MARK D. ANDERSON P.E.

consulting engineer

Structural Engineering &
Seismic Hazard Mitigation

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SUMMARY

More than 20 years experience in Alaska in all aspects of structural engineering including analysis and design, specification and design criteria development, seismic hazard evaluation and mitigation, failure analysis, peer review, and quality control.

REGISTRATION:

CE.; Alaska, Washington.

EDUCATION:

9/96	Short course “Fracture and Fatigue Control” by Rolfe and Barsom, Univ. of Kansas.
5/85	Short course "Design of Welded Structures" at Lincoln Electric Co., Cleveland, OH.
4/81	Short course “Measurement Systems Engineering” by Peter K. Stein of Stein Engineering Services, Inc., Phoenix, Arizona.
8/80 to 11/81	University of Idaho - Moscow, Idaho Master of Science in Civil Engineering - December, 1983
8/75 to 5/80	Bachelor of Science in Civil Engineering - May, 1980

PROFESSIONAL ACTIVITIES:

- Member of the American Institute of Steel Construction (AISC)
- Member of the American Society of Civil Engineers (ASCE)
- Member of the American Welding Society (AWS)
- Member of the Earthquake Engineering Research Institute (EERI)
- Member of the International Conference of Building Officials (ICBO)
- Co-author (with D.J. Nyman and J.L. White) "Verification of Trans-Alaska Pipeline Operating Systems for Seismic Integrity", Sixth U.S. National Conference of Earthquake Engineering.
- Co-author (with C.P. Mortgat, D.J. Nyman, and J-P. Conoscente) "Seismic Design Verification of Cable Tray Systems", Sixth U.S. National Conference on Earthquake Engineering.
- Co-author (with D.C. Perry, H. Thurston) "Current and Proposed Revisions of Wind Load Standards and Codes in the United States", an invited paper presented at the Fourth U.S. National Conference on Wind Engineering Research.
- Past Chairman, Professional Engineers in Private Practice (PEPP) Anchorage Chapter of NSPE.
- 2-Term Board Member, Alaska Professional Design Council (APDC)
- Past President, Structural Engineers Association of Alaska (SEAA)
- Adjunct Instructor, University of Alaska, Anchorage - senior level design courses in timber and concrete.
- Associate Member, Building Seismic Safety Council (BSSC) TS 13 Committee (Non-Building Structures) Seismic Provisions for National Earthquake Hazard Reduction Program - NEHRP 97 Provisions (FEMA 302/303).

EMPLOYMENT RECORD:

1/98 to Present **Mark D. Anderson, *consulting engineer***
Mark D. Anderson, *consulting engineer* is a sole proprietorship licensed in Alaska, serving industrial, commercial, governmental, institutional, and utility clients. Mark D. Anderson PE, is the owner and principal structural engineer. Services provided include structural analysis, design and review, specification and design criteria development, structural failure analysis, as well as specialty services in seismic hazard evaluation/mitigation and piping system analysis.

7/89 to 12/97 **Alyeska Pipeline Service Co. (APSC)**
Engineering Coordinator/Seismic Coordinator. In addition to providing direct support for the design and review of a wide variety of projects, Mark was responsible for re-establishing the Trans-Alaska Pipeline System (TAPS) seismic program. This included a reassessment of TAPS stipulated seismic criteria, revision of the Earthquake Design Basis, and development of implementing procedures and technical specifications. He has also actively worked throughout the company and with the government to achieve and maintain regulatory compliance and design control in the structural and seismic areas.

11/86 to 7/89 **Kramer Chin & Mayo, Inc., Anchorage, AK**
Branch Manager and Senior Structural Engineer. Responsibilities in addition to design functions included marketing, contract negotiations, construction administration, and staff supervision.

2/86 to 11/86 **Anderson & Anderson Consulting Engineers, Anchorage, AK**
Owner and Principal Structural Engineer. Provided computer modeling, seismic design, and specialty support to other consulting offices, along with technical peer reviews and failure analysis for various clients.

9/85 to 2/86 **Tippets-Abbett-McCarthy-Stratton (TAMS), Anchorage, AK**
Senior Structural Engineer. Responsible for conceptual through final structural designs on two major projects at the Anchorage Airport.

7/84 to 9/85 **Porath/Berry Architects & Engineers, Anchorage, AK**
Senior Structural Engineer. In charge of design and preparation of plans, specifications, and construction surveillance for shopping center and other facilities. Developed two comprehensive computer programs for steel design.

