Current requirements for tailings dam engineers in Alaska

Charles F. Cobb, P. E.
State Dam Safety Engineer
Alaska Department of Natural Resources

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Presentation Outline

Current requirements for dam safety engineers in Alaska

Under the Alaska Dam Safety Program

- Alaska dam safety guidelines
- Alaska dam safety statutes and regulations
  - AS 46.17 and 11 AAC 93

Under the Board of Registration for Architects, Engineers, and Land Surveyors

- Alaska Board of Registration guidelines
- Alaska Board of Registration statutes and regulations
  - AS 08.48 and 12 AAC 36

Opinions and recommendations

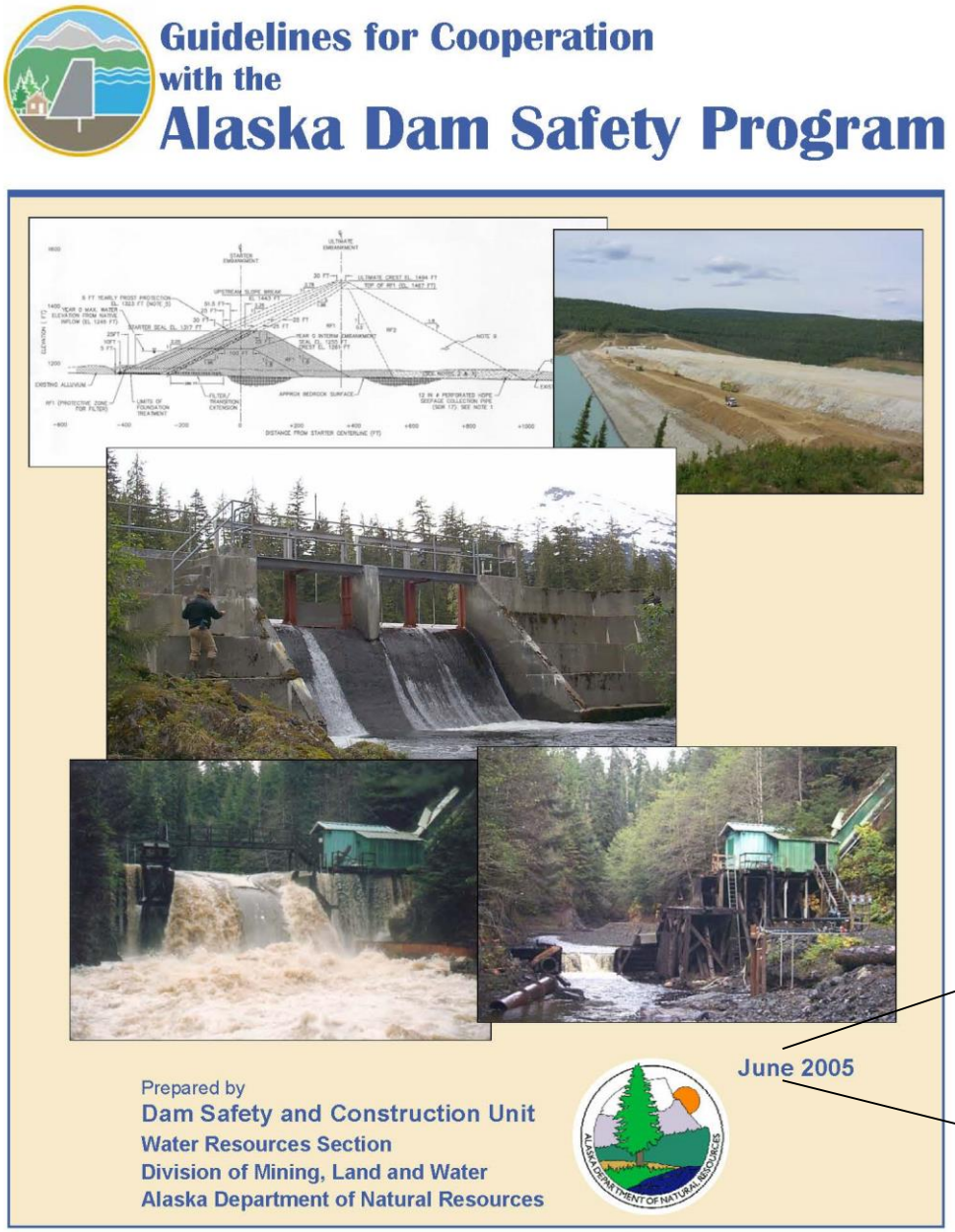
GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

http://dnr.alaska.gov/mlw/water/dams

Available online at:

