Darrow, M. M.**, and Xu, L. (2011). *UAF Support for Shishmaref Airport Master Plan, Stage II, Wind Study and Climate Data Collection Project: Shishmaref Thermal Modeling*: UAF Institute of Northern Engineering, 40 p.

20. **Darrow, M. M.**, Huang, S. L., Obermiller, K. (2011). *A Study of Unstable Slopes in Permafrost Areas: Alaskan Case Studies Used as a Training Tool*: UAF Institute of Northern Engineering, 13 p. (plus training presentation).