11/81 to 7/84 **Skilling Ward Rogers Barkshire Inc., Anchorage, AK**
Project Engineer/Structural Design Engineer. Primary responsibilities were conceptual design, plan layout and organization, supervision of project design engineers, project review and budget control, and coordination with clients and contractor. Other duties included supervision and scheduling of the drafting staff, participation on the in-house education committee, and organization and development of the office technical files and library. Design experience was primarily focused on steel and timber design, and involved extensive computer modeling and analysis.

PROJECT EXPERIENCE

The following projects, GROUPED BY TYPE, illustrate Mark's experience as engineer-in-responsible-charge:

INDUSTRIAL

- Module 55 Vibration Study and Retrofit, Milne Point – Responsible for the evaluation of a vibration study completed by others, which addressed damaging vibrations associated with large gas compression equipment. Mark designed a foundation bracing system that was successfully implemented to reduce module vibrations to acceptable levels.
- Miscellaneous Small Projects, Milne Point & Lisburne Fields – under an ongoing term authorization, Mark has provided support on numerous small tasks addressing roof fall protection, mezzanine loading, vessel support modifications, specialized lifting devices, etc.
- Alyeska Corrosion and Reinsulation Projects - these projects included the Pump Station 3 bypass and mainline remode, design and construction surveillance of numerous basements beneath existing buildings to provide access for inspection and replacement of buried piping, and design of the remode of the 36 inch relief piping systems at Pump Stations 3, 5, and 6. Mark also served as the Lift Engineer for the releveling (while in service) of several thousand feet of mainline, pumpstation and Valdez Marine Terminal piping, utilizing real-time strain monitoring and authored a technical specification to guide this procedure. The work included evaluation of "blind-hole" drilling strain-gaging techniques to evaluate in-situ stress fields.
- Alyeska IMO Trailer Modifications - Alyeska's fleet of IMO trailer/tankers for transportation of Drag Reduction Agent (DRA) were experiencing fatigue damage to the forward frame area of the trailers. Mark provided support to the Welding Engineering Group, which resulted in a completely different philosophy of repair based upon structural principles. These repairs were successfully implemented throughout the fleet and no further problems reported.
- Bulk Chemical Storage Tanks and Skids, Prudhoe Bay, Alaska, for the Standard Alaska Production Company - Project structural engineer for the design of two projects: one with six 20,000 - gallon carbon - steel storage tanks, the other with six 10,000-gallon stainless-steel tanks, including pile-supported skids and extensive elevated catwalks.
- 24 Inch High-Pressure Off-Gas Line Analysis, Prudhoe Bay, Alaska, for the Standard Alaska Production Company - Project structural engineer for the computer modeling and stress analysis of 1,500 feet of pile supported stainless steel piping.
- Corrosion Monitoring Platforms, Prudhoe Bay, Alaska, for the Standard Alaska Production Company - Structural engineer for the design of 12 access platform structures.
- Lifting Device Analysis for Production Facilities, Prudhoe Bay, Alaska, for the Standard Alaska Production Company - Structural engineer for the analysis and load rating of 18 non-engineered lifting devices of up to 10-ton capacity.

BUILDINGS

- SERVS/VEOC, Valdez, Alaska – Structural engineer for the seismic evaluation of this facility housing a regional emergency-response center.
- DOT/PF Statewide Building Structural Evaluations – as a subconsultant with another firm, Mark completed assessment reports on 9 existing buildings and the Potter Weigh Scale, to assess collapse potential and structural integrity.
- Scout Readiness Centers, Chevak, Kake, Kasigluk, Kipnuk, Newtok, and Scammon Bay, Alaska – Structural engineer for the site-adaptation and design of six National Guard Readiness Centers.
- IBEW Training Center, Anchorage - Recently completed the structural design of this 2-story braced steel frame facility.

PROJECT EXPERIENCE (cont.)