- **http://dnr.alaska.gov/mlw/water/dams/**



Update in progress

Available online at:

- http://dnr.alaska.gov/mlw/water/dams/

Guidelines for Cooperation with the Alaska Dam Safety Program

Chapter 1

WELCOME TO THE ALASKA DAM SAFETY PROGRAM

Guidelines for Cooperation with the Alaska Dam Safety Program (excerpts)

- "Within these guidelines, references to the "engineer" are widespread and context dependent. A variety of engineers are referred to and described; examples are "engineer of record" and "construction inspection engineer." For purposes of these guidelines, references to the engineer assume a qualified engineer as defined by the regulations, within the context of the discussion. Generally speaking, the engineer is responsible for the following:

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Guidelines for Cooperation with the Alaska Dam Safety Program (excerpts)

- Maintaining a curriculum vitae that demonstrates relevant experience to meet the qualifications described in 11 AAC 93.193
- Understanding the regulatory setting of a project, the intent of the regulations, and the work necessary to accomplish the desired outcome, without taking shortcuts that circumvent the regulations and compound the risks
- Becoming an "engineer of record" by placing a signature and seal on reports, drawings, specifications, and other engineering work products. ["Sealed" is defined in 11 AAC 93.201(12) to mean "prepared by an engineer or a person under that engineer's direct supervision, and bearing the signature and seal of that engineer as required by AS 08.48.221 and 12 AAC 36.185."]
- Recognizing personal limitations and assembling a team of engineers as required to address all of the broad range of engineering disciplines typically associated with a dam, including additional engineers of record to certify details associated with other disciplines such as electrical or structural components
- Locating and designing dams with safety as the primary goal by using technically sound and complete engineering methodology that represents the level of care exercised by professional engineers across the nation…[five more bullets in list]

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska dam safety statutes (excerpts)

AS 46.17.020 Administration and Staffing

The department shall supervise the safety of dams and reservoirs. The department shall employ a licensed and qualified engineer, experienced in the design and construction of dams and reservoirs…for performing duties under this section...

AS 46.17.050 Inspections

At least once every five years, the department shall inspect every dam and reservoir… The department may require the owner of a dam or reservoir to conduct the inspection…using a qualified engineer approved by the department…

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska dam safety regulations (excerpts)

11 AAC 93.193 Qualified Engineers [3 distinctions]

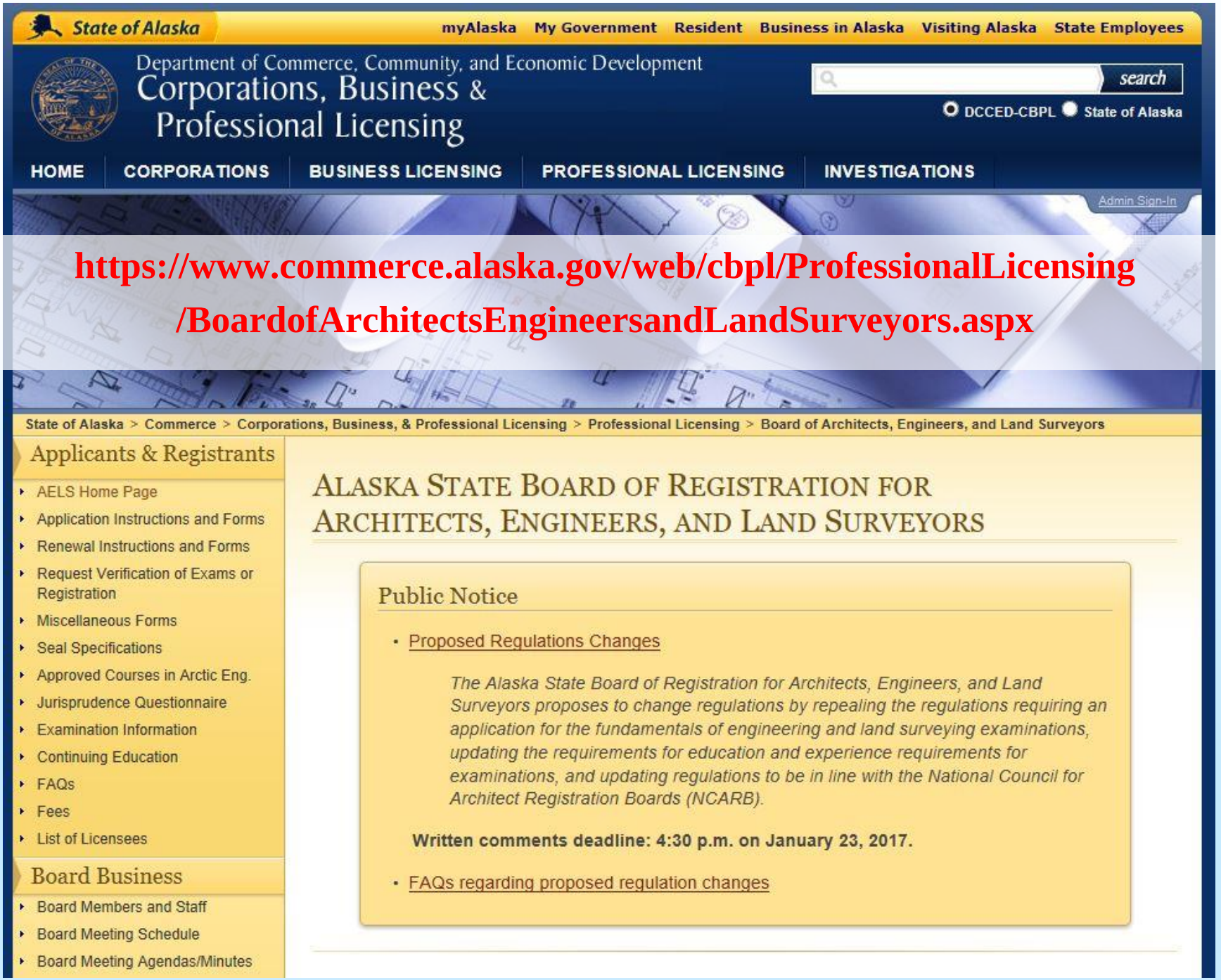
a) To conduct hazard potential classifications or seal design and construction documents:
   i. 5 years as a licensed civil engineer in the U.S. and registered to practice in Alaska
   ii. Significant work experience with dams

b) To be approved for periodic safety inspections conducted in accordance with 11 AAC 93.159
   i. 5 years as a licensed civil engineer in the U.S. and registered to practice in Alaska
   ii. Sufficient experience to determine safety of dam being inspected

c) To observe and inspect dam construction
   i. Same as first, but not necessarily the same person