- Nye Frontier Toyota Shop and Parts Warehouse, Anchorage - Structural engineer for the seismic strengthening of the existing shop and for a new shop expansion.
- National Guard Armory, Camp Denali, Fort Richardson, Alaska - Project manager for civil, mechanical, and structural design, and lead structural engineer for the two-story, 225,000 sq. ft. facility, and associated 15,000 sq. ft. Organizational Maintenance Shop. The Armory utilizes load-bearing masonry in the lower story and steel moment-framing in the upper level to resist gravity and lateral loads.
- Gastineau Salmon Hatchery, Juneau, Alaska, for Douglas Island Pink and Chum Inc. - Lead structural engineer for the steel frame building housing this $6.4 million project.
- Mt Edgecombe High School, Phase III Classroom and Library Building, Sitka, Alaska, Alaska DOT/PF - Lead structural engineer for this 24,000 sq. ft. wood frame brick veneered facility.
- Matanuska-Susitna Borough Animal Control Shelter, Palmer, Alaska - Project structural engineer, responsible for the structural design and construction surveillance of a fast-track (design/build) 7,500 sq. ft. wood-framed facility with a small barn.
- Dimond Center Expansion, Anchorage - Project structural engineer for this 350,000 sq. ft. fast track addition, with four stories of office space over two stories of retail mall area, and a full height atrium over a skating rink in the lower level.
- University Center Expansion, Anchorage - Project structural engineer for a 115,000 sq. ft. addition with two large vaulted skylights. This $7.1 million project was completed with contractor-initiated structural change orders of $10,000.
- Carr's Jewel Lake Expansion, Anchorage - Project structural engineer for this fast-track expansion that included 85,000 sq. ft. of steel-braced frame construction.
- Jane Mears Junior High School, Anchorage - Project structural engineer and responsible for introducing a unique method of lateral analysis used for design of this 150,000 sq. ft. multi-level structure to ensure compatible force distribution and displacements under seismic loading. Total construction cost for this project was $17 million, $2 million under budget with 0.2 percent structural change orders.
- Yakatat Hangar, U.S. Navy, Adak, Alaska - Structural engineer for evaluation of existing roof conditions and design of a standing seam replacement system.
- High School Addition, Upper Kalskag, Alaska, for the Lower Kuskokwim School District - Structural engineer for major addition including analysis and restoration for the existing facility foundations
- Loussac Public Library, Anchorage - Structural engineer for the circular Collections Building and the grand staircase, both of which withstood the scrutiny of a rigorous post-design review process.
- Anchorage Airport South Terminal Expansion, Anchorage - Project structural engineer for an 80,000 sq. ft. expansion with concrete ductile moment frames, cast-in-place shear walls and diaphragms, structural precast panels, steel-braced frames, and moment-resisting steel frames.
- Eagle Financial Center, Eagle River, Alaska - Project structural engineer for design of this two-story, 50,000 sq. ft. steel moment frame structure that included a four-on-twelve-pitch hipped roof and provision for ice glaciation of 300 psf on the entrance canopy. The project was executed on a negotiated design/build basis.
- Industrial Indemnity Office Building, Anchorage - Project structural engineer for this four-story, 45,000 sq. ft. facility with moment-resisting steel framing.
- Fire Lake Recreation Center, Chugiak, Alaska - Project structural engineer for this 50,000 sq. ft. steel framed facility to house the second Olympic-sized skating rink in Alaska. Contractor-initiated structural change orders on this $4.28 million facility totaled less than $6,000.

PROJECT EXPERIENCE (cont.)

BRIDGES, DOCKS, AND RELATED STRUCTURES

- POGO Mine Access Road, Delta Junction, Alaska – Mark provided designs for 6 river and stream crossings of the mine access road, up to 380 feet in length, for 100 ton off-highway equipment loads.
- TAPS Workpad and Access Road Bridges, TAPS Right-of-Way – Structural Engineer for the evaluation, repair, and load rating of 10 bridges in 1998, and evaluation of 18 bridges in 2002.
- Central Creek Bridge, Milne Point – This bridge was reportedly damaged by uncontrolled welding transverse to the bottom flange of the steel girders. Mark led a fast-track study that evaluated the fracture potential of the bridge, and concluded that 1.7 million pound drilling rigs could cross the bridge without repair.
- TAPS Crossing @ PLMP 704.2, Kenny Lake, Alaska –Provided a design for an 85 ton capacity "dry-land" bridge over the TAPS pipeline for an access road to a new agricultural development.
- Alyeska Valdez Marine Terminal Oil Spill Response Base - Mark prepared the seismic design criteria for the dock structure and provided structural review and revision of the design that greatly improved the expected earthquake performance of the original design for the dock.
- Anchorage Airport South Terminal Lobby and Pedestrian Tunnels, Anchorage, Alaska – Structural engineer for the design of 10,000 sq. ft. of below-grade, reinforced-concrete and post-tensioned flat slab construction, including AASHTO loading.