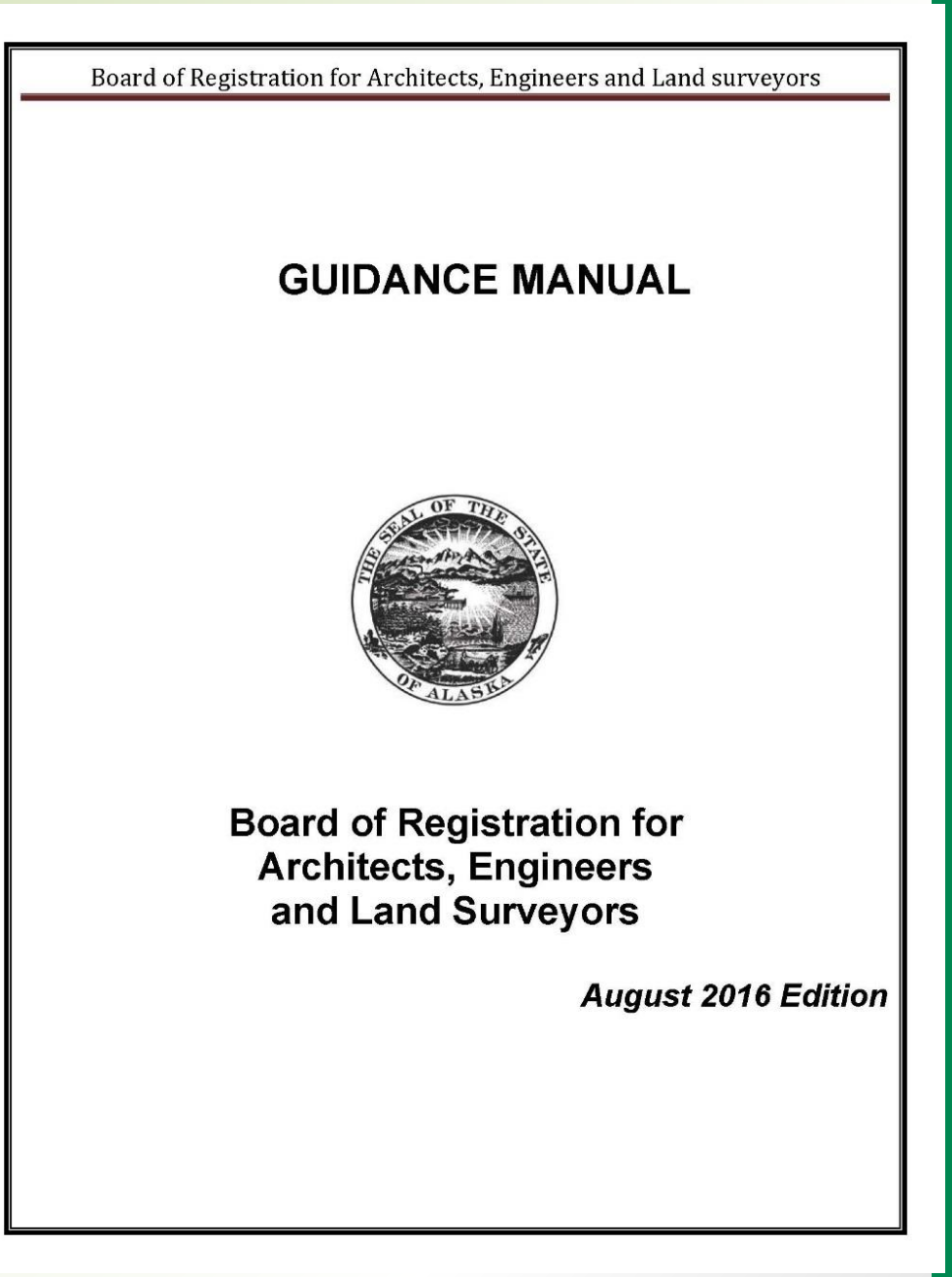
GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program


State of Alaska
myAlaska
My Government
Resident
Business in Alaska
Visiting Alaska
State Employees
Department of Commerce, Community, and Economic Development
Corporations, Business & Professional Licensing
search
DCCED-CBPL
State of Alaska
HOME
CORPORATIONS
BUSINESS LICENSING
PROFESSIONAL LICENSING
INVESTIGATIONS
Admin Sign-In
https://www.commerce.alaska.gov/web/cbpl/ProfessionalLicensing/BoardofArchitectsEngineersandLandSurveyors.aspx
State of Alaska > Commerce > Corporations, Business, & Professional Licensing > Professional Licensing > Board of Architects, Engineers, and Land Surveyors
Applicants & Registrants
AELS Home Page
Application Instructions and Forms
Renewal Instructions and Forms
Request Verification of Exams or Registration
Miscellaneous Forms
Seal Specifications
Approved Courses in Arctic Eng.
Jurisprudence Questionnaire
Examination Information
Continuing Education
FAQs
Fees
List of Licensees
Board Business
Board Members and Staff
Board Meeting Schedule
Board Meeting Agendas/Minutes
ALASKA STATE BOARD OF REGISTRATION FOR ARCHITECTS, ENGINEERS, AND LAND SURVEYORS
Public Notice
Proposed Regulations Changes
The Alaska State Board of Registration for Architects, Engineers, and Land Surveyors proposes to change regulations by repealing the regulations requiring an application for the fundamentals of engineering and land surveying examinations, updating the requirements for education and experience requirements for examinations, and updating regulations to be in line with the National Council for Architect Registration Boards (NCARB).
Written comments deadline: 4:30 p.m. on January 23, 2017.
FAQs regarding proposed regulation changes

Available online at:

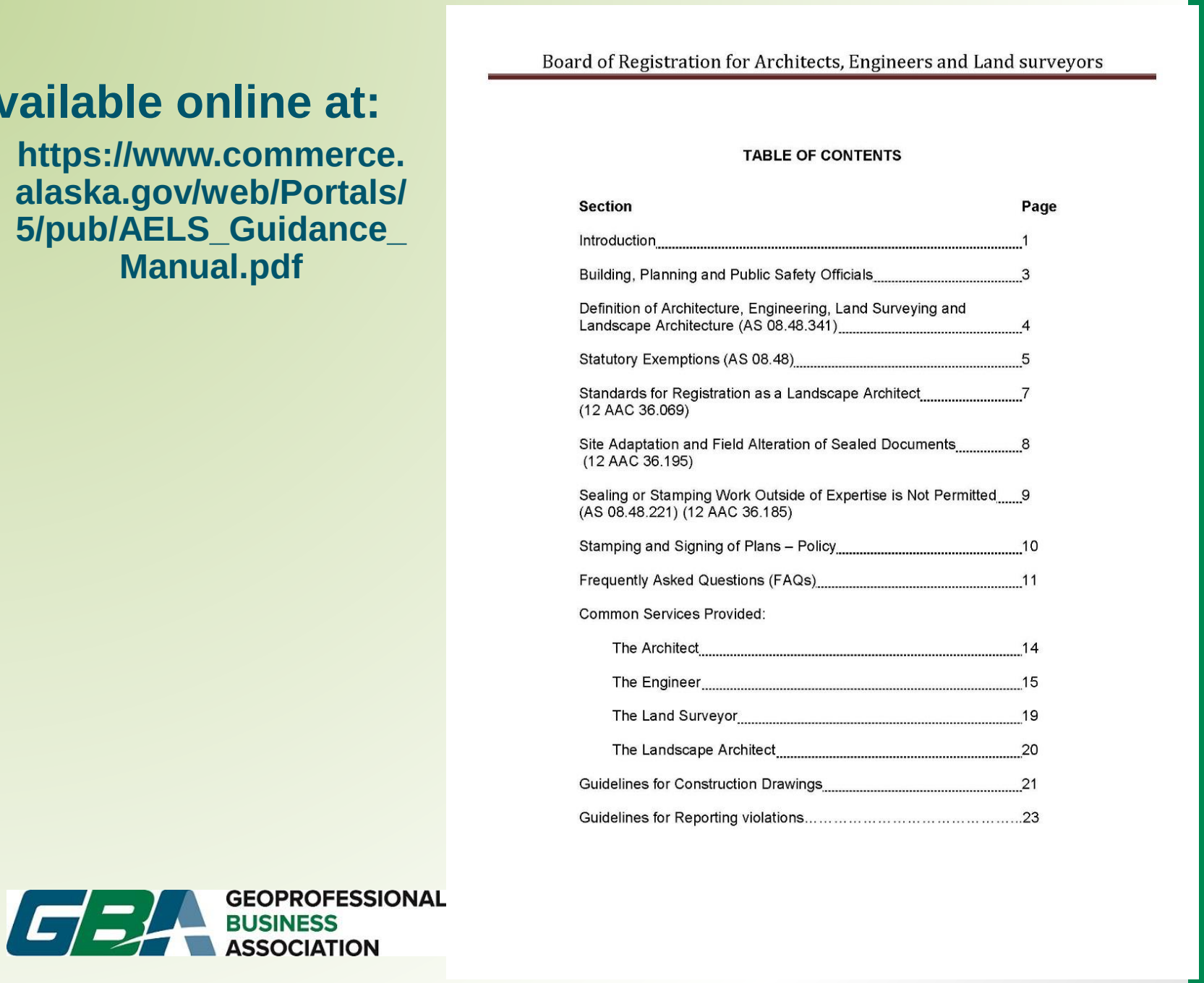
- **https://www.commerce.alaska.gov/web/Portals/5/pub/AELS_Guidance_Manual.pdf**