SEISMIC HAZARD MITIGATION

- Alyeska Pipeline Service Co., AT&T Alascom Backbone Communications System – Serving as the Alyeska technical representative, Mark just completed review and assessment of the Phase 1 Digital Upgrade and System-Wide Seismic Design Verification of the TAPS Backbone Communication System performed by AT&T Alascom.
- North Pole Metering Facilities, North Pole, Alaska – Structural engineer for the seismic design verification of the TAPS metering facility feeding the Fairbanks area refinery.
- Knik Arm Power Plant, Anchorage – Structural engineer for the Phase 1 structural code review, which served to provide a preliminary basis for scoping the extent of seismic deficiencies and repairs.
- Alyeska Pipeline Service Co., Earthquake Monitoring System – Mark completed a revised post-earthquake inspection database for the entire pipeline and terminal system to guide post-earthquake inspection efforts on TAPS.
- Alaska Fiber Star, LLC, Anchorage – Completed a seismic assessment of the existing central office facilities to identify the existing vulnerabilities, and prepared designs for seismic retrofits.
- Caldon Inc., Pittsburgh, PA – Prepared seismic qualification reports for electronics equipment to be installed in TVA and Consolidated Edison Co. nuclear power plants.
- Pipeline Systems Incorporated, Anchorage – Provided a seismic evaluation of existing central office equipment to assess compliance of the installation with the project seismic design criteria.
- Alyeska Seismic Design Verification – As Alyeska's technical representative, Mark managed a program to evaluate the seismic integrity of all existing operating systems comprising the Trans-Alaska Pipeline System (TAPS). Mark oversaw the $ 1.5 million engineering effort, which included design review and approval of all seismic retrofits.
- Alyeska Cable Tray Seismic Integrity Evaluation and Upgrade - Provided oversight and accountability as Alyeska's technical representative for all phases of this $8 million project, undertaken to resolve questions raised by auditors in 1993, concerning the seismic integrity of existing cable tray systems throughout TAPS.

PROJECT EXPERIENCE (cont.)

DESIGN REVIEW/PEER REVIEW

- Alascom Headquarters Building, Anchorage - Lead structural reviewer, provided input for the review of this 90,000 sq. ft. combined braced and moment frame steel structure that led to a redesign incorporating a structural curtain wall system to adequately resist seismic loading.
- School Building Code Compliance Review, Nikiski, Soldotna, Kenai and Hope, Alaska - Provided structural reviews for the construction manager for four school projects, representing $53 million in construction costs.
- Terminal No. 1 rehabilitation, Port of Anchorage – Provided project review for addition and renovation project, including 16,000 sq. ft. of new office space and an observation walkway atop the existing transit roof shed.

CONSTRUCTION SUPPORT

- Anchorage Airport South Terminal Railroad Station, Anchorage – structural engineer retained by the General Contractor for resolution of field structural retrofits.
- Begich, Boggs Visitor Center, Portage Glacier, Alaska, - Mark was special consultant to the General Contractor for wind load analysis and bracing of this precast concrete facility which experienced winds in excess of 130 mph during construction.
- Orion Elementary, Anchorage, Alaska – Provided shoring design to the Contractor for extensive structural modifications.
- Lifting Beams and Devices – Mark has designed numerous lifting beams, up to 60 feet in length, and specialized rigging and handling components for handling large valves, pipeline stoppling equipment, building erection, etc.

OTHER

- Boston Street Retaining Wall, Anchorage – Mark prepared the structural design of a replacement 700 foot long wall utilizing driven steel pile and lightweight steel lagging.
- Various Insurers and Owners – Mark has completed numerous collapse and failure investigations, including the collapse of the RV storage building in Whittier (originally the US Army Gymnasium).
- Spill Prevention Control and Countermeasure Plan for Power Plant, University of Alaska, Fairbanks, Alaska - responsible for site survey, preparation of the SPCC plan, and design of necessary site improvements for compliance with EPA regulations.
- TVRO Dish Antenna Support system, Prudhoe Bay, Alaska, for the Standard Alaska Production Company - Structural engineer for the design of a support structure for a 7-meter dish atop a lightly framed existing two-story module, which has since withstood 100 mph winds.
- 500-kV Transmission Tower Failure, Idaho Falls, Idaho - Special consultant to Idaho Power for the structural investigation of a partial collapse of a tower that occurred during cable-stringing operations.