GEOPROFESSIONAL BUSINESS ASSOCIATION

Available online at:

- **https://www.commerce.alaska.gov/web/Portals/5/pub/AELS_Guidance_Manual.pdf**



Board of Registration for Architects, Engineers and Land surveyors

TABLE OF CONTENTS

GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

The engineer must be registered in one or more of the following branches, but crossover is allowed per Article 2 of 12 AAC 36 Code of Conduct (ethics):

AG – Agricultural
CE – Civil
EE – Electrical
FP – Fire Protection
ME – Mechanical
EC – Chemical
CS – Control Systems
EV – Environmental
IN – Industrial
MM – Metallurgical and Materials
EM – Mining and Mineral Processing
NM – Naval Architecture and Marine
NU – Nuclear
SE – Structural
EP – Petroleum

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

AS 08.48.341 Definitions

(3) “engineer” means a professional engineer…

(16) “professional engineer” means a person who has been legally registered as a professional engineer by the board

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

"civil engineering" means the branch of professional engineering that embraces studies and activities relating to research, design, and construction of fixed works for irrigation, drainage, waterpower, water supply and treatment, flood control, inland waterways, harbors, municipal improvements, railroads, highways, tunnels, airports and airways, sewerage, refuse disposal, foundations, structures, and bridges, and the organizational and economic aspects of these studies and activities;

"mining and mineral processing engineering" means the branch of professional engineering that embraces studies and activities relating to the exploration, location, and recovery of mineral commodities, and the research, design, construction, and development of structures, devices, and facilities of production, and the organizational and economic aspects related to these studies and activities;

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

AS 08.48.341 (12) “practice of engineering” means professional service or creative work, the adequate performance of which requires the specialized knowledge of applied mathematics and sciences, dealing with the design of structures, machines, equipment, utilities systems, materials, processes, works, or projects, public or private; the teaching of advanced engineering courses in institutions of higher learning; the direction of or the performance of engineering surveys, consultation, investigation, evaluation, planning, and professional observation of construction of public and private structures, works, or projects and engineering review of drawings and specifications by regulatory agencies; “practice of engineering” may by regulation of the board include architectural building design of minor importance, but it does not include comprehensive architectural services;

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

- AS 08.48.171 through 265 Registration and Practice
  - Registered professional engineer
    - Seals and certifies documents developed under “direct supervision”
  - Certificate of authorization for corporate, limited liability company or limited liability partnership practice
    - Must designate Alaska registered engineer responsible for field of practice

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors (excerpts)

- 12 AAC 36.135 Review of application for corporate, LLC, or LLP authorization
  - Requires resolution from board of directors designating sector lead registered engineer
  - Resolution must provide that engineer with full authority “to make all final practice decisions on behalf of the corporation, LLC, LLP”…

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

- 12 AAC 185 Use of Seals

  (a) A registrant may

  (1) Not sign or seal a drawing or document dealing with professional services in which the registrant is not qualified to sign or seal by virtue of education, experience and registration…

  (7) Not sign or seal drawings, documents, or other professional work for which the registrant does not have direct professional knowledge or direct supervisory control …

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

- 12 AAC 185 Use of Seals

  (b) If portions of drawings, documents, or other professional work are prepared by other registered professionals, a registrant may seal only that portion of the work for which the registrant has direct professional knowledge and direct supervisory control

GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Alaska Board of Registration for Architects, Engineers and Land Surveyors
(excerpts)

- 12 AAC 185 Use of Seals

  (c) Each office maintained for the preparation of drawings, specifications, reports, or other professional work that will require a professional seal must have a registrant assigned to and regularly employed in that office who has direct knowledge and supervisory control of that work

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Opinions and recommendations

- National and international initiatives on engineers of records may encounter resistance with state or provincial jurisdictions because of existing statutes and regulations
- Resistance should not discourage dialogue on subject at state, national and international levels and efforts to improve consistency and regulations across regulatory jurisdictions
- Alaska dam safety regulations were carefully crafted to avoid conflicts with state license requirements for professional engineers
- Alaska Dam Safety Program currently advocates team approach to dam safety including mine tailings dams
  - Presentation on technical team approach to tailings dam design, construction, and operation at Alaska Miners Association annual conference in 2011.

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Opinions and recommendations

- Alaska Miners Association 2011 annual conference

First presented at the
Alaska Miners Association
Annual Conference
November, 2011

How to drive a dam safely and win the race

By Charles F. Cobb, P. E.
Alaska Department of Natural Resources
Dam Safety and Construction Unit

A dam is like a car or truck: It is as safe as the one who drives it. However, if the tires are cheap or the brake lines faulty, even the safest driver is in danger from using the vehicle. Similarly diverse in form and function, a dam is an indispensible tool that provides significant direct benefits, from individuals to society at large, whether it creates a stock pond down on the ranch, or controls floods or produces hydroelectricity. Dams also provide indirect benefits to society as an essential element of mining, when water and tailings storage are critical to the development and operation of the mine. While most mines are in remote locations, where an accident with the dam may not actually kill somebody, the failure or mis-operation of a dam can have major impacts, and fatally injure a mining project. While rare in occurrence, safeguarding against such an event requires careful planning and performance. To avoid a fatal flaw, an interdisciplinary team of highly qualified experts is required to carefully select the appropriate location, and provide for the skilled design, construction, operation and closure of the dam.

A certain wise man once said, "Plans fail for lack of counsel, but with many advisors they succeed." This proverb is especially true for dams, as a "technical team" approach is required to competently develop the many investigations, evaluations, reports and plans that must come together to assure that the car stays on the road. The horsepower of the technical team comes from qualified professional engineers, engineering geologists, hydrologists, seismologists, tailings specialists, risk managers and other experts, depending on the unique aspects of the project. Figure 1 shows suspected causes of dam failures in the United States and Alaska that the technical team must guard against[1]. Figure 2 shows an international perspective on the threats to tailings dams[2]. Neglect these hazards at your peril!

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program

Un-named Alaska Placer Mine had at least two prior piping failures

Construction of blanket drain <u>designed by qualified engineer</u>

Un-named Alaska Dam

Construction complete April 25, 1992
Failed May 25, 1992 due to piping
No fatalities

Stewardship of Tailings Facilities

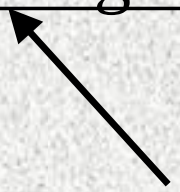
Martin and Davies, et.al. (2002)

- "There have been no unexplained tailings dams failures…every failure has been predictable…
- "There are no unknown loading causes, no mysterious soil mechanics…"
- "Tailings dam failures often occur where one or more aspects of design and construction/operation are deficient"

Tailings Dam Failures: The Human Factor

Al Gipson (2003)

- "[Problems seen] are all areas where we have the technical information to avoid or the management tools to fix. None are rocket science or lessons we have not learned in the past."
- "Utilizing knowledgeable experienced professionals for policy setting, planning, design, construction and operation of tailing facilities with appropriate internal peer reviews and regulatory oversight by trained and experienced professionals with appropriate levels of funding can lead to the goal of zero failures."



Applies to everyone in list

When things go right

What the technical team can do…

High tech horsepower…Yeah, Baby!

The results of thinking ahead

Protecting the Operator (Operations)

Protecting the Public (Environment)

The safety wall

Again, more than meets the eye

Thank you for listening!

Charles F. Cobb, P. E.
Alaska Department of Natural Resources

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Alaska Dam Safety